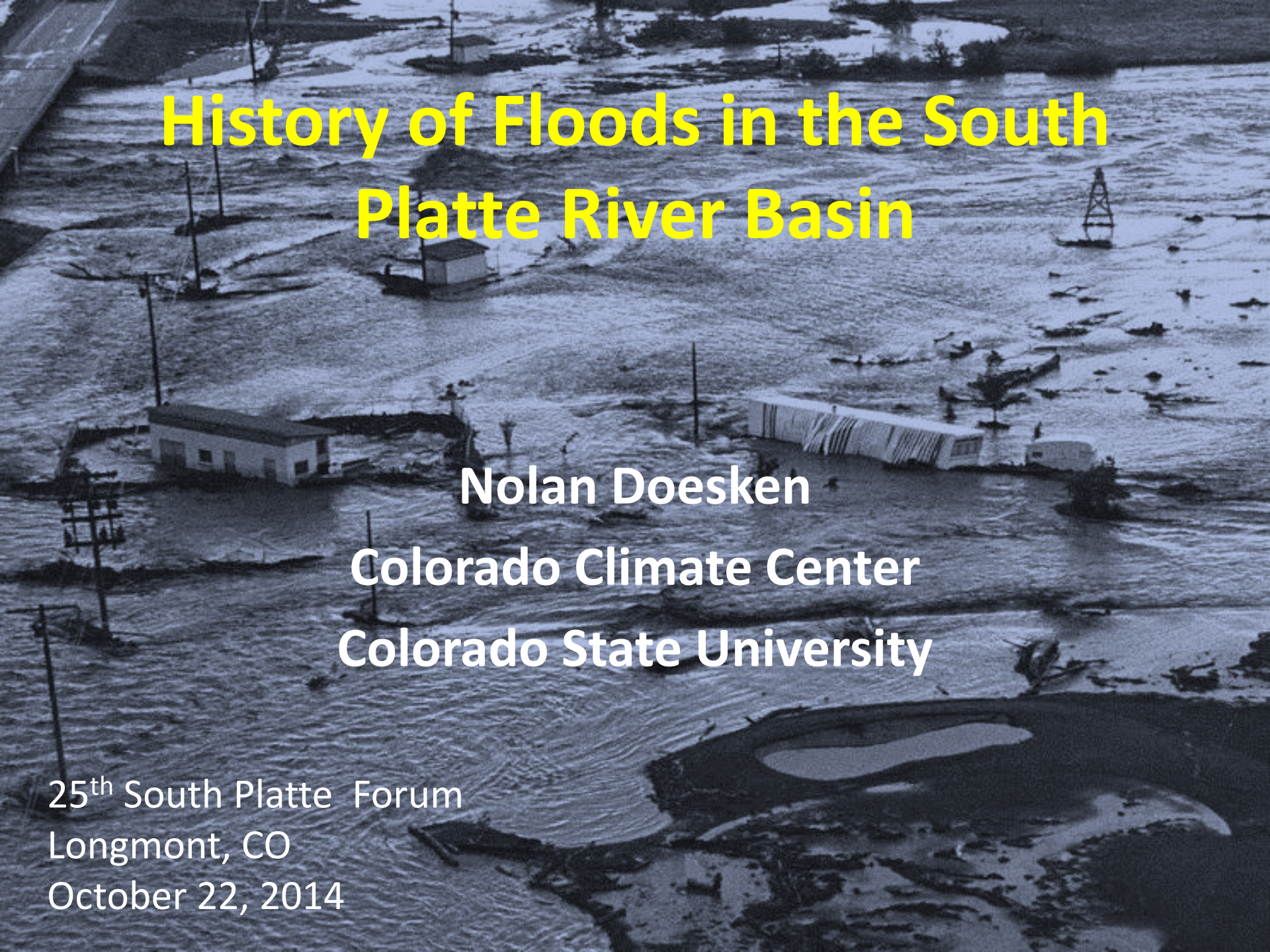


An aerial photograph showing a severe flood. The water is murky and turbulent, covering a large area of land. Several buildings are partially submerged, including a small white house on the left and a larger, long building on the right. Power lines and poles are visible, some standing and some partially submerged. The overall scene depicts a major disaster.

History of Floods in the South Platte River Basin

Nolan Doesken
Colorado Climate Center
Colorado State University

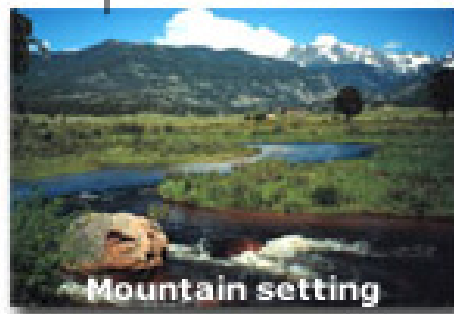
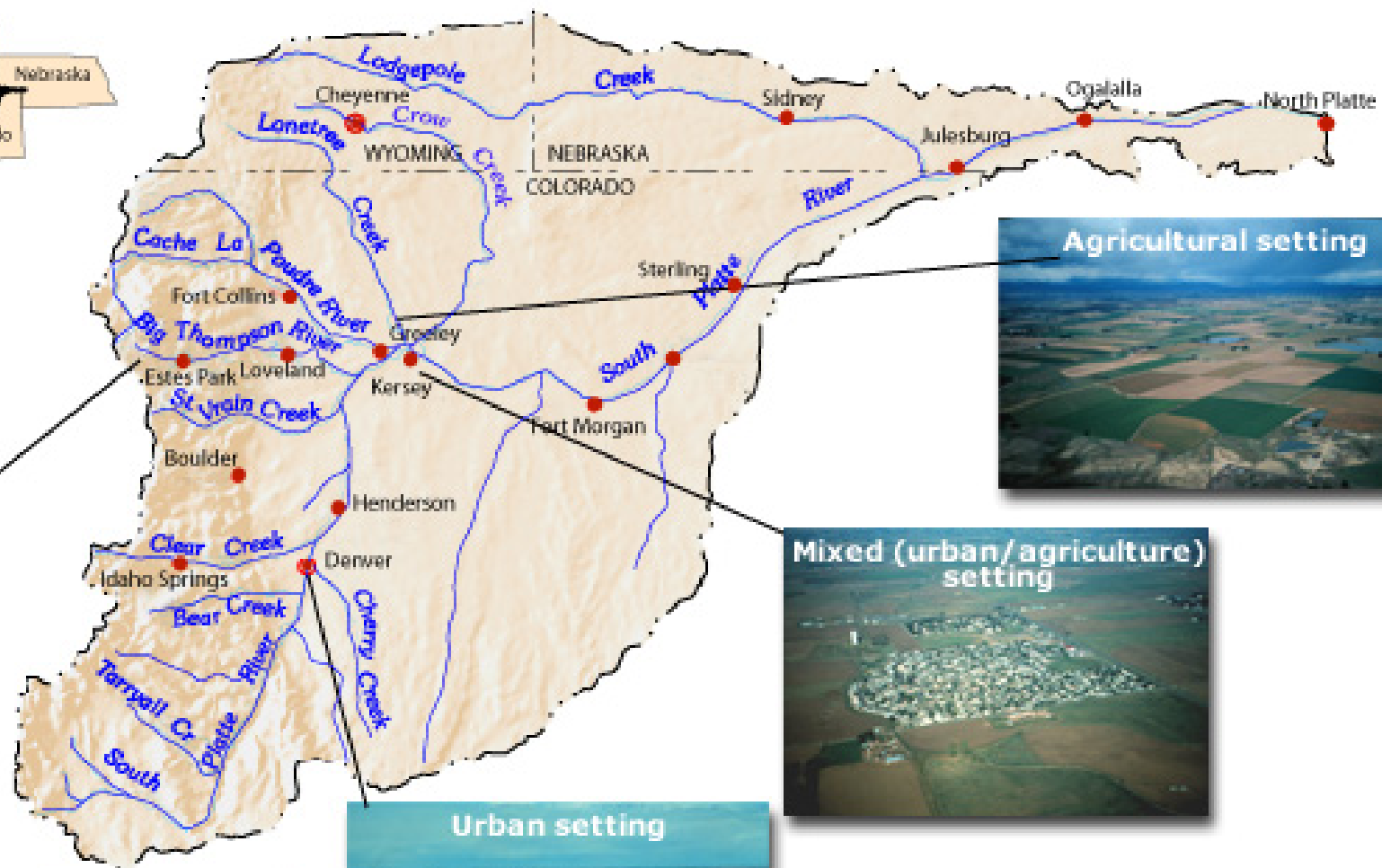
25th South Platte Forum
Longmont, CO
October 22, 2014

Acknowledgment: Thanks to Zach Schwalbe for much help compiling flood data and making graphs



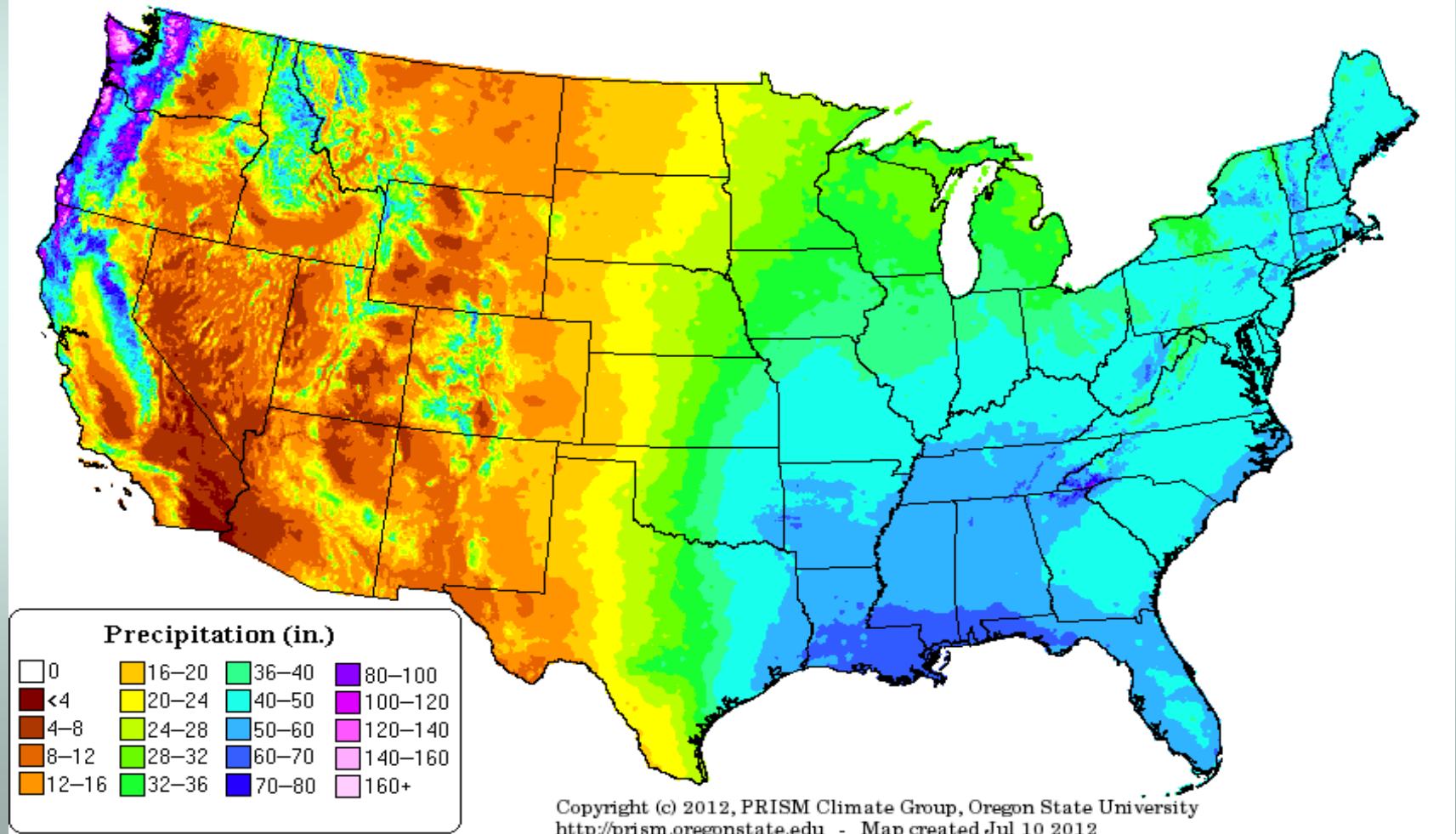


Credit: Bob Henson, UCAR

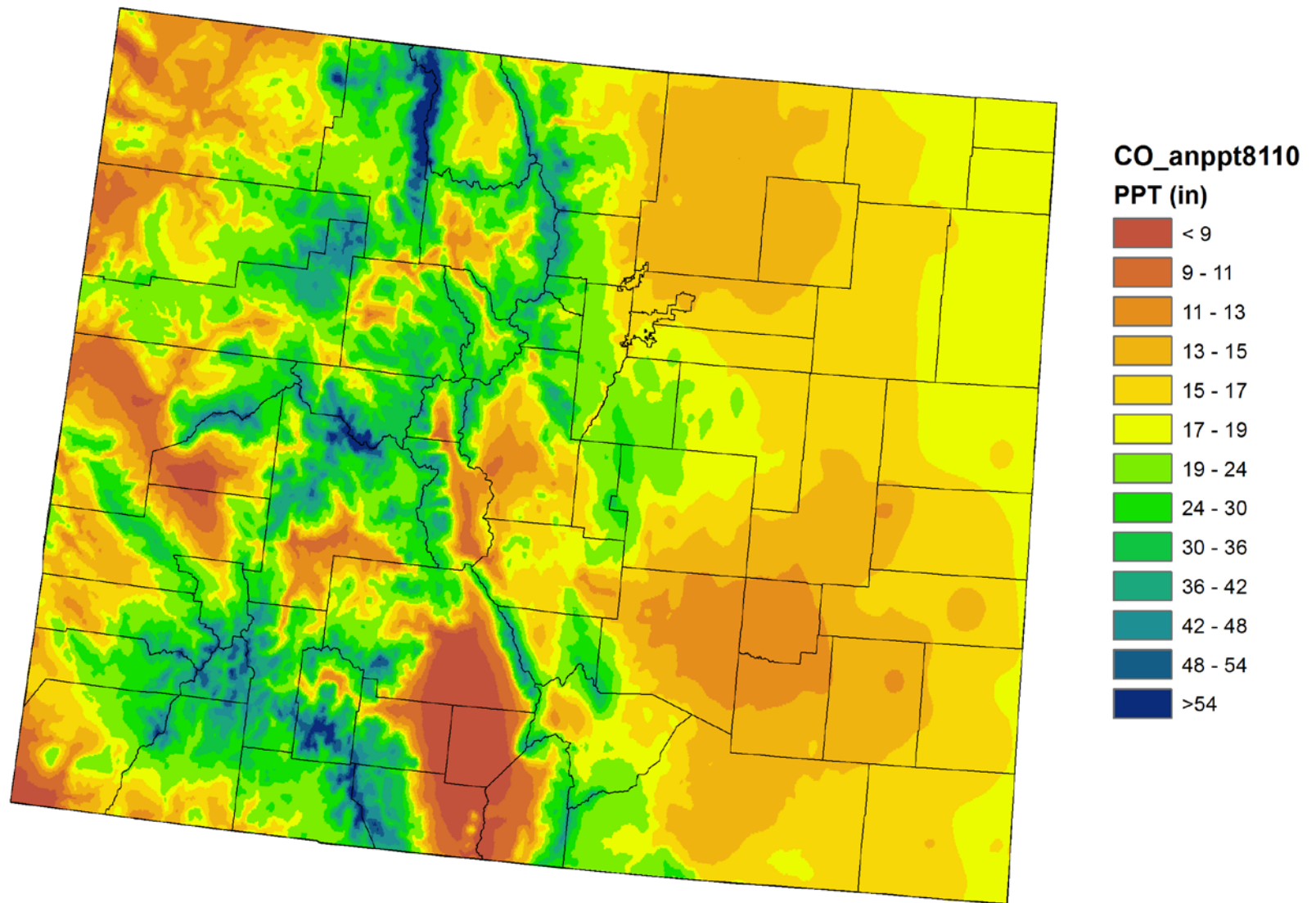


Remember where we are

Precipitation: Annual Climatology (1981-2010)



Colorado Annual Average Precipitation (in) 1981-2010



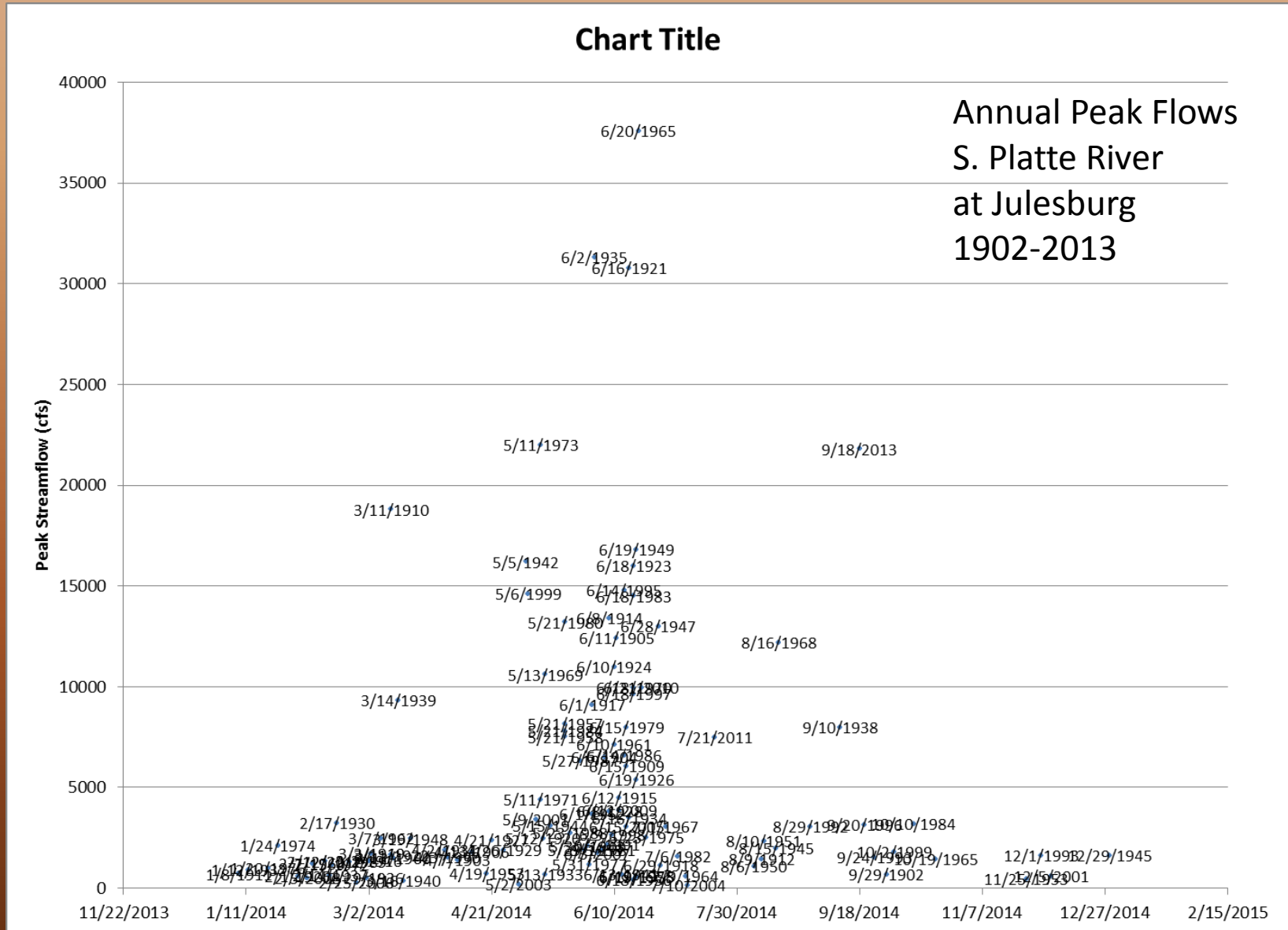
Colorado Precipitation:

Usually Dry punctuated by
occasional large events

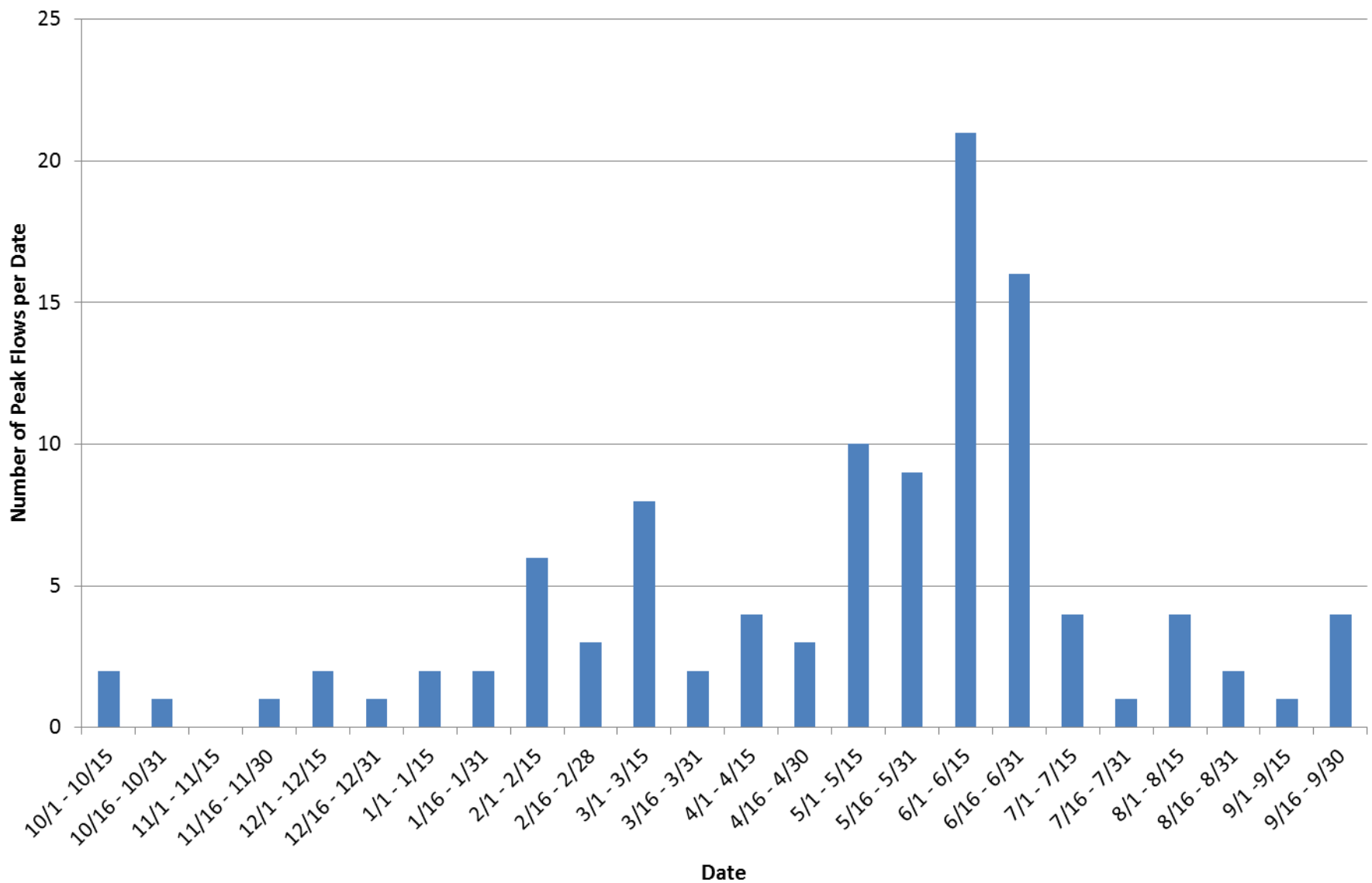
Strong seasonality

High variability

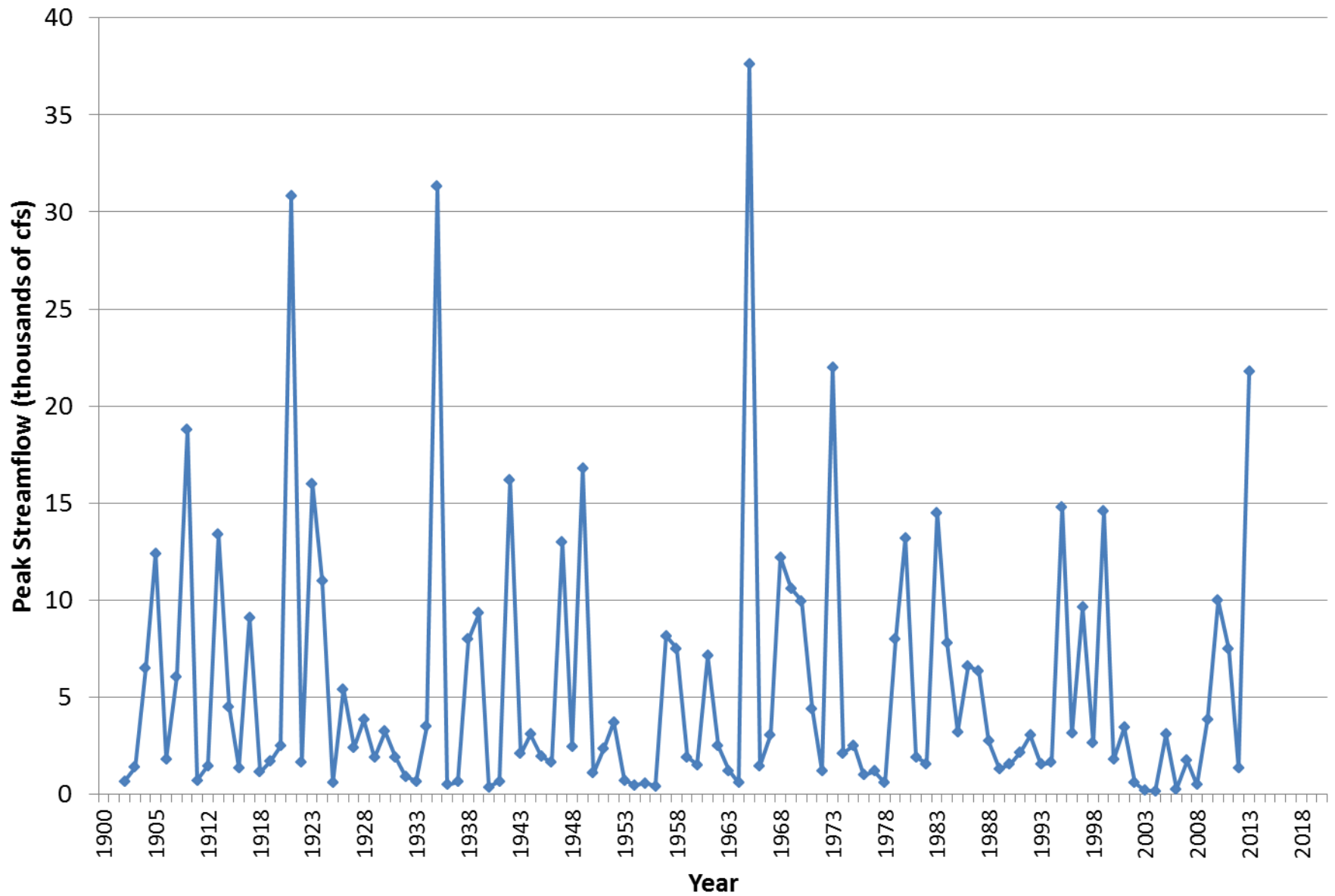
This is it -- the History



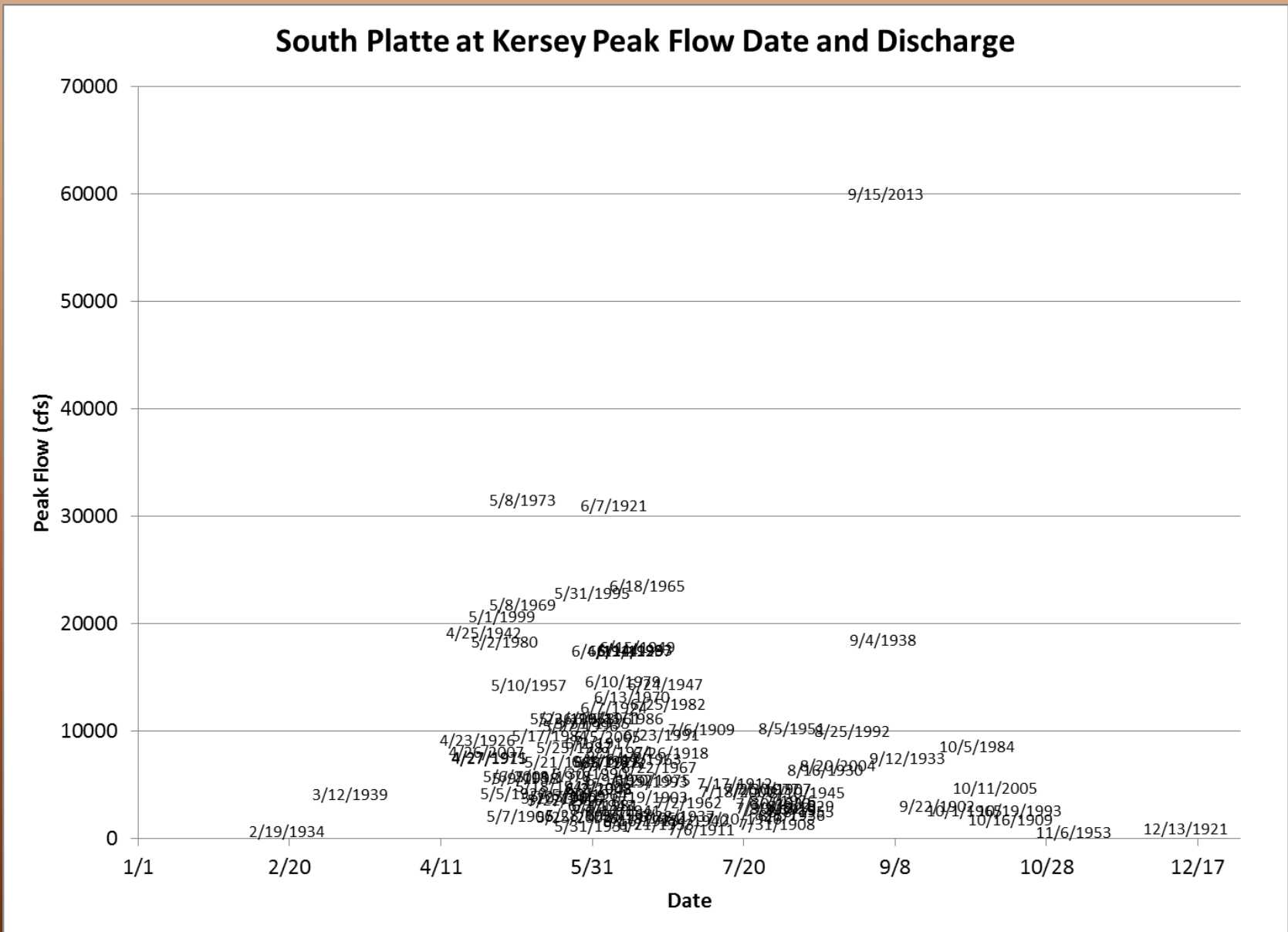
Frequency of Dates of Peak Flow for South Platte at Julesburg 1902-2013



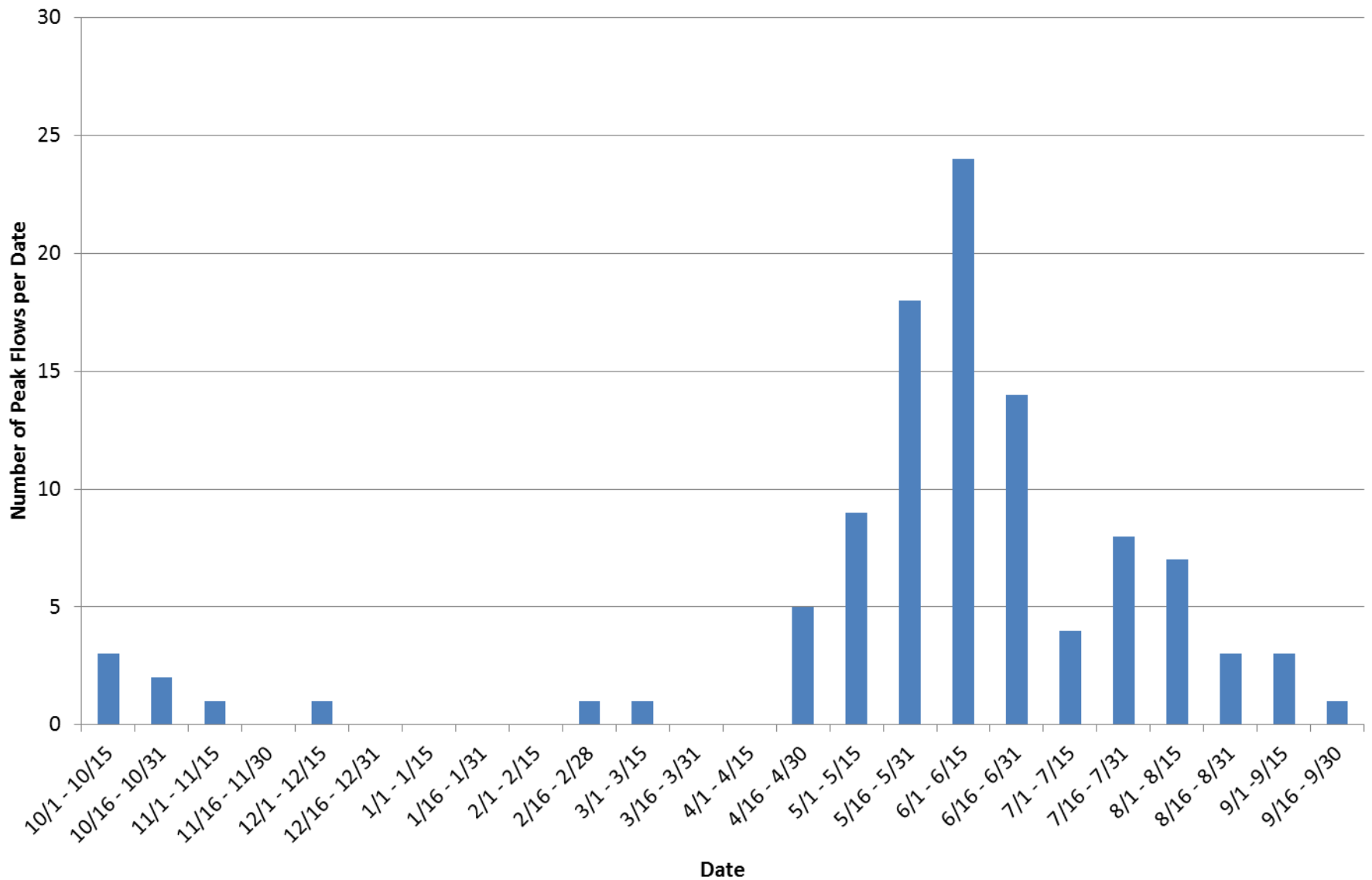
Annual Peak Streamflow on South Platte River at Julesburg, CO



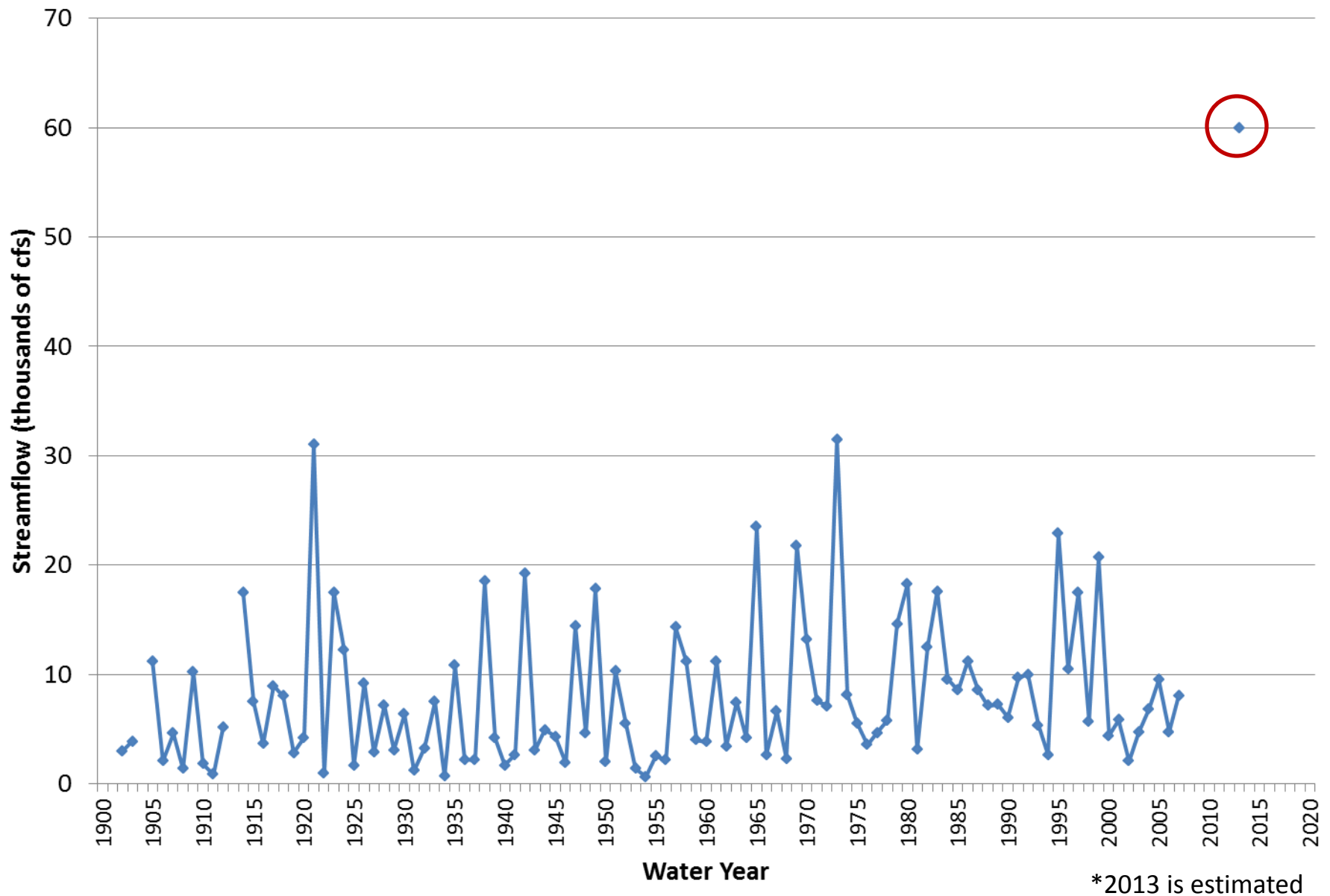
Now, let's head upstream to Kersey



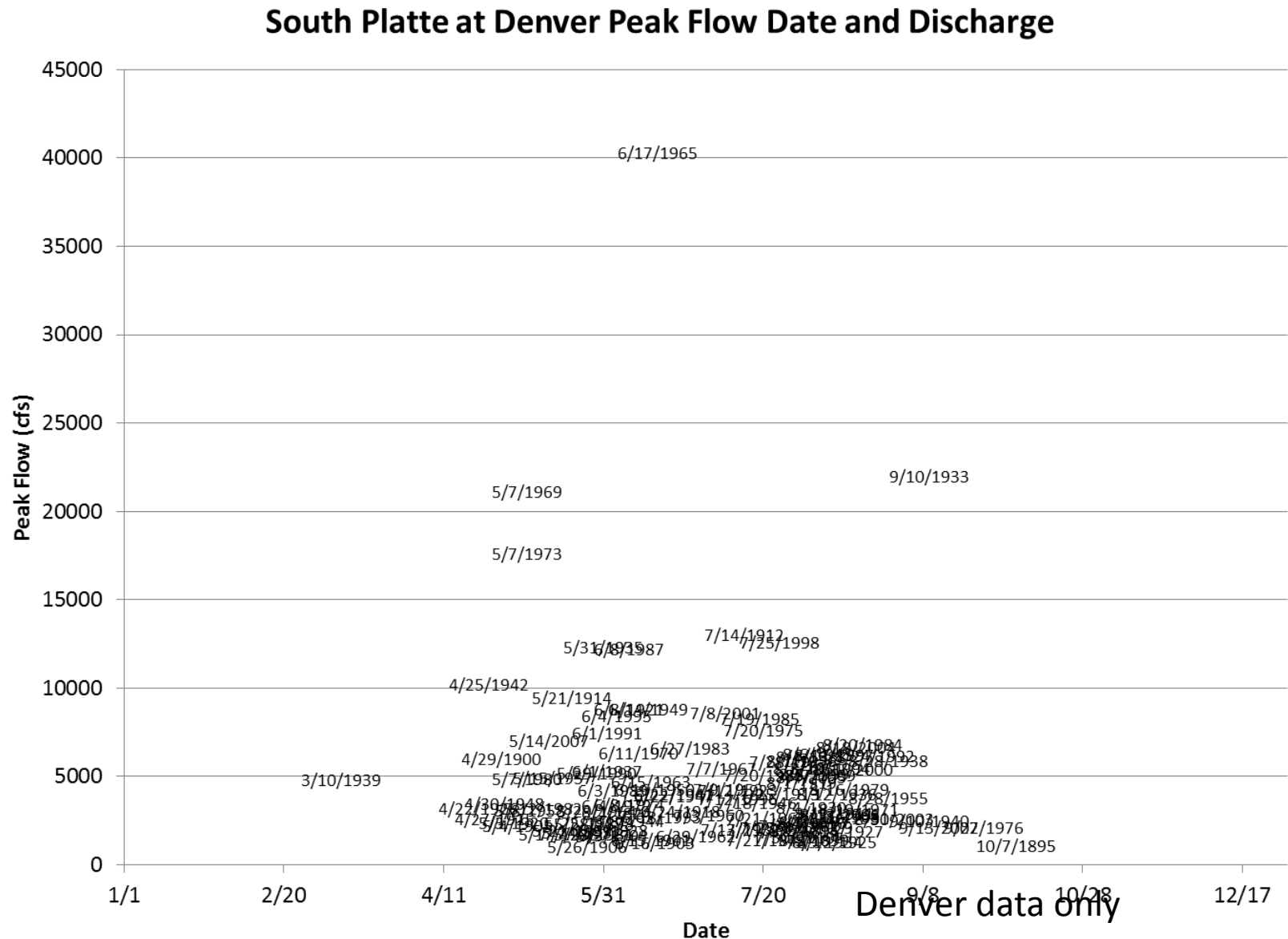
Frequency of Date of Peak Flow on South Platte at Kersey 1902-2007



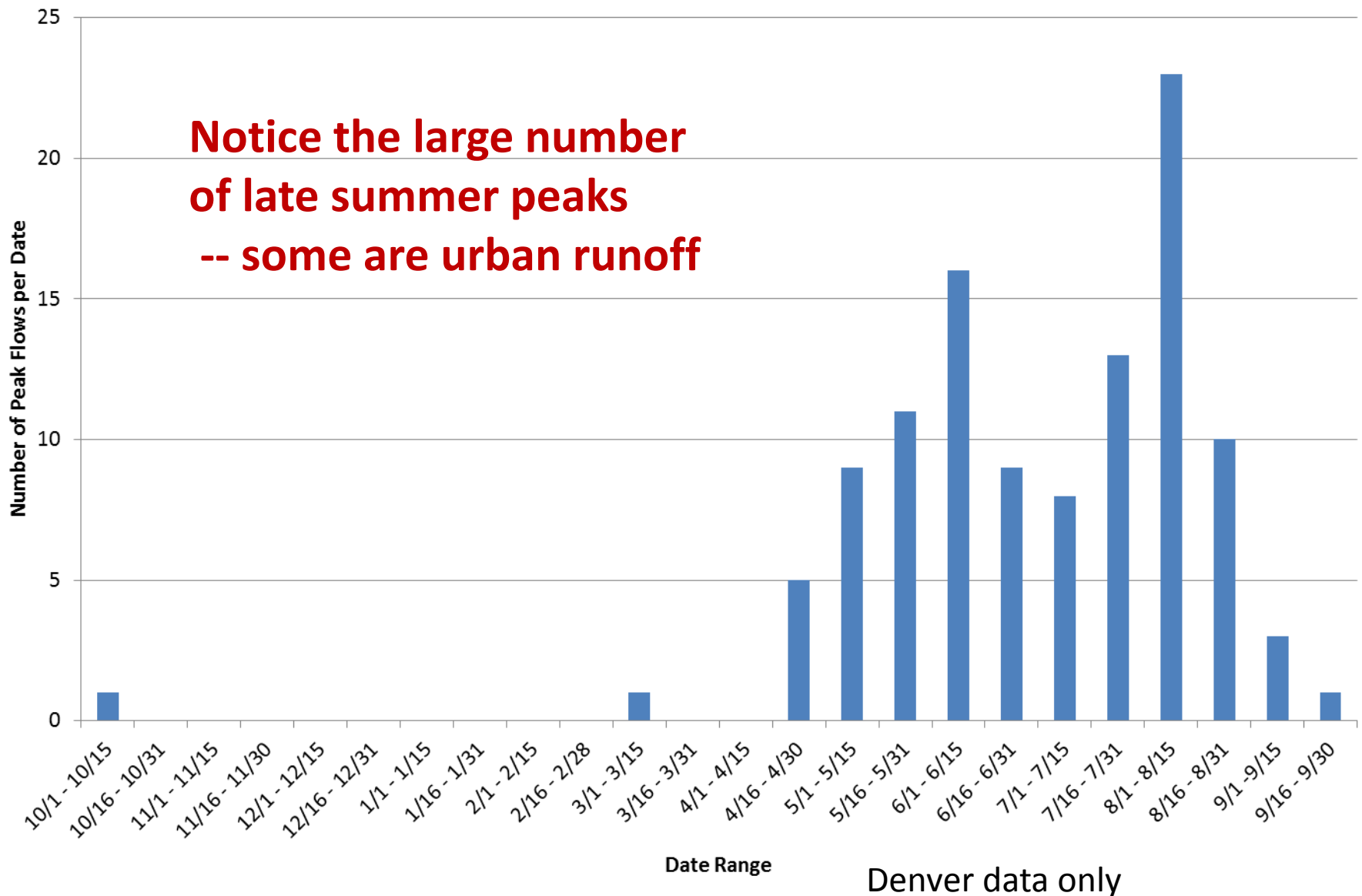
Annual Peak Streamflow on South Platte River at Kersey



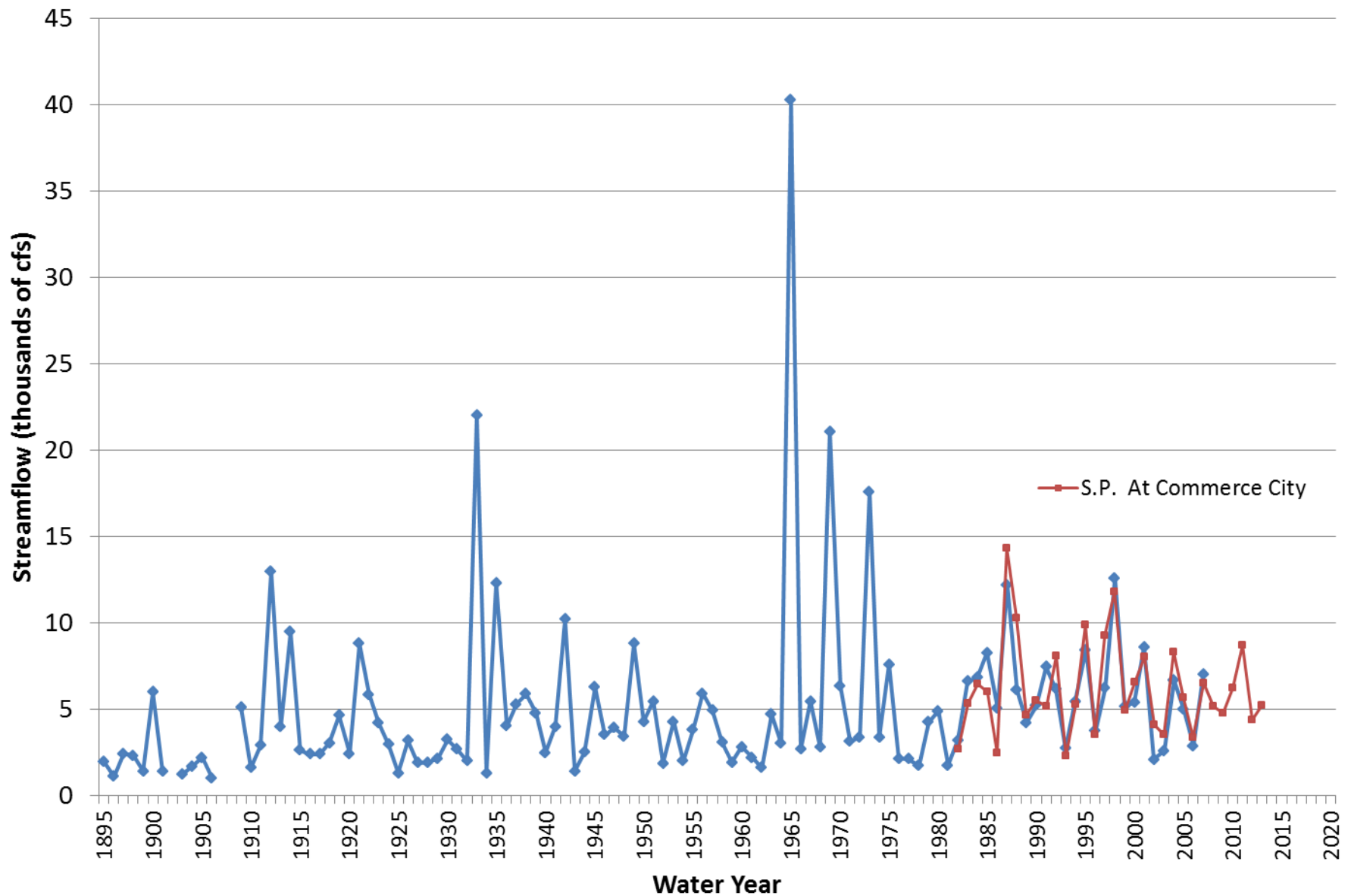
And farther upstream - Denver



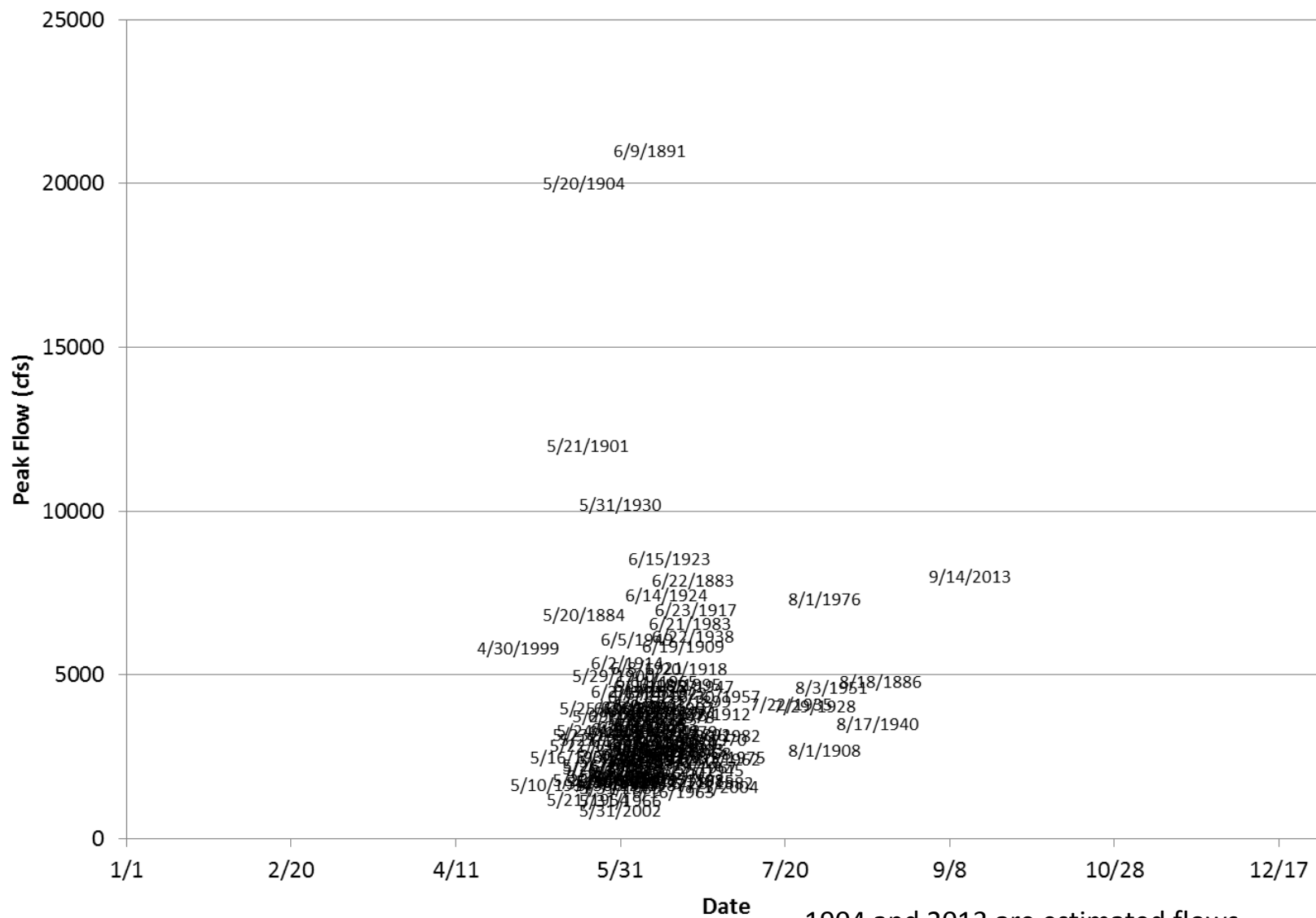
Frequency of Date of Peak Flow on South Platte River at Denver 1895-2007



Annual Peak Streamflow of South Platte River at Denver

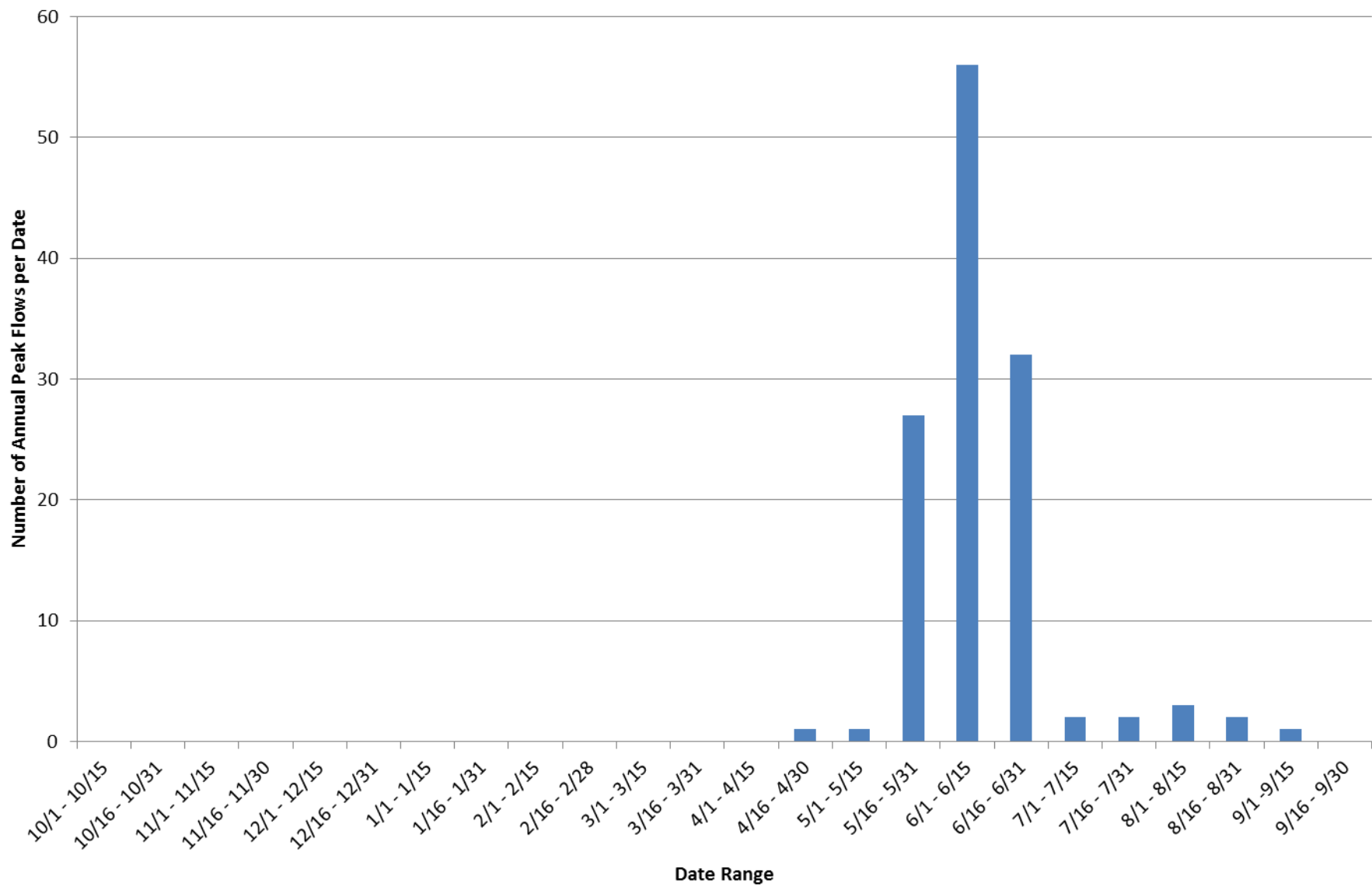


Cache la Poudre at Canyon Mouth Peak Flow Date and Discharge

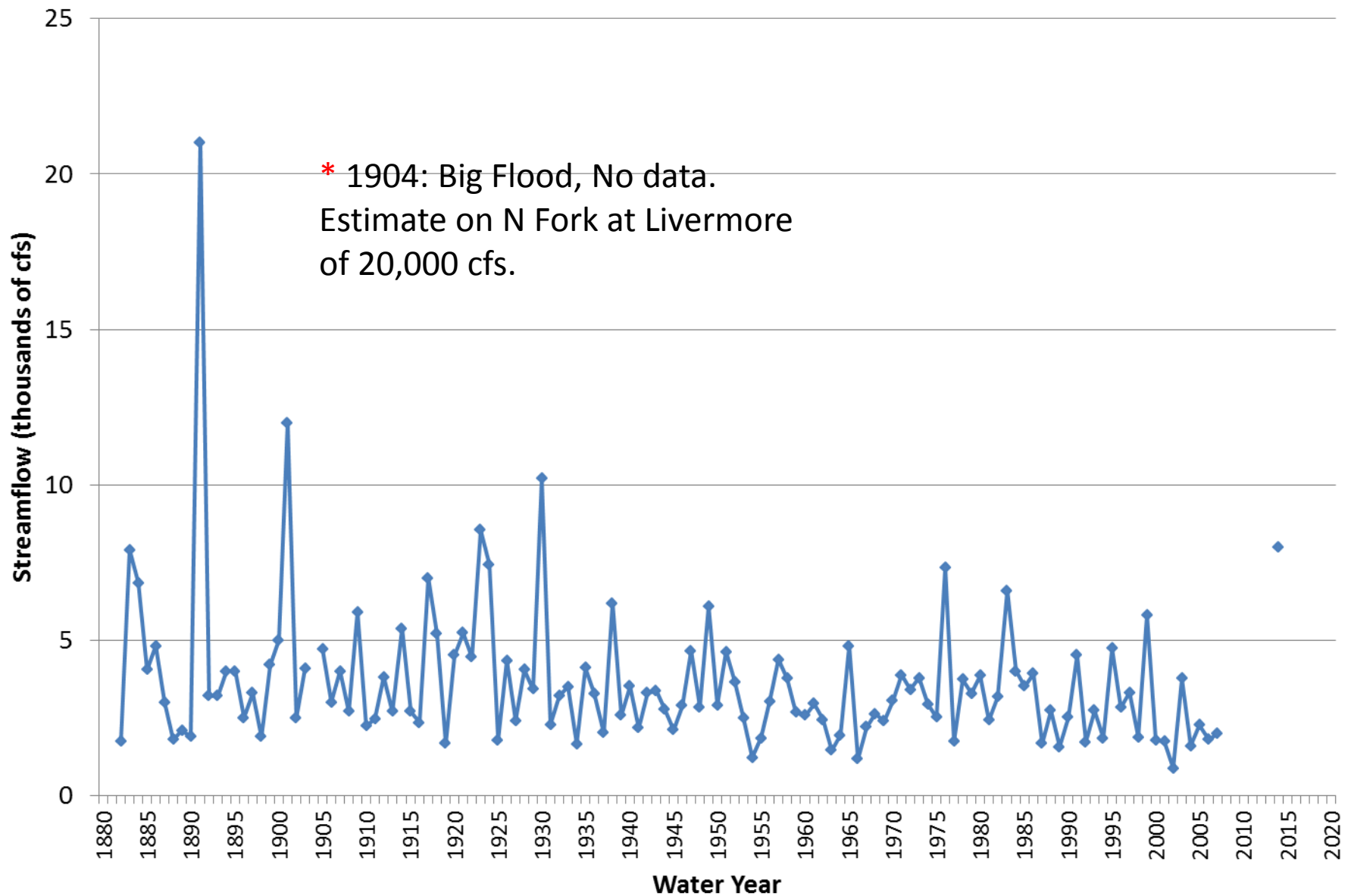


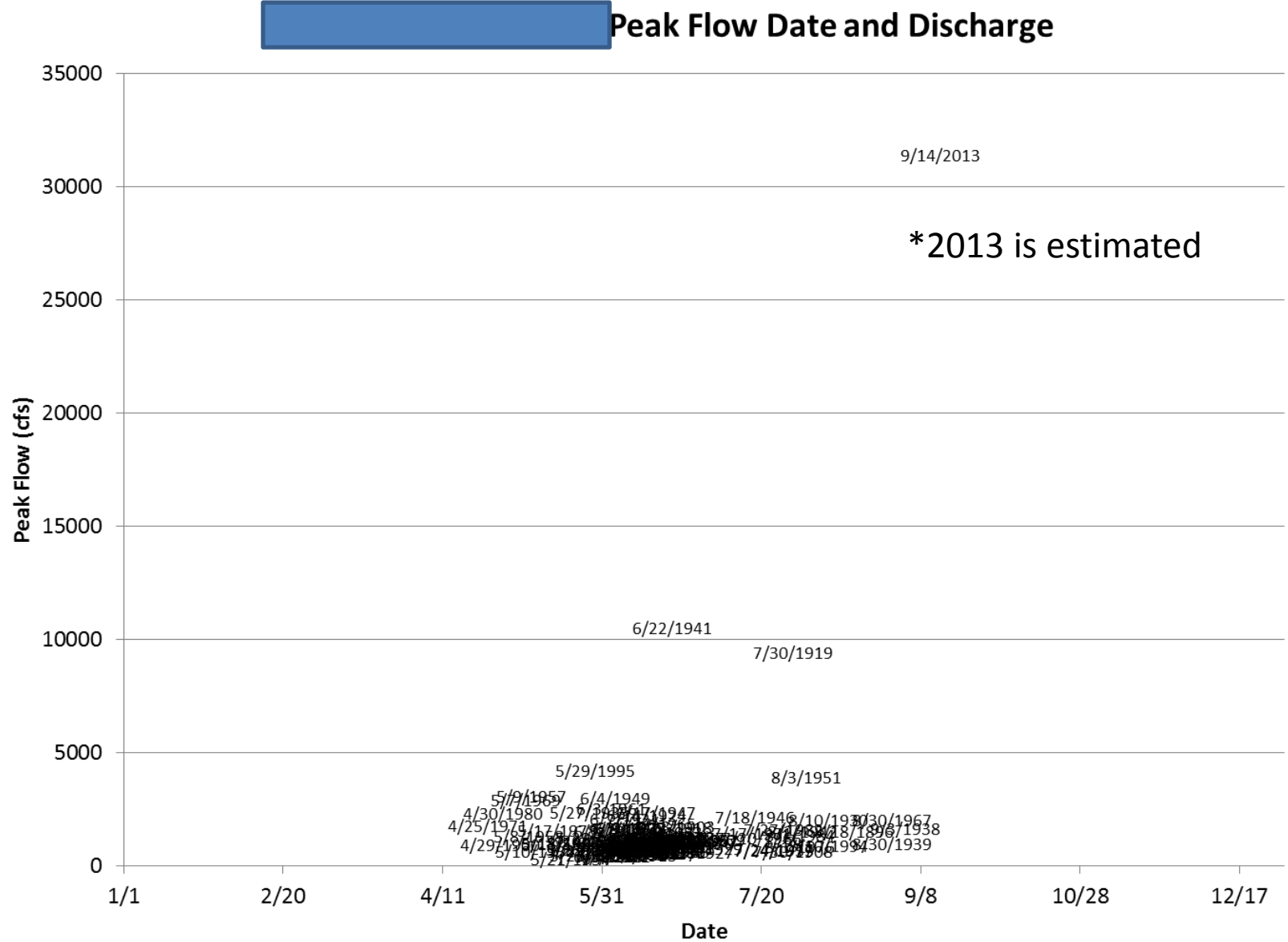
1904 and 2013 are estimated flows

Frequency of Peak Flows per Date on Cache la Poudre at Canyon Mouth 1882-2013

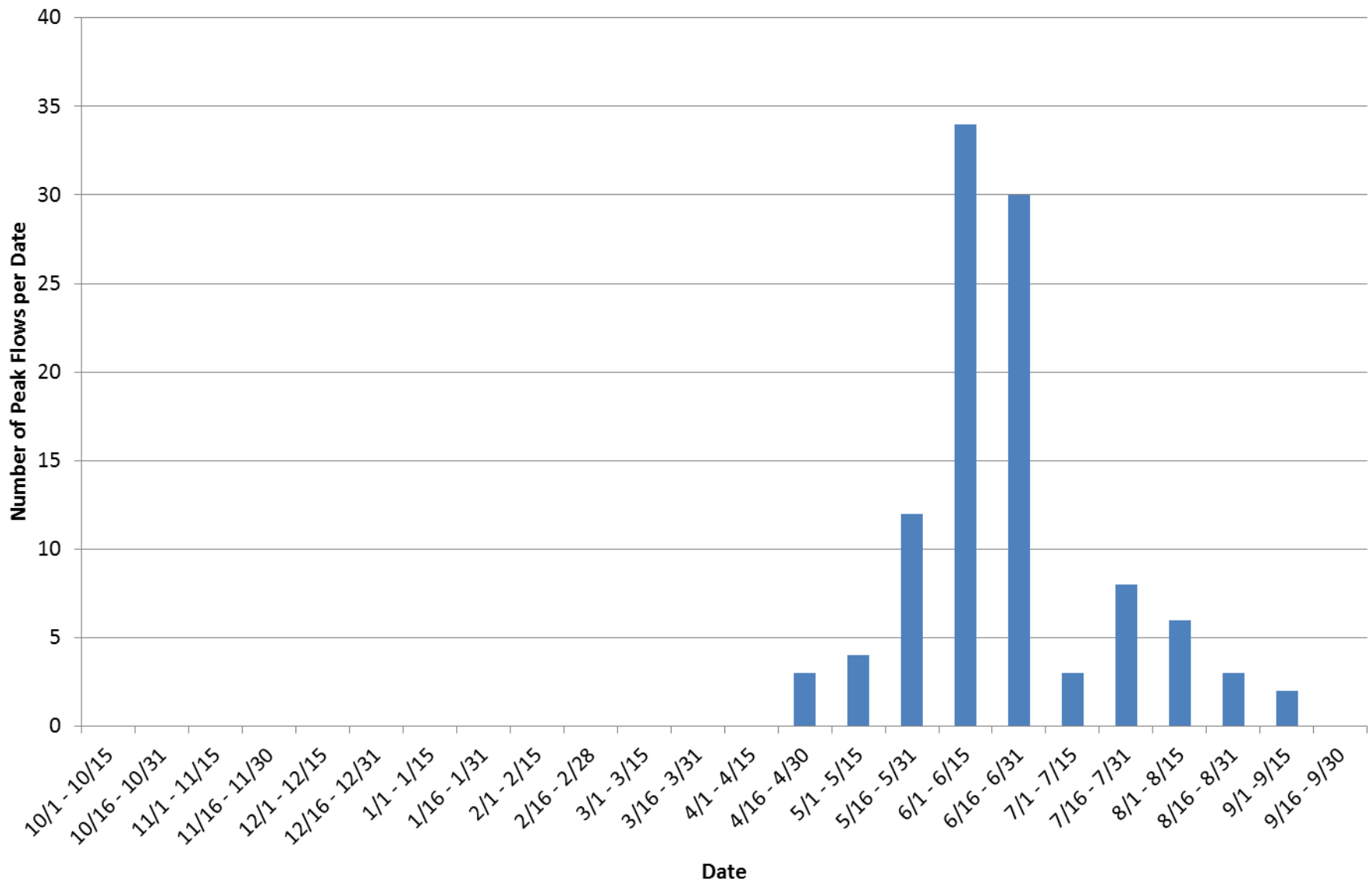


Cache La Poudre at Canyon Mouth Annual Peak Streamflow

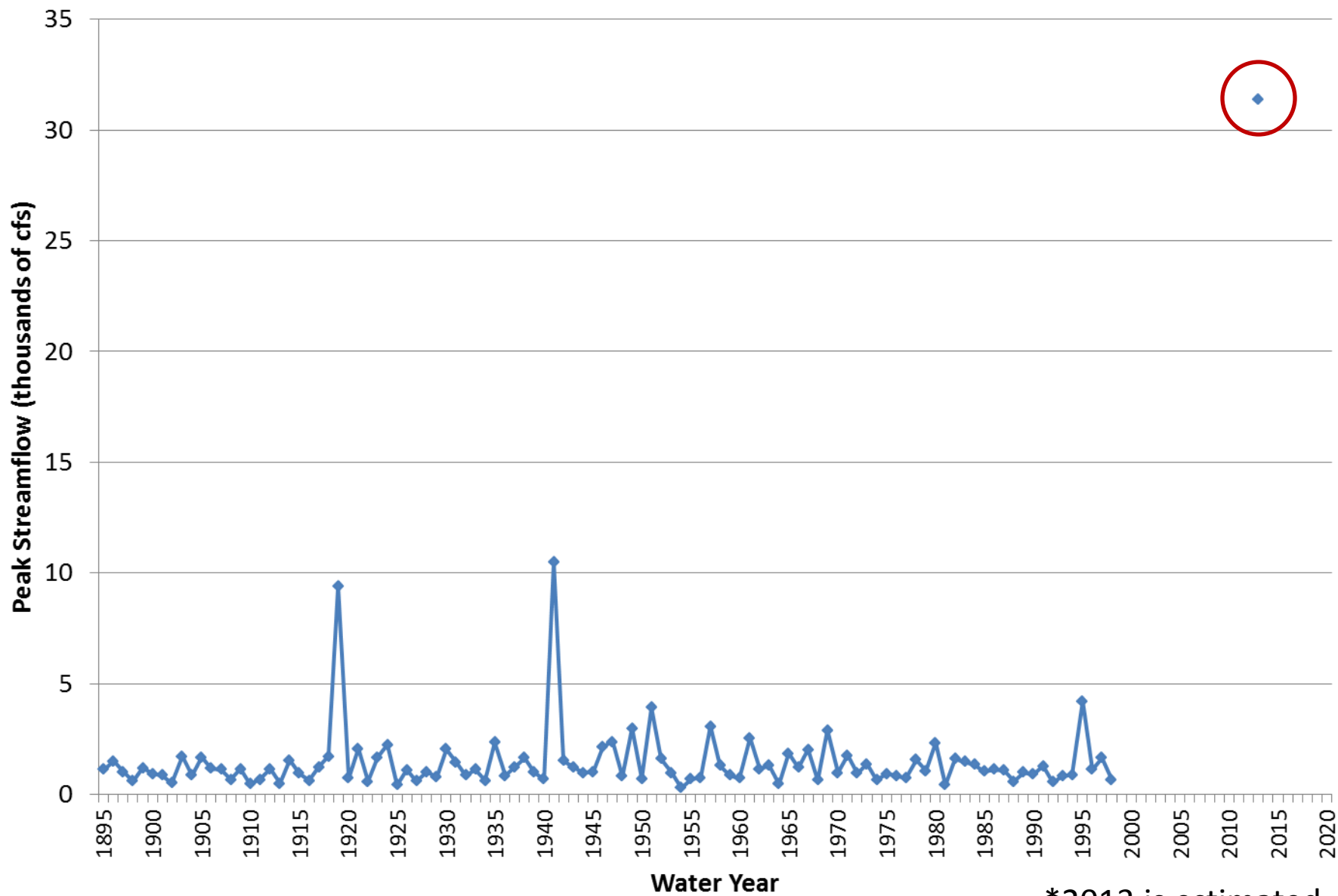




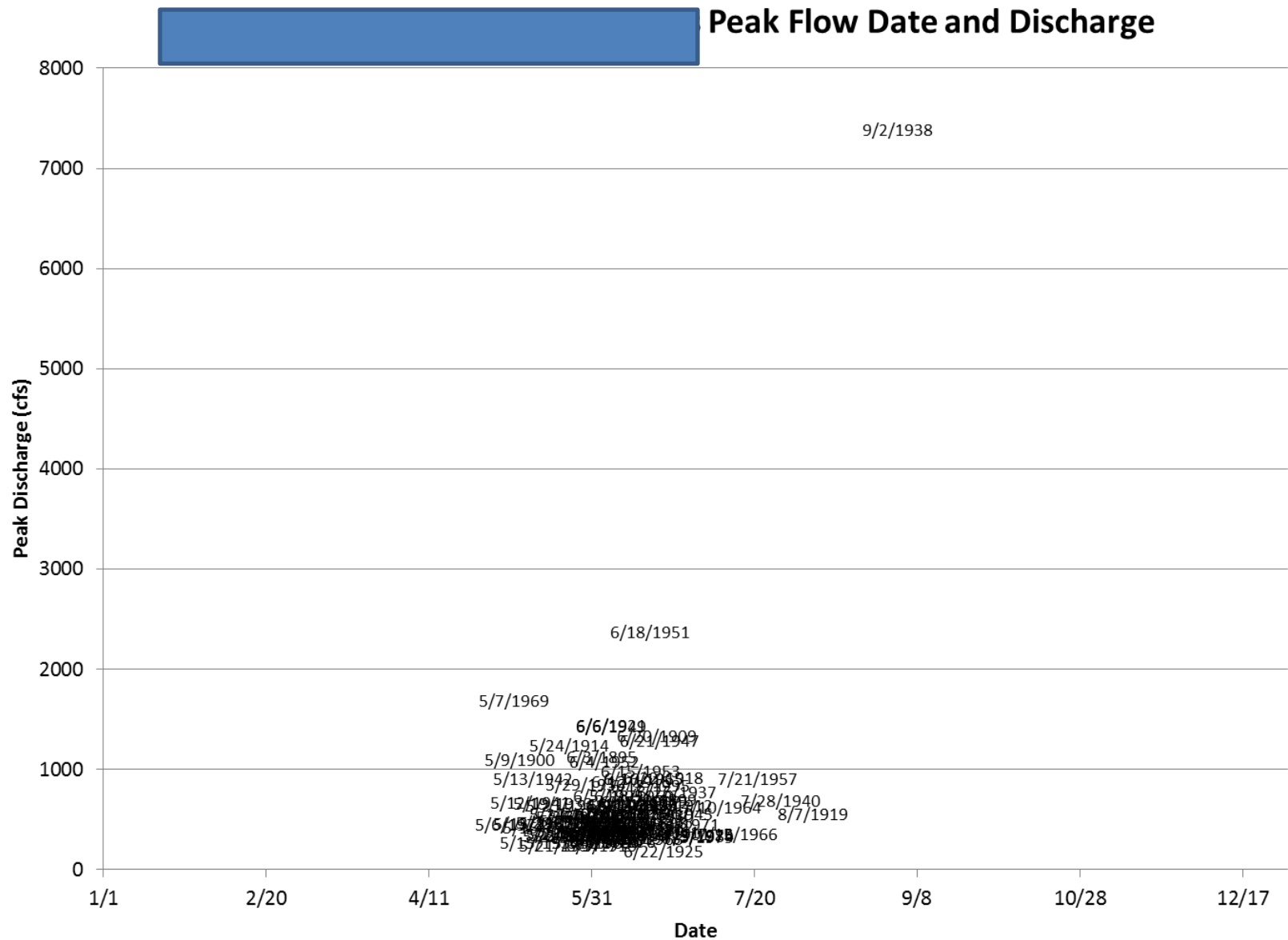
Frequency of Dates of Peak Flow for St. Vrain River at Lyons 1895-1998



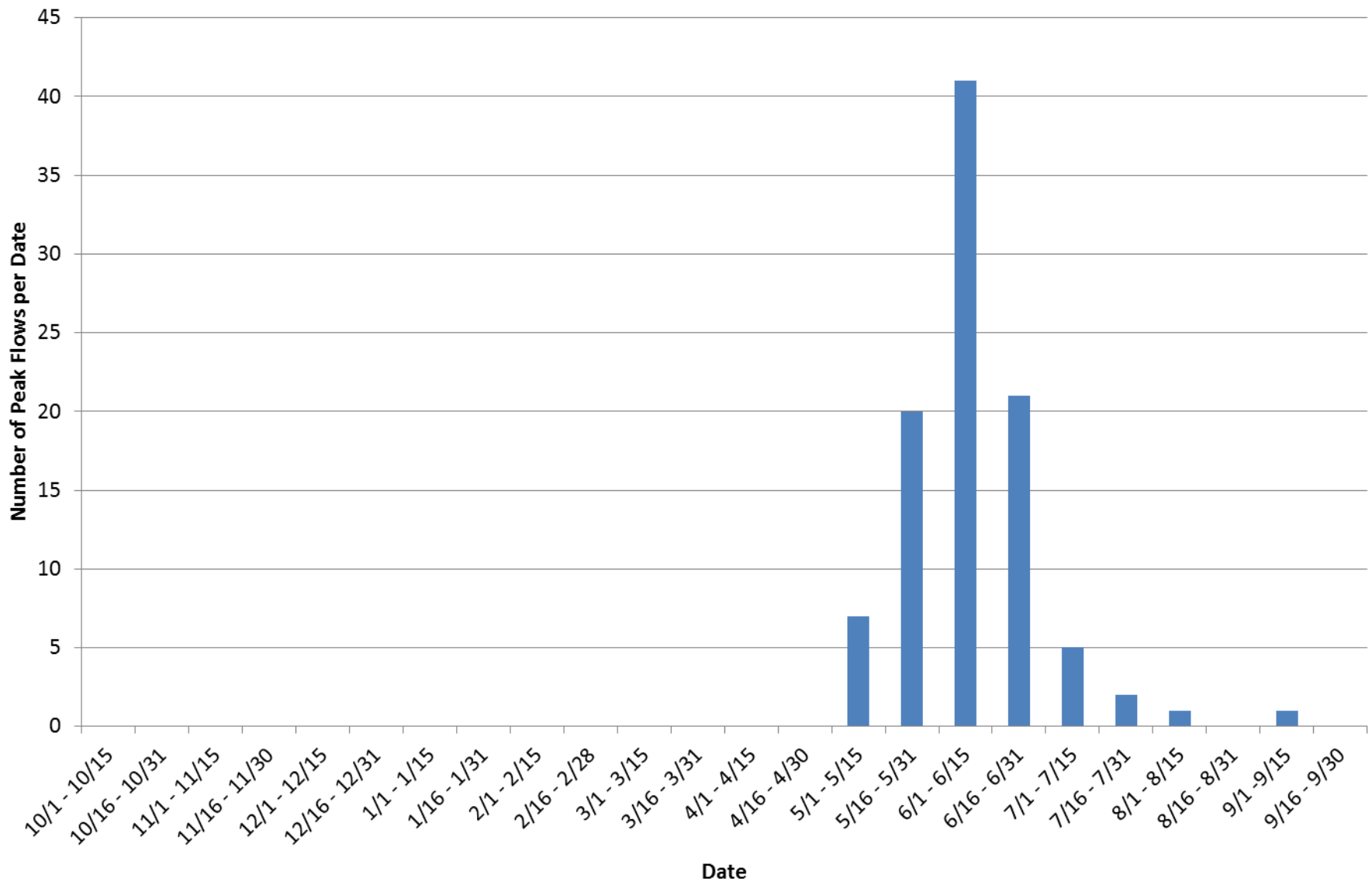
St. Vrain River at Lyons, CO Annual Peak Streamflow



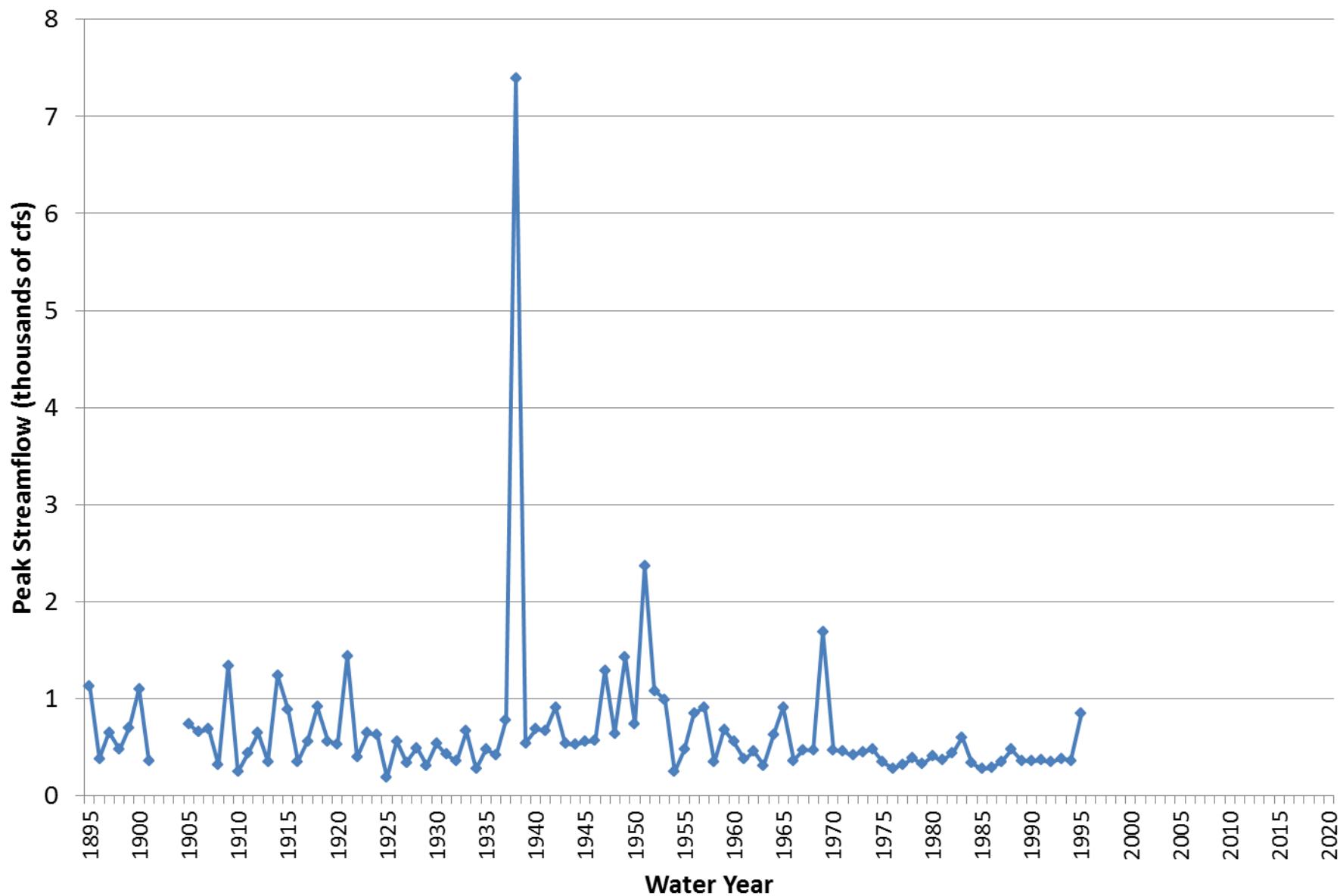
What about this one?



Frequency of Dates of Peak Flow on S. Boulder Creek at Eldorado Springs 1885-1995



South Boulder Creek at Eldorado Springs Annual Peak Flow

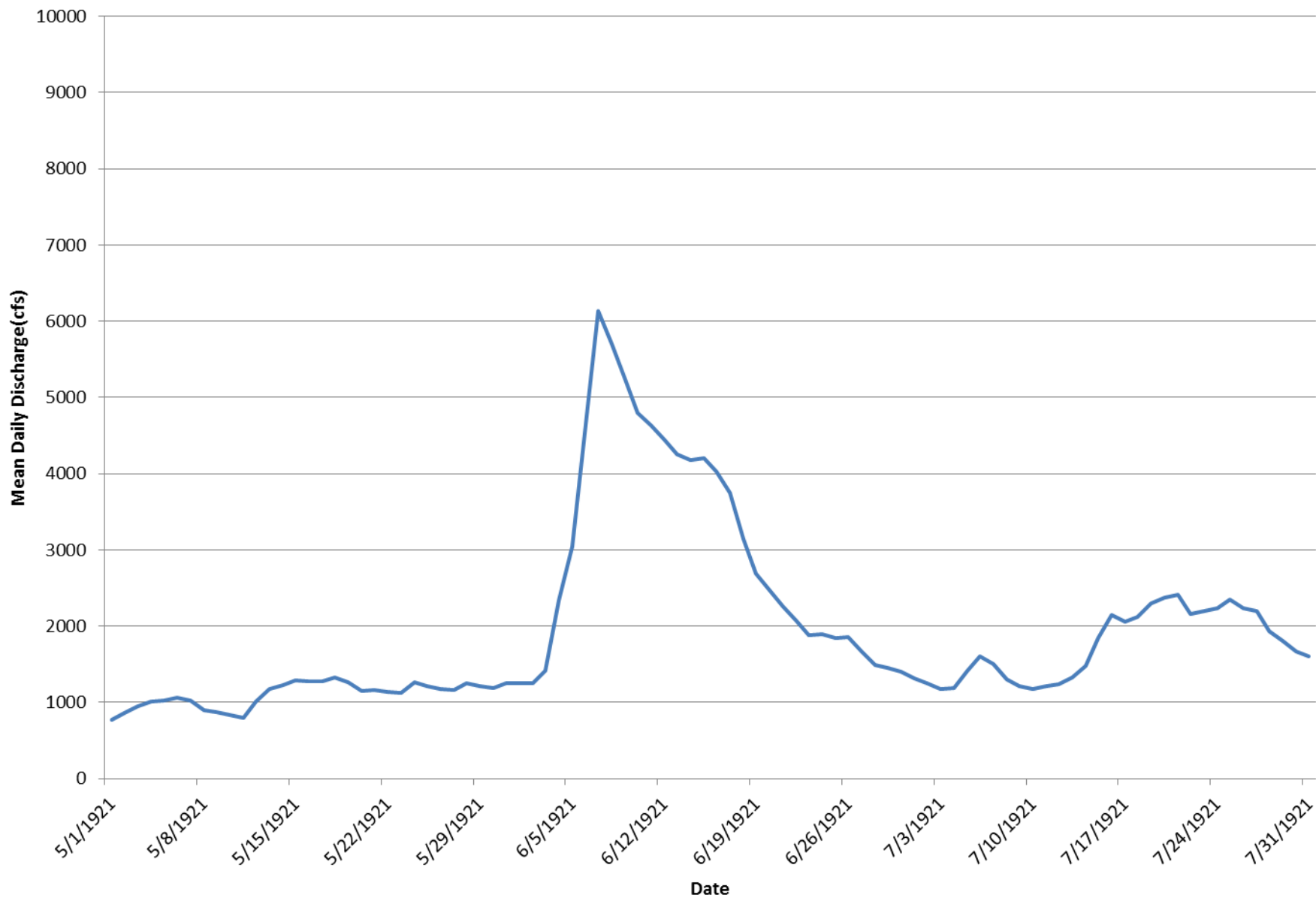


1921 Storm

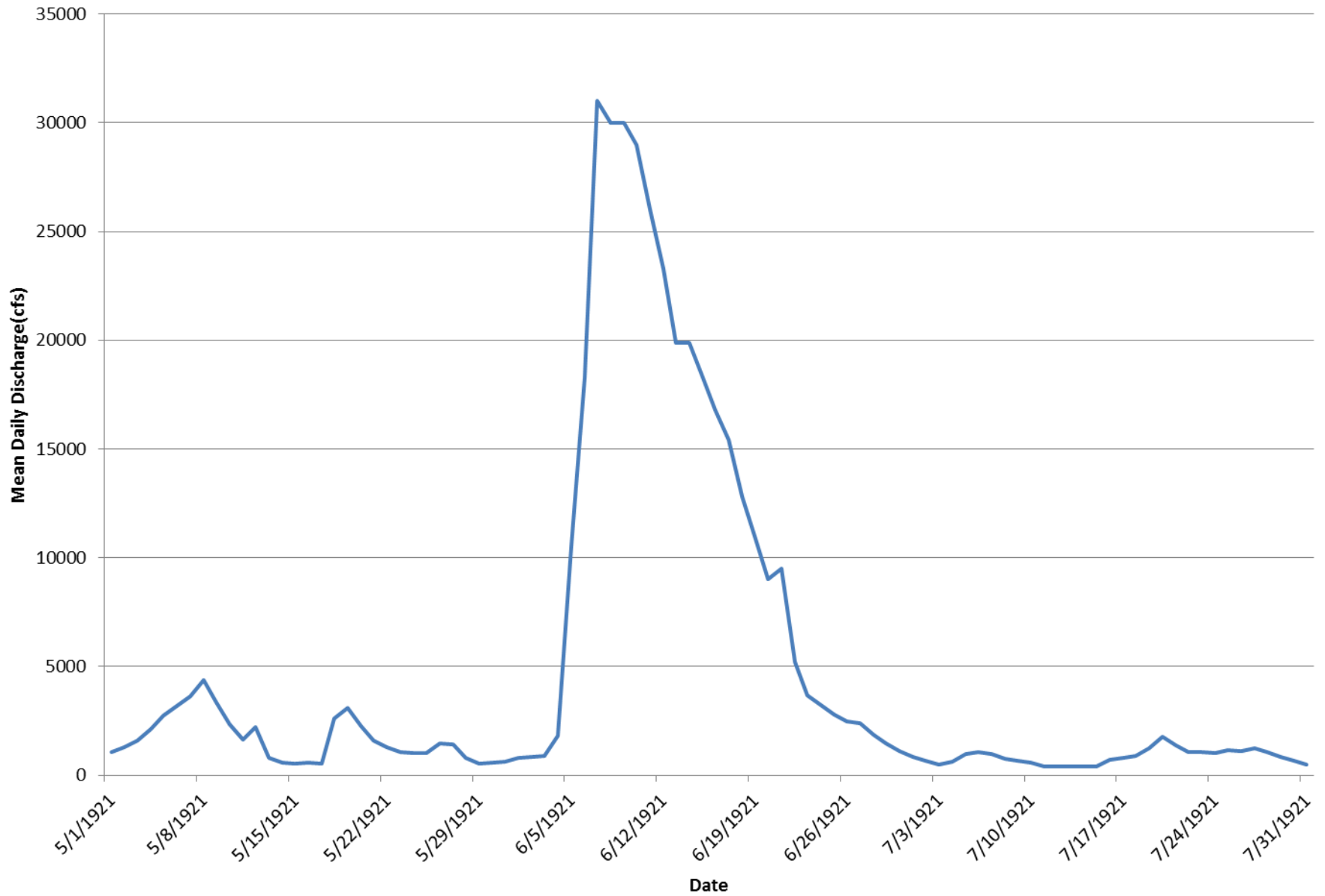
- Maybe best to skip these hydrographs



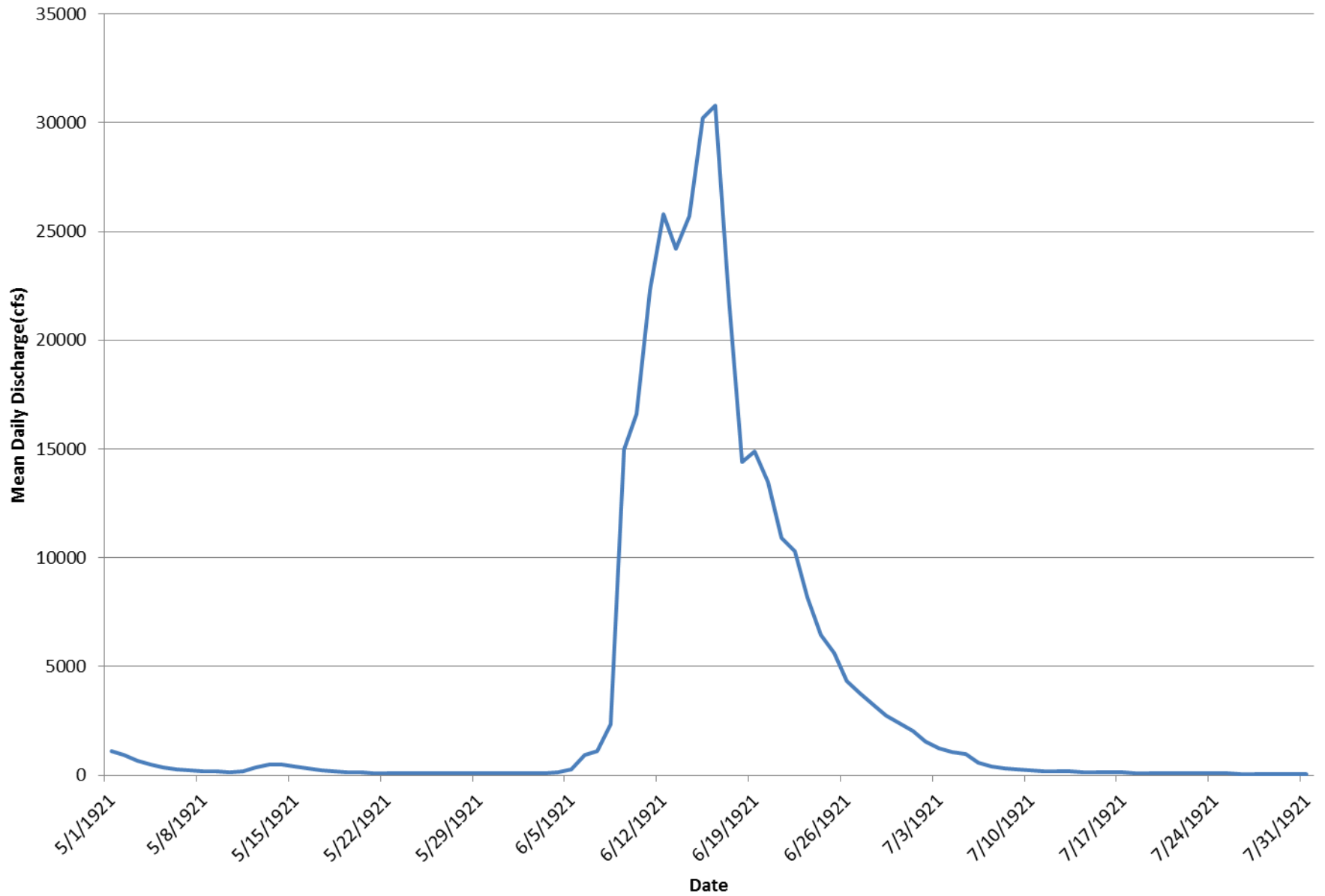
South Platte at South Platte, CO Daily Discharge



South Platte River at Kersey Daily Discharge

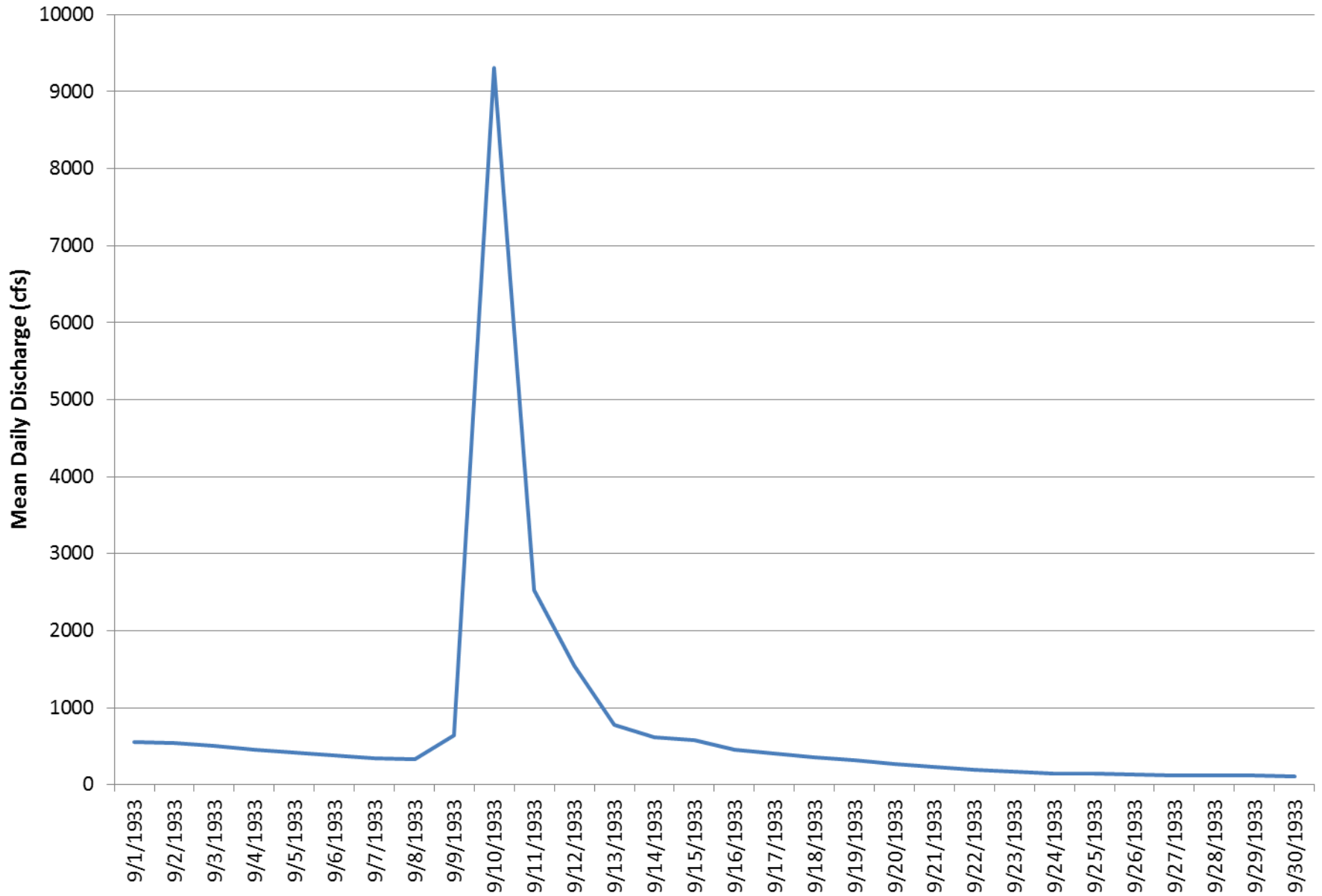


South Platte River at Julesburg Daily Discharge



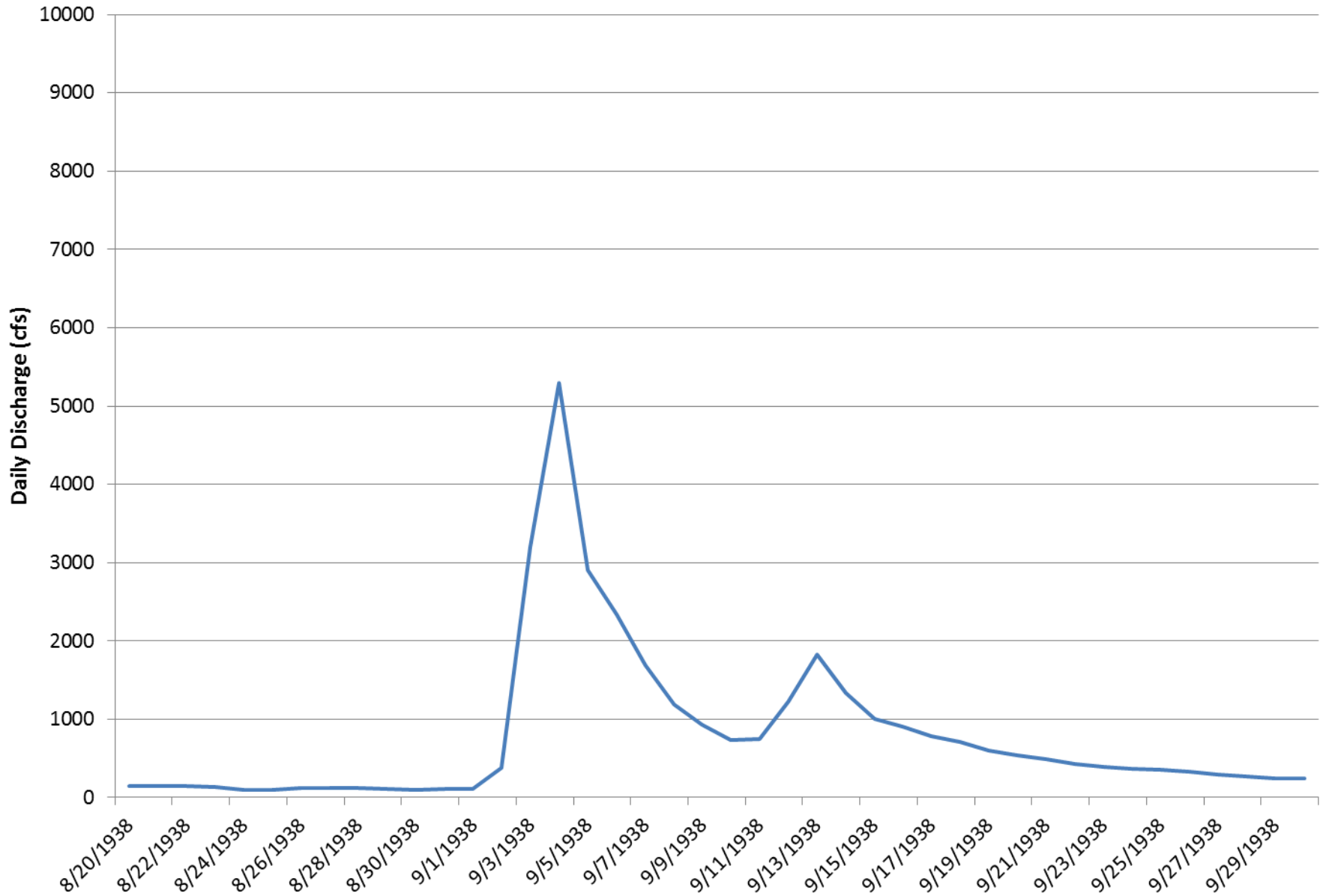
1933

South Platte River at Denver Daily Discharge

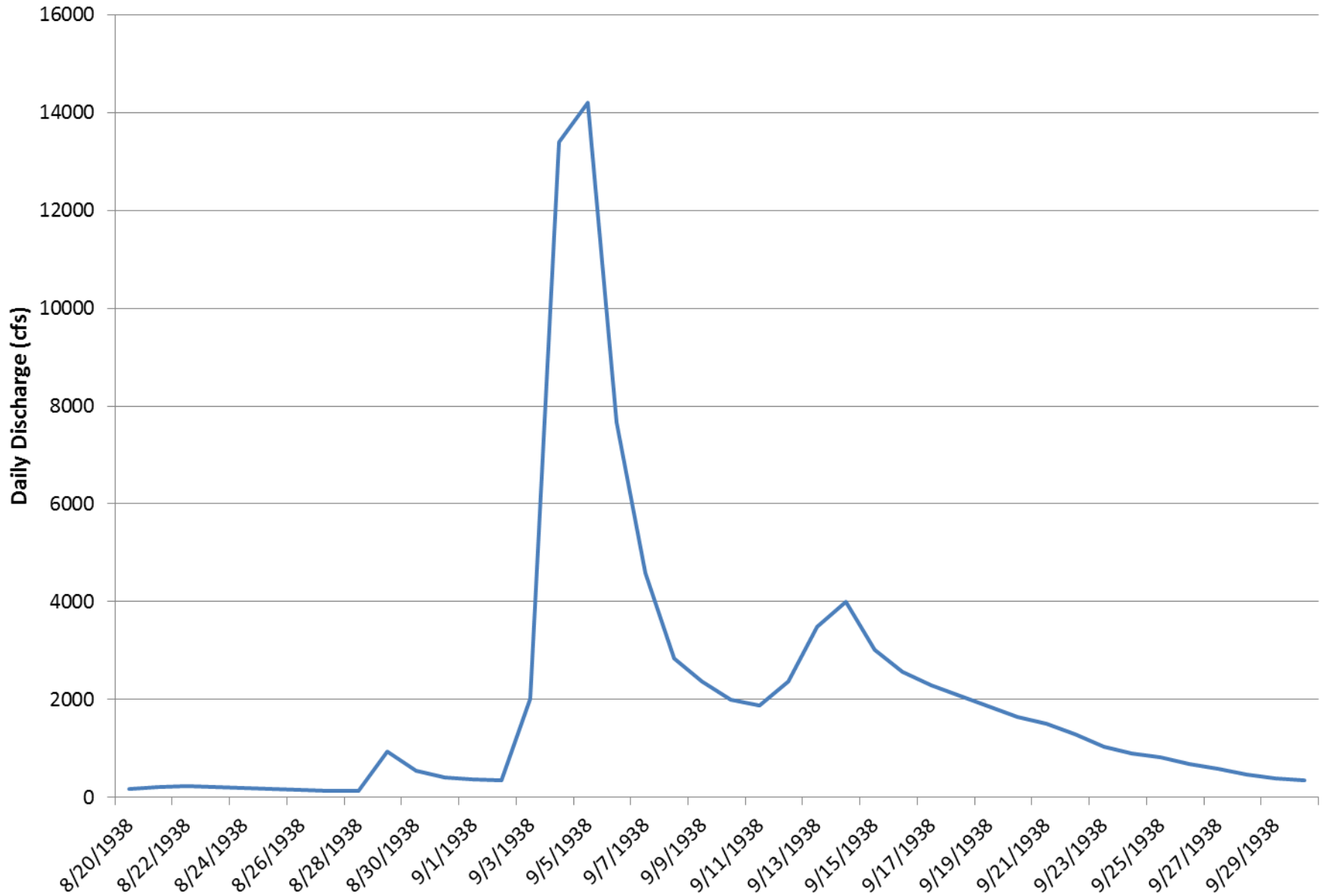


September 1938

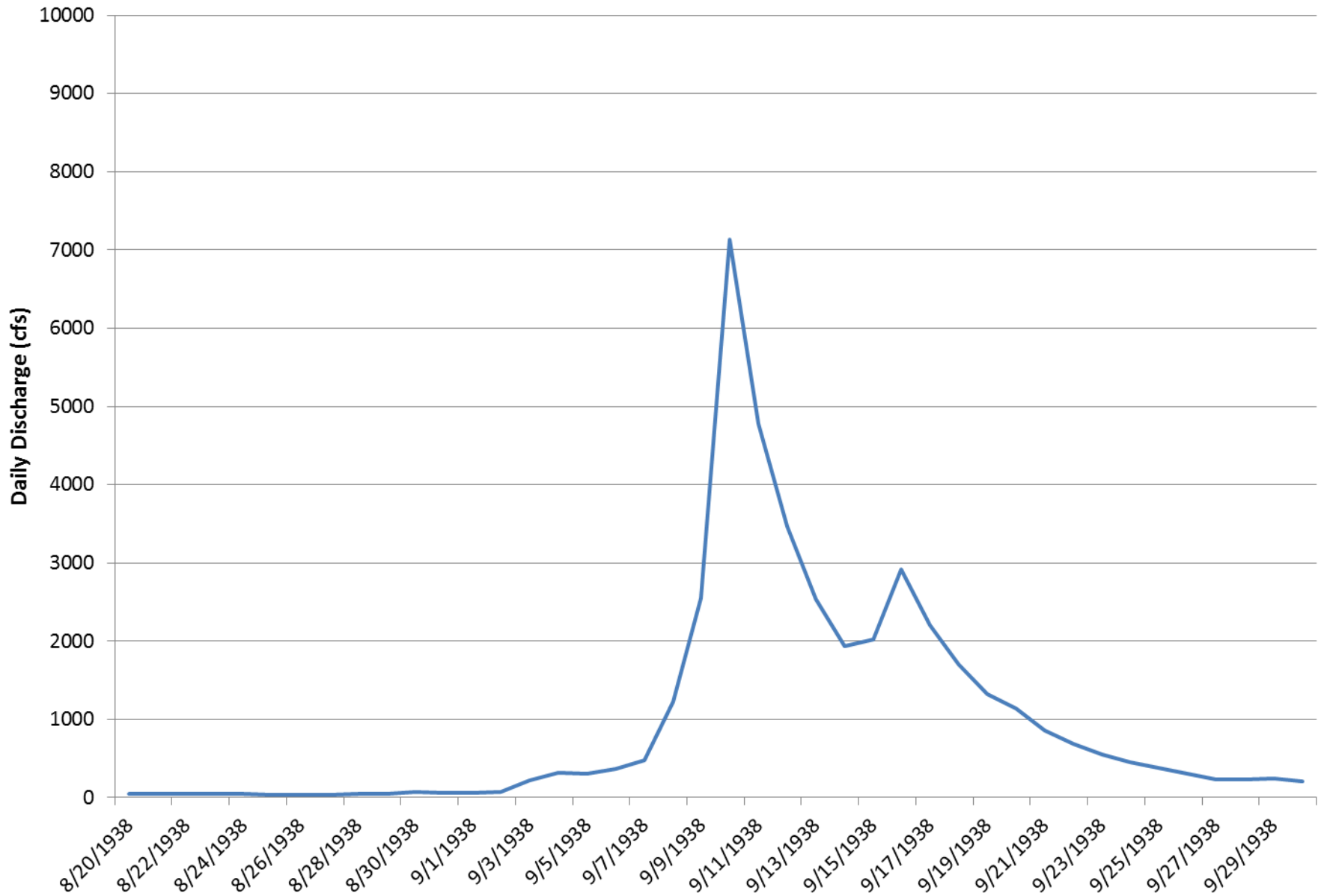
St. Vrain at Platteville Mean Daily Discharge



South Platte at Kersey Mean Daily Discharge

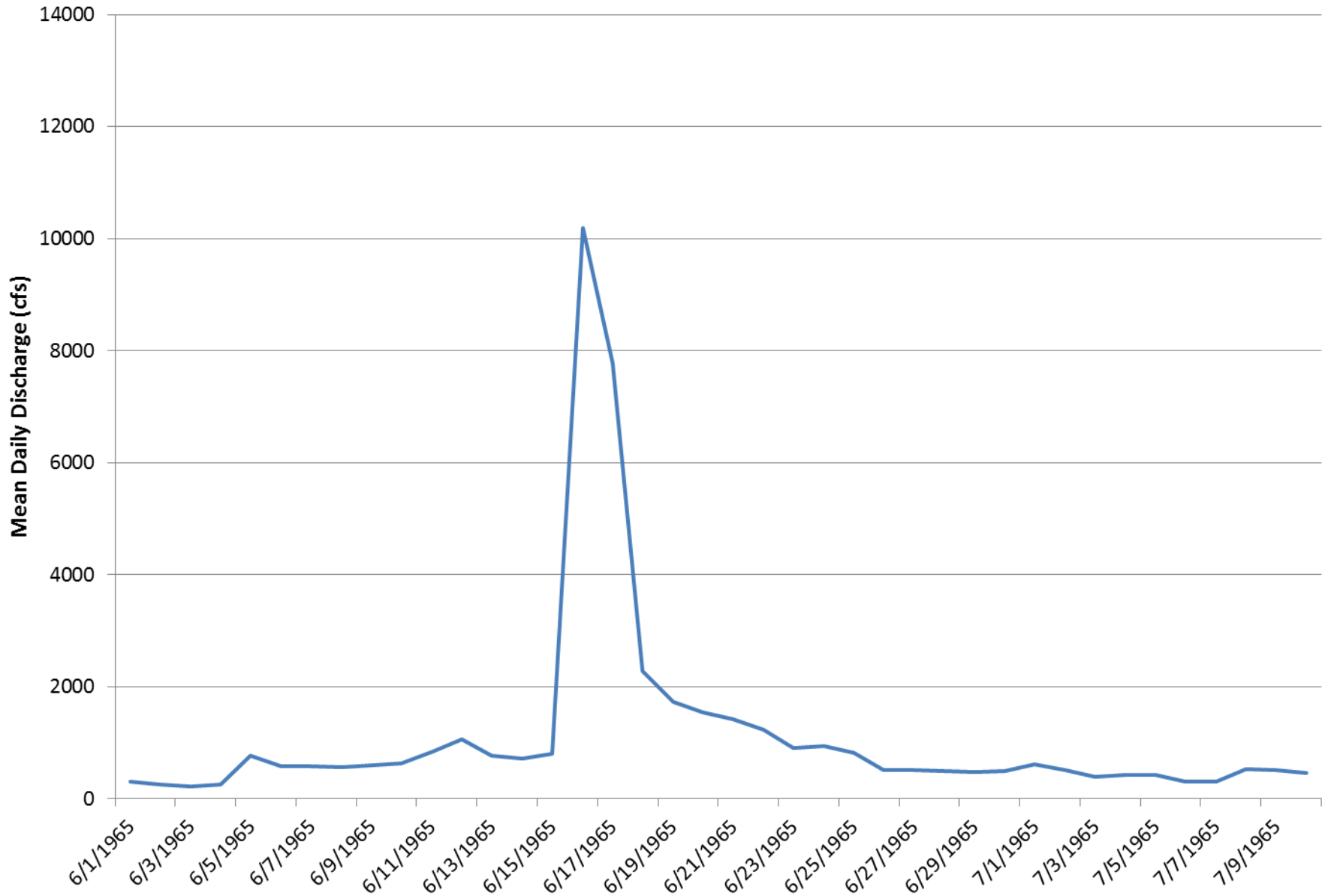


South Platte at Julesburg, CO Mean Daily Discharge

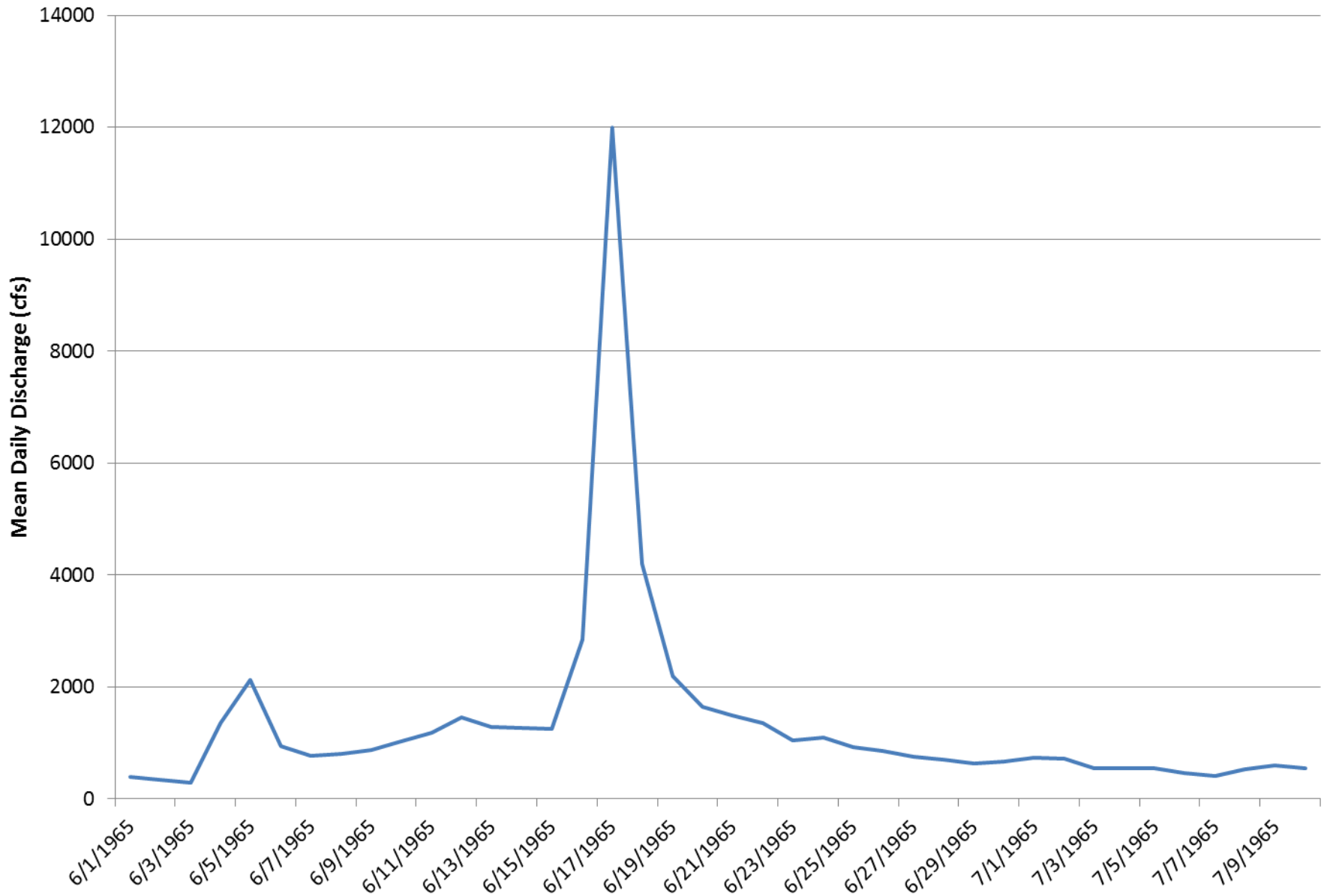


1965

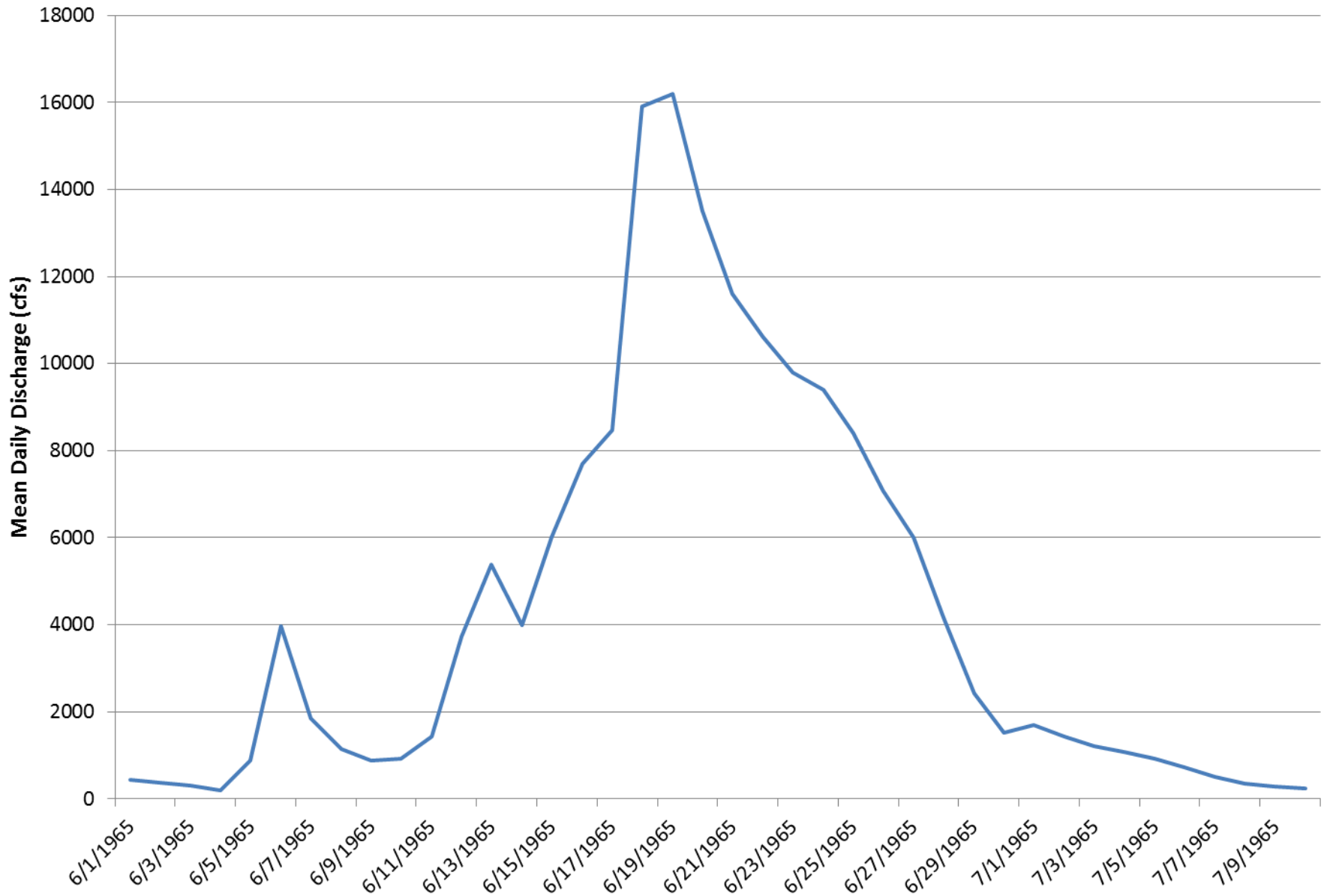
South Platte River at South Platte Mean Daily Discharge



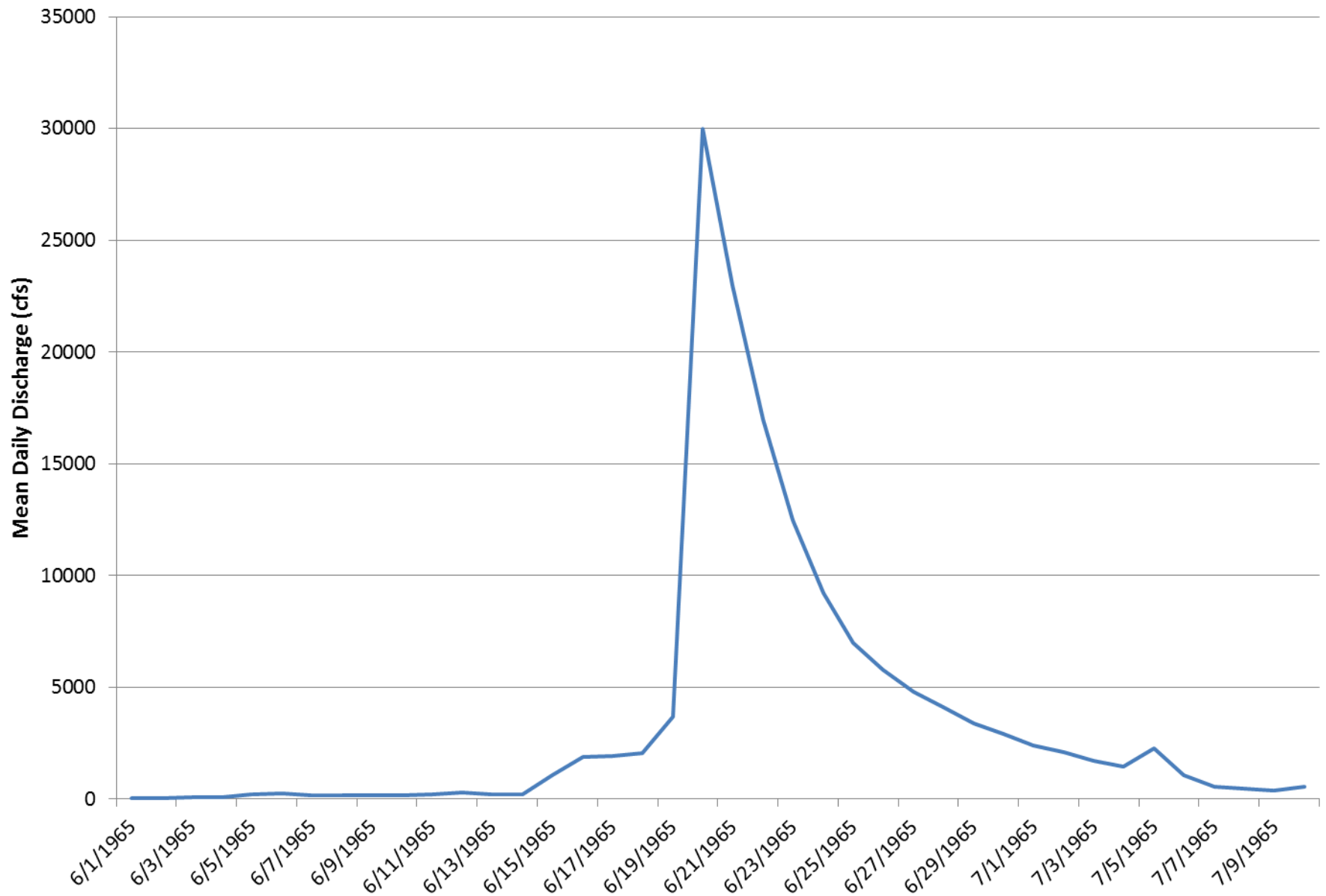
South Platte River at Denver Mean Daily Discharge



South Platte River at Kersey Mean Daily Discharge

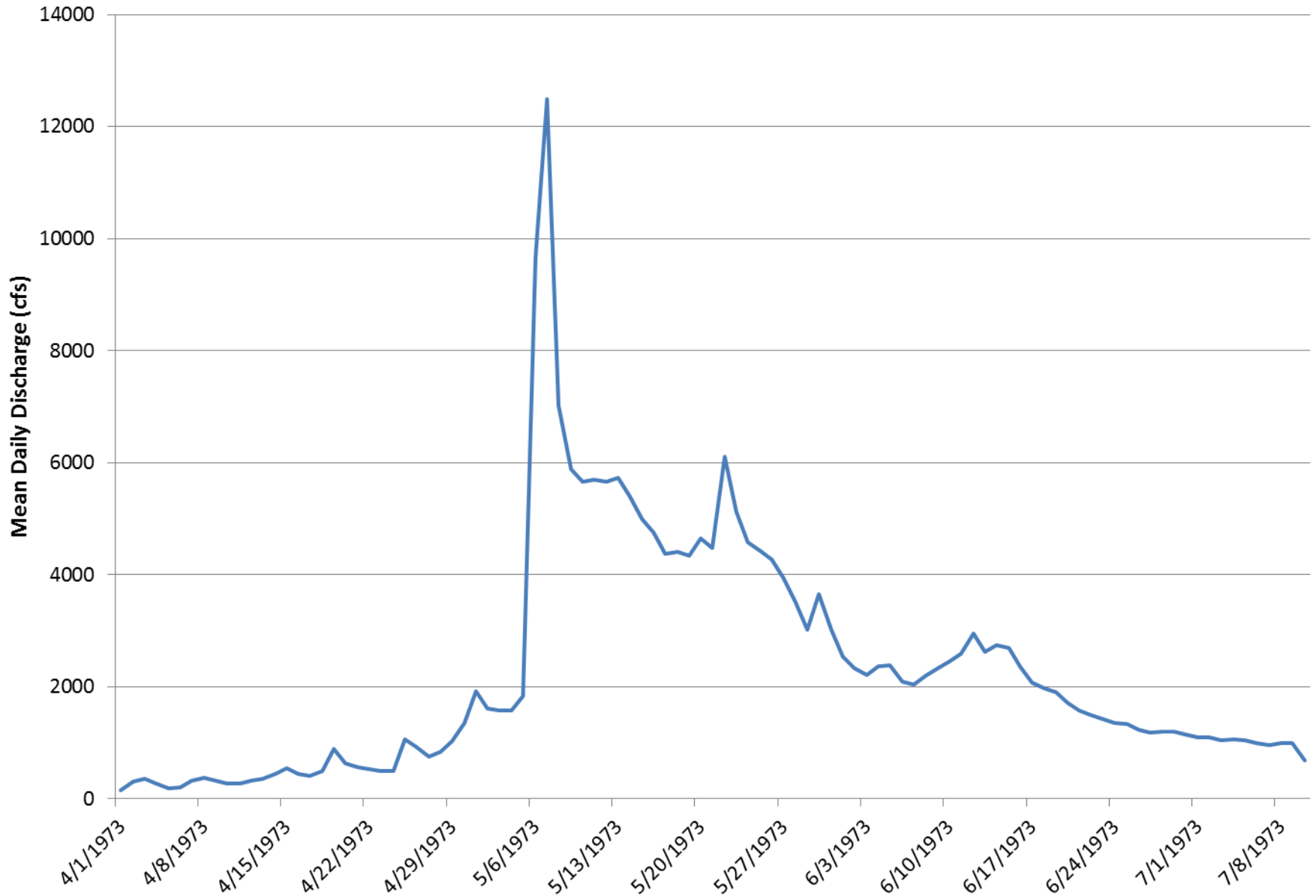


South Platte River at Julesburg Mean Daily Discharge

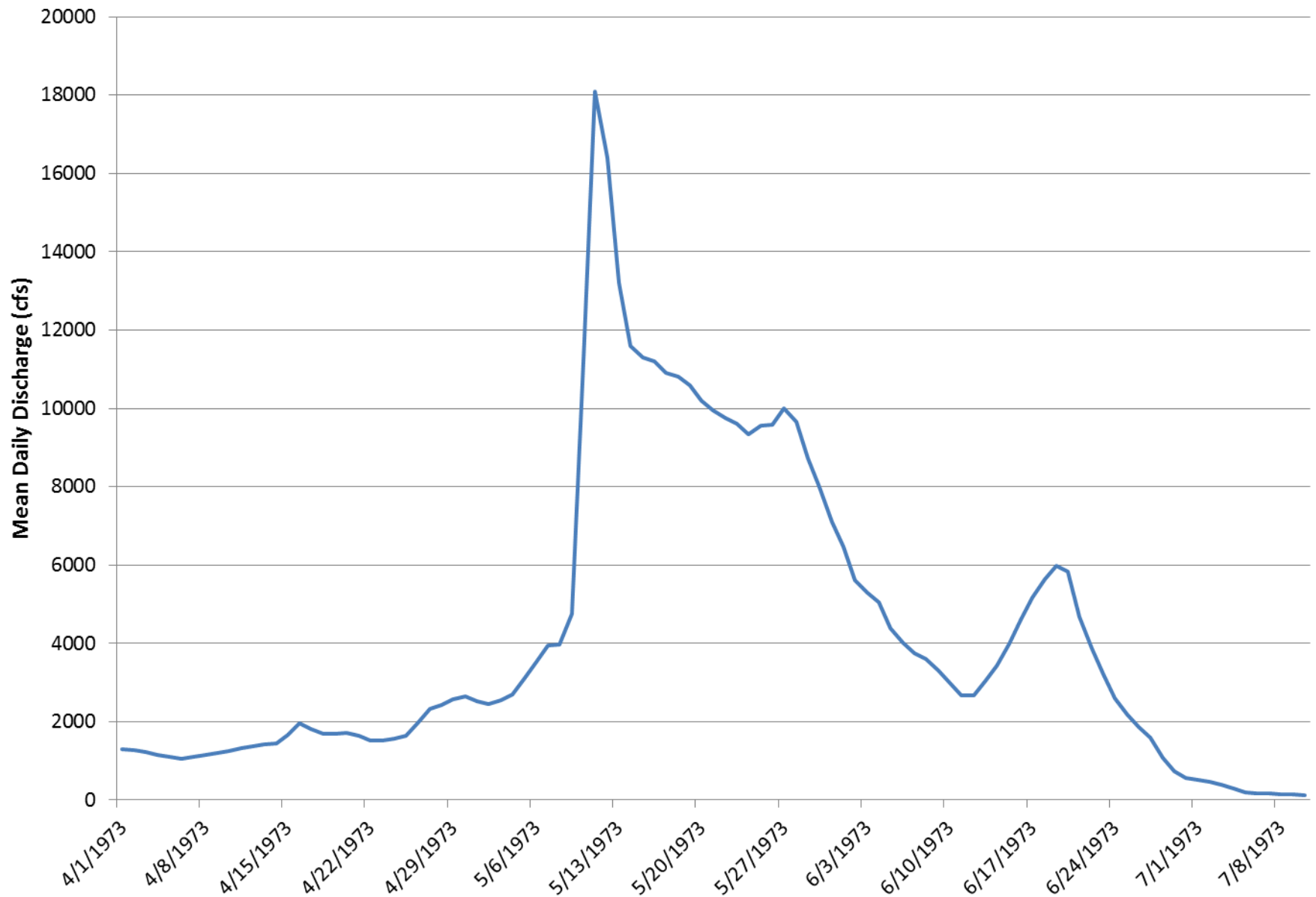


1973

South Platte River at Denver Mean Daily Discharge

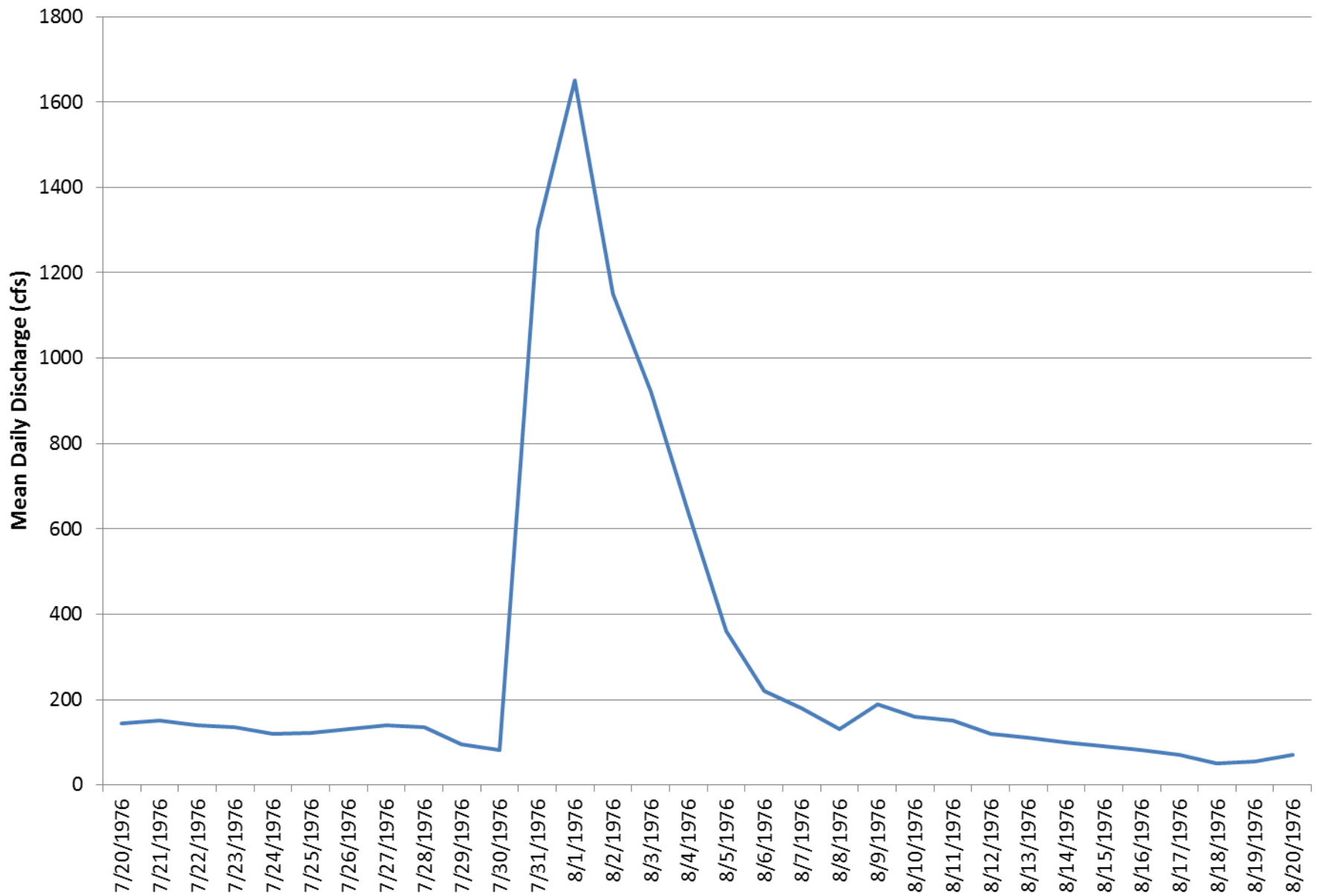


South Platte River at Julesburg Mean Daily Discharge

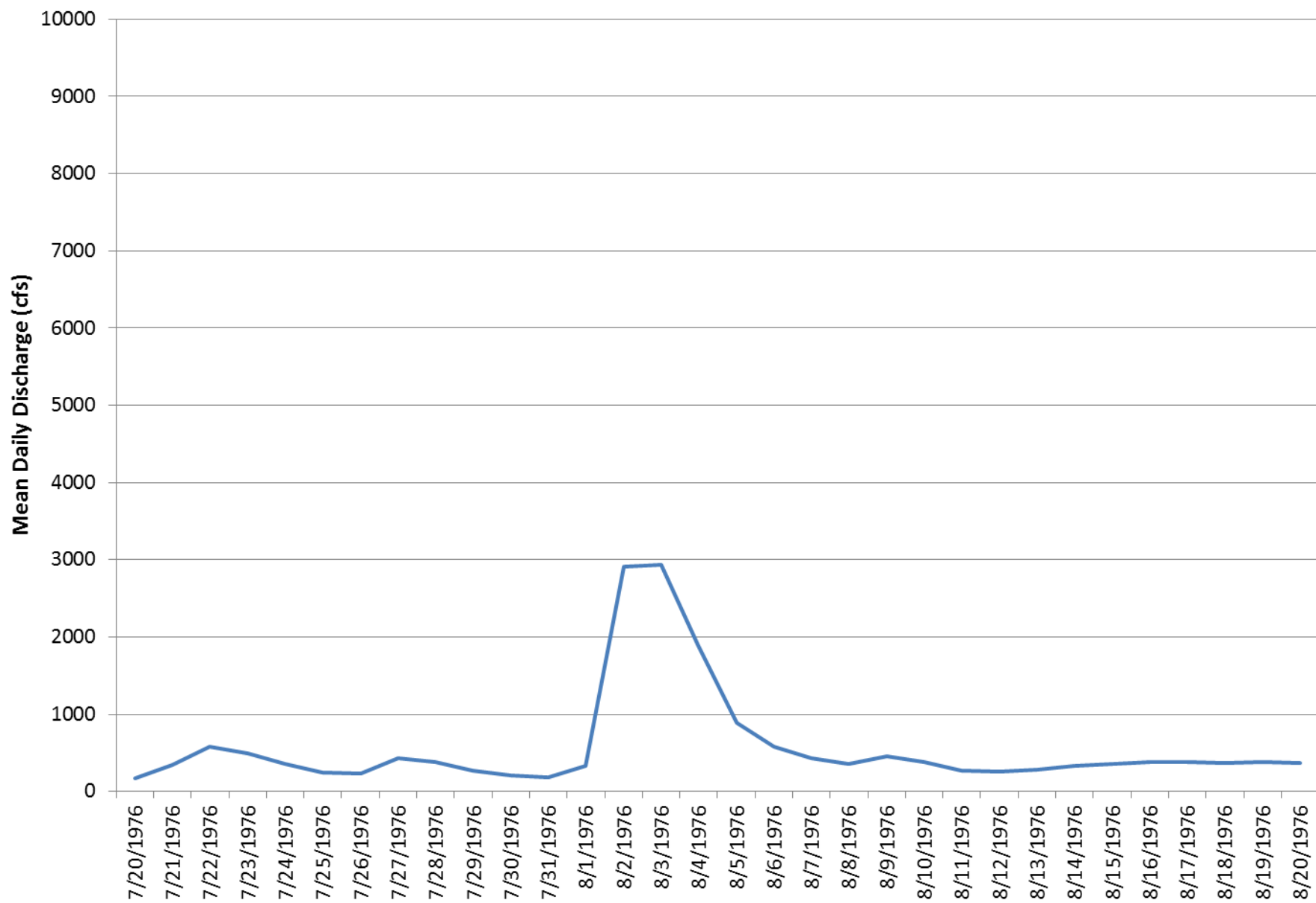


1976 Big Thompson

Big Thompson River at Canyon Mouth Daily Discharge

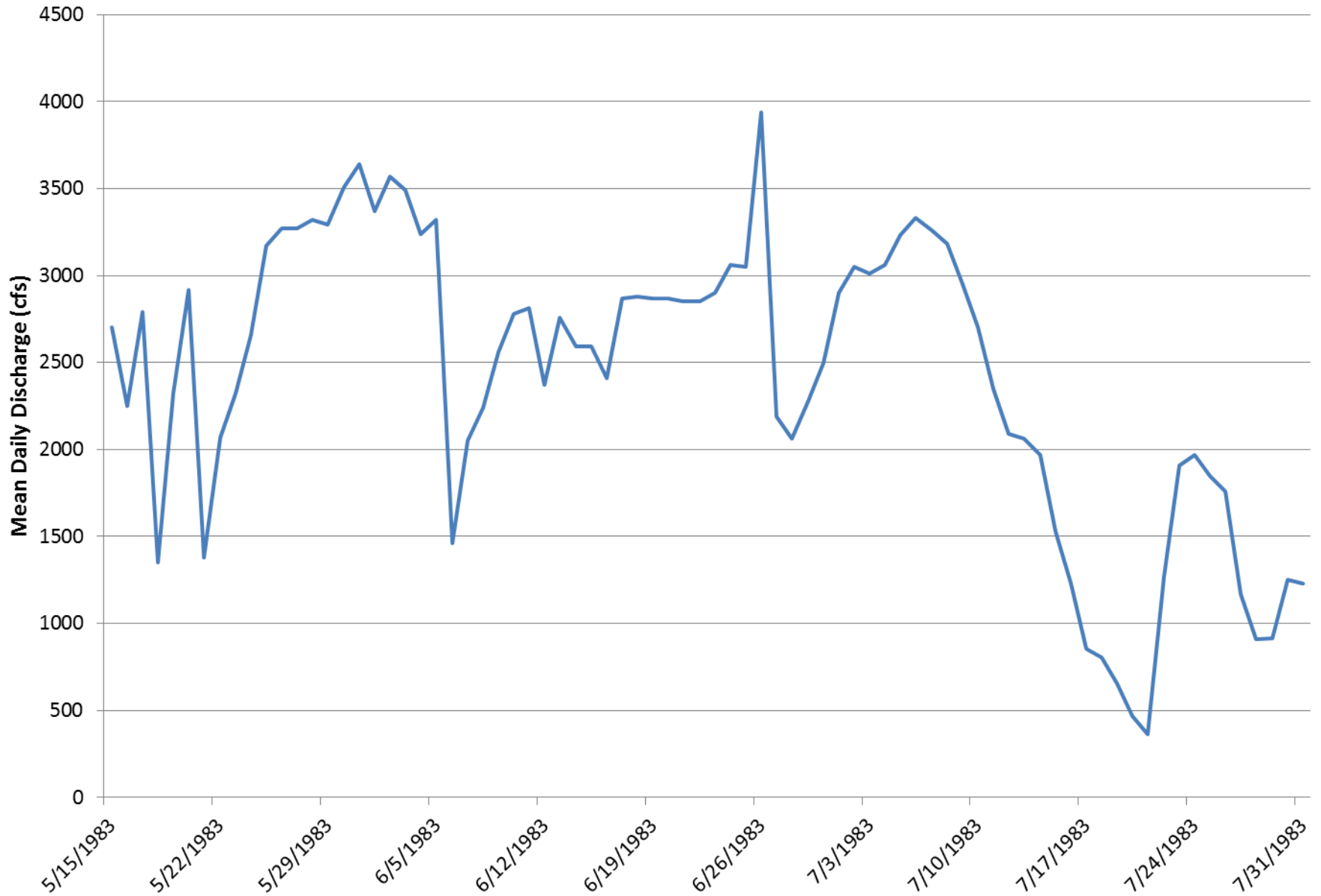


South Platte River at Kersey Mean Daily Discharge

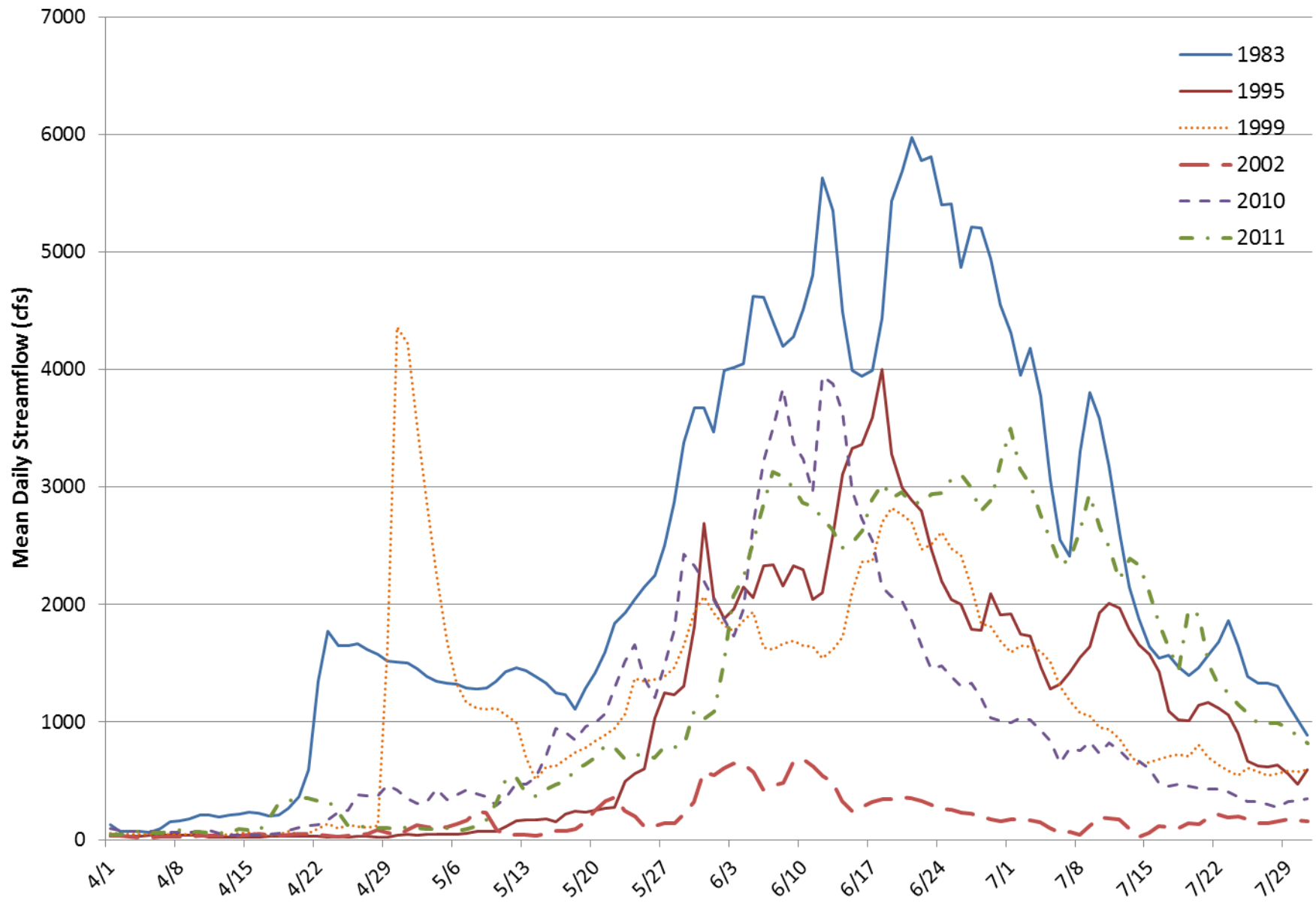


1983

South Platte River at Denver Mean Daily Discharge



Cache la Poudre at Canyon Mouth Mean Daily Discharge

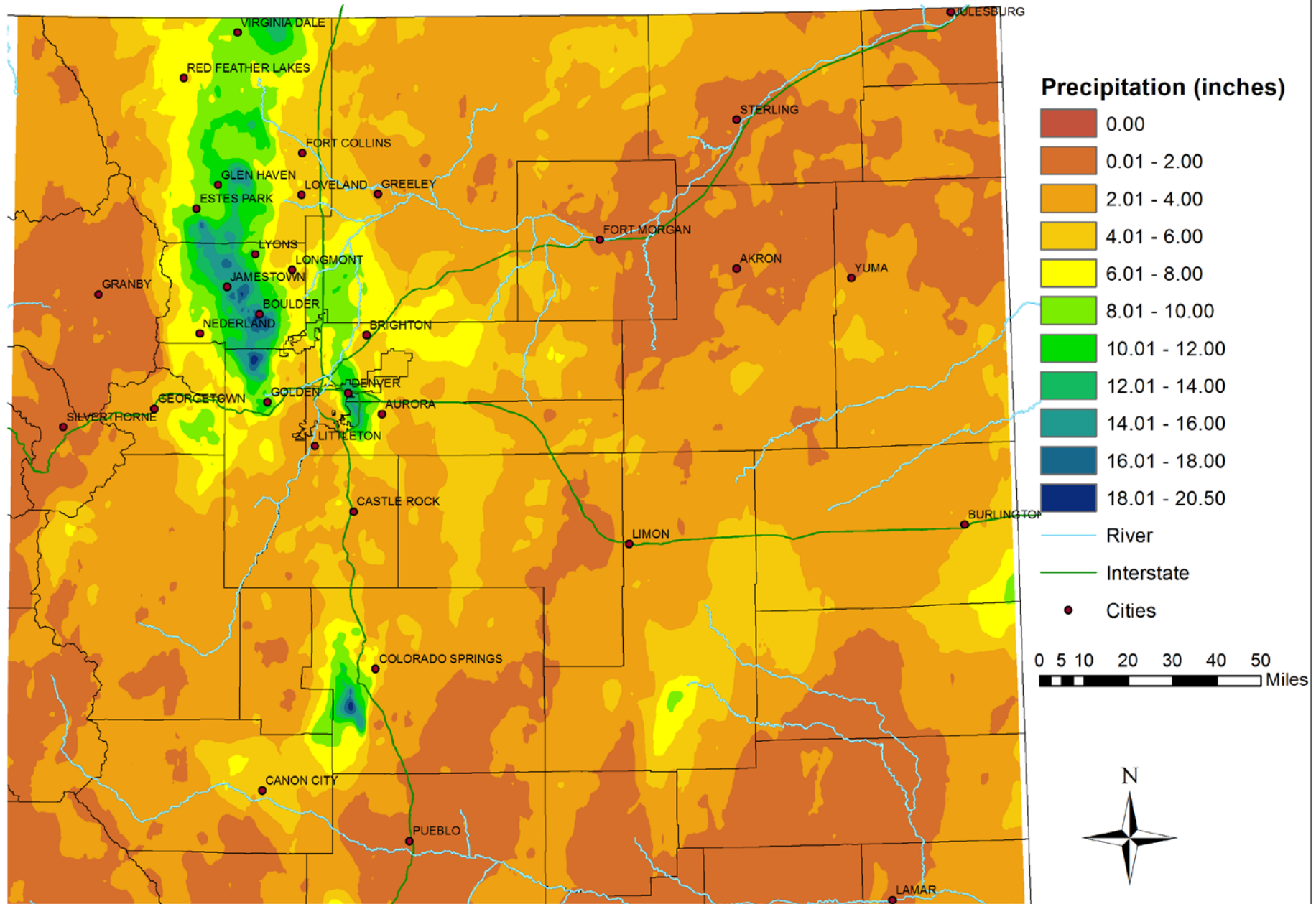


What does this teach us?

- Behind every S. Platte flood, is rain or snow (so get out there and measure it ☺)
- Plains floods and mountain floods are often different
- Floods are pretty darn common and come in several flavors (the next may be coming sooner than you wish)
- Winter floods are rare and small (so you can at least rest for a few months)
- The 2013 flood was a BIG DEAL! (in case you hadn't figured that out)

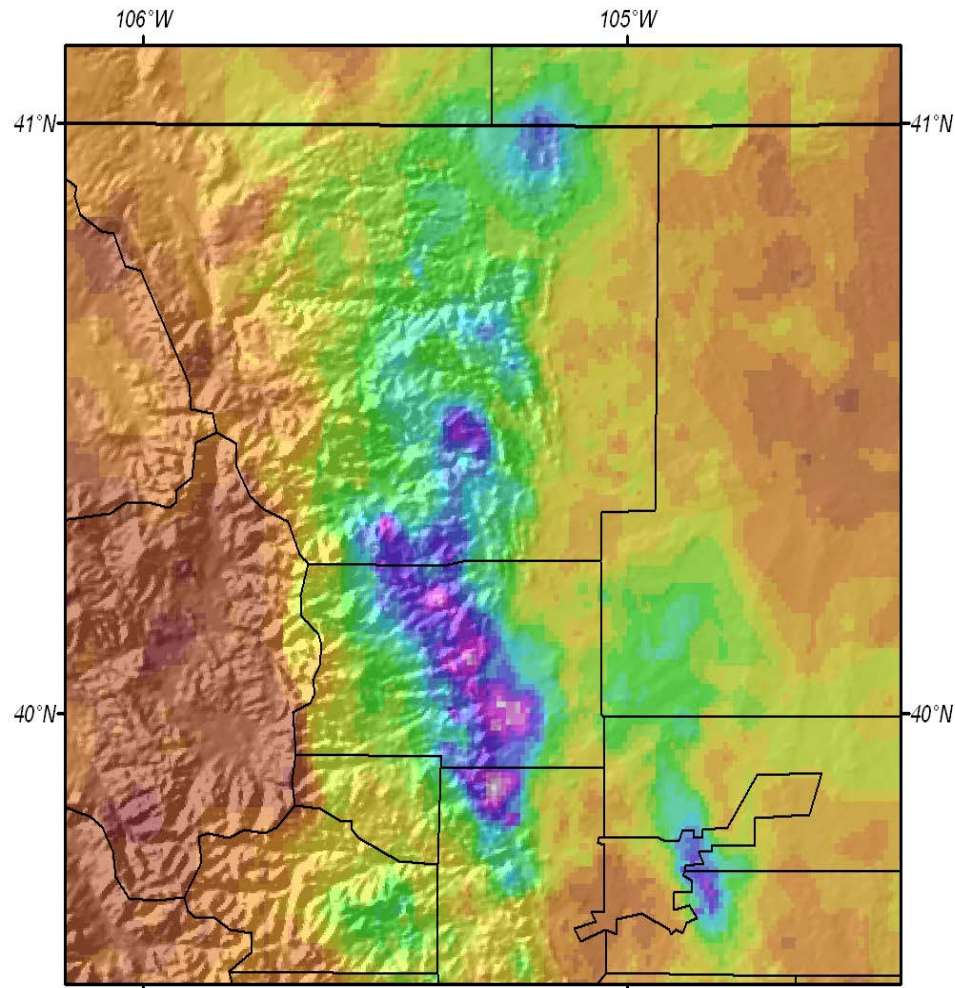
- Snowmelt Floods (common, not extreme – large volumes, modest peak flows)
- Rain on Snow (possible but uncommon)
- Widespread Spring Rains (very possible)
- Late spring “hybrids” (Rare/extreme -- 1965)
- Summer flash floods (common, intense, local)
- Fall rains (Tropical moisture and “hybrid” upslope/convective systems -- more likely western Colorado but (Not common but a huge concern because dynamics+convection+tropical moisture and warm-rain processes)

Precipitation beginning September 8, 2013 ending 7:00 AM MST September 17, 2013



Map created with the Storm Precipitation Analysis System (SPAS) through a collaborative effort by Applied Weather Associates, LLC, MetStat, Inc. and the Colorado Climate Center. Radar data supplied by Weather Decision Technologies, Inc.

With a team effort, Radar data were incorporated with the gauge data via the Storm Precipitation Analysis System

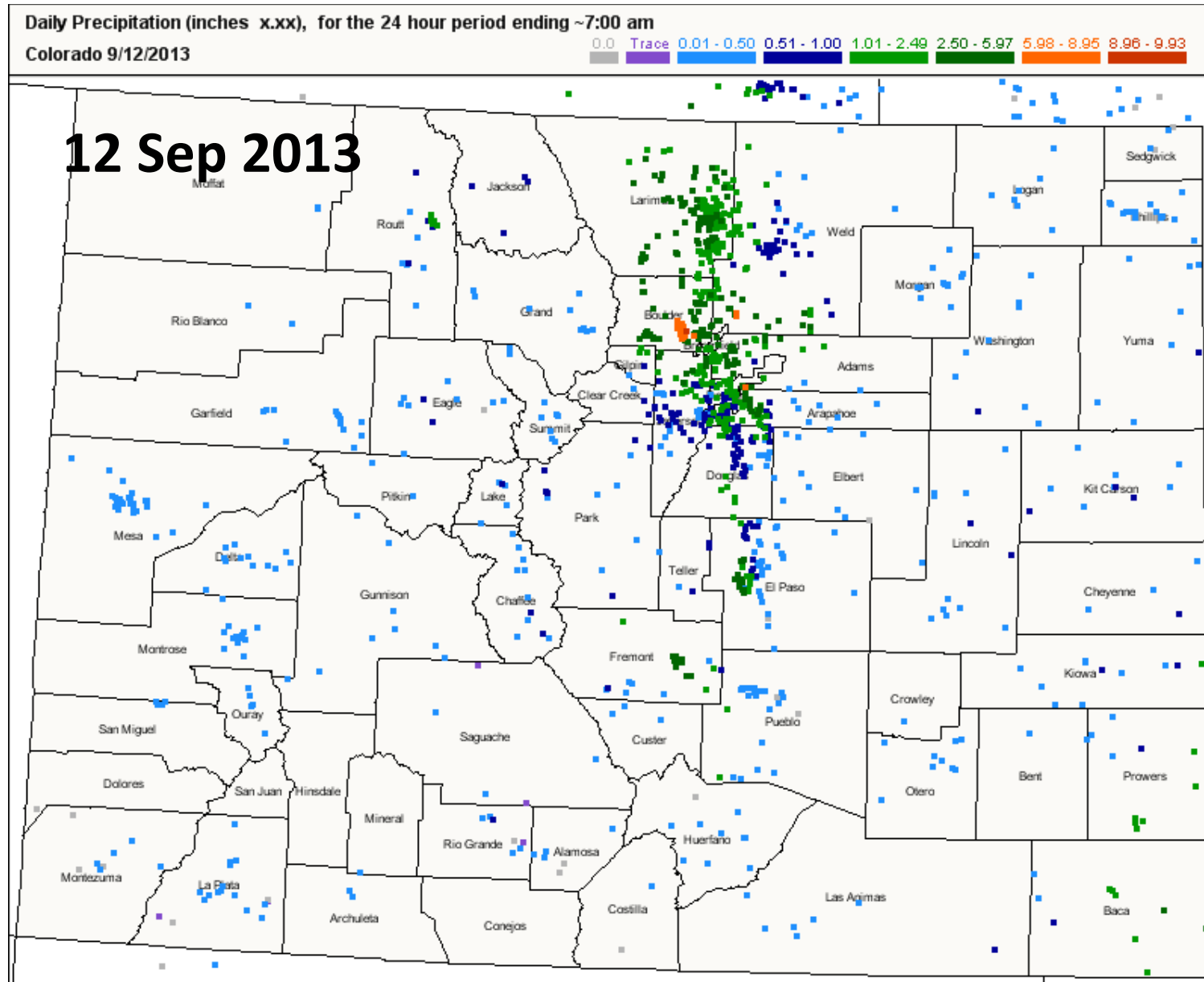


Map created with the Storm Precipitation Analysis System (SPAS) through a collaborative effort by Applied Weather Associates, LLC, MetStat, Inc. and the CSU Colorado Climate Center.
Radar data supplied by Weather Decision Technologies, Inc.

Floods happen -- You can help



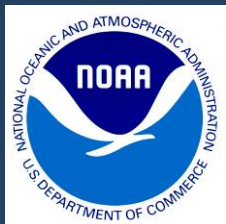
We've still got some gaps on the maps



Please help!! For information and to volunteer, visit the CoCoRaHS Web Site



<http://www.cocorahs.org>

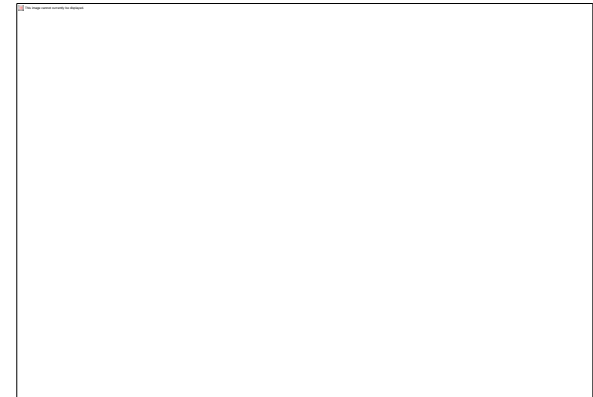
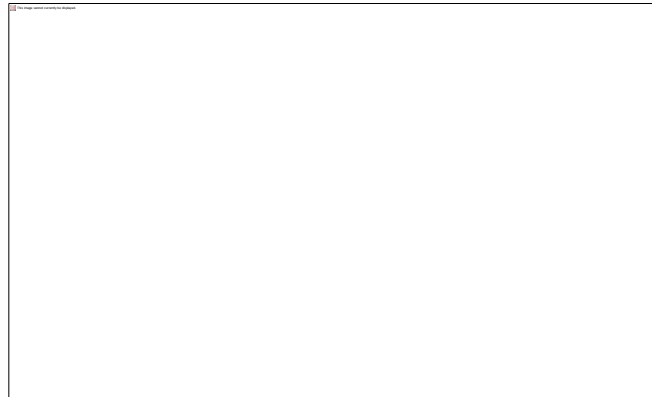
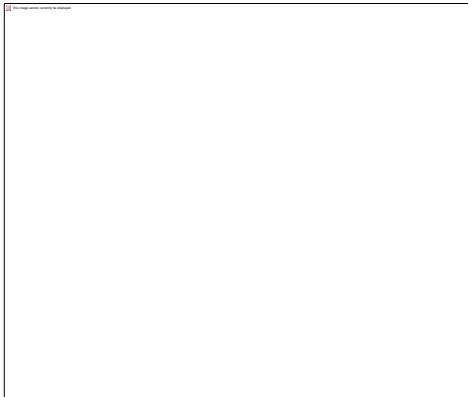
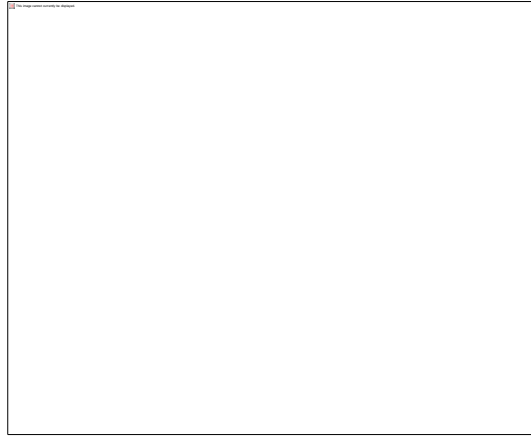
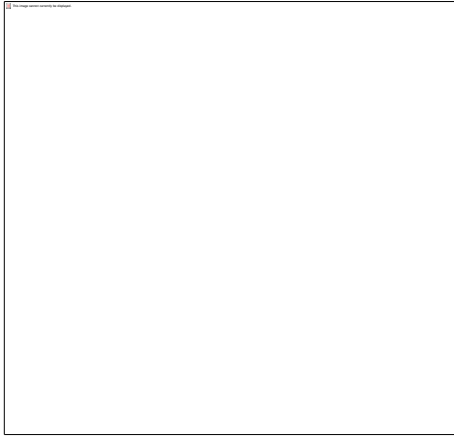


Support for this project provided by
NSF Informal Science Education Program,
NOAA Environmental Literacy Program
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Also, if you need timely climate information --

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National Integrated Drought Information System (NIDIS)



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