Trends in Growing Season Climate

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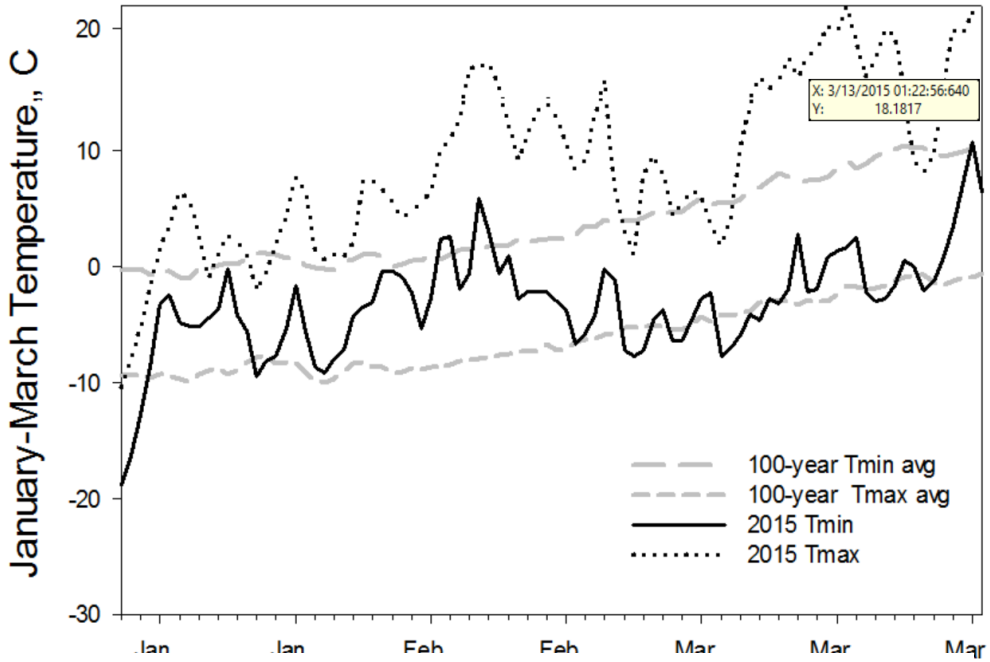
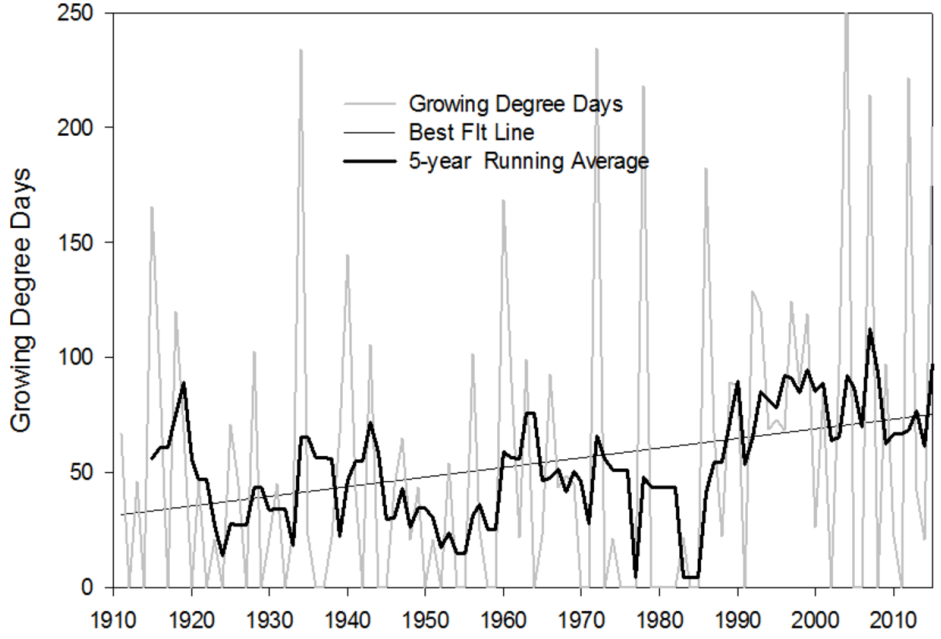
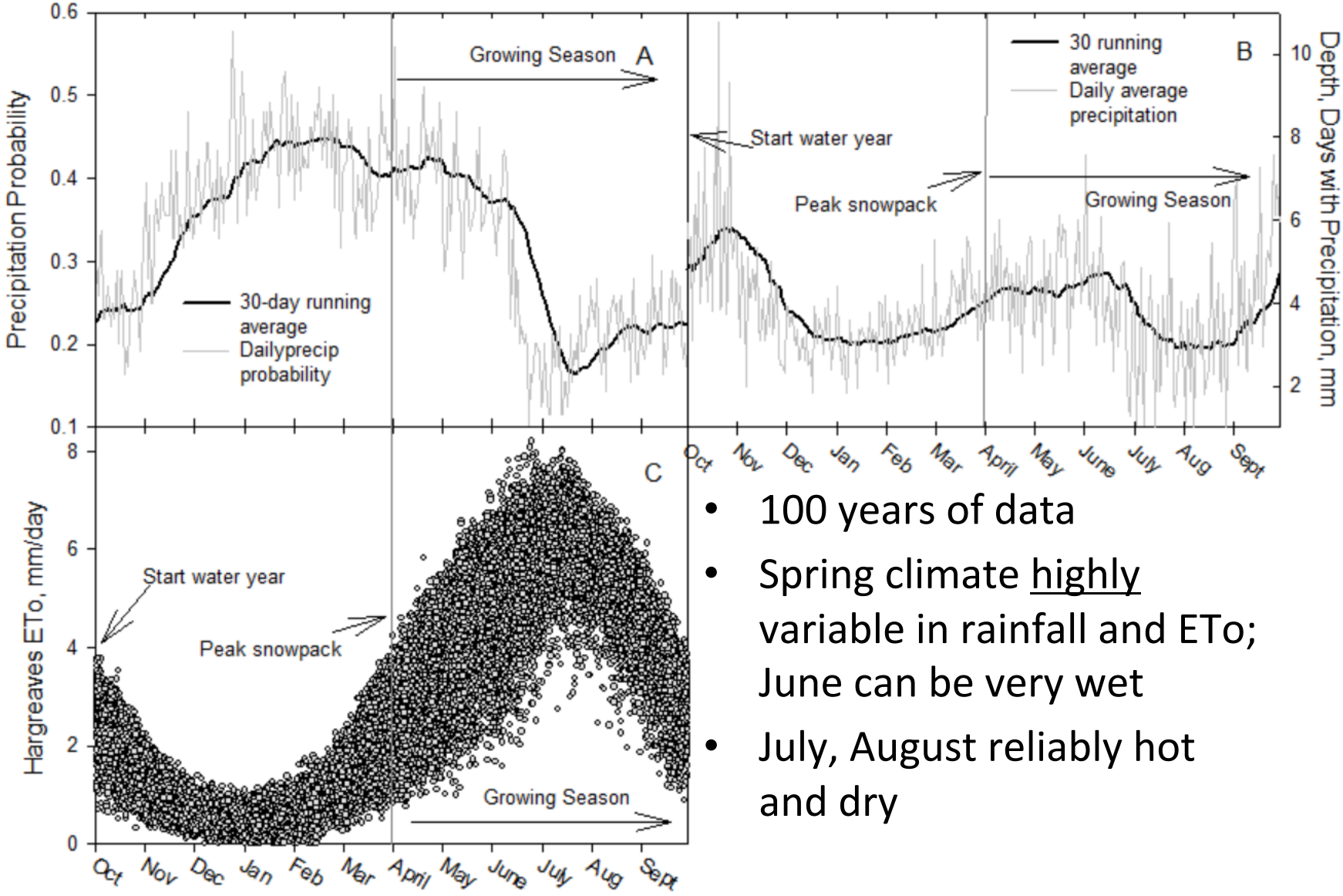
February, March Temperatures





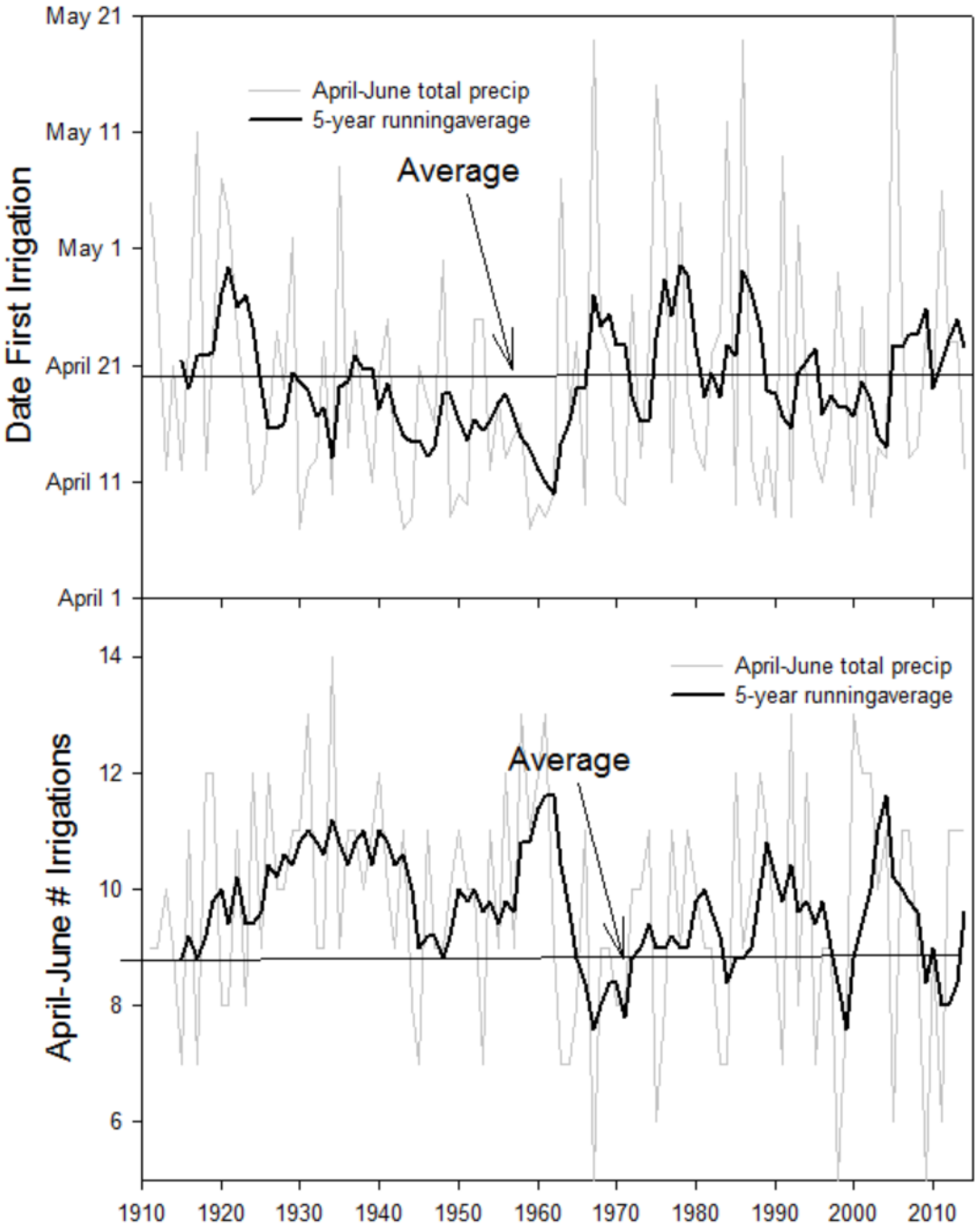
- 2015 February-March temperatures were often above 100+ year average
- March is getting warmer; growing degree days [(Tmax+Tmin)/2 – 50F] increasing
- Warmer March = longer growing seasons, more ET, both in irrigation and mountain forests

Annual Climate



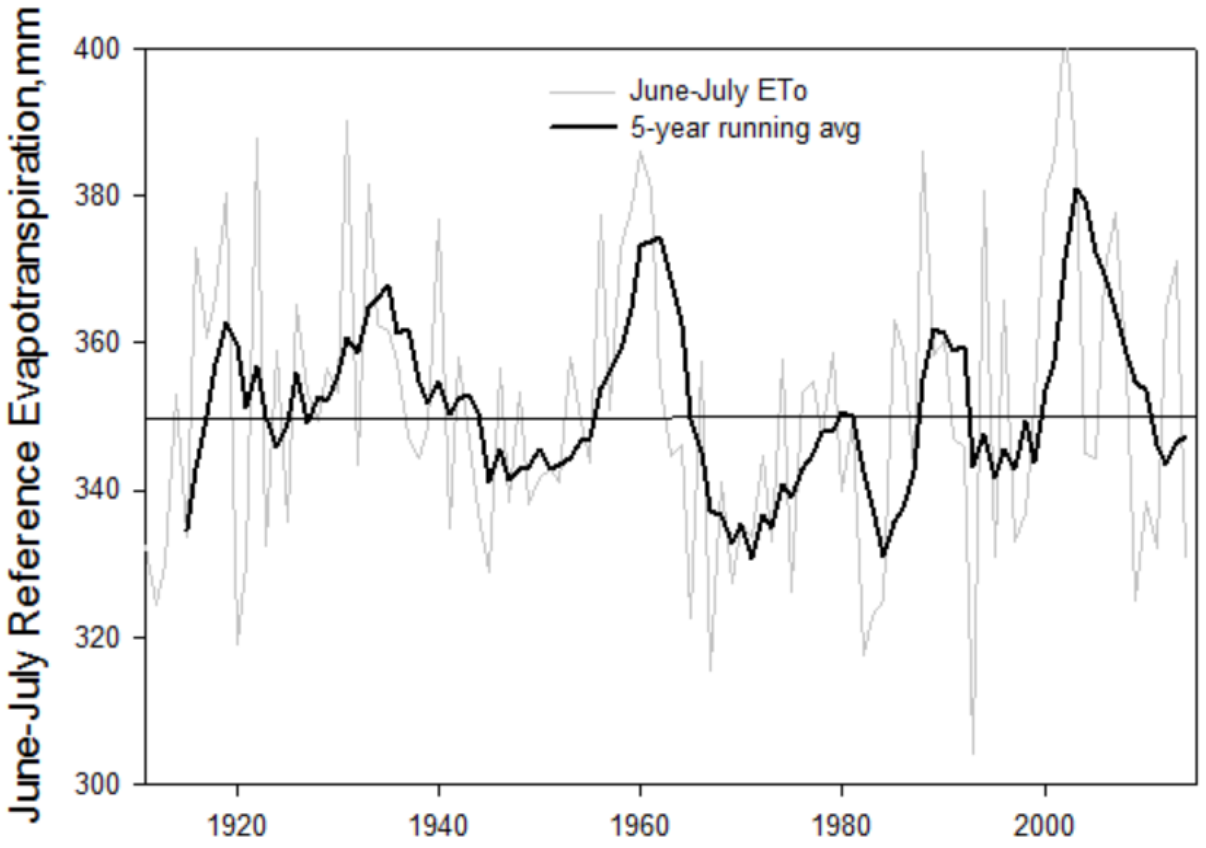
- 100 years of data
- Spring climate highly variable in rainfall and ETo; June can be very wet
- July, August reliably hot and dry

Spring Irrigation



- Highly variable spring weather
- Assumptions
  - Available water in turfgrass root zone = 0.65 inches
  - Effective rainfall =80%
- First turf irrigation of season: from early April to late May
- April-June total # irrigations from 5 to 14; difference = 6” water between wet and dry spring; include irrigation uniformity of 50%, difference is 12 inches

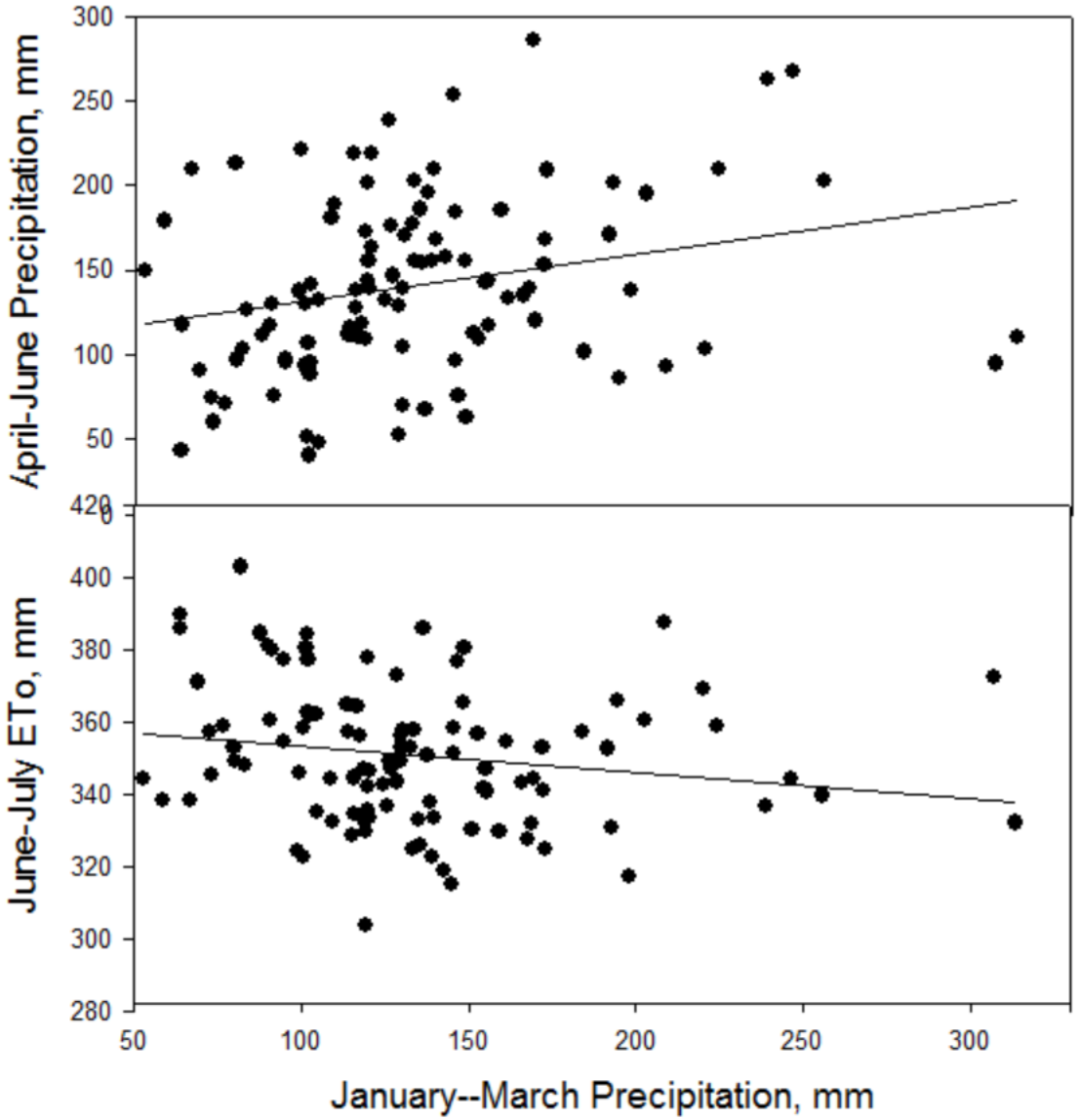
June-July Temperature/ET/VPD



- Higher temperatures = higher ETo and more frequent irrigation

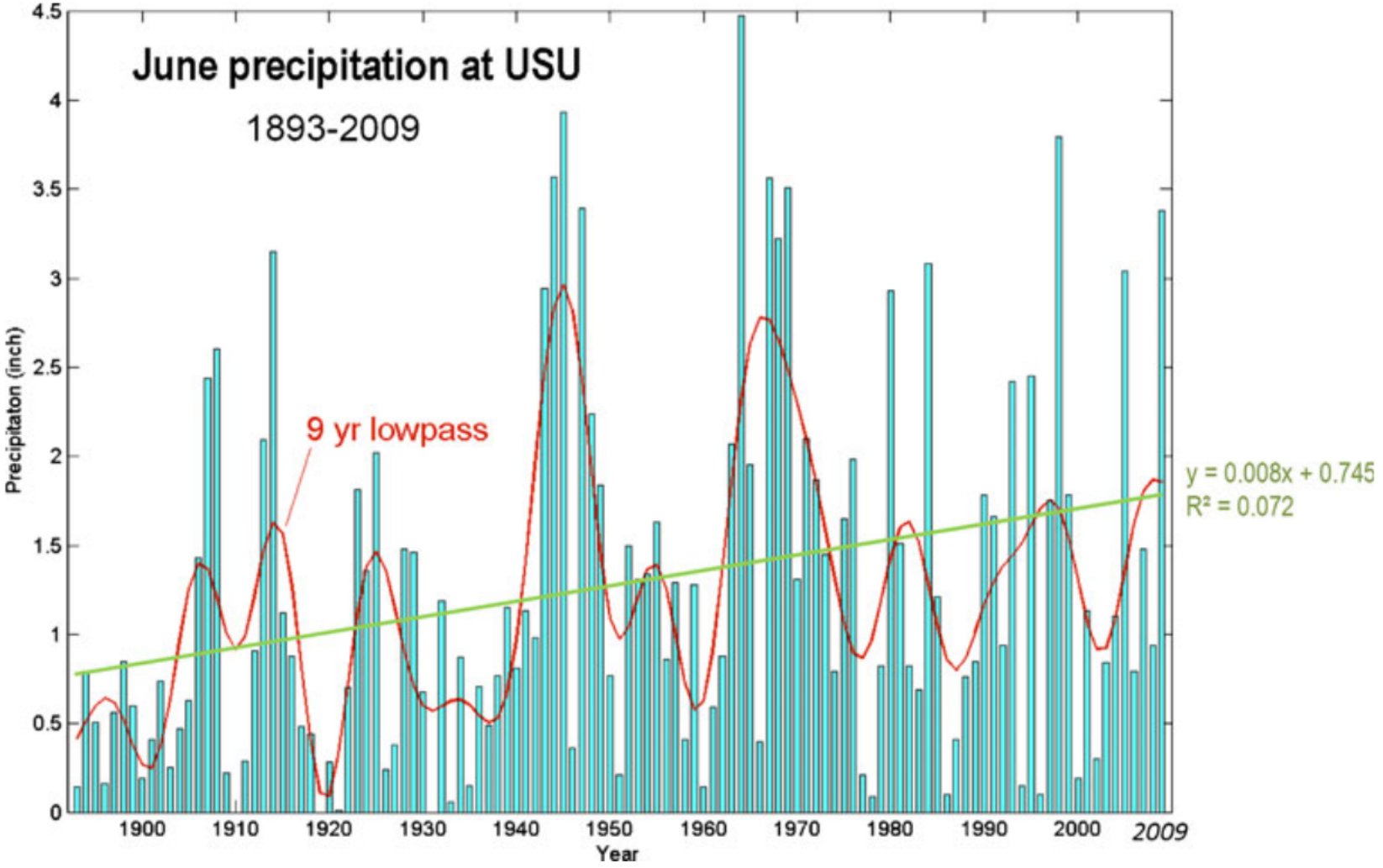
- June, July longest days; July highest ETo, June sometimes also hot
- Warm since 1990 (1993 anomalous cold);
  - Similar to 1930's
  - Warmer since 2000

Relationship between dry winters and spring rain and summer ETo?



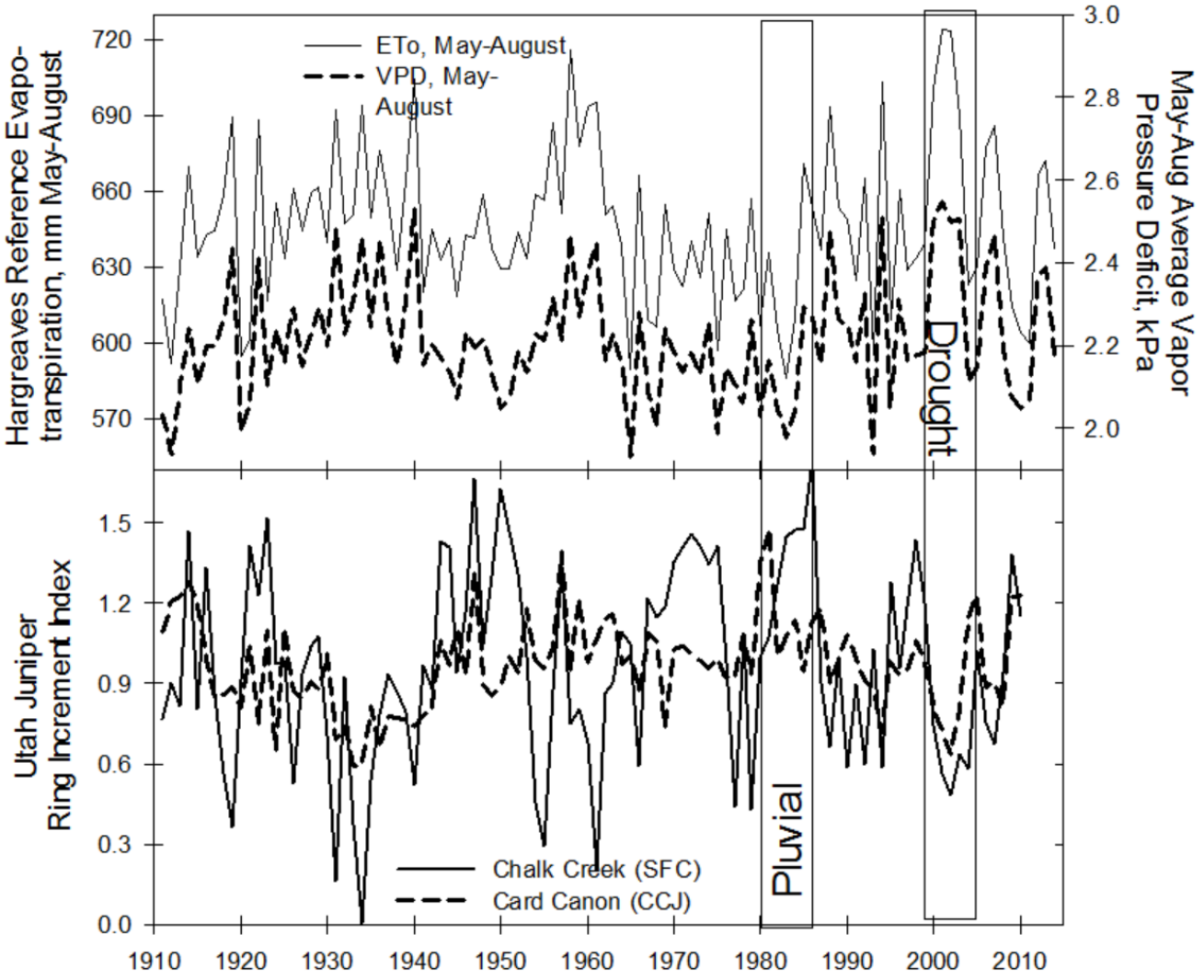
- Growing season climate over 100 year period appears not related to peak period winter precipitation
- Dry winter does not mean hot and dry summer

WF growing season climate pivots at



- Circumglobal teleconnection and early summer rainfall in the US Intermountain West. 2010. Theoretical & Applied Climatology 102:245-252. Wang, Hipps, Gillies, Jiang & Moller

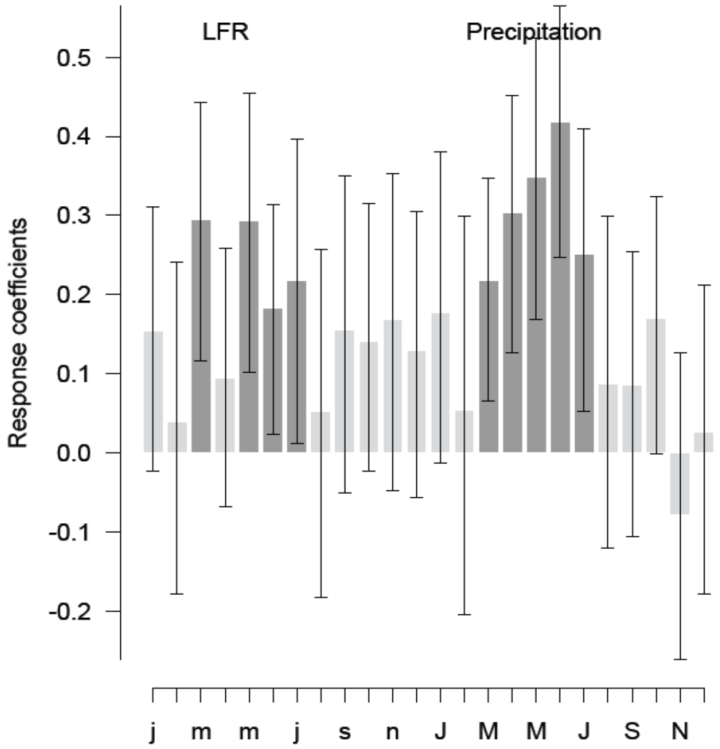
Tree Rings & Growing Season Climate

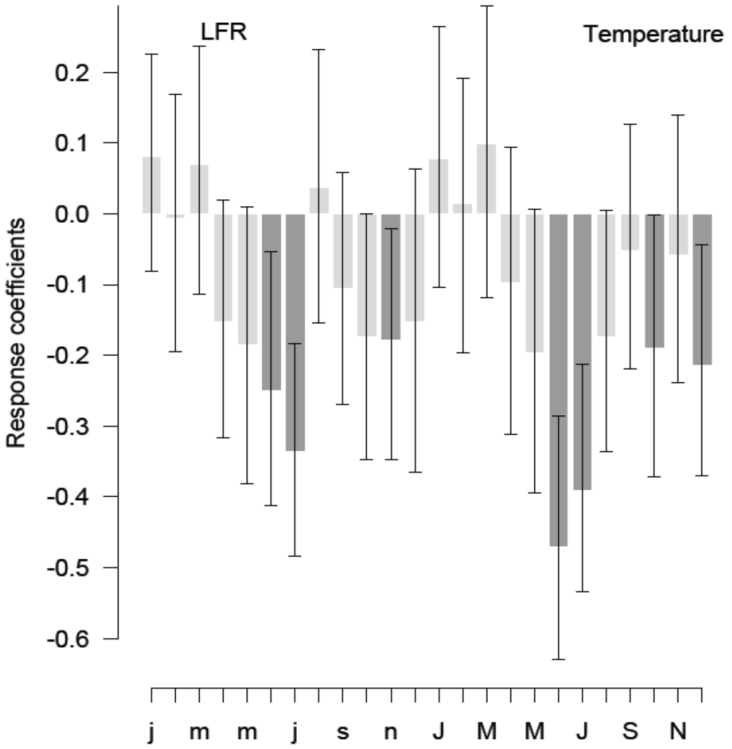


- Growing season climate directly controls tree ring growth
- May be able to reconstruct growing season climate back several centuries

Correlation Tree Rings to Current and Previous Year Precipitation, Temperature

- Rocky Mountain Juniper from Blacksmith Fork Canyon: correlation of tree rings to current year and previous year precipitation and temperature
- Again, may be able to reconstruction growing season climate from past centuries





Take Home Points

- March getting warmer, growing season starting earlier, longer
- April-June wetter; save water by delaying start of irrigation season
- June-July warmer since 2000; higher ETo, more irrigation
- Juniper tree rings capture high spring rainfall (more growth) and high June-July temperatures; may be able to reconstruct growing season climate 500-1000 years