AN ABSTRACT OF THE THESIS OF

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Title: Geomorphic Processes and Past Climatic Variations Inferred from a Tree-ring Series, Trinchera Peak Area, Colorado

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A set of 21 tree-ring cores was taken from 11 Colorado blue spruce (*Picea pungens*) and two Douglas fir (*Pseudotsuga menziesii*) in the vicinity of Trinchera Peak, Colorado. Annual and long-term variations in ring-width patterns show relationships to climatic variables. Cores taken from older trees near timberline were used as proxies for the local temperature record. Low summer temperatures control the growth of trees near timberline. Cores from near timberline document the effects of the Little Ice Age and the continuing warming of the Northern Hemisphere as the Earth recovers from the cold of the Little Ice Age. The effects of the Little Ice Age in this area became quite distinct about 1670. Warming began in the late 19th century. The eruption of Mount Tambora in mid-1815 depressed temperatures around the world. The year after the eruption (1816) was notably cold, and appears as a distinct event in several cores from near timberline.

Cores taken from trees in the lower forest were used as proxies for local precipitation, and reveal a dry period between 1912 and 1930, and another dry period from 1950 through 1960.

The second part of the study consisted of field observations of glacial erosion and deposition, and geomorphic processes present in the area. Climate controls geomorphic processes operating at this study area. Glaciers created much of the present landscape before the establishment of the forest. Quaternary deposits of the Trinchera Peak area include till, rock-glacier debris, and mass-movement deposits. Fluvial erosion, periglacial morphogenesis, and mass wasting are the dominant geomorphic processes operating today. Aerial photography was used to document the current landscape and the geomorphic processes that operate in the mountains.

Geomorphic Processes and Past Climatic Variations Inferred from a Tree-ring Series, Trinchera Peak Area, Colorado

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by

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Chapter 1

Introduction

The Earth's environment constantly changes — fluctuating weather and seasons are two good examples. Trees record environmental changes in their growth rings, producing varying width, density, and chemical compositions in the wood as they respond to environmental conditions. Tree rings are important tools in reconstructing regional patterns of drought and climatic change. In addition, tree rings document evidence of floods, landslides, hurricanes, erosion, fire, insect attacks, lightning strikes, and earthquakes.

This work is a reconnaissance study undertaken with little previous work at the study site. There is no suitable climate data available. The purpose of my study is twofold: first, to investigate past climatic change based on dendrochronology in the Trinchera Peak area and secondly, to examine the geomorphology of the study site. Sites were chosen that provided tree-ring series sensitive to the climatic variable being examined. Trees responsive to drought conditions are generally found on well-drained hillsides, crest of small moraine ridges, and rocky outcrops where rainfall is the limiting growth factor. Trees responsive to temperature are usually found near timberline where the length of the growing season is the limiting growth factor (Fritts, 1976). Chronologies were developed that provide a multi-century record of climate variability.

Previous investigations in the study area include the early reports by Siebenthal (1907) and Ray (1940) that briefly discuss the glacial phenomena in the Culebra Range. Ray's work is primarily field observations, and provides some of the early photographs of the area (Figure 1). Geologic mapping was done by Wallace and Lindsey (1996).

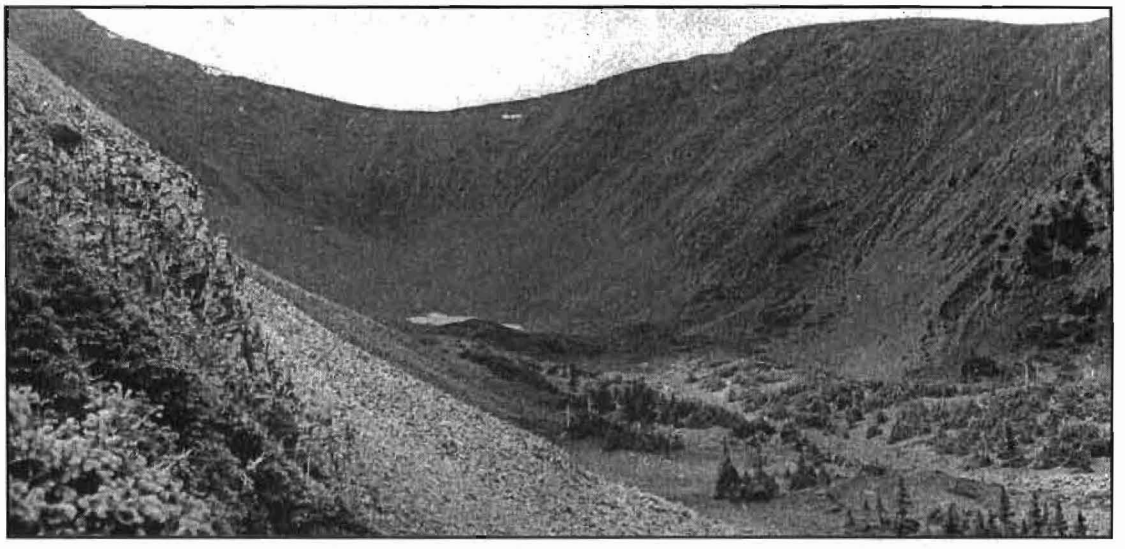


Figure 1. A view of the third cirque north of Trinchera Peak on its eastern slope. A talus, formed by sliderock or scree, follows the axis of the cirque along the northern valley wall. A very small talus ridge lies along the southern valley wall. The sliderock fell from the steep slopes after the glacier disappeared (Ray, 1940). Due to frost shattering and gravity, this process continues today. The mass movement depicted here has both erosional and depositional effects. This photo was taken the summer of 1938 by L. Ray. Photo used by permission (Geological Society of America).

The systematic study of tree rings, or dendrochronology, began with the work of Andrew Ellicott Douglass (1867-1959) in the early 1900s. Douglass, an astronomer, studied annual growth rings in pine trees trying to find a connection between sunspot activity and drought. Because tree rings establish absolute ages and record past climate conditions, dendrochronology is now used in a variety of research applications.

Tree Growth

As trees grow, they increase in height (apical growth) and in breadth (radial growth). New tissue is formed between the existing xylem (wood) and the bark, which increases the width of the xylem and adds an annual growth layer or ring. Growth rings consist of two parts: a wider, lighter colored band termed earlywood formed during the spring and summer and a thinner, dark-colored band termed latewood formed at the end of a growth season during the fall. The wood between these two boundaries, formed during one growth season, is an annual increment of growth or tree ring (Stokes and Smiley, 1968).

Tree rings form from the center of the tree outward — the ring closest to the bark is the youngest or the last growth ring. The ring nearest to the center of the tree is the oldest growth ring. The width of each year's ring reflects the growing conditions, such as moisture, temperature, and other environmental conditions. A wider ring indicates good growing conditions, while a narrower ring indicates poor growing conditions (Stokes and Smiley, 1968).

Chapter 2

The Study Area

The study area is about 12 kilometers (7.5 miles) southwest of the town of Cuchara, in Huerfano County, Colorado on the east slope of the Culebra Range (part of the Sangre de Cristo Mountains). Denver is 290 air kilometers (180 miles) north of the area (Figure 2).

The Sangre de Cristo range, elevated by Cenozoic tectonism, extends from central New Mexico to central Colorado (McAlpin, 1983). The Culebra mountain range formed during the Laramide orogeny in the late Cretaceous and early Tertiary, when the crust underwent strong compression. The tectonic regime subsequently changed to tension during the middle Tertiary, when the Rio Grande rift system opened up between the Colorado Plateau on the west and the interior craton on the east (Penn and Lindsey 1996). It was during this episode of stretching that intrusions took place at Spanish Peaks and several other igneous sites in the region (Aber, pers. comm.). The whole region experienced great vertical uplift and erosion during the late Tertiary and Quaternary (Penn and Lindsey 1996).

The study area, in the San Isabel National Forest, is accessible by U.S. Forest Service access road 413 west from Colorado highway 12. U. S. Forest Service access road 436 extends to an abandoned mine just below Trinchera Peak, and provides access to study site two and the alpine tundra. Several old logging and mining roads and a few trails cross the region that allows easy access to most of the area.

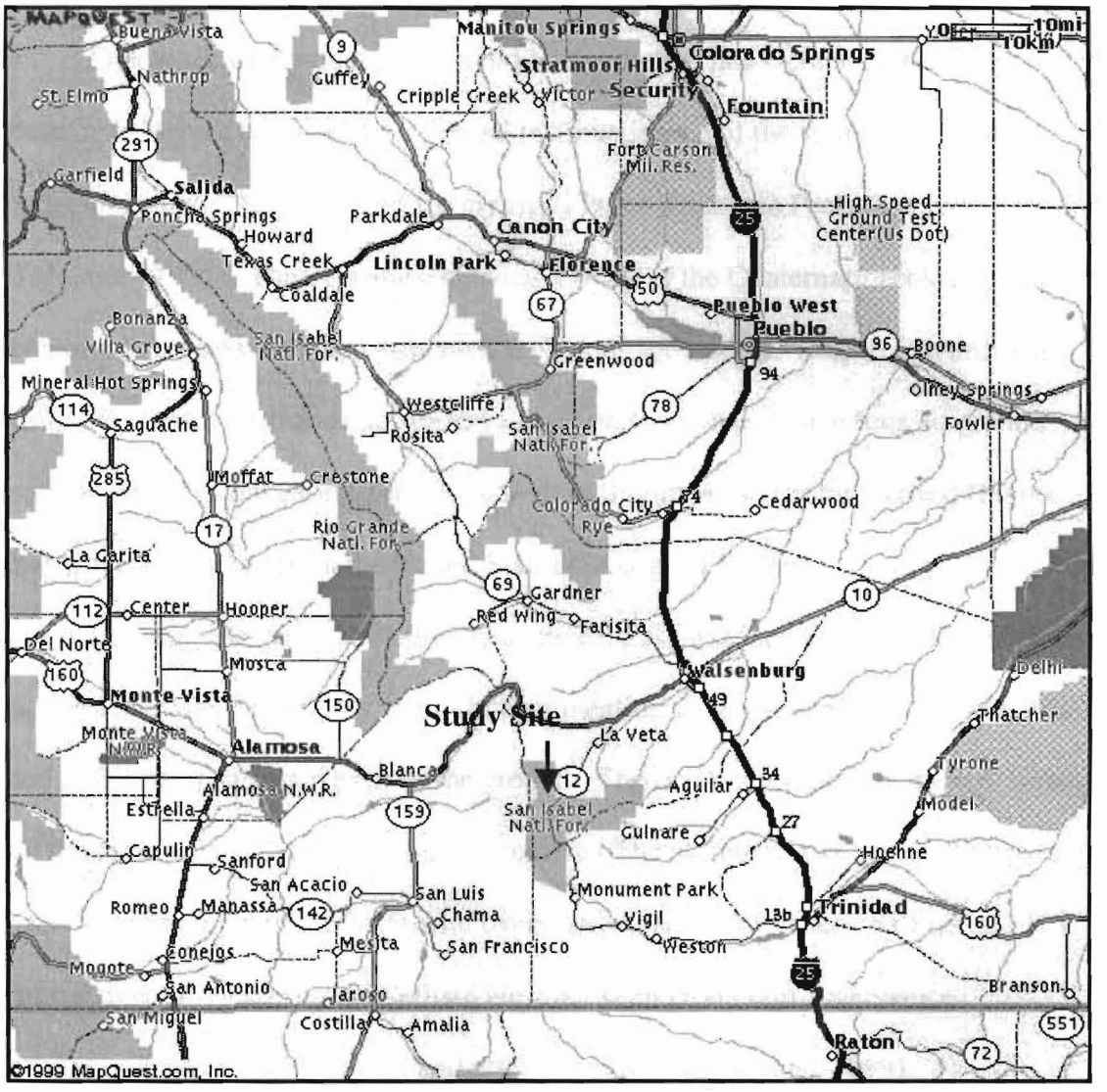


Figure 2. The study site is shown south and west of La Veta, Colorado. Map used by permission (Mapquest).

Chapter 3

Methods

Field Methods

Fieldwork was conducted from mid-June though late October, 1999. The first phase of fieldwork consisted of a general reconnaissance of the study area. The topographic map (Figure 3) used for my study is the Trinchera Peak, Colorado 7.5 minute quadrangle (1994). The next stage entailed a study of the Quaternary geology and geomorphic processes in the Cucharas Creek drainage system. Remote sensing was utilized to review landforms, to see large scale patterns, and to save time on ground reconnaissance. Conventional black-and-white (Figure 4) and color infrared (Figure 5) images were obtained from the United States Geological Survey.

Low altitude aerial photography using cameras attached to kites (kite aerial photography) was particularly useful in documenting the landscape. A large kite was used for lifting a camera rig above the ground. The radio-controlled rig rotated, tilted, and triggered a 35-mm point-and-shoot camera. The oblique views acquired from kite aerial photography provided a general overview of the various sites. Kite aerial photography provided an intermediate view between ground reconnaissance, conventional aerial photography, and satellite images (Aber et al., 1999).

Sites were selected where moisture or temperature regimes stress trees during their growing season. These growing conditions cause the trees to produce narrow and wide rings that vary from year to year. This type of growth pattern is called a sensitive ring series. At sites where conditions are satisfactory, tree rings are generally wide with

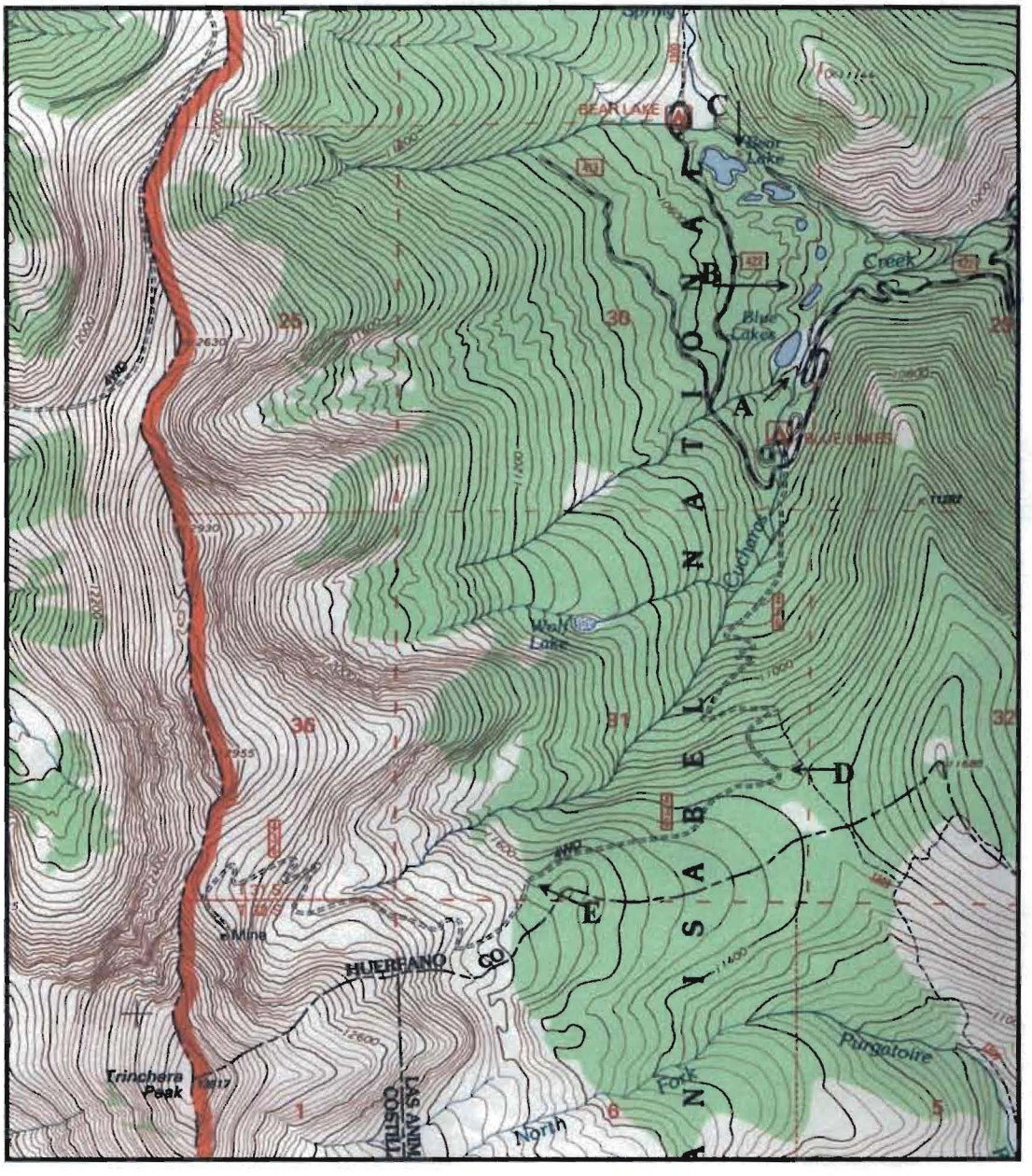


Figure 3. Study site. Trinchera Peak Quadrangle 7.5-minute series 1994.

North is toward the top. Core collection sites A through E are shown.

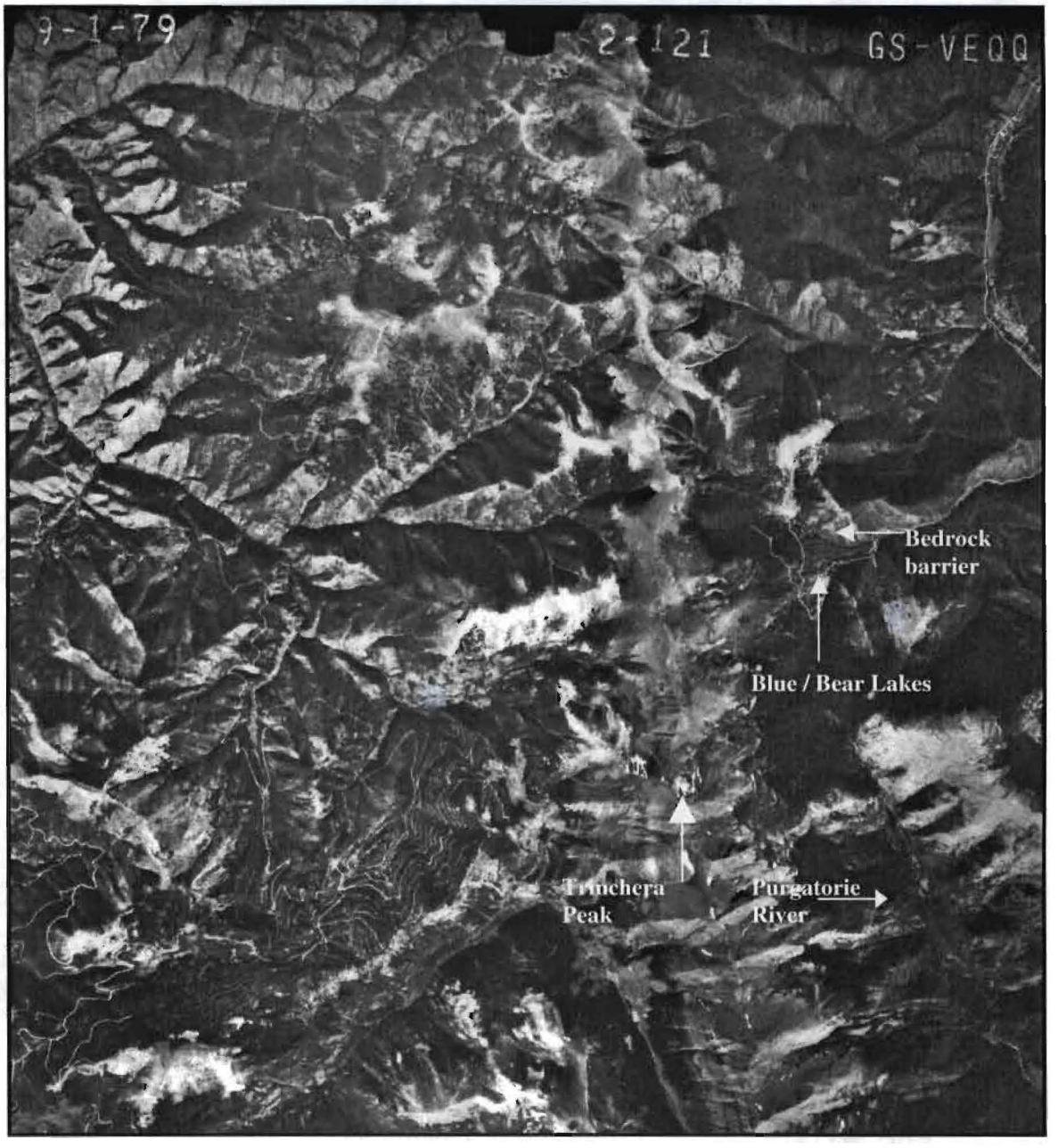


Figure 4. GS-VEQQ vertical aerial photo of the Trinchera Peak area (9/1/79). Photo ID 2-121 from USGS. Image reduced form original 1:80,000 scale.

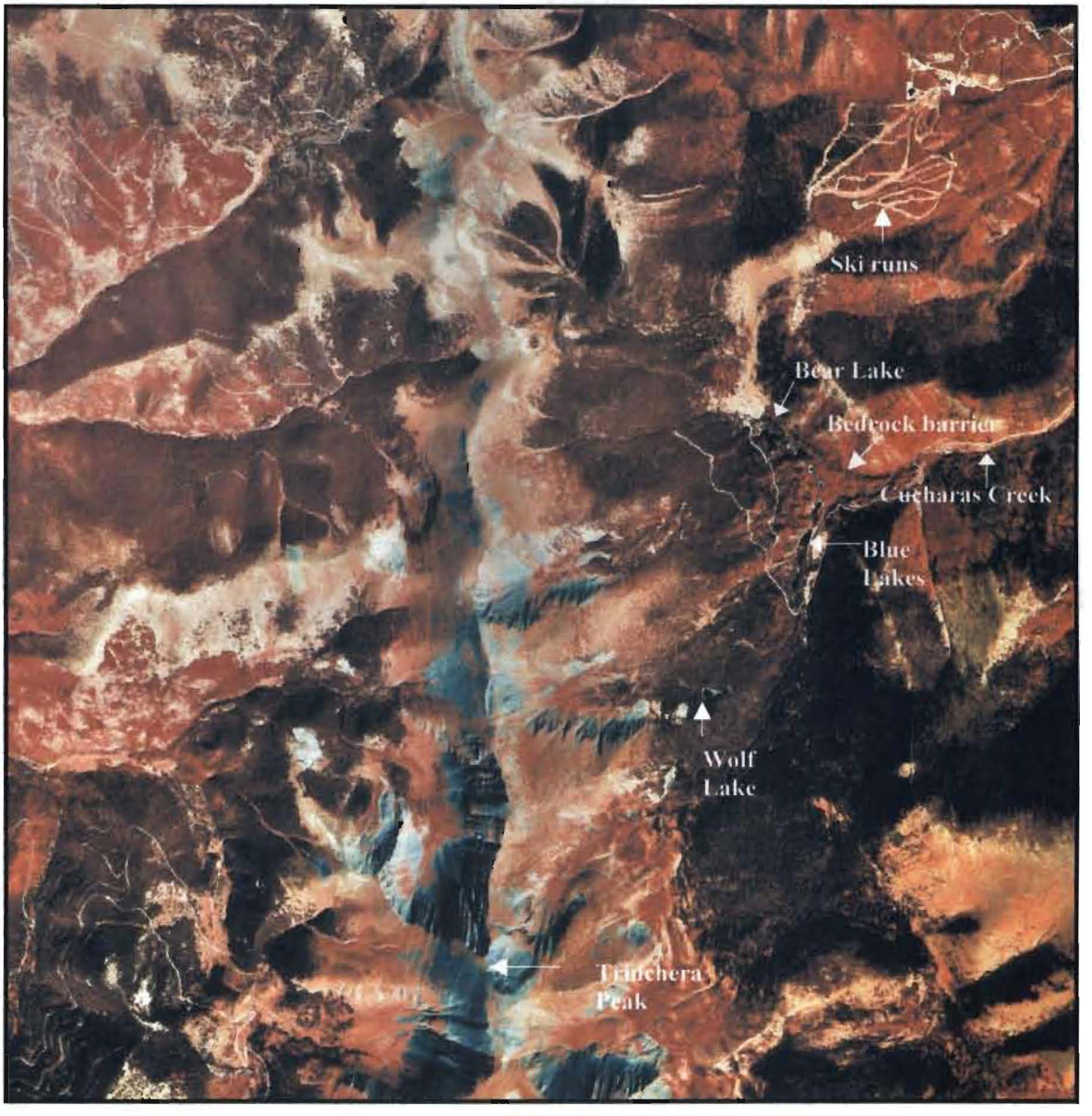


Figure 5. NAPP vertical color infrared aerial photo of the Trinchera Peak Area (8/26/90). Image reduced from original 1:40,000 scale.

little yearly variation (other than a gradual decrease in width as the tree ages). Such tree-ring series are called complacent.

Cores were collected in August 1999 by drilling a standard increment borer one meter above the ground into each tree. Two cores, oriented at right angles to each other, were obtained to detect asymmetrical growth centers and rings, knots, and other flaws in the tree.

Laboratory Methods

After a core was removed, it was air-dried for several days. The rough surfaces of the cores were lightly sanded with fine and then extra-fine sandpaper to reveal the tree rings. In some cases, to enhance the rings, furniture polish was lightly applied on the core. Changing the intensity and direction of a spot light on the core during measuring was the most helpful method to enhance rings.

After sanding, the cores were placed in a Bengan Model 5 counting instrument with a magnifying (10X) ocular that measured ring widths to the nearest tenth of a millimeter (which is the limit of the instrument and visual technique employed). Each core was measured at least twice to verify results. A number of cores were measured three or more times to ensure accurate results. When dating the rings, the outer layer of bark and the central pith layer of a core were not counted. Each ring was dated by counting backward from the year of the last growth season. Because of tree asymmetry, ring widths varied in different cores of the same tree.

Dating errors can occur from locally absent rings (rings that are missing at the point sampled) and from false or double rings. By cross dating using a skeleton plot such

potential errors can usually be found and absolute dates can be assigned to each tree ring. A skeleton plot relates a group of specimens chronologically to each other by matching ring-width patterns in all trees from a site (Fritts, 1976). This process will detect missing or double rings and rings improperly observed. If the ring patterns of two cores are off by one year, one of the cores contains a locally absent ring (missing) or a false ring.

The occurrence of missing rings is generally more common in the outer rings of older, environmentally stressed trees (Phipps, 1985). Although a false ring appears to be a separate ring, it is part of the annual increment. False and partial rings can be discerned when an abrupt change occurs from latewood to earlywood. Species of pine, spruce, and oak are nearly free from the tendency to form double rings and other irregularities (Thwaites, 1985).

To correct an absent ring, a zero width is inserted in the chronology. To correct a double ring the values of the two layers are combined to form a single value (Stokes and Smiley, 1968). Any cores with unresolved problems are not included as part of a site chronology (Fritts, 1986).

A Four-Step Statistical Protocol

A four-step statistical analysis of each tree-ring width series was employed. First, the widths of the tree rings were measured. The raw tree ring width measurements contained significant trend (direction of data) from growth effects. Tree-ring widths are wider when the tree is young and the trunk is small. This produces the juvenile growth effect often seen in tree-ring series. Values for juvenile growth were removed as they do not have a climatic signal in them; they are strictly related to growth (Fritts, 1976). As

the tree ages and grows larger, radial growth slows and ring widths become narrower. This growth trend is removed in a later step. The second step standardized the tree-ring width series by fitting a trend line (Fritts et al., 1969; Graybill, 1982). Standardization removes long-term variations from a tree-ring time series. During the third step, the trend was subtracted from the ring width. The difference is the residual width, which eliminated growth variations related to age (Grissino-Mayer, pers. comm.). In the fourth step, the residual ring widths were plotted on a graph comparing years with ring width. This method provides an index of tree growth with a mean of zero. Positive values on the plot are wider rings, indicating more growth. Negative values represent the narrow rings indicating adverse growing conditions.

A chronology was developed from an average of all the individual tree residuals (actual value minus the trend) for each year, to create a master residual chronology for each site (Grissino-Mayer, 1998). Averaging standardized indices increases the climatic signal; non-climatic noise which varies with each tree is canceled, in part, in this procedure of averaging (Bradley, 1985).

In some cases, only a single core represented a site as other core samples contained imperfections (soft zones, knots, or cavities) or the center of the tree was missed during coring.

Chapter 4

Study Site 1: Blue Lakes and Bear Lake Campgrounds

Blue Lakes (Figures 6 and 7) and Bear Lake (Figure 8) are kettle lakes formed behind a recessional moraine complex with some human modification. Both lakes are located in a climax spruce-fir ecosystem. No other tree species can reproduce in the shade at this elevation; thus spruce and fir replace themselves and dominate (Mutel and Emerick, 1992). This spruce-fir forest is protected from fire by moist summers, and the rugged terrain prevents the cutting of timber. Consequently, these high-elevation forests have maintained their basic characteristics for thousands of years.

The forest is cool and moist. The dense stands of trees decrease the wind and reduce the sun's intensity, thereby holding moisture. The winter snows are deeper and last longer here than in any other area on the mountain. The snowpack remains late in the summer and follows the melting of the snow on the tundra. The forest floor is covered with rotting logs, and the tree limbs are covered with hanging hair lichen known locally as "old man's beard."

The Cucharas Creek drainage basin includes three small stream valleys that were occupied by small valley glaciers during Pinedale time. The highest point in the Cucharas Creek drainage basin is Trinchera Peak (Figures 9 and 10) at an elevation of 4,120 meters (13,517 feet).

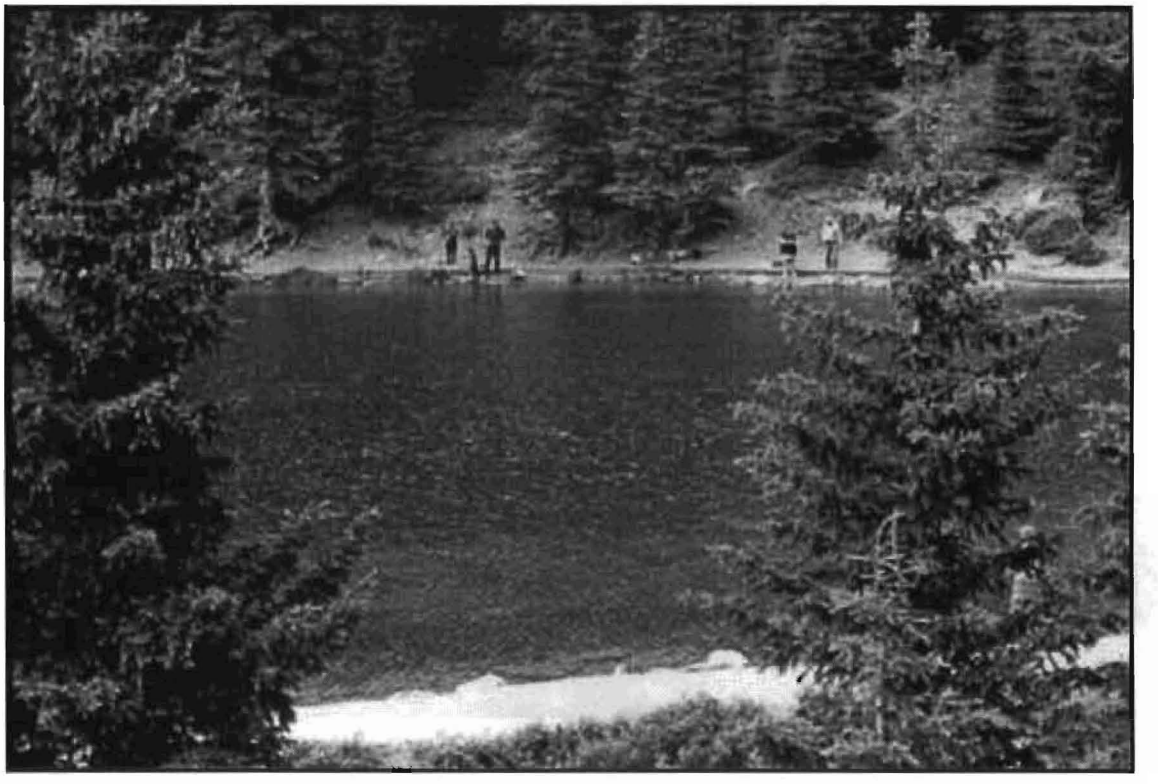


Figure 6. Blue Lakes Campground is 3,170 meters (10,400 feet) in elevation. Along the road to Blue Lakes are striated cobbles of red sandstone in a jumbled mass of moraine material exposed in road cuts. Photo by Scott Harris.

Figure 7. View over Blue Lakes campground from kite aerial photography. The kite string is the vertical line on the right. Trinchera Peak is in the center background. The Whiskey Creek Pass Limestone (Middle Pennsylvanian) is exposed on Trinchera Peak and along its northern slopes. The Sangre de Cristo Formation crops out on the upper eastern slope of the peak (Wallace and Lindsey, 1996). Kite aerial photo by J. S. Aber.

Figure 8. Bear Lake Campground is 3,194 meters (10,480 feet) in elevation. The Pleistocene ice advance descended far enough from the third cirque, north of Trinchera Peak, to deposit a moraine where Bear Lake was formed. Polished surfaces and striations were found on red sandstone next to Bear Lake. Photo by Scott Harris.

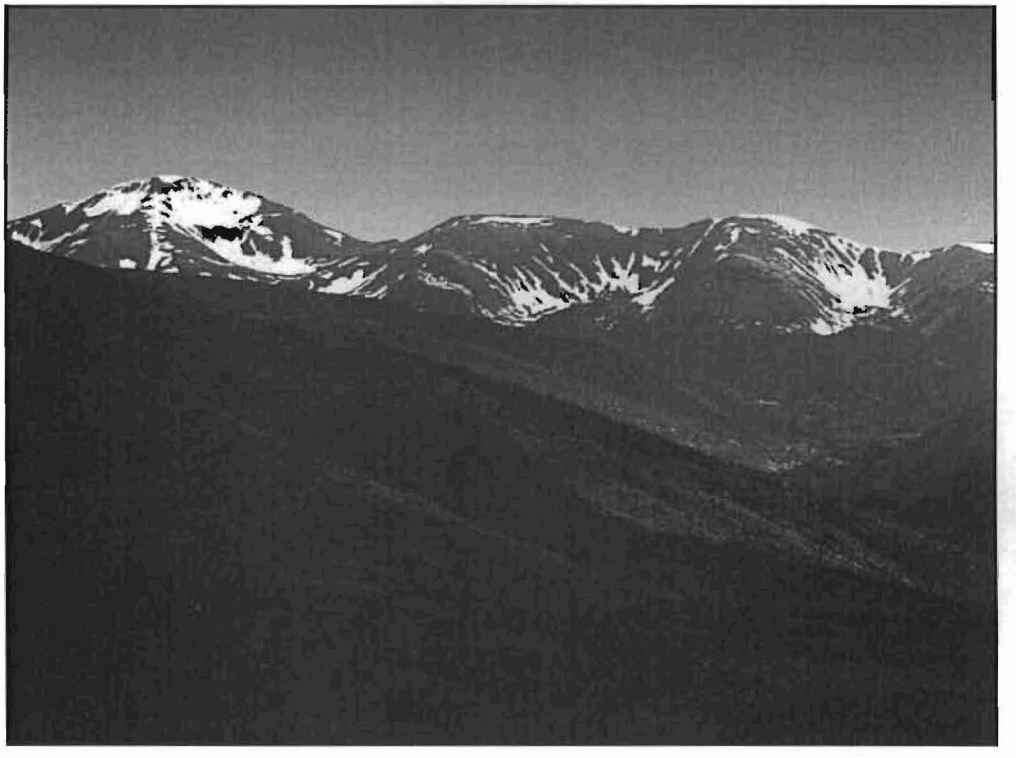


Figure 9. Snow capped Trinchera Peak is 4,120 meters (13,517 feet) in elevation. Three alpine glaciers advanced down the valleys of the Cucharas Creek drainage basin. These glaciers scoured the underlying bedrock leaving behind steep-walled U-shaped valleys. A tarn or cirque lake is just below Trinchera Peak. Trinchera Peak is a horn, where several cirques intersect to form a triangular faceted peak. Photo by Scott Harris.

Figure 10. High-oblique view Trinchera Peak and the Culebra Range from Cucharas Pass. A large successional meadow floors the valley where timber had been destroyed and was subsequently invaded by dense herbs and grass. The trees have not returned because low moisture conditions. The soil, without the protection of large plants, is dry and exposed to wind and solar radiation. Kite aerial photo by J.S. Aber.

The lowest point in the basin is 3,000 meters (9,840 feet); a relief of 1,120 meters (3,677 feet) is present in the study area. This indicates that a majority of the landscape is a steep slope.

The present landscape reflects both past and present environments and continues to undergo constant alteration. Today, the agents of water, mass movement, periglacial activity, and the impact of humans are the primary geomorphic processes (Table 1). Running water is the dominant agent of erosion, transportation, and deposition of materials at the surface in the lower forest. Glaciers were the dominant morphogenetic agents during the Pleistocene.

Fluvial erosion and transport	Flowing water is the dominant agent of landscape alteration in the lower forest area. The intensity of fluvial processes varies with precipitation.
Mass wasting	The downslope movement of weathered rock debris and soil is important in hillslope evolution above and below timberline. Gravity is the main force at work here, producing avalanches, rock falls, landslides, rock and soil creep.
Organic and chemical factors	Animal burrowing, beaver dams, falling trees that uproot soil, forest fires that expose slopes, and chemical solution, plus human activity have shaped the land in recent times.
Climatic factors (climatic factors produce a combination of geomorphic processes that form a distinct landscape).	Glaciers were the dominant morphogenetic agents during the Pleistocene Epoch.
	Periglacial processes dominate above timberline. Intense frost action produces patterned ground.
	Wind erosion rips at rocks and plants above timberline.

Table 1. Geomorphic Processes Based on Field Observations at Trinchera Peak

Chapter 5

Study Site 2: Near Timberline

The trail to a mine (U.S. Forest Service access road 436) ascends the east side of Trinchera Peak and enters the alpine tundra ecosystem. The tree limit, or timberline, marks the boundary between the subalpine and alpine zone. At this boundary the trees become smaller and gradually disappear and are replaced by small shrubs and other plants.

The windswept alpine tundra ecosystem lies above timberline. Vegetation in the alpine tundra is dominated by shrubs, cushion plants (low round mats with large flowers), small forbs, lush meadows, narrow leafed sedges and grasses. The rock surfaces are covered with lichens and mosses.

Above timberline, climatic factors produce geomorphic processes that form distinct features in the alpine tundra. These alpine landscapes are formed — for the most part — from intense seasonal freezing (9 % volume expansion when water freezes) and thawing of the upper layer of the ground, or the active layer.

During the brief summer when the upper part of the frozen soil melts, downslope movement of the active layer forms solifluction features. Several small solifluction terraces, less than 0.5 meters high, are traceable below snow patches on the wettest area of the slopes. The solifluction terraces are generally higher in elevation than nearby rock glaciers.

On the steep slopes towards the alpine lakes and along the trail to Trinchera Peak are several small inactive rock glaciers (Wallace and Lindsey, 1996). Most of the rock

glaciers are 30 to 50 meters in length; one is about 150 meters long. Their edges are buried under turf or peat.

Higher, on more gentle slopes, are clear features of patterned ground composed of patches of fresh gravelly sand with silt and some clay. Grassy zones surround the patterned ground. Excluding rock outcrops, the gravelly patches and grass-covered sections comprise approximately one third of the alpine tundra. Small desiccation cracks and stone concentrations, with ring diameters approximately 5 meters, are centered inside the gravelly patches. Frost heaving lifted stones into the active layer on slopes during the winter. The stones remained in these positions when the active layer thawed in the spring.

Chapter 6

Quaternary History

The Quaternary history of this area was dominated by four episodes of alpine glaciation: (1) pre-Bull Lake, (2) Bull Lake, (3) Pinedale, and (4) a period of Neoglaciation (Table 2). Quaternary deposits in the study area can be broadly classified as glacial till, rock glacier debris, and mass movement deposits.

The Trinchera Peak glaciers began at the head of the Cucharas Creek drainage basin on the east side of the mountain and pushed easterly. These glaciers, as they advanced down three alpine valleys, scoured out the underlying bedrock and carried rock material to lower elevations, leaving behind U-shaped valleys and magnificent cirques. The glaciers dumped debris at lateral and terminal moraines, and at recessional moraines where they paused during melting. Till of Bull Lake age was mapped by Wallace and Lindsey (1996). Pinedale till, characterized by its rugged topography, prominent moraines, and undrained depressions, dominates the area.

The eastern, lower limit of glacial deposits in the study area appears to have been blocked by a bedrock barrier below the Blue Lakes Campground (Lindsey, pers. comm.). This bedrock barrier was responsible for the formation of a recessional moraine complex. Blue Lakes and Bear Lake were formed behind this recessional moraine complex. The black-and-white and color infrared aerial photographs show a well-defined outline of this moraine (see Figures 4 and 5). If ice volumes had been greater, the glacier would have breached the bedrock barrier and flowed farther downstream. Because of the lack of a bedrock barrier, the glacier did flow farther down the headwaters of the Purgatorie River in the next drainage basin to the south.

Yr. B.P.	Climate
2,000,000	The formation and advance of continental glaciers in the Northern Hemisphere mark the start of the Pleistocene Epoch. This is not a time of continuous glaciation, there were warm interglacial periods when glaciers alternately advanced and retreated over large portions of North America and Europe (Pre-Bull Lake and Bull Lake glaciation).
22,000 - 18,000	Glaciers in North America reach maximum extent (Pinedale glaciation). Sea level was 125 meters (395 feet) lower than present. The lower sea level exposed the Bering Land Bridge, allowing the migration of humans from Asia to North America.
14,000	Glaciers begin to retreat and surface temperatures slowly rise.
11,000	Average global temperatures suddenly fall during a cold period, known as Younger-Dryas (named after an arctic flower, the *Dryas*). Northeastern North America and northern Europe return to glacial conditions.
10,000	Cold interval of Younger Dryas ends.
8,000	Continental ice sheets covering North America are gone.
6,000 - 5,000	Average global temperatures are warm (1°C warmer than present). This period was the warmest (altithermal) interval during the Holocene Epoch.
5,000	A cooling trend develops; alpine glaciers return (Neoglaciation). Continental ice sheets do not form.

1,300 - 800	The Medieval climatic optimum begins. The Northern Hemisphere is warm and dry and the climate remained relatively mild for 500 years. Vikings established settlements in Iceland and Greenland. English vineyards flourished.
800 - 540	Medieval glaciation begins as the climate in Europe deteriorated, bringing extremely cold winters, floods, droughts, and famines. Glaciers expand in Iceland and the Alps. Viking settlements are isolated and those who remain perish. English vineyards disappear.
440 - 110	The Little Ice Age (1560-1890) varied (climate and glacier activity) on a regional basis but occurred worldwide. Average global temperature was 1-2°C cooler than present. In some parts of the world the Little Ice Age did not end until the 1930s (Grove, 1988).
110	Beginning in the late 1800s, the average global temperature began to rise.

Table 2. Climatic History of the Quaternary

Source: Aherns (1994) and Grove (1988).

As the climate grew warmer, the glaciers melted and eventually dumped rock material along their sides, forming lateral moraines. These steeply sloped Pinedale age lateral moraines, composed of unsorted rock debris, formed embankments along the side of Bear Lake and Blue Lakes. Creeks cut thorough the moraines in comparatively narrow notches at Bear Lake. Stream gradients are steeper at the notch than either upstream or downstream.

As the glacier melted and retreated, blocks of ice were left in the till. When these blocks of ice melted they left behind holes or depressions that subsequently filled with water and formed kettle lakes. Blue and Bear Lakes are good examples of kettle lakes. Wolf Lake, in the upper part of the glacial valley north of Trinchera Peak, appears to have been formed behind a recessional moraine during the late-Pinedale glacial retreat. A careful examination of aerial photography (Figures 4 and 5) shows a morainal ridge below Wolf Lake.

Small cirque moraines and rock glaciers that exist in valley heads represent Neoglacial till. Their size and the fact that they occur only in favorable topographic locations (north-facing cirques) suggest that post-Pinedale climatic conditions were marginal for glacier formation in the Trinchera Peak area.

There is no evidence of glacial activity in the valleys north of Bear Lake or in the valley immediately west of the Bear Lake Campground. Colluvium, material that moves downhill under the force of gravity, was noted in these areas.

Chapter 7

Dendrochronology Results

Table 3 shows a summary of all of the cores collected. Seven cores could not be used due to imperfections (soft zones in larger trees, cores broken from extraction process, and cavities). Results for individual cores are presented in the Appendix (p. 55 - 122). Master residual chronologies for each site were developed from an average of all individual tree residuals for each year (see Appendix, p 123-125).

The chronology in Figure 11 (cores 1C, 2A, 3A, and 4A) was developed from several Colorado blue spruce trees on a heavily forested lateral moraine near upper Blue Lake. Precipitation and temperature are the limiting ring-width growth factors in the lower forest (Fritts, 1976). The present geomorphology of the lower forest area at this site resulted from fluvial erosion.

The chronology in Figure 12 was based on cores taken from fir trees in an area of dense forest growth on steep slopes. The period from 1913 to 1923 may reveal an attack of western budworms (*Choristoneura occidentalis*) causing radial growth reduction (Swetnam, 1986). A period of extended dryness begins in the early 1940s and ends in 1966.

Cores 8A, 9B, and 10A (Figure 13) were taken from Colorado blue spruce on the crest of a small moraine on the north side of Bear Lake in a dense forest. Ring-width variation in trees in the lower forest is an important indicator of precipitation, and possibly temperature (Fritts, 1976).

Core	Site	Elevation	Ring Count	% Locally Absent Rings	Mean width (mm)	Species	Substrate
1A	Upper Blue Lakes CG A	3170 (m) 10400 (ft)	Core imperfections			Blue spruce	Till
1B	Upper Blue Lakes CG A	3170 (m) 10400 (ft)	Core imperfections			Blue spruce	Till
1C	Upper Blue Lakes CG A	3170 (m) 10400 (ft)	67	0	29.2388	Blue spruce	Till
2A	Upper Blue Lakes CG A	3170 (m) 10400 (ft)	75	0.0267	25.1733	Blue spruce	Till
2B	Upper Blue Lakes CG A	3170 (m) 10400 (ft)	77	0	25.0259	Blue spruce	Till
3A	Upper Blue Lakes CG A	3182 (m) 10440 (ft)	86	0	26.1628	Blue spruce	Till
3B	Upper Blue Lakes CG A	3182 (m) 10440 (ft)	86	0	21.1628	Blue spruce	Till
4A	Upper Blue Lakes CG A	3182 (m) 10440 (ft)	90	0	24.9889	Blue spruce	Till
4B	Upper Blue Lakes CG A	3182 (m) 10440 (ft)	90	0	18.3000	Blue spruce	Till
5A	Lower Blue Lakes CG B	3158 (m) 10360 (ft)	82	0	26.1585	Douglas fir	Till
5B	Lower Blue Lakes CG B	3158 (m) 10360 (ft)	82	0	27.7927	Douglas fir	Till
6A	Lower Blue Lakes CG B	3158 (m) 10360 (ft)	109	0	20.2385	Douglas fir	Till
6B	Lower Blue Lakes CG B	3158 (m) 10360 (ft)	109	0	18.1193	Douglas fir	Till
7A	Lower Blue Lakes CG B	3158 (m) 10360 (ft)	Core imperfections			Douglas fir	Till
8A	Bear Lake CG C	3194 (m) 10480 (ft)	80	0	20.9500	Blue spruce	Till
8B	Bear Lake CG C	3194 (m) 10480 (ft)	80	0	26.5875	Blue spruce	Till
9A	Bear Lake CG C	3194 (m) 10480 (ft)	Core imperfections			Blue spruce	Till
9B	Bear Lake CG C	3194 (m) 10480 (ft)	77	0	27.0909	Blue spruce	Till
10A	Bear Lake CG C	3194 (m) 10480 (ft)	69	0	21.8406	Blue spruce	Till
10B	Bear Lake CG C	3194 (m) 10480 (ft)	Core imperfections			Blue spruce	Till
11A	Near Timberline D	3463 (m) 11360 (ft)	239	0	8.5941	Blue spruce	Colluvium
11B	Near Timberline D	3463 (m) 11360 (ft)	239	0	7.8787	Blue spruce	Colluvium
12A	Near Timberline E	3560 (m) 11680 (ft)	382	0	6.4847	Blue spruce	Colluvium
12B	Near Timberline E	3560 (m) 11680 (ft)	Core imperfections			Blue spruce	Colluvium
13A	Near Timberline E	3560 (m) 11680 (ft)	279	0	9.6165	Blue spruce	Colluvium
13B	Near Timberline E	3560 (m) 11680 (ft)	Core imperfections			Blue spruce	Colluvium
14A	Near Timberline E	3560 (m) 11680 (ft)	299	0	7.4916	Blue spruce	Colluvium
14B	Near Timberline E	3560 (m) 11680 (ft)	298	0.0033	6.2383	Blue spruce	Colluvium

Table 3. Core Summary

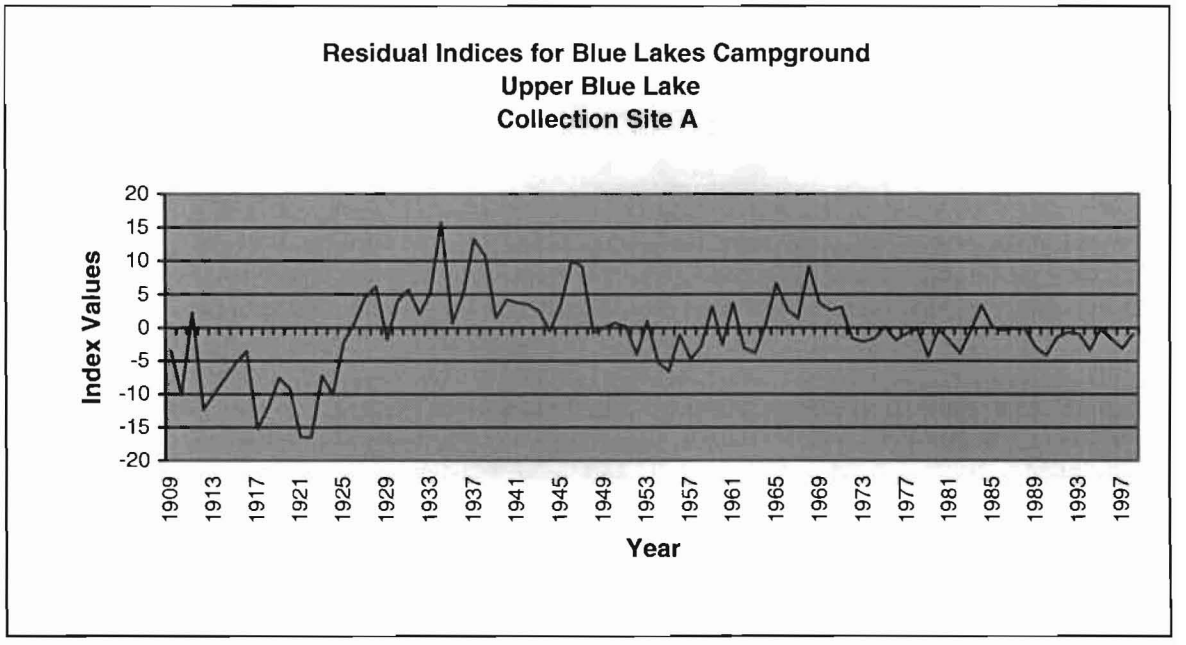


Figure 11. Chronology (cores 1C, 2A, 3A, and 4A) showing standardized growth indices at the upper Blue Lake site A.

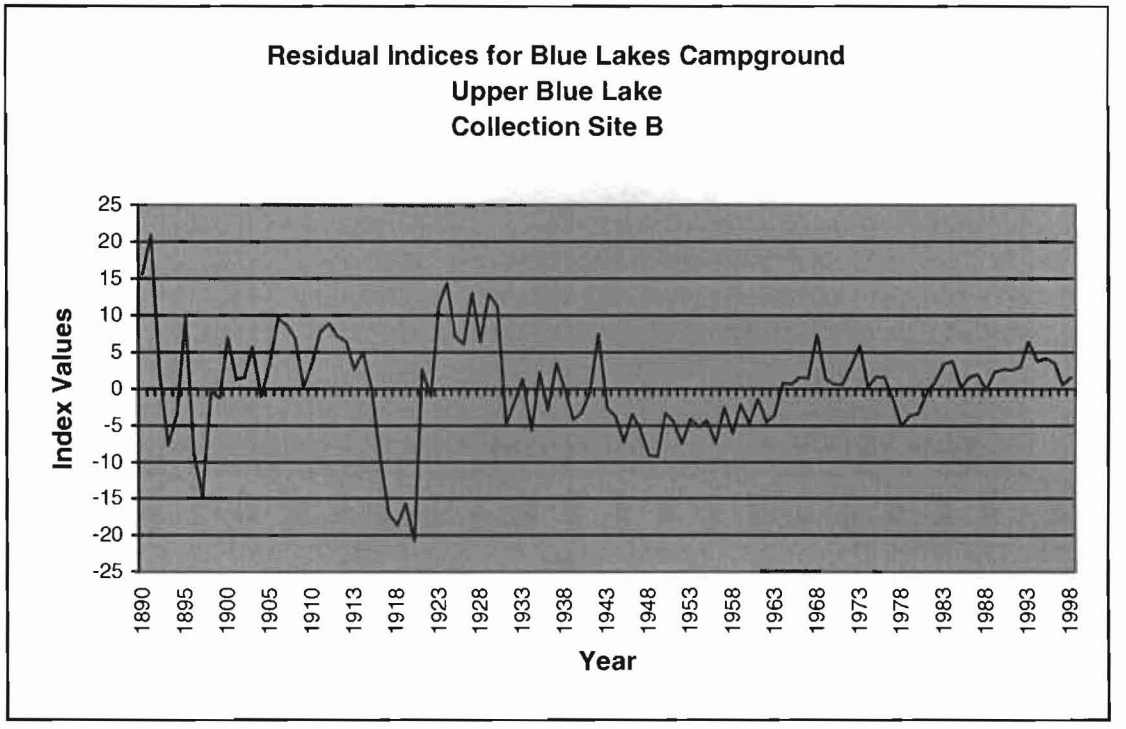


Figure 12. This chronology (cores 5A and 6A), spanning 108 years, was developed from two Douglas fir trees close to lower Blue Lake site B.

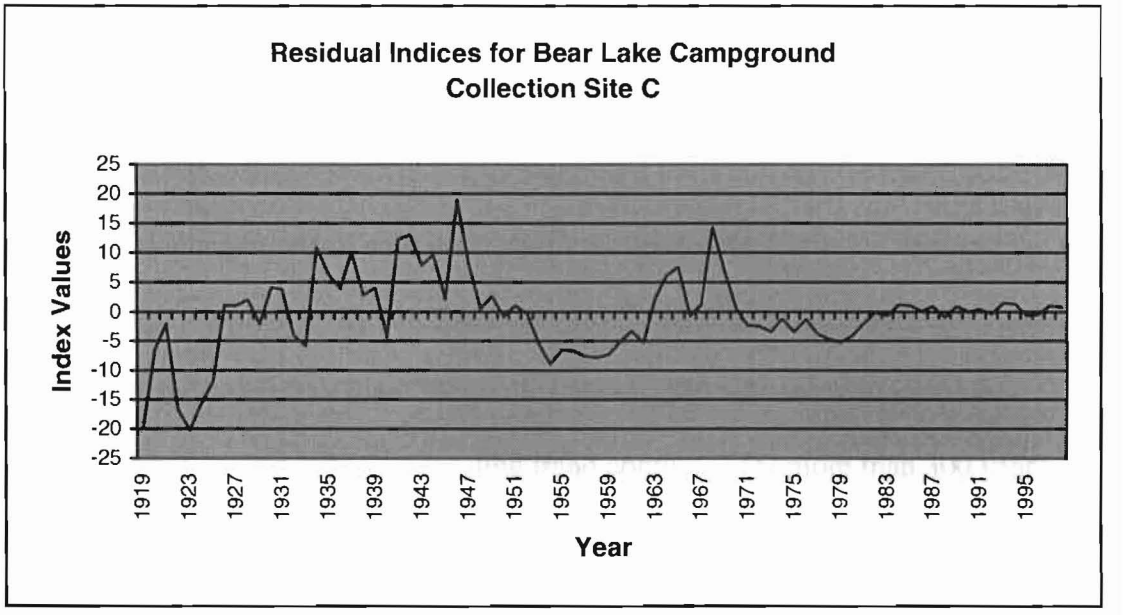


Figure 13. Standardized ring-width chronology (cores 8A, 9B, and 10A) from Bear Lake Campground, site C.

Chapter 8

Discussion of Results

Little Ice Age Overview

Corresponding historical events were used to test reconstructed climatic data. Two remarkable periods of cold and disturbed climate, the Little Ice Age and the year following the eruption of Mount Tambora (1815), were correlated with tree rings from cores collected near timberline. Beginning about 1560 AD, the average global temperature started to fall. This cooling trend continued for more than 300 years, ending about 1890 (Aber, 1999). This time of cool summers and extremely cold winters is known as the Little Ice Age (LeRoy Laudrie 1971; Grove 1988).

The Little Ice Age was an integrated response to variations in the receipt of solar radiation, volcanic eruptions, and a change in the pattern of ocean circulation — especially the amount of warm water flowing into the North Atlantic from the south. (Grove, 1988; Wigley, 1991; Bradley and Jones, 1992; Overpeck and Rind, 1992; Karlen and Kuylenstierna, 1996).

The sun's energy drives the Earth's climatic system. A number of phenomena mark the surface of the sun, including solar prominences, solar flares, and sunspots. Sunspots, often occurring in pairs, have magnetic fields powerful enough to prevent normal convection of turbulent solar gases. Sunspots appear dark because they are cooler (~3500°C) than the warmer (~5500°C) solar granules that surround them (Trefil, 1999).

A period of reduced sunspots (less heat) ranging from 1645 to 1715 is known as the Maunder Minimum (Eddy, 1976, 1977). It was during this time when the intensity of

solar activity was reduced as much as one quarter of one percent, causing widespread cooling on Earth.

The Little Ice Age was also punctuated with volcanic eruptions that emitted particles and gasses into the atmosphere. These aerosols reflected incoming solar heat back into space, lowering temperatures. The eruption of Tambora in Indonesia in 1815 was one of the largest in recorded history. These factors: (1) a dimmer sun; (2) dust in the atmosphere; and (3) a change in ocean circulation resulted in long, bitter winters and short summers during the Little Ice Age.

The Thames River in England and the New York Harbor in North America were frozen a number of times during the long winters of the Little Ice Age (Grove, 1988). Alpine glaciers increased in size and advanced far down the valleys of the Alps and Norway, creating many problems for small farming areas (Grove, 1988). The severely cold weather caused harvest failures and destroyed English vineyards. Many farms were abandoned and certain rural areas were deserted. Famine-weakened populations fell victim to the plague, and civil unrest followed.

Little Ice Age in Study Area

The oldest trees in this study, found near timberline growing in harsh environmental conditions, contain long and sensitive climatic records in their tree rings. Tree rings near timberline are presumably correlated with temperature.

The early work of Leopold (1953) demonstrated a positive correlation exists between the growth rate of Engleman spruce (*Picea engelmannii*) on Pikes Peak, Colorado and the length of the growing season. The length of the growing season is

determined by temperature. At these elevations, low summer temperatures limit growth, and the annual rings vary in width as they respond to yearly differences in the temperature regimes (Fritts, 1976; LaMarche 1978; Brubaker and Cook, 1984; Luckman 1993). At the upper elevation limit for Great Basin bristlecone pine (*Pinus longaeva*), narrow rings were found in cores and correlated with low temperatures (LaMarche, 1974). The work of Jacoby and Cook (1981) demonstrated that radial growth, in white spruce trees (*Picea glauca*) near the northern tree line in the Yukon Territory, correlates with summer temperatures.

Low summer temperatures reduce growth by lowering photosynthetic rates. The rates of net photosynthesis near timberline are directly proportional to air temperature. During a warm summer more photosynthates will be produced than in a cool summer (LaMarche and Stockton, 1974).

The tree ring series in Figures 14 and 15 shows the Little Ice Age followed by a period of warming. Positive values (wide annual rings) represent warm summers and good growing conditions. Negative values (narrow annual rings) represent cool summers, poor growing conditions, and minimal growth.

Core 12A was from the oldest tree sampled (Figure 14). This tree-ring series reveals the Little Ice Age when tree growth was strongly suppressed between 1670 and 1833. There is an apparent lightning strike about 1826. The plot between 1827 through 1833 shows an anomalous spike in positive values, revealing an abrupt transition from concentric rings to elliptical rings that represent eccentric-wood growth.

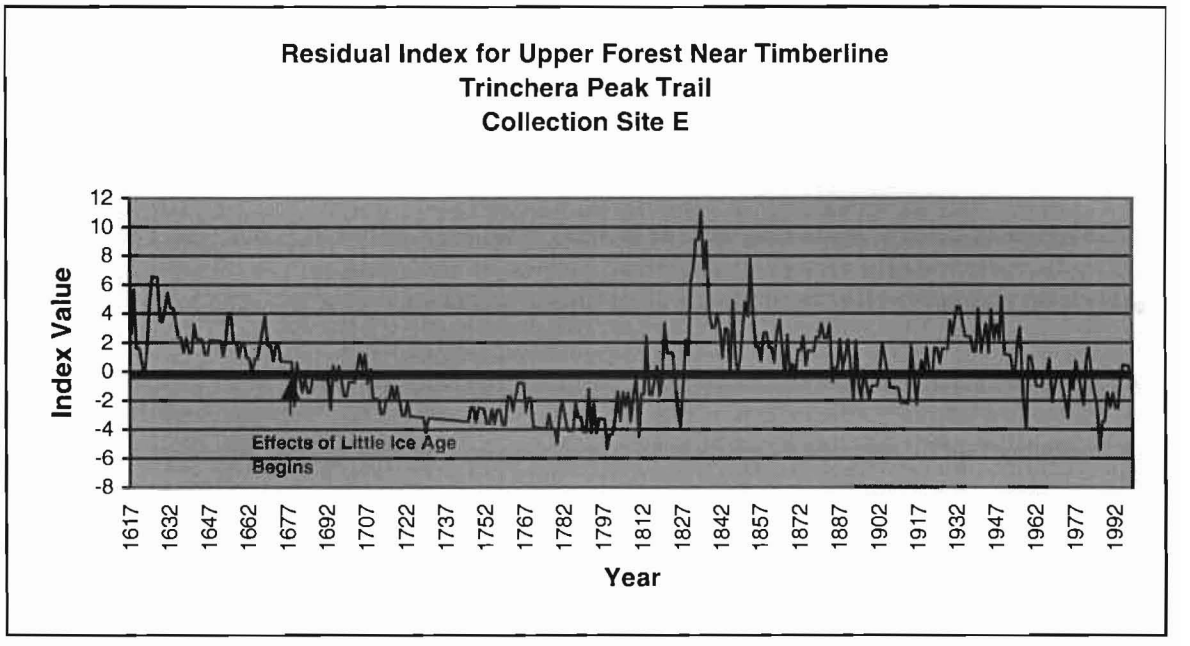


Figure 14. Core 12A was taken near timberline at 3,560 meters (11,680 feet) in elevation where the trail opens on a moderate, north-facing slope (site E).

The larger ring widths — following the lightning strike — result from the core being taken from the wider, elliptical rings. This tree, with such a localized disturbance, cannot be used to infer any climate signal after the lightning strike.

A single core, 14B (Figure 15), reveals possible heavy wind damage in the forest. Wind stress is evident in the sudden changes in ring widths after 1948. Strong and persistent winds form compression wood in tree rings. Changes in the proportion of compression wood record wind velocity. (Schweingruber, 1988).

The Little Ice Age in the Trinchera Peak area was important geomorphologically. During the Little Ice Age, snowlines would have been lower than at present, and snow cover would have lasted longer into summer. Snowpatches would have been larger and more permanent, producing an increased rate of meltwater erosion. The frequency and magnitude of mass movement on steep mountain slopes would have increased during the Little Ice Age.

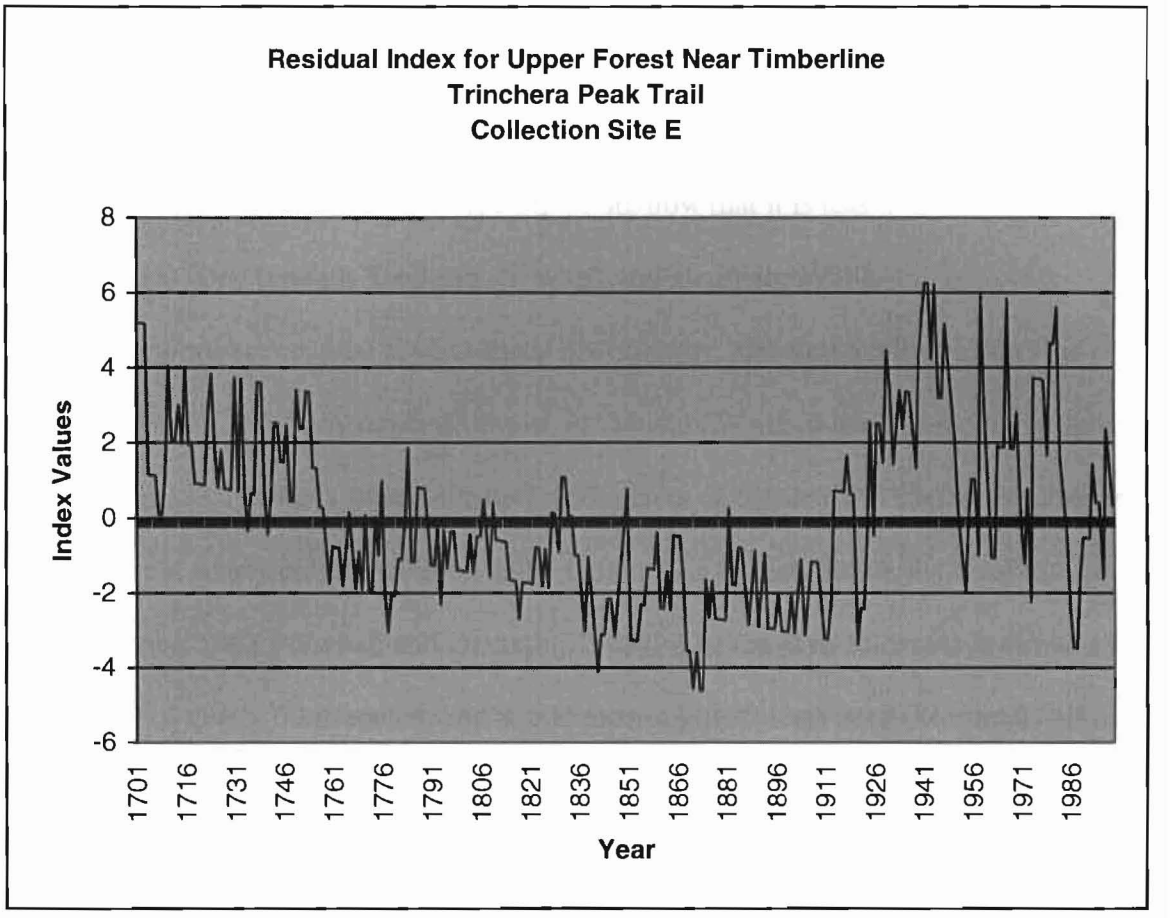


Figure 15. Core 14B-was collected near timberline about 3,560 meters (11,680 feet) in elevation from a north facing blue spruce on a moderate slope (site E).

Mount Tambora

According to the Smithsonian Institution, Mount Tambora ranks as the most explosive volcano in the past 10,000 years (Stommel and Stommel, 1983). Mount Tambora is a large stratovolcano on the Indonesian Island of Sumbawa along the east Sunda Arc (Figure 16). The island lies 300 kilometers (186.4 miles) behind the Sunda Trench — a subduction zone that has a dip so shallow that it is less than 200 kilometers (124.5 miles) deep beneath Tambora (Newhall and Dzurisin, 1988).

Tambora has erupted several times historically. The first explosive eruption occurred April 5, 1815. A larger eruption followed on April 10 and 11, reducing the 4,000 meter (13,125 feet) stratovolcano 1,100 meters (3,610 feet). This last eruption left the rim of the nearly circular caldera 2,900 meters (9,515 feet) above sea level (Stommel and Stommel, 1983; Newhall and Dzurisin, 1988). The massive caldera that remains has a diameter of nearly 6 kilometers and is 600 meters (1,970 feet) deep (Stommel and Stommel, 1983). A large freshwater lake, fed by rains, fills the bottom of the caldera (Stommel and Stommel, 1983).

The tremendous eruption of Mount Tambora was devastating. An area within 200 miles of the volcano was totally dark for three days. Of the 12,000 inhabitants, only 26 survived the deadly pyroclastic flows. The disaster also struck the neighboring islands of Lombok, Flores, South Sulawesi, and Bali. In all, 90,000 people were killed (Mills, 2000).

Figure 16. Near-vertical view of the Tambora caldera. The large crater was formed in 1815 after a tremendous volcanic eruption ejected 100 cubic kilometers of debris into the stratosphere (Stommel and Stommel 1983). Space-shuttle photograph, NASA Johnson Space Center, STS026-38-056, taken 10/03/88.

Tambora's explosive eruption emitted fine ash and large quantities of sulfur dioxide gas into the stratosphere, where it combined with water to form a sulfuric acid aerosol that encircled the planet. This acid aerosol blocked some of the sunlight from reaching the Earth, resulting in cooler temperatures and unusual climatic effects.

By September 1815, the sunsets in England were a brilliant red each evening. (Sigurdsson, 2000). Bad weather followed the crimson sunsets, and the following year, 1816, was the coldest year on record in Europe. It was unusually cold in New England, where snows or frost occurred in every month of the year (Mills, 2000). Throughout western Europe and New England, the average temperature fell 1° to 2.5°C below normal. The average global temperature is estimated to have dropped by 0.4° to 0.7°C (Mills, 2000).

In New England crops failed and farms were abandoned during the cold summer of 1816. Many farmers left for the warmer areas to the south. Vermont experienced an eight percent reduction in population. Europe had started to recover from the wreckage of the Napoleonic Wars when the cold weather following Tambora caused famine and rioting (Mills, 2000). In India crop failures from abnormal weather caused a famine. The reduced resistance to diseases caused by the famine led to an outbreak of cholera spread by British soldiers.

The eruption of Mount Tambora in mid-1815 depressed temperatures around the world. The year that followed the eruption (1816) appears in a core from near timberline (Figure 17) as a very narrow ring. The tree at this elevation, being sensitive to temperature, produced a narrow ring during the short growing season of this very cool

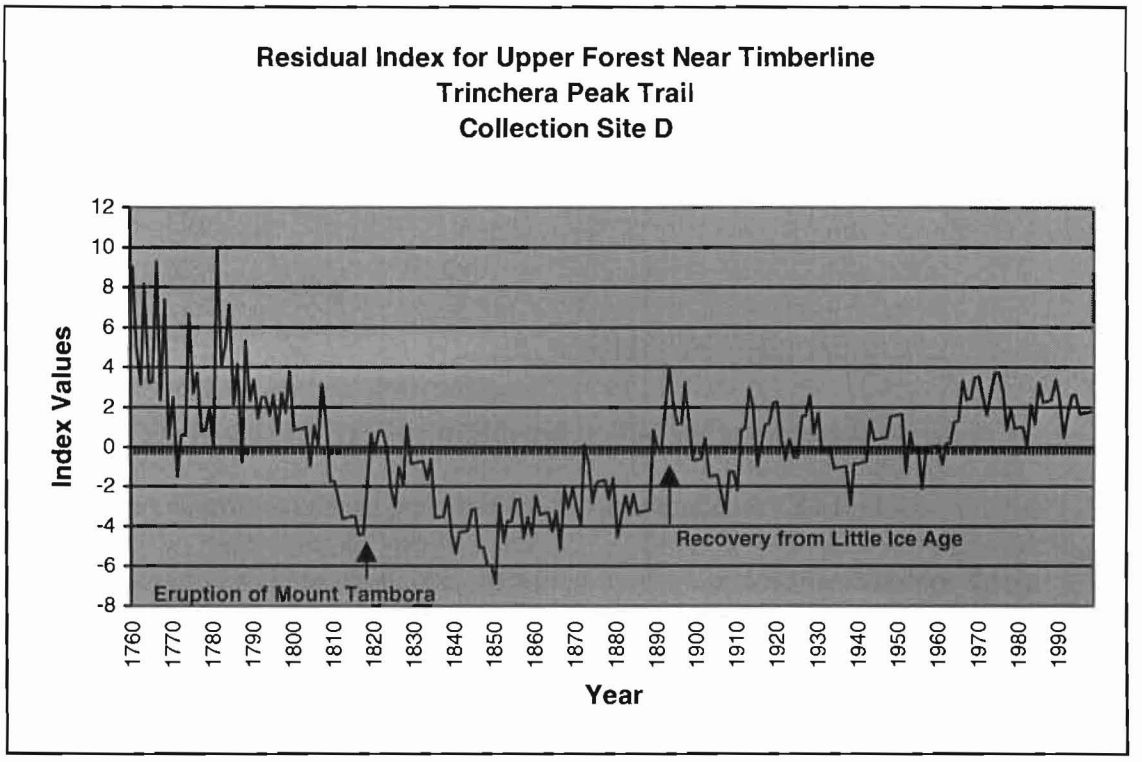


Figure 17. During the Little Ice Age one year was remarkable —1816, when an unusually cold summer with heavy snow was followed by a bitterly cold winter. Core 11A clearly records what has become known as the "year without a summer."

summer. In lower elevations in other regions, 1816 actually appears as a wide ring because lower temperatures mean less water loss due to evapotranspiration (Grissino-Mayer, pers. comm.). This situation enhances radial tree growth, producing wider rings.

Recent Climate Warming

Recently there is concern that the warming climate is caused by human activity (Kellog, 1987, Wood, 1988). The media and politicians assume that we are in a time of extraordinary warming caused by using fossil fuels that emit CO_2.

Average worldwide temperatures, reported by the Goddard Institute for Space Studies, increased about 0.8°C between 1866 and 1998 (Bluemle et al., 1999). During this same time, the concentration of CO_2 in the atmosphere increased from 280 to 353 ppm. Since this time period approximately coincides with the Industrial Revolution, it has been popularly assumed that the warming was caused by fossil fuels. (Bluemle et al., 1999).

Recent climatic warming appears to have begun around 1890 in the Trinchera vicinity (Figure 17). The twentieth century has witnessed variations in climate as shown by cores from the Blue and Bear Lakes area (Figures 11 - 13). These variations may reflect fluctuations in precipitation, temperature, evapotranspiration, or other climatic factors.

The amount of recent global warming since 1866, when compared to broad fluctuations in temperature during the Tertiary period and the Ice Age, is so small it is almost inconspicuous. The recurrent and rapid climate fluctuations during the Holocene are convincing evidence that the warming of the last 100 years is not an unusual event, and implies that the present warming trend had causes other than an increase in

greenhouse gasses (Denton and Karlen, 1973; Bonnefille et al., 1990; Hodell et al., 1991; Mosley-Thompson, 1992; Talma and Vogel, 1992; Vorren et al., 1996; Bond et al., 1997; Overpeck et al., 1997).

Rising global temperatures may not be the result of human influence, but may also reflect the recovery of the Earth from the Little Ice Age (Bluemle et al., 1999).. Global temperatures could continue to rise another 2 to 2.5°C, a level similar to the relatively warm temperatures of the Medieval Warm Period (1,200 - 700 years BP). Alternatively, global temperatures could peak at anytime and begin falling toward a new period of glacial conditions.

Chapter 9

Conclusions

The Earth has undergone and will continue to experience significant changes in climate. The tree rings collected near timberline on Trinchera Peak provide evidence of times when climates were markedly different. The chronology from these tree rings extends from 1617 to 1998, spanning 381 years. Fritts (1991) listed four basic causes of climatic variations over time:

1. Reoccurring cyclical climatic changes associated with solar output and the tidal force of sun and moon.
2. Volcanic forcing of climate changes due to the injection of large amounts of dust into the stratosphere creating large dust veils.
3. Climate changes resulting form variations in the circulation of the oceans.
4. Changes in atmospheric gases and atmospheric conditions that affect transparency (cloudiness, smoke, and aerosols).

The trees near timberline respond to the causes of climatic variability listed by Fritts and mirror the climatic conditions in this area as they react to summer temperatures. The tree rings in Figures 15 and 17 clearly respond to the effects of the Little Ice Age. Figure 17 shows widespread cooling (associated with large dust veils) followed Tambora's explosive volcanic eruptions in 1815. A drought is shown in Figures 11 and 12 in the 1950s and 1960s. A recent warming trend is evident in the near timberline chronologies.

Future tree-ring research at this location will focus on the collection and analysis of cores from near timberline sites. Additional cores will yield longer and more detailed

and climatic records. By developing a long-term environmental database of ring-width patterns, research will identify causes of natural climatic change, determine the extent to which human activity affects global climate, and predict future climatic conditions.

References

Aber, J. S. 1999. Climatic history of the Holocene, World Wide Web homepage: URL:http://academic.emporia.edu/aberjame/ice/let19/lec19.htm

Aber, J. S., Sobieksi, R., Distler, D. and Nowak, M. 1999. Kite aerial photography for environmental site investigations in Kansas. *Transactions of the Kansas Academy of Science* 102: 57-67.

Aherns, C.A. 1994. *Meteorology today: an introduction to weather, climate, and the environment*, West Publishing Co., St. Paul, p. 430-483.

Bluemle, J.P., Sabel, J.M. and Karlen, W. 1999. Rate and magnitude of past global climate changes. *Environmental Geosciences* 6: 63-75.

Bond, G., Showers, W., Cheseby, M., Lotti, R., Almasi, P., de Menocal, P., Priore, P., Cullen, H.H. and Bonani, G. 1997. A pervasive millennial-scale cycle in North Atlantic Holocene and glacial climates. *Science* 278: 1557-1566.

Bonnefille, R., Roeland, J.C. and Guoit, J. 1990. Temperature and rainfall estimates for the past 40,000 years in equatorial Africa. *Nature* 346: 347-349.

Bradley, R.S. 1985. *Quaternary paleoclimatology: Methods of paleoclimatic reconstruction.* Allen and Unwin, Boston, 472 p.

Bradley, R. S. and Jones, P.D. 1992. When was the "Little Ice Age." *In* Mikami, T. (ed.), *Proceedings of the conference on the Little Ice Age Climate*, p. 1-4. Tokyo Metropolitan University.

Brubaker, L.B. and Cook, E.R. 1984. Tree-ring studies of Holocene environments, *In* Wright, H.E., Jr. (ed), *Late Quaternary environments of the United States*, p. 222 -235. The Holocene, vol. 2. Longman, London.

Denton, G.H. and Karlen, W. 1973. Holocene climatic variations—Their pattern and cause. *Quaternary Research* 3: 155-205.

Eddy, J.A. 1976. The Maunder Minimum. *Science* 192: 1189-1202.

Eddy, J.A. 1977. Climate and the changing sun. *Climatic Change* 1: 173-90.

Fritts, H.C. 1976. *Tree rings and climate.* Academic Press, NY, 396 p.

Fritts, H.C. 1986. Principles and practices of dendrochronology. *In* Jacoby, G.C. Jr. and Hornbeck, J.W. (eds), *Proceeding of the International Symposium on Ecological Aspects of tree-ring analysis*, p. 6-17. Marymount College, NY.

Fritts, H.C. 1991. *Reconstructing large-scale climatic patterns from tree-ring data* University of Arizona Press, Tucson, 286 p.

Fritts, H. C., Mosimann, J.E. and Bottorff, C.P. 1969. A revised computer program for standardizing tree-ring series. *Tree-Ring Bulletin* 29: 15-20.

Graybill, D.A. 1982. Chronology development and analysis. *In* Hughes, M.K., Kelly, P.M, Pilcher J., LaMarche, Jr, V.C. (eds.), *Climate from tree rings*, p. 21-28. Cambridge University Press, Cambridge.

Grissino-Mayer, H.D. 1998. Dendroclimatic analysis of ponderosa pine and Douglas fir in the Central Colorado Front Range. World Wide Web homepage: URL: www.valdosta.edu/~grissino/nadef/1998/abstract.htm

Grove, J.M. 1988. *The Little Ice Age.* Methuen, London, 498 p.

Hodell, D.A., Curtis, J.A. Jones, G.A., Higuera-Gundy, A., Brenner, M., Binford, M.W. and Dorsey, K.T. 1991. Reconstruction of Caribbean climate change over the past 10,500 years. *Nature* 352: 790-793.

Jacoby, G.C. and Cook, E.R. 1981. Past temperature variations inferred from a 400-year tree-ring chronology from Yukon Territory, Canada. *Arctic and Alpine Research* 73: 409-418.

Karlen, W. and Kuylenstierna, J. 1996. On solar forcing of Holocene climate: evidence from Scandinavia. *Holocene* 6: 359-365.

Kellog, W.W. 1987. Mankind's impact on climate: the evolution of an awareness. *Climatic Change* 10: 113-136.

LaMarche, V.C. Jr. 1974. Paleoclimatic inferences from long tree records. *Science* 183: 1043-1048.

LaMarche, V.C. Jr. 1978. Tree-ring evidence of past climatic variability. *Nature: Climatology Supplement* 276: 3334-338.

LaMarche, V.C. Jr., and Stockton, C.W. 1974. Chronologies from temperature-sensitive bristlecone pines at upper timberline in western United States. *Tree-Ring Bulletin* 34: 21-45.

Leopold. E. B. 1953. Timberline growth rate and climatic correlations on Pikes Peak, Colorado (abstract). *Bulletin of the Ecological Society of America* 39: 90.

LeRoy Laudrie, E. 1971. *Times of feast, times of famine: a history of climate since the year 1000.* Doubleday, Garden City, NY, 426 p.

Luckman, B.H. 1993. Glacier fluctuation and tree-ring records for the last millennium in the Canadian Rockies. *Quaternary Science Reviews* 12: 441-450.

McAlpin, J. 1983. Quaternary geology and neotectonics of the west flank of the northern Sangre de Cristo Mountains, south-central Colorado. *Colorado School of Mines Quarterly* 77:1 -95.

Mills, M.J. 2000. Volcanic aerosol and global atmospheric effects. *In* Sigurdsson, H. (ed.) *Encyclopedia of Volcanoes*, p. 933. Academic Press, San Diego.

Mosley-Thompson, E. 1992. Paleoenvrionmental conditions in Antarctica since A.D. 1500: ice core evidence. *In* R.S. Bradley and P.D. Jones (eds.). *Climate since A.D. 1500,* p. 572-591. Routledge, New York.

Mutel, C.F. and Emerick, J.C. 1992. *From grassland to glacier: The natural history of Colorado and the surrounding region.* Johnson Books, Boulder, 290 p.

Newhall, C. and Dzurisin, G. 1988. Historical unrest at large calderas of the world. *U.S. Geological Survey, Bulletin 1855*, 1: 330-331.

Overpeck, J. and Rind, D. 1992. Modeling the possible causes of Little Ice Age cooling. *In* Mikiami, T. (ed.), *Proceedings of the International Conference on the Little Ice Age Climate*, p 331-336. Tokyo Metropolitan University.

Overpeck, J., Hughen, K., Hardy, D., Bradley, R., Case, R., Douglas, M., Finney, B. Gajewski, K. Jacoby, G., Jennings, A., Lamoureux, S., Lasca, A., MacDonald, G., Moore, J., Retelle, J., Smith, S., Wolfe, A. and Zelinski, G. 1997. Arctic environmental changes of the last four centuries. *Science* 278: 1251-1255.

Penn, B. and Lindsey, D. 1996. Teritary igneous rocks and Laramide structure and stratigraphy of the Spanish Peaks region, south-central, Colorado. *Open-file report 96-4, Colorado Geological Survey*, Denver, CO, 28 p.

Phipps, R. L. 1985. Collecting, preparing, crossdating, and measuring tree increment cores. *U.S. Geological Survey Water Resources Investigations Report* 85-4148. 48 p.

Ray, L. L. 1940. Glacial chronology of the southern Rocky Mountains. *Bulletin of the Geological Society of America* 51: 1885-1889.

Schweingruber, F.H. 1988. *Tree rings: basics and applications of dendrochronology.* Kluwer Academic Publishers, Dordrech, Holland, p 200-201.

Siebenthal, C.E. 1907. Notes on glaciation in the Sangre de Cristo Range, Colorado. *Journal of Geology* 15: 15-22.

Sigurdsson, H. 2000. Introduction. *In* Sigurdsson, H. (ed.) *Encyclopedia of Volcanoes*, p. 1090-91. Academic Press, San Diego.

Stokes, M. A. and Smiley, T. L. 1968. *An introduction to tree-ring dating*. University of Chicago Press, Chicago, 73 p.

Stommel, H. M. and Stommel, E. 1983. *Volcano Weather: the story of 1816 — the year without a summer*. Seven Seas Press, Newport, RI, 169 p.

Swetnam, T.W. 1986. Western spruce budworm outbreaks in northern New Mexico: tree-ring evidence of occurrence and radial growth impacts from 1700 to 1983. *In* Jacoby, G.C. Jr. and Hornbeck, J.W. (eds), *Proceedings of the International Symposium on Ecological Aspects of tree-ring analysis*, p 130-141. Marymount College, Tarrytown NY

Talma, A. and Vogel, J.C. 1992. Late Quaternary paleotemperatures derived from a speleothem from Cango Caves, Cape Province, South Africa. *Quaternary Research* 37: 303-310.

Thwaites, R.N. 1985. Trees, astronomy, ruins and isotopes. A review of dendrochronolgy and radiocarbon calibration relationship. *South African Forestry Journal* 117: 54-60.

Trefil, J. 1999. *Other worlds: Images of the cosmos from Earth and space.* National Geographic, Washington, D.C. p 40.

Vorren, K., Alm, R., and Morkved, B. 1996. Holocene pine (*Pinus sylvestris L.*) and grey alder (*Alnus incana* Moench.) immigration and areal oscillations in central Troms, northern Norway and their Palaeoclimatic implications. *Palaeoclimatic Research* 20: 271-291.

Wallace, A. R. and Lindsey, D. A. 1996. Geologic Map of the Trinchera Peak quadrangle, Costilla, Huerfano, and Las Animas Counties, Colorado. *U.S. Geological Survey Miscellaneous Field Studies Map* MF - 2283, scale 1:24,000.

Wigley, T. M. L. 1991. Climatic variability on the 10,000 year time scale: observations and possible causes. *In* Bradley, R.S. (ed.), *Global changes of the past,* p.83-102. UCAR, Office of Interdisciplinary Research, Boulder, CO.

Wood, F.B. 1988. The need for systems research on global climate change. *System Research* 5: 225-40.

APPENDICES

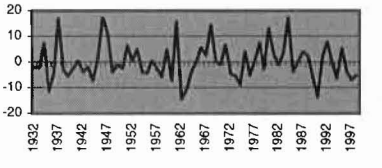
Tree-ring data sheet

24-Jan-00

Sample: 1C Count date 09-Sep-99

No	Year	Width	Trend	w/o Trend
1	1932	21	23.21905	-2.2190518
2	1933	21	23.40147	-2.40146859
3	1934	31	23.58389	7.416114614
4	1935	12	23.7663	-11.7663022
5	1936	19	23.94872	-4.94871897
6	1937	41	24.13114	16.86886423
7	1938	21	24.31355	-3.31355256
8	1939	19	24.49597	-5.49596935
9	1940	22	24.67839	-2.67838614
10	1941	25	24.8608	0.139197063
11	1942	21	25.04322	-4.04321973
12	1943	23	25.22564	-2.22563652
13	1944	18	25.40805	-7.40805332
14	1945	27	25.59047	1.409529891
15	1946	43	25.77289	17.2271131
16	1947	37	25.9553	11.0446963
17	1948	22	26.13772	-4.13772049
18	1949	25	26.32014	-1.32013728
19	1950	24	26.50255	-2.50255407
20	1951	33	26.68497	6.315029132
21	1952	27	26.86739	0.132612339
22	1953	32	27.0498	4.950195546
23	1954	23	27.23222	-4.23222125
24	1955	23	27.41464	-4.41463804
25	1956	28	27.59705	0.402945167
26	1957	25	27.77947	-2.77947163
27	1958	22	27.96189	-5.96188842
28	1959	33	28.14431	4.855694788
29	1960	21	28.32672	-7.326722
30	1961	44	28.50914	15.4908612
31	1962	14	28.69156	-14.6915556
32	1963	18	28.87397	-10.8739724
33	1964	25	29.05639	-4.05638918
34	1965	29	29.23881	-0.23880597
35	1966	35	29.42122	5.578777237
36	1967	32	29.60364	2.396360444
37	1968	44	29.78606	14.21394365
38	1969	30	29.96847	0.031526858
39	1970	29	30.15089	-1.15088994
40	1971	37	30.33331	6.666693272
41	1972	26	30.51572	-4.51572352
42	1973	25	30.69814	-5.69814031
43	1974	22	30.88056	-8.88055711
44	1975	35	31.06297	3.937026099
45	1976	26	31.24539	-5.24539069
46	1977	32	31.42781	0.572192513
47	1978	39	31.61022	7.38977572
48	1979	29	31.79264	-2.79264107
49	1980	45	31.97506	13.02494213

Descriptive Statistics	
Mean	29.23880597
Standard Error	0.978070159
Median	29
Mode	21
Standard Deviation	8.005849286
Sample Variance	64.0936228
Kurtosis	-0.261830171
Skewness	0.332808696
Range	38
Minimum	12
Maximum	50
Sum	1959
Count	67
Regression Statistics	
Multiple R	0.443975128
R Square	0.197113914
Adjusted R Square	0.184761821
Standard Error	7.228524632
Observations	67
Coefficients	
Intercept	23.03663501
X Variable 1	0.182416793
Standard Error	
1.786167481	
0.045664264	



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Blue Lakes campground, small lateral moraines between road and upper Blue Lake, Colorado
Species: blue spruce
Location: next to parking area
Elevation: 10,400 feet
Setting: side of lateral moraine
Slope aspect: steep, south facing
Drainage: excellent
Cirumferance: 63"
Comments: Good core. Isolated tree.

50	1981	35	32.15747	2.842525341
51	1982	31	32.33989	-1.33989145
52	1983	36	32.52231	3.477691755
53	1984	50	32.70473	17.29527496
54	1985	29	32.88714	-3.88714183
55	1986	33	33.06956	-0.06955862
56	1987	37	33.25198	3.748024583
57	1988	36	33.43439	2.56560779
58	1989	28	33.61681	-5.616809
59	1990	20	33.79923	-13.7992258
60	1991	36	33.98164	2.018357411
61	1992	42	34.16406	7.835940618
62	1993	34	34.34648	-0.34647618
63	1994	28	34.52889	-6.52889297
64	1995	40	34.71131	5.288690239
65	1996	31	34.89373	-3.89372655
66	1997	28	35.07614	-7.07614335
67	1998	30	35.25856	-5.25856014

Tree-ringdata sheet

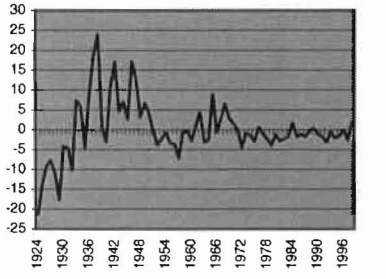
24-Jan-00

Sample: 2A Count date 09-Sep-99

No	Year	Width	Trend	w/o Trend
1	1924	23	44.27859649	-21.27859649
2	1925	30	43.76223803	-13.76223803
3	1926	34	43.24587956	-9.245879564
4	1927	35	42.7295211	-7.7295211
5	1928	31	42.21316264	-11.21316264
6	1929	24	41.69680417	-17.69680417
7	1930	37	41.18044571	-4.180445709
8	1931	36	40.66408725	-4.664087245
9	1932	30	40.14772878	-10.14772878
10	1933	47	39.63137032	7.368629682
11	1934	45	39.11501185	5.884988146
12	1935	34	38.59865339	-4.59865339
13	1936	47	38.08229493	8.917705073
14	1937	56	37.56593646	18.43406354
15	1938	61	37.049578	23.950422
16	1939	37	36.53321954	0.466780465
17	1940	33	36.01686107	-3.016861072
18	1941	46	35.50050261	10.49949739
19	1942	52	34.98414414	17.01585586
20	1943	39	34.46778568	4.53221432
21	1944	41	33.95142722	7.048572783
22	1945	36	33.43506875	2.564931247
23	1946	50	32.91871029	17.08128971
24	1947	45	32.40235183	12.59764817
25	1948	35	31.88599336	3.114006638
26	1949	38	31.3696349	6.630365102
27	1950	35	30.85327643	4.146723566
28	1951	30	30.33691797	-0.336917971
29	1952	26	29.82055951	-3.820559507
30	1953	27	29.30420104	-2.304201043
31	1954	28	28.78784258	-0.787842579
32	1955	25	28.27148412	-3.271484116
33	1956	24	27.75512565	-3.755125652
34	1957	20	27.23876719	-7.238767188
35	1958	26	26.72240872	-0.722408725
36	1959	26	26.20605026	-0.206050261
37	1960	23	25.6896918	-2.689691797
38	1961	26	25.17333333	0.826666667
39	1962	29	24.65697487	4.34302513
40	1963	21	24.14061641	-3.140616406
41	1964	21	23.62425794	-2.624257942
42	1965	32	23.10789948	8.892100522
43	1966	22	22.59154101	-0.591541015
44	1967	25	22.07518255	2.924817449
45	1968	28	21.55882409	6.441175913
46	1969	24	21.04246562	2.957534376
47	1970	22	20.52610716	1.47389284
48	1971	20	20.0097487	-0.009748696
49	1972	15	19.49339023	-4.493390232

Descriptive Statistics	
Mean	25.17333333
Standard Error	1.545044194
Median	24
Mode	26
Standard Deviation	13.38047522
Sample Variance	179.0371171
Kurtosis	-0.334949772
Skewness	0.503788287
Range	57
Minimum	4
Maximum	61
Sum	1888
Count	75
Regression Statistics	
Multiple R	0.841059202
R Square	0.707380581
Adjusted R Square	0.703372096
Standard Error	7.287482747
Observations	75
Coefficients	
Intercept	44.79495495
X Variable 1	-0.516358464

Standard Error
1.699943626
0.03887003



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Blue Lakes campground, small lateral moraines between road and upper Blue Lake, Colorado
Species: blue spruce
Location: next to upper Blue Lake
Elevation: 10,400 feet
Setting: crest of lateral moraine
Slope aspect: moderate, north facing
Drainage: good
Clrumferance: 58"
Comments: Good core. Dense custer of spruce trees.

50	1973	18	18.97703177	-0.977031769
51	1974	17	18.4606733	-1.460673305
52	1975	15	17.94431484	-2.944314841
53	1976	18	17.42795638	0.572043623
54	1977	16	16.91159791	-0.911597914
55	1978	14	16.39523945	-2.39523945
56	1979	12	15.87888099	-3.878880986
57	1980	14	15.36252252	-1.362522523
58	1981	12	14.84616406	-2.846164059
59	1982	12	14.3298056	-2.329805595
60	1983	12	13.81344713	-1.813447131
61	1984	15	13.29708867	1.702911332
62	1985	11	12.7807302	-1.780730204
63	1986	11	12.26437174	-1.26437174
64	1987	10	11.74801328	-1.748013276
65	1988	11	11.23165481	-0.231654813
66	1989	11	10.71529635	0.284703651
67	1990	9	10.19893789	-1.198937885
68	1991	8	9.682579422	-1.682579422
69	1992	6	9.166220958	-3.166220958
70	1993	8	8.649862494	-0.649862494
71	1994	6	8.13350403	-2.13350403
72	1995	6	7.617145567	-1.617145567
73	1996	7	7.100787103	-0.100787103
74	1997	4	6.584428639	-2.584428639
75	1998	8	6.068070175	1.931929825

Tree-ring data sheet

24-Jan-00

Sample: 2B Count date 09-Sep-99

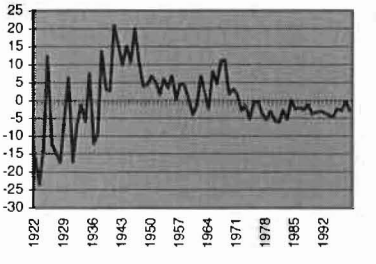
No	Year	Width	Trend	w/o Trend
1	1922	25	41.002997	-16.002997
2	1923	17	40.58254903	-23.58254903
3	1924	27	40.16210106	-13.16210106
4	1925	52	39.74165308	12.25834692
5	1926	27	39.32120511	-12.32120511
6	1927	24	38.90075714	-14.90075714
7	1928	21	38.48030916	-17.48030916
8	1929	33	38.05986119	-5.059861191
9	1930	44	37.63941322	6.360586782
10	1931	20	37.21896525	-17.21896525
11	1932	30	36.79851727	-6.798517272
12	1933	35	36.3780693	-1.378069299
13	1934	30	35.95762133	-5.957621326
14	1935	43	35.53717335	7.462826647
15	1936	23	35.11672538	-12.11672538
16	1937	25	34.69627741	-9.696277407
17	1938	48	34.27582943	13.72417057
18	1939	37	33.85538146	3.144618539
19	1940	36	33.43493349	2.565066512
20	1941	54	33.01448551	20.98551449
21	1942	48	32.59403754	15.40596246
22	1943	42	32.17358957	9.826410432
23	1944	47	31.7531416	15.2468584
24	1945	42	31.33269362	10.66730638
25	1946	51	30.91224565	20.08775435
26	1947	41	30.49179768	10.50820232
27	1948	34	30.0713497	3.928650297
28	1949	34	29.65090173	4.34909827
29	1950	36	29.23045376	6.769546243
30	1951	34	28.81000578	5.189994216
31	1952	30	28.38955781	1.610442189
32	1953	34	27.96910984	6.030890162
33	1954	31	27.54866186	3.451338136
34	1955	34	27.12821389	6.871786109
35	1956	27	26.70776592	0.292234082
36	1957	31	26.28731795	4.712682055
37	1958	30	25.86686997	4.133130028
38	1959	26	25.446422	0.553578001
39	1960	21	25.02597403	-4.025974026
40	1961	23	24.60552605	-1.605526053
41	1962	31	24.18507808	6.81492192
42	1963	26	23.76463011	2.235369893
43	1964	21	23.34418213	-2.344182134
44	1965	31	22.92373416	8.076265839
45	1966	27	22.50328619	4.496713813
46	1967	33	22.08283821	10.91716179
47	1968	33	21.66239024	11.33760976
48	1969	23	21.24194227	1.758057732
49	1970	24	20.8214943	3.178505705

Descriptive Statistics	
Mean	25.02597403
Standard Error	1.439124015
Median	25
Mode	34
Standard Deviation	12.62826198
Sample Variance	159.4730007
Kurtosis	-0.687441904
Skewness	0.352201044
Range	48
Minimum	6
Maximum	54
Sum	1927
Count	77

Regression Statistics	
Multiple R	0.744853257
R Square	0.554806374
Adjusted R Square	0.548870459
Standard Error	8.481920866
Observations	77

Coefficients	
Intercept	41.42344498
X Variable 1	-0.420447973

Standard Error
1.952193689
0.043489597



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Blue Lakes campground, small lateral moraines between road and upper Blue Lake, Colorado
Species: blue spruce
Location: next to upper Blue Lake
Elevation: 10,400
Setting: crest of lateral moraine
Slope aspect: moderate, north facing
Drainage: good
Cirumferance: 58"
Comments: Good core. Dense custer of spruce trees. Core easy to see

50	1971	22	20.40104632	1.598953678
51	1972	17	19.98059835	-2.980598349
52	1973	18	19.56015038	-1.560150376
53	1974	14	19.1397024	-5.139702403
54	1975	18	18.71925443	-0.71925443
55	1976	18	18.29880646	-0.298806457
56	1977	14	17.87835848	-3.878358484
57	1978	12	17.45791051	-5.457910511
58	1979	14	17.03746254	-3.037462537
59	1980	11	16.61701456	-5.617014564
60	1981	10	16.19656659	-6.196566591
61	1982	13	15.77611862	-2.776118618
62	1983	10	15.35567065	-5.355670645
63	1984	15	14.93522267	0.064777328
64	1985	12	14.5147747	-2.514774699
65	1986	12	14.09432673	-2.094326726
66	1987	11	13.67387875	-2.673878753
67	1988	12	13.25343078	-1.25343078
68	1989	9	12.83298281	-3.832982807
69	1990	9	12.41253483	-3.412534834
70	1991	9	11.99208686	-2.992086861
71	1992	8	11.57163889	-3.571638887
72	1993	7	11.15119091	-4.151190914
73	1994	6	10.73074294	-4.730742941
74	1995	8	10.31029497	-2.310294968
75	1996	7	9.889846995	-2.889846995
76	1997	9	9.469399022	-0.469399022
77	1998	6	9.048951049	-3.048951049

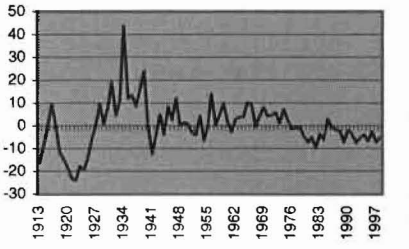
Tree-ring data sheet

25-Jan-00

Sample: 3A Count Date 10-Sep-99

No	Year	Width	Trend	w/o Trend
1	1913	20	36.17562149	-16.17562149
2	1914	27	35.94002547	-8.940025473
3	1915	35	35.70442945	-0.704429454
4	1916	45	35.46883344	9.531166564
5	1917	36	35.23323742	0.766762583
6	1918	23	34.9976414	-11.9976414
7	1919	20	34.76204538	-14.76204538
8	1920	16	34.52644936	-18.52644936
9	1921	11	34.29085334	-23.29085334
10	1922	10	34.05525732	-24.05525732
11	1923	16	33.8196613	-17.8196613
12	1924	14	33.58406529	-19.58406529
13	1925	19	33.34846927	-14.34846927
14	1926	27	33.11287325	-6.112873249
15	1927	33	32.87727723	0.12272277
16	1928	42	32.64168121	9.358318789
17	1929	33	32.40608519	0.593914807
18	1930	40	32.17048917	7.829510826
19	1931	51	31.93489316	19.06510684
20	1932	36	31.69929714	4.300702863
21	1933	42	31.46370112	10.53629888
22	1934	75	31.2281051	43.7718949
23	1935	43	30.99250908	12.00749092
24	1936	44	30.75691306	13.24308694
25	1937	39	30.52131704	8.478682957
26	1938	46	30.28572102	15.71427898
27	1939	54	30.05012501	23.94987499
28	1940	30	29.81452899	0.185471013
29	1941	17	29.57893297	-12.57893297
30	1942	25	29.34333695	-4.34333695
31	1943	34	29.10774093	4.892259069
32	1944	25	28.87214491	-3.872144912
33	1945	37	28.63654889	8.363451106
34	1946	31	28.40095288	2.599047125
35	1947	40	28.16535686	11.83464314
36	1948	28	27.92976084	0.070239162
37	1949	29	27.69416482	1.305835181
38	1950	28	27.4585688	0.5414312
39	1951	24	27.22297278	-3.222972782
40	1952	23	26.98737676	-3.987376763
41	1953	31	26.75178074	4.248219256
42	1954	20	26.51618473	-6.516184726
43	1955	26	26.28058871	-0.280588707
44	1956	40	26.04499269	13.95500731
45	1957	26	25.80939667	0.19060333
46	1958	30	25.57380065	4.426199349
47	1959	35	25.33820463	9.661795368
48	1960	27	25.10260861	1.897391386
49	1961	22	24.86701259	-2.867012595

Descriptive Statistics	
Mean	26.1627907
Standard Error	1.269106827
Median	26
Mode	27
Standard Deviation	11.76921254
Sample Variance	138.5143639
Kurtosis	2.340148682
Skewness	1.064034513
Range	66
Minimum	9
Maximum	75
Sum	2250
Count	86
Regression Statistics	
Multiple R	0.499848934
R Square	0.249848957
Adjusted R Square	0.240918587
Standard Error	10.25395919
Observations	86
Coefficients	
Intercept	36.41121751
X Variable 1	-0.235596019
Standard Error	
2.230852958	
0.044541403	



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Blue Lakes campground, small lateral moraines between road and upper Blue Lake, Colorado
Species: blue spruce
Location: next to upper Blue Lake
Elevation: 10,400 feet
Setting: crest of lateral moraine
Slope aspect: moderate, south facing
Drainage: good
Cirumferance: 54"
Comments: Good core. One of "twin" trees.

50	1962	27	24.63141658	2.368583424
51	1963	28	24.39582056	3.604179442
52	1964	28	24.16022454	3.839775461
53	1965	34	23.92462852	10.07537148
54	1966	33	23.6890325	9.310967498
55	1967	23	23.45343648	-0.453436483
56	1968	27	23.21784046	3.782159536
57	1969	31	22.98224445	8.017755555
58	1970	27	22.74664843	4.253351573
59	1971	27	22.51105241	4.488947592
60	1972	28	22.27545639	5.724543611
61	1973	23	22.03986037	0.960139629
62	1974	29	21.80426435	7.195735648
63	1975	24	21.56866833	2.431331667
64	1976	20	21.33307231	-1.333072315
65	1977	20	21.0974763	-1.097476296
66	1978	20	20.86188028	-0.861880277
67	1979	16	20.62628426	-4.626284259
68	1980	13	20.39068824	-7.39068824
69	1981	15	20.15509222	-5.155092221
70	1982	10	19.9194962	-9.919496203
71	1983	16	19.68390018	-3.683900184
72	1984	13	19.44830417	-6.448304165
73	1985	22	19.21270815	2.787291853
74	1986	18	18.97711213	-0.977112128
75	1987	17	18.74151611	-1.741516109
76	1988	16	18.50592009	-2.505920091
77	1989	11	18.27032407	-7.270324072
78	1990	16	18.03472805	-2.034728053
79	1991	14	17.79913203	-3.799132035
80	1992	10	17.56353602	-7.563536016
81	1993	12	17.32794	-5.327939997
82	1994	13	17.09234398	-4.092343978
83	1995	10	16.85674796	-6.85674796
84	1996	14	16.62115194	-2.621151941
85	1997	9	16.38555592	-7.385555922
86	1998	11	16.1499599	-5.149959904

Tree-ring count

25-Jan-00

Sample: 3B Count Date 10-Sep-99

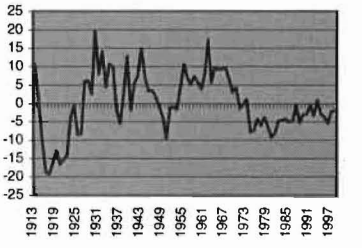
No	Year	Width	Trend	w/o Trend
1	1913	42	31.36968725	10.63031275
2	1914	33	31.12952498	1.870475022
3	1915	21	30.88936271	-9.889362706
4	1916	12	30.64920043	-18.64920043
5	1917	11	30.40903816	-19.40903816
6	1918	14	30.16887589	-16.16887589
7	1919	17	29.92871362	-12.92871362
8	1920	13	29.68855135	-16.68855135
9	1921	14	29.44838907	-15.44838907
10	1922	15	29.2082268	-14.2082268
11	1923	25	28.96806453	-3.968064531
12	1924	28	28.72790226	-0.72790226
13	1925	20	28.48773999	-8.487739988
14	1926	20	28.24757772	-8.247577716
15	1927	34	28.00741544	5.992584556
16	1928	34	27.76725317	6.232746828
17	1929	30	27.5270909	2.472909099
18	1930	47	27.28692863	19.71307137
19	1931	35	27.04676636	7.953233643
20	1932	41	26.80660409	14.19339591
21	1933	31	26.56644181	4.433558187
22	1934	37	26.32627954	10.67372046
23	1935	36	26.08611727	9.91388273
24	1936	24	25.845955	-1.845954998
25	1937	20	25.60579273	-5.605792726
26	1938	28	25.36563045	2.634369546
27	1939	38	25.12546818	12.87453182
28	1940	23	24.88530591	-1.885305911
29	1941	30	24.64514364	5.354856361
30	1942	32	24.40498137	7.595018633
31	1943	39	24.1648191	14.8351809
32	1944	31	23.92465682	7.075343177
33	1945	27	23.68449455	3.315505448
34	1946	27	23.44433228	3.55566772
35	1947	25	23.20417001	1.795829992
36	1948	22	22.96400774	-0.964007736
37	1949	19	22.72384546	-3.723845464
38	1950	13	22.48368319	-9.483683193
39	1951	21	22.24352092	-1.243520921
40	1952	21	22.00335865	-1.003358649
41	1953	20	21.76319638	-1.763196377
42	1954	26	21.52303411	4.476965895
43	1955	32	21.28287183	10.71712817
44	1956	28	21.04270956	6.957290438
45	1957	26	20.80254729	5.19745271
46	1958	28	20.56238502	7.437614982
47	1959	26	20.32222275	5.677777254
48	1960	24	20.08206047	3.917939525
49	1961	28	19.8418982	8.158101797

Descriptive Statistics	
Mean	21.1627907
Standard Error	1.092927201
Median	21
Mode	9
Standard Deviation	10.13538991
Sample Variance	102.7261286
Kurtosis	-0.83434715
Skewness	0.32009363
Range	41
Minimum	6
Maximum	47
Sum	1820
Count	86

Regression Statistics	
Multiple R	0.59167409
R Square	0.350078229
Adjusted R Square	0.342341065
Standard Error	8.219413383
Observations	86

Coefficients	
Intercept	31.60984952
X Variable 1	-0.24016227

Standard Error
1.788216855
0.035703692



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Blue Lakes campground, small lateral moraines between road and upper Blue Lake, Colorado
Species: blue spruce
Location: next to upper Blue Lake
Elevation: 10,400 feet
Setting: crest of lateral moraine
Slope aspect: moderate, south facing
Drainage: good
Cirumferance: 54"
Comments: Good core. One of "twin" trees. Had to use furniture polish -- center of core hard to discern

50	1962	37	19.60173593	17.39826407
51	1963	25	19.36157366	5.638426341
52	1964	29	19.12141139	9.878588613
53	1965	28	18.88124912	9.118750884
54	1966	28	18.64108684	9.358913156
55	1967	28	18.40092457	9.599075428
56	1968	25	18.1607623	6.8392377
57	1969	21	17.92060003	3.079399972
58	1970	22	17.68043776	4.319562244
59	1971	16	17.44027548	-1.440275485
60	1972	17	17.20011321	-0.200113213
61	1973	18	16.95995094	1.040049059
62	1974	9	16.71978867	-7.719788669
63	1975	9	16.4796264	-7.479626397
64	1976	12	16.23946413	-4.239464126
65	1977	10	15.99930185	-5.999301854
66	1978	12	15.75913958	-3.759139582
67	1979	9	15.51897731	-6.51897731
68	1980	6	15.27881504	-9.278815038
69	1981	7	15.03865277	-8.038652767
70	1982	10	14.79849049	-4.798490495
71	1983	10	14.55832822	-4.558328223
72	1984	10	14.31816595	-4.318165951
73	1985	9	14.07800368	-5.078003679
74	1986	9	13.83784141	-4.837841408
75	1987	13	13.59767914	-0.597679136
76	1988	8	13.35751686	-5.357516864
77	1989	10	13.11735459	-3.117354592
78	1990	10	12.87719232	-2.87719232
79	1991	12	12.63703005	-0.637030049
80	1992	9	12.39686778	-3.396867777
81	1993	13	12.1567055	0.843294495
82	1994	9	11.91654323	-2.916543233
83	1995	8	11.67638096	-3.676380961
84	1996	6	11.43621869	-5.43621869
85	1997	9	11.19605642	-2.196056418
86	1998	9	10.95589415	-1.955894146

Tree-ring data sheet

25-Jan-00

Sample: 4A Count Date 10-Sep-99

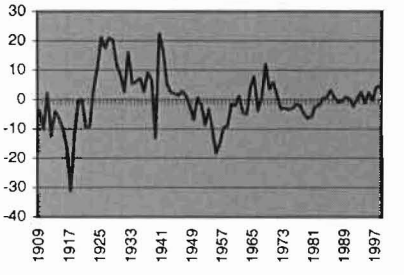
No	Year	Width	Trend	w/o Trend
1	1909	40	43.5973138	-3.597313797
2	1910	33	43.17914695	-10.17914695
3	1911	45	42.76098009	2.239019906
4	1912	30	42.34281324	-12.34281324
5	1913	38	41.92464639	-3.92464639
6	1914	35	41.50647954	-6.506479538
7	1915	31	41.08831269	-10.08831269
8	1916	24	40.67014583	-16.67014583
9	1917	9	40.25197898	-31.25197898
10	1918	28	39.83381213	-11.83381213
11	1919	39	39.41564528	-0.415645279
12	1920	39	38.99747843	0.002521573
13	1921	29	38.57931157	-9.579311575
14	1922	29	38.16114472	-9.161144723
15	1923	41	37.74297787	3.257022129
16	1924	48	37.32481102	10.67518898
17	1925	58	36.90664417	21.09335583
18	1926	54	36.48847732	17.51152268
19	1927	57	36.07031046	20.92968954
20	1928	56	35.65214361	20.34785639
21	1929	47	35.23397676	11.76602324
22	1930	43	34.81580991	8.184190092
23	1931	37	34.39764306	2.602356944
24	1932	50	33.9794762	16.0205238
25	1933	39	33.56130935	5.438690648
26	1934	39	33.1431425	5.8568575
27	1935	40	32.72497565	7.275024351
28	1936	35	32.3068088	2.693191203
29	1937	41	31.88864194	9.111358055
30	1938	38	31.47047509	6.529524907
31	1939	18	31.05230824	-13.05230824
32	1940	53	30.63414139	22.36585861
33	1941	47	30.21597454	16.78402546
34	1942	35	29.79780769	5.202192315
35	1943	32	29.37964083	2.620359166
36	1944	31	28.96147398	2.038526018
37	1945	30	28.54330713	1.45669287
38	1946	31	28.12514028	2.874859722
39	1947	29	27.70697343	1.293026574
40	1948	25	27.28880657	-2.288806574
41	1949	20	26.87063972	-6.870639722
42	1950	27	26.45247287	0.54752713
43	1951	24	26.03430602	-2.034306019
44	1952	17	25.61613917	-8.616139167
45	1953	22	25.19797231	-3.197972315
46	1954	15	24.77980546	-9.779805463
47	1955	6	24.36163861	-18.36163861
48	1956	9	23.94347176	-14.94347176
49	1957	14	23.52530491	-9.525304907

Descriptive Statistics	
Mean	24.98888889
Standard Error	1.482944606
Median	22.5
Mode	11
Standard Deviation	14.0684478
Sample Variance	197.9212235
Kurtosis	-0.666559596
Skewness	0.589175135
Range	52
Minimum	6
Maximum	58
Sum	2249
Count	90

Regression Statistics	
Multiple R	0.776523758
R Square	0.602989147
Adjusted R Square	0.59847766
Standard Error	8.914583154
Observations	90

Coefficients	
Intercept	44.01548065
X Variable 1	-0.418166852

Standard Error
1.895130266
0.036170516



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Blue Lakes campground, small lateral moraines between road and upper Blue Lake, Colorado
Species: blue spruce
Location: next to upper Blue Lake
Elevation: 10,400 feet
Setting: crest of lateral moraine
Slope aspect: moderate, south facing
Drainage: good
Cirumferance: 60"
Comments: Good core. One of "twin" trees.

50	1958	14	23.10713806	-9.107138055
51	1959	21	22.6889712	-1.688971204
52	1960	20	22.27080435	-2.270804352
53	1961	23	21.8526375	1.1473625
54	1962	17	21.43447065	-4.434470648
55	1963	16	21.0163038	-5.016303796
56	1964	25	20.59813694	4.401863056
57	1965	28	20.17997009	7.820029908
58	1966	16	19.76180324	-3.76180324
59	1967	20	19.34363639	0.656363611
60	1968	31	18.92546954	12.07453046
61	1969	22	18.50730268	3.492697315
62	1970	24	18.08913583	5.910864167
63	1971	19	17.67096898	1.329031019
64	1972	14	17.25280213	-3.252802129
65	1973	14	16.83463528	-2.834635277
66	1974	13	16.41646843	-3.416468425
67	1975	13	15.99830157	-2.998301574
68	1976	14	15.58013472	-1.580134722
69	1977	13	15.16196787	-2.16196787
70	1978	10	14.74380102	-4.743801018
71	1979	8	14.32563417	-6.325634166
72	1980	8	13.90746731	-5.907467314
73	1981	11	13.48930046	-2.489300462
74	1982	11	13.07113361	-2.07113361
75	1983	13	12.65296676	0.347033241
76	1984	13	12.23479991	0.765200093
77	1985	15	11.81663305	3.183366945
78	1986	12	11.3984662	0.601533797
79	1987	10	10.98029935	-0.980299351
80	1988	10	10.5621325	-0.562132499
81	1989	11	10.14396565	0.856034353
82	1990	10	9.725798795	0.274201205
83	1991	7	9.307631944	-2.307631944
84	1992	9	8.889465092	0.110534908
85	1993	11	8.47129824	2.52870176
86	1994	7	8.053131388	-1.053131388
87	1995	10	7.634964536	2.365035464
88	1996	7	7.216797684	-0.216797684
89	1997	11	6.798630832	4.201369168
90	1998	11	6.38046398	4.61953602

Tree-ring data sheet

26-Jan-00

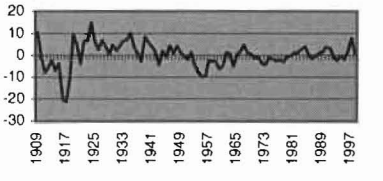
Sample: 4B Count Date 13-Sep-99

No	Year	Width	Trend	w/o Trend
1	1909	42	31.59194139	10.40805861
2	1910	31	31.29324608	-0.29324608
3	1911	23	30.99455077	-7.994550768
4	1912	25	30.69585546	-5.695855455
5	1913	28	30.39716014	-2.397160143
6	1914	23	30.09846483	-7.098464831
7	1915	26	29.79976952	-3.799769519
8	1916	9	29.50107421	-20.50107421
9	1917	8	29.20237889	-21.20237889
10	1918	18	28.90368358	-10.90368358
11	1919	38	28.60498827	9.39501173
12	1920	33	28.30629296	4.693707042
13	1921	24	28.00759765	-4.007597646
14	1922	34	27.70890233	6.291097666
15	1923	34	27.41020702	6.589792979
16	1924	42	27.11151171	14.88848829
17	1925	33	26.8128164	6.187183603
18	1926	29	26.51412108	2.485878915
19	1927	33	26.21542577	6.784574227
20	1928	30	25.91673046	4.083269539
21	1929	26	25.61803515	0.381964852
22	1930	30	25.31933984	4.680660164
23	1931	27	25.02064452	1.979355476
24	1932	29	24.72194921	4.278050788
25	1933	31	24.4232539	6.5767461
26	1934	31	24.12455859	6.875441413
27	1935	34	23.82586328	10.17413672
28	1936	27	23.52716796	3.472832037
29	1937	24	23.22847265	0.771527349
30	1938	20	22.92977734	-2.929777339
31	1939	31	22.63108203	8.368917973
32	1940	28	22.33238671	5.667613286
33	1941	26	22.0336914	3.966308598
34	1942	23	21.73499609	1.26500391
35	1943	17	21.43630078	-4.436300778
36	1944	23	21.13760547	1.862394534
37	1945	20	20.83891015	-0.838910154
38	1946	25	20.54021484	4.459785159
39	1947	21	20.24151953	0.758480471
40	1948	24	19.94282422	4.057175783
41	1949	21	19.6441289	1.355871095
42	1950	19	19.34543359	-0.345433593
43	1951	17	19.04673828	-2.04673828
44	1952	20	18.74804297	1.251957032
45	1953	14	18.44934766	-4.449347656
46	1954	10	18.15065234	-8.150652344
47	1955	8	17.85195703	-9.851957032
48	1956	8	17.55326172	-9.55326172
49	1957	15	17.25456641	-2.254566407

Descriptive Statistics	
Mean	18.3
Standard Error	1.016155394
Median	16
Mode	9
Standard Deviation	9.640096508
Sample Variance	92.93146067
Kurtosis	-0.764255971
Skewness	0.531535698
Range	38
Minimum	4
Maximum	42
Sum	1647
Count	90

Regression Statistics	
Multiple R	0.809465517
R Square	0.655234424
Adjusted R Square	0.651316633
Standard Error	5.692420802
Observations	90

Coefficients	
Intercept	31.8906367
X Variable 1	-0.298695312
Standard Error	
1.21013835	
0.023096739	



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Blue Lakes campground, small lateral moraines between road and upper Blue Lake, Colorado
Species: blue spruce
Location: next to upper Blue Lake
Elevation: 10,400 feet
Setting: crest of lateral moraine
Slope aspect: moderate, south facing
Drainage: good
Cirumferance: 60"
Comments: Good core. One of "twin" trees.

50	1958	14	16.9558711	-2.955871095
51	1959	14	16.65717578	-2.657175783
52	1960	10	16.35848047	-6.358480471
53	1961	11	16.05978516	-5.059785159
54	1962	17	15.76108985	1.238910154
55	1963	16	15.46239453	0.537605466
56	1964	10	15.16369922	-5.163699222
57	1965	15	14.86500391	0.13499609
58	1966	16	14.5663086	1.433691402
59	1967	19	14.26761329	4.732386714
60	1968	15	13.96891797	1.031082027
61	1969	14	13.67022266	0.329777339
62	1970	12	13.37152735	-1.371527349
63	1971	12	13.07283204	-1.072832037
64	1972	9	12.77413672	-3.774136725
65	1973	8	12.47544141	-4.475441413
66	1974	11	12.1767461	-1.1767461
67	1975	10	11.87805079	-1.878050788
68	1976	9	11.57935548	-2.579355476
69	1977	9	11.28066016	-2.280660164
70	1978	8	10.98196485	-2.981964852
71	1979	10	10.68326954	-0.683269539
72	1980	10	10.38457423	-0.384574227
73	1981	11	10.08587892	0.914121085
74	1982	11	9.787183603	1.212816397
75	1983	12	9.488488291	2.511511709
76	1984	13	9.189792979	3.810207021
77	1985	9	8.891097666	0.108902334
78	1986	7	8.592402354	-1.592402354
79	1987	8	8.293707042	-0.293707042
80	1988	9	7.99501173	1.00498827
81	1989	9	7.696316418	1.303683582
82	1990	11	7.397621105	3.602378895
83	1991	10	7.098925793	2.901074207
84	1992	6	6.800230481	-0.800230481
85	1993	4	6.501535169	-2.501535169
86	1994	6	6.202839857	-0.202839857
87	1995	4	5.904144545	-1.904144545
88	1996	7	5.605449232	1.394550768
89	1997	13	5.30675392	7.69324608
90	1998	6	5.008058608	0.991941392

50	1966	16	21.43908969	-5.439089692
51	1967	19	20.88386065	-1.883860646
52	1968	31	20.3286316	10.6713684
53	1969	19	19.77340255	-0.773402553
54	1970	20	19.21817351	0.781826493
55	1971	17	18.66294446	-1.662944461
56	1972	21	18.10771541	2.892284585
57	1973	24	17.55248637	6.447513632
58	1974	15	16.99725732	-1.997257322
59	1975	20	16.44202828	3.557971724
60	1976	19	15.88679923	3.113200771
61	1977	15	15.33157018	-0.331570183
62	1978	12	14.77634114	-2.776341137
63	1979	12	14.22111209	-2.221112091
64	1980	10	13.66588304	-3.665883044
65	1981	10	13.110654	-3.110653998
66	1982	10	12.55542495	-2.555424952
67	1983	11	12.00019591	-1.000195906
68	1984	13	11.44496686	1.555033141
69	1985	11	10.88973781	0.110262187
70	1986	13	10.33450877	2.665491233
71	1987	12	9.779279721	2.220720279
72	1988	10	9.224050674	0.775949326
73	1989	12	8.668821628	3.331178372
74	1990	10	8.113592582	1.886407418
75	1991	9	7.558363535	1.441636465
76	1992	11	7.003134489	3.996865511
77	1993	13	6.447905443	6.552094557
78	1994	11	5.892676397	5.107323603
79	1995	12	5.33744735	6.66255265
80	1996	11	4.782218304	6.217781696
81	1997	8	4.226989258	3.773010742
82	1998	5	3.671760212	1.328239788

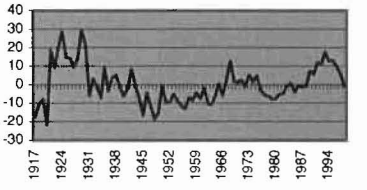
Tree-ring data sheet

26-Jan-00

Sample: 5B Count Date 14-Sep-99

No	Year	Width	Trend	w/o Trend
1	1917	23	40.65089627	-17.65089627
2	1918	30	40.33340952	-10.33340952
3	1919	32	40.01592277	-8.01592277
4	1920	18	39.69843602	-21.69843602
5	1921	58	39.38094927	18.61905073
6	1922	48	39.06346252	8.936537478
7	1923	59	38.74597577	20.25402423
8	1924	67	38.42848902	28.57151098
9	1925	53	38.11100227	14.88899773
10	1926	52	37.79351553	14.20648447
11	1927	47	37.47602878	9.523971224
12	1928	51	37.15854203	13.84145797
13	1929	66	36.84105528	29.15894472
14	1930	58	36.52356853	21.47643147
15	1931	30	36.20608178	-6.20608178
16	1932	39	35.88859503	3.111404969
17	1933	34	35.57110828	-1.571108281
18	1934	28	35.25362153	-7.253621532
19	1935	44	34.93613478	9.063865217
20	1936	31	34.61864803	-3.618648034
21	1937	38	34.30116128	3.698838715
22	1938	39	33.98367454	5.016325464
23	1939	32	33.66618779	-1.666187786
24	1940	27	33.34870104	-6.348701037
25	1941	31	33.03121429	-2.031214288
26	1942	41	32.71372754	8.286272461
27	1943	32	32.39624079	-0.39624079
28	1944	24	32.07875404	-8.078754041
29	1945	15	31.76126729	-16.76126729
30	1946	27	31.44378054	-4.443780542
31	1947	20	31.12629379	-11.12629379
32	1948	12	30.80880704	-18.80880704
33	1949	15	30.49132029	-15.49132029
34	1950	29	30.17383355	-1.173833546
35	1951	20	29.8563468	-9.856346796
36	1952	20	29.53886005	-9.538860047
37	1953	24	29.2213733	-5.221373298
38	1954	20	28.90388655	-8.903886549
39	1955	17	28.5863998	-11.5863998
40	1956	15	28.26891305	-13.26891305
41	1957	21	27.9514263	-6.951426301
42	1958	19	27.63393955	-8.633939552
43	1959	23	27.3164528	-4.316452803
44	1960	19	26.99896605	-7.998966054
45	1961	25	26.6814793	-1.681479305
46	1962	16	26.36399256	-10.36399256
47	1963	15	26.04650581	-11.04650581
48	1964	19	25.72901906	-6.729019057
49	1965	26	25.41153231	0.588467692

Descriptive Statistics	
Mean	27.79268293
Standard Error	1.422042016
Median	25
Mode	15
Standard Deviation	12.87713813
Sample Variance	165.8206865
Kurtosis	1.319150241
Skewness	1.333642562
Range	55
Minimum	12
Maximum	67
Sum	2279
Count	82
Regression Statistics	
Multiple R	0.587166945
R Square	0.344765022
Adjusted R Square	0.336574584
Standard Error	10.48854889
Observations	82
Coefficients	
Intercept	40.96838302
X Variable 1	-0.31748675
Standard Error	
2.337883906	
0.04893477	



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Blue Lakes campground, around head of lower Blue Lake, Colorado. Dense tree growth.
Species: Douglas fir
Location: above head of lower Blue Lake
Elevation: 10,360 feet
Setting: several meters above lake surface
Slope aspect: steep, eastward
Drainage: good
Cirumferance: 70"
Comments: Good core, next to drainage channel.
Core not found (matched to 5A)

50	1966	19	25.09404556	-6.094045559
51	1967	27	24.77655881	2.22344119
52	1968	37	24.45907206	12.54092794
53	1969	26	24.14158531	1.858414689
54	1970	25	23.82409856	1.175901438
55	1971	26	23.50661181	2.493388187
56	1972	22	23.18912506	-1.189125064
57	1973	28	22.87163831	5.128361685
58	1974	24	22.55415157	1.445848434
59	1975	27	22.23666482	4.763335184
60	1976	19	21.91917807	-2.919178067
61	1977	16	21.60169132	-5.601691318
62	1978	15	21.28420457	-6.284204569
63	1979	13	20.96671782	-7.96671782
64	1980	13	20.64923107	-7.649231071
65	1981	15	20.33174432	-5.331744321
66	1982	15	20.01425757	-5.014257572
67	1983	19	19.69677082	-0.696770823
68	1984	20	19.37928407	0.620715926
69	1985	15	19.06179732	-4.061797325
70	1986	18	18.74431058	-0.744310576
71	1987	17	18.42682383	-1.426823826
72	1988	17	18.10933708	-1.109337077
73	1989	25	17.79185033	7.208149672
74	1990	23	17.47436358	5.525636421
75	1991	29	17.15687683	11.84312317
76	1992	28	16.83939008	11.16060992
77	1993	34	16.52190333	17.47809667
78	1994	29	16.20441658	12.79558342
79	1995	29	15.88692983	13.11307017
80	1996	25	15.56944308	9.430556916
81	1997	21	15.25195633	5.748043665
82	1998	14	14.93446959	-0.934469586

Tree-ring data sheet

26-Jan-00

Sample: 6A Count Date 14-Sep-99

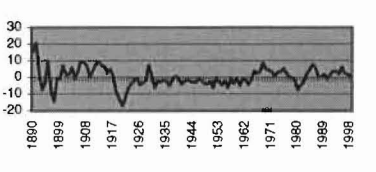
No	Year	Width	Trend	w/o Trend
1	1890	49	33.40550459	15.59449541
2	1891	54	33.16167176	20.83832824
3	1892	35	32.91783894	2.08216106
4	1893	25	32.67400612	-7.674006116
5	1894	29	32.43017329	-3.430173293
6	1895	42	32.18634047	9.813659531
7	1896	23	31.94250765	-8.942507645
8	1897	17	31.69867482	-14.69867482
9	1898	31	31.454842	-0.454841998
10	1899	30	31.21100917	-1.211009174
11	1900	38	30.96717635	7.032823649
12	1901	32	30.72334353	1.276656473
13	1902	32	30.4795107	1.520489297
14	1903	36	30.23567788	5.76432212
15	1904	29	29.99184506	-0.991845056
16	1905	33	29.74801223	3.251987768
17	1906	39	29.50417941	9.495820591
18	1907	38	29.26034659	8.739653415
19	1908	36	29.01651376	6.983486239
20	1909	29	28.77268094	0.227319062
21	1910	32	28.52884811	3.471151886
22	1911	36	28.28501529	7.714984709
23	1912	37	28.04118247	8.958817533
24	1913	35	27.79734964	7.202650357
25	1914	34	27.55351682	6.44648318
26	1915	30	27.309684	2.690316004
27	1916	32	27.06585117	4.934148828
28	1917	27	26.82201835	0.177981651
29	1918	17	26.57818552	-9.578185525
30	1919	13	26.3343527	-13.3343527
31	1920	9	26.09051988	-17.09051988
32	1921	13	25.84668705	-12.84668705
33	1922	19	25.60285423	-6.60285423
34	1923	21	25.35902141	-4.359021407
35	1924	23	25.11518858	-2.115188583
36	1925	24	24.87135576	-0.871355759
37	1926	20	24.62752294	-4.627522936
38	1927	21	24.38369011	-3.383690112
39	1928	22	24.13985729	-2.139857288
40	1929	31	23.89602446	7.103975535
41	1930	24	23.65219164	0.347808359
42	1931	17	23.40835882	-6.408358818
43	1932	21	23.16452599	-2.164525994
44	1933	20	22.92069317	-2.92069317
45	1934	21	22.67686035	-1.676860347
46	1935	20	22.43302752	-2.433027523
47	1936	17	22.1891947	-5.189194699
48	1937	21	21.94536188	-0.945361876
49	1938	22	21.70152905	0.298470948

Descriptive Statistics	
Mean	20.23853211
Standard Error	0.918797827
Median	18
Mode	17
Standard Deviation	9.592530932
Sample Variance	92.01664968
Kurtosis	0.909810814
Skewness	1.051951362
Range	50
Minimum	4
Maximum	54
Sum	2206
Count	109

Regression Statistics	
Multiple R	0.803485286
R Square	0.645588605
Adjusted R Square	0.642276349
Standard Error	5.737293078
Observations	109

Coefficients	
Intercept	33.64933741
X Variable 1	-0.243832824

Standard Error
1.106672107
0.017465306



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Blue Lakes campground, around head of lower Blue Lake, Colorado. Dense tree growth.
Species: Douglas fir
Location: near edge of Lower Blue Lake
Elevation: 10,360
Setting: few meters above lake surface
Slope aspect: steep, north facing
Drainage: excellent
Cirumferance: 61"
Comments: Good core, close to lake, core very well exposed rings, easy to count. Used furniture polish to enhance ring count.

50	1939	21	21.45769623	-0.457696228
51	1940	17	21.2138634	-4.213863405
52	1941	18	20.97003058	-2.970030581
53	1942	19	20.72619776	-1.726197757
54	1943	18	20.48236493	-2.482364934
55	1944	17	20.23853211	-3.23853211
56	1945	17	19.99469929	-2.994699286
57	1946	19	19.75086646	-0.750866463
58	1947	17	19.50703364	-2.507033639
59	1948	15	19.26320082	-4.263200815
60	1949	15	19.01936799	-4.019367992
61	1950	16	18.77553517	-2.775535168
62	1951	12	18.53170234	-6.531702345
63	1952	18	18.28786952	-0.287869521
64	1953	15	18.0440367	-3.044036697
65	1954	13	17.80020387	-4.800203874
66	1955	15	17.55637105	-2.55637105
67	1956	11	17.31253823	-6.312538226
68	1957	16	17.0687054	-1.068705403
69	1958	13	16.82487258	-3.824872579
70	1959	16	16.58103976	-0.581039755
71	1960	11	16.33720693	-5.337206932
72	1961	15	16.09337411	-1.093374108
73	1962	14	15.84954128	-1.849541284
74	1963	11	15.60570846	-4.605708461
75	1964	14	15.36187564	-1.361875637
76	1965	19	15.11804281	3.881957187
77	1966	17	14.87420999	2.12579001
78	1967	18	14.63037717	3.369622834
79	1968	23	14.38654434	8.613455657
80	1969	19	14.14271152	4.857288481
81	1970	18	13.8988787	4.101121305
82	1971	17	13.65504587	3.344954128
83	1972	14	13.41121305	0.588786952
84	1973	16	13.16738022	2.832619776
85	1974	16	12.9235474	3.076452599
86	1975	18	12.67971458	5.320285423
87	1976	15	12.43588175	2.564118247
88	1977	12	12.19204893	-0.19204893
89	1978	12	11.94821611	0.051783894
90	1979	9	11.70438328	-2.704383282
91	1980	4	11.46055046	-7.460550459
92	1981	6	11.21671764	-5.216717635
93	1982	8	10.97288481	-2.972884811
94	1983	13	10.72905199	2.270948012
95	1984	15	10.48521916	4.514780836
96	1985	18	10.24138634	7.75861366
97	1986	16	9.997553517	6.002446483
98	1987	10	9.753720693	0.246279307
99	1988	10	9.50988787	0.49011213
100	1989	11	9.266055046	1.733944954
101	1990	8	9.022222222	-1.022222222

102	1991	10	8.778389399	1.221610601
103	1992	12	8.534556575	3.465443425
104	1993	12	8.290723751	3.709276249
105	1994	10	8.046890928	1.953109072
106	1995	14	7.803058104	6.196941896
107	1996	10	7.55922528	2.44077472
108	1997	9	7.315392457	1.684607543
109	1998	8	7.071559633	0.928440367

Tree-ring data sheet

26-Jan-00

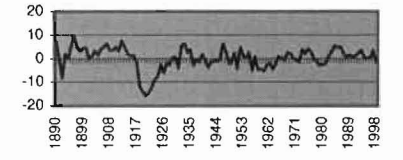
Sample: 6B Count Date 16-Sep-99

No	Year	Width	Trend	w/o Trend
1	1890	38	30.85437865	7.145621351
2	1891	30	30.61854323	-0.61854323
3	1892	22	30.38270781	-8.382707812
4	1893	32	30.14687239	1.853127606
5	1894	30	29.91103698	0.088963025
6	1895	35	29.67520156	5.324798443
7	1896	39	29.43936614	9.560633862
8	1897	34	29.20353072	4.79646928
9	1898	32	28.9676953	3.032304698
10	1899	33	28.73185988	4.268140117
11	1900	33	28.49602446	4.503975535
12	1901	28	28.26018905	-0.260189046
13	1902	29	28.02435363	0.975646372
14	1903	31	27.78851821	3.21148179
15	1904	29	27.55268279	1.447317209
16	1905	31	27.31684737	3.683152627
17	1906	32	27.08101195	4.918988046
18	1907	33	26.84517654	6.154823464
19	1908	30	26.60934112	3.390658882
20	1909	30	26.3735057	3.626494301
21	1910	31	26.13767028	4.862329719
22	1911	29	25.90183486	3.098165138
23	1912	33	25.66599944	7.334000556
24	1913	30	25.43016403	4.569835974
25	1914	27	25.19432861	1.805671393
26	1915	26	24.95849319	1.041506811
27	1916	26	24.72265777	1.27734223
28	1917	22	24.48682235	-2.486822352
29	1918	12	24.25098693	-12.25098693
30	1919	10	24.01515152	-14.01515152
31	1920	8	23.7793161	-15.7793161
32	1921	9	23.54348068	-14.54348068
33	1922	11	23.30764526	-12.30764526
34	1923	14	23.07180984	-9.071809842
35	1924	15	22.83597442	-7.835974423
36	1925	20	22.600139	-2.600139005
37	1926	16	22.36430359	-6.364303586
38	1927	20	22.12846817	-2.128468168
39	1928	19	21.89263275	-2.89263275
40	1929	22	21.65679733	0.343202669
41	1930	22	21.42096191	0.579038087
42	1931	17	21.18512649	-4.185126494
43	1932	26	20.94929108	5.050708924
44	1933	27	20.71345566	6.286544343
45	1934	23	20.47762024	2.522379761
46	1935	24	20.24178482	3.758215179
47	1936	17	20.0059494	-3.005949402
48	1937	19	19.77011398	-0.770113984
49	1938	18	19.53427857	-1.534278565

Descriptive Statistics	
Mean	18.11926606
Standard Error	0.839854684
Median	16
Mode	10
Standard Deviation	8.768340325
Sample Variance	76.88379205
Kurtosis	-0.836495143
Skewness	0.561620023
Range	35
Minimum	4
Maximum	39
Sum	1975
Count	109

Regression Statistics	
Multiple R	0.850179444
R Square	0.722805086
Adjusted R Square	0.72021448
Standard Error	4.637992212
Observations	109

Coefficients	
Intercept	31.09021407
X Variable 1	-0.235835418
Standard Error	
0.894626882	
0.014118845	



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Blue Lakes campground, around head of lower Blue Lake, Colorado. Dense tree growth.
Species: Douglas fir
Location: near edge of Lower Blue Lake
Elevation: 10,360
Setting: few meters above lake surface
Slope aspect: steep, north facing
Drainage: excellent
Cirumferance: 61"
Comments: Good core, close to lake. Very well-exposed rings, easy to count. Used furniture polish to enhance ring count.

50	1939	21	19.29844315	1.701556853
51	1940	18	19.06260773	-1.062607729
52	1941	15	18.82677231	-3.82677231
53	1942	17	18.59093689	-1.590936892
54	1943	17	18.35510147	-1.355101473
55	1944	17	18.11926606	-1.119266055
56	1945	18	17.88343064	0.116569363
57	1946	24	17.64759522	6.352404782
58	1947	20	17.4117598	2.5882402
59	1948	15	17.17592438	-2.175924381
60	1949	15	16.94008896	-1.940088963
61	1950	19	16.70425354	2.295746455
62	1951	12	16.46841813	-4.468418126
63	1952	21	16.23258271	4.767417292
64	1953	17	15.99674729	1.003252711
65	1954	16	15.76091187	0.239088129
66	1955	18	15.52507645	2.474923547
67	1956	10	15.28924103	-5.289241034
68	1957	16	15.05340562	0.946594384
69	1958	10	14.8175702	-4.817570197
70	1959	10	14.58173478	-4.581734779
71	1960	9	14.34589936	-5.345899361
72	1961	11	14.11006394	-3.110063942
73	1962	12	13.87422852	-1.874228524
74	1963	9	13.63839311	-4.638393105
75	1964	11	13.40255769	-2.402557687
76	1965	14	13.16672227	0.833277731
77	1966	13	12.93088685	0.06911315
78	1967	12	12.69505143	-0.695051432
79	1968	15	12.45921601	2.540783987
80	1969	14	12.22338059	1.776619405
81	1970	12	11.98754518	0.012454823
82	1971	11	11.75170976	-0.751709758
83	1972	10	11.51587434	-1.51587434
84	1973	15	11.28003892	3.719961079
85	1974	13	11.0442035	1.955796497
86	1975	15	10.80836808	4.191631915
87	1976	13	10.57253267	2.427467334
88	1977	10	10.33669725	-0.336697248
89	1978	9	10.10086183	-1.100861829
90	1979	7	9.865026411	-2.865026411
91	1980	7	9.629190992	-2.629190992
92	1981	7	9.393355574	-2.393355574
93	1982	10	9.157520156	0.842479844
94	1983	12	8.921684737	3.078315263
95	1984	14	8.685849319	5.314150681
96	1985	13	8.4500139	4.5499861
97	1986	13	8.214178482	4.785821518
98	1987	10	7.978343064	2.021656936
99	1988	8	7.742507645	0.257492355
100	1989	9	7.506672227	1.493327773
101	1990	8	7.270836808	0.729163192

102	1991	8	7.03500139	0.96499861
103	1992	9	6.799165972	2.200834028
104	1993	10	6.563330553	3.436669447
105	1994	7	6.327495135	0.672504865
106	1995	6	6.091659716	-0.091659716
107	1996	6	5.855824298	0.144175702
108	1997	9	5.61998888	3.38001112
109	1998	4	5.384153461	-1.384153461

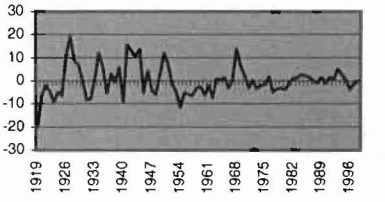
Tree-ring data sheet

28-Jan-00

Sample: 8A Count Date 19-Sep-99

No.	Year	Width	Trend	w/o Trend
1	1919	16	35.8787037	-19.8787037
2	1920	29	35.50076184	-6.500761838
3	1921	33	35.12281997	-2.122819972
4	1922	30	34.74487811	-4.744878106
5	1923	25	34.36693624	-9.36693624
6	1924	29	33.98899437	-4.988994374
7	1925	27	33.61105251	-6.611052508
8	1926	44	33.23311064	10.76688936
9	1927	52	32.85516878	19.14483122
10	1928	41	32.47722691	8.52277309
11	1929	39	32.09928504	6.900714955
12	1930	32	31.72134318	0.278656821
13	1931	23	31.34340131	-8.343401313
14	1932	23	30.96545945	-7.965459447
15	1933	31	30.58751758	0.412482419
16	1934	42	30.20957571	11.79042429
17	1935	36	29.83163385	6.168366151
18	1936	24	29.45369198	-5.453691983
19	1937	32	29.07575012	2.924249883
20	1938	28	28.69780825	-0.697808251
21	1939	34	28.31986639	5.680133615
22	1940	19	27.94192452	-8.941924519
23	1941	43	27.56398265	15.43601735
24	1942	40	27.18604079	12.81395921
25	1943	37	26.80809892	10.19190108
26	1944	40	26.43015706	13.56984294
27	1945	21	26.05221519	-5.05221519
28	1946	30	25.67427332	4.325726676
29	1947	21	25.29633146	-4.296331458
30	1948	19	24.91838959	-5.918389592
31	1949	27	24.54044773	2.459552274
32	1950	36	24.16250586	11.83749414
33	1951	31	23.78456399	7.215436006
34	1952	22	23.40662213	-1.406622128
35	1953	18	23.02868026	-5.028680263
36	1954	11	22.6507384	-11.6507384
37	1955	17	22.27279653	-5.272796531
38	1956	16	21.89485466	-5.894854665
39	1957	15	21.5169128	-6.516912799
40	1958	18	21.13897093	-3.138970933
41	1959	18	20.76102907	-2.761029067
42	1960	14	20.3830872	-6.383087201
43	1961	18	20.00514534	-2.005145335
44	1962	12	19.62720347	-7.627203469
45	1963	20	19.2492616	0.750738397
46	1964	19	18.87131974	0.128680263
47	1965	20	18.49337787	1.506622128
48	1966	15	18.11543601	-3.115436006
49	1967	18	17.73749414	0.26250586

Descritpive Statistics	
Mean	20.95
Standard Error	1.230017495
Median	18
Mode	13
Standard Deviation	11.00161093
Sample Variance	121.035443
Kurtosis	-0.313780104
Skewness	0.704178349
Range	49
Minimum	3
Maximum	52
Sum	1676
Count	80
Regression Statistics	
Multiple R	0.798299028
R Square	0.637281339
Adjusted R Square	0.632631099
Standard Error	6.668182484
Observations	80
Coefficients	
Intercept	36.25664557
X Variable 1	-0.377941866
Standard Error	
1.505139915	



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Bear Lake campground, small moraine ridges on north side of lake.
Species: Blue spruce
Location: crest of small moraine
Elevation: 10,480 feet
Setting: dense forest
Slope aspect: moderate, south facing
Drainage: good
Cirumferance: 64"
Comments: Good core

50	1968	31	17.35955227	13.64044773
51	1969	23	16.98161041	6.018389592
52	1970	19	16.60366854	2.396331458
53	1971	13	16.22572668	-3.225726676
54	1972	16	15.84778481	0.15221519
55	1973	12	15.46984294	-3.469842944
56	1974	13	15.09190108	-2.091901078
57	1975	13	14.71395921	-1.713959212
58	1976	16	14.33601735	1.663982654
59	1977	9	13.95807548	-4.958075481
60	1978	10	13.58013361	-3.580133615
61	1979	10	13.20219175	-3.202191749
62	1980	9	12.82424988	-3.824249883
63	1981	11	12.44630802	-1.446308017
64	1982	13	12.06836615	0.931633849
65	1983	13	11.69042429	1.309575715
66	1984	14	11.31248242	2.687517581
67	1985	13	10.93454055	2.065459447
68	1986	12	10.55659869	1.443401313
69	1987	10	10.17865682	-0.178656821
70	1988	9	9.800714955	-0.800714955
71	1989	11	9.42277309	1.57722691
72	1990	8	9.044831224	-1.044831224
73	1991	10	8.666889358	1.333110642
74	1992	9	8.288947492	0.711052508
75	1993	13	7.911005626	5.088994374
76	1994	10	7.53306376	2.46693624
77	1995	7	7.155121894	-0.155121894
78	1996	3	6.777180028	-3.777180028
79	1997	5	6.399238162	-1.399238162
80	1998	6	6.021296296	-0.021296296

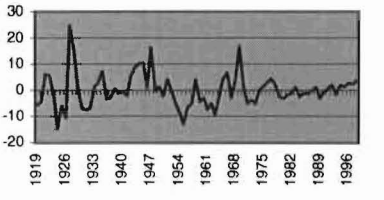
Tree-ring data sheet

28-Jan-00

Sample: 8B Count Date 19-Sep-99

No	Year	Width	Trend	w/o Trend
1	1919	38	43.74722222	-5.747222222
2	1920	39	43.31279887	-4.312798875
3	1921	49	42.87837553	6.121624473
4	1922	48	42.44395218	5.55604782
5	1923	40	42.00952883	-2.009528833
6	1924	27	41.57510549	-14.57510549
7	1925	35	41.14068214	-6.140682138
8	1926	30	40.70625879	-10.70625879
9	1927	65	40.27183544	24.72816456
10	1928	55	39.8374121	15.1625879
11	1929	40	39.40298875	0.597011252
12	1930	32	38.9685654	-6.968565401
13	1931	31	38.53414205	-7.534142053
14	1932	31	38.09971871	-7.099718706
15	1933	39	37.66529536	1.334704641
16	1934	40	37.23087201	2.769127989
17	1935	44	36.79644866	7.203551336
18	1936	33	36.36202532	-3.362025316
19	1937	33	35.92760197	-2.927601969
20	1938	36	35.49317862	0.506821378
21	1939	34	35.05875527	-1.058755274
22	1940	34	34.62433193	-0.624331927
23	1941	32	34.18990858	-2.189908579
24	1942	39	33.75548523	5.244514768
25	1943	42	33.32106188	8.678938115
26	1944	43	32.88663854	10.11336146
27	1945	43	32.45221519	10.54778481
28	1946	33	32.01779184	0.982208158
29	1947	48	31.5833685	16.4166315
30	1948	31	31.14894515	-0.148945148
31	1949	32	30.7145218	1.2854782
32	1950	28	30.28009845	-2.280098453
33	1951	34	29.84567511	4.154324895
34	1952	29	29.41125176	-0.411251758
35	1953	24	28.97682841	-4.976828411
36	1954	20	28.54240506	-8.542405063
37	1955	15	28.10798172	-13.10798172
38	1956	21	27.67355837	-6.673558368
39	1957	22	27.23913502	-5.239135021
40	1958	31	26.80471167	4.195288326
41	1959	22	26.37028833	-4.370288326
42	1960	23	25.93586498	-2.935864979
43	1961	18	25.50144163	-7.501441632
44	1962	20	25.06701828	-5.067018284
45	1963	15	24.63259494	-9.632594937
46	1964	22	24.19817159	-2.198171589
47	1965	28	23.76374824	4.236251758
48	1966	30	23.32932489	6.670675105
49	1967	20	22.89490155	-2.894901547

Descriptive Statistics	
Mean	26.5875
Standard Error	1.340896846
Median	23.5
Mode	15
Standard Deviation	11.99334599
Sample Variance	143.8403481
Kurtosis	0.05264264
Skewness	0.683054135
Range	55
Minimum	10
Maximum	65
Sum	2127
Count	80
Regression Statistics	
Multiple R	0.841723931
R Square	0.708499176
Adjusted R Square	0.704761986
Standard Error	6.516681567
Observations	80
Coefficients	
Intercept	44.18164557
X Variable 1	-0.434423347
Standard Error	
1.470943179	
0.031551214	



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Bear Lake campground, small moraine ridges on north side of lake.
Species: Blue spruce
Location: crest of small moraine
Elevation: 10,480 feet
Setting: dense forest
Slope aspect: moderate, south facing
Drainage: good
Cirumferance: 64"
Comments: Good core

50	1968	26	22.4604782	3.5395218
51	1969	39	22.02605485	16.97394515
52	1970	23	21.5916315	1.408368495
53	1971	16	21.15720816	-5.157208158
54	1972	17	20.72278481	-3.72278481
55	1973	15	20.28836146	-5.288361463
56	1974	20	19.85393812	0.146061885
57	1975	21	19.41951477	1.580485232
58	1976	22	18.98509142	3.014908579
59	1977	23	18.55066807	4.449331927
60	1978	20	18.11624473	1.883755274
61	1979	15	17.68182138	-2.681821378
62	1980	14	17.24739803	-3.247398031
63	1981	15	16.81297468	-1.812974684
64	1982	15	16.37855134	-1.378551336
65	1983	17	15.94412799	1.055872011
66	1984	13	15.50970464	-2.509704641
67	1985	14	15.07528129	-1.075281294
68	1986	13	14.64085795	-1.640857947
69	1987	14	14.2064346	-0.206434599
70	1988	15	13.77201125	1.227988748
71	1989	10	13.3375879	-3.337587904
72	1990	12	12.90316456	-0.903164557
73	1991	13	12.46874121	0.53125879
74	1992	14	12.03431786	1.965682138
75	1993	10	11.59989451	-1.599894515
76	1994	13	11.16547117	1.834528833
77	1995	12	10.73104782	1.26895218
78	1996	13	10.29662447	2.703375527
79	1997	12	9.862201125	2.137798875
80	1998	13	9.427777778	3.572222222

Tree-ring data sheet

28-Jan-00

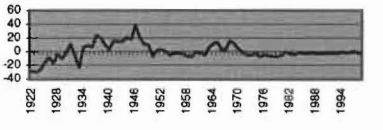
Sample: 9B Count Date 19-Sep-99

No	Year	Width	Trend	w/o Trend
1	1922	17	45.5994006	-28.5994006
2	1923	14	45.11233503	-31.11233503
3	1924	18	44.62526947	-26.62526947
4	1925	27	44.1382039	-17.1382039
5	1926	35	43.65113834	-8.651138335
6	1927	26	43.16407277	-17.16407277
7	1928	38	42.6770072	-4.677007203
8	1929	31	42.18994164	-11.18994164
9	1930	40	41.70287607	-1.702876071
10	1931	52	41.21581051	10.78418949
11	1932	34	40.72874494	-6.728744939
12	1933	16	40.24167937	-24.24167937
13	1934	46	39.75461381	6.245386193
14	1935	48	39.26754824	8.732451759
15	1936	45	38.78048268	6.219517325
16	1937	62	38.29341711	23.70658289
17	1938	57	37.80635154	19.19364846
18	1939	47	37.31928598	9.680714023
19	1940	40	36.83222041	3.167779589
20	1941	52	36.34515485	15.65484515
21	1942	50	35.85808928	14.14191072
22	1943	50	35.37102371	14.62897629
23	1944	55	34.88395815	20.11604185
24	1945	52	34.39689258	17.60310742
25	1946	72	33.90982702	38.09017298
26	1947	54	33.42276145	20.57723855
27	1948	44	32.93569588	11.06430412
28	1949	42	32.44863032	9.551369683
29	1950	24	31.96156475	-7.961564751
30	1951	33	31.47449919	1.525500815
31	1952	34	30.98743362	3.012566381
32	1953	30	30.50036805	-0.500368053
33	1954	24	30.01330249	-6.013302487
34	1955	27	29.52623692	-2.526236921
35	1956	26	29.03917135	-3.039171355
36	1957	25	28.55210579	-3.552105789
37	1958	21	28.06504022	-7.065040223
38	1959	20	27.57797466	-7.577974657
39	1960	27	27.09090909	-0.090909091
40	1961	24	26.60384352	-2.603843525
41	1962	21	26.11677796	-5.116777959
42	1963	31	25.62971239	5.370287607
43	1964	37	25.14264683	11.85735317
44	1965	39	24.65558126	14.34441874
45	1966	27	24.16851569	2.831484305
46	1967	27	23.68145013	3.318549871
47	1968	39	23.19438456	15.80561544
48	1969	34	22.707319	11.292681
49	1970	25	22.22025343	2.779746569

Descritpive Statistics	
Mean	27.09090909
Standard Error	1.81389618
Median	25
Mode	27
Standard Deviation	15.91687438
Sample Variance	253.34689
Kurtosis	-0.448399448
Skewness	0.669084421
Range	66
Minimum	6
Maximum	72
Sum	2086
Count	77

Regression Statistics	
Multiple R	0.684591779
R Square	0.468665904
Adjusted R Square	0.461581449
Standard Error	11.6793264
Observations	77

Coefficients	
Intercept	46.08646617
X Variable 1	-0.487065566
Standard Error	
2.688106581	
0.059883746	



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Bear Lake campground, small moraine ridges on north side of lake.
Species: Blue spruce
Location: crest of small moraine
Elevation: 10,480
Setting: dense forest
Slope aspect: moderate on crest
Drainage: good
Cirumferance: 69"
Comments: Good core, tips broke
Core is 28, not included above

50	1971	20	21.73318786	-1.733187865
51	1972	16	21.2461223	-5.246122299
52	1973	16	20.75905673	-4.759056733
53	1974	17	20.27199117	-3.271991167
54	1975	12	19.7849256	-7.784925601
55	1976	15	19.29786003	-4.297860035
56	1977	12	18.81079447	-6.810794469
57	1978	11	18.3237289	-7.323728903
58	1979	10	17.83666334	-7.836663337
59	1980	12	17.34959777	-5.349597771
60	1981	16	16.8625322	-0.862532205
61	1982	13	16.37546664	-3.375466639
62	1983	11	15.88840107	-4.888401073
63	1984	14	15.40133551	-1.401335507
64	1985	12	14.91426994	-2.914269941
65	1986	11	14.42720437	-3.427204375
66	1987	12	13.94013881	-1.940138809
67	1988	10	13.45307324	-3.453073243
68	1989	10	12.96600768	-2.966007677
69	1990	9	12.47894211	-3.478942111
70	1991	10	11.99187654	-1.991876545
71	1992	8	11.50481098	-3.504810978
72	1993	8	11.01774541	-3.017745412
73	1994	10	10.53067985	-0.530679846
74	1995	8	10.04361428	-2.04361428
75	1996	9	9.556548714	-0.556548714
76	1997	9	9.069483148	-0.069483148
77	1998	6	8.582417582	-2.582417582

Tree-ring data sheet

28-Jan-00

Sample: 10A Count Date 21-Sep-99

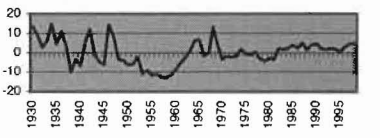
No	Year	Width	Trend	w/o Trend
1	1930	54	40.53374741	13.46625259
2	1931	49	39.98394836	9.016051638
3	1932	42	39.43414931	2.565850688
4	1933	45	38.88435026	6.115649738
5	1934	53	38.33455121	14.66544879
6	1935	42	37.78475216	4.215247838
7	1936	48	37.23495311	10.76504689
8	1937	40	36.68515406	3.314845938
9	1938	26	36.13535501	-10.13535501
10	1939	32	35.58555596	-3.585555962
11	1940	28	35.03575691	-7.035756911
12	1941	40	34.48595786	5.514042139
13	1942	46	33.93615881	12.06384119
14	1943	32	33.38635976	-1.386359761
15	1944	28	32.83656071	-4.836560711
16	1945	26	32.28676166	-6.286761661
17	1946	46	31.73696261	14.26303739
18	1947	39	31.18716356	7.812836439
19	1948	27	30.63736451	-3.637364511
20	1949	26	30.08756546	-4.087565461
21	1950	23	29.53776641	-6.537766411
22	1951	23	28.98796736	-5.987967361
23	1952	26	28.43816831	-2.438168311
24	1953	17	27.88836926	-10.88836926
25	1954	18	27.33857021	-9.338570211
26	1955	15	26.78877116	-11.78877116
27	1956	15	26.23897211	-11.23897211
28	1957	13	25.68917306	-12.68917306
29	1958	12	25.13937401	-13.13937401
30	1959	13	24.58957496	-11.58957496
31	1960	15	24.03977591	-9.03977591
32	1961	18	23.48997686	-5.48997686
33	1962	20	22.94017781	-2.94017781
34	1963	23	22.39037876	0.60962124
35	1964	28	21.84057971	6.15942029
36	1965	28	21.29078066	6.70921934
37	1966	19	20.74098161	-1.74098161
38	1967	20	20.19118256	-0.19118256
39	1968	33	19.64138351	13.35861649
40	1969	23	19.09158446	3.90841554
41	1970	15	18.54178541	-3.54178541
42	1971	16	17.99198636	-1.99198636
43	1972	15	17.44218731	-2.44218731
44	1973	15	16.89238826	-1.89238826
45	1974	18	16.34258921	1.65741079
46	1975	15	15.79279016	-0.79279016
47	1976	14	15.24299111	-1.242991109
48	1977	15	14.69319206	0.306807941
49	1978	11	14.14339301	-3.143393009

Descriptive Statistics	
Mean	21.84057971
Standard Error	1.55197303
Median	17
Mode	15
Standard Deviation	12.8916562
Sample Variance	166.1947997
Kurtosis	-0.096331449
Skewness	0.960594789
Range	49
Minimum	5
Maximum	54
Sum	1507
Count	69

Regression Statistics	
Multiple R	0.855614651
R Square	0.73207643
Adjusted R Square	0.728077571
Standard Error	6.722506497
Observations	69

Coefficients	
Intercept	41.08354646
X Variable 1	-0.54979905

Standard Error
1.63634407
0.040634398



Date: 2 Aug 99
Collector: Jim and Susie Aber
Vicinity: Bear Lake campground, small moraine ridges on north side of lake.
Species: Blue spruce
Location: crest of small moraine
Elevation: 10,480 feet
Setting: dense forest
Slope aspect: steep on crest
Drainage: excellent
Circumferance: 65"
Comments: Good core, tips broke

50	1979	9	13.59359396	-4.593593959
51	1980	10	13.04379491	-3.043794909
52	1981	9	12.49399586	-3.493995859
53	1982	14	11.94419681	2.055803191
54	1983	13	11.39439776	1.605602241
55	1984	13	10.84459871	2.155401291
56	1985	14	10.29479966	3.705200341
57	1986	12	9.745000609	2.254999391
58	1987	14	9.195201559	4.804798441
59	1988	10	8.645402509	1.354597491
60	1989	12	8.095603459	3.904396541
61	1990	12	7.545804409	4.454195591
62	1991	9	6.996005359	2.003994641
63	1992	8	6.446206309	1.553793691
64	1993	8	5.896407259	2.103592741
65	1994	7	5.346608209	1.653391791
66	1995	5	4.796809158	0.203190842
67	1996	7	4.247010108	2.752989892
68	1997	8	3.697211058	4.302788942
69	1998	8	3.147412008	4.852587992

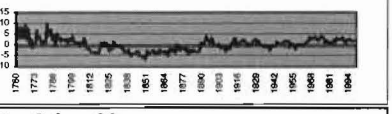
Tree-ring data sheet

29-Jan-00

Sample: 11 A Count Date 21-Sep-99

No	Year	Width	Trend	w/o Trend
1	1760	23	13.97698745	9.023012552
2	1761	19	13.93175345	5.068246545
3	1762	17	13.88651946	3.113480539
4	1763	22	13.84128547	8.158714532
5	1764	17	13.79605147	3.203948525
6	1765	17	13.75081748	3.249182518
7	1766	23	13.70558349	9.294416511
8	1767	16	13.6603495	2.339650505
9	1768	21	13.6151155	7.384884498
10	1769	14	13.56988151	0.430118491
11	1770	16	13.52464752	2.475352484
12	1771	12	13.47941352	-1.479413523
13	1772	14	13.43417953	0.56582047
14	1773	14	13.38894554	0.611054464
15	1774	20	13.34371154	6.656288457
16	1775	16	13.29847755	2.70152245
17	1776	17	13.25324356	3.746756443
18	1777	14	13.20800956	0.791990436
19	1778	14	13.16277557	0.83722443
20	1779	15	13.11754158	1.882458423
21	1780	13	13.07230758	-0.072307584
22	1781	23	13.02707359	9.972926409
23	1782	17	12.9818396	4.018160402
24	1783	18	12.9366056	5.063394395
25	1784	20	12.89137161	7.108628389
26	1785	15	12.84613762	2.153862382
27	1786	17	12.80090363	4.199096375
28	1787	12	12.75566963	-0.755669632
29	1788	18	12.71043564	5.289564361
30	1789	15	12.66520165	2.334798354
31	1790	16	12.61996765	3.380032348
32	1791	14	12.57473366	1.425266341
33	1792	15	12.52949967	2.470500334
34	1793	15	12.48426567	2.515734327
35	1794	14	12.43903168	1.56096832
36	1795	15	12.39379769	2.606202314
37	1796	13	12.34856369	0.651436307
38	1797	15	12.3033297	2.6966703
39	1798	14	12.25809571	1.741904293
40	1799	16	12.21286171	3.787138286
41	1800	13	12.16762772	0.832372279
42	1801	13	12.12239373	0.877606273
43	1802	13	12.07715973	0.922840266
44	1803	13	12.03192574	0.968074259
45	1804	11	11.98669175	-0.986691748
46	1805	13	11.94145775	1.058542245
47	1806	12	11.89622376	0.103776239
48	1807	15	11.85098977	3.149010232
49	1808	13	11.80575578	1.194244225

Descriptive Statistics	
Mean	8.594142259
Standard Error	0.274485874
Median	7
Mode	6
Standard Deviation	4.243448633
Sample Variance	18.0068563
Kurtosis	1.376639958
Skewness	1.375817616
Range	20
Minimum	3
Maximum	23
Sum	2054
Count	239
Regression Statistics	
Multiple R	0.73698717
R Square	0.543150088
Adjusted R Square	0.541222451
Standard Error	2.874220137
Observations	239
Coefficients	
Intercept	14.02222144
X Variable 1	-0.045233993
Standard Error	
0.373005601	
0.002694745	



Date: 3 Aug 99
Collector: Jim, Jeremy and Jay Aber
Vicinity: Trail to Trinchera Peak above Blue Lake Campground.
Species: Blue spruce crest of small moraine
Location: Trinchera/Purgatorie trail junction
Elevation: 11,360 feet
Setting: dense, tall forest
Slope aspect: moderate, north facing
Drainage: good
Cirumferance: 75"
Comments: Good core

50	1809	10	11.76052178	-1.760521782
51	1810	10	11.71528779	-1.715287789
52	1811	9	11.6700538	-2.670053796
53	1812	8	11.6248198	-3.624819802
54	1813	8	11.57958581	-3.579585809
55	1814	8	11.53435182	-3.534351816
56	1815	8	11.48911782	-3.489117823
57	1816	7	11.44388383	-4.44388383
58	1817	7	11.39864984	-4.398649837
59	1818	9	11.35341584	-2.353415843
60	1819	12	11.30818185	0.69181815
61	1820	11	11.26294786	-0.262947857
62	1821	12	11.21771386	0.782286136
63	1822	12	11.17247987	0.827520129
64	1823	11	11.12724588	-0.127245877
65	1824	9	11.08201188	-2.082011884
66	1825	8	11.03677789	-3.036777891
67	1826	10	10.9915439	-0.991543898
68	1827	9	10.9463099	-1.946309905
69	1828	12	10.90107591	1.098924088
70	1829	10	10.85584192	-0.855841918
71	1830	10	10.81060793	-0.810607925
72	1831	10	10.76537393	-0.765373932
73	1832	10	10.72013994	-0.720139939
74	1833	9	10.67490595	-1.674905946
75	1834	10	10.62967195	-0.629671952
76	1835	7	10.58443796	-3.584437959
77	1836	7	10.53920397	-3.539203966
78	1837	7	10.49396997	-3.493969973
79	1838	8	10.44873598	-2.44873598
80	1839	6	10.40350199	-4.403501987
81	1840	5	10.35826799	-5.358267993
82	1841	6	10.313034	-4.313034
83	1842	6	10.26780001	-4.267800007
84	1843	6	10.22256601	-4.222566014
85	1844	7	10.17733202	-3.177332021
86	1845	7	10.13209803	-3.132098027
87	1846	5	10.08686403	-5.086864034
88	1847	5	10.04163004	-5.041630041
89	1848	4	9.996396048	-5.996396048
90	1849	4	9.951162055	-5.951162055
91	1850	3	9.905928062	-6.905928062
92	1851	7	9.860694068	-2.860694068
93	1852	5	9.815460075	-4.815460075
94	1853	6	9.770226082	-3.770226082
95	1854	6	9.724992089	-3.724992089
96	1855	7	9.679758096	-2.679758096
97	1856	7	9.634524103	-2.634524103
98	1857	5	9.589290109	-4.589290109
99	1858	6	9.544056116	-3.544056116
100	1859	5	9.498822123	-4.498822123
101	1860	7	9.45358813	-2.45358813

102	1861	6	9.408354137	-3.408354137
103	1862	6	9.363120143	-3.363120143
104	1863	6	9.31788615	-3.31788615
105	1864	5	9.272652157	-4.272652157
106	1865	6	9.227418164	-3.227418164
107	1866	4	9.182184171	-5.182184171
108	1867	7	9.136950178	-2.136950178
109	1868	6	9.091716184	-3.091716184
110	1869	7	9.046482191	-2.046482191
111	1870	6	9.001248198	-3.001248198
112	1871	5	8.956014205	-3.956014205
113	1872	9	8.910780212	0.089219788
114	1873	8	8.865546218	-0.865546218
115	1874	6	8.820312225	-2.820312225
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117	1876	7	8.729844239	-1.729844239
118	1877	7	8.684610246	-1.684610246
119	1878	6	8.639376253	-2.639376253
120	1879	7	8.594142259	-1.594142259
121	1880	4	8.548908266	-4.548908266
122	1881	5	8.503674273	-3.503674273
123	1882	6	8.45844028	-2.45844028
124	1883	5	8.413206287	-3.413206287
125	1884	6	8.367972294	-2.367972294
126	1885	5	8.3227383	-3.3227383
127	1886	5	8.277504307	-3.277504307
128	1887	5	8.232270314	-3.232270314
129	1888	5	8.187036321	-3.187036321
130	1889	9	8.141802328	0.858197672
131	1890	8	8.096568334	-0.096568334
132	1891	8	8.051334341	-0.051334341
133	1892	10	8.006100348	1.993899652
134	1893	12	7.960866355	4.039133645
135	1894	10	7.915632362	2.084367638
136	1895	9	7.870398369	1.129601631
137	1896	9	7.825164375	1.174835625
138	1897	11	7.779930382	3.220069618
139	1898	9	7.734696389	1.265303611
140	1899	7	7.689462396	-0.689462396
141	1900	7	7.644228403	-0.644228403
142	1901	7	7.598994409	-0.598994409
143	1902	8	7.553760416	0.446239584
144	1903	6	7.508526423	-1.508526423
145	1904	6	7.46329243	-1.46329243
146	1905	6	7.418058437	-1.418058437
147	1906	5	7.372824444	-2.372824444
148	1907	4	7.32759045	-3.32759045
149	1908	6	7.282356457	-1.282356457
150	1909	6	7.237122464	-1.237122464
151	1910	5	7.191888471	-2.191888471
152	1911	8	7.146654478	0.853345522
153	1912	8	7.101420485	0.898579515

154	1913	10	7.056186491	2.943813509
155	1914	9	7.010952498	1.989047502
156	1915	6	6.965718505	-0.965718505
157	1916	7	6.920484512	0.079515488
158	1917	8	6.875250519	1.124749481
159	1918	8	6.830016525	1.169983475
160	1919	9	6.784782532	2.215217468
161	1920	9	6.739548539	2.260451461
162	1921	7	6.694314546	0.305685454
163	1922	6	6.649080553	-0.649080553
164	1923	7	6.60384656	0.39615344
165	1924	6	6.558612566	-0.558612566
166	1925	6	6.513378573	-0.513378573
167	1926	8	6.46814458	1.53185542
168	1927	8	6.422910587	1.577089413
169	1928	9	6.377676594	2.622323406
170	1929	7	6.3324426	0.6675574
171	1930	8	6.287208607	1.712791393
172	1931	6	6.241974614	-0.241974614
173	1932	6	6.196740621	-0.196740621
174	1933	6	6.151506628	-0.151506628
175	1934	5	6.106272635	-1.106272635
176	1935	5	6.061038641	-1.061038641
177	1936	5	6.015804648	-1.015804648
178	1937	5	5.970570655	-0.970570655
179	1938	3	5.925336662	-2.925336662
180	1939	5	5.880102669	-0.880102669
181	1940	5	5.834868676	-0.834868676
182	1941	5	5.789634682	-0.789634682
183	1942	5	5.744400689	-0.744400689
184	1943	7	5.699166696	1.300833304
185	1944	6	5.653932703	0.346067297
186	1945	6	5.60869871	0.39130129
187	1946	6	5.563464716	0.436535284
188	1947	6	5.518230723	0.481769277
189	1948	7	5.47299673	1.52700327
190	1949	7	5.427762737	1.572237263
191	1950	7	5.382528744	1.617471256
192	1951	7	5.337294751	1.662705249
193	1952	4	5.292060757	-1.292060757
194	1953	6	5.246826764	0.753173236
195	1954	5	5.201592771	-0.201592771
196	1955	5	5.156358778	-0.156358778
197	1956	3	5.111124785	-2.111124785
198	1957	5	5.065890791	-0.065890791
199	1958	5	5.020656798	-0.020656798
200	1959	5	4.975422805	0.024577195
201	1960	5	4.930188812	0.069811188
202	1961	4	4.884954819	-0.884954819
203	1962	5	4.839720826	0.160279174
204	1963	5	4.794486832	0.205513168
205	1964	6	4.749252839	1.250747161

206	1965	6	4.704018846	1.295981154
207	1966	8	4.658784853	3.341215147
208	1967	7	4.61355086	2.38644914
209	1968	7	4.568316866	2.431683134
210	1969	8	4.523082873	3.476917127
211	1970	8	4.47784888	3.52215112
212	1971	7	4.432614887	2.567385113
213	1972	6	4.387380894	1.612619106
214	1973	7	4.342146901	2.657853099
215	1974	8	4.296912907	3.703087093
216	1975	8	4.251678914	3.748321086
217	1976	7	4.206444921	2.793555079
218	1977	5	4.161210928	0.838789072
219	1978	6	4.115976935	1.884023065
220	1979	5	4.070742942	0.929257058
221	1980	5	4.025508948	0.974491052
222	1981	5	3.980274955	1.019725045
223	1982	4	3.935040962	0.064959038
224	1983	6	3.889806969	2.110193031
225	1984	5	3.844572976	1.155427024
226	1985	7	3.799338982	3.200661018
227	1986	6	3.754104989	2.245895011
228	1987	6	3.708870996	2.291129004
229	1988	6	3.663637003	2.336362997
230	1989	7	3.61840301	3.38159699
231	1990	6	3.573169017	2.426830983
232	1991	4	3.527935023	0.472064977
233	1992	5	3.48270103	1.51729897
234	1993	6	3.437467037	2.562532963
235	1994	6	3.392233044	2.607766956
236	1995	5	3.346999051	1.653000949
237	1996	5	3.301765057	1.698234943
238	1997	5	3.256531064	1.743468936
239	1998	5	3.211297071	1.788702929

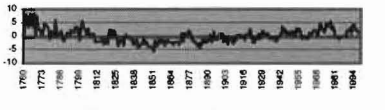
Tree-ring data sheet

29-Jan-00

Sample: 11B Count Date 21-Sep-99

No	Year	Width	Trend	w/o Trend
1	1760	12	11.95899582	0.041004184
2	1761	20	11.92470729	8.075292711
3	1762	18	11.89041876	6.109581238
4	1763	15	11.85613023	3.143869765
5	1764	20	11.82184171	8.178158293
6	1765	17	11.78755318	5.21244682
7	1766	15	11.75326465	3.246735347
8	1767	20	11.71897613	8.281023874
9	1768	12	11.6846876	0.315312401
10	1769	19	11.65039907	7.349600928
11	1770	14	11.61611054	2.383889455
12	1771	14	11.58182202	2.418177982
13	1772	12	11.54753349	0.45246651
14	1773	12	11.51324496	0.486755037
15	1774	16	11.47895644	4.521043564
16	1775	16	11.44466791	4.555332091
17	1776	15	11.41037938	3.589620618
18	1777	14	11.37609085	2.623909145
19	1778	10	11.34180233	-1.341802328
20	1779	13	11.3075138	1.6924862
21	1780	11	11.27322527	-0.273225273
22	1781	11	11.23893675	-0.238936746
23	1782	17	11.20464822	5.795351781
24	1783	11	11.17035969	-0.170359692
25	1784	11	11.13607116	-0.136071165
26	1785	12	11.10178264	0.898217362
27	1786	13	11.06749411	1.932505889
28	1787	10	11.03320558	-1.033205583
29	1788	9	10.99891706	-1.998917056
30	1789	10	10.96462853	-0.964628529
31	1790	12	10.93034	1.069659998
32	1791	12	10.89605147	1.103948525
33	1792	11	10.86176295	0.138237052
34	1793	13	10.82747442	2.172525579
35	1794	12	10.79318589	1.206814106
36	1795	12	10.75889737	1.241102634
37	1796	14	10.72460884	3.275391161
38	1797	14	10.69032031	3.309679688
39	1798	12	10.65603179	1.343968215
40	1799	9	10.62174326	-1.621743258
41	1800	14	10.58745473	3.412545269
42	1801	16	10.5531662	5.446833796
43	1802	13	10.51887768	2.481122323
44	1803	13	10.48458915	2.515410851
45	1804	11	10.45030062	0.549699378
46	1805	13	10.4160121	2.583987905
47	1806	11	10.38172357	0.618276432
48	1807	10	10.34743504	-0.347435041
49	1808	11	10.31314651	0.686853486

Descriptive Statistics	
Mean	7.878661088
Standard Error	0.220972451
Median	7
Mode	6
Standard Deviation	3.41615119
Sample Variance	11.67008896
Kurtosis	1.752501302
Skewness	1.363228702
Range	17
Minimum	3
Maximum	20
Sum	1883
Count	239
Regression Statistics	
Multiple R	0.69394603
R Square	0.481561092
Adjusted R Square	0.479373586
Standard Error	2.46490498
Observations	239
Coefficients	
Intercept	11.99328434
X Variable 1	-0.034288527
Standard Error	
0.319886202	
0.002310988	



Date: 3 Aug 99
Collector: Jim, Jeremy and Jay Aber
Vicinity: Trail to Trinchera Peak above Blue Lake Campground.
Species: Blue spruce crest of small moraine
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Cirumferance: 75"
Comments: Good core

50	1809	11	10.27885799	0.721142013
51	1810	8	10.24456946	-2.24456946
52	1811	8	10.21028093	-2.210280932
53	1812	8	10.17599241	-2.175992405
54	1813	8	10.14170388	-2.141703878
55	1814	8	10.10741535	-2.107415351
56	1815	9	10.07312682	-1.073126824
57	1816	7	10.0388383	-3.038838297
58	1817	7	10.00454977	-3.00454977
59	1818	9	9.970261243	-0.970261243
60	1819	7	9.935972715	-2.935972715
61	1820	12	9.901684188	2.098315812
62	1821	12	9.867395661	2.132604339
63	1822	9	9.833107134	-0.833107134
64	1823	12	9.798818607	2.201181393
65	1824	10	9.76453008	0.23546992
66	1825	10	9.730241553	0.269758447
67	1826	6	9.695953026	-3.695953026
68	1827	7	9.661664498	-2.661664498
69	1828	8	9.627375971	-1.627375971
70	1829	8	9.593087444	-1.593087444
71	1830	6	9.558798917	-3.558798917
72	1831	9	9.52451039	-0.52451039
73	1832	10	9.490221863	0.509778137
74	1833	9	9.455933336	-0.455933336
75	1834	9	9.421644809	-0.421644809
76	1835	8	9.387356281	-1.387356281
77	1836	8	9.353067754	-1.353067754
78	1837	6	9.318779227	-3.318779227
79	1838	7	9.2844907	-2.2844907
80	1839	8	9.250202173	-1.250202173
81	1840	5	9.215913646	-4.215913646
82	1841	5	9.181625119	-4.181625119
83	1842	6	9.147336592	-3.147336592
84	1843	6	9.113048064	-3.113048064
85	1844	8	9.078759537	-1.078759537
86	1845	6	9.04447101	-3.04447101
87	1846	7	9.010182483	-2.010182483
88	1847	5	8.975893956	-3.975893956
89	1848	5	8.941605429	-3.941605429
90	1849	5	8.907316902	-3.907316902
91	1850	4	8.873028375	-4.873028375
92	1851	3	8.838739847	-5.838739847
93	1852	7	8.80445132	-1.80445132
94	1853	5	8.770162793	-3.770162793
95	1854	5	8.735874266	-3.735874266
96	1855	7	8.701585739	-1.701585739
97	1856	7	8.667297212	-1.667297212
98	1857	6	8.633008685	-2.633008685
99	1858	7	8.598720158	-1.598720158
100	1859	5	8.56443163	-3.56443163
101	1860	6	8.530143103	-2.530143103

102	1861	7	8.495854576	-1.495854576
103	1862	6	8.461566049	-2.461566049
104	1863	6	8.427277522	-2.427277522
105	1864	6	8.392988995	-2.392988995
106	1865	5	8.358700468	-3.358700468
107	1866	6	8.324411941	-2.324411941
108	1867	6	8.290123413	-2.290123413
109	1868	6	8.255834886	-2.255834886
110	1869	5	8.221546359	-3.221546359
111	1870	6	8.187257832	-2.187257832
112	1871	9	8.152969305	0.847030695
113	1872	6	8.118680778	-2.118680778
114	1873	9	8.084392251	0.915607749
115	1874	8	8.050103723	-0.050103723
116	1875	8	8.015815196	-0.015815196
117	1876	10	7.981526669	2.018473331
118	1877	9	7.947238142	1.052761858
119	1878	7	7.912949615	-0.912949615
120	1879	6	7.878661088	-1.878661088
121	1880	6	7.844372561	-1.844372561
122	1881	5	7.810084034	-2.810084034
123	1882	4	7.775795506	-3.775795506
124	1883	5	7.741506979	-2.741506979
125	1884	3	7.707218452	-4.707218452
126	1885	5	7.672929925	-2.672929925
127	1886	6	7.638641398	-1.638641398
128	1887	5	7.604352871	-2.604352871
129	1888	6	7.570064344	-1.570064344
130	1889	5	7.535775817	-2.535775817
131	1890	6	7.501487289	-1.501487289
132	1891	8	7.467198762	0.532801238
133	1892	5	7.432910235	-2.432910235
134	1893	6	7.398621708	-1.398621708
135	1894	9	7.364333181	1.635666819
136	1895	6	7.330044654	-1.330044654
137	1896	6	7.295756127	-1.295756127
138	1897	6	7.2614676	-1.2614676
139	1898	8	7.227179072	0.772820928
140	1899	8	7.192890545	0.807109455
141	1900	8	7.158602018	0.841397982
142	1901	5	7.124313491	-2.124313491
143	1902	6	7.090024964	-1.090024964
144	1903	6	7.055736437	-1.055736437
145	1904	4	7.02144791	-3.02144791
146	1905	6	6.987159383	-0.987159383
147	1906	6	6.952870855	-0.952870855
148	1907	5	6.918582328	-1.918582328
149	1908	4	6.884293801	-2.884293801
150	1909	6	6.850005274	-0.850005274
151	1910	5	6.815716747	-1.815716747
152	1911	7	6.78142822	0.21857178
153	1912	7	6.747139693	0.252860307

154	1913	6	6.712851166	-0.712851166
155	1914	7	6.678562638	0.321437362
156	1915	6	6.644274111	-0.644274111
157	1916	5	6.609985584	-1.609985584
158	1917	7	6.575697057	0.424302943
159	1918	7	6.54140853	0.45859147
160	1919	7	6.507120003	0.492879997
161	1920	9	6.472831476	2.527168524
162	1921	6	6.438542949	-0.438542949
163	1922	4	6.404254421	-2.404254421
164	1923	4	6.369965894	-2.369965894
165	1924	6	6.335677367	-0.335677367
166	1925	5	6.30138884	-1.30138884
167	1926	7	6.267100313	0.732899687
168	1927	5	6.232811786	-1.232811786
169	1928	7	6.198523259	0.801476741
170	1929	8	6.164234732	1.835765268
171	1930	7	6.129946204	0.870053796
172	1931	6	6.095657677	-0.095657677
173	1932	7	6.06136915	0.93863085
174	1933	6	6.027080623	-0.027080623
175	1934	5	5.992792096	-0.992792096
176	1935	5	5.958503569	-0.958503569
177	1936	5	5.924215042	-0.924215042
178	1937	5	5.889926515	-0.889926515
179	1938	4	5.855637987	-1.855637987
180	1939	4	5.82134946	-1.82134946
181	1940	5	5.787060933	-0.787060933
182	1941	6	5.752772406	0.247227594
183	1942	6	5.718483879	0.281516121
184	1943	9	5.684195352	3.315804648
185	1944	7	5.649906825	1.350093175
186	1945	8	5.615618298	2.384381702
187	1946	6	5.58132977	0.41867023
188	1947	6	5.547041243	0.452958757
189	1948	7	5.512752716	1.487247284
190	1949	6	5.478464189	0.521535811
191	1950	7	5.444175662	1.555824338
192	1951	7	5.409887135	1.590112865
193	1952	5	5.375598608	-0.375598608
194	1953	8	5.341310081	2.658689919
195	1954	7	5.307021553	1.692978447
196	1955	8	5.272733026	2.727266974
197	1956	6	5.238444499	0.761555501
198	1957	4	5.204155972	-1.204155972
199	1958	5	5.169867445	-0.169867445
200	1959	5	5.135578918	-0.135578918
201	1960	4	5.101290391	-1.101290391
202	1961	4	5.067001864	-1.067001864
203	1962	6	5.032713336	0.967286664
204	1963	5	4.998424809	0.001575191
205	1964	6	4.964136282	1.035863718

206	1965	7	4.929847755	2.070152245
207	1966	7	4.895559228	2.104440772
208	1967	6	4.861270701	1.138729299
209	1968	5	4.826982174	0.173017826
210	1969	8	4.792693646	3.207306354
211	1970	9	4.758405119	4.241594881
212	1971	7	4.724116592	2.275883408
213	1972	7	4.689828065	2.310171935
214	1973	6	4.655539538	1.344460462
215	1974	9	4.621251011	4.378748989
216	1975	8	4.586962484	3.413037516
217	1976	8	4.552673957	3.447326043
218	1977	10	4.518385429	5.481614571
219	1978	7	4.484096902	2.515903098
220	1979	8	4.449808375	3.550191625
221	1980	5	4.415519848	0.584480152
222	1981	4	4.381231321	-0.381231321
223	1982	4	4.346942794	-0.346942794
224	1983	3	4.312654267	-1.312654267
225	1984	4	4.27836574	-0.27836574
226	1985	4	4.244077212	-0.244077212
227	1986	4	4.209788685	-0.209788685
228	1987	4	4.175500158	-0.175500158
229	1988	4	4.141211631	-0.141211631
230	1989	6	4.106923104	1.893076896
231	1990	6	4.072634577	1.927365423
232	1991	7	4.03834605	2.96165395
233	1992	5	4.004057523	0.995942477
234	1993	8	3.969768995	4.030231005
235	1994	8	3.935480468	4.064519532
236	1995	6	3.901191941	2.098808059
237	1996	6	3.866903414	2.133096586
238	1997	5	3.832614887	1.167385113
239	1998	5	3.79832636	1.20167364

Tree-ring data sheet

24-Sep-99

Sample: 12A Count Date 23-Sep-99

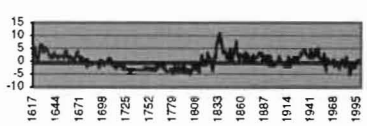
No.	Year	Width	Trend	w/o Trend
1	1617	6	3.35937	2.640629913
2	1618	9	3.375788	5.624212375
3	1619	5	3.392205	1.607794838
4	1620	5	3.408623	1.5913773
5	1621	4	3.42504	0.574959762
6	1622	3	3.441458	-0.44145778
7	1623	5	3.457875	1.542124687
8	1624	8	3.474293	4.52570715
9	1625	10	3.49071	6.509289612
10	1626	10	3.507128	6.492872075
11	1627	10	3.523545	6.476454537
12	1628	7	3.539963	3.460036999
13	1629	7	3.556381	3.443619462
14	1630	8	3.572798	4.427201924
15	1631	9	3.589216	5.410784387
16	1632	8	3.605633	4.394366849
17	1633	8	3.622051	4.377949312
18	1634	7	3.638468	3.361531774
19	1635	6	3.654886	2.345114236
20	1636	6	3.671303	2.328696699
21	1637	5	3.687721	1.312279161
22	1638	6	3.704138	2.295861624
23	1639	5	3.720556	1.279444086
24	1640	5	3.736973	1.263026548
25	1641	7	3.753391	3.246609011
26	1642	6	3.769809	2.230191473
27	1643	6	3.786226	2.213773936
28	1644	6	3.802644	2.197356398
29	1645	5	3.819061	1.180938861
30	1646	5	3.835479	1.164521323
31	1647	6	3.851896	2.148103785
32	1648	6	3.868314	2.131686248
33	1649	6	3.884731	2.11526871
34	1650	6	3.901149	2.098851173
35	1651	6	3.917566	2.082433635
36	1652	5	3.933984	1.066016098
37	1653	6	3.950401	2.04959856
38	1654	8	3.966819	4.033181022
39	1655	8	3.983237	4.016763485
40	1656	6	3.999654	2.000345947
41	1657	6	4.016072	1.98392841
42	1658	5	4.032489	0.967510872
43	1659	6	4.048907	1.951093335
44	1660	6	4.065324	1.934675797
45	1661	5	4.081742	0.918258259
46	1662	5	4.098159	0.901840722
47	1663	4	4.114577	-0.11457682
48	1664	5	4.130994	0.869005647
49	1665	5	4.147412	0.852588109

Descriptive Statistics	
Mean	6.486910995
Standard Error	0.168442285
Median	6
Mode	2
Standard Deviation	3.292174191
Sample Variance	10.83841091
Kurtosis	-0.329505128
Skewness	0.402547029
Range	17
Minimum	1
Maximum	18
Sum	2478
Count	382

Regression Statistics	
Multiple R	0.55063734
R Square	0.30320148
Adjusted R Square	0.301367799
Standard Error	2.751738153
Observations	382

Coefficients	
Intercept	3.34295255
X Variable 1	0.016417538

Standard Error
0.282136095
0.001276745



Date: 3 Aug 99
Collector: Jim, Jeremy and Jay Aber
Vicinity: Trail to Trinchera Peak above Blue Lake Campground.
Species: Blue spruce
Location: Near timberline where trail opens
Elevation: 11,680 feet
Setting: heavy wind damage in forest
Slope aspect: moderate, north facing
Drainage: good
Cirumferance: 74"
Comments: Lightening strike scar. Counted twice.

50	1666	6	4.163829	1.836170572
51	1667	7	4.180247	2.819753034
52	1668	8	4.196665	3.803335496
53	1669	6	4.213082	1.786917959
54	1670	6	4.2295	1.770500421
55	1671	5	4.245917	0.754082884
56	1672	6	4.262335	1.737665346
57	1673	6	4.278752	1.721247809
58	1674	5	4.29517	0.704830271
59	1675	5	4.311587	0.688412733
60	1676	5	4.328005	0.671995196
61	1677	5	4.344422	0.655577658
62	1678	5	4.36084	0.639160121
63	1679	2	4.377257	-2.37725742
64	1680	5	4.393675	0.606325046
65	1681	4	4.410092	-0.41009249
66	1682	3	4.42651	-1.42651003
67	1683	4	4.442928	-0.44292757
68	1684	3	4.459345	-1.4593451
69	1685	3	4.475763	-1.47576264
70	1686	4	4.49218	-0.49218018
71	1687	4	4.508598	-0.50859772
72	1688	4	4.525015	-0.52501525
73	1689	4	4.541433	-0.54143279
74	1690	4	4.55785	-0.55785033
75	1691	4	4.574268	-0.57426787
76	1692	4	4.590685	-0.59068541
77	1693	2	4.607103	-2.60710294
78	1694	5	4.62352	0.37647952
79	1695	4	4.639938	-0.63993802
80	1696	5	4.656356	0.343644444
81	1697	4	4.672773	-0.67277309
82	1698	3	4.689191	-1.68919063
83	1699	3	4.705608	-1.70560817
84	1700	4	4.722026	-0.72202571
85	1701	4	4.738443	-0.73844324
86	1702	4	4.754861	-0.75486078
87	1703	5	4.771278	0.228721681
88	1704	6	4.787696	1.212304144
89	1705	5	4.804113	0.195886606
90	1706	6	4.820531	1.179469069
91	1707	4	4.836948	-0.83694847
92	1708	5	4.853366	0.146633994
93	1709	3	4.869784	-1.86978354
94	1710	3	4.886201	-1.88620108
95	1711	3	4.902619	-1.90261862
96	1712	2	4.919036	-2.91903616
97	1713	2	4.935454	-2.93545369
98	1714	3	4.951871	-1.95187123
99	1715	3	4.968289	-1.96828877
100	1716	4	4.984706	-0.98470631
101	1717	3	5.001124	-2.00112384

102	1718	4	5.017541	-1.01754138
103	1719	3	5.033959	-2.03395892
104	1720	2	5.050376	-3.05037646
105	1721	2	5.066794	-3.06679399
106	1722	3	5.083212	-2.08321153
107	1723	2	5.099629	-3.09962907
108	1724	2	5.116047	-3.11604661
109	1725	2	5.132464	-3.13246415
110	1726	2	5.148882	-3.14888168
111	1727	2	5.165299	-3.16529922
112	1728	2	5.181717	-3.18171676
113	1729	1	5.198134	-4.1981343
114	1730	2	5.214552	-3.21455183
115	1731	2	5.230969	-3.23096937
116	1732	2	5.247387	-3.24738691
117	1733	2	5.263804	-3.26380445
118	1734	2	5.280222	-3.28022198
119	1735	2	5.29664	-3.29663952
120	1736	2	5.313057	-3.31305706
121	1737	2	5.329475	-3.3294746
122	1738	2	5.345892	-3.34589213
123	1739	2	5.36231	-3.36230967
124	1740	2	5.378727	-3.37872721
125	1741	2	5.395145	-3.39514475
126	1742	2	5.411562	-3.41156228
127	1743	2	5.42798	-3.42797982
128	1744	2	5.444397	-3.44439736
129	1745	2	5.460815	-3.4608149
130	1746	3	5.477232	-2.47723243
131	1747	3	5.49365	-2.49364997
132	1748	2	5.510068	-3.51006751
133	1749	3	5.526485	-2.52648505
134	1750	3	5.542903	-2.54290258
135	1751	3	5.55932	-2.55932012
136	1752	2	5.575738	-3.57573766
137	1753	2	5.592155	-3.5921552
138	1754	3	5.608573	-2.60857273
139	1755	2	5.62499	-3.62499027
140	1756	3	5.641408	-2.64140781
141	1757	3	5.657825	-2.65782535
142	1758	2	5.674243	-3.67424288
143	1759	2	5.69066	-3.69066042
144	1760	4	5.707078	-1.70707796
145	1761	4	5.723495	-1.7234955
146	1762	3	5.739913	-2.73991304
147	1763	4	5.756331	-1.75633057
148	1764	5	5.772748	-0.77274811
149	1765	5	5.789166	-0.78916565
150	1766	5	5.805583	-0.80558319
151	1767	3	5.822001	-2.82200072
152	1768	4	5.838418	-1.83841826
153	1769	4	5.854836	-1.8548358

154	1770	2	5.871253	-3.87125334
155	1771	2	5.887671	-3.88767087
156	1772	2	5.904088	-3.90408841
157	1773	2	5.920506	-3.92050595
158	1774	2	5.936923	-3.93692349
159	1775	2	5.953341	-3.95334102
160	1776	3	5.969759	-2.96975856
161	1777	2	5.986176	-3.9861761
162	1778	2	6.002594	-4.00259364
163	1779	1	6.019011	-5.01901117
164	1780	3	6.035429	-3.03542871
165	1781	4	6.051846	-2.05184625
166	1782	3	6.068264	-3.06826379
167	1783	2	6.084681	-4.08468132
168	1784	2	6.101099	-4.10109886
169	1785	2	6.117516	-4.1175164
170	1786	4	6.133934	-2.13393394
171	1787	3	6.150351	-3.15035147
172	1788	3	6.166769	-3.16676901
173	1789	2	6.183187	-4.18318655
174	1790	2	6.199604	-4.19960409
175	1791	5	6.216022	-1.21602162
176	1792	2	6.232439	-4.23243916
177	1793	4	6.248857	-2.2488567
178	1794	2	6.265274	-4.26527424
179	1795	3	6.281692	-3.28169178
180	1796	3	6.298109	-3.29810931
181	1797	3	6.314527	-3.31452685
182	1798	1	6.330944	-5.33094439
183	1799	2	6.347362	-4.34736193
184	1800	2	6.363779	-4.36377946
185	1801	3	6.380197	-3.380197
186	1802	5	6.396615	-1.39661454
187	1803	3	6.413032	-3.41303208
188	1804	5	6.42945	-1.42944961
189	1805	4	6.445867	-2.44586715
190	1806	5	6.462285	-1.46228469
191	1807	3	6.478702	-3.47870223
192	1808	5	6.49512	-1.49511976
193	1809	6	6.511537	-0.5115373
194	1810	2	6.527955	-4.52795484
195	1811	5	6.544372	-1.54437238
196	1812	5	6.56079	-1.56078991
197	1813	9	6.577207	2.422792549
198	1814	5	6.593625	-1.59362499
199	1815	5	6.610043	-1.61004253
200	1816	6	6.62646	-0.62646006
201	1817	7	6.642878	0.357122398
202	1818	5	6.659295	-1.65929514
203	1819	6	6.675713	-0.67571268
204	1820	10	6.69213	3.307869786
205	1821	8	6.708548	1.291452248

206	1822	8	6.724965	1.27503471
207	1823	8	6.741383	1.258617173
208	1824	6	6.7578	-0.75780036
209	1825	4	6.774218	-2.7742179
210	1826	3	6.790635	-3.79063544
211	1827	6	6.807053	-0.80705298
212	1828	9	6.823471	2.176529485
213	1829	8	6.839888	1.160111947
214	1830	13	6.856306	6.14369441
215	1831	14	6.872723	7.127276872
216	1832	16	6.889141	9.110859335
217	1833	16	6.905558	9.094441797
218	1834	18	6.921976	11.07802426
219	1835	14	6.938393	7.061606722
220	1836	16	6.954811	9.045189184
221	1837	11	6.971228	4.028771647
222	1838	10	6.987646	3.012354109
223	1839	10	7.004063	2.995936572
224	1840	11	7.020481	3.979519034
225	1841	10	7.036899	2.963101497
226	1842	8	7.053316	0.946683959
227	1843	10	7.069734	2.930266421
228	1844	10	7.086151	2.913848884
229	1845	7	7.102569	-0.10256865
230	1846	12	7.118986	4.881013809
231	1847	8	7.135404	0.864596271
232	1848	7	7.151821	-0.15182127
233	1849	8	7.168239	0.831761196
234	1850	10	7.184656	2.815343658
235	1851	12	7.201074	4.798926121
236	1852	11	7.217491	3.782508583
237	1853	15	7.233909	7.766091046
238	1854	11	7.250326	3.749673508
239	1855	9	7.266744	1.733255971
240	1856	9	7.283162	1.716838433
241	1857	8	7.299579	0.700420895
242	1858	10	7.315997	2.684003358
243	1859	10	7.332414	2.66758582
244	1860	9	7.348832	1.651168283
245	1861	9	7.365249	1.634750745
246	1862	8	7.381667	0.618333208
247	1863	10	7.398084	2.60191567
248	1864	11	7.414502	3.585498132
249	1865	9	7.430919	1.569080595
250	1866	7	7.447337	-0.44733694
251	1867	10	7.463754	2.53624552
252	1868	7	7.480172	-0.48017202
253	1869	8	7.49659	0.503410445
254	1870	7	7.513007	-0.51300709
255	1871	9	7.529425	1.470575369
256	1872	9	7.545842	1.454157832
257	1873	10	7.56226	2.437740294

258	1874	8	7.578677	0.421322757
259	1875	9	7.595095	1.404905219
260	1876	9	7.611512	1.388487682
261	1877	9	7.62793	1.372070144
262	1878	10	7.644347	2.355652606
263	1879	10	7.660765	2.339235069
264	1880	11	7.677182	3.322817531
265	1881	10	7.6936	2.306399994
266	1882	10	7.710018	2.289982456
267	1883	11	7.726435	3.273564919
268	1884	7	7.742853	-0.74285262
269	1885	8	7.75927	0.240729843
270	1886	8	7.775688	0.224312306
271	1887	10	7.792105	2.207894768
272	1888	8	7.808523	0.191477231
273	1889	9	7.82494	1.175059693
274	1890	10	7.841358	2.158642156
275	1891	8	7.857775	0.142224618
276	1892	6	7.874193	-1.87419292
277	1893	10	7.89061	2.109389543
278	1894	7	7.907028	-0.90702799
279	1895	6	7.923446	-1.92344553
280	1896	8	7.939863	0.06013693
281	1897	7	7.956281	-0.95628061
282	1898	6	7.972698	-1.97269815
283	1899	7	7.989116	-0.98911568
284	1900	7	8.005533	-1.00553322
285	1901	7	8.021951	-1.02195076
286	1902	8	8.038368	-0.0383683
287	1903	10	8.054786	1.945214167
288	1904	9	8.071203	0.92879663
289	1905	8	8.087621	-0.08762091
290	1906	7	8.104038	-1.10403845
291	1907	7	8.120456	-1.12045598
292	1908	7	8.136874	-1.13687352
293	1909	7	8.153291	-1.15329106
294	1910	6	8.169709	-2.1697086
295	1911	6	8.186126	-2.18612613
296	1912	6	8.202544	-2.20254367
297	1913	6	8.218961	-2.21896121
298	1914	10	8.235379	1.764621254
299	1915	8	8.251796	-0.25179628
300	1916	6	8.268214	-2.26821382
301	1917	8	8.284631	-0.28463136
302	1918	9	8.301049	0.698951104
303	1919	8	8.317466	-0.31746643
304	1920	10	8.333884	1.666116028
305	1921	8	8.350302	-0.35030151
306	1922	8	8.366719	-0.36671905
307	1923	10	8.383137	1.616863416
308	1924	10	8.399554	1.600445878
309	1925	9	8.415972	0.584028341

310	1926	10	8.432389	1.567610803
311	1927	10	8.448807	1.551193265
312	1928	10	8.465224	1.534775728
313	1929	12	8.481642	3.51835819
314	1930	11	8.498059	2.501940653
315	1931	12	8.514477	3.485523115
316	1932	13	8.530894	4.469105578
317	1933	13	8.547312	4.45268804
318	1934	12	8.563729	3.436270502
319	1935	11	8.580147	2.419852965
320	1936	11	8.596565	2.403435427
321	1937	11	8.612982	2.38701789
322	1938	10	8.6294	1.370600352
323	1939	10	8.645817	1.354182815
324	1940	13	8.662235	4.337765277
325	1941	10	8.678652	1.321347739
326	1942	11	8.69507	2.304930202
327	1943	12	8.711487	3.288512664
328	1944	10	8.727905	1.272095127
329	1945	13	8.744322	4.255677589
330	1946	11	8.76074	2.239260052
331	1947	12	8.777157	3.222842514
332	1948	11	8.793575	2.206424976
333	1949	14	8.809993	5.190007439
334	1950	10	8.82641	1.173589901
335	1951	10	8.842828	1.157172364
336	1952	10	8.859245	1.140754826
337	1953	9	8.875663	0.124337289
338	1954	9	8.89208	0.107919751
339	1955	11	8.908498	2.091502213
340	1956	12	8.924915	3.075084676
341	1957	7	8.941333	-1.94133286
342	1958	5	8.95775	-3.9577504
343	1959	10	8.974168	1.025832063
344	1960	10	8.990585	1.009414526
345	1961	9	9.007003	-0.00700301
346	1962	8	9.023421	-1.02342055
347	1963	8	9.039838	-1.03983809
348	1964	8	9.056256	-1.05625562
349	1965	9	9.072673	-0.07267316
350	1966	9	9.089091	-0.0890907
351	1967	10	9.105508	0.894491763
352	1968	7	9.121926	-2.12192578
353	1969	8	9.138343	-1.13834331
354	1970	9	9.154761	-0.15476085
355	1971	9	9.171178	-0.17117839
356	1972	8	9.187596	-1.18759593
357	1973	7	9.204013	-2.20401346
358	1974	6	9.220431	-3.220431
359	1975	9	9.236849	-0.23684854
360	1976	8	9.253266	-1.25326608
361	1977	10	9.269684	0.730316387

362	1978	9	9.286101	-0.28610115
363	1979	8	9.302519	-1.30251869
364	1980	7	9.318936	-2.31893623
365	1981	10	9.335354	0.664646237
366	1982	11	9.351771	1.648228699
367	1983	9	9.368189	-0.36818884
368	1984	8	9.384606	-1.38460638
369	1985	7	9.401024	-2.40102391
370	1986	4	9.417441	-5.41744145
371	1987	6	9.433859	-3.43385899
372	1988	6	9.450277	-3.45027653
373	1989	8	9.466694	-1.46669406
374	1990	7	9.483112	-2.4831116
375	1991	8	9.499529	-1.49952914
376	1992	7	9.515947	-2.51594668
377	1993	7	9.532364	-2.53236421
378	1994	9	9.548782	-0.54878175
379	1995	10	9.565199	0.434800711
380	1996	10	9.581617	0.418383173
381	1997	10	9.598034	0.401965635
382	1998	9	9.614452	-0.6144519

Tree-ring data sheet

29-Jan-00

Sample: 13A Count Date 24-Sep-99

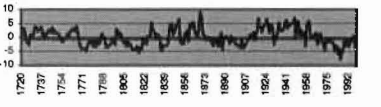
No	Year	Width	Trend	w/o Trend
1	1720	9	5.719713262	3.280286738
2	1721	7	5.747747608	1.252252392
3	1722	9	5.775781955	3.224218045
4	1723	6	5.803816302	0.196183698
5	1724	4	5.831850649	-1.831850649
6	1725	4	5.859884995	-1.859884995
7	1726	3	5.887919342	-2.887919342
8	1727	7	5.915953689	1.084046311
9	1728	6	5.943988035	0.056011965
10	1729	6	5.972022382	0.027977618
11	1730	8	6.000056729	1.999943271
12	1731	10	6.028091076	3.971908924
13	1732	9	6.056125422	2.943874578
14	1733	8	6.084159769	1.915840231
15	1734	9	6.112194116	2.887805884
16	1735	9	6.140228462	2.859771538
17	1736	10	6.168262809	3.831737191
18	1737	7	6.196297156	0.803702844
19	1738	8	6.224331503	1.775668497
20	1739	6	6.252365849	-0.252365849
21	1740	7	6.280400196	0.719599804
22	1741	8	6.308434543	1.691565457
23	1742	9	6.336468889	2.663531111
24	1743	8	6.364503236	1.635496764
25	1744	9	6.392537583	2.607462417
26	1745	10	6.42057193	3.57942807
27	1746	8	6.448606276	1.551393724
28	1747	9	6.476640623	2.523359377
29	1748	8	6.50467497	1.49532503
30	1749	8	6.532709316	1.467290684
31	1750	8	6.560743663	1.439256337
32	1751	7	6.58877801	0.41122199
33	1752	6	6.616812357	-0.616812357
34	1753	5	6.644846703	-1.644846703
35	1754	5	6.67288105	-1.67288105
36	1755	6	6.700915397	-0.700915397
37	1756	6	6.728949743	-0.728949743
38	1757	7	6.75698409	0.24301591
39	1758	8	6.785018437	1.214981563
40	1759	7	6.813052784	0.186947216
41	1760	9	6.84108713	2.15891287
42	1761	9	6.869121477	2.130878523
43	1762	10	6.897155824	3.102844176
44	1763	10	6.92519017	3.07480983
45	1764	9	6.953224517	2.046775483
46	1765	11	6.981258864	4.018741136
47	1766	9	7.009293211	1.990706789
48	1767	6	7.037327557	-1.037327557
49	1768	4	7.065361904	-3.065361904

Descritpive Statistics	
Mean	9.616487455
Standard Error	0.226125684
Median	9
Mode	9
Standard Deviation	3.777043569
Sample Variance	14.26605812
Kurtosis	-0.46187369
Skewness	0.382573795
Range	17
Minimum	2
Maximum	19
Sum	2683
Count	279

Regression Statistics	
Multiple R	0.598865011
R Square	0.358639301
Adjusted R Square	0.35632392
Standard Error	3.030300376
Observations	279

Coefficients	
Intercept	5.691678915
X Variable 1	0.028034347

Standard Error
0.363816241
0.002252541



Date: 3 Aug 99
Collector: Jim, Jeremy and Jay Aber
Vicinity: Trail to Trinchera Peak above Blue Lake Campground.
Species: Blue spruce
Location: Near timberline where trail opens
Elevation: 11,680 feet
Setting: heavy wind damage in forest
Slope aspect: moderate, north facing
Drainage: good
Cirumferance: 64"
Comments: Good core. Core separated. 8 feet from #14.
Got a good count on this core.

50	1769	3	7.093396251	-4.093396251
51	1770	3	7.121430597	-4.121430597
52	1771	3	7.149464944	-4.149464944
53	1772	3	7.177499291	-4.177499291
54	1773	2	7.205533638	-5.205533638
55	1774	4	7.233567984	-3.233567984
56	1775	5	7.261602331	-2.261602331
57	1776	6	7.289636678	-1.289636678
58	1777	5	7.317671024	-2.317671024
59	1778	6	7.345705371	-1.345705371
60	1779	4	7.373739718	-3.373739718
61	1780	6	7.401774065	-1.401774065
62	1781	4	7.429808411	-3.429808411
63	1782	6	7.457842758	-1.457842758
64	1783	5	7.485877105	-2.485877105
65	1784	5	7.513911451	-2.513911451
66	1785	7	7.541945798	-0.541945798
67	1786	9	7.569980145	1.430019855
68	1787	8	7.598014492	0.401985508
69	1788	7	7.626048838	-0.626048838
70	1789	5	7.654083185	-2.654083185
71	1790	4	7.682117532	-3.682117532
72	1791	4	7.710151878	-3.710151878
73	1792	5	7.738186225	-2.738186225
74	1793	5	7.766220572	-2.766220572
75	1794	6	7.794254919	-1.794254919
76	1795	7	7.822289265	-0.822289265
77	1796	6	7.850323612	-1.850323612
78	1797	5	7.878357959	-2.878357959
79	1798	11	7.906392306	3.093607694
80	1799	9	7.934426652	1.065573348
81	1800	10	7.962460999	2.037539001
82	1801	8	7.990495346	0.009504654
83	1802	9	8.018529692	0.981470308
84	1803	7	8.046564039	-1.046564039
85	1804	6	8.074598386	-2.074598386
86	1805	6	8.102632733	-2.102632733
87	1806	5	8.130667079	-3.130667079
88	1807	7	8.158701426	-1.158701426
89	1808	5	8.186735773	-3.186735773
90	1809	6	8.214770119	-2.214770119
91	1810	5	8.242804466	-3.242804466
92	1811	4	8.270838813	-4.270838813
93	1812	4	8.29887316	-4.29887316
94	1813	4	8.326907506	-4.326907506
95	1814	4	8.354941853	-4.354941853
96	1815	5	8.3829762	-3.3829762
97	1816	3	8.411010546	-5.411010546
98	1817	3	8.439044893	-5.439044893
99	1818	5	8.46707924	-3.46707924
100	1819	4	8.495113587	-4.495113587
101	1820	7	8.523147933	-1.523147933

102	1821	8	8.55118228	-0.55118228
103	1822	8	8.579216627	-0.579216627
104	1823	6	8.607250973	-2.607250973
105	1824	9	8.63528532	0.36471468
106	1825	9	8.663319667	0.336680333
107	1826	9	8.691354014	0.308645986
108	1827	14	8.71938836	5.28061164
109	1828	12	8.747422707	3.252577293
110	1829	11	8.775457054	2.224542946
111	1830	10	8.8034914	1.1965086
112	1831	8	8.831525747	-0.831525747
113	1832	10	8.859560094	1.140439906
114	1833	9	8.887594441	0.112405559
115	1834	9	8.915628787	0.084371213
116	1835	4	8.943663134	-4.943663134
117	1836	4	8.971697481	-4.971697481
118	1837	6	8.999731827	-2.999731827
119	1838	6	9.027766174	-3.027766174
120	1839	6	9.055800521	-3.055800521
121	1840	6	9.083834868	-3.083834868
122	1841	7	9.111869214	-2.111869214
123	1842	12	9.139903561	2.860096439
124	1843	14	9.167937908	4.832062092
125	1844	14	9.195972254	4.804027746
126	1845	10	9.224006601	0.775993399
127	1846	11	9.252040948	1.747959052
128	1847	12	9.280075295	2.719924705
129	1848	14	9.308109641	4.691890359
130	1849	14	9.336143988	4.663856012
131	1850	16	9.364178335	6.635821665
132	1851	8	9.392212681	-1.392212681
133	1852	7	9.420247028	-2.420247028
134	1853	8	9.448281375	-1.448281375
135	1854	7	9.476315722	-2.476315722
136	1855	11	9.504350068	1.495649932
137	1856	9	9.532384415	-0.532384415
138	1857	12	9.560418762	2.439581238
139	1858	8	9.588453108	-1.588453108
140	1859	14	9.616487455	4.383512545
141	1860	13	9.644521802	3.355478198
142	1861	15	9.672556149	5.327443851
143	1862	15	9.700590495	5.299409505
144	1863	12	9.728624842	2.271375158
145	1864	11	9.756659189	1.243340811
146	1865	10	9.784693535	0.215306465
147	1866	11	9.812727882	1.187272118
148	1867	16	9.840762229	6.159237771
149	1868	19	9.868796576	9.131203424
150	1869	17	9.896830922	7.103169078
151	1870	11	9.924865269	1.075134731
152	1871	11	9.952899616	1.047100384
153	1872	9	9.980933963	-0.980933963

154	1873	9	10.00896831	-1.008968309
155	1874	10	10.03700266	-0.037002656
156	1875	10	10.065037	-0.065037003
157	1876	9	10.09307135	-1.093071349
158	1877	10	10.1211057	-0.121105696
159	1878	8	10.14914004	-2.149140043
160	1879	7	10.17717439	-3.17717439
161	1880	8	10.20520874	-2.205208736
162	1881	9	10.23324308	-1.233243083
163	1882	10	10.26127743	-0.26127743
164	1883	7	10.28931178	-3.289311776
165	1884	7	10.31734612	-3.317346123
166	1885	10	10.34538047	-0.34538047
167	1886	12	10.37341482	1.626585183
168	1887	6	10.40144916	-4.401449163
169	1888	10	10.42948351	-0.42948351
170	1889	10	10.45751786	-0.457517857
171	1890	11	10.4855522	0.514447797
172	1891	10	10.51358655	-0.51358655
173	1892	10	10.5416209	-0.541620897
174	1893	8	10.56965524	-2.569655244
175	1894	11	10.59768959	0.40231041
176	1895	9	10.62572394	-1.625723937
177	1896	9	10.65375828	-1.653758284
178	1897	10	10.68179263	-0.68179263
179	1898	8	10.70982698	-2.709826977
180	1899	8	10.73786132	-2.737861324
181	1900	8	10.76589567	-2.765895671
182	1901	7	10.79393002	-3.793930017
183	1902	7	10.82196436	-3.821964364
184	1903	10	10.84999871	-0.849998711
185	1904	7	10.87803306	-3.878033057
186	1905	7	10.9060674	-3.906067404
187	1906	8	10.93410175	-2.934101751
188	1907	9	10.9621361	-1.962136098
189	1908	10	10.99017044	-0.990170444
190	1909	10	11.01820479	-1.018204791
191	1910	12	11.04623914	0.953760862
192	1911	11	11.07427348	-0.074273484
193	1912	11	11.10230783	-0.102307831
194	1913	13	11.13034218	1.869657822
195	1914	10	11.15837652	-1.158376525
196	1915	13	11.18641087	1.813589129
197	1916	13	11.21444522	1.785554782
198	1917	18	11.24247956	6.757520435
199	1918	15	11.27051391	3.729486089
200	1919	15	11.29854826	3.701451742
201	1920	13	11.3265826	1.673417395
202	1921	15	11.35461695	3.645383048
203	1922	16	11.3826513	4.617348702
204	1923	16	11.41068565	4.589314355
205	1924	18	11.43871999	6.561280008

206	1925	15	11.46675434	3.533245662
207	1926	13	11.49478869	1.505211315
208	1927	16	11.52282303	4.477176968
209	1928	16	11.55085738	4.449142621
210	1929	14	11.57889173	2.421108275
211	1930	9	11.60692607	-2.606926072
212	1931	12	11.63496042	0.365039581
213	1932	11	11.66299477	-0.662994765
214	1933	14	11.69102911	2.308970888
215	1934	17	11.71906346	5.280936541
216	1935	14	11.74709781	2.252902194
217	1936	14	11.77513215	2.224867848
218	1937	14	11.8031665	2.196833501
219	1938	15	11.83120085	3.168799154
220	1939	17	11.85923519	5.140764808
221	1940	18	11.88726954	6.112730461
222	1941	15	11.91530389	3.084696114
223	1942	17	11.94333823	5.056661767
224	1943	16	11.97137258	4.028627421
225	1944	17	11.99940693	5.000593074
226	1945	17	12.02744127	4.972558727
227	1946	17	12.05547562	4.94452438
228	1947	19	12.08350997	6.916490034
229	1948	12	12.11154431	-0.111544313
230	1949	17	12.13957866	4.86042134
231	1950	18	12.16761301	5.832386994
232	1951	13	12.19564735	0.804352647
233	1952	15	12.2236817	2.7763183
234	1953	13	12.25171605	0.748283953
235	1954	13	12.27975039	0.720249607
236	1955	14	12.30778474	1.69221526
237	1956	9	12.33581909	-3.335819087
238	1957	16	12.36385343	3.636146567
239	1958	18	12.39188778	5.60811222
240	1959	18	12.41992213	5.580077873
241	1960	13	12.44795647	0.552043526
242	1961	12	12.47599082	-0.47599082
243	1962	12	12.50402517	-0.504025167
244	1963	13	12.53205951	0.467940486
245	1964	14	12.56009386	1.43990614
246	1965	14	12.58812821	1.411871793
247	1966	10	12.61616255	-2.616162554
248	1967	11	12.6441969	-1.644196901
249	1968	14	12.67223125	1.327768753
250	1969	13	12.70026559	0.299734406
251	1970	11	12.72829994	-1.728299941
252	1971	10	12.75633429	-2.756334287
253	1972	8	12.78436863	-4.784368634
254	1973	12	12.81240298	-0.812402981
255	1974	11	12.84043733	-1.840437328
256	1975	12	12.86847167	-0.868471674
257	1976	11	12.89650602	-1.896506021

258	1977	12	12.92454037	-0.924540368
259	1978	11	12.95257471	-1.952574714
260	1979	11	12.98060906	-1.980609061
261	1980	8	13.00864341	-5.008643408
262	1981	8	13.03667775	-5.036677755
263	1982	10	13.0647121	-3.064712101
264	1983	7	13.09274645	-6.092746448
265	1984	9	13.12078079	-4.120780795
266	1985	5	13.14881514	-8.148815141
267	1986	7	13.17684949	-6.176849488
268	1987	8	13.20488383	-5.204883835
269	1988	12	13.23291818	-1.232918182
270	1989	10	13.26095253	-3.260952528
271	1990	12	13.28898688	-1.288986875
272	1991	10	13.31702122	-3.317021222
273	1992	10	13.34505557	-3.345055568
274	1993	12	13.37308992	-1.373089915
275	1994	13	13.40112426	-0.401124262
276	1995	12	13.42915861	-1.429158609
277	1996	14	13.45719296	0.542807045
278	1997	10	13.4852273	-3.485227302
279	1998	12	13.51326165	-1.513261649

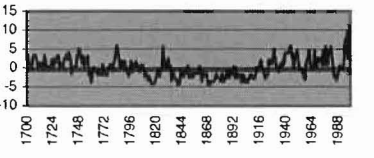
Tree-ring data sheet

02-Feb-00

Sample: 14A Count Date 24-Sep-99

No	Year	Width	Trend	w/o Trend
1	1700	10	6.524882943	3.475117057
2	1701	8	6.531371237	1.468628763
3	1702	8	6.537859532	1.462140468
4	1703	7	6.544347826	0.455652174
5	1704	6	6.55083612	-0.55083612
6	1705	9	6.557324415	2.442675585
7	1706	10	6.563812709	3.436187291
8	1707	10	6.570301003	3.429698997
9	1708	9	6.576789298	2.423210702
10	1709	8	6.583277592	1.416722408
11	1710	6	6.589765886	-0.589765886
12	1711	8	6.596254181	1.403745819
13	1712	8	6.602742475	1.397257525
14	1713	7	6.609230769	0.390769231
15	1714	8	6.615719064	1.384280936
16	1715	6	6.622207358	-0.622207358
17	1716	10	6.628695652	3.371304348
18	1717	8	6.635183946	1.364816054
19	1718	7	6.641672241	0.358327759
20	1719	7	6.648160535	0.351839465
21	1720	6	6.654648829	-0.654648829
22	1721	7	6.661137124	0.338862876
23	1722	7	6.667625418	0.332374582
24	1723	9	6.674113712	2.325886288
25	1724	7	6.680602007	0.319397993
26	1725	9	6.687090301	2.312909699
27	1726	8	6.693578595	1.306421405
28	1727	9	6.70006689	2.29993311
29	1728	10	6.706555184	3.293444816
30	1729	10	6.713043478	3.286956522
31	1730	6	6.719531773	-0.719531773
32	1731	8	6.726020067	1.273979933
33	1732	7	6.732508361	0.267491639
34	1733	7	6.738996656	0.261003344
35	1734	9	6.74548495	2.25451505
36	1735	9	6.751973244	2.248026756
37	1736	10	6.758461538	3.241538462
38	1737	9	6.764949833	2.235050167
39	1738	11	6.771438127	4.228561873
40	1739	10	6.777926421	3.222073579
41	1740	9	6.784414716	2.215585284
42	1741	5	6.79090301	-1.79090301
43	1742	7	6.797391304	0.202608696
44	1743	7	6.803879599	0.196120401
45	1744	7	6.810367893	0.189632107
46	1745	7	6.816856187	0.183143813
47	1746	10	6.823344482	3.176655518
48	1747	10	6.829832776	3.170167224
49	1748	12	6.83632107	5.16367893

Descriptive Statistics	
Mean	7.491638796
Standard Error	0.148946345
Median	7
Mode	6
Standard Deviation	2.575523076
Sample Variance	6.633319117
Kurtosis	0.614905966
Skewness	0.716218657
Range	15
Minimum	3
Maximum	18
Sum	2240
Count	299
Regression Statistics	
Multiple R	0.217806429
R Square	0.04743964
Adjusted R Square	0.044232367
Standard Error	2.517918131
Observations	299
Coefficients	
Intercept	6.518394649
X Variable 1	0.006488294
Standard Error	
0.291961972	
0.00168705	



Date: 3 Aug 99
Collector: Jim, Jeremy and Jay Aber
Vicinity: Trail to Trinchera Peak above Blue Lake Campground.
Species: Blue spruce
Location: Near timberline where trail opens
Elevation: 11,680 feet
Setting: heavy wind damage in forest
Slope aspect: moderate, north facing
Drainage: good
Cirumferance: 58"
Comments: Good core. Core separated. 8 ft from #13. Good count, easy to see core and discern rings

50	1749	11	6.842809365	4.157190635
51	1750	9	6.849297659	2.150702341
52	1751	8	6.855785953	1.144214047
53	1752	10	6.862274247	3.137725753
54	1753	7	6.868762542	0.131237458
55	1754	9	6.875250836	2.124749164
56	1755	9	6.88173913	2.11826087
57	1756	10	6.888227425	3.111772575
58	1757	5	6.894715719	-1.894715719
59	1758	6	6.901204013	-0.901204013
60	1759	3	6.907692308	-3.907692308
61	1760	4	6.914180602	-2.914180602
62	1761	7	6.920668896	0.079331104
63	1762	7	6.927157191	0.072842809
64	1763	6	6.933645485	-0.933645485
65	1764	6	6.940133779	-0.940133779
66	1765	5	6.946622074	-1.946622074
67	1766	6	6.953110368	-0.953110368
68	1767	6	6.959598662	-0.959598662
69	1768	5	6.966086957	-1.966086957
70	1769	6	6.972575251	-0.972575251
71	1770	8	6.979063545	1.020936455
72	1771	5	6.985551839	-1.985551839
73	1772	5	6.992040134	-1.992040134
74	1773	5	6.998528428	-1.998528428
75	1774	5	7.005016722	-2.005016722
76	1775	7	7.011505017	-0.011505017
77	1776	7	7.017993311	-0.017993311
78	1777	8	7.024481605	0.975518395
79	1778	7	7.0309699	-0.0309699
80	1779	6	7.037458194	-1.037458194
81	1780	8	7.043946488	0.956053512
82	1781	9	7.050434783	1.949565217
83	1782	11	7.056923077	3.943076923
84	1783	13	7.063411371	5.936588629
85	1784	12	7.069899666	4.930100334
86	1785	9	7.07638796	1.92361204
87	1786	7	7.082876254	-0.082876254
88	1787	9	7.089364548	1.910635452
89	1788	9	7.095852843	1.904147157
90	1789	7	7.102341137	-0.102341137
91	1790	9	7.108829431	1.891170569
92	1791	8	7.115317726	0.884682274
93	1792	6	7.12180602	-1.12180602
94	1793	7	7.128294314	-0.128294314
95	1794	5	7.134782609	-2.134782609
96	1795	6	7.141270903	-1.141270903
97	1796	9	7.147759197	1.852240803
98	1797	7	7.154247492	-0.154247492
99	1798	6	7.160735786	-1.160735786
100	1799	8	7.16722408	0.83277592
101	1800	8	7.173712375	0.826287625

102	1801	9	7.180200669	1.819799331
103	1802	7	7.186688963	-0.186688963
104	1803	7	7.193177258	-0.193177258
105	1804	6	7.199665552	-1.199665552
106	1805	8	7.206153846	0.793846154
107	1806	7	7.21264214	-0.21264214
108	1807	8	7.219130435	0.780869565
109	1808	7	7.225618729	-0.225618729
110	1809	5	7.232107023	-2.232107023
111	1810	6	7.238595318	-1.238595318
112	1811	5	7.245083612	-2.245083612
113	1812	4	7.251571906	-3.251571906
114	1813	5	7.258060201	-2.258060201
115	1814	4	7.264548495	-3.264548495
116	1815	3	7.271036789	-4.271036789
117	1816	3	7.277525084	-4.277525084
118	1817	3	7.284013378	-4.284013378
119	1818	3	7.290501672	-4.290501672
120	1819	4	7.296989967	-3.296989967
121	1820	5	7.303478261	-2.303478261
122	1821	7	7.309966555	-0.309966555
123	1822	7	7.316454849	-0.316454849
124	1823	5	7.322943144	-2.322943144
125	1824	7	7.329431438	-0.329431438
126	1825	7	7.335919732	-0.335919732
127	1826	13	7.342408027	5.657591973
128	1827	8	7.348896321	0.651103679
129	1828	9	7.355384615	1.644615385
130	1829	7	7.36187291	-0.36187291
131	1830	7	7.368361204	-0.368361204
132	1831	10	7.374849498	2.625150502
133	1832	7	7.381337793	-0.381337793
134	1833	8	7.387826087	0.612173913
135	1834	4	7.394314381	-3.394314381
136	1835	7	7.400802676	-0.400802676
137	1836	5	7.40729097	-2.40729097
138	1837	5	7.413779264	-2.413779264
139	1838	4	7.420267559	-3.420267559
140	1839	4	7.426755853	-3.426755853
141	1840	3	7.433244147	-4.433244147
142	1841	3	7.439732441	-4.439732441
143	1842	5	7.446220736	-2.446220736
144	1843	7	7.45270903	-0.45270903
145	1844	5	7.459197324	-2.459197324
146	1845	5	7.465685619	-2.465685619
147	1846	6	7.472173913	-1.472173913
148	1847	7	7.478662207	-0.478662207
149	1848	6	7.485150502	-1.485150502
150	1849	8	7.491638796	0.508361204
151	1850	5	7.49812709	-2.49812709
152	1851	5	7.504615385	-2.504615385
153	1852	5	7.511103679	-2.511103679

154	1853	6	7.517591973	-1.517591973
155	1854	5	7.524080268	-2.524080268
156	1855	6	7.530568562	-1.530568562
157	1856	6	7.537056856	-1.537056856
158	1857	6	7.543545151	-1.543545151
159	1858	7	7.550033445	-0.550033445
160	1859	6	7.556521739	-1.556521739
161	1860	8	7.563010033	0.436989967
162	1861	7	7.569498328	-0.569498328
163	1862	4	7.575986622	-3.575986622
164	1863	6	7.582474916	-1.582474916
165	1864	6	7.588963211	-1.588963211
166	1865	6	7.595451505	-1.595451505
167	1866	5	7.601939799	-2.601939799
168	1867	6	7.608428094	-1.608428094
169	1868	3	7.614916388	-4.614916388
170	1869	4	7.621404682	-3.621404682
171	1870	3	7.627892977	-4.627892977
172	1871	4	7.634381271	-3.634381271
173	1872	4	7.640869565	-3.640869565
174	1873	4	7.64735786	-3.64735786
175	1874	4	7.653846154	-3.653846154
176	1875	5	7.660334448	-2.660334448
177	1876	6	7.666822742	-1.666822742
178	1877	5	7.673311037	-2.673311037
179	1878	5	7.679799331	-2.679799331
180	1879	5	7.686287625	-2.686287625
181	1880	4	7.69277592	-3.69277592
182	1881	6	7.699264214	-1.699264214
183	1882	4	7.705752508	-3.705752508
184	1883	4	7.712240803	-3.712240803
185	1884	5	7.718729097	-2.718729097
186	1885	6	7.725217391	-1.725217391
187	1886	7	7.731705686	-0.731705686
188	1887	5	7.73819398	-2.73819398
189	1888	5	7.744682274	-2.744682274
190	1889	7	7.751170569	-0.751170569
191	1890	6	7.757658863	-1.757658863
192	1891	6	7.764147157	-1.764147157
193	1892	8	7.770635452	0.229364548
194	1893	5	7.777123746	-2.777123746
195	1894	8	7.78361204	0.21638796
196	1895	5	7.790100334	-2.790100334
197	1896	6	7.796588629	-1.796588629
198	1897	6	7.803076923	-1.803076923
199	1898	6	7.809565217	-1.809565217
200	1899	4	7.816053512	-3.816053512
201	1900	6	7.822541806	-1.822541806
202	1901	6	7.8290301	-1.8290301
203	1902	4	7.835518395	-3.835518395
204	1903	5	7.842006689	-2.842006689
205	1904	4	7.848494983	-3.848494983

206	1905	4	7.854983278	-3.854983278
207	1906	5	7.861471572	-2.861471572
208	1907	6	7.867959866	-1.867959866
209	1908	6	7.874448161	-1.874448161
210	1909	5	7.880936455	-2.880936455
211	1910	5	7.887424749	-2.887424749
212	1911	5	7.893913043	-2.893913043
213	1912	6	7.900401338	-1.900401338
214	1913	8	7.906889632	0.093110368
215	1914	7	7.913377926	-0.913377926
216	1915	7	7.919866221	-0.919866221
217	1916	9	7.926354515	1.073645485
218	1917	10	7.932842809	2.067157191
219	1918	8	7.939331104	0.060668896
220	1919	7	7.945819398	-0.945819398
221	1920	6	7.952307692	-1.952307692
222	1921	5	7.958795987	-2.958795987
223	1922	6	7.965284281	-1.965284281
224	1923	6	7.971772575	-1.971772575
225	1924	10	7.97826087	2.02173913
226	1925	10	7.984749164	2.015250836
227	1926	9	7.991237458	1.008762542
228	1927	9	7.997725753	1.002274247
229	1928	11	8.004214047	2.995785953
230	1929	13	8.010702341	4.989297659
231	1930	10	8.017190635	1.982809365
232	1931	8	8.02367893	-0.02367893
233	1932	8	8.030167224	-0.030167224
234	1933	7	8.036655518	-1.036655518
235	1934	8	8.043143813	-0.043143813
236	1935	9	8.049632107	0.950367893
237	1936	8	8.056120401	-0.056120401
238	1937	10	8.062608696	1.937391304
239	1938	9	8.06909699	0.93090301
240	1939	12	8.075585284	3.924414716
241	1940	12	8.082073579	3.917926421
242	1941	12	8.088561873	3.911438127
243	1942	12	8.095050167	3.904949833
244	1943	13	8.101538462	4.898461538
245	1944	14	8.108026756	5.891973244
246	1945	11	8.11451505	2.88548495
247	1946	12	8.121003344	3.878996656
248	1947	8	8.127491639	-0.127491639
249	1948	11	8.133979933	2.866020067
250	1949	11	8.140468227	2.859531773
251	1950	13	8.146956522	4.853043478
252	1951	10	8.153444816	1.846555184
253	1952	8	8.15993311	-0.15993311
254	1953	8	8.166421405	-0.166421405
255	1954	7	8.172909699	-1.172909699
256	1955	8	8.179397993	-0.179397993
257	1956	6	8.185886288	-2.185886288

258	1957	5	8.192374582	-3.192374582
259	1958	9	8.198862876	0.801137124
260	1959	10	8.205351171	1.794648829
261	1960	11	8.211839465	2.788160535
262	1961	13	8.218327759	4.781672241
263	1962	9	8.224816054	0.775183946
264	1963	8	8.231304348	-0.231304348
265	1964	8	8.237792642	-0.237792642
266	1965	8	8.244280936	-0.244280936
267	1966	13	8.250769231	4.749230769
268	1967	8	8.257257525	-0.257257525
269	1968	8	8.263745819	-0.263745819
270	1969	11	8.270234114	2.729765886
271	1970	10	8.276722408	1.723277592
272	1971	10	8.283210702	1.716789298
273	1972	11	8.289698997	2.710301003
274	1973	9	8.296187291	0.703812709
275	1974	13	8.302675585	4.697324415
276	1975	9	8.30916388	0.69083612
277	1976	14	8.315652174	5.684347826
278	1977	12	8.322140468	3.677859532
279	1978	9	8.328628763	0.671371237
280	1979	13	8.335117057	4.664882943
281	1980	12	8.341605351	3.658394649
282	1981	14	8.348093645	5.651906355
283	1982	11	8.35458194	2.64541806
284	1983	8	8.361070234	-0.361070234
285	1984	6	8.367558528	-2.367558528
286	1985	6	8.374046823	-2.374046823
287	1986	5	8.380535117	-3.380535117
288	1987	6	8.387023411	-2.387023411
289	1988	8	8.393511706	-0.393511706
290	1989	9	8.4	0.6
291	1990	8	8.406488294	-0.406488294
292	1991	8	8.412976589	-0.412976589
293	1992	8	8.419464883	-0.419464883
294	1993	11	8.425953177	2.574046823
295	1994	16	8.432441472	7.567558528
296	1995	12	8.438929766	3.561070234
297	1996	18	8.44541806	9.55458194
298	1997	11	8.451906355	2.548093645
299	1998	11	8.458394649	2.541605351

Tree-ring data sheet

02-Feb-00

Sample: 14B Count Date 24-Sep-99

No	Year	Width	Trend	w/o Trend
1	1701	9	3.802989832	5.197010168
2	1702	9	3.819388924	5.180611076
3	1703	9	3.835788016	5.164211984
4	1704	5	3.852187109	1.147812891
5	1705	5	3.868586201	1.131413799
6	1706	5	3.884985293	1.115014707
7	1707	4	3.901384385	0.098615615
8	1708	4	3.917783478	0.082216522
9	1709	5	3.93418257	1.06581743
10	1710	8	3.950581662	4.049418338
11	1711	6	3.966980755	2.033019245
12	1712	6	3.983379847	2.016620153
13	1713	7	3.999778939	3.000221061
14	1714	6	4.016178031	1.983821969
15	1715	8	4.032577124	3.967422876
16	1716	6	4.048976216	1.951023784
17	1717	6	4.065375308	1.934624692
18	1718	5	4.0817744	0.9182256
19	1719	5	4.098173493	0.901826507
20	1720	5	4.114572585	0.885427415
21	1721	5	4.130971677	0.869028323
22	1722	7	4.147370769	2.852629231
23	1723	8	4.163769862	3.836230138
24	1724	6	4.180168954	1.819831046
25	1725	5	4.196568046	0.803431954
26	1726	6	4.212967139	1.787032861
27	1727	5	4.229366231	0.770633769
28	1728	5	4.245765323	0.754234677
29	1729	5	4.262164415	0.737835585
30	1730	8	4.278563508	3.721436492
31	1731	5	4.2949626	0.7050374
32	1732	8	4.311361692	3.688638308
33	1733	5	4.327760784	0.672239216
34	1734	4	4.344159877	-0.344159877
35	1735	5	4.360558969	0.639441031
36	1736	5	4.376958061	0.623041939
37	1737	8	4.393357153	3.606642847
38	1738	8	4.409756246	3.590243754
39	1739	5	4.426155338	0.573844662
40	1740	4	4.44255443	-0.44255443
41	1741	5	4.458953523	0.541046477
42	1742	7	4.475352615	2.524647385
43	1743	7	4.491751707	2.508248293
44	1744	6	4.508150799	1.491849201
45	1745	6	4.524549892	1.475450108
46	1746	7	4.540948984	2.459051016
47	1747	5	4.557348076	0.442651924
48	1748	5	4.573747168	0.426252832
49	1749	8	4.590146261	3.409853739

Descriptive Statistics	
Mean	6.238255034
Standard Error	0.157664263
Median	5
Mode	5
Standard Deviation	2.721707162
Sample Variance	7.407689874
Kurtosis	0.359987511
Skewness	1.008848688
Range	12
Minimum	2
Maximum	14
Sum	1859
Count	298
Regression Statistics	
Multiple R	0.519196213
R Square	0.269564708
Adjusted R Square	0.267097021
Standard Error	2.330046775
Observations	298
Coefficients	
Intercept	3.78659074
X Variable 1	0.016399092
Standard Error	
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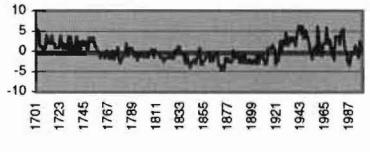
0.001569037	



Date: 3 Aug 99
Collector: Jim, Jeremy and Jay Aber
Vicinity: Trail to Trinchera Peak above Blue Lake Campground.
Species: Blue spruce
Location: Near timberline where trail opens
Elevation: 11,680 feet
Setting: heavy wind damage in forest
Slope aspect: moderate, north facing
Drainage: good
Cirumferance: 58"
Comments: Good core, core separated. 8ft from #13.

50	1750	7	4.606545353	2.393454647
51	1751	7	4.622944445	2.377055555
52	1752	8	4.639343538	3.360656462
53	1753	8	4.65574263	3.34425737
54	1754	6	4.672141722	1.327858278
55	1755	6	4.688540814	1.311459186
56	1756	5	4.704939907	0.295060093
57	1757	5	4.721338999	0.278661001
58	1758	4	4.737738091	-0.737738091
59	1759	3	4.754137183	-1.754137183
60	1760	4	4.770536276	-0.770536276
61	1761	4	4.786935368	-0.786935368
62	1762	4	4.80333446	-0.80333446
63	1763	3	4.819733552	-1.819733552
64	1764	4	4.836132645	-0.836132645
65	1765	5	4.852531737	0.147468263
66	1766	4	4.868930829	-0.868930829
67	1767	3	4.885329922	-1.885329922
68	1768	4	4.901729014	-0.901729014
69	1769	3	4.918128106	-1.918128106
70	1770	5	4.934527198	0.065472802
71	1771	3	4.950926291	-1.950926291
72	1772	3	4.967325383	-1.967325383
73	1773	5	4.983724475	0.016275525
74	1774	4	5.000123567	-1.000123567
75	1775	6	5.01652266	0.98347734
76	1776	3	5.032921752	-2.032921752
77	1777	2	5.049320844	-3.049320844
78	1778	3	5.065719936	-2.065719936
79	1779	3	5.082119029	-2.082119029
80	1780	4	5.098518121	-1.098518121
81	1781	4	5.114917213	-1.114917213
82	1782	5	5.131316306	-0.131316306
83	1783	7	5.147715398	1.852284602
84	1784	4	5.16411449	-1.16411449
85	1785	4	5.180513582	-1.180513582
86	1786	6	5.196912675	0.803087325
87	1787	6	5.213311767	0.786688233
88	1788	6	5.229710859	0.770289141
89	1789	5	5.246109951	-0.246109951
90	1790	4	5.262509044	-1.262509044
91	1791	4	5.278908136	-1.278908136
92	1792	5	5.295307228	-0.295307228
93	1793	3	5.31170632	-2.31170632
94	1794	5	5.328105413	-0.328105413
95	1795	4	5.344504505	-1.344504505
96	1796	5	5.360903597	-0.360903597
97	1797	5	5.37730269	-0.37730269
98	1798	4	5.393701782	-1.393701782
99	1799	4	5.410100874	-1.410100874
100	1800	4	5.426499966	-1.426499966
101	1801	4	5.442899059	-1.442899059

102	1802	5	5.459298151	-0.459298151
103	1803	4	5.475697243	-1.475697243
104	1804	5	5.492096335	-0.492096335
105	1805	5	5.508495428	-0.508495428
106	1806	6	5.52489452	0.47510548
107	1807	5	5.541293612	-0.541293612
108	1808	4	5.557692704	-1.557692704
109	1809	6	5.574091797	0.425908203
110	1810	5	5.590490889	-0.590490889
111	1811	5	5.606889981	-0.606889981
112	1812	5	5.623289074	-0.623289074
113	1813	5	5.639688166	-0.639688166
114	1814	4	5.656087258	-1.656087258
115	1815	4	5.67248635	-1.67248635
116	1816	4	5.688885443	-1.688885443
117	1817	3	5.705284535	-2.705284535
118	1818	4	5.721683627	-1.721683627
119	1819	4	5.738082719	-1.738082719
120	1820	4	5.754481812	-1.754481812
121	1821	4	5.770880904	-1.770880904
122	1822	5	5.787279996	-0.787279996
123	1823	5	5.803679088	-0.803679088
124	1824	4	5.820078181	-1.820078181
125	1825	5	5.836477273	-0.836477273
126	1826	4	5.852876365	-1.852876365
127	1827	6	5.869275458	0.130724542
128	1828	6	5.88567455	0.11432545
129	1829	5	5.902073642	-0.902073642
130	1830	7	5.918472734	1.081527266
131	1831	7	5.934871827	1.065128173
132	1832	6	5.951270919	0.048729081
133	1833	6	5.967670011	0.032329989
134	1834	5	5.984069103	-0.984069103
135	1835	5	6.000468196	-1.000468196
136	1836	4	6.016867288	-2.016867288
137	1837	3	6.03326638	-3.03326638
138	1838	5	6.049665472	-1.049665472
139	1839	4	6.066064565	-2.066064565
140	1840	3	6.082463657	-3.082463657
141	1841	2	6.098862749	-4.098862749
142	1842	3	6.115261842	-3.115261842
143	1843	3	6.131660934	-3.131660934
144	1844	4	6.148060026	-2.148060026
145	1845	4	6.164459118	-2.164459118
146	1846	3	6.180858211	-3.180858211
147	1847	4	6.197257303	-2.197257303
148	1848	5	6.213656395	-1.213656395
149	1849	6	6.230055487	-0.230055487
150	1850	7	6.24645458	0.75354542
151	1851	3	6.262853672	-3.262853672
152	1852	3	6.279252764	-3.279252764
153	1853	3	6.295651856	-3.295651856

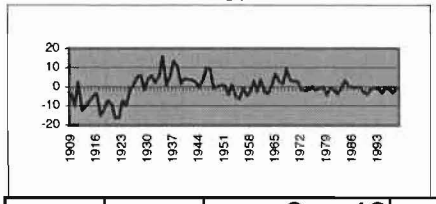
154	1854	4	6.312050949	-2.312050949
155	1855	4	6.328450041	-2.328450041
156	1856	5	6.344849133	-1.344849133
157	1857	5	6.361248226	-1.361248226
158	1858	5	6.377647318	-1.377647318
159	1859	6	6.39404641	-0.39404641
160	1860	4	6.410445502	-2.410445502
161	1861	4	6.426844595	-2.426844595
162	1862	5	6.443243687	-1.443243687
163	1863	4	6.459642779	-2.459642779
164	1864	6	6.476041871	-0.476041871
165	1865	6	6.492440964	-0.492440964
166	1866	6	6.508840056	-0.508840056
167	1867	5	6.525239148	-1.525239148
168	1868	3	6.541638241	-3.541638241
169	1869	3	6.558037333	-3.558037333
170	1870	2	6.574436425	-4.574436425
171	1871	3	6.590835517	-3.590835517
172	1872	2	6.60723461	-4.60723461
173	1873	2	6.623633702	-4.623633702
174	1874	5	6.640032794	-1.640032794
175	1875	4	6.656431886	-2.656431886
176	1876	5	6.672830979	-1.672830979
177	1877	4	6.689230071	-2.689230071
178	1878	4	6.705629163	-2.705629163
179	1879	4	6.722028255	-2.722028255
180	1880	4	6.738427348	-2.738427348
181	1881	7	6.75482644	0.24517356
182	1882	5	6.771225532	-1.771225532
183	1883	5	6.787624625	-1.787624625
184	1884	6	6.804023717	-0.804023717
185	1885	6	6.820422809	-0.820422809
186	1886	5	6.836821901	-1.836821901
187	1887	4	6.853220994	-2.853220994
188	1888	5	6.869620086	-1.869620086
189	1889	6	6.886019178	-0.886019178
190	1890	4	6.90241827	-2.90241827
191	1891	5	6.918817363	-1.918817363
192	1892	6	6.935216455	-0.935216455
193	1893	4	6.951615547	-2.951615547
194	1894	4	6.968014639	-2.968014639
195	1895	4	6.984413732	-2.984413732
196	1896	5	7.000812824	-2.000812824
197	1897	4	7.017211916	-3.017211916
198	1898	4	7.033611009	-3.033611009
199	1899	4	7.050010101	-3.050010101
200	1900	5	7.066409193	-2.066409193
201	1901	4	7.082808285	-3.082808285
202	1902	5	7.099207378	-2.099207378
203	1903	6	7.11560647	-1.11560647
204	1904	4	7.132005562	-3.132005562
205	1905	5	7.148404654	-2.148404654

206	1906	6	7.164803747	-1.164803747
207	1907	6	7.181202839	-1.181202839
208	1908	6	7.197601931	-1.197601931
209	1909	5	7.214001023	-2.214001023
210	1910	4	7.230400116	-3.230400116
211	1911	4	7.246799208	-3.246799208
212	1912	5	7.2631983	-2.2631983
213	1913	8	7.279597393	0.720402607
214	1914	8	7.295996485	0.704003515
215	1915	8	7.312395577	0.687604423
216	1916	8	7.328794669	0.671205331
217	1917	9	7.345193762	1.654806238
218	1918	8	7.361592854	0.638407146
219	1919	8	7.377991946	0.622008054
220	1920	4	7.394391038	-3.394391038
221	1921	5	7.410790131	-2.410790131
222	1922	5	7.427189223	-2.427189223
223	1923	7	7.443588315	-0.443588315
224	1924	10	7.459987407	2.540012593
225	1925	7	7.4763865	-0.4763865
226	1926	10	7.492785592	2.507214408
227	1927	10	7.509184684	2.490815316
228	1928	9	7.525583777	1.474416223
229	1929	12	7.541982869	4.458017131
230	1930	11	7.558381961	3.441618039
231	1931	9	7.574781053	1.425218947
232	1932	10	7.591180146	2.408819854
233	1933	11	7.607579238	3.392420762
234	1934	10	7.62397833	2.37602167
235	1935	11	7.640377422	3.359622578
236	1936	11	7.656776515	3.343223485
237	1937	10	7.673175607	2.326824393
238	1938	9	7.689574699	1.310425301
239	1939	12	7.705973791	4.294026209
240	1940	13	7.722372884	5.277627116
241	1941	14	7.738771976	6.261228024
242	1942	14	7.755171068	6.244828932
243	1943	12	7.771570161	4.228429839
244	1944	14	7.787969253	6.212030747
245	1945	11	7.804368345	3.195631655
246	1946	11	7.820767437	3.179232563
247	1947	13	7.83716653	5.16283347
248	1948	12	7.853565622	4.146434378
249	1949	11	7.869964714	3.130035286
250	1950	10	7.886363806	2.113636194
251	1951	8	7.902762899	0.097237101
252	1952	7	7.919161991	-0.919161991
253	1953	6	7.935561083	-1.935561083
254	1954	8	7.951960175	0.048039825
255	1955	9	7.968359268	1.031640732
256	1956	9	7.98475836	1.01524164
257	1957	7	8.001157452	-1.001157452

258	1958	14	8.017556545	5.982443455
259	1959	11	8.033955637	2.966044363
260	1960	9	8.050354729	0.949645271
261	1961	7	8.066753821	-1.066753821
262	1962	7	8.083152914	-1.083152914
263	1963	10	8.099552006	1.900447994
264	1964	10	8.115951098	1.884048902
265	1965	10	8.13235019	1.86764981
266	1966	14	8.148749283	5.851250717
267	1967	10	8.165148375	1.834851625
268	1968	10	8.181547467	1.818452533
269	1969	11	8.197946559	2.802053441
270	1970	8	8.214345652	-0.214345652
271	1971	7	8.230744744	-1.230744744
272	1972	9	8.247143836	0.752856164
273	1973	6	8.263542929	-2.263542929
274	1974	12	8.279942021	3.720057979
275	1975	12	8.296341113	3.703658887
276	1976	12	8.312740205	3.687259795
277	1977	12	8.329139298	3.670860702
278	1978	10	8.34553839	1.65446161
279	1979	13	8.361937482	4.638062518
280	1980	13	8.378336574	4.621663426
281	1981	14	8.394735667	5.605264333
282	1982	10	8.411134759	1.588865241
283	1983	9	8.427533851	0.572466149
284	1984	8	8.443932943	-0.443932943
285	1985	6	8.460332036	-2.460332036
286	1986	5	8.476731128	-3.476731128
287	1987	5	8.49313022	-3.49313022
288	1988	7	8.509529313	-1.509529313
289	1989	8	8.525928405	-0.525928405
290	1990	8	8.542327497	-0.542327497
291	1991	8	8.558726589	-0.558726589
292	1992	10	8.575125682	1.424874318
293	1993	9	8.591524774	0.408475226
294	1994	9	8.607923866	0.392076134
295	1995	7	8.624322958	-1.624322958
296	1996	11	8.640722051	2.359277949
297	1997	10	8.657121143	1.342878857
298	1998	9	8.673520235	0.326479765

Tree-ring data sheet

Master Chronology **SITE A**

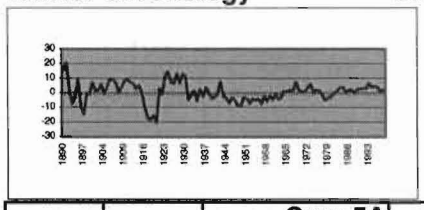


No	Year	Core 1C Residual	Core 2A Residual	Core 3A Residual	Core 4A Residual	Average Residuals
1	1909				-3.597313797	-3.597313797
2	1910				-10.17914695	-10.17914695
3	1911				2.239019906	2.239019906
4	1912				-12.34281324	-12.34281324
5	1913			-16.17562149	-3.92464639	-10.05013394
6	1914			-8.940025473	-6.506479538	-7.723252505
7	1915			-0.704429454	-10.08831269	-5.39637107
8	1916			9.531166564	-16.67014583	-3.569489635
9	1917			0.766762583	-31.25197898	-15.2426082
10	1918			-11.9976414	-11.83381213	-11.91572676
11	1919			-14.76204538	-0.415645279	-7.588845329
12	1920			-18.52644936	0.002521573	-9.261963894
13	1921			-23.29085334	-9.579311575	-16.43508246
14	1922			-24.05525732	-9.161144723	-16.60820102
15	1923			-17.8196613	3.257022129	-7.281319588
16	1924		-21.27859649	-19.58406529	10.67518898	-10.06249093
17	1925		-13.76223803	-14.34846927	21.09335583	-2.339117154
18	1926		-9.245879564	-6.112873249	17.51152268	0.717589957
19	1927		-7.7295211	0.12272277	20.92968954	4.440963735
20	1928		-11.21316264	9.358318789	20.34785639	6.164337514
21	1929		-17.69680417	0.593914807	11.76602324	-1.778955375
22	1930		-4.180445709	7.829510826	8.184190092	3.944418403
23	1931		-4.664087245	19.06510684	2.602356944	5.667792181
24	1932	-2.2190518	-10.14772878	4.300702863	16.0205238	1.988611519
25	1933	-2.401468593	7.368629682	10.53629888	5.438690648	5.235537655
26	1934	7.416114614	5.884988146	43.7718949	5.8568575	15.73246379
27	1935	-11.76630218	-4.59865339	12.00749092	7.275024351	0.729389925
28	1936	-4.948718972	8.917705073	13.24308694	2.693191203	4.976316061
29	1937	16.86886423	18.43406354	8.478682957	9.111358055	13.2232422
30	1938	-3.313552558	23.950422	15.71427898	6.529524907	10.72016833
31	1939	-5.495969351	0.466780465	23.94987499	-13.05230824	1.467094467
32	1940	-2.678386144	-3.016861072	0.185471013	22.36585861	4.214020602
33	1941	0.139197063	10.49949739	-12.57893297	16.78402546	3.710946737
34	1942	-4.04321973	17.01585586	-4.34333695	5.202192315	3.457872873
35	1943	-2.225636523	4.53221432	4.892259069	2.620359166	2.454799008
36	1944	-7.408053316	7.048572783	-3.872144912	2.038526018	-0.548274857
37	1945	1.409529891	2.564931247	8.363451106	1.45669287	3.448651279
38	1946	17.2271131	17.08128971	2.599047125	2.874859722	9.945577414
39	1947	11.0446963	12.59764817	11.83464314	1.293026574	9.192503549
40	1948	-4.137720488	3.114006638	0.070239162	-2.288806574	-0.810570316
41	1949	-1.320137282	6.630365102	1.305835181	-6.870639722	-0.06364418
42	1950	-2.502554075	4.146723566	0.5414312	0.54752713	0.683281955

43	1951	6.315029132	-0.336917971	-3.222972782	-2.034306019	0.18020809
44	1952	0.132612339	-3.820559507	-3.987376763	-8.616139167	-4.072865774
45	1953	4.950195546	-2.304201043	4.248219256	-3.197972315	0.924060361
46	1954	-4.232221247	-0.787842579	-6.516184726	-9.779805463	-5.329013504
47	1955	-4.41463804	-3.271484116	-0.280588707	-18.36163861	-6.582087368
48	1956	0.402945167	-3.755125652	13.95500731	-14.94347176	-1.085161233
49	1957	-2.779471626	-7.238767188	0.19060333	-9.525304907	-4.838235098
50	1958	-5.961888419	-0.722408725	4.426199349	-9.107138055	-2.841308962
51	1959	4.855694788	-0.206050261	9.661795368	-1.688971204	3.155617173
52	1960	-7.326722005	-2.689691797	1.897391386	-2.270804352	-2.597456692
53	1961	15.4908612	0.826666667	-2.867012595	1.1473625	3.649469443
54	1962	-14.69155559	4.34302513	2.368583424	-4.434470648	-3.103604421
55	1963	-10.87397238	-3.140616406	3.604179442	-5.016303796	-3.856678286
56	1964	-4.056389177	-2.624257942	3.839775461	4.401863056	0.390247849
57	1965	-0.23880597	8.892100522	10.07537148	7.820029908	6.637173985
58	1966	5.578777237	-0.591541015	9.310967498	-3.76180324	2.63410012
59	1967	2.396360444	2.924817449	-0.453436483	0.656363611	1.381026255
60	1968	14.21394365	6.441175913	3.782159536	12.07453046	9.127952391
61	1969	0.031526858	2.957534376	8.017755555	3.492697315	3.624878526
62	1970	-1.150889935	1.47389284	4.253351573	5.910864167	2.621804661
63	1971	6.666693272	-0.009748696	4.488947592	1.329031019	3.118730797
64	1972	-4.515723521	-4.493390232	5.724543611	-3.252802129	-1.634343068
65	1973	-5.698140314	-0.977031769	0.960139629	-2.834635277	-2.137416933
66	1974	-8.880557108	-1.460673305	7.195735648	-3.416468425	-1.640490797
67	1975	3.937026099	-2.944314841	2.431331667	-2.998301574	0.106435338
68	1976	-5.245390694	0.572043623	-1.333072315	-1.580134722	-1.896638527
69	1977	0.572192513	-0.911597914	-1.097476296	-2.16196787	-0.899712392
70	1978	7.38977572	-2.39523945	-0.861880277	-4.743801018	-0.152786256
71	1979	-2.792641073	-3.878880986	-4.626284259	-6.325634166	-4.405860121
72	1980	13.02494213	-1.362522523	-7.39068824	-5.907467314	-0.408933986
73	1981	2.842525341	-2.846164059	-5.155092221	-2.489300462	-1.91200785
74	1982	-1.339891452	-2.329805595	-9.919496203	-2.07113361	-3.915081715
75	1983	3.477691755	-1.813447131	-3.683900184	0.347033241	-0.41815558
76	1984	17.29527496	1.702911332	-6.448304165	0.765200093	3.328770556
77	1985	-3.887141831	-1.780730204	2.787291853	3.183366945	0.075696691
78	1986	-0.069558624	-1.26437174	-0.977112128	0.601533797	-0.427377174
79	1987	3.748024583	-1.748013276	-1.741516109	-0.980299351	-0.180451038
80	1988	2.56560779	-0.231654813	-2.505920091	-0.562132499	-0.183524903
81	1989	-5.616809003	0.284703651	-7.270324072	0.856034353	-2.936598768
82	1990	-13.7992258	-1.198937885	-2.034728053	0.274201205	-4.189672633
83	1991	2.018357411	-1.682579422	-3.799132035	-2.307631944	-1.442746497
84	1992	7.835940618	-3.166220958	-7.563536016	0.110534908	-0.695820362
85	1993	-0.346476175	-0.649862494	-5.327939997	2.52870176	-0.948894227
86	1994	-6.528892968	-2.13350403	-4.092343978	-1.053131388	-3.451968091
87	1995	5.288690239	-1.617145567	-6.85674796	2.365035464	-0.205041956
88	1996	-3.893726554	-0.100787103	-2.621151941	-0.216797684	-1.708115821
89	1997	-7.076143347	-2.584428639	-7.385555922	4.201369168	-3.211189685
90	1998	-5.25856014	1.931929825	-5.149959904	4.61953602	-0.96426355

Tree-ring data sheet

Master Chronology **SITE B**



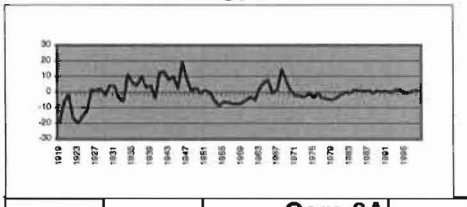
No	Year	Core 5A Residual	Core 6 A Residual	Average Residuals
1	1890		15.59449541	15.59449541
2	1891		20.83832824	20.83832824
3	1892		2.08216106	2.08216106
4	1893		-7.674006116	-7.674006116
5	1894		-3.430173293	-3.430173293
6	1895		9.813659531	9.813659531
7	1896		-8.942507645	-8.942507645
8	1897		-14.69867482	-14.69867482
9	1898		-0.454841998	-0.454841998
10	1899		-1.211009174	-1.211009174
11	1900		7.032823649	7.032823649
12	1901		1.276656473	1.276656473
13	1902		1.520489297	1.520489297
14	1903		5.76432212	5.76432212
15	1904		-0.991845056	-0.991845056
16	1905		3.251987768	3.251987768
17	1906		9.495820591	9.495820591
18	1907		8.739653415	8.739653415
19	1908		6.983486239	6.983486239
20	1909		0.227319062	0.227319062
21	1910		3.471151886	3.471151886
22	1909		7.714984709	7.714984709
23	1910		8.958817533	8.958817533
24	1911		7.202650357	7.202650357
25	1912		6.44648318	6.44648318
26	1913		2.690316004	2.690316004
27	1914		4.934148828	4.934148828
28	1915		0.177981651	0.177981651
29	1916		-9.578185525	-9.578185525
30	1917	-20.64531296	-13.3343527	-16.98983283
31	1918	-20.09008391	-17.09051988	-18.5903019
32	1919	-18.53485487	-12.84668705	-15.69077096
33	1920	-34.97962582	-6.60285423	-20.79124003
34	1921	9.575603226	-4.359021407	2.60829091
35	1922	0.130832272	-2.115188583	-0.992178155
36	1923	23.68606132	-0.871355759	11.40735278
37	1924	33.24129036	-4.627522936	14.30688371
38	1925	17.79651941	-3.383690112	7.206414649
39	1926	14.35174846	-2.139857288	6.105945584
40	1927	18.9069775	7.103975535	13.00547652
41	1928	12.46220655	0.347808359	6.405007454
42	1929	32.0174356	-6.408358818	12.80453839

43	1930	24.57266464	-2.164525994	11.20406932
44	1931	-6.872106311	-2.92069317	-4.896399741
45	1932	-2.316877265	-1.676860347	-1.996868806
46	1933	5.238351781	-2.433027523	1.402662129
47	1934	-6.206419173	-5.189194699	-5.697806936
48	1935	5.348809874	-0.945361876	2.201723999
49	1936	-6.09596108	0.298470948	-2.898745066
50	1937	7.459267966	-0.457696228	3.500785869
51	1938	4.014497012	-4.213863405	-0.099683196
52	1939	-5.430273941	-2.970030581	-4.200152261
53	1940	-4.875044895	-1.726197757	-3.300621326
54	1941	1.680184151	-2.482364934	-0.401090391
55	1942	18.2354132	-3.23853211	7.498440544
56	1943	-2.209357756	-2.994699286	-2.602028521
57	1944	-6.65412871	-0.750866463	-3.702497586
58	1945	-12.09889966	-2.507033639	-7.302966651
59	1946	-2.543670617	-4.263200815	-3.403435716
60	1947	-6.988441571	-4.019367992	-5.503904782
61	1948	-15.43321252	-2.775535168	-9.104373847
62	1949	-11.87798348	-6.531702345	-9.204842912
63	1950	-6.322754432	-0.287869521	-3.305311977
64	1951	-5.767525386	-3.044036697	-4.405781042
65	1952	-10.21229634	-4.800203874	-7.506250107
66	1953	-5.657067294	-2.55637105	-4.106719172
67	1954	-4.101838247	-6.312538226	-5.207188237
68	1955	-7.546609201	-1.068705403	-4.307657302
69	1956	-10.99138015	-3.824872579	-7.408126367
70	1957	-4.436151108	-0.581039755	-2.508595432
71	1958	-6.880922062	-5.337206932	-6.109064497
72	1959	-3.325693016	-1.093374108	-2.209533562
73	1960	-7.77046397	-1.849541284	-4.810002627
74	1961	1.784765077	-4.605708461	-1.410471692
75	1962	-7.660005877	-1.361875637	-4.510940757
76	1963	-11.10477683	3.881957187	-3.611409822
77	1964	-0.549547785	2.12579001	0.788121113
78	1965	-1.994318738	3.369622834	0.687652048
79	1966	-5.439089692	8.613455657	1.587182983
80	1967	-1.883860646	4.857288481	1.486713918
81	1968	10.6713684	4.101121305	7.386244853
82	1969	-0.773402553	3.344954128	1.285775788
83	1970	0.781826493	0.588786952	0.685306723
84	1971	-1.662944461	2.832619776	0.584837657
85	1972	2.892284585	3.076452599	2.984368592
86	1973	6.447513632	5.320285423	5.883899527
87	1974	-1.997257322	2.564118247	0.283430462
88	1975	3.557971724	-0.19204893	1.682961397
89	1976	3.113200771	0.051783894	1.582492332
90	1977	-0.331570183	-2.704383282	-1.517976733
91	1978	-2.776341137	-7.460550459	-5.118445798
92	1979	-2.221112091	-5.216717635	-3.718914863
93	1980	-3.665883044	-2.972884811	-3.319383928
94	1981	-3.110653998	2.270948012	-0.419852993

95	1982	-2.555424952	4.514780836	0.979677942
96	1983	-1.000195906	7.75861366	3.379208877
97	1984	1.555033141	6.002446483	3.778739812
98	1985	0.110262187	0.246279307	0.178270747
99	1986	2.665491233	0.49011213	1.577801682
100	1987	2.220720279	1.733944954	1.977332617
101	1988	0.775949326	-1.022222222	-0.123136448
102	1989	3.331178372	1.221610601	2.276394487
103	1990	1.886407418	3.465443425	2.675925422
104	1991	1.441636465	3.709276249	2.575456357
105	1992	3.996865511	1.953109072	2.974987292
106	1993	6.552094557	6.196941896	6.374518227
107	1994	5.107323603	2.44077472	3.774049162
108	1995	6.66255265	1.684607543	4.173580096
109	1996	6.217781696	0.928440367	3.573111031
110	1997	3.773010742	-2.584428639	0.594291051
111	1998	1.328239788	1.931929825	1.630084806

Tree-ring data sheet

Master Chronology **SITE C**

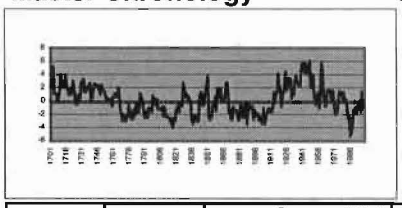


No	Year	Core 8A Residual	Core 9B Residual	Core10A Residual	Average Residuals
1	1919	-19.8787037			-19.8787037
2	1920	-6.500761838			-6.500761838
3	1921	-2.122819972			-2.122819972
4	1922	-4.744878106	-28.5994006		-16.67213935
5	1923	-9.36693624	-31.11233503		-20.23963564
6	1924	-4.988994374	-26.62526947		-15.80713192
7	1925	-6.611052508	-17.1382039		-11.8746282
8	1926	10.76688936	-8.651138335		1.057875511
9	1927	19.14483122	-17.16407277		0.990379227
10	1928	8.52277309	-4.677007203		1.922882943
11	1929	6.900714955	-11.18994164		-2.144613341
12	1930	0.278656821	-1.702876071	13.46625259	4.014011113
13	1931	-8.343401313	10.78418949	9.016051638	3.818946607
14	1932	-7.965459447	-6.728744939	2.565850688	-4.042784566
15	1933	0.412482419	-24.24167937	6.115649738	-5.904515739
16	1934	11.79042429	6.245386193	14.66544879	10.90041976
17	1935	6.168366151	8.732451759	4.215247838	6.372021916
18	1936	-5.453691983	6.219517325	10.76504689	3.843624077
19	1937	2.924249883	23.70658289	3.314845938	9.981892904
20	1938	-0.697808251	19.19364846	-10.13535501	2.786828398
21	1939	5.680133615	9.680714023	-3.585555962	3.925097225
22	1940	-8.941924519	3.167779589	-7.035756911	-4.269967281
23	1941	15.43601735	15.65484515	5.514042139	12.20163488
24	1942	12.81395921	14.14191072	12.06384119	13.00657037
25	1943	10.19190108	14.62897629	-1.386359761	7.811505868
26	1944	13.56984294	20.11604185	-4.836560711	9.616441362
27	1945	-5.05221519	17.60310742	-6.286761661	2.088043523
28	1946	4.325726676	38.09017298	14.26303739	18.89297902
29	1947	-4.296331458	20.57723855	7.812836439	8.031247844
30	1948	-5.918389592	11.06430412	-3.637364511	0.502850005
31	1949	2.459552274	9.551369683	-4.087565461	2.641118832
32	1950	11.83749414	-7.961564751	-6.537766411	-0.887279007
33	1951	7.215436006	1.525500815	-5.987967361	0.917656487
34	1952	-1.406622128	3.012566381	-2.438168311	-0.277408019
35	1953	-5.028680263	-0.500368053	-10.88836926	-5.472472525
36	1954	-11.6507384	-6.013302487	-9.338570211	-9.000870365
37	1955	-5.272796531	-2.526236921	-11.78877116	-6.529268204
38	1956	-5.894854665	-3.039171355	-11.23897211	-6.72433271
39	1957	-6.516912799	-3.552105789	-12.68917306	-7.586063883
40	1958	-3.138970933	-7.065040223	-13.13937401	-7.781128389
41	1959	-2.761029067	-7.577974657	-11.58957496	-7.309526228
42	1960	-6.383087201	-0.090909091	-9.03977591	-5.171257401

43	1961	-2.005145335	-2.603843525	-5.48997686	-3.366321907
44	1962	-7.627203469	-5.116777959	-2.94017781	-5.228053079
45	1963	0.750738397	5.370287607	0.60962124	2.243549081
46	1964	0.128680263	11.85735317	6.15942029	6.048484575
47	1965	1.506622128	14.34441874	6.70921934	7.520086736
48	1966	-3.115436006	2.831484305	-1.74098161	-0.67497777
49	1967	0.26250586	3.318549871	-0.19118256	1.129957724
50	1968	13.64044773	15.80561544	13.35861649	14.26822655
51	1969	6.018389592	11.292681	3.90841554	7.073162045
52	1970	2.396331458	2.779746569	-3.54178541	0.544764206
53	1971	-3.225726676	-1.733187865	-1.99198636	-2.316966967
54	1972	0.15221519	-5.246122299	-2.44218731	-2.512031473
55	1973	-3.469842944	-4.759056733	-1.89238826	-3.373762646
56	1974	-2.091901078	-3.271991167	1.65741079	-1.235493818
57	1975	-1.713959212	-7.784925601	-0.79279016	-3.430558324
58	1976	1.663982654	-4.297860035	-1.242991109	-1.292289497
59	1977	-4.958075481	-6.810794469	0.306807941	-3.820687336
60	1978	-3.580133615	-7.323728903	-3.143393009	-4.682418509
61	1979	-3.202191749	-7.836663337	-4.593593959	-5.210816348
62	1980	-3.824249883	-5.349597771	-3.043794909	-4.072547521
63	1981	-1.446308017	-0.862532205	-3.493995859	-1.934278694
64	1982	0.931633849	-3.375466639	2.055803191	-0.1293432
65	1983	1.309575715	-4.888401073	1.605602241	-0.657741039
66	1984	2.687517581	-1.401335507	2.155401291	1.147194455
67	1985	2.065459447	-2.914269941	3.705200341	0.952129949
68	1986	1.443401313	-3.427204375	2.254999391	0.090398776
69	1987	-0.178656821	-1.940138809	4.804798441	0.89533427
70	1988	-0.800714955	-3.453073243	1.354597491	-0.966396902
71	1989	1.57722691	-2.966007677	3.904396541	0.838538592
72	1990	-1.044831224	-3.478942111	4.454195591	-0.023192581
73	1991	1.333110642	-1.991876545	2.003994641	0.44840958
74	1992	0.711052508	-3.504810978	1.553793691	-0.413321593
75	1993	5.088994374	-3.017745412	2.103592741	1.391613901
76	1994	2.46693624	-0.530679846	1.653391791	1.196549395
77	1995	-0.155121894	-2.04361428	0.203190842	-0.665181778
78	1996	-3.777180028	-0.556548714	2.752989892	-0.52691295
79	1997	-1.399238162	-0.069483148	4.302788942	0.94468921
80	1998	-0.021296296	-2.582417582	4.852587992	0.749624704

Tree-ring data sheet

Master Chronology **SITE E**



No	Year	Core 13A Residual	Core 14B Residual	Average Residuals
1	1701		5.197010168	5.197010168
2	1702		5.180611076	5.180611076
3	1703		5.164211984	5.164211984
4	1704		1.147812891	1.147812891
5	1705		1.131413799	1.131413799
6	1706		1.115014707	1.115014707
7	1707		0.098615615	0.098615615
8	1708		0.082216522	0.082216522
9	1709		1.06581743	1.06581743
10	1710		4.049418338	4.049418338
11	1711		2.033019245	2.033019245
12	1712		2.016620153	2.016620153
13	1713		3.000221061	3.000221061
14	1714		1.983821969	1.983821969
15	1715		3.967422876	3.967422876
16	1716		1.951023784	1.951023784
17	1717		1.934624692	1.934624692
18	1718		0.9182256	0.9182256
19	1719		0.901826507	0.901826507
20	1720	3.280286738	0.885427415	2.082857077
21	1721	1.252252392	0.869028323	1.060640357
22	1722	3.224218045	2.852629231	3.038423638
23	1723	0.196183698	3.836230138	2.016206918
24	1724	-1.831850649	1.819831046	-0.006009801
25	1725	-1.859884995	0.803431954	-0.528226521
26	1726	-2.887919342	1.787032861	-0.55044324
27	1727	1.084046311	0.770633769	0.92734004
28	1728	0.056011965	0.754234677	0.405123321
29	1729	0.027977618	0.737835585	0.382906601
30	1730	1.999943271	3.721436492	2.860689882
31	1731	3.971908924	0.7050374	2.338473162
32	1732	2.943874578	3.688638308	3.316256443
33	1733	1.915840231	0.672239216	1.294039723
34	1734	2.887805884	-0.344159877	1.271823004
35	1735	2.859771538	0.639441031	1.749606284
36	1736	3.831737191	0.623041939	2.227389565
37	1737	0.803702844	3.606642847	2.205172845
38	1738	1.775668497	3.590243754	2.682956126
39	1739	-0.252365849	0.573844662	0.160739406
40	1740	0.719599804	-0.44255443	0.138522687
41	1741	1.691565457	0.541046477	1.116305967
42	1742	2.663531111	2.524647385	2.594089248

43	1743	1.635496764	2.508248293	2.071872528
44	1744	2.607462417	1.491849201	2.049655809
45	1745	3.57942807	1.475450108	2.527439089
46	1746	1.551393724	2.459051016	2.00522237
47	1747	2.523359377	0.442651924	1.48300565
48	1748	1.49532503	0.426252832	0.960788931
49	1749	1.467290684	3.409853739	2.438572211
50	1750	1.439256337	2.393454647	1.916355492
51	1751	0.41122199	2.377055555	1.394138772
52	1752	-0.616812357	3.360656462	1.371922053
53	1753	-1.644846703	3.34425737	0.849705333
54	1754	-1.67288105	1.327858278	-0.172511386
55	1755	-0.700915397	1.311459186	0.305271894
56	1756	-0.728949743	0.295060093	-0.216944825
57	1757	0.24301591	0.278661001	0.260838456
58	1758	1.214981563	-0.737738091	0.238621736
59	1759	0.186947216	-1.754137183	-0.783594983
60	1760	2.15891287	-0.770536276	0.694188297
61	1761	2.130878523	-0.786935368	0.671971578
62	1762	3.102844176	-0.80333446	1.149754858
63	1763	3.07480983	-1.819733552	0.627538139
64	1764	2.046775483	-0.836132645	0.605321419
65	1765	4.018741136	0.147468263	2.0831047
66	1766	1.990706789	-0.868930829	0.56088798
67	1767	-1.037327557	-1.885329922	-1.461328739
68	1768	-3.065361904	-0.901729014	-1.983545459
69	1769	-4.093396251	-1.918128106	-3.005762178
70	1770	-4.121430597	0.065472802	-2.027978898
71	1771	-4.149464944	-1.950926291	-3.050195617
72	1772	-4.177499291	-1.967325383	-3.072412337
73	1773	-5.205533638	0.016275525	-2.594629056
74	1774	-3.233567984	-1.000123567	-2.116845776
75	1775	-2.261602331	0.98347734	-0.639062495
76	1776	-1.289636678	-2.032921752	-1.661279215
77	1777	-2.317671024	-3.049320844	-2.683495934
78	1778	-1.345705371	-2.065719936	-1.705712654
79	1779	-3.373739718	-2.082119029	-2.727929373
80	1780	-1.401774065	-1.098518121	-1.250146093
81	1781	-3.429808411	-1.114917213	-2.272362812
82	1782	-1.457842758	-0.131316306	-0.794579532
83	1783	-2.485877105	1.852284602	-0.316796251
84	1784	-2.513911451	-1.16411449	-1.839012971
85	1785	-0.541945798	-1.180513582	-0.86122969
86	1786	1.430019855	0.803087325	1.11655359
87	1787	0.401985508	0.786688233	0.594336871
88	1788	-0.626048838	0.770289141	0.072120151
89	1789	-2.654083185	-0.246109951	-1.450096568
90	1790	-3.682117532	-1.262509044	-2.472313288
91	1791	-3.710151878	-1.278908136	-2.494530007
92	1792	-2.738186225	-0.295307228	-1.516746727
93	1793	-2.766220572	-2.31170632	-2.538963446
94	1794	-1.794254919	-0.328105413	-1.061180166

95	1795	-0.822289265	-1.344504505	-1.083396885
96	1796	-1.850323612	-0.360903597	-1.105613605
97	1797	-2.878357959	-0.37730269	-1.627830324
98	1798	3.093607694	-1.393701782	0.849952956
99	1799	1.065573348	-1.410100874	-0.172263763
100	1800	2.037539001	-1.426499966	0.305519517
101	1801	0.009504654	-1.442899059	-0.716697202
102	1802	0.981470308	-0.459298151	0.261086078
103	1803	-1.046564039	-1.475697243	-1.261130641
104	1804	-2.074598386	-0.492096335	-1.283347361
105	1805	-2.102632733	-0.508495428	-1.30556408
106	1806	-3.130667079	0.47510548	-1.3277808
107	1807	-1.158701426	-0.541293612	-0.849997519
108	1808	-3.186735773	-1.557692704	-2.372214239
109	1809	-2.214770119	0.425908203	-0.894430958
110	1810	-3.242804466	-0.590490889	-1.916647678
111	1811	-4.270838813	-0.606889981	-2.438864397
112	1812	-4.29887316	-0.623289074	-2.461081117
113	1813	-4.326907506	-0.639688166	-2.483297836
114	1814	-4.354941853	-1.656087258	-3.005514556
115	1815	-3.3829762	-1.67248635	-2.527731275
116	1816	-5.411010546	-1.688885443	-3.549947995
117	1817	-5.439044893	-2.705284535	-4.072164714
118	1818	-3.46707924	-1.721683627	-2.594381433
119	1819	-4.495113587	-1.738082719	-3.116598153
120	1820	-1.523147933	-1.754481812	-1.638814872
121	1821	-0.55118228	-1.770880904	-1.161031592
122	1822	-0.579216627	-0.787279996	-0.683248311
123	1823	-2.607250973	-0.803679088	-1.705465031
124	1824	0.36471468	-1.820078181	-0.72768175
125	1825	0.336680333	-0.836477273	-0.24989847
126	1826	0.308645986	-1.852876365	-0.772115189
127	1827	5.28061164	0.130724542	2.705668091
128	1828	3.252577293	0.11432545	1.683451372
129	1829	2.224542946	-0.902073642	0.661234652
130	1830	1.1965086	1.081527266	1.139017933
131	1831	-0.831525747	1.065128173	0.116801213
132	1832	1.140439906	0.048729081	0.594584494
133	1833	0.112405559	0.032329989	0.072367774
134	1834	0.084371213	-0.984069103	-0.449848945
135	1835	-4.943663134	-1.000468196	-2.972065665
136	1836	-4.971697481	-2.016867288	-3.494282384
137	1837	-2.999731827	-3.03326638	-3.016499104
138	1838	-3.027766174	-1.049665472	-2.038715823
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141	1841	-2.111869214	-4.098862749	-3.105365982
142	1842	2.860096439	-3.115261842	-0.127582701
143	1843	4.832062092	-3.131660934	0.850200579
144	1844	4.804027746	-2.148060026	1.32798386
145	1845	0.775993399	-2.164459118	-0.69423286
146	1846	1.747959052	-3.180858211	-0.716449579

147	1847	2.719924705	-2.197257303	0.261333701
148	1848	4.691890359	-1.213656395	1.739116982
149	1849	4.663856012	-0.230055487	2.216900262
150	1850	6.635821665	0.75354542	3.694683543
151	1851	-1.392212681	-3.262853672	-2.327533177
152	1852	-2.420247028	-3.279252764	-2.849749896
153	1853	-1.448281375	-3.295651856	-2.371966616
154	1854	-2.476315722	-2.312050949	-2.394183335
155	1855	1.495649932	-2.328450041	-0.416400055
156	1856	-0.532384415	-1.344849133	-0.938616774
157	1857	2.439581238	-1.361248226	0.539166506
158	1858	-1.588453108	-1.377647318	-1.483050213
159	1859	4.383512545	-0.39404641	1.994733067
160	1860	3.355478198	-2.410445502	0.472516348
161	1861	5.327443851	-2.426844595	1.450299628
162	1862	5.299409505	-1.443243687	1.928082909
163	1863	2.271375158	-2.459642779	-0.094133811
164	1864	1.243340811	-0.476041871	0.38364947
165	1865	0.215306465	-0.492440964	-0.13856725
166	1866	1.187272118	-0.508840056	0.339216031
167	1867	6.159237771	-1.525239148	2.316999311
168	1868	9.131203424	-3.541638241	2.794782592
169	1869	7.103169078	-3.558037333	1.772565872
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171	1871	1.047100384	-3.590835517	-1.271867567
172	1872	-0.980933963	-4.60723461	-2.794084286
173	1873	-1.008968309	-4.623633702	-2.816301006
174	1874	-0.037002656	-1.640032794	-0.838517725
175	1875	-0.065037003	-2.656431886	-1.360734445
176	1876	-1.093071349	-1.672830979	-1.382951164
177	1877	-0.121105696	-2.689230071	-1.405167883
178	1878	-2.149140043	-2.705629163	-2.427384603
179	1879	-3.17717439	-2.722028255	-2.949601322
180	1880	-2.205208736	-2.738427348	-2.471818042
181	1881	-1.233243083	0.24517356	-0.494034761
182	1882	-0.26127743	-1.771225532	-1.016251481
183	1883	-3.289311776	-1.787624625	-2.5384682
184	1884	-3.317346123	-0.804023717	-2.06068492
185	1885	-0.34538047	-0.820422809	-0.582901639
186	1886	1.626585183	-1.836821901	-0.105118359
187	1887	-4.401449163	-2.853220994	-3.627335078
188	1888	-0.42948351	-1.869620086	-1.149551798
189	1889	-0.457517857	-0.886019178	-0.671768517
190	1890	0.514447797	-2.90241827	-1.193985237
191	1891	-0.51358655	-1.918817363	-1.216201956
192	1892	-0.541620897	-0.935216455	-0.738418676
193	1893	-2.569655244	-2.951615547	-2.760635395
194	1894	0.40231041	-2.968014639	-1.282852115
195	1895	-1.625723937	-2.984413732	-2.305068834
196	1896	-1.653758284	-2.000812824	-1.827285554
197	1897	-0.68179263	-3.017211916	-1.849502273
198	1898	-2.709826977	-3.033611009	-2.871718993

199	1899	-2.737861324	-3.050010101	-2.893935712
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201	1901	-3.793930017	-3.082808285	-3.438369151
202	1902	-3.821964364	-2.099207378	-2.960585871
203	1903	-0.849998711	-1.11560647	-0.98280259
204	1904	-3.878033057	-3.132005562	-3.50501931
205	1905	-3.906067404	-2.148404654	-3.027236029
206	1906	-2.934101751	-1.164803747	-2.049452749
207	1907	-1.962136098	-1.181202839	-1.571669468
208	1908	-0.990170444	-1.197601931	-1.093886188
209	1909	-1.018204791	-2.214001023	-1.616102907
210	1910	0.953760862	-3.230400116	-1.138319627
211	1911	-0.074273484	-3.246799208	-1.660536346
212	1912	-0.102307831	-2.2631983	-1.182753066
213	1913	1.869657822	0.720402607	1.295030215
214	1914	-1.158376525	0.704003515	-0.227186505
215	1915	1.813589129	0.687604423	1.250596776
216	1916	1.785554782	0.671205331	1.228380056
217	1917	6.757520435	1.654806238	4.206163337
218	1918	3.729486089	0.638407146	2.183946617
219	1919	3.701451742	0.622008054	2.161729898
220	1920	1.673417395	-3.394391038	-0.860486822
221	1921	3.645383048	-2.410790131	0.617296459
222	1922	4.617348702	-2.427189223	1.095079739
223	1923	4.589314355	-0.443588315	2.07286302
224	1924	6.561280008	2.540012593	4.5506463
225	1925	3.533245662	-0.4763865	1.528429581
226	1926	1.505211315	2.507214408	2.006212861
227	1927	4.477176968	2.490815316	3.483996142
228	1928	4.449142621	1.474416223	2.961779422
229	1929	2.421108275	4.458017131	3.439562703
230	1930	-2.606926072	3.441618039	0.417345983
231	1931	0.365039581	1.425218947	0.895129264
232	1932	-0.662994765	2.408819854	0.872912544
233	1933	2.308970888	3.392420762	2.850695825
234	1934	5.280936541	2.37602167	3.828479105
235	1935	2.252902194	3.359622578	2.806262386
236	1936	2.224867848	3.343223485	2.784045666
237	1937	2.196833501	2.326824393	2.261828947
238	1938	3.168799154	1.310425301	2.239612228
239	1939	5.140764808	4.294026209	4.717395508
240	1940	6.112730461	5.277627116	5.695178789
241	1941	3.084696114	6.261228024	4.672962069
242	1942	5.056661767	6.244828932	5.65074535
243	1943	4.028627421	4.228429839	4.12852863
244	1944	5.000593074	6.212030747	5.606311911
245	1945	4.972558727	3.195631655	4.084095191
246	1946	4.94452438	3.179232563	4.061878472
247	1947	6.916490034	5.16283347	6.039661752
248	1948	-0.111544313	4.146434378	2.017445033
249	1949	4.86042134	3.130035286	3.995228313
250	1950	5.832386994	2.113636194	3.973011594

251	1951	0.804352647	0.097237101	0.450794874
252	1952	2.7763183	-0.919161991	0.928578155
253	1953	0.748283953	-1.935561083	-0.593638565
254	1954	0.720249607	0.048039825	0.384144716
255	1955	1.69221526	1.031640732	1.361927996
256	1956	-3.335819087	1.01524164	-1.160288723
257	1957	3.636146567	-1.001157452	1.317494557
258	1958	5.60811222	5.982443455	5.795277838
259	1959	5.580077873	2.966044363	4.273061118
260	1960	0.552043526	0.949645271	0.750844399
261	1961	-0.47599082	-1.066753821	-0.771372321
262	1962	-0.504025167	-1.083152914	-0.79358904
263	1963	0.467940486	1.900447994	1.18419424
264	1964	1.43990614	1.884048902	1.661977521
265	1965	1.411871793	1.86764981	1.639760801
266	1966	-2.616162554	5.851250717	1.617544082
267	1967	-1.644196901	1.834851625	0.095327362
268	1968	1.327768753	1.818452533	1.573110643
269	1969	0.299734406	2.802053441	1.550893923
270	1970	-1.728299941	-0.214345652	-0.971322796
271	1971	-2.756334287	-1.230744744	-1.993539516
272	1972	-4.784368634	0.752856164	-2.015756235
273	1973	-0.812402981	-2.263542929	-1.537972955
274	1974	-1.840437328	3.720057979	0.939810326
275	1975	-0.868471674	3.703658887	1.417593606
276	1976	-1.896506021	3.687259795	0.895376887
277	1977	-0.924540368	3.670860702	1.373160167
278	1978	-1.952574714	1.65446161	-0.149056552
279	1979	-1.980609061	4.638062518	1.328726728
280	1980	-5.008643408	4.621663426	-0.193489991
281	1981	-5.036677755	5.605264333	0.284293289
282	1982	-3.064712101	1.588865241	-0.73792343
283	1983	-6.092746448	0.572466149	-2.76014015
284	1984	-4.120780795	-0.443932943	-2.282356869
285	1985	-8.148815141	-2.460332036	-5.304573589
286	1986	-6.176849488	-3.476731128	-4.826790308
287	1987	-5.204883835	-3.49313022	-4.349007028
288	1988	-1.232918182	-1.509529313	-1.371223747
289	1989	-3.260952528	-0.525928405	-1.893440467
290	1990	-1.288986875	-0.542327497	-0.915657186
291	1991	-3.317021222	-0.558726589	-1.937873906
292	1992	-3.345055568	1.424874318	-0.960090625
293	1993	-1.373089915	0.408475226	-0.482307345
294	1994	-0.401124262	0.392076134	-0.004524064
295	1995	-1.429158609	-1.624322958	-1.526740784
296	1996	0.542807045	2.359277949	1.451042497
297	1997	-3.485227302	1.342878857	-1.071174222
298	1998	-1.513261649	0.326479765	-0.593390942

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