Climatological Perspectives on Flooding in Colorado

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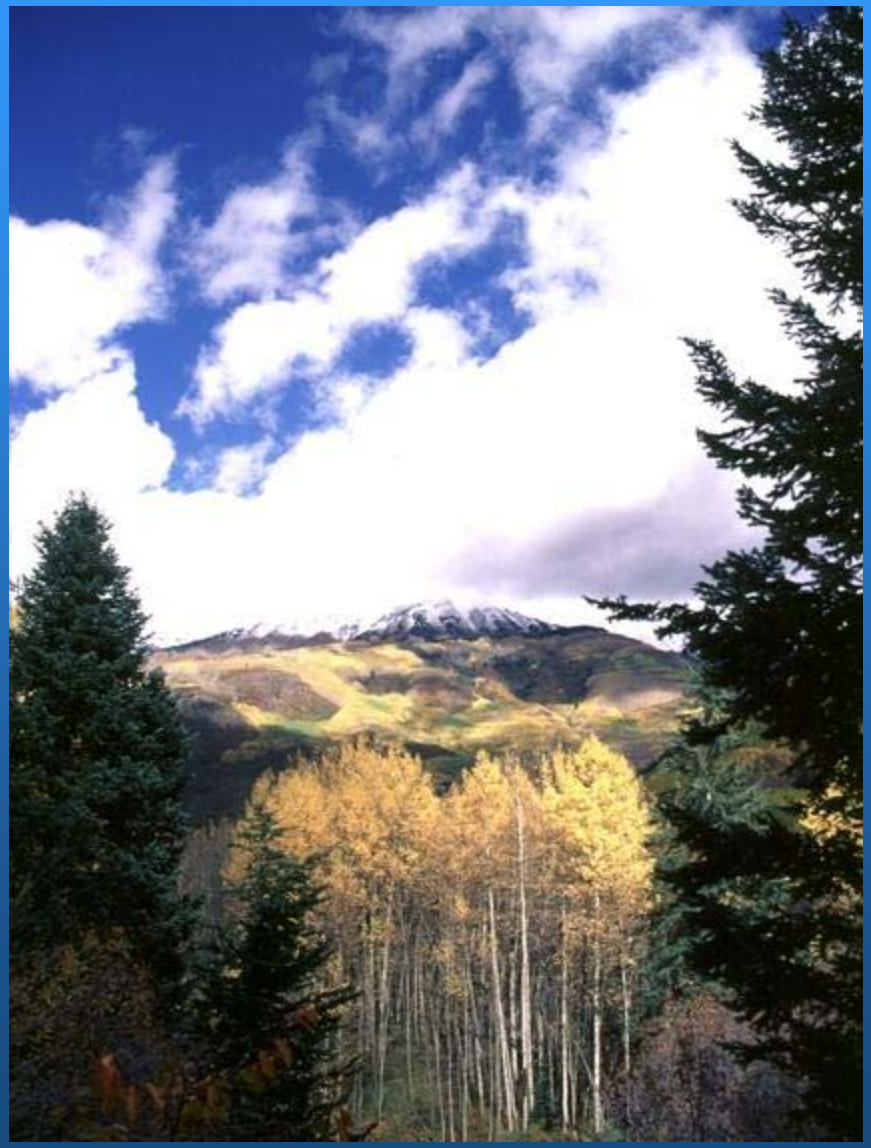
Colorado State University
Knowledge to Go Places

Colorado is known for:

1. Lots of sunshine
2. Changing seasons
3. Mountain snows
4. Periodic droughts
5. Occasional hailstorms
6. A little bit of everything – some times on the same day

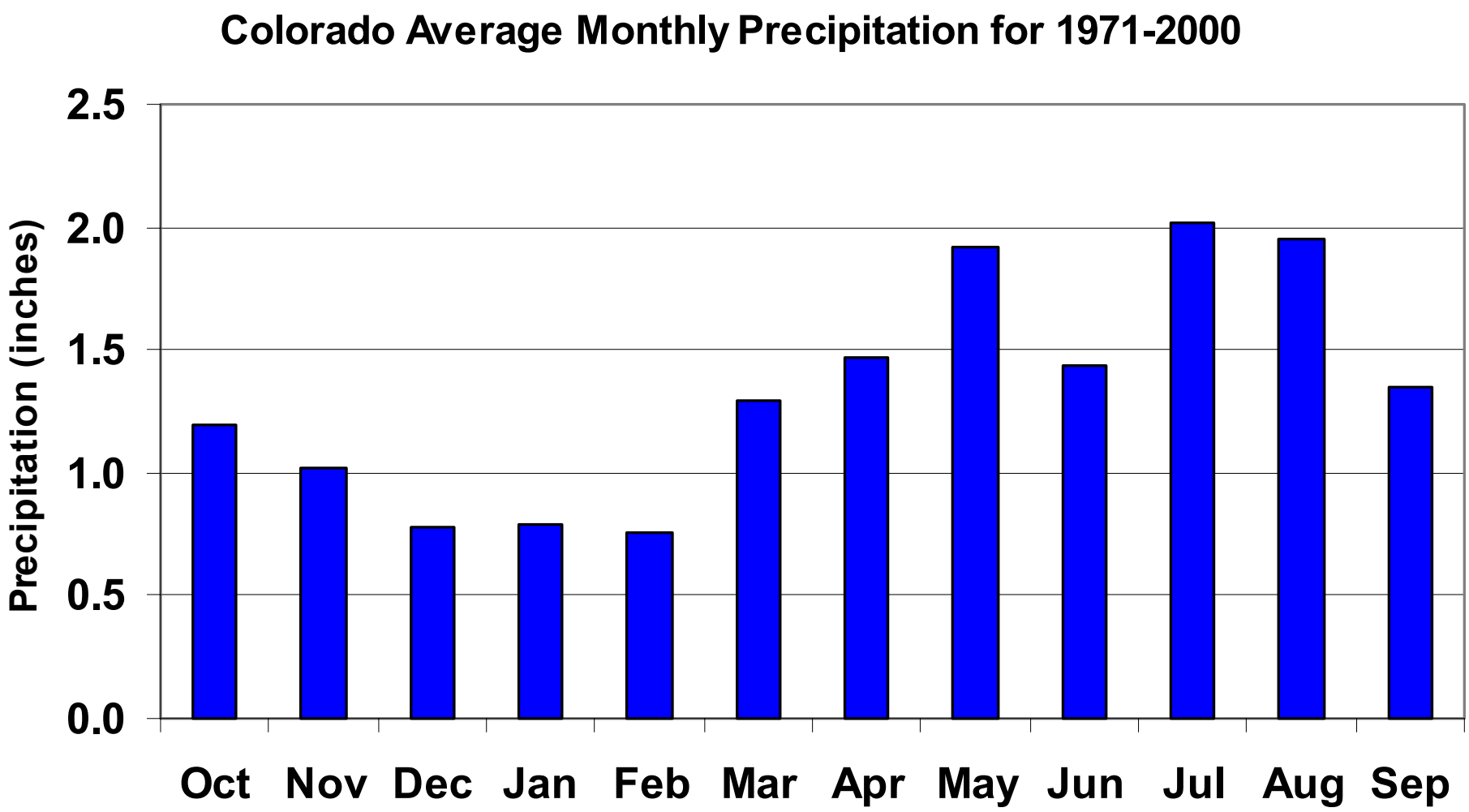


Colorado is also known for periodic and sometimes extreme floods!

Spring Creek Flood, photo by John Weaver

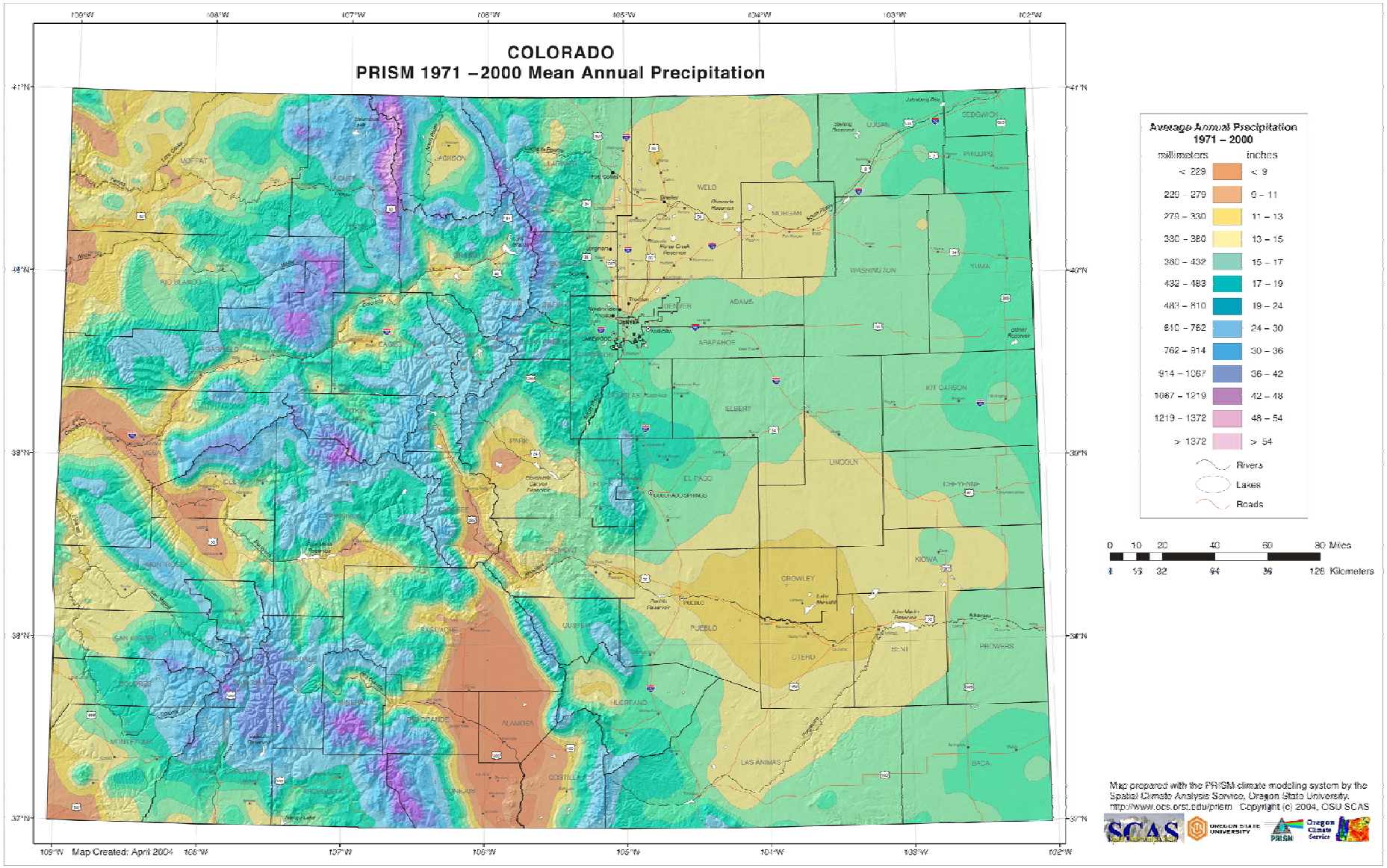
Let’s talk about Precipitation

Colorado Average Monthly Precipitation (1971-2000)

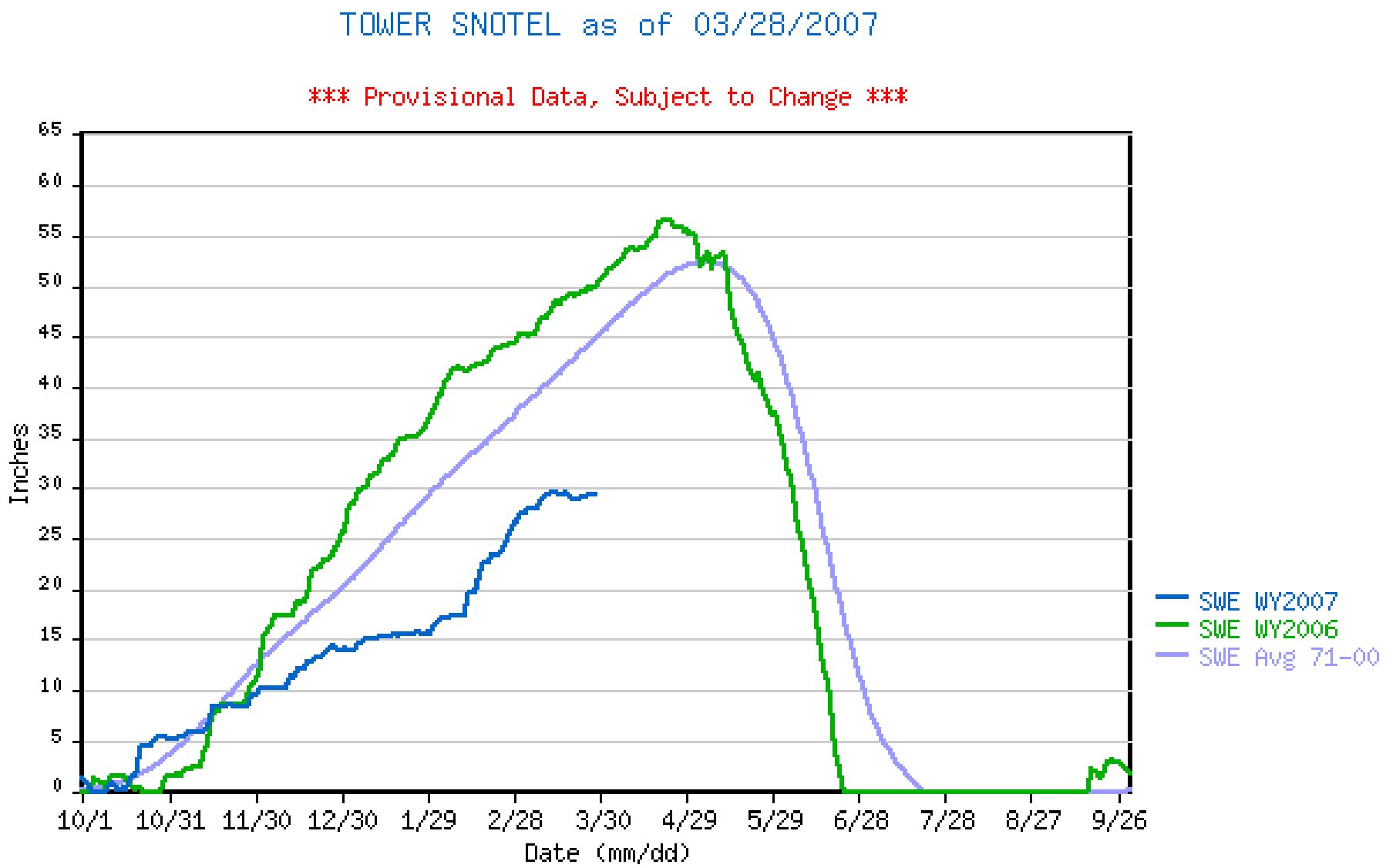


This map tells us a lot about precipitation, but not much about flooding

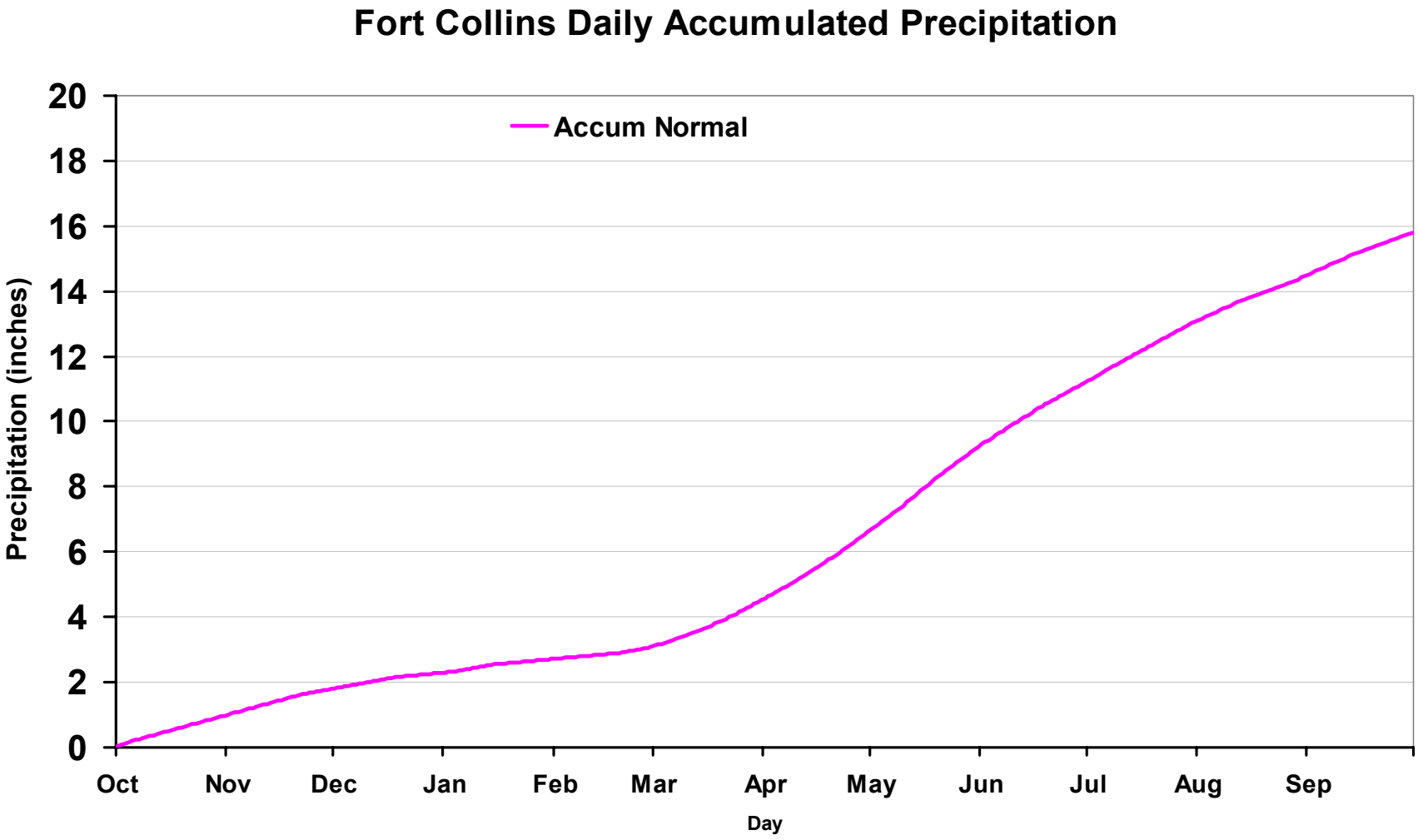
Colorado Average Annual Precipitation



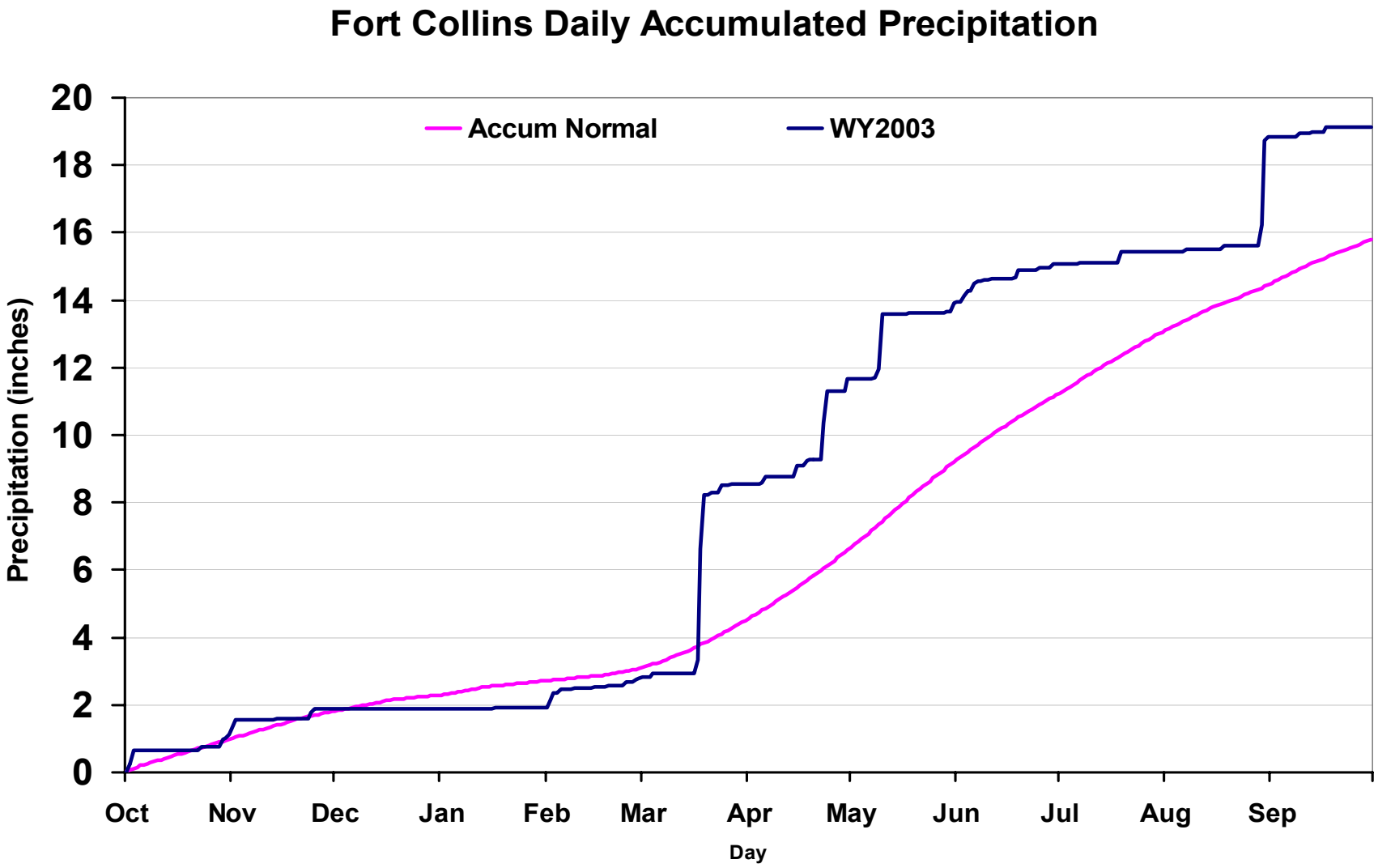
Snowpack accumulates like this – and melts at a predictable time of year



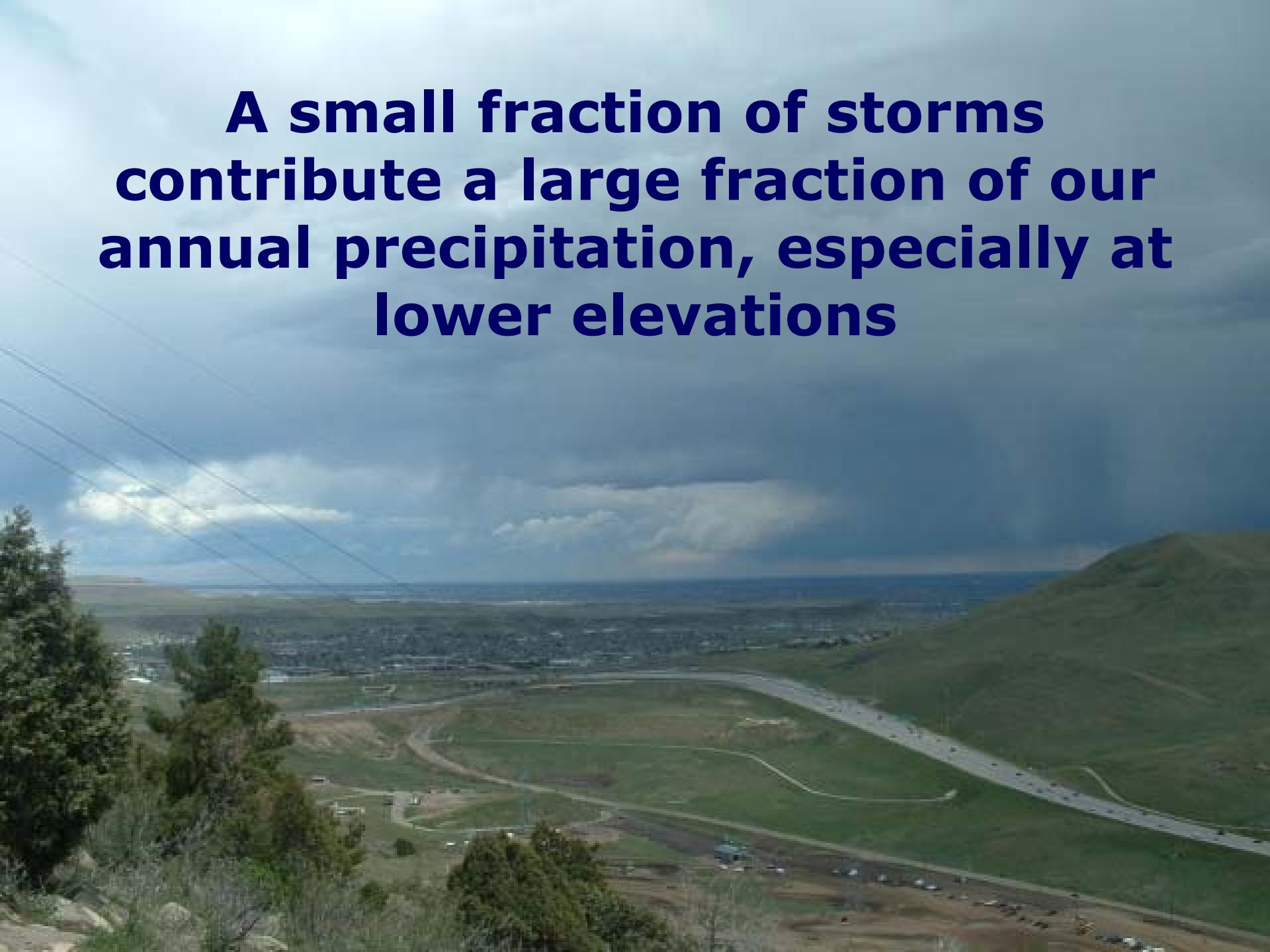
Average Precipitation Accumulates like this



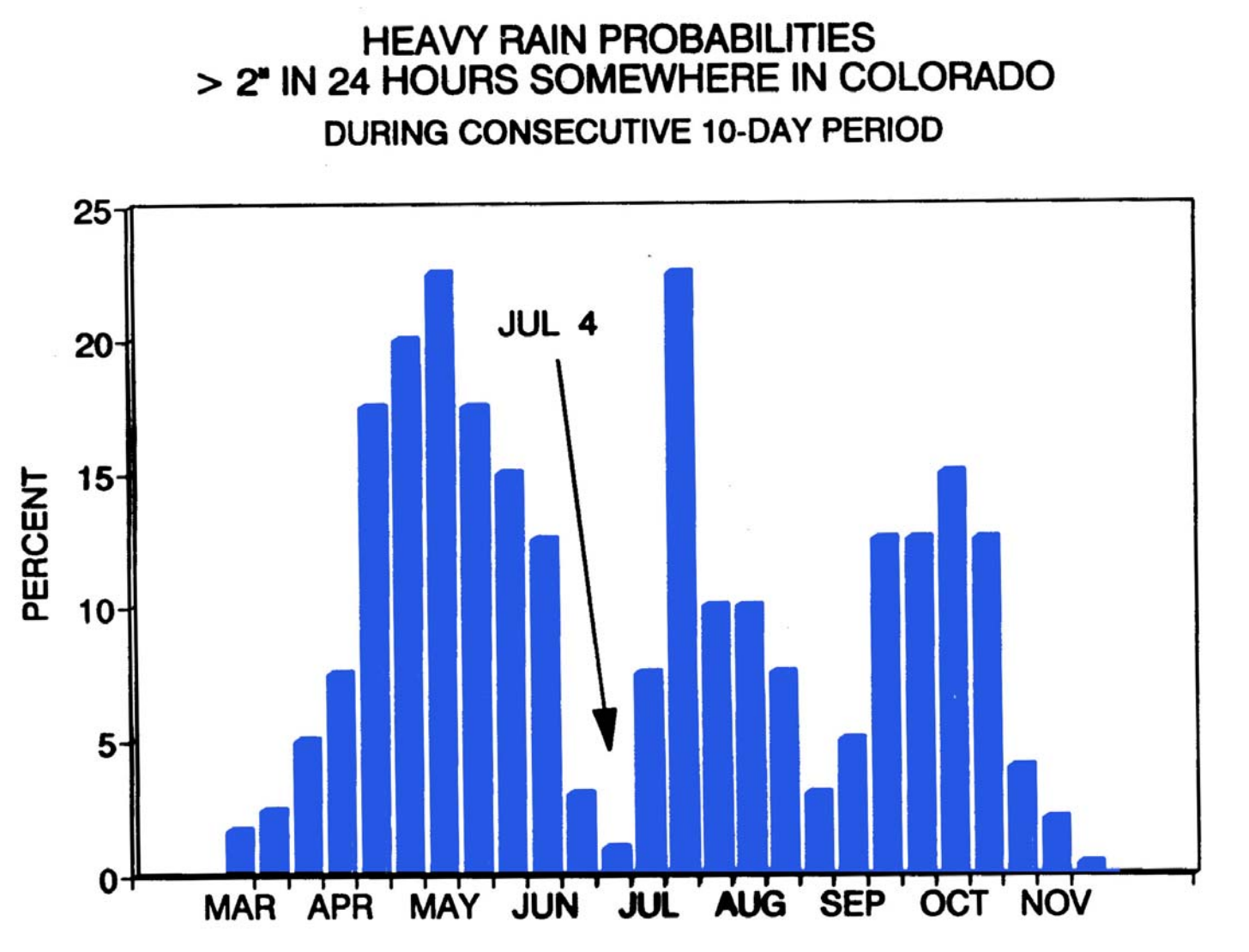
Actual Precipitation Accumulates like this!



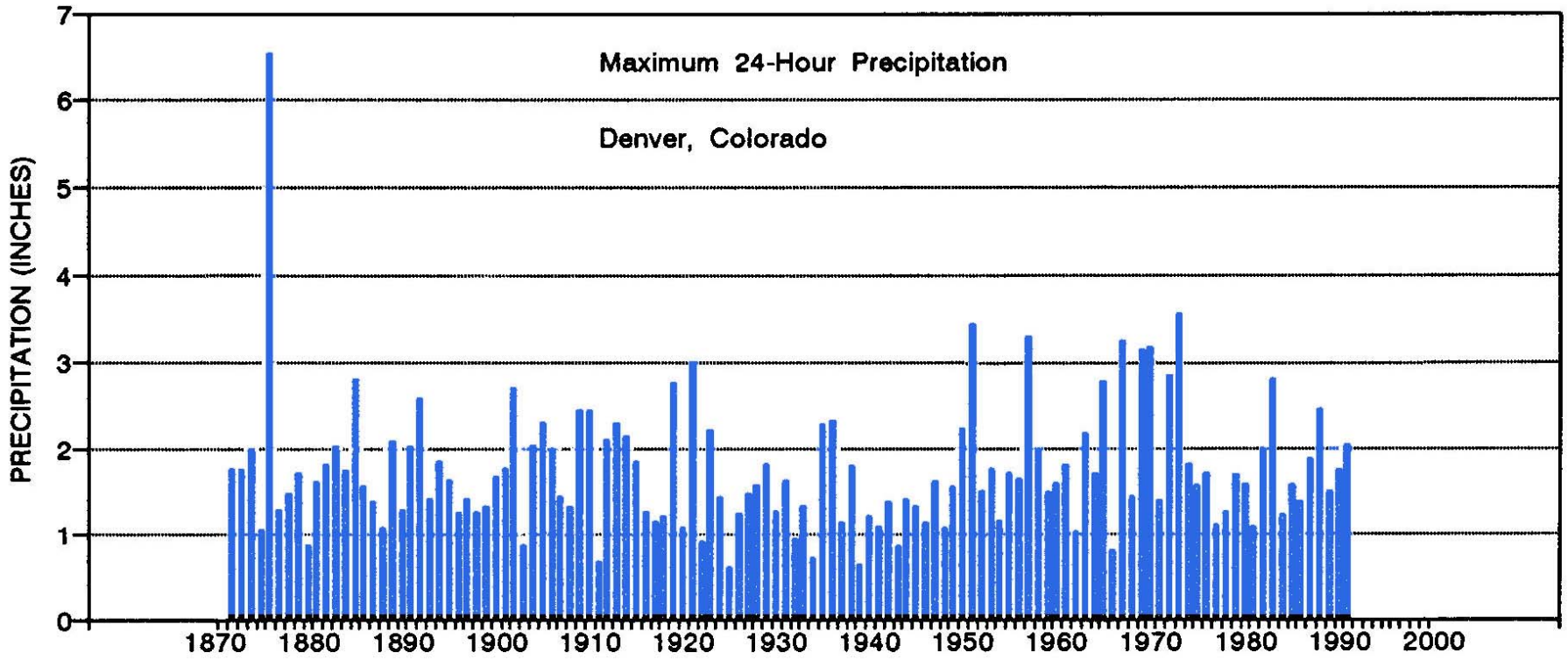
Rain comes in infrequent but occasionally very large events


A small fraction of storms contribute a large fraction of our annual precipitation, especially at lower elevations

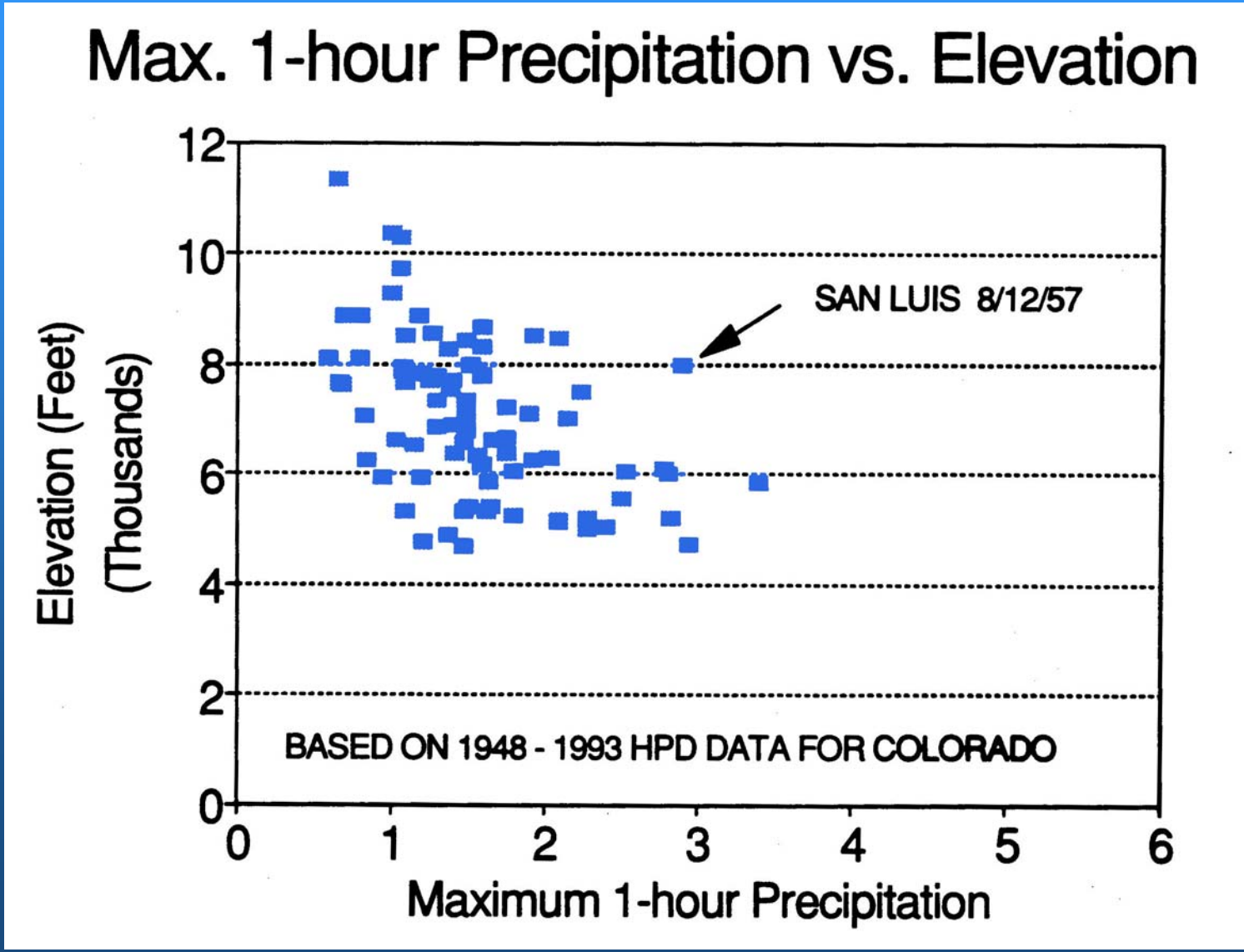
We know when heavy rains are most likely



Denver Maximum 1-day Precipitation History



Maximum 1-hour Precipitation vs Elevation



A List to Remember: Colorado Historic Floods

1864, May 20, Jun 9-10, Cherry Creek, etc.

1876, May 22, Denver

1885, Jul 25, Colorado Springs

1894, May 29-31, Boulder County

1904, May 20-21, Larimer County

A List to Remember: Colorado Historic Floods

1911, Oct 4-6, Durango, etc.

1921, Jun 2-6, Pueblo/Penrose

1935, May 30-31, Hale/Elbert

1938, Sep 2, Morrison & Colo Front Range

1951, Aug 2-3, Larimer County

1955, May 18-23, Southern Front Range

A List to Remember: Colorado Historic Floods

1956, Jul 30-Aug 3, Denver

1965, Jun 13-20, Denver/Eastern Colo

1969, May 4-8, Jefferson/Boulder Counties

1970, Sep 4-6, Southwest Colorado

1976, July 31, Big Thompson Canyon

A List to Remember: Colorado Historic Floods

1981, Jul 2-3, Trinidad

1983 & 1984, Widespread, large volume snowmelt floods

1997, Jul 28, Fort Collins

1997, Jul 29-30, Sterling

1999, Apr 30, Colo Springs & Arkansas Valley ....

Many other smaller or more localized storms, such as Penrose, July 2006

Some Points to Remember:

Really big floods are not that uncommon (usually at least once per decade). Most would not have been anticipated 1-2 weeks in advance even with today's forecasting skill.

Colorado Snowmelt Usually is Well Behaved

Snowmelt floods usually require prolonged very warm temperatures and/or widespread late-season snowpack including snow on south facing slopes

Rain on Snow is "usually" not a problem – but . . . . ??


Most of Colorado's worst
floods are rainfall floods

Flash floods are especially problematic over sparsely vegetated sloped surfaces

Floods and drought are NOT mutually exclusive

Intense rains are often highly localized

Fort Collins
Rainfall
Jul 27, 4pm to
Jul 28, 11pm
1997

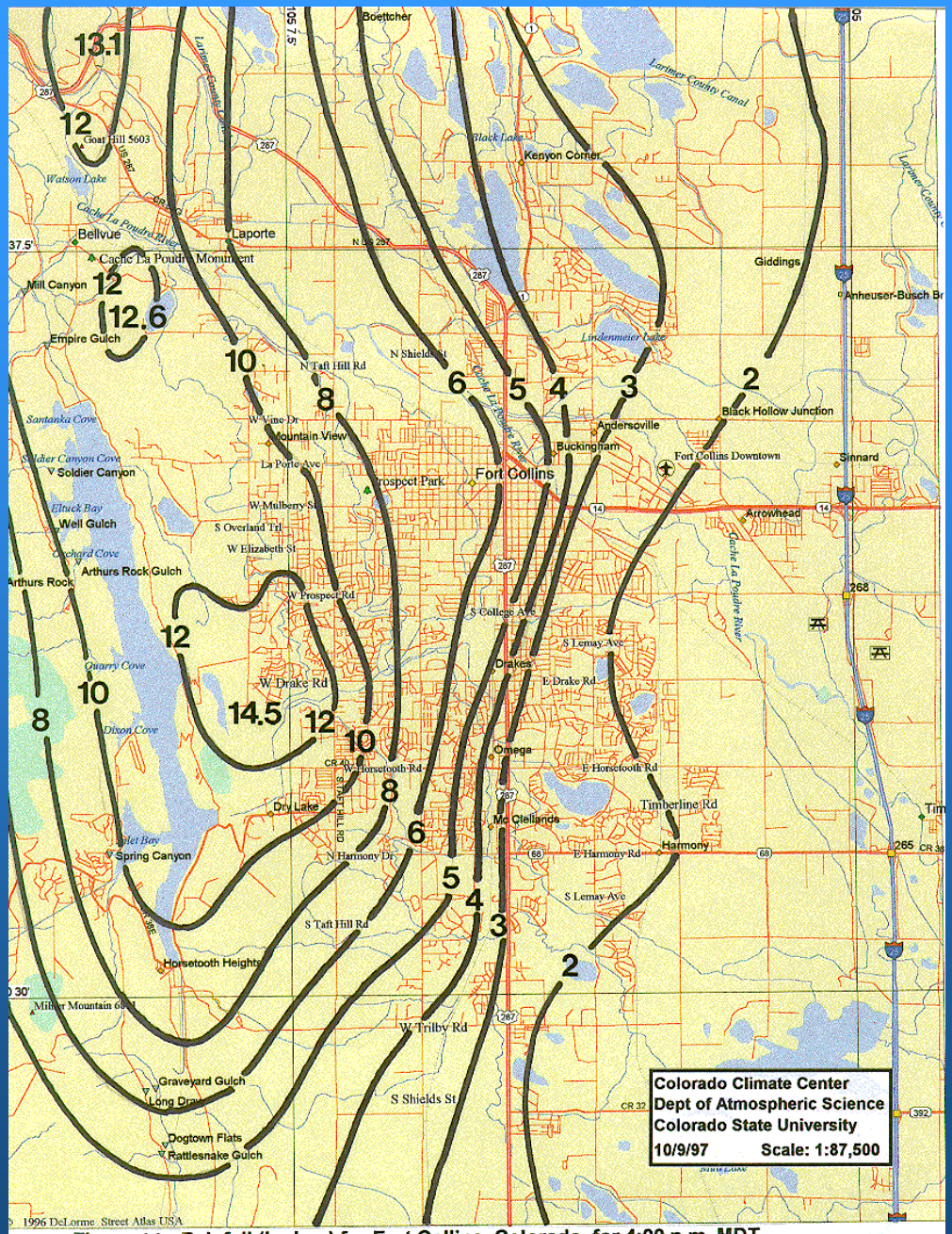
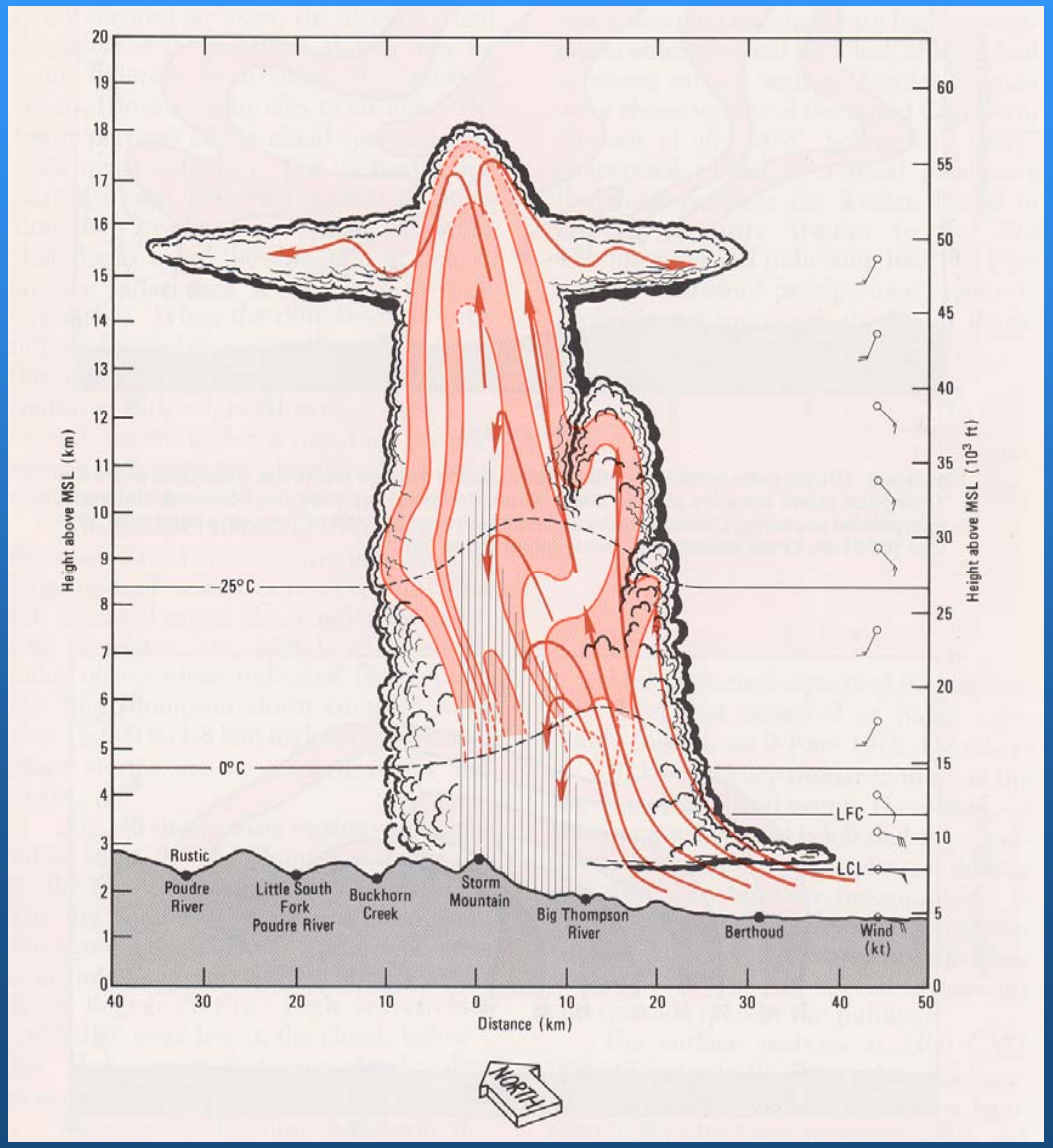


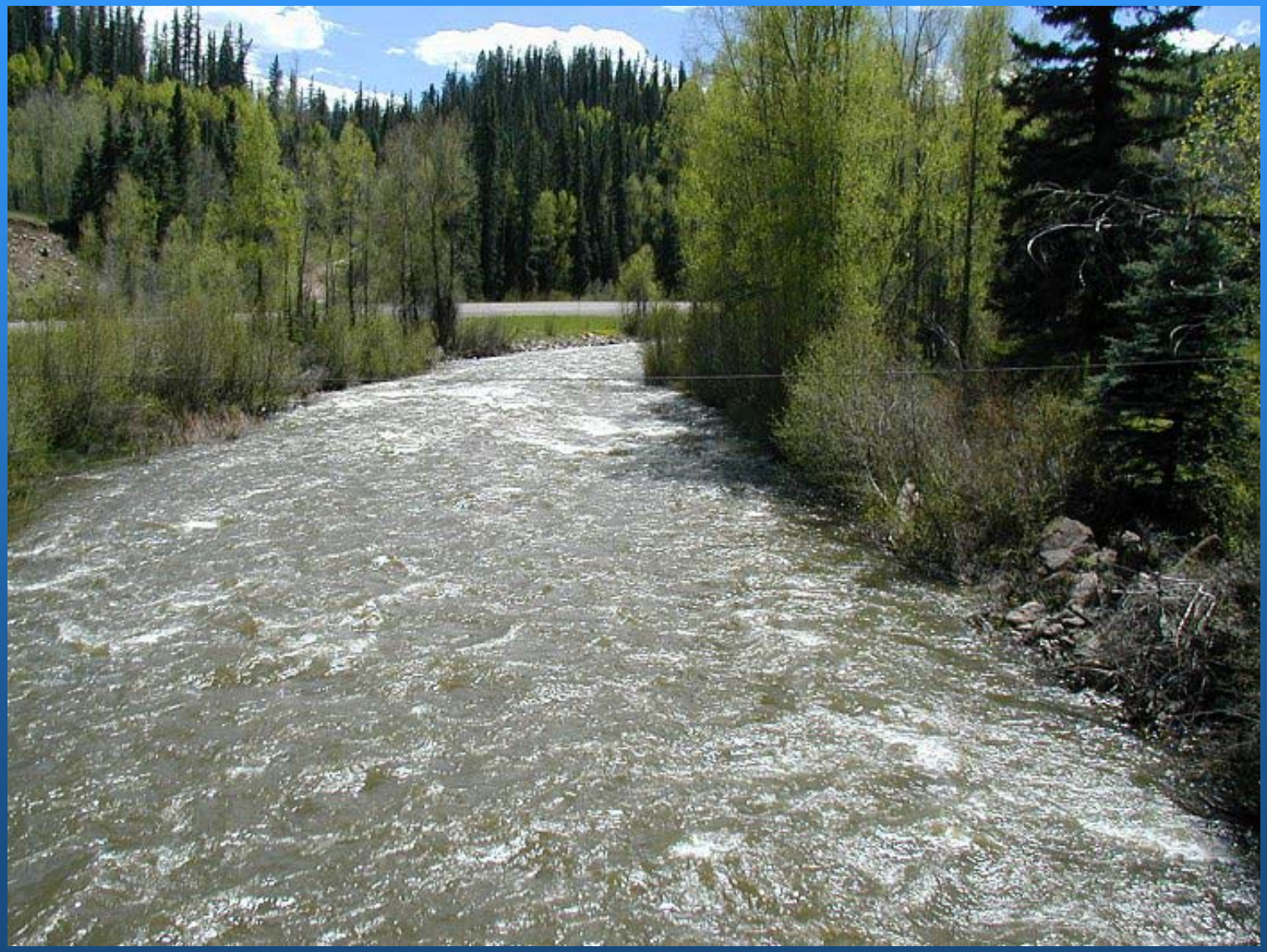
Figure 14. Rainfall (inches) for Fort Collins, Colorado, for 4:00 p.m. MDT July 27, 1997 through 11:00 p.m. MDT for July 28, 1997

If it rains hard enough, everything is in the "flood plain"

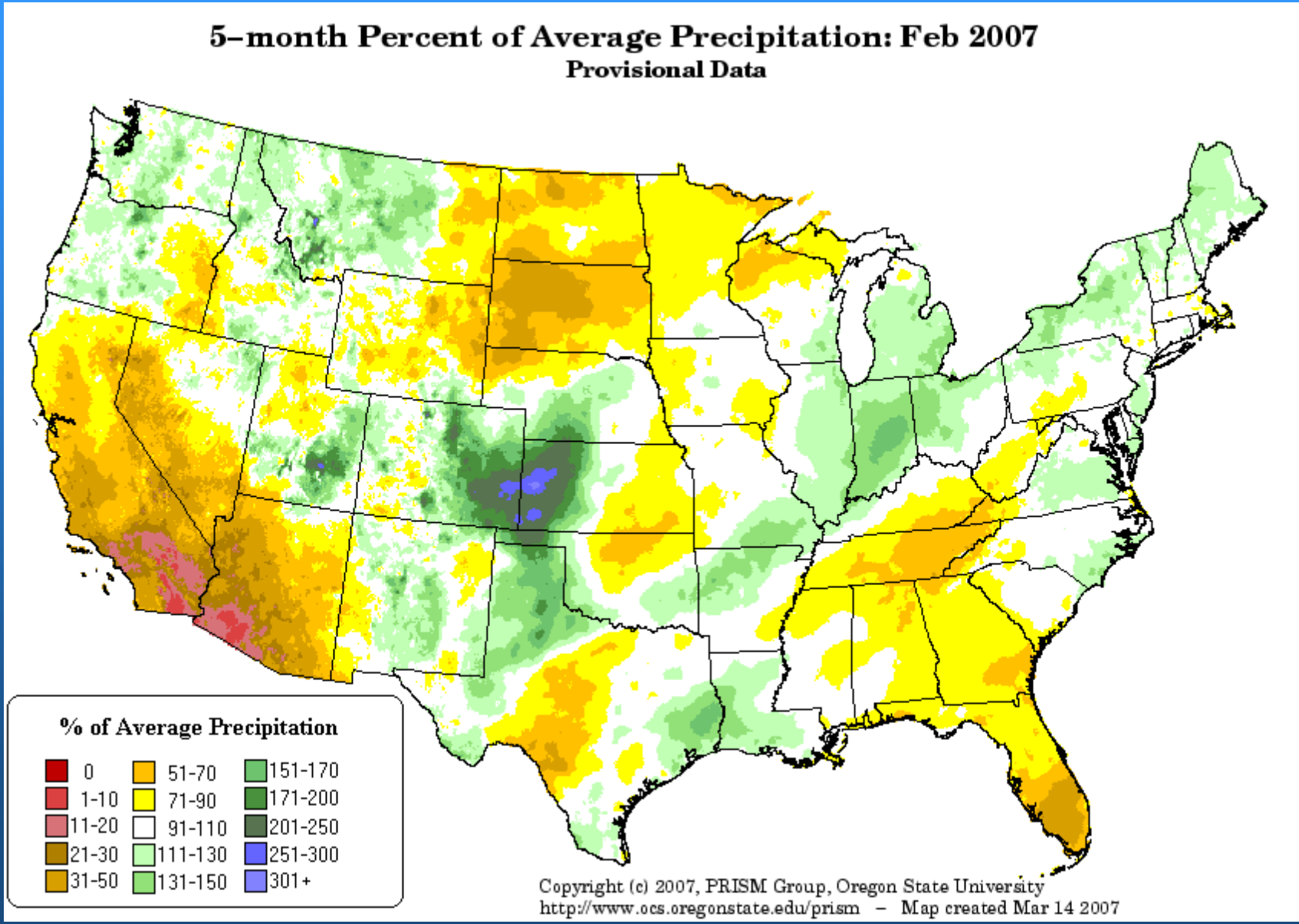


Big Thompson Flood

Late April through Mid June is our main season for "volume" floods



Where do we stand today??

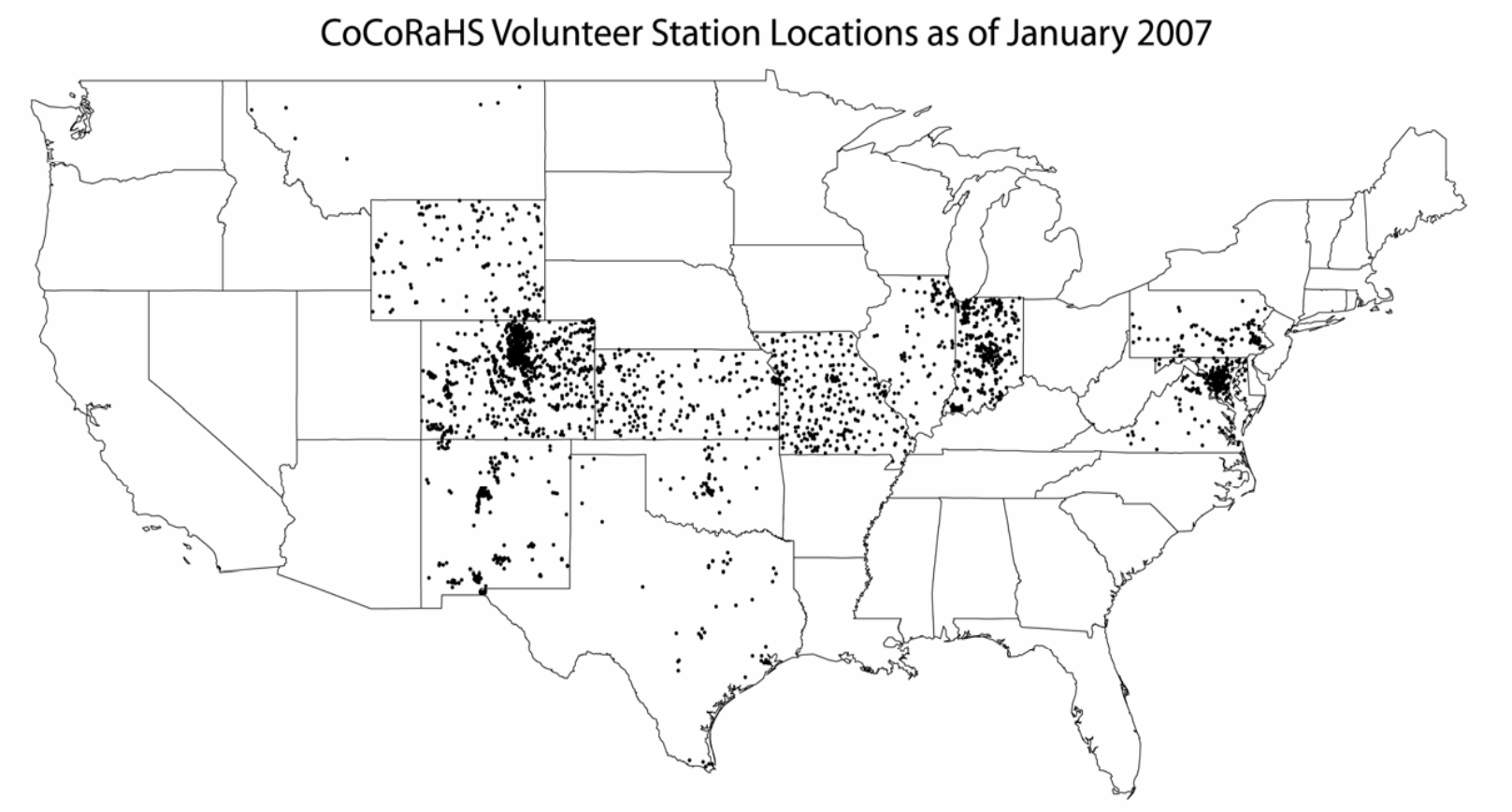


My Suggestion: Join CoCoRaHS!

Community Collaborative Rain, Hail and Snow Network

www.cocorahs.org

With more rain gauges in more places and more people paying more attention we are more likely to – know what hit us!



Colorado Climate Center
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Data and Power Point Presentations available for downloading

http://ccc.atmos.colostate.edu

- click on "Drought"
- then click on "Presentations"

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