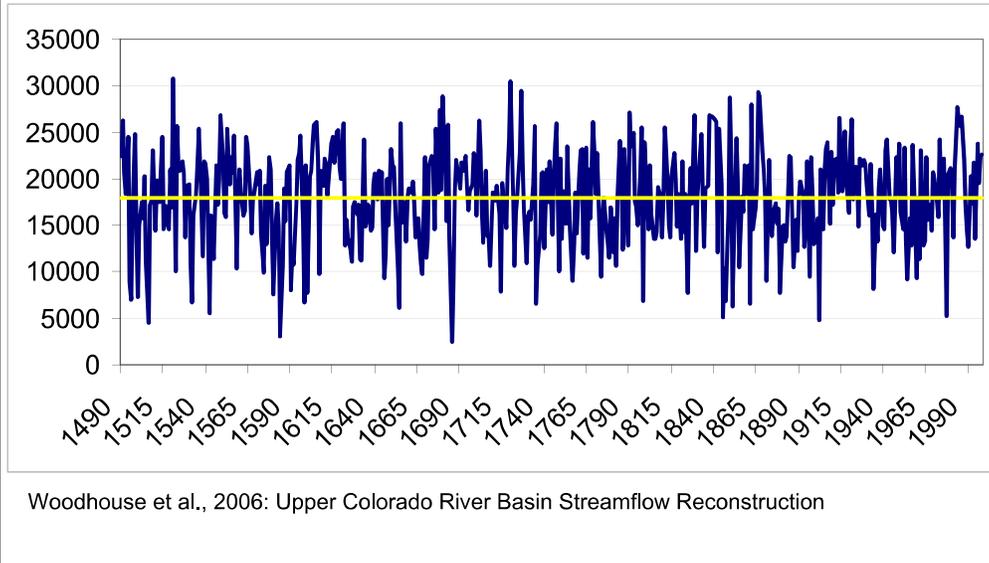


Paleodroughts



Now let's take a quick look at paleorecords. Paleo reconstructions use proxy data like tree rings or lake sediments to generate a picture of runoff or precipitation that extends far beyond the observed record. Shown here is the Lee's Ferry flow reconstruction for the Colorado River developed from tree ring data by Connie Woodhouse and others. The yellow line depicts the period of record average. From this chart, you can see that the paleorecord gives the impression of greater variability and extended periods of below average runoff. As these are expected characteristics of climate change, the paleorecord can be used to guide planning efforts for the future.

100+yr. Droughts in California?

"Here I present a study of relict tree stumps rooted in present-day lakes, marshes and streams, which suggests that California's Sierra Nevada experienced extremely severe drought conditions for more than 2 centuries before AD~1112 and for more than 140 years before AD~1350."

"Future natural or anthropogenically induced warming may cause a recurrence of the extreme drought conditions"

"California's mediaeval precipitation regime, if it recurred with today's burgeoning human population, would be highly disruptive environmentally and economically."

(ref. Scott Stine, *Nature*, June 1994)

Slide Acknowledgement: Jay Lund, UC Davis

One of the often cited events in the paleo record are the medieval droughts around 1100 AD and 1300 AD. These multi-decadal to century long droughts are thought to have played a significant role in the evolution of native civilizations in the American Southwest. This slide, borrowed from Jay Lund (UC Davis) quotes Scott Stine's *Nature* article noting that if these droughts were to re-occur in modern times, similar civilization changing results are likely to occur.

1921-1940 Sacramento Basin

- Only 6 years with above average rainfall in 8 Station Index (1921, 1925, 1927, 1936, 1938, 1940)
- Average annual precipitation 44 inches during this time
- Water year runoff average 14.9 MAF
- Water Supply Index Class Distribution: 2W, 4AN, 4BN, 5D, 5C

While I consider these megadroughts to be climate shifts rather than droughts, it is worth noting that a smaller duration shift is present in the observed record for the Sacramento Basin. The twenty year period from 1921 to 1940 had only six years with above average rainfall. The average rainfall during this period was six inches less than the period of record average of 50 inches that we use today. Runoff during this period averaged 14.9 million acre-feet which is over 3 million acre-feet less than our current average of 18 million acre-feet. I also show the water supply index water year classification distribution for this period which shows a distinctly dry bias (W = Wet, AN = Above Normal, BN = Below Normal, D = Dry, and C = Critical).