

# History of Floods in the South Platte River Basin

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Colorado Climate Center  
Colorado State University

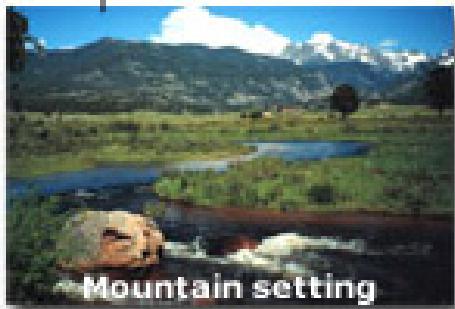
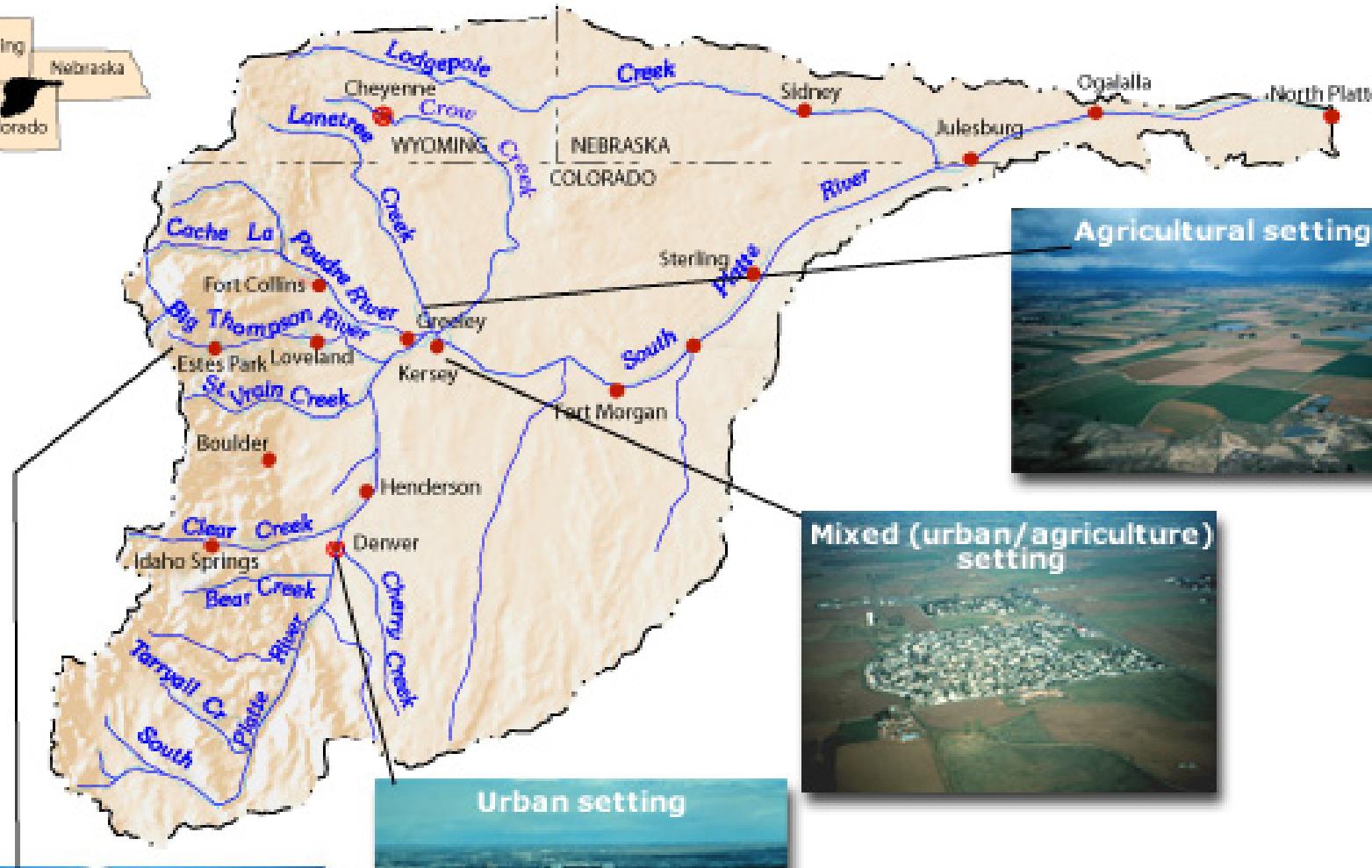
25<sup>th</sup> South Platte Forum  
Longmont, CO  
October 22, 2014

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

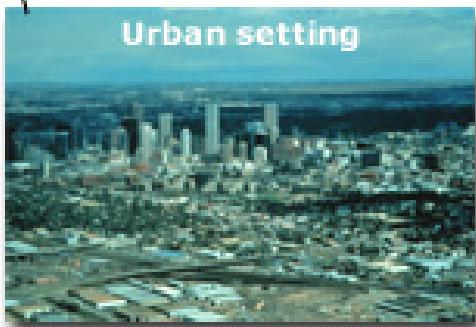




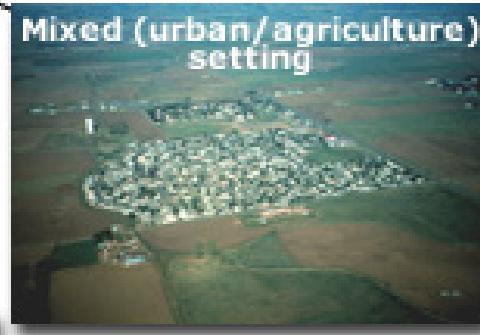
Credit: Bob Henson, UCAR



Mountain setting



Urban setting

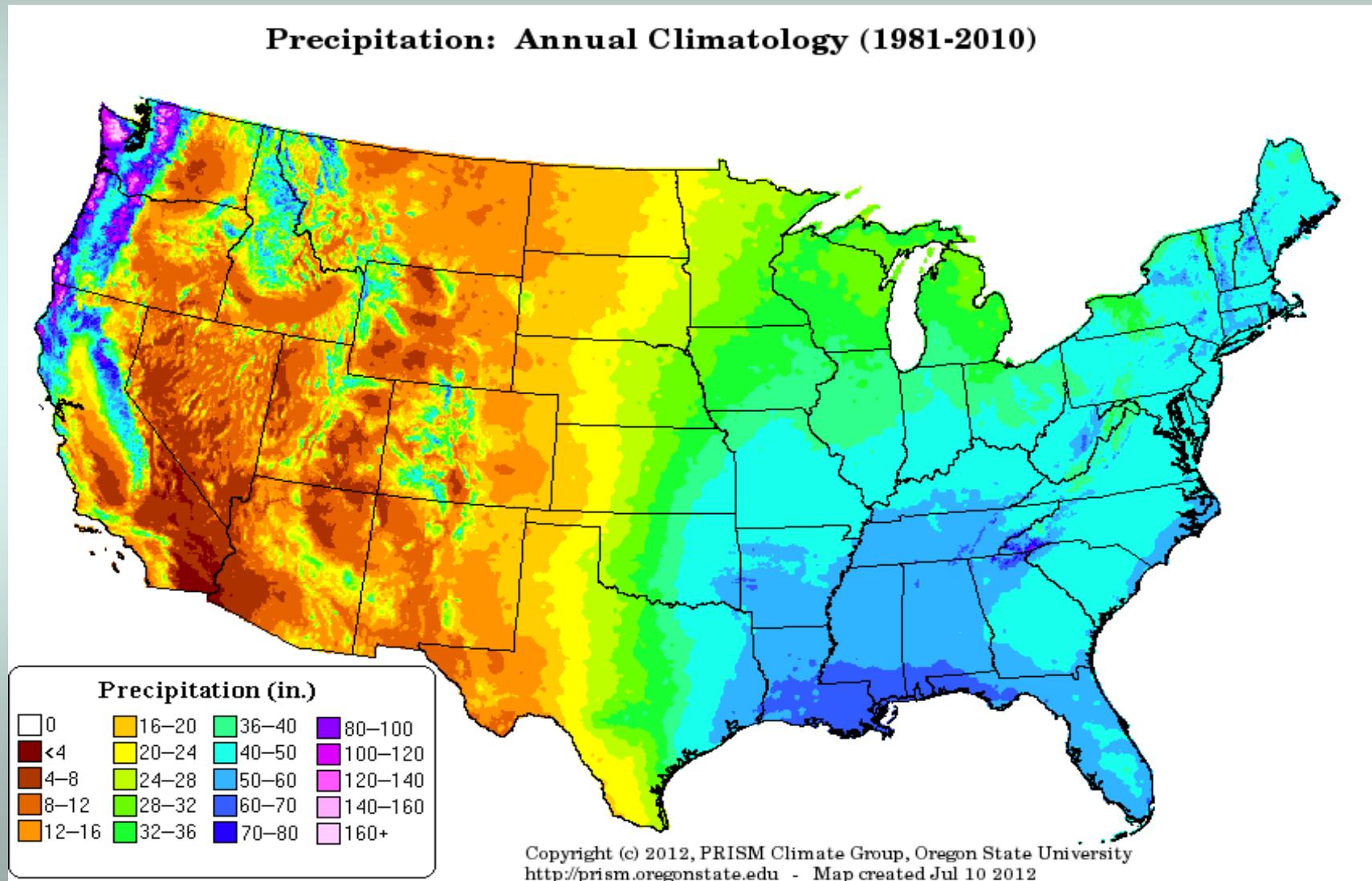


Mixed (urban/agriculture) setting

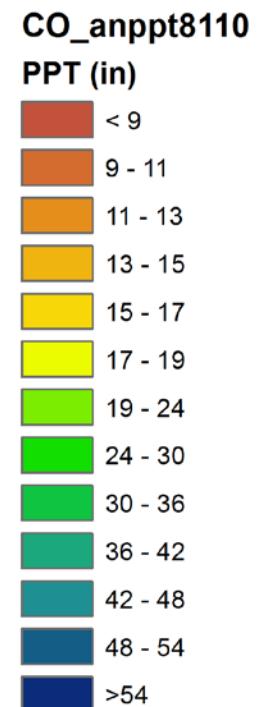
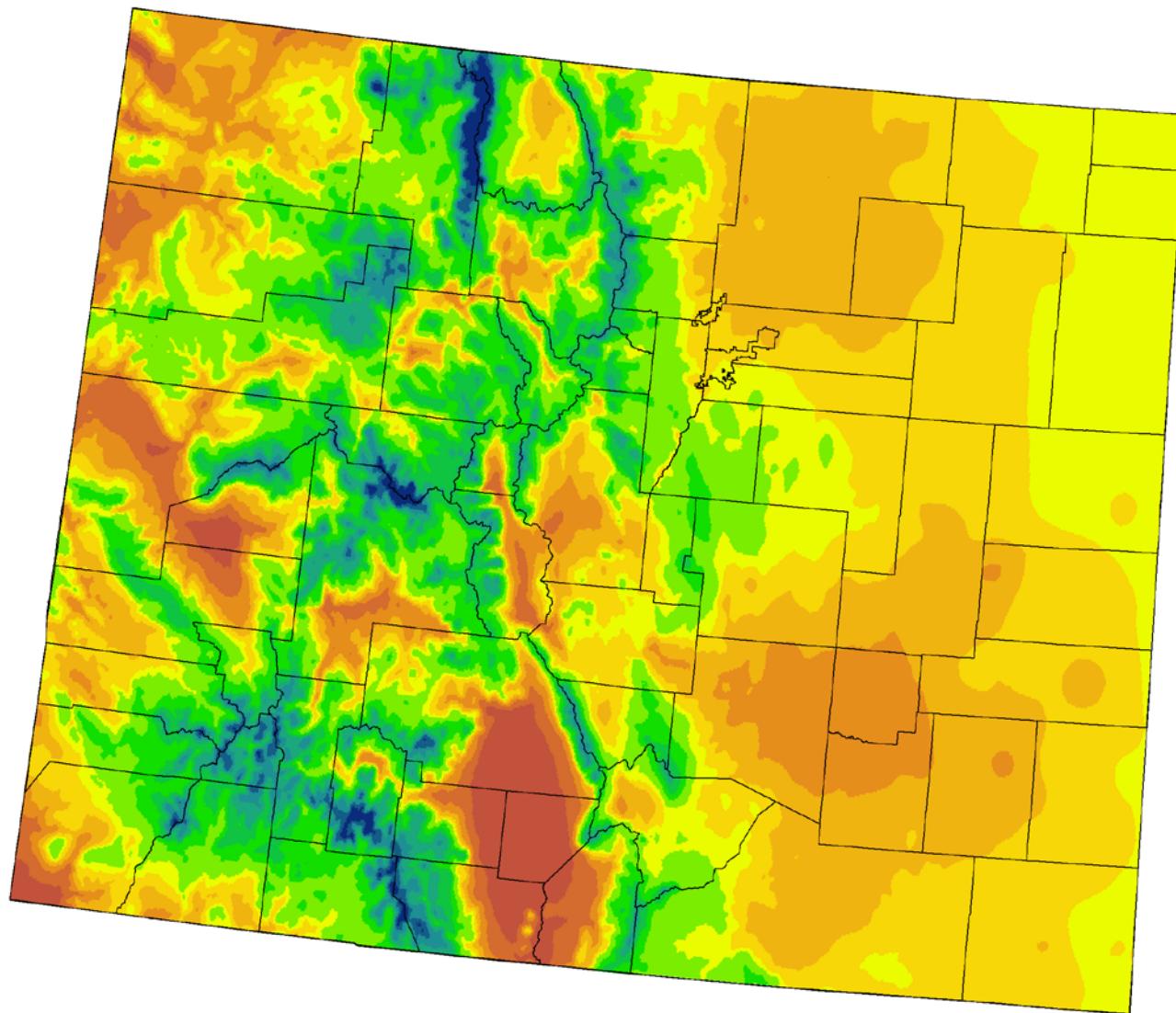


Agricultural setting

# Remember where we are



# Colorado Annual Average Precipitation (in) 1981-2010



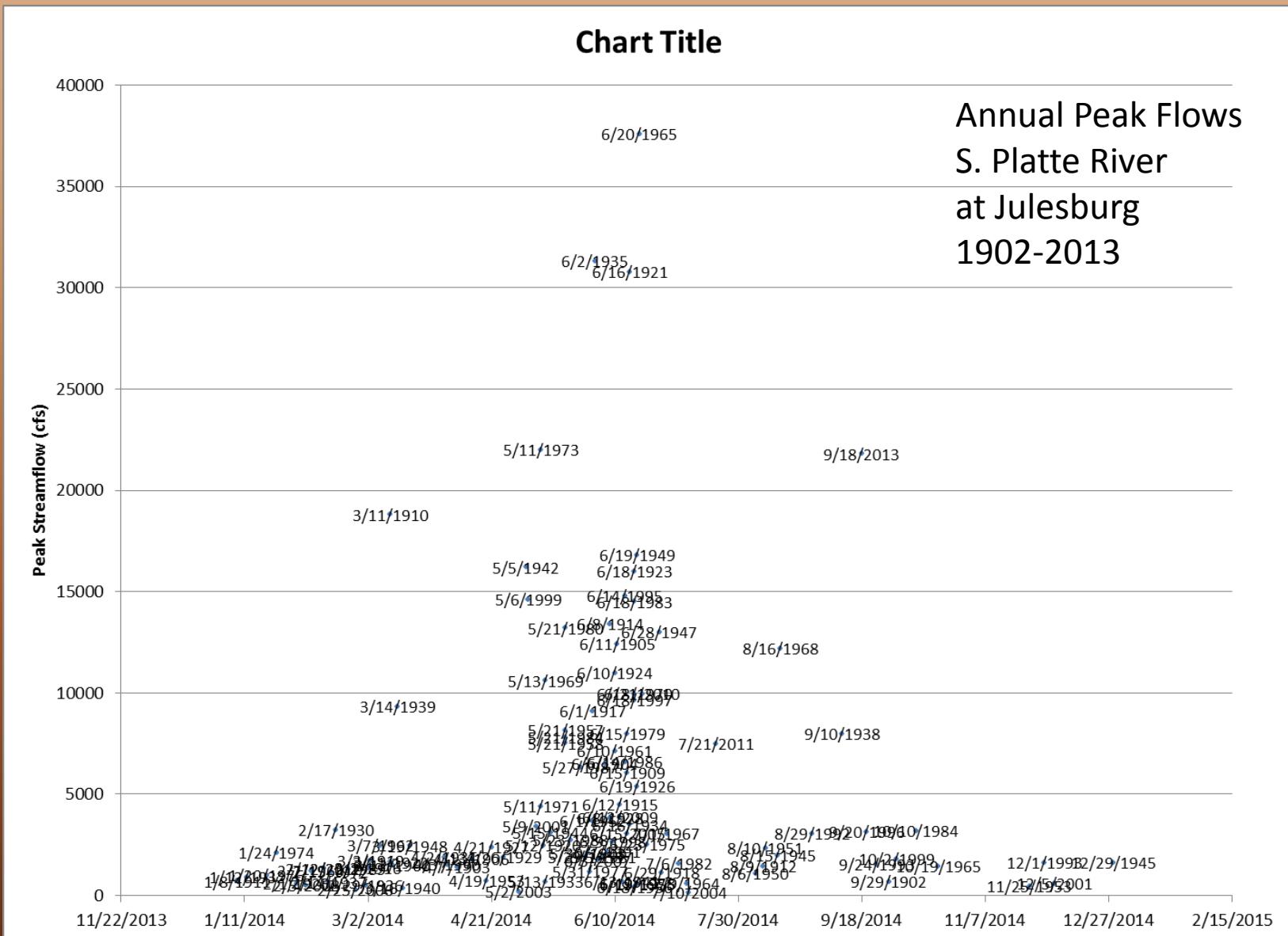
# Colorado Precipitation:

Usually Dry punctuated by  
occasional large events

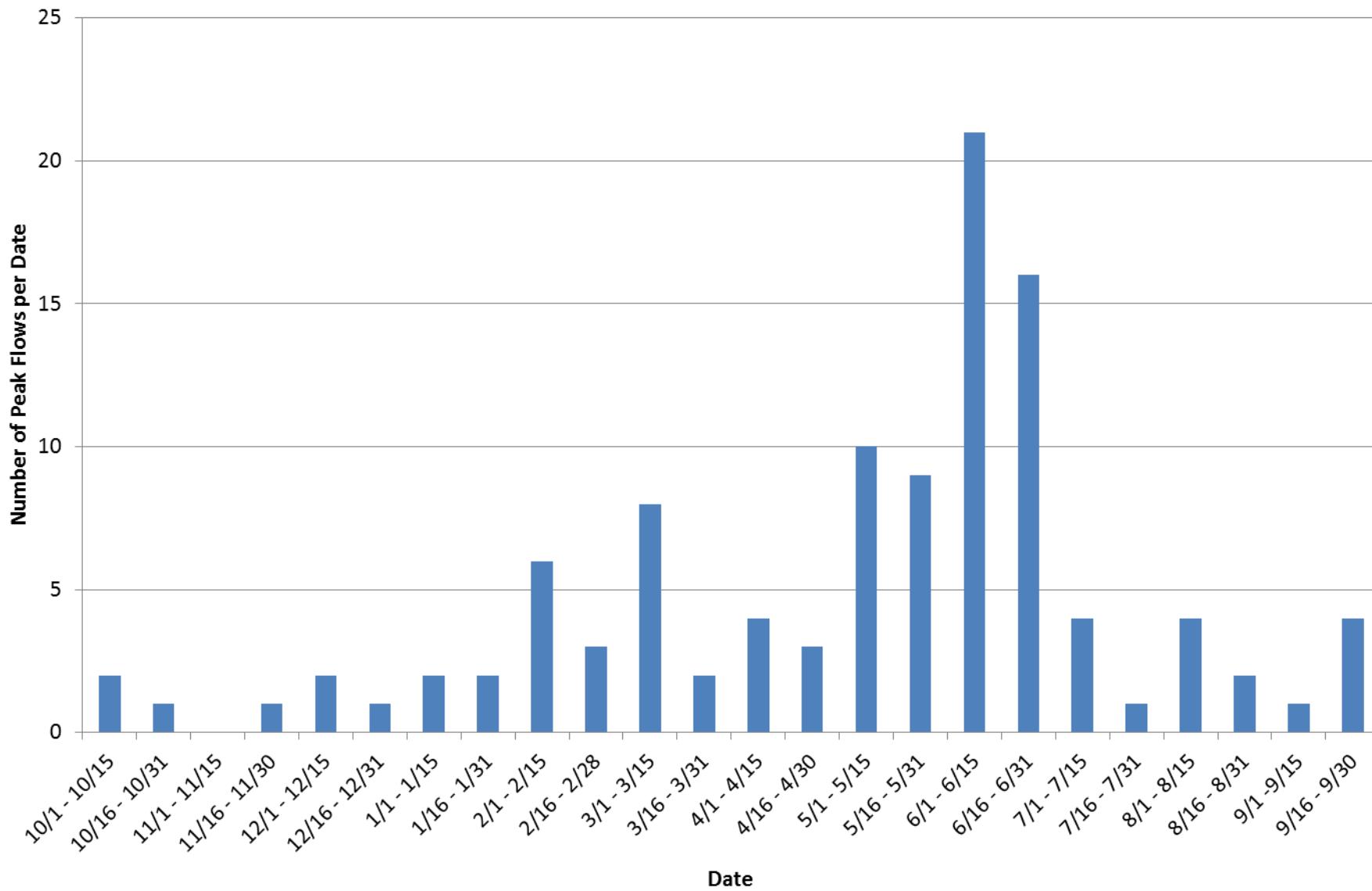
Strong seasonality

High variability

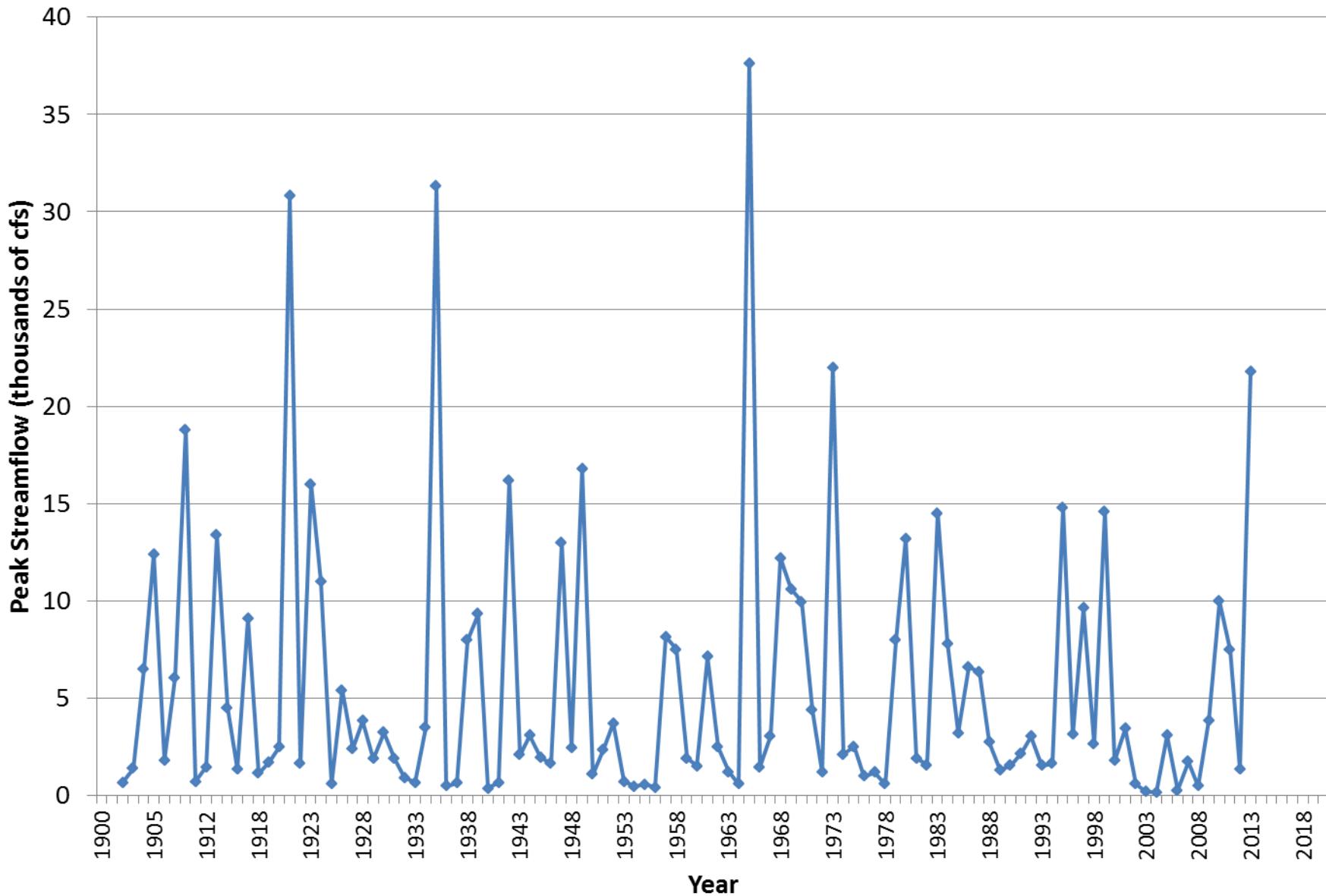
# This is it -- the History



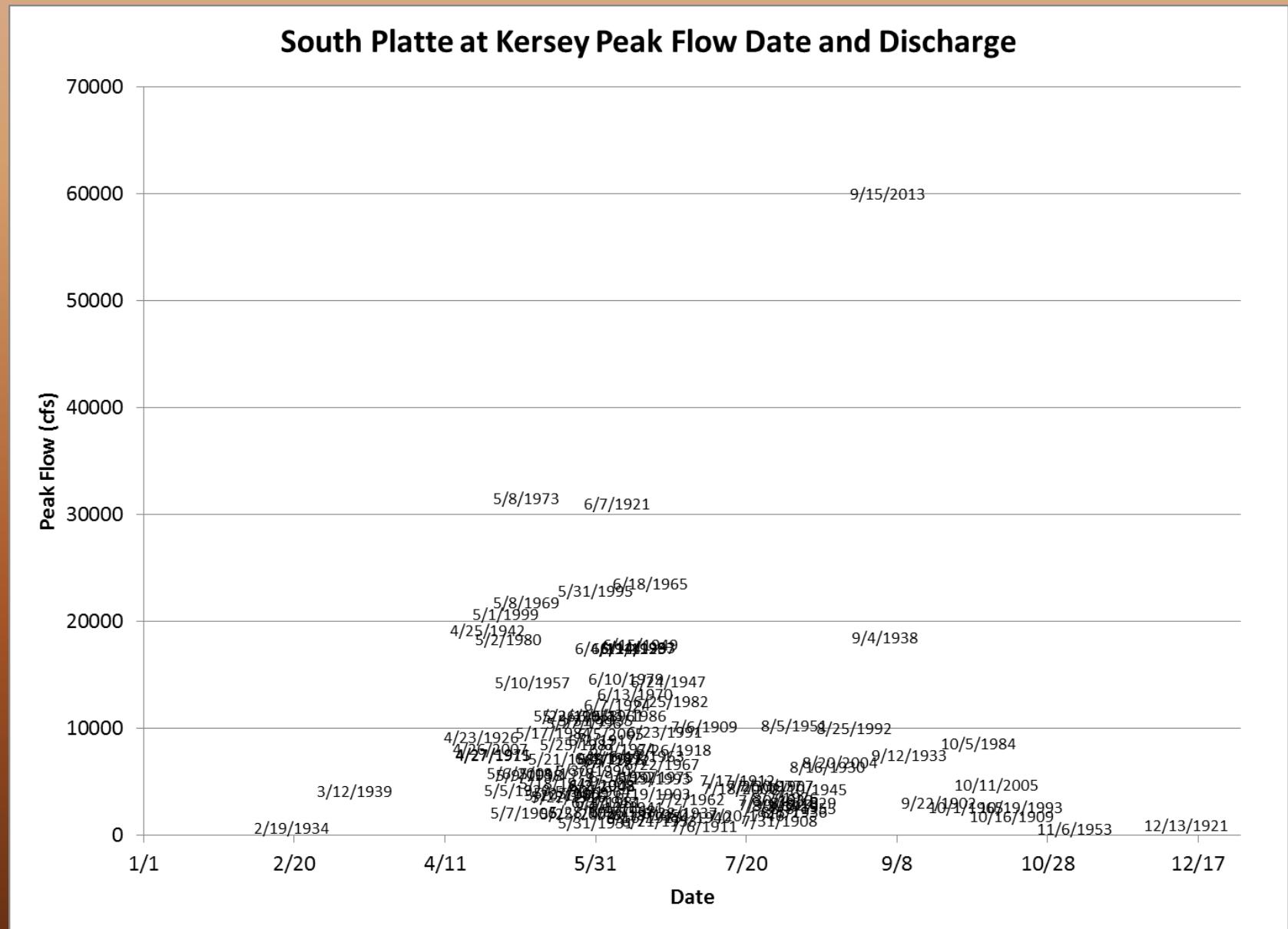
## Frequency of Dates of Peak Flow for South Platte at Julesburg 1902-2013



# Annual Peak Streamflow on South Platte River at Julesburg, CO

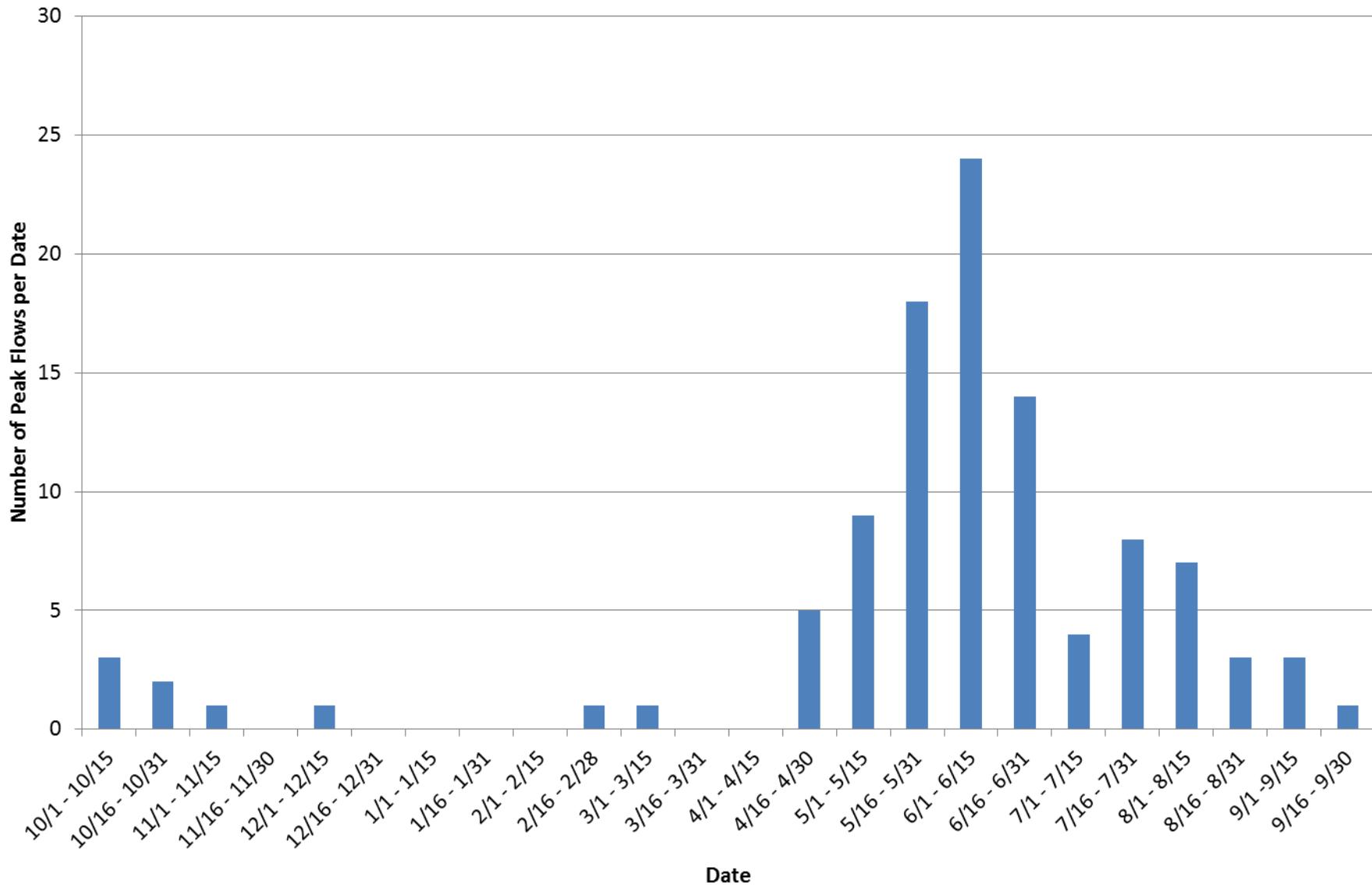


# Now, let's head upstream to Kersey

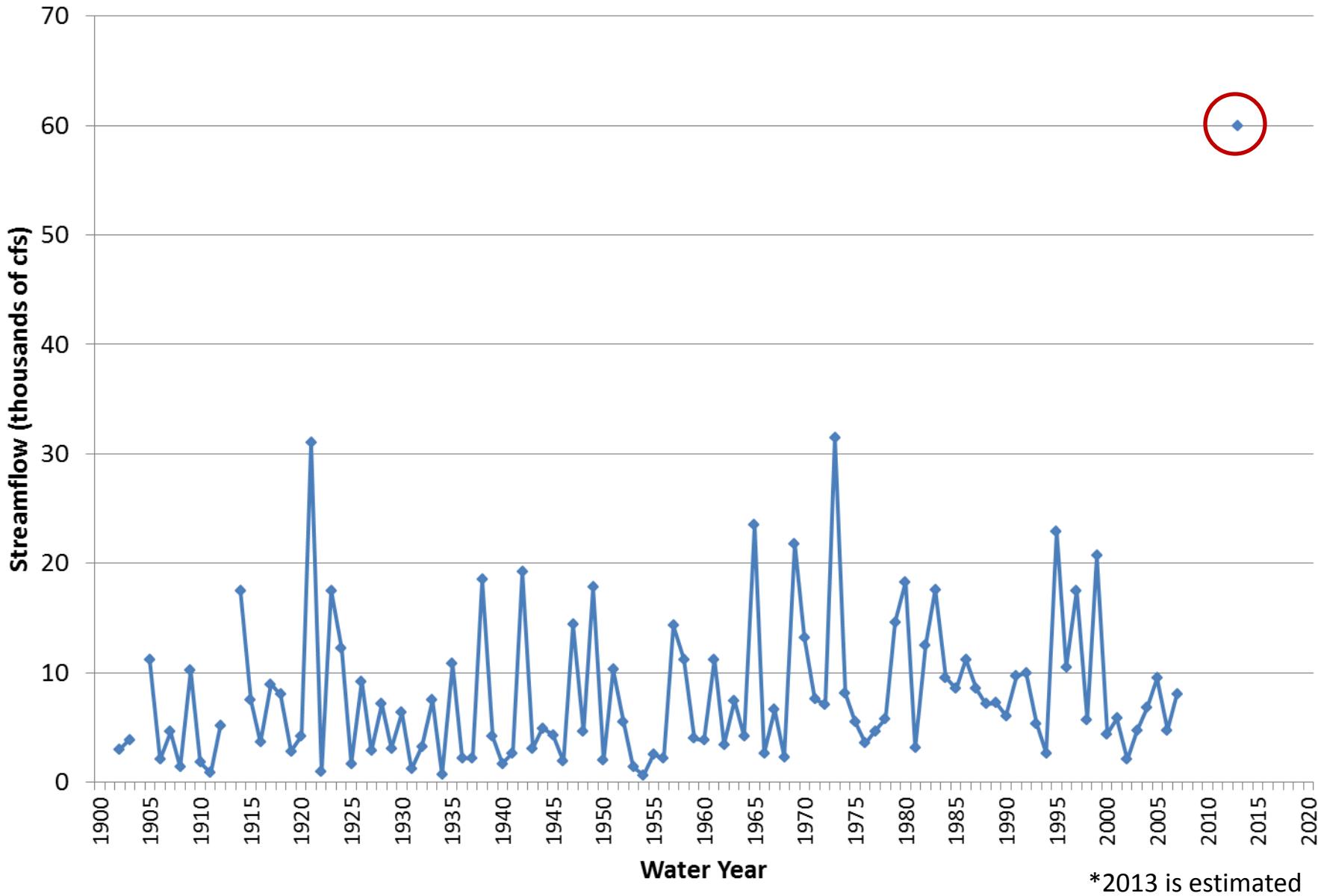


# Frequency of Date of Peak Flow on South Platte at Kersey

## 1902-2007

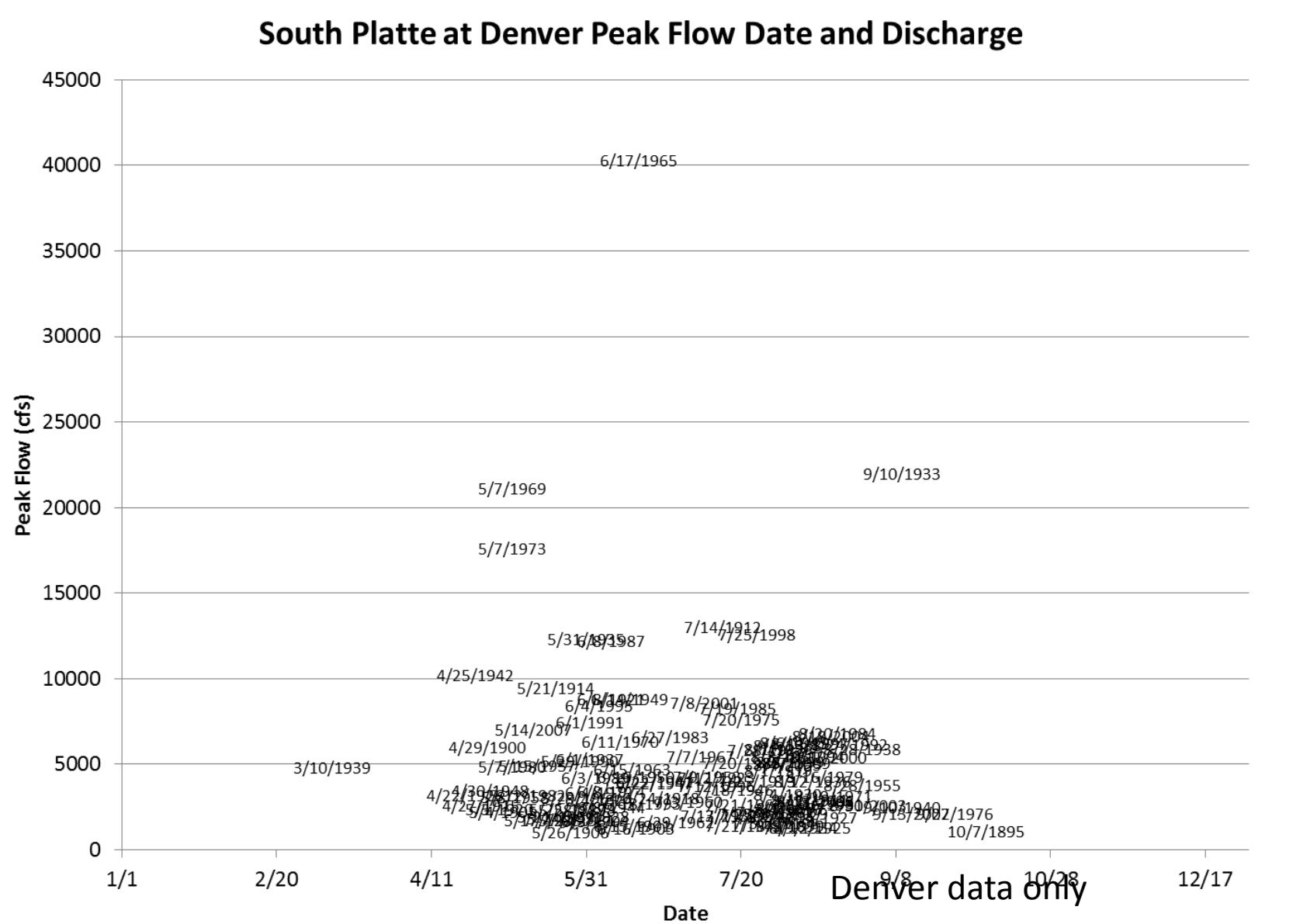


## Annual Peak Streamflow on South Platte River at Kersey

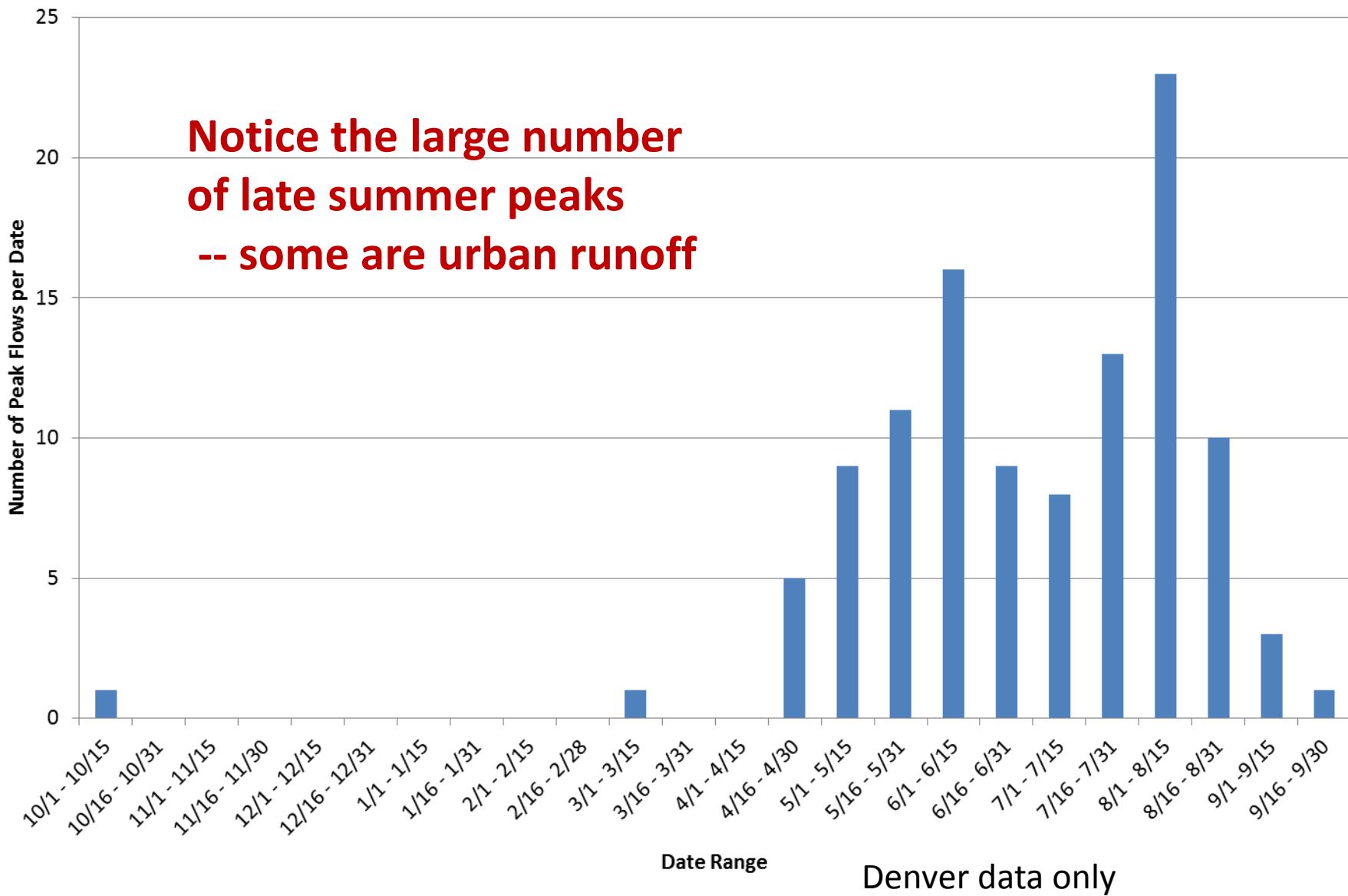


\*2013 is estimated

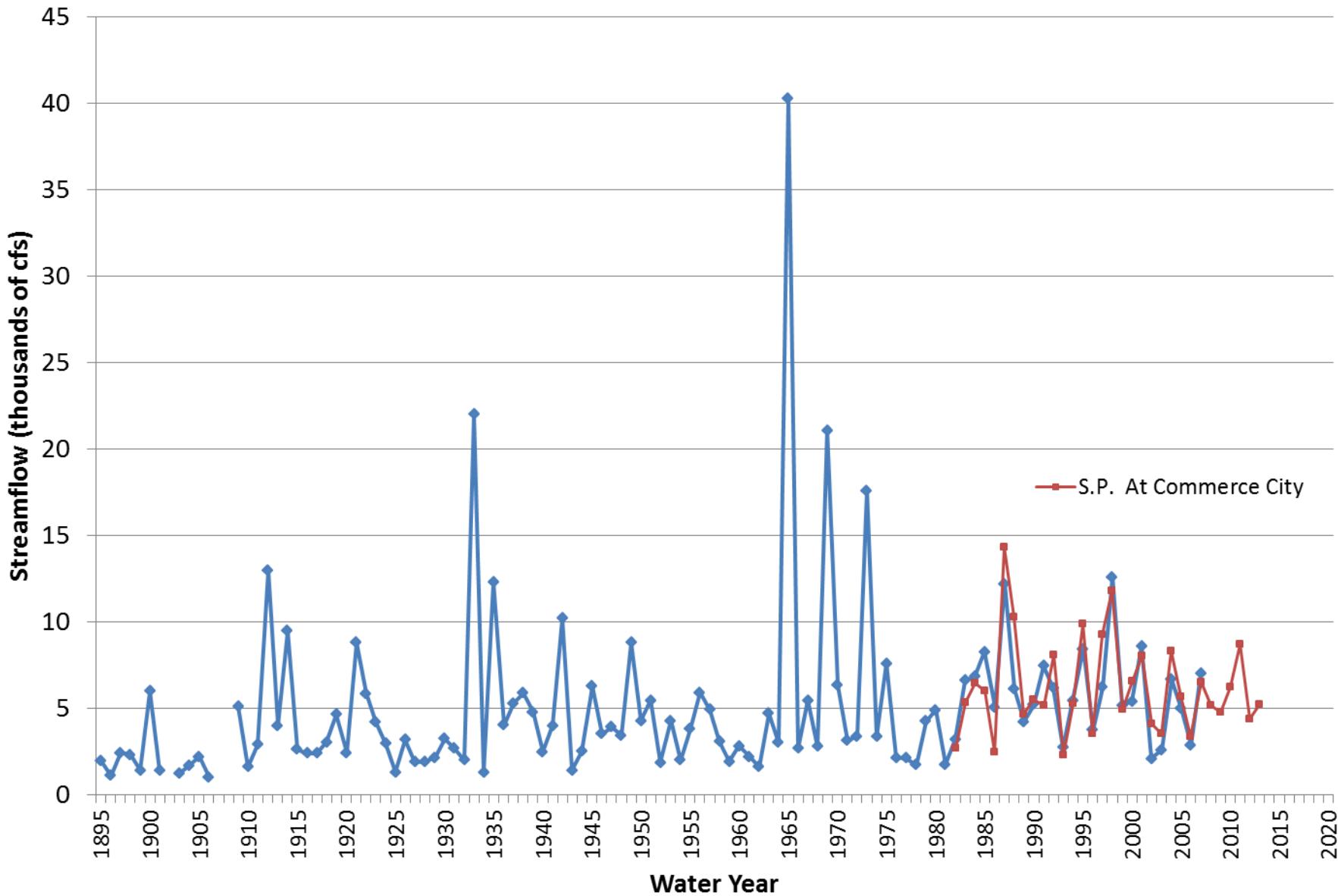
# And farther upstream - Denver



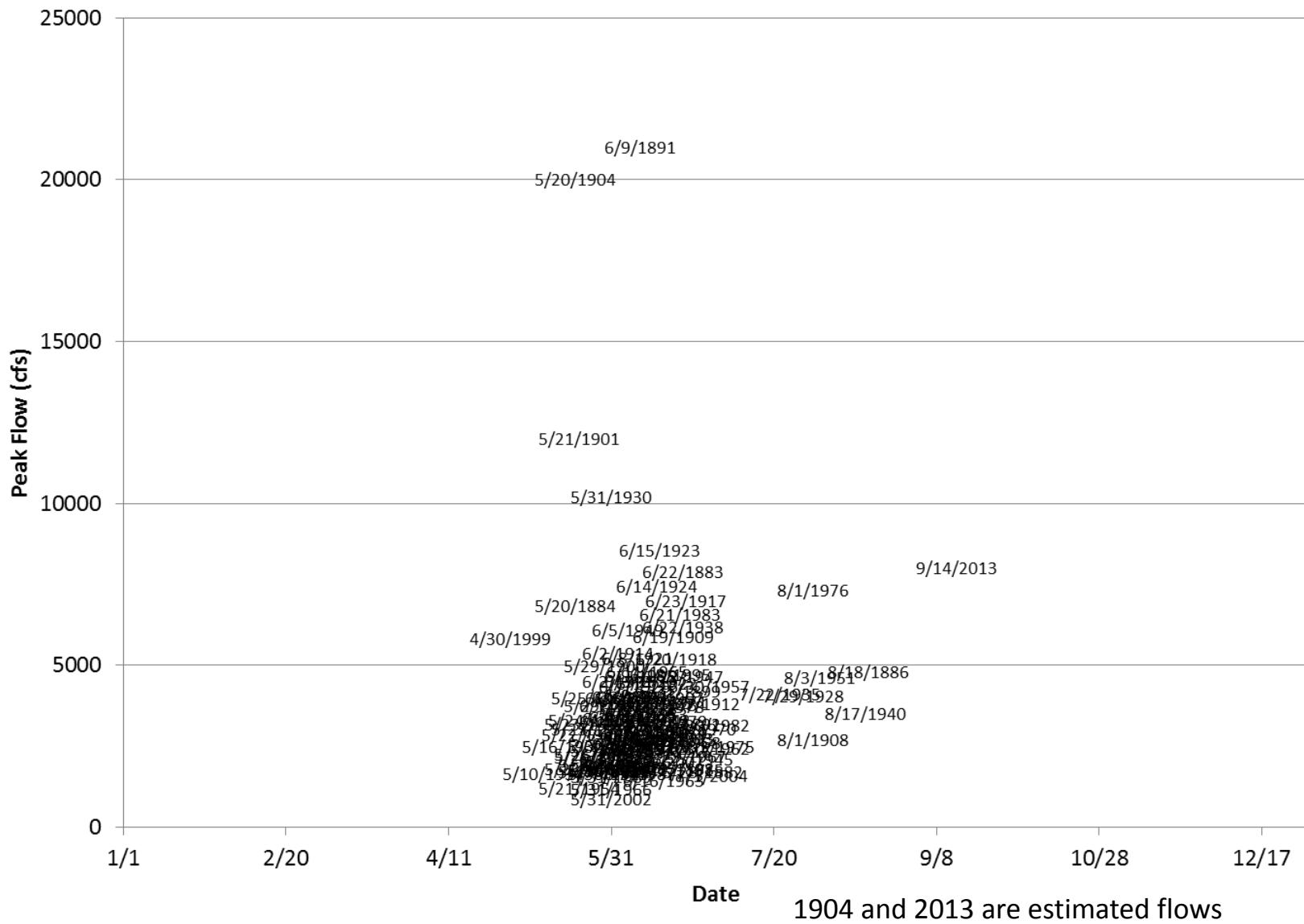
## Frequency of Date of Peak Flow on South Platte River at Denver 1895-2007



## Annual Peak Streamflow of South Platte River at Denver

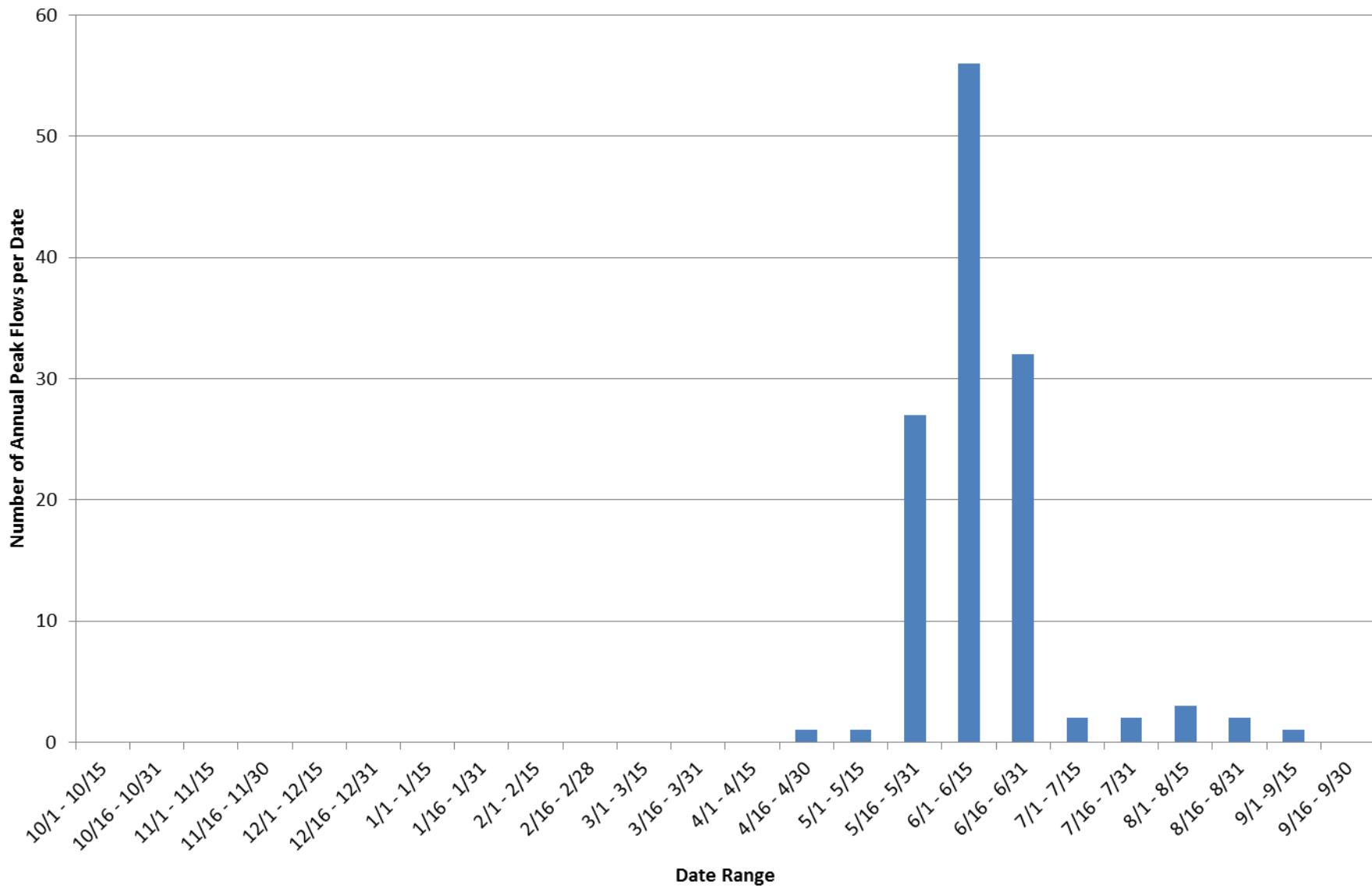


## Cache la Poudre at Canyon Mouth Peak Flow Date and Discharge

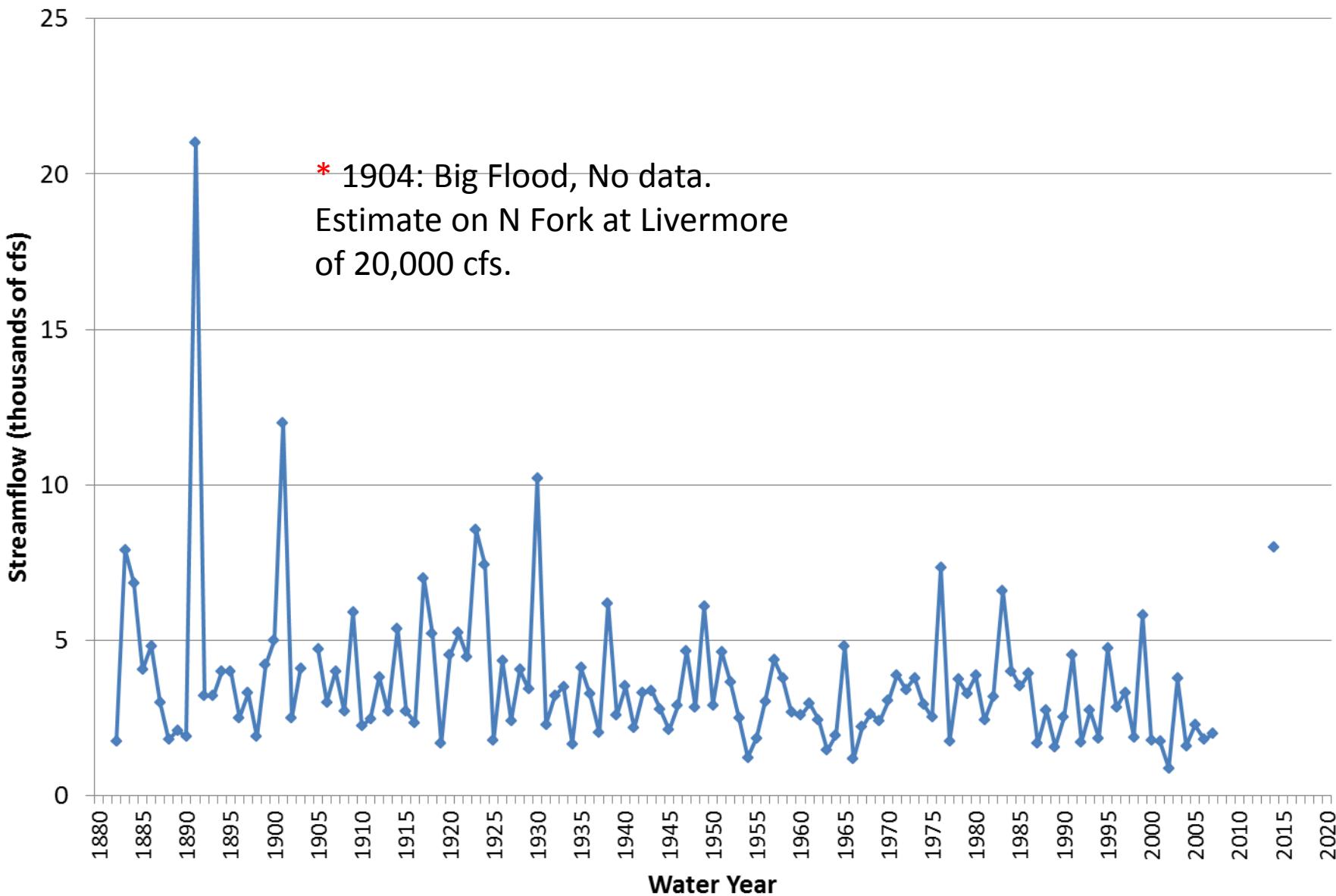


# **Frequency of Peak Flows per Date on Cache la Poudre at Canyon Mouth**

## **1882-2013**

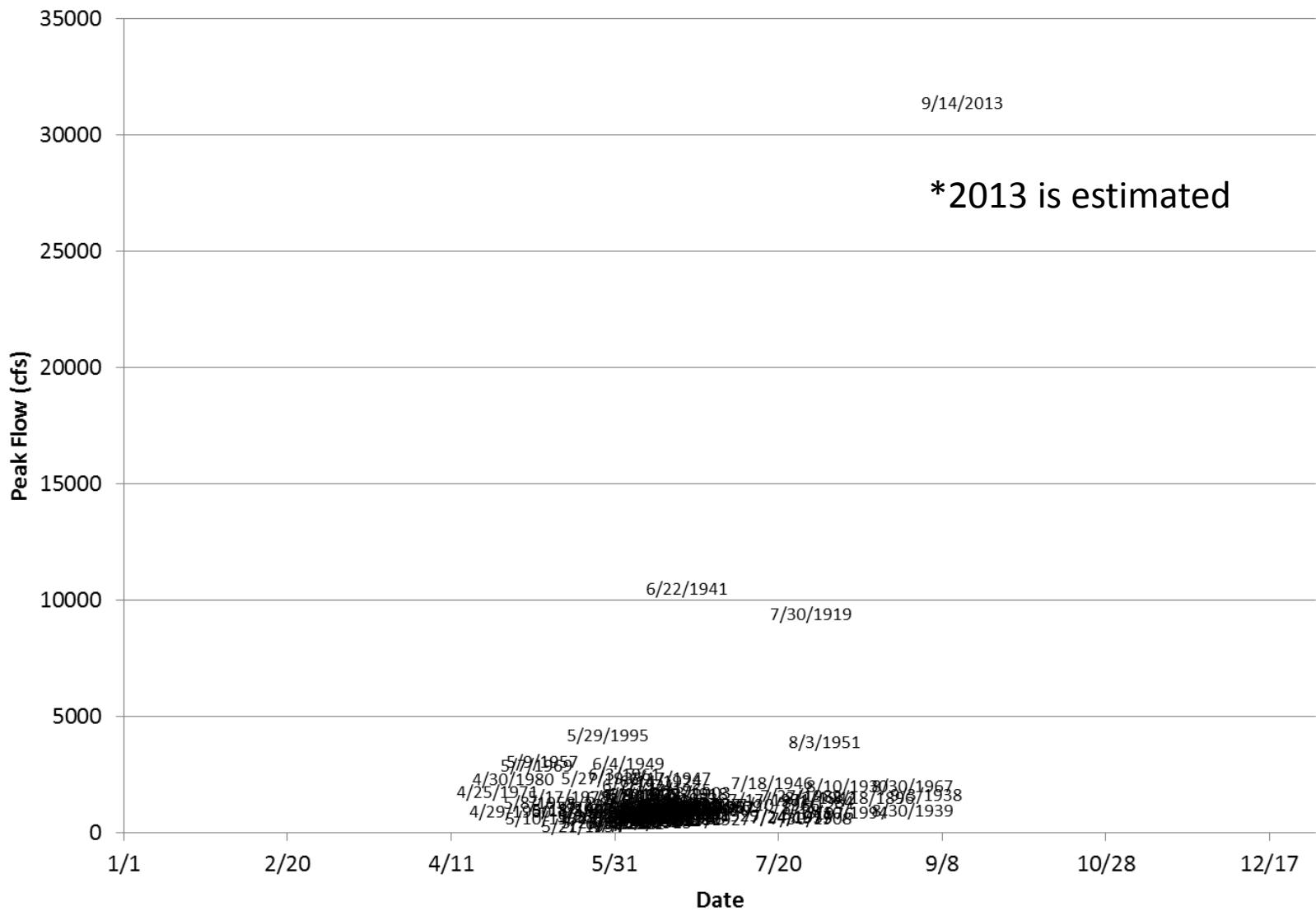


## Cache La Poudre at Canyon Mouth Annual Peak Streamflow

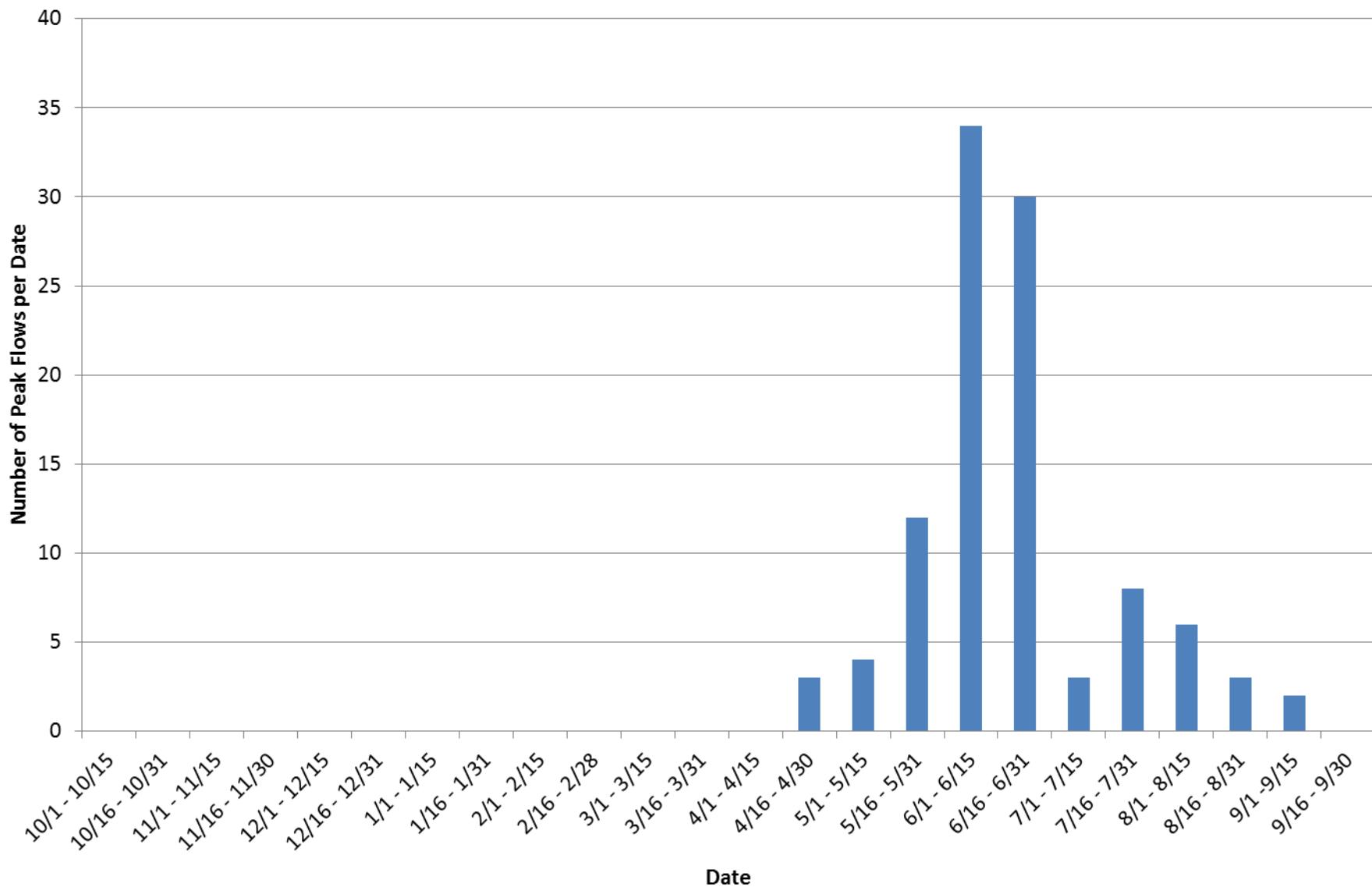


# Which tributary is this one?

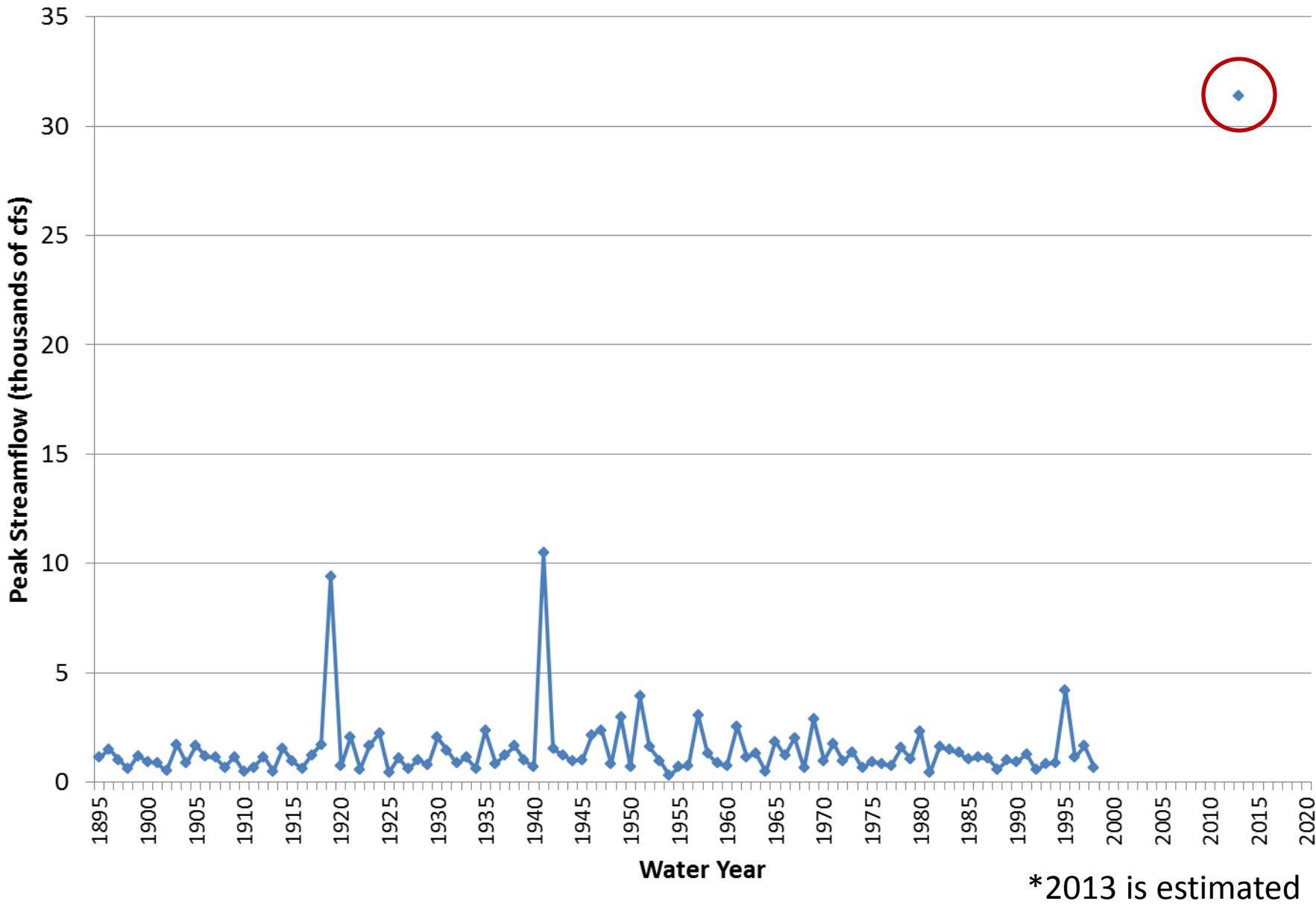
## Peak Flow Date and Discharge



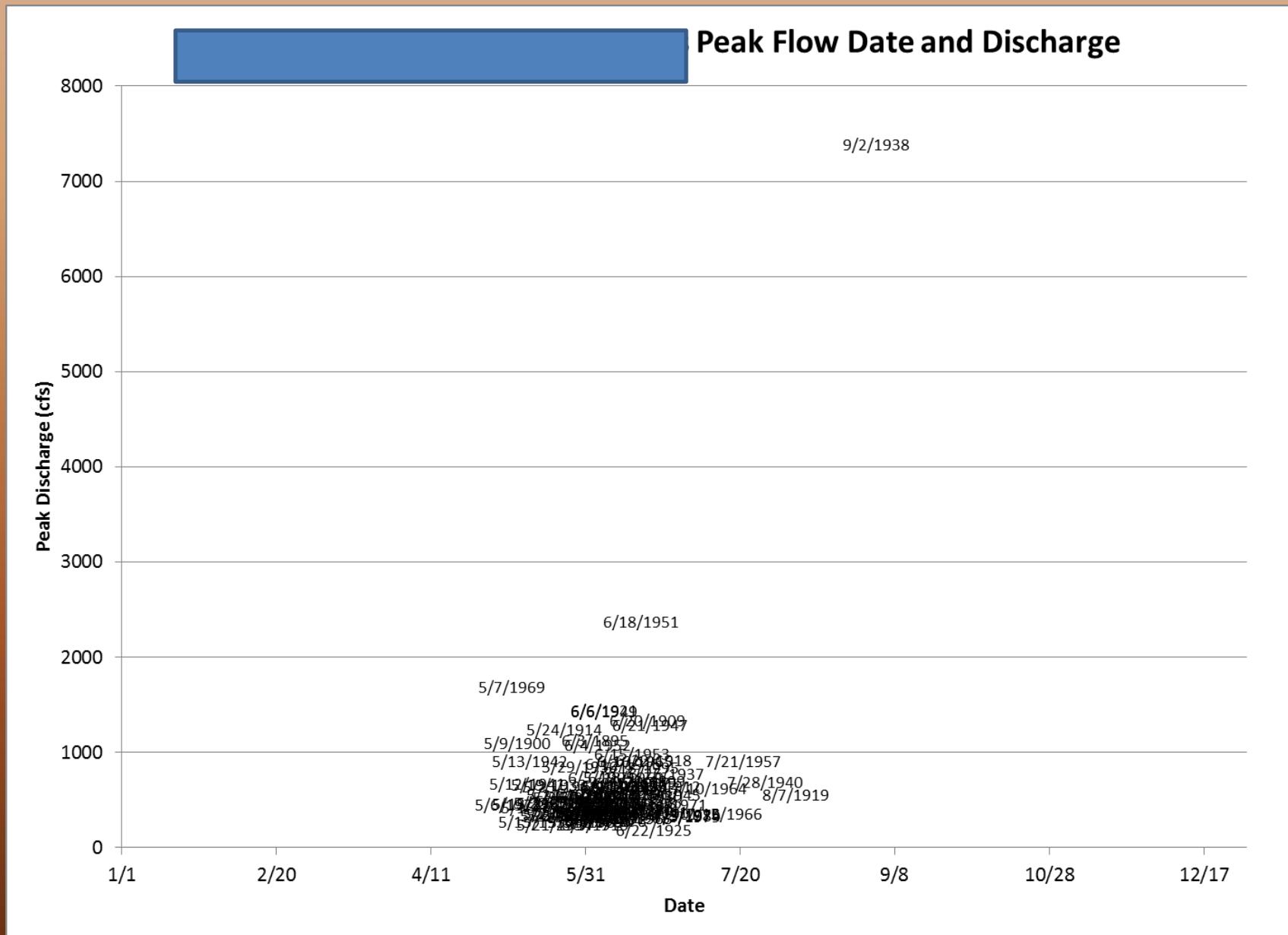
## **Frequency of Dates of Peak Flow for St. Vrain River at Lyons 1895-1998**



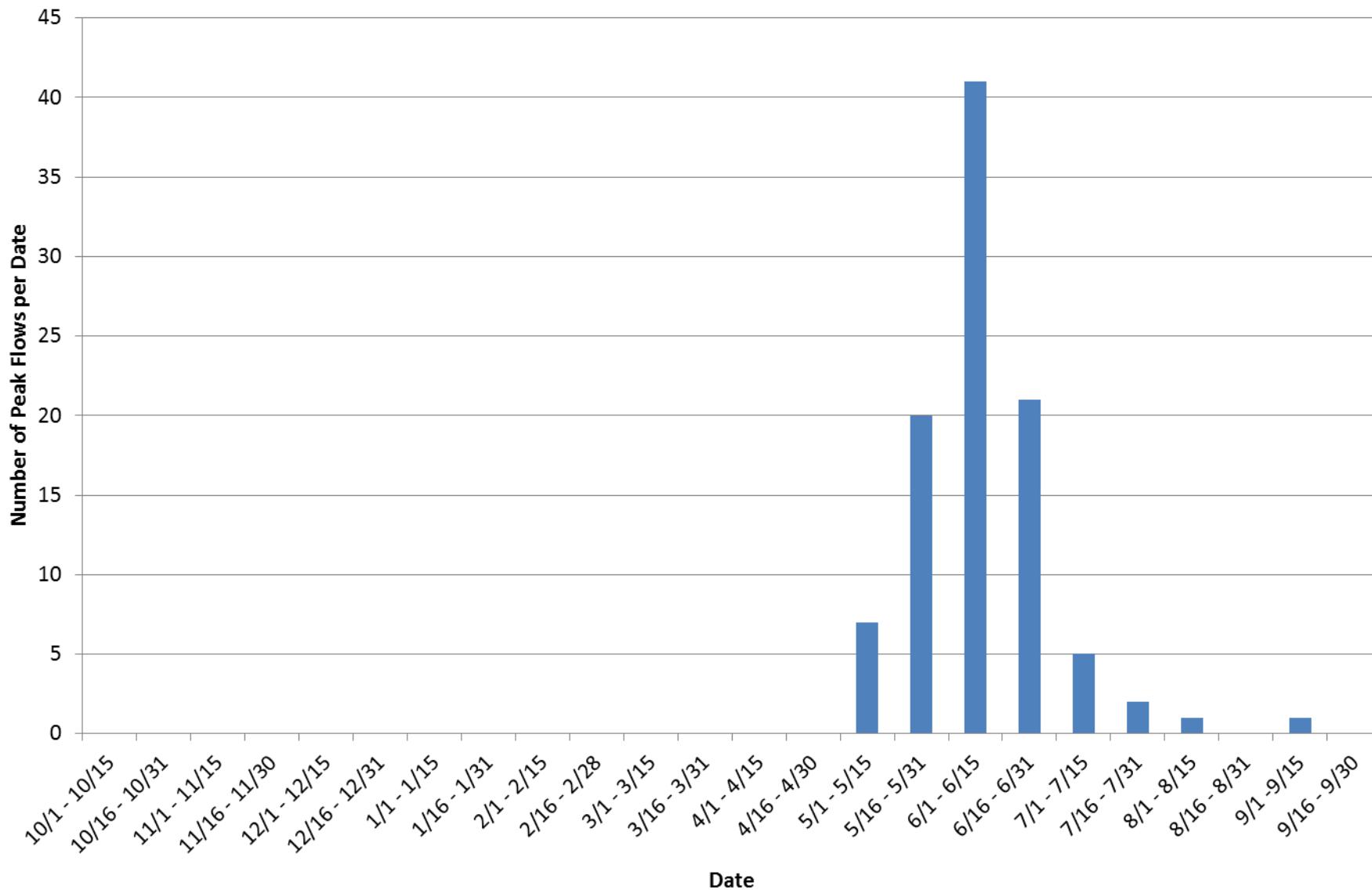
## St. Vrain River at Lyons, CO Annual Peak Streamflow



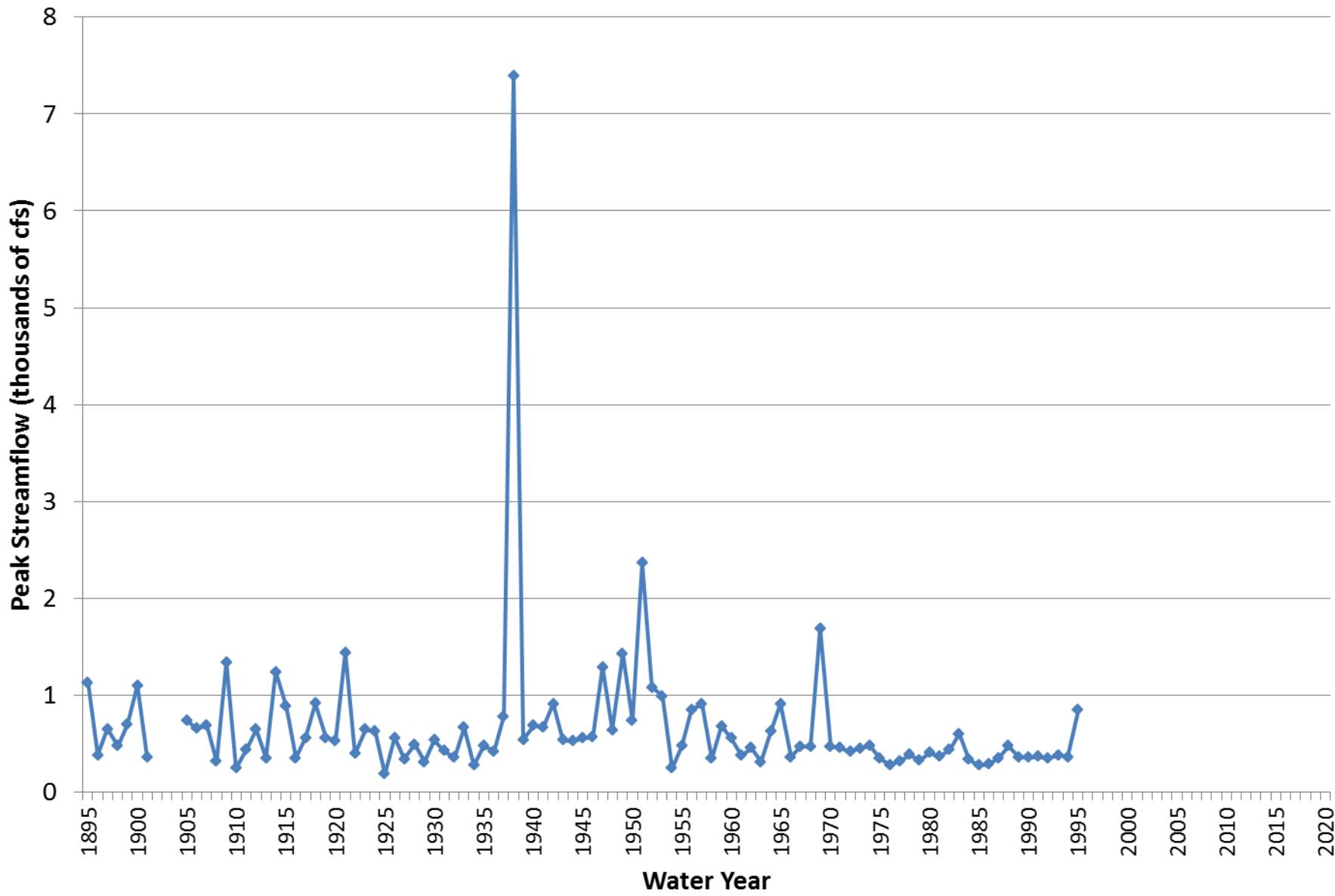
# What about this one?



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



## South Boulder Creek at Eldorado Springs Annual Peak Flow

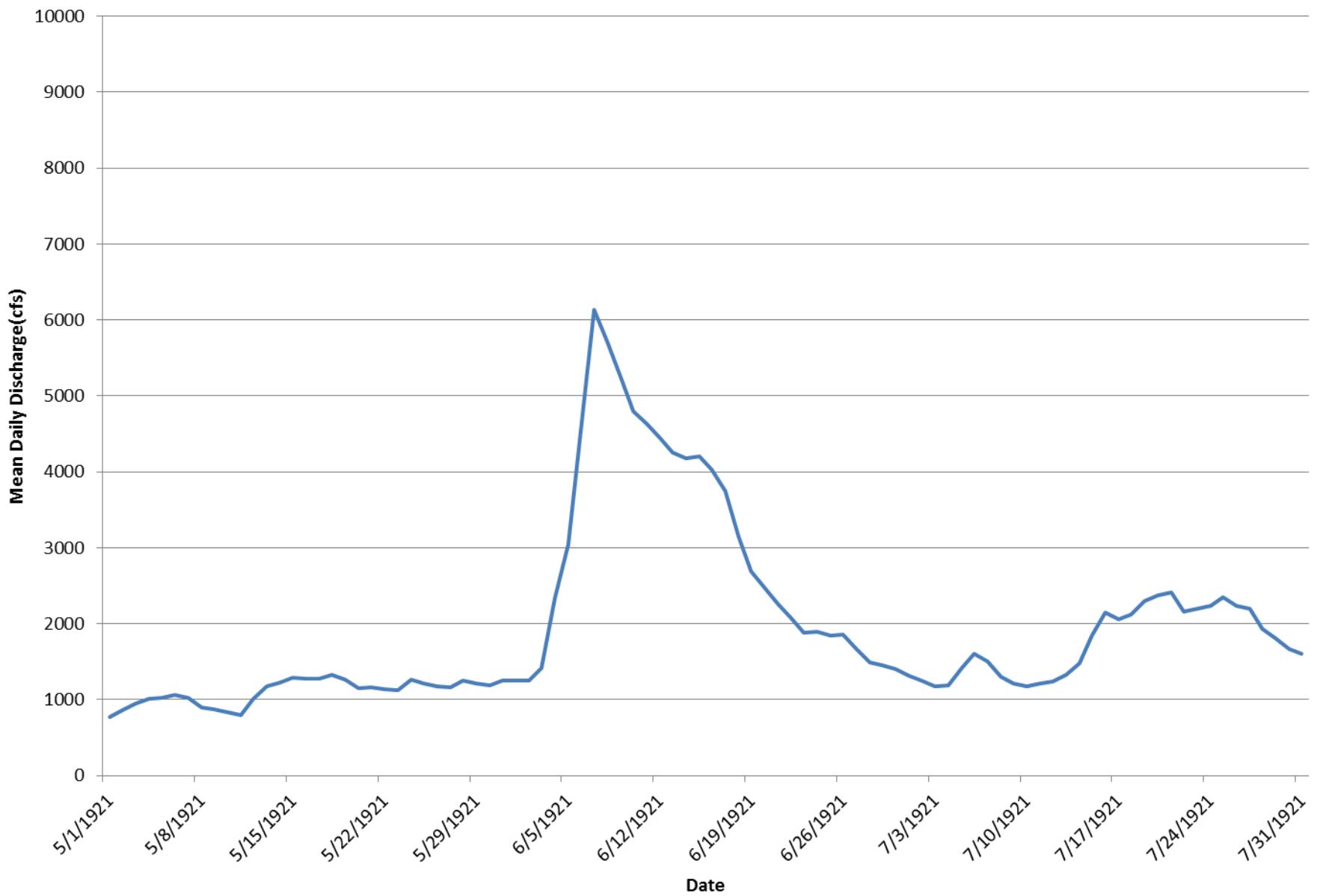


# 1921 Storm

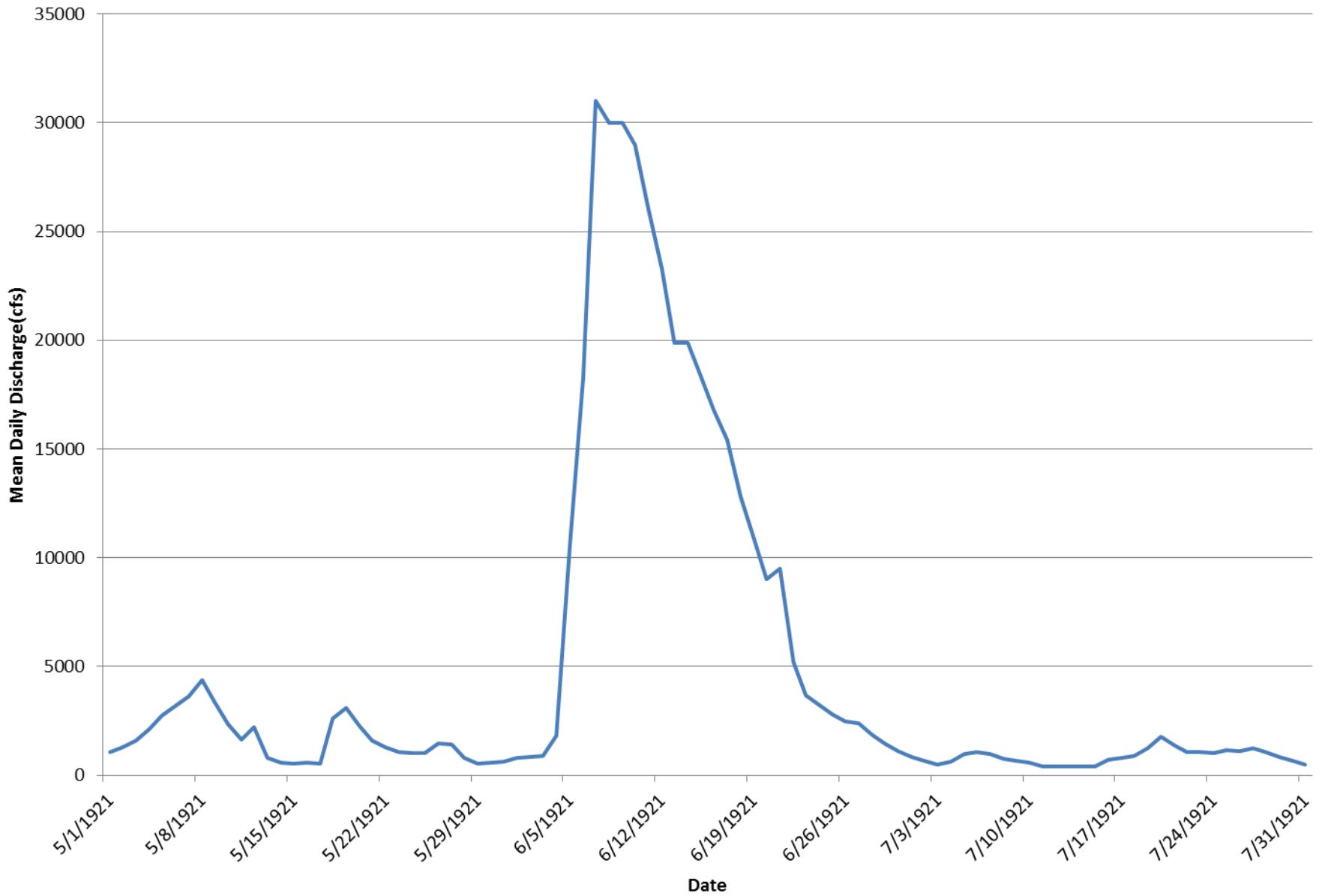
- Maybe best to skip these hydrographs



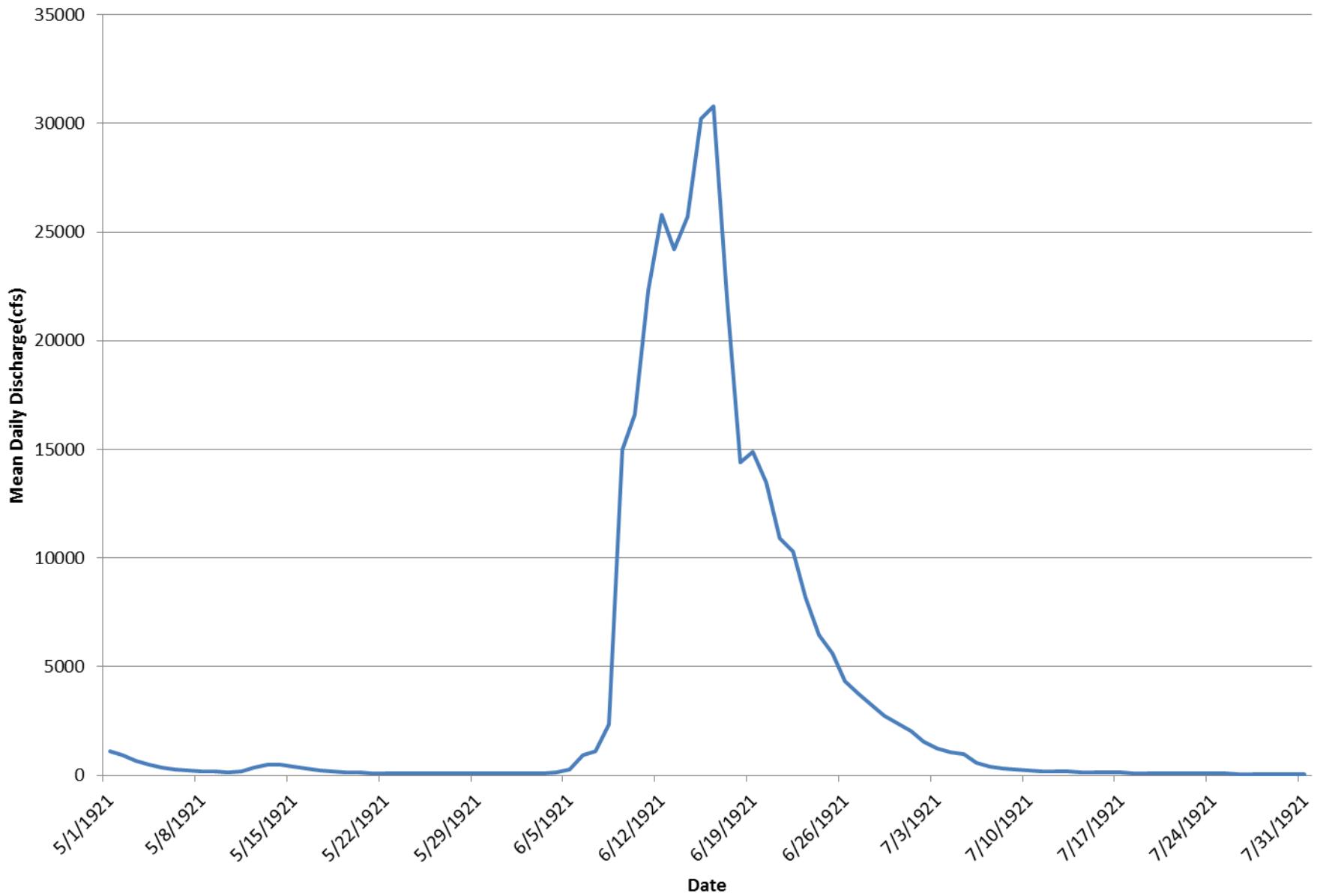
## South Platte at South Platte, CO Daily Discharge



## South Platte River at Kersey Daily Discharge

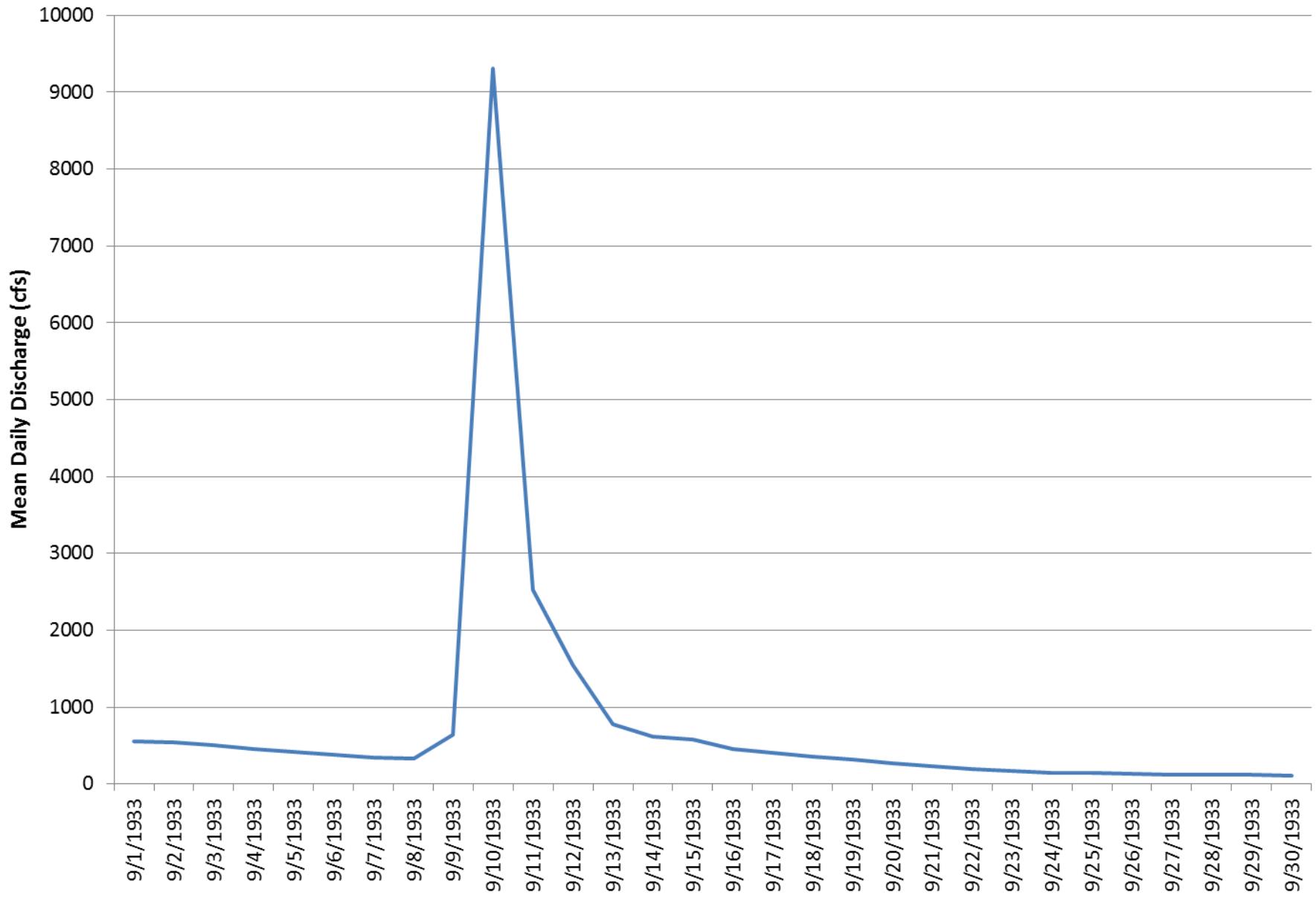


## South Platte River at Julesburg Daily Discharge



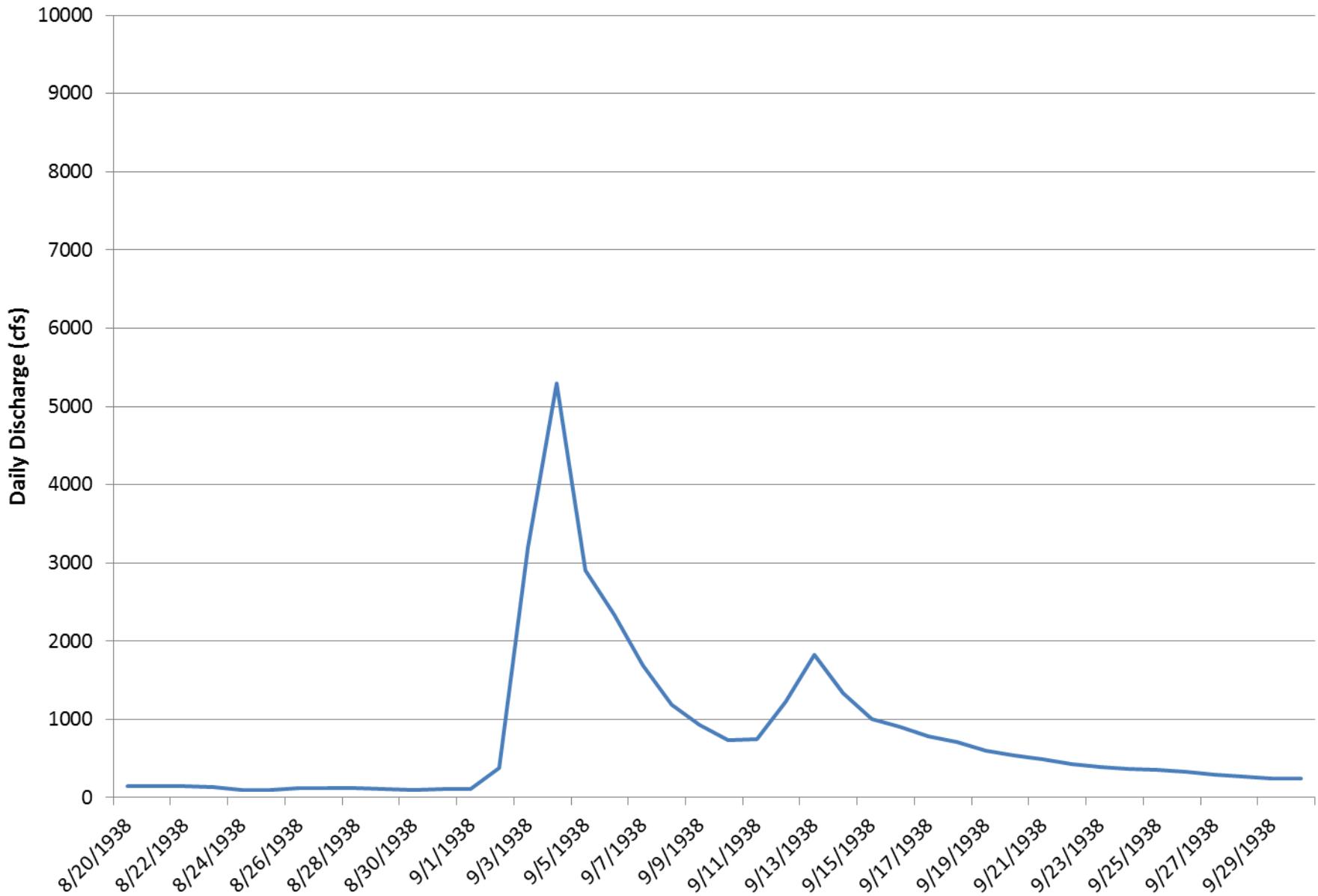
1933

# South Platte River at Denver Daily Discharge

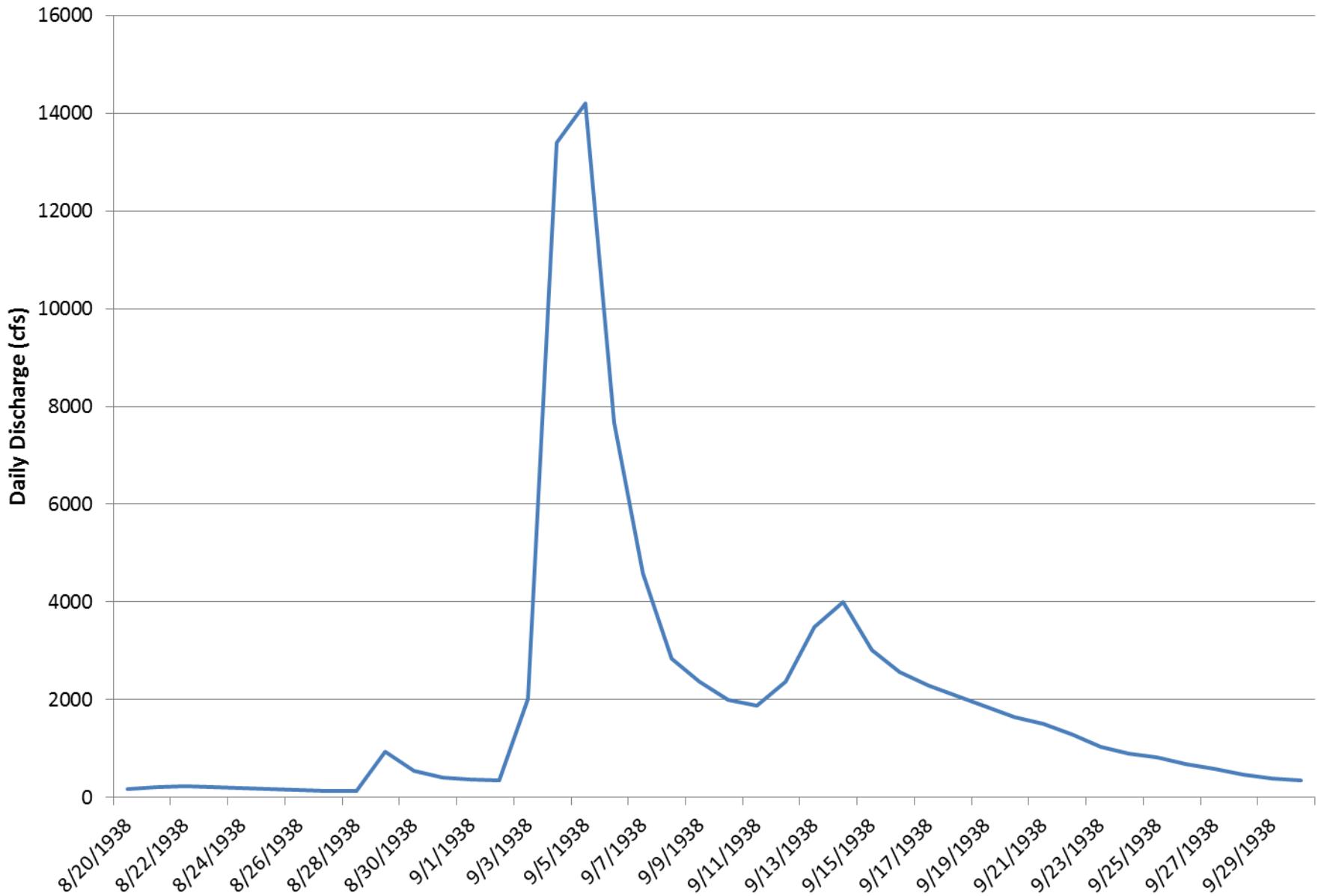


September 1938

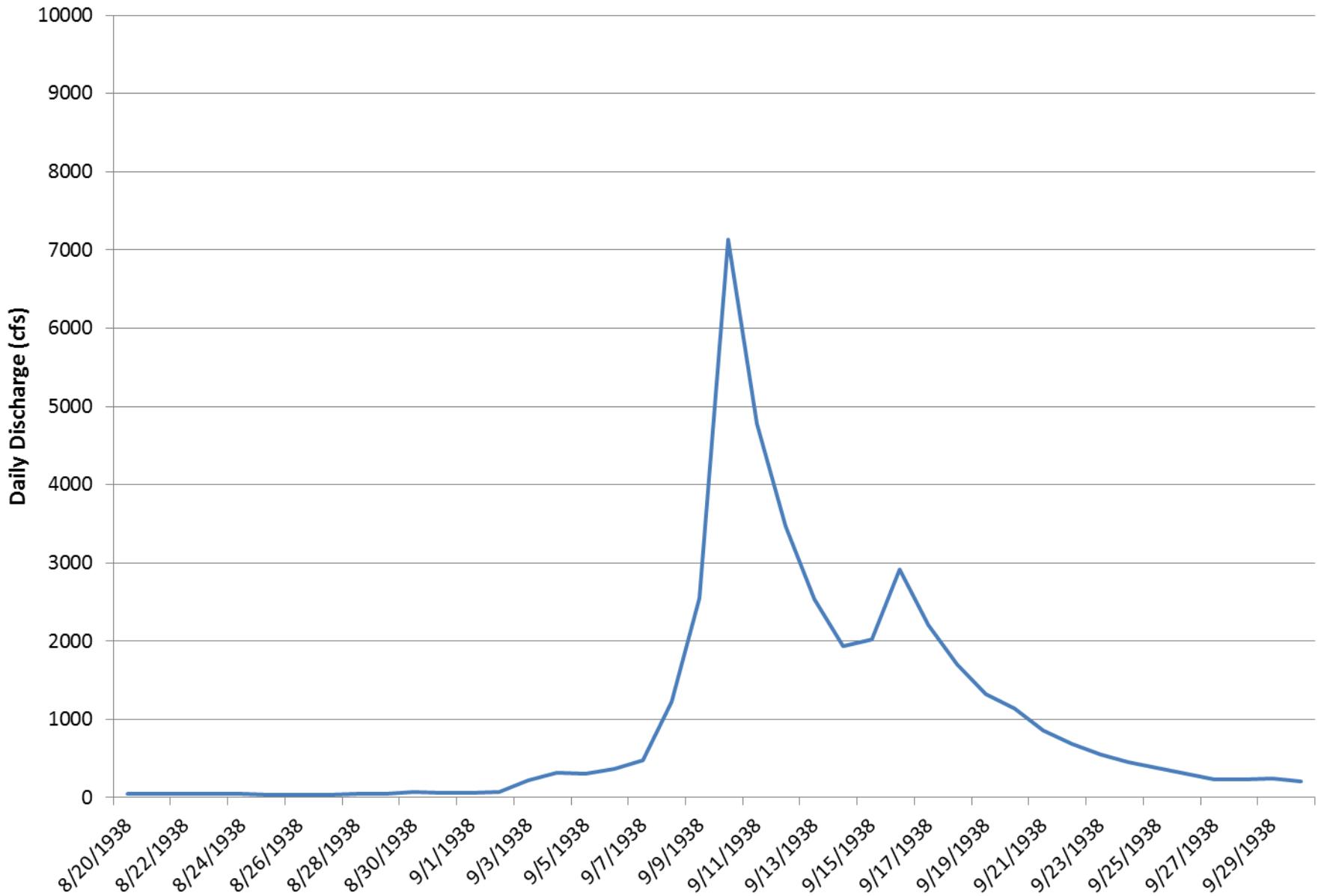
# St. Vrain at Platteville Mean Daily Discharge



# South Platte at Kersey Mean Daily Discharge

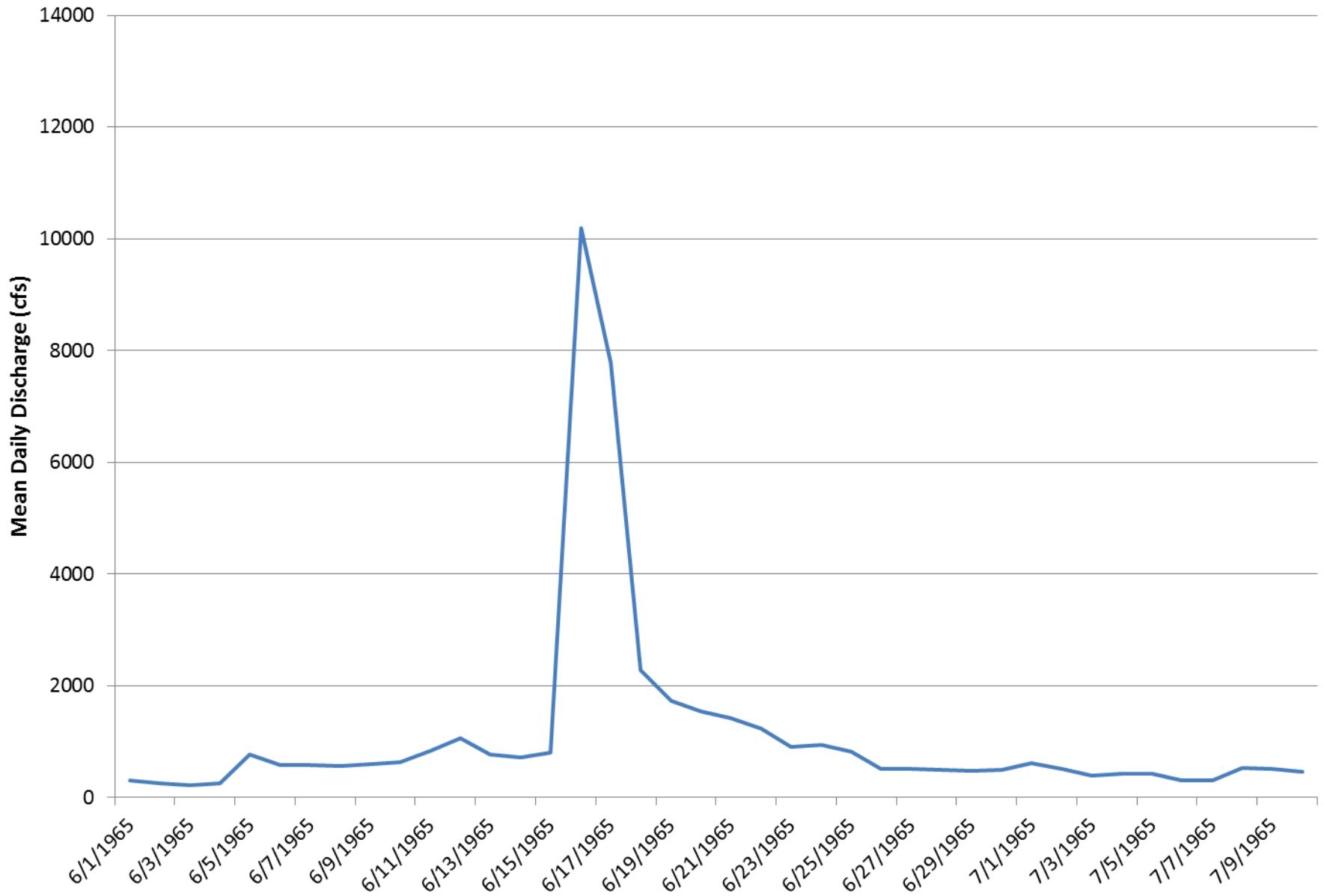


# South Platte at Julesburg, CO Mean Daily Discharge

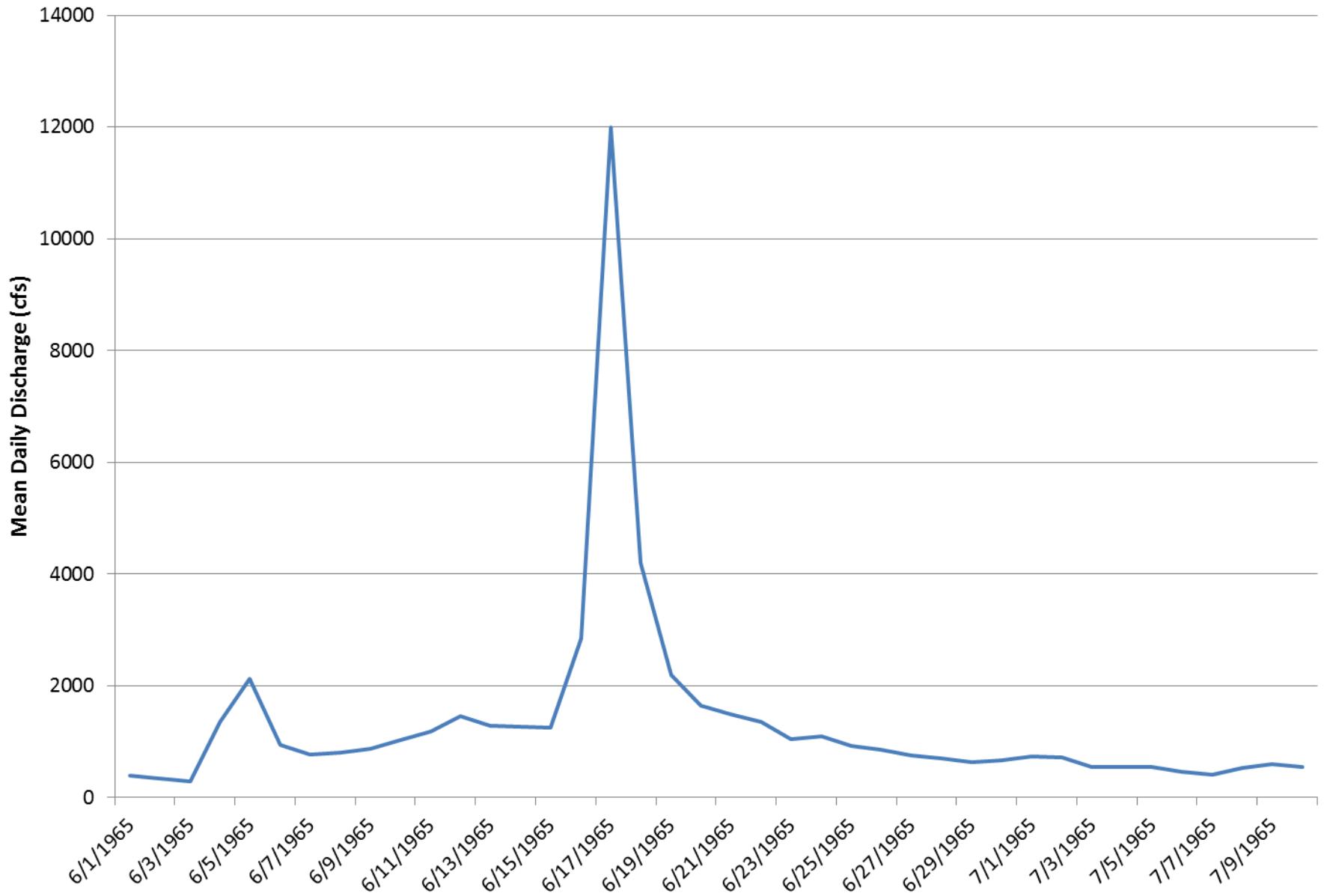


**1965**

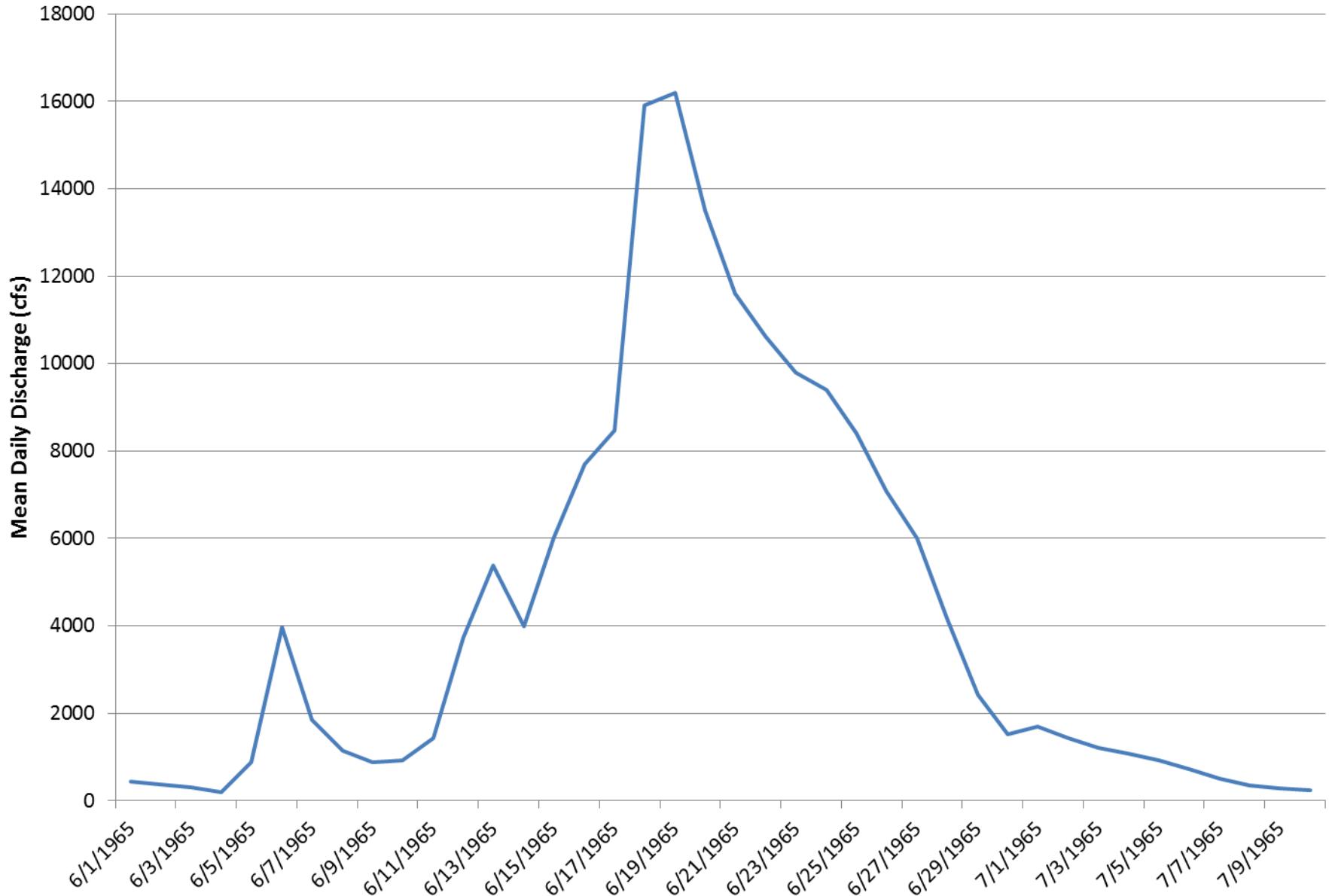
# South Platte River at South Platte Mean Daily Discharge



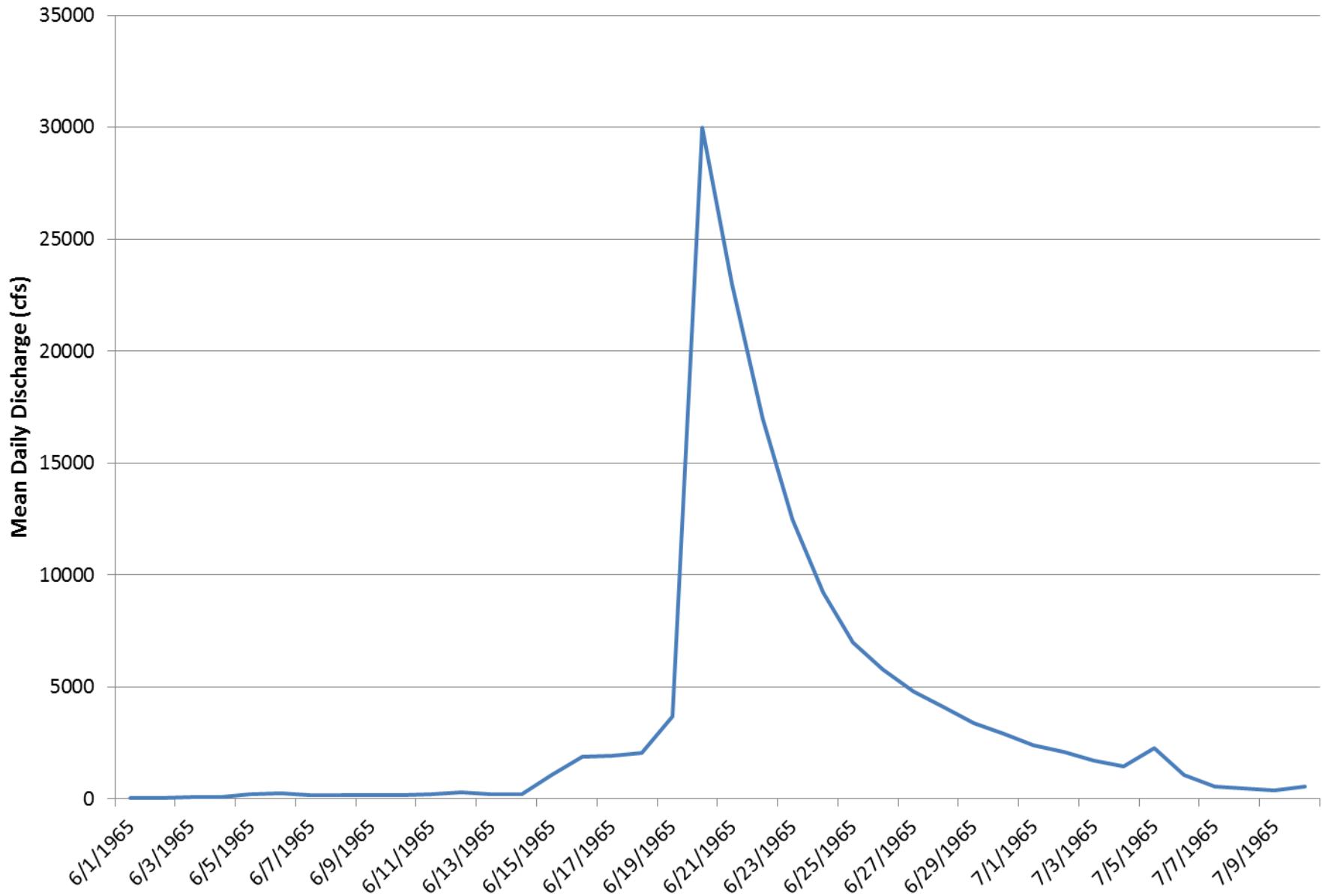
# South Platte River at Denver Mean Daily Discharge



# South Platte River at Kersey Mean Daily Discharge

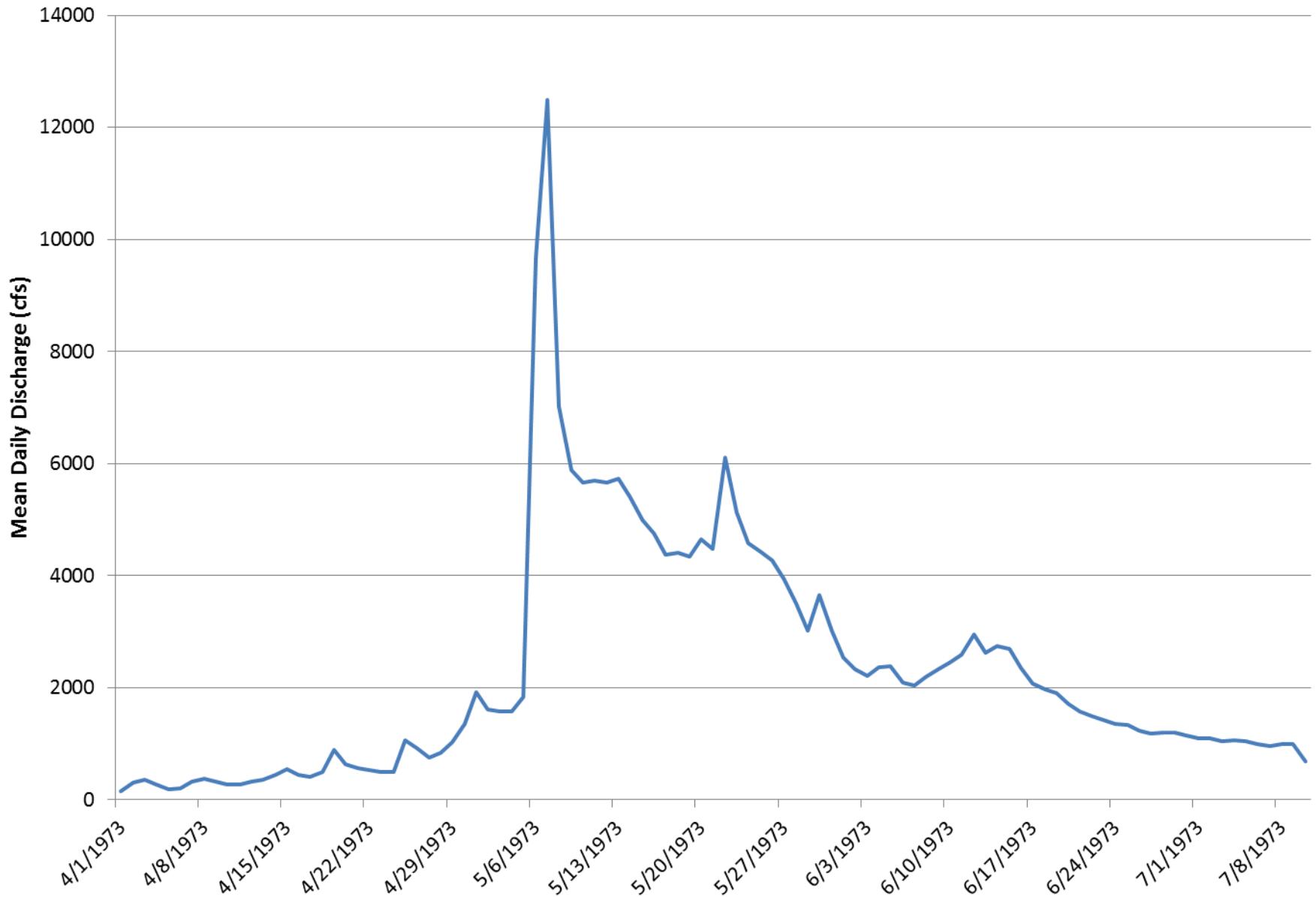


# South Platte River at Julesburg Mean Daily Discharge

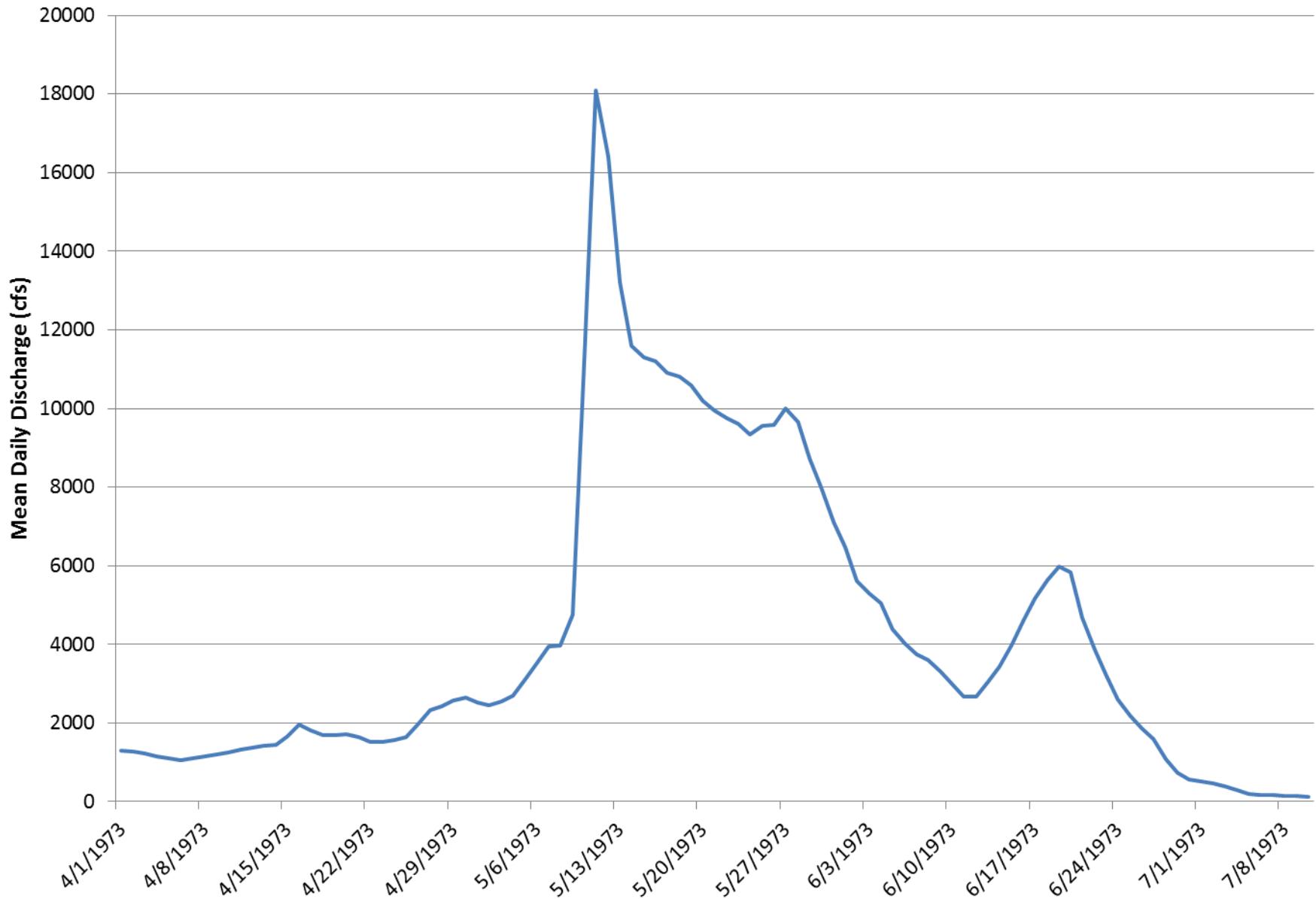


1973

# South Platte River at Denver Mean Daily Discharge

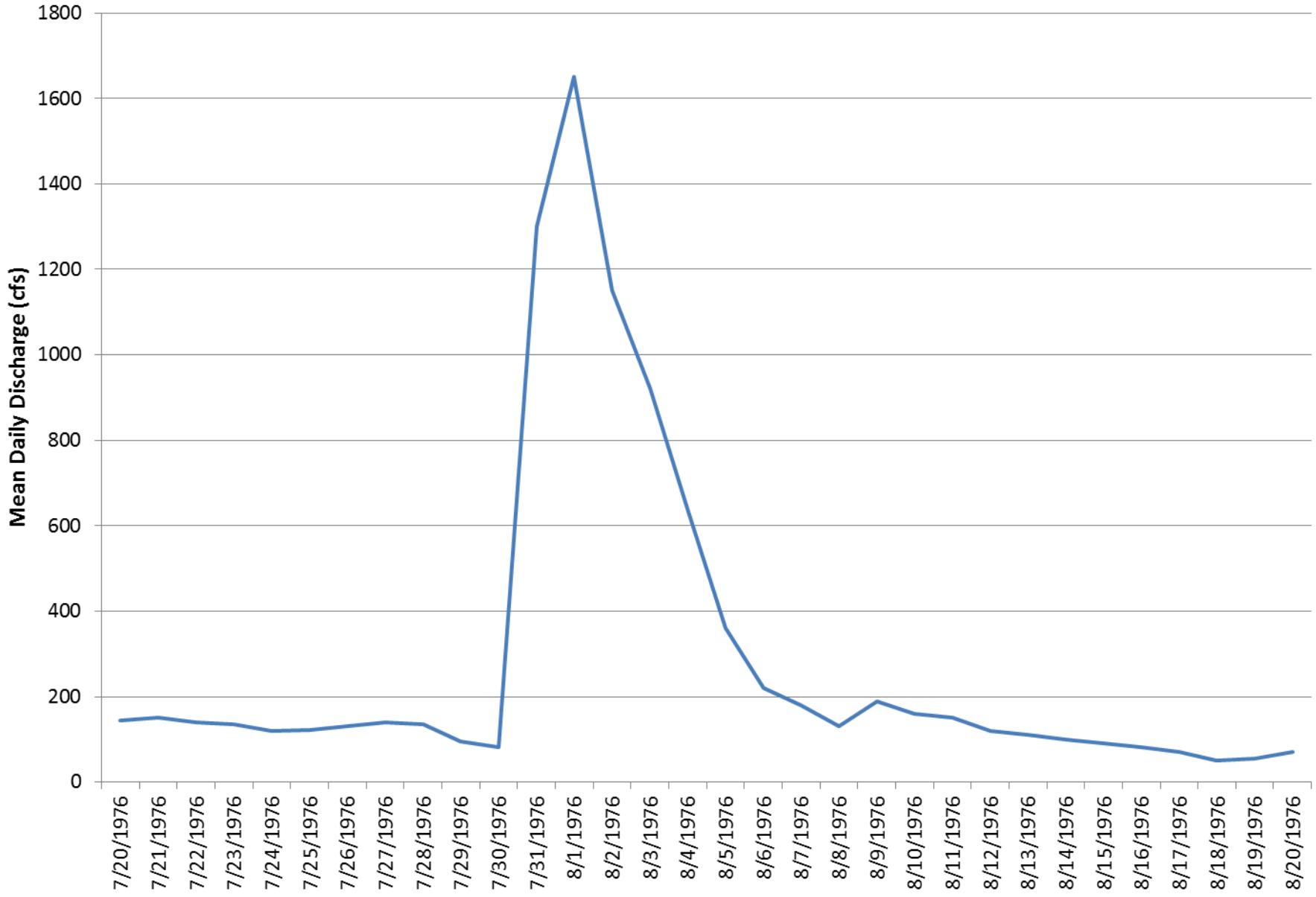


# South Platte River at Julesburg Mean Daily Discharge

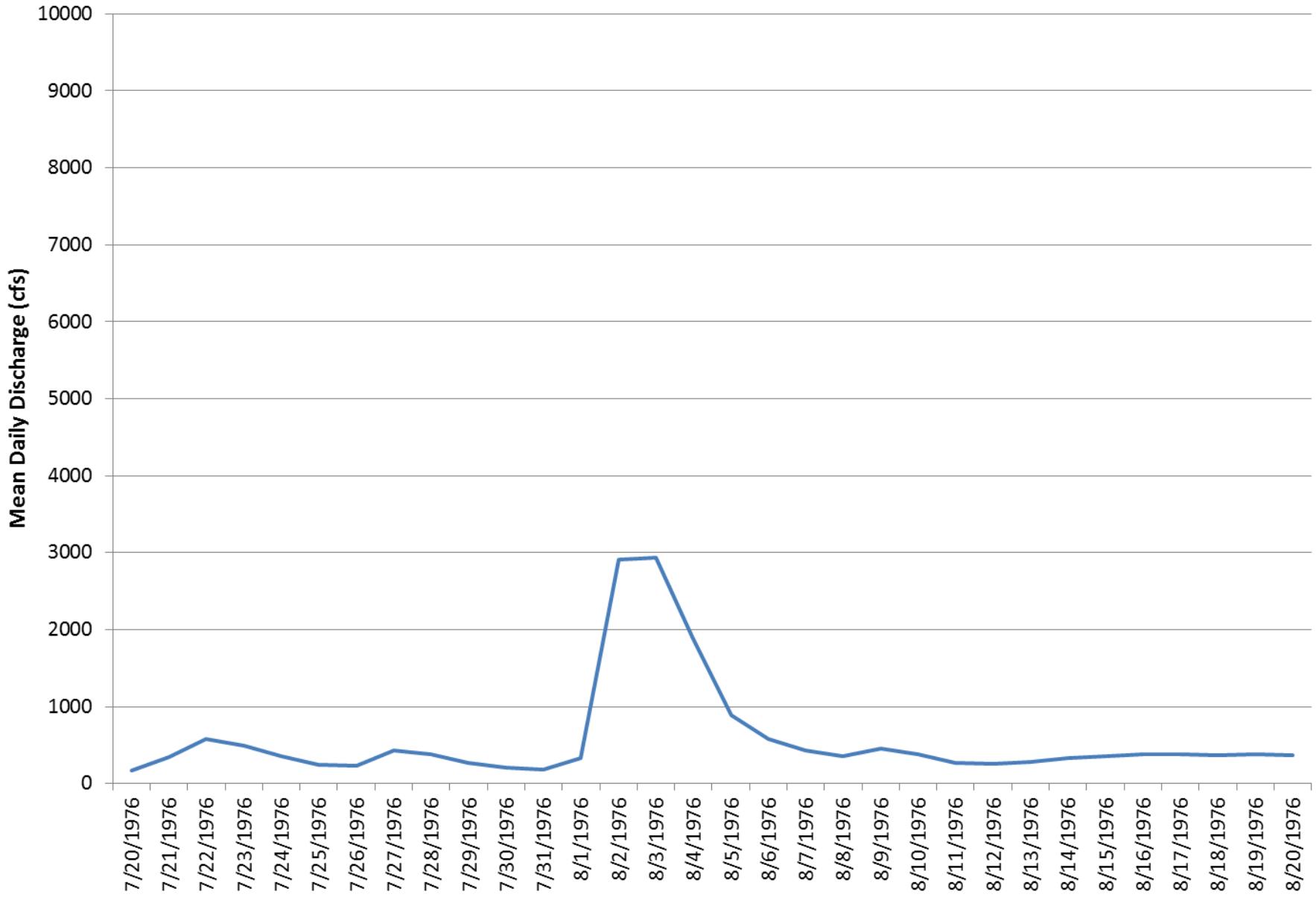


1976 Big Thompson

# Big Thompson River at Canyon Mouth Daily Discharge

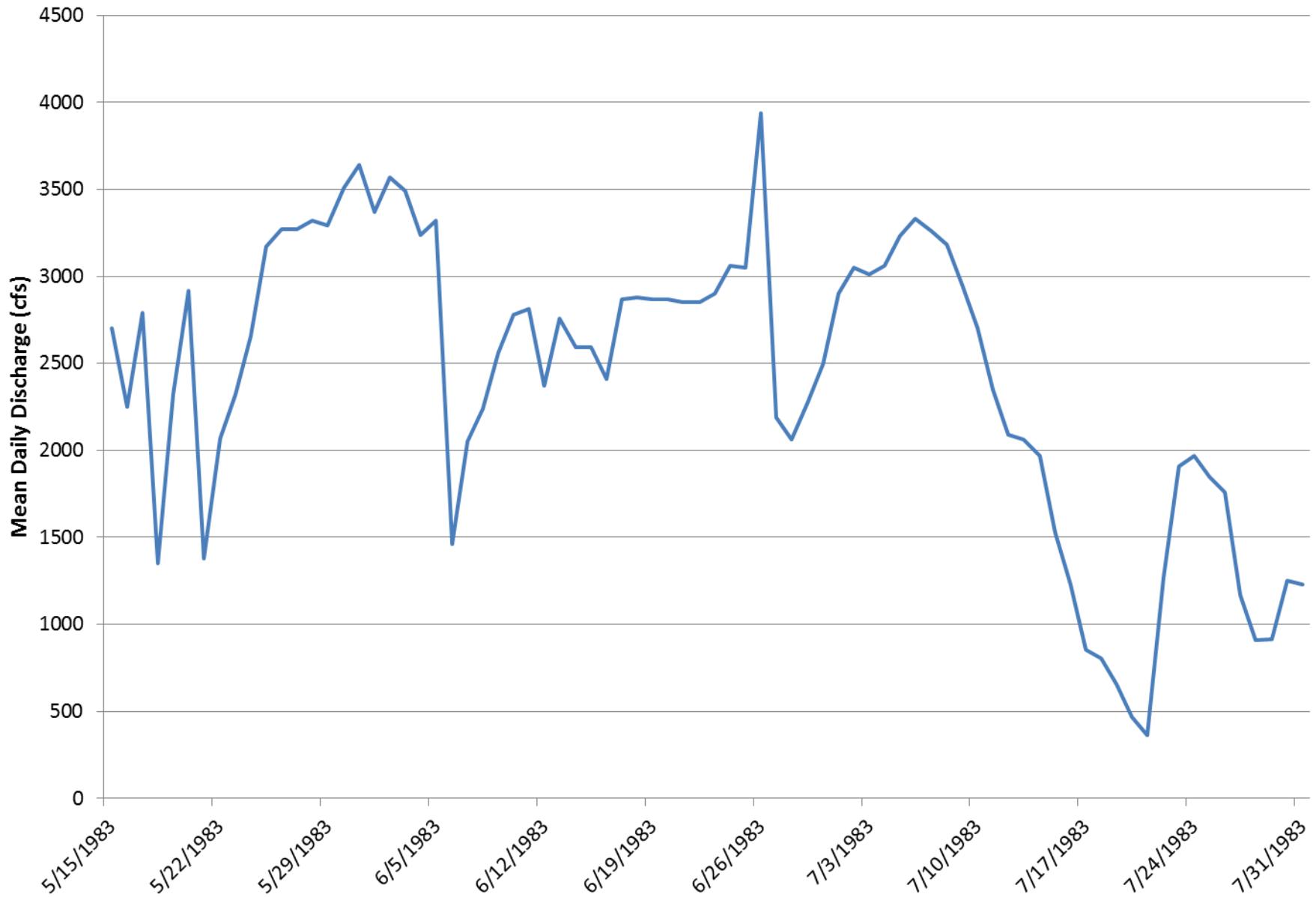


## South Platte River at Kersey Mean Daily Discharge

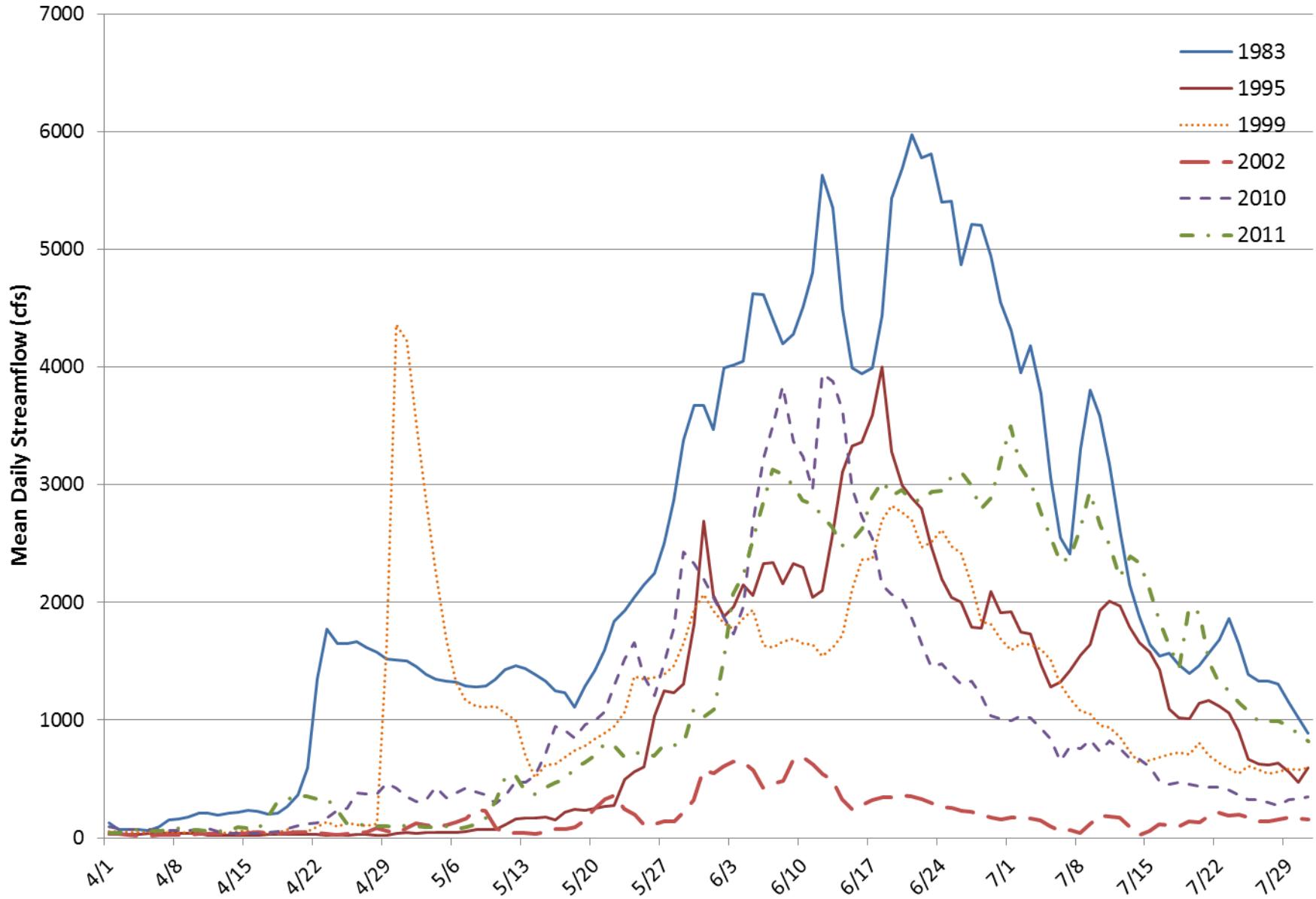


**1983**

# South Platte River at Denver Mean Daily Discharge



# Cache la Poudre at Canyon Mouth Mean Daily Discharge

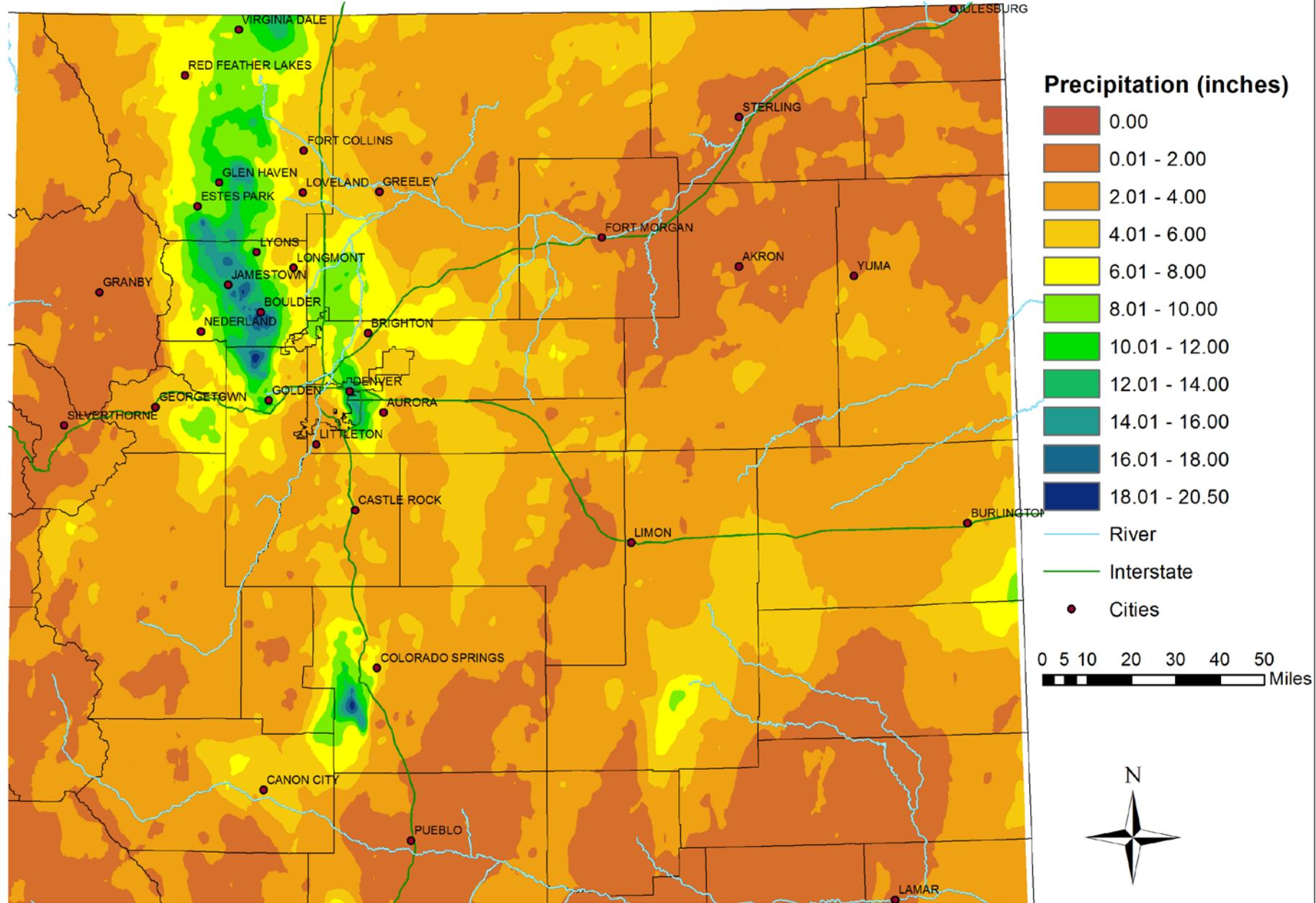


# What does this teach us?

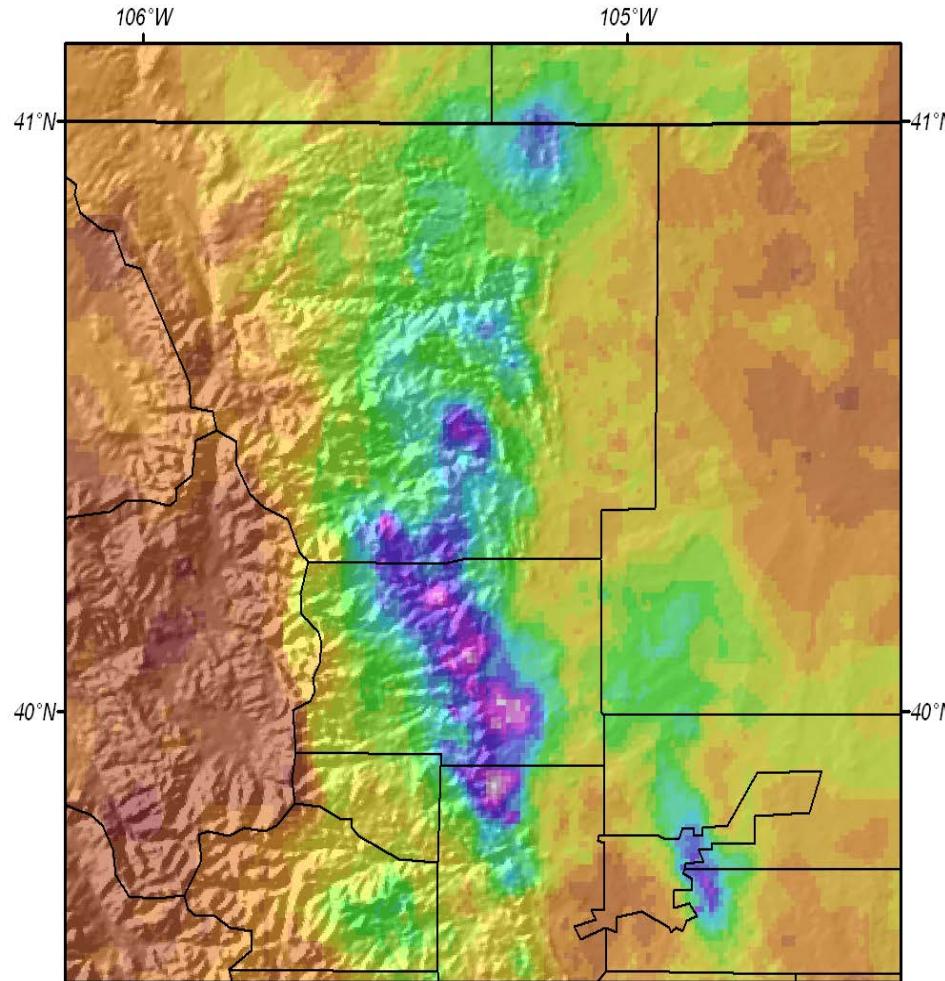
- Behind every S. Platte flood, is rain or snow (so get out there and measure it 😊)
- Plains floods and mountain floods are often different
- Floods are pretty darn common and come in several flavors (the next may be coming sooner than you wish)
- Winter floods are rare and small (so you can at least 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

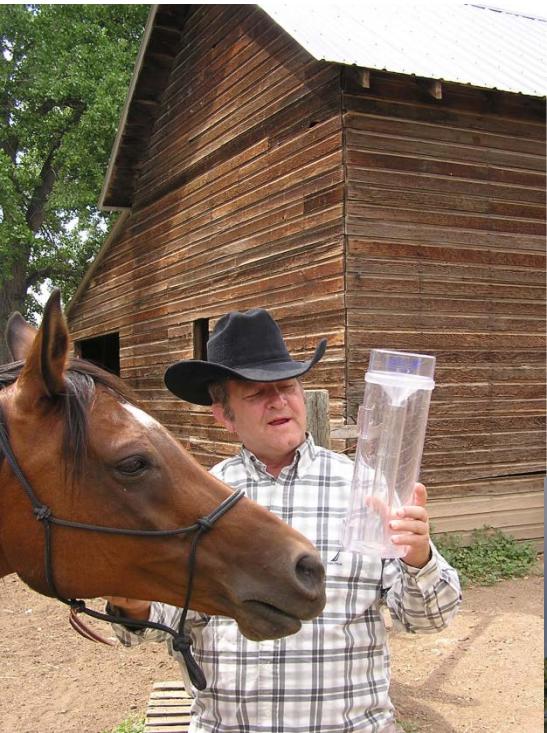


# With a team effort, Radar data were incorporated with the gauge data via the Storm Precipitation Analysis System

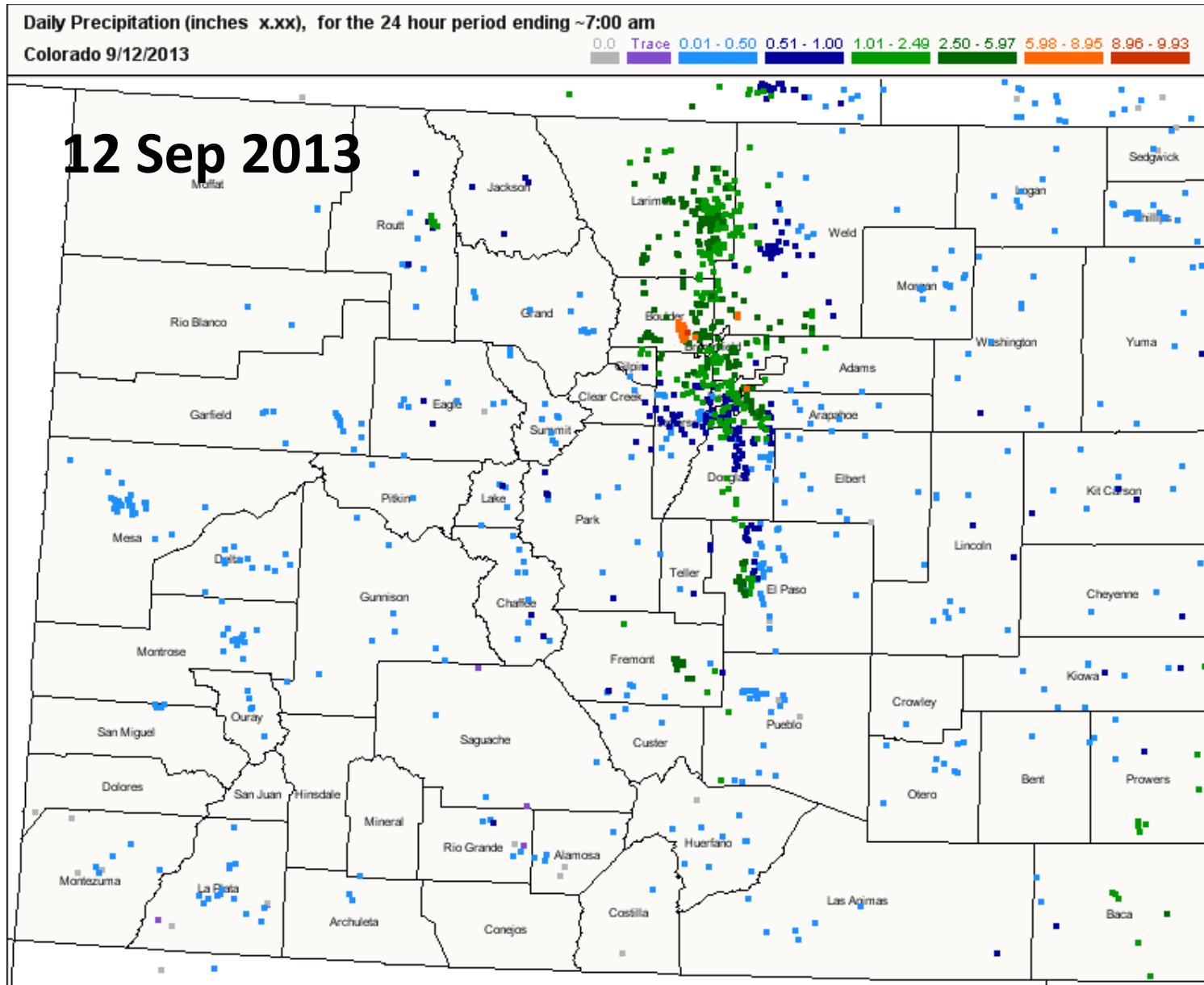


Map created with the Storm Precipitation Analysis System (SPAS) through a collaborative effort by Applied Weather Associates, LLC, MetStat, Inc. and the CSU Colorado Climate Center. Radar data supplied by Weather Decision Technologies, Inc.

# Floods happen -- You can help



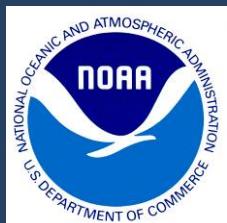
# We've still got some gaps on the maps



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



**<http://www.cocorahs.org>**

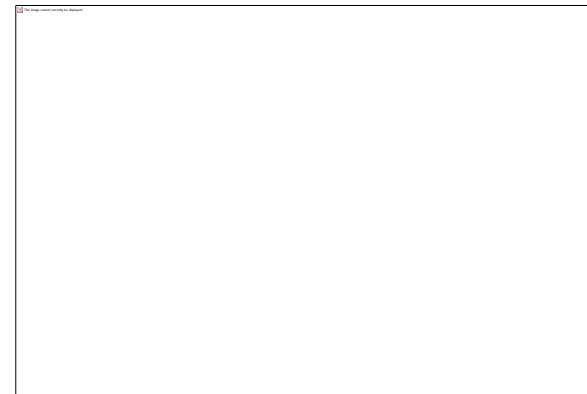
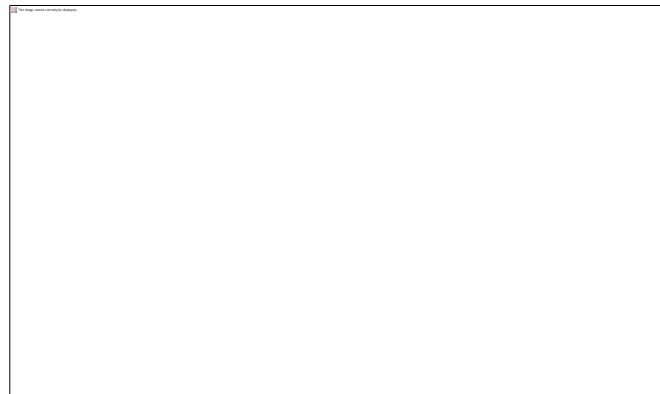
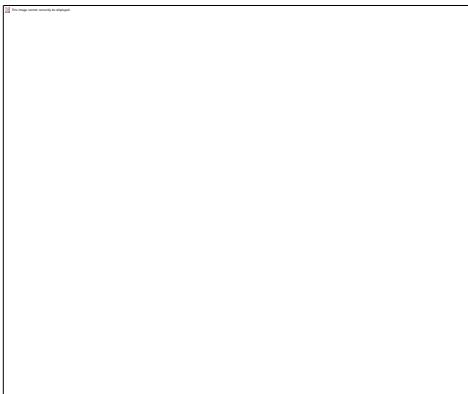
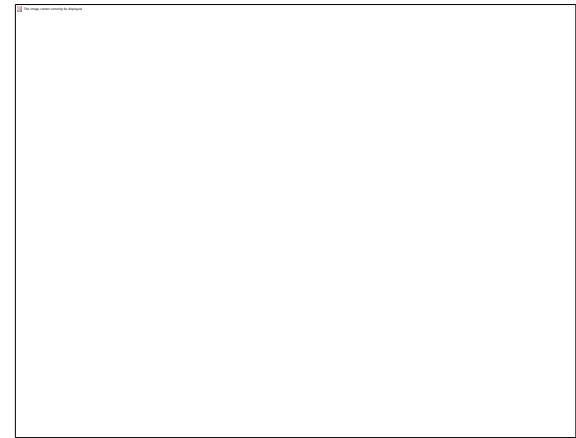
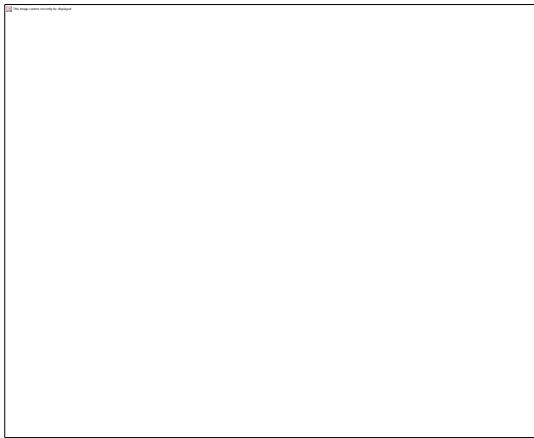
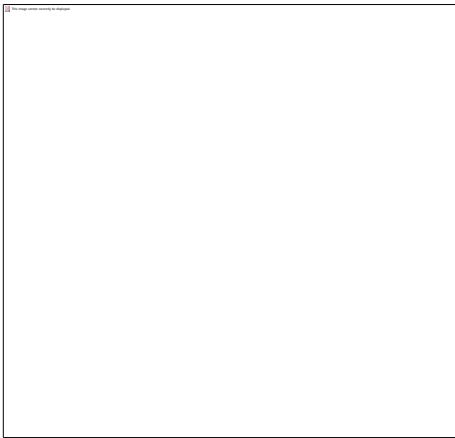


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NSF Informal Science Education Program,  
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Also, if you need timely climate information --

## Drought Early Warning System

National Integrated Drought Information System (NIDIS)



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