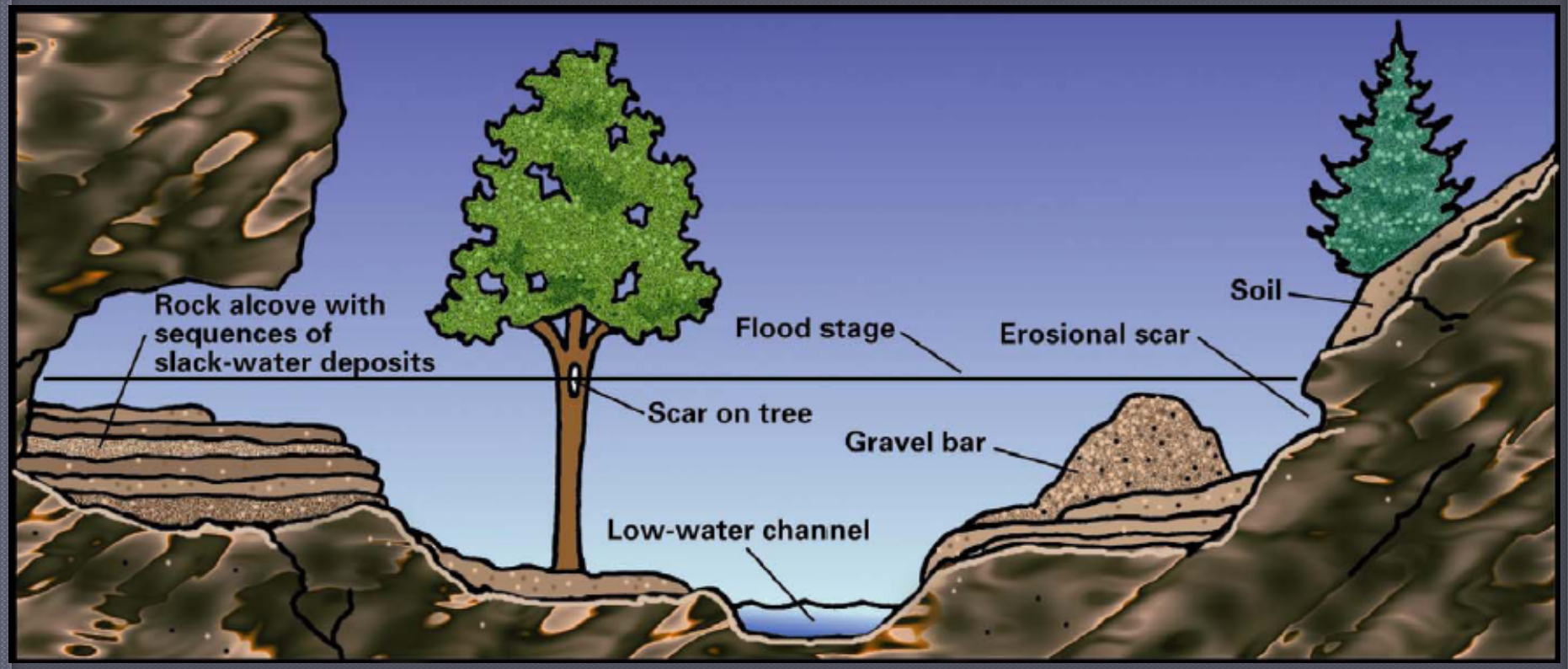
Flood frequency analysis of the Tennessee River near Chattanooga, Tennessee using 3800 years of paleoflood data

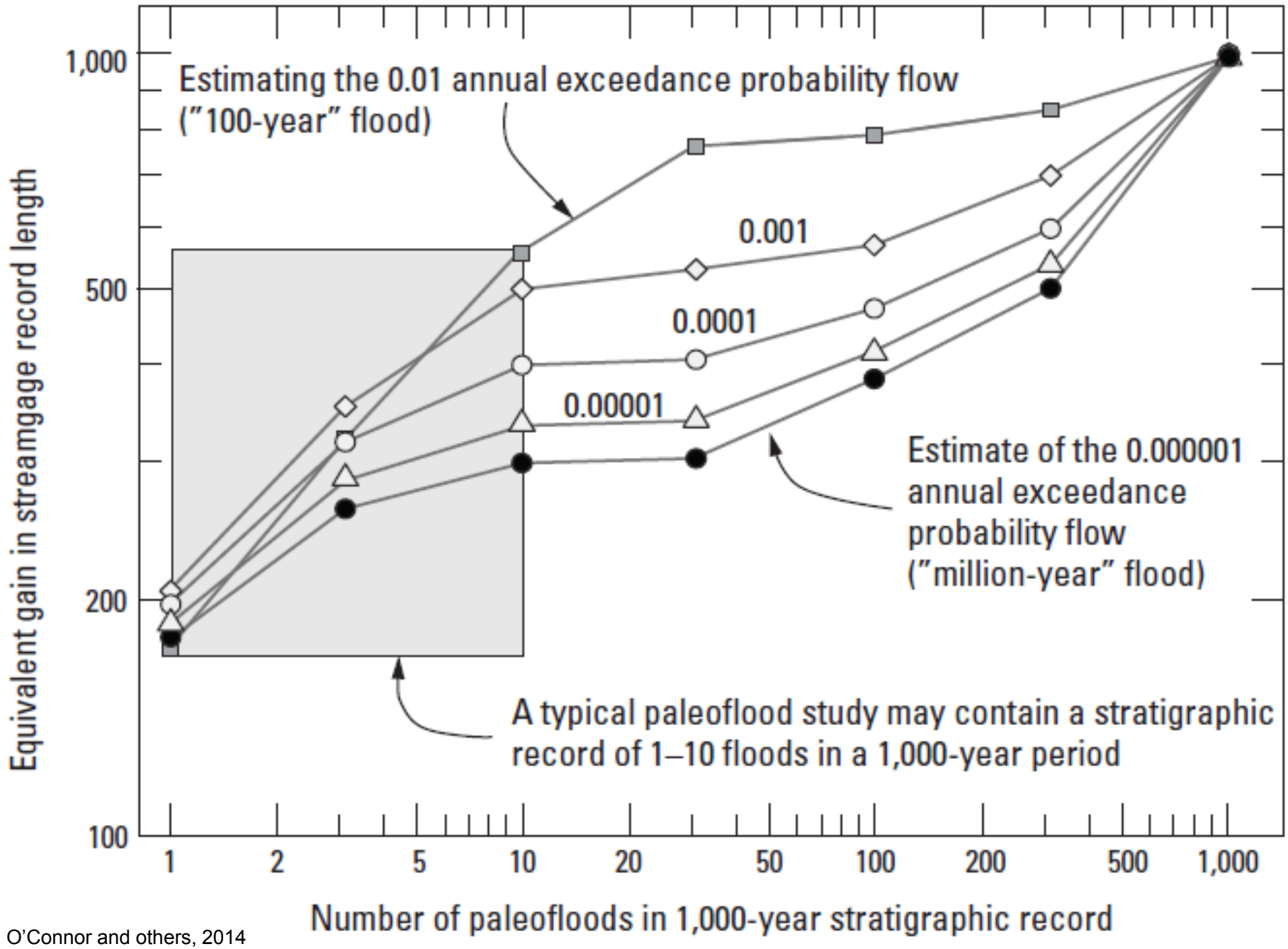
Tess Harden – Oregon Water Science Center
Jim O'Connor – Geology, Mineral, Energy and Geophysics

U.S. Geological Survey, Portland, OR

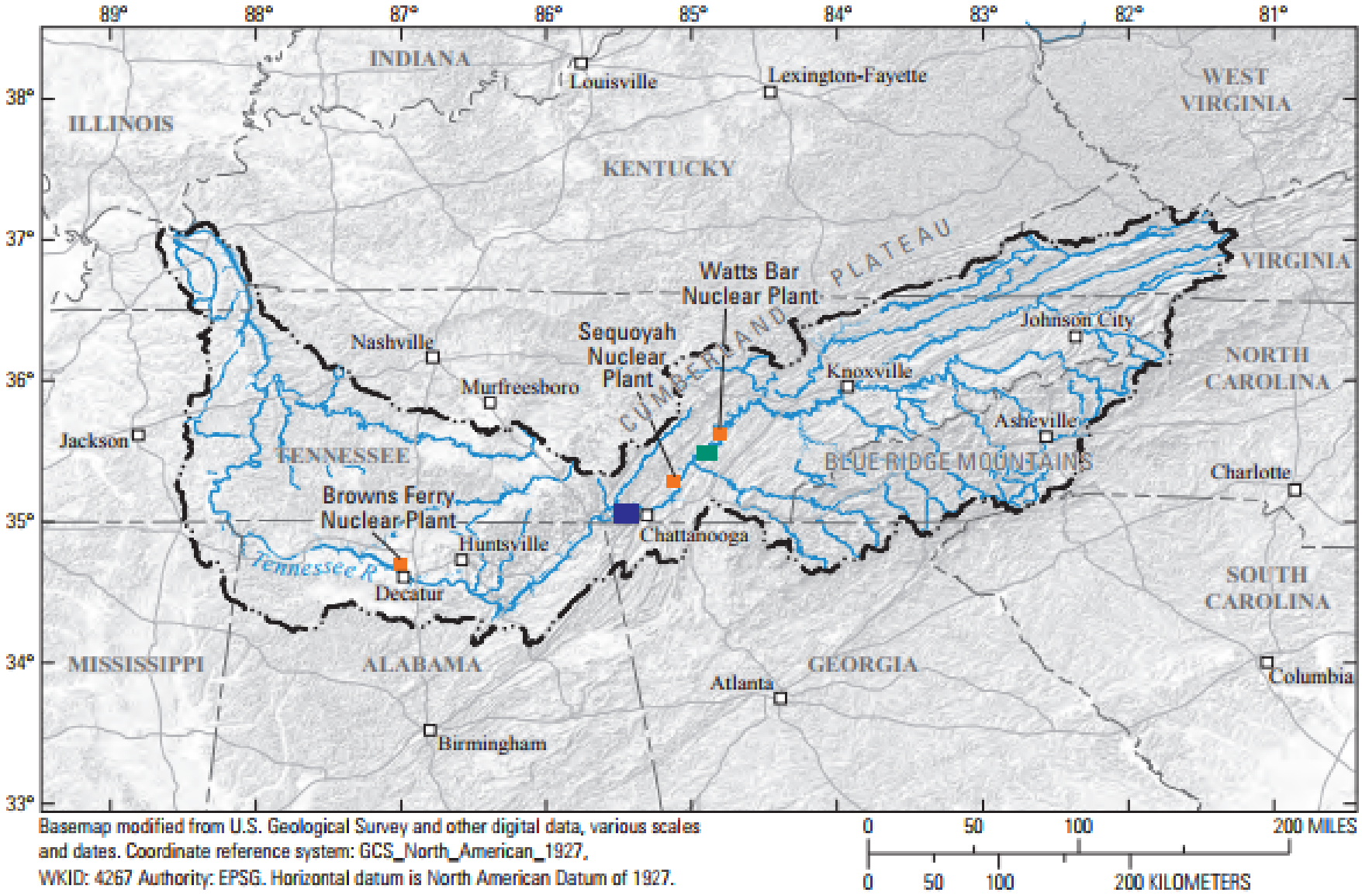
What is “Paleoflood” Hydrology



….using geologic evidence to understand flood history…

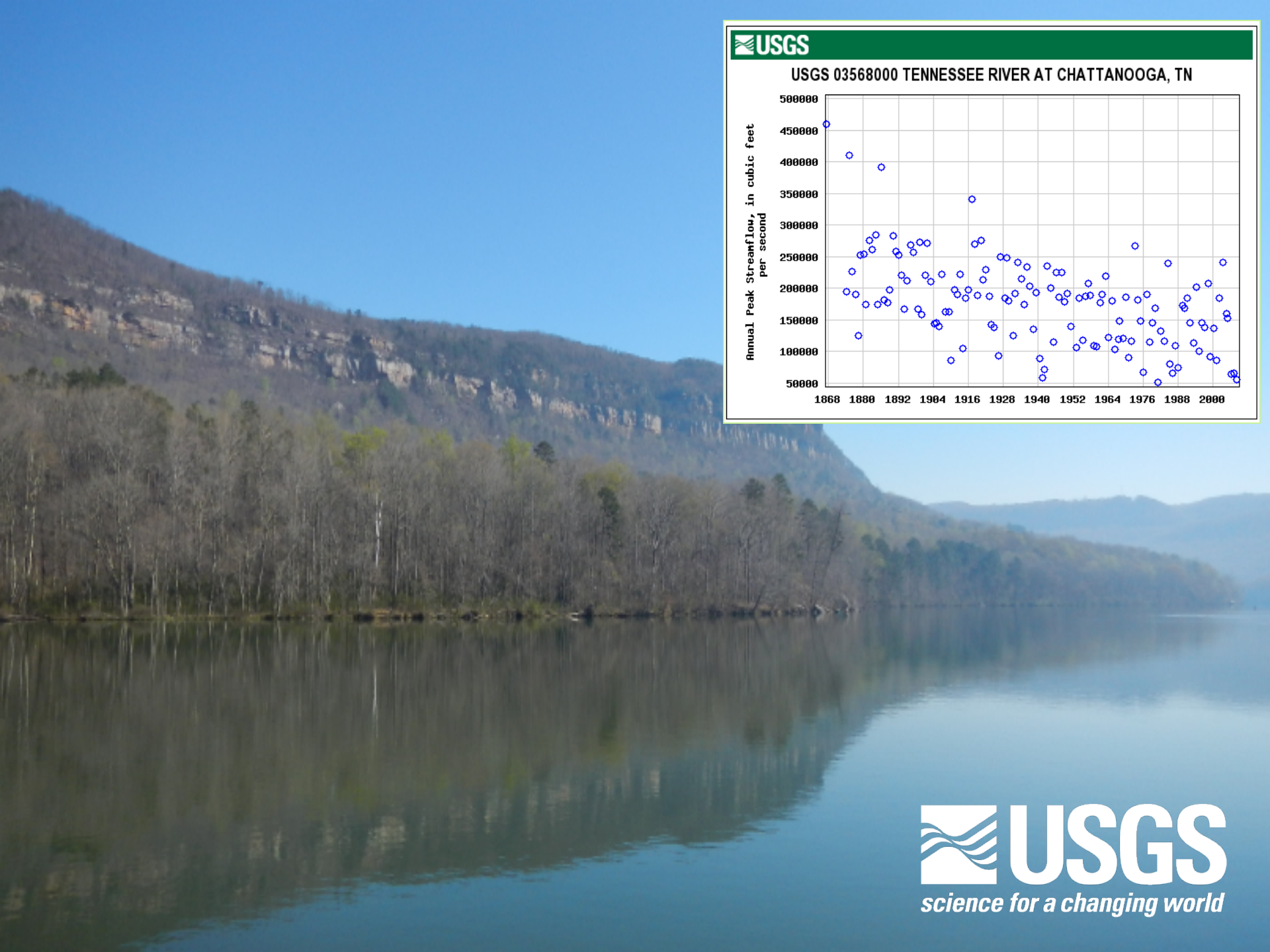


O'Connor and others, 2014



Harden and O'Connor, 2017


Chattanooga


USGS
USGS 03568000 TENNESSEE RIVER AT CHATTANOOGA, TN
Annual Peak Streamflow, in cubic feet per second
500000
450000
400000
350000
300000
250000
200000
150000
100000
50000
1868
1880
1892
1904
1916
1928
1940
1952
1964
1976
1988
2000
USGS
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USGS
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Lufkin
RUGGED
mm
USGS
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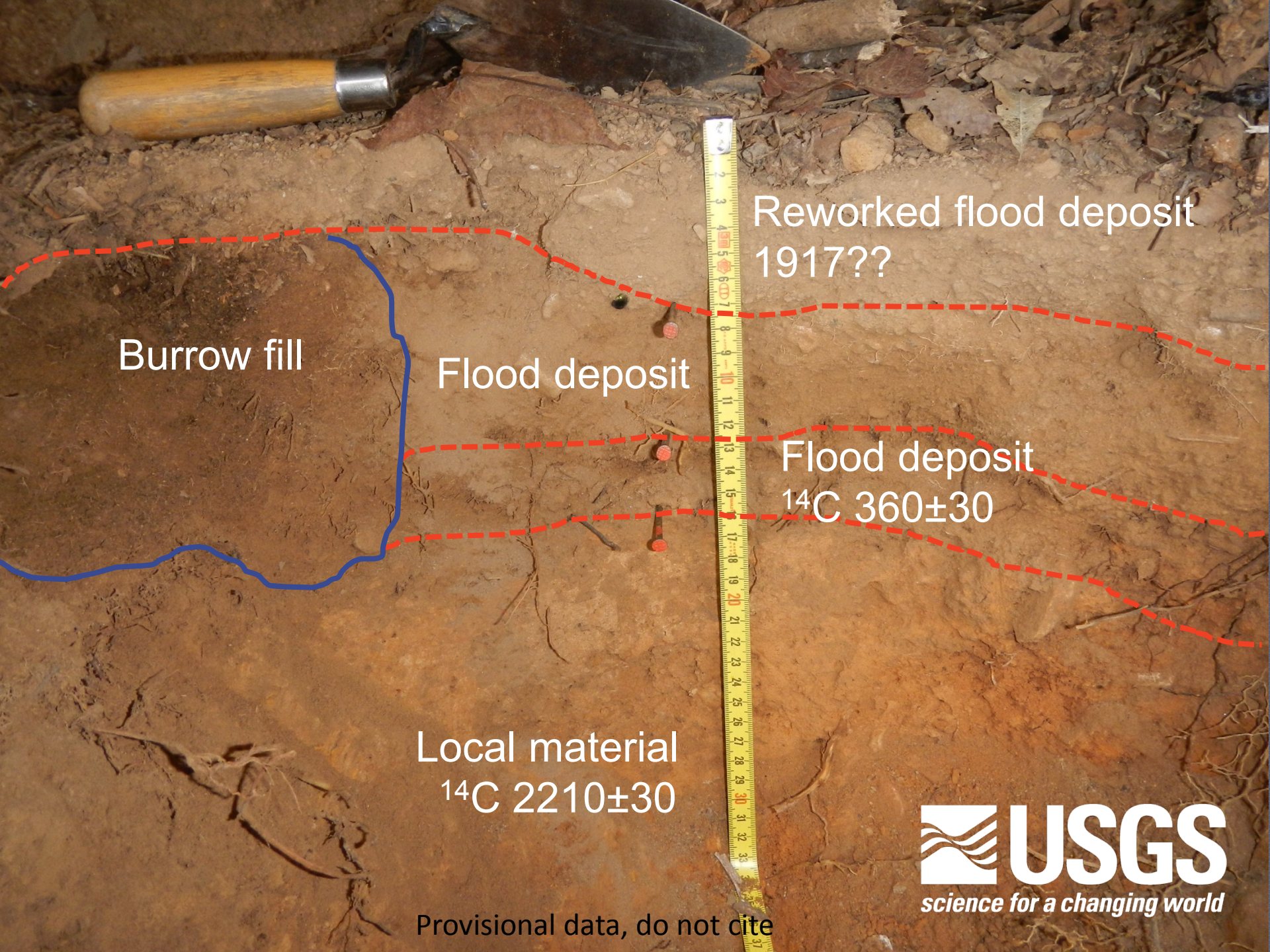
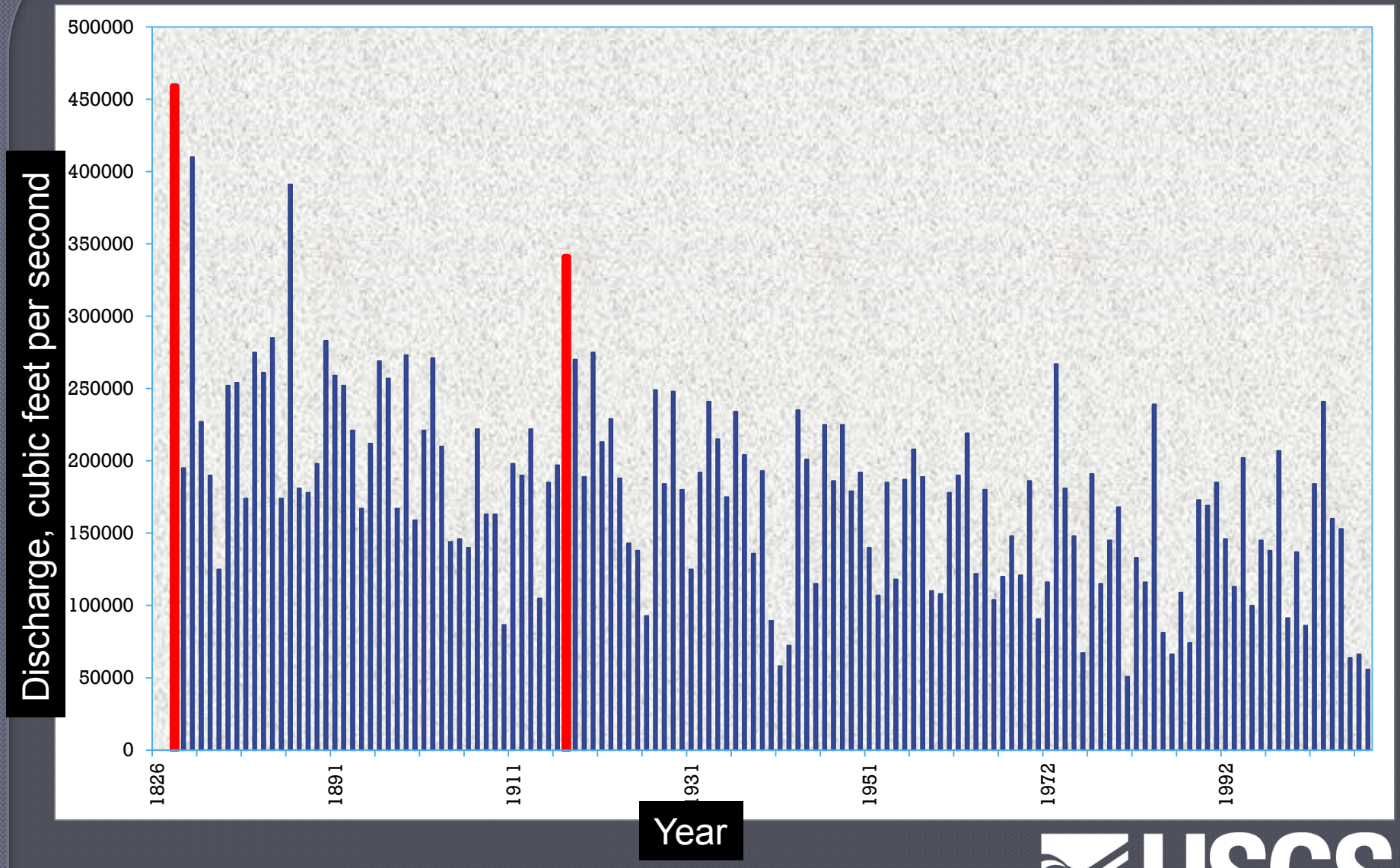

Reworked flood deposit
1917??
Burrow fill
Flood deposit
Flood deposit
^{14}C 360±30
Local material
^{14}C 2210±30
USGS
science for a changing world
Provisional data, do not cite



USGS
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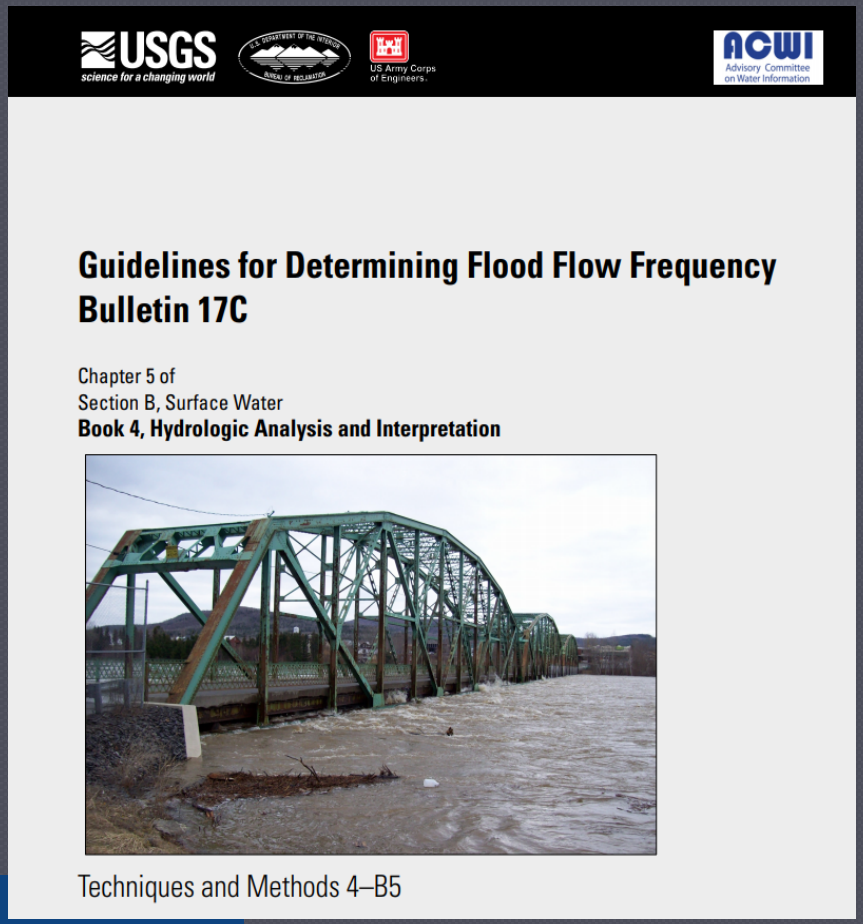
Frequency Analysis

- Bulletin 17C
- EMA
- Discharge uncertainty and perception thresholds
- LP3 distribution
- USGS PeakFQ



England and others, 2018

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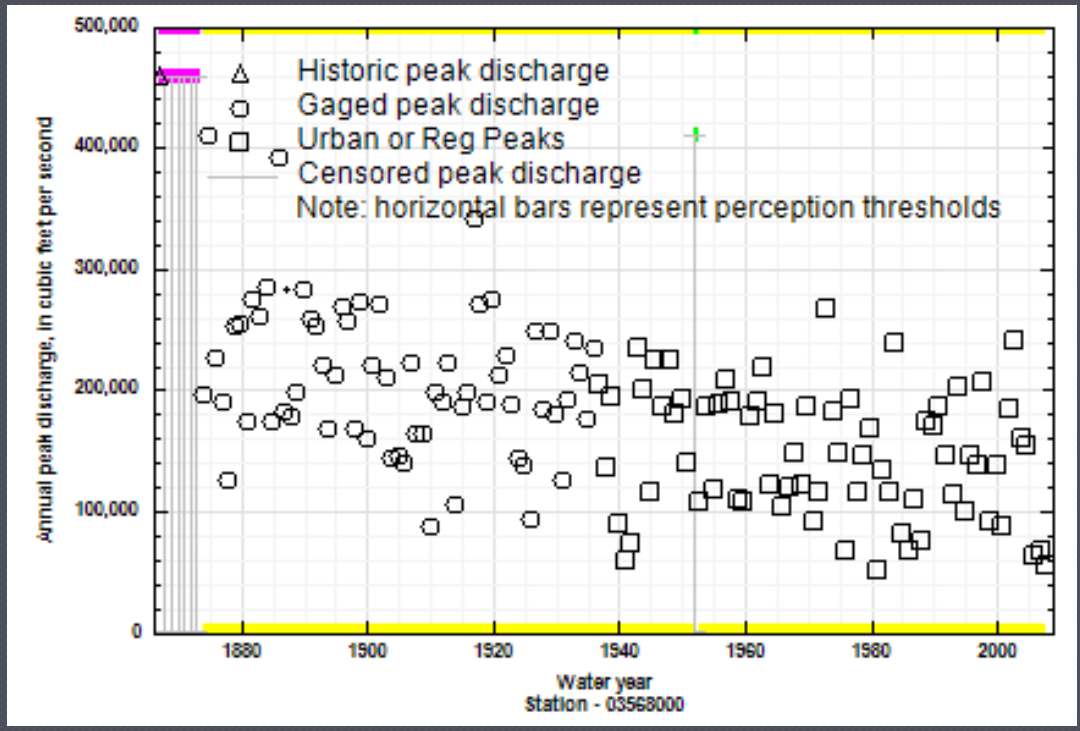
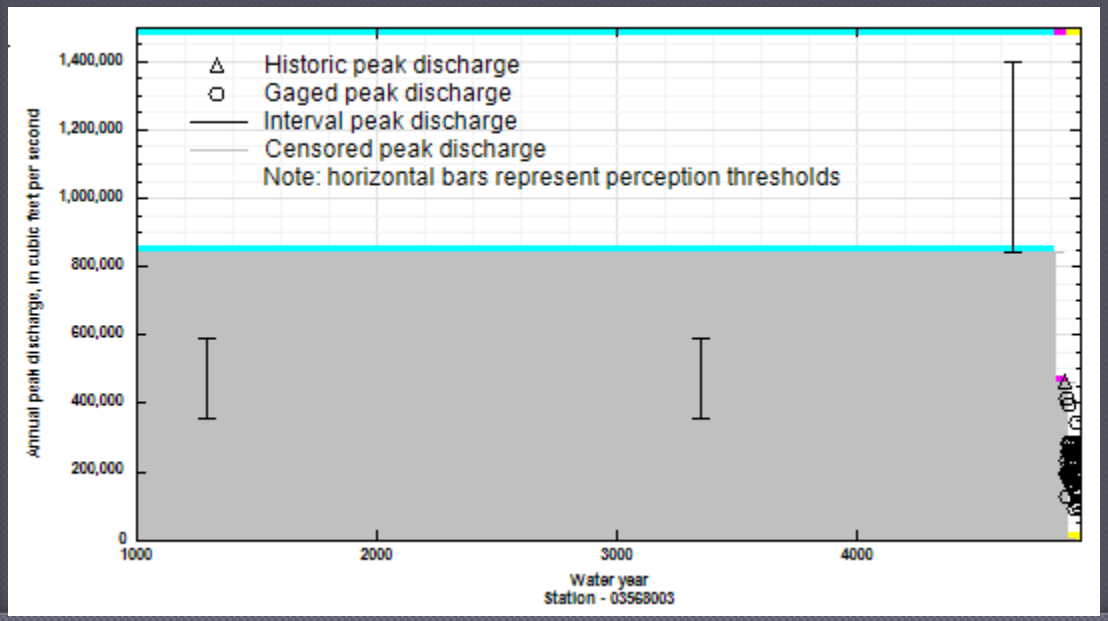
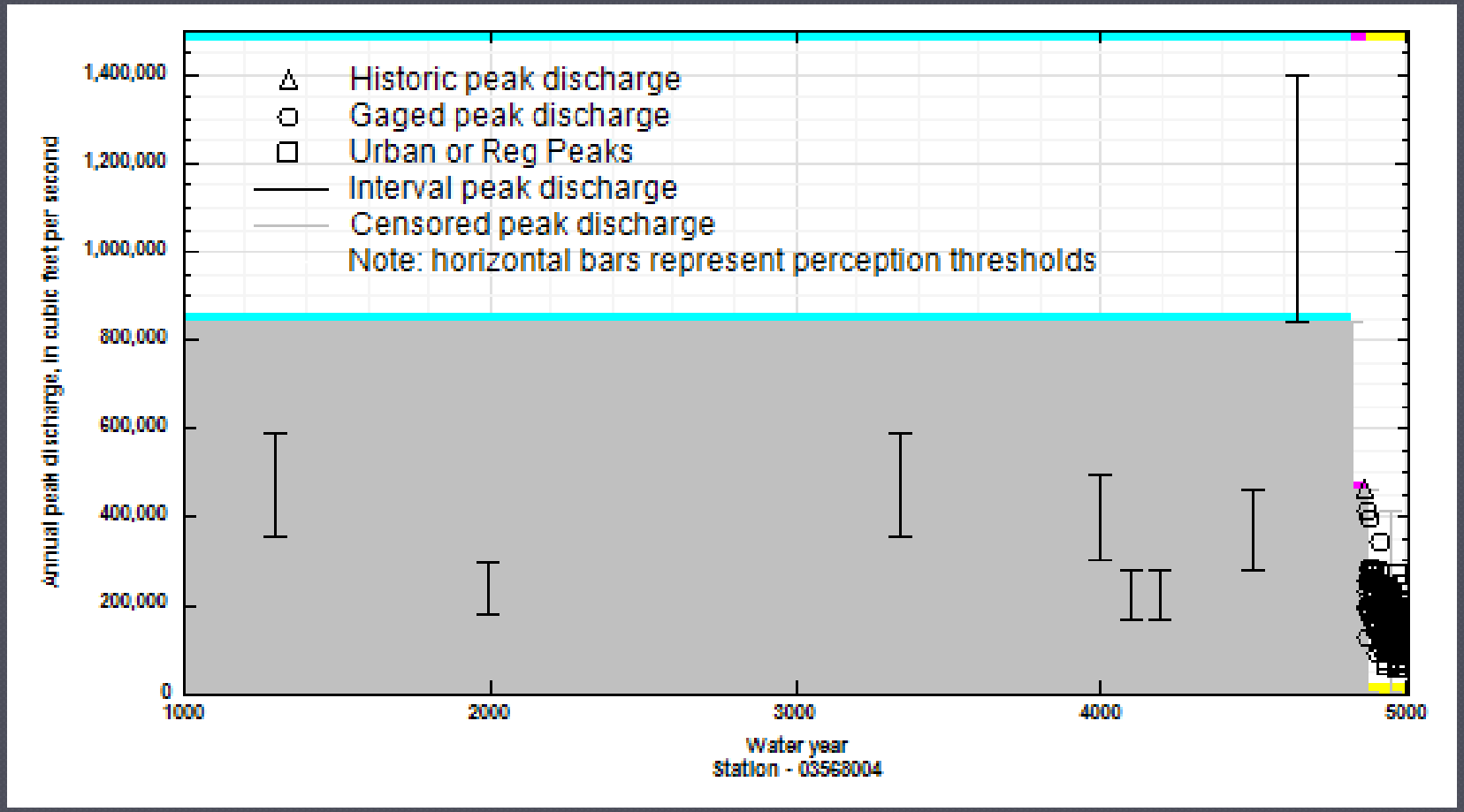
Gaged record only at Chattanooga ~1867-2008





Gaged plus paleofloods (at benchmark) sites ~4000 years of record

Provisional data, do not cite



Gaged record plus all 8 paleofloods

Provisional data, do not cite

summary

- Adding several thousand years of paleoflood data reduces uncertainty of the very small AEP's even with the addition of an exceptionally large flood
- Fitted frequency curve and 95% confidence limits increase for rare events.
- The shape of frequency curve is heavily influenced by just a few of the very largest floods