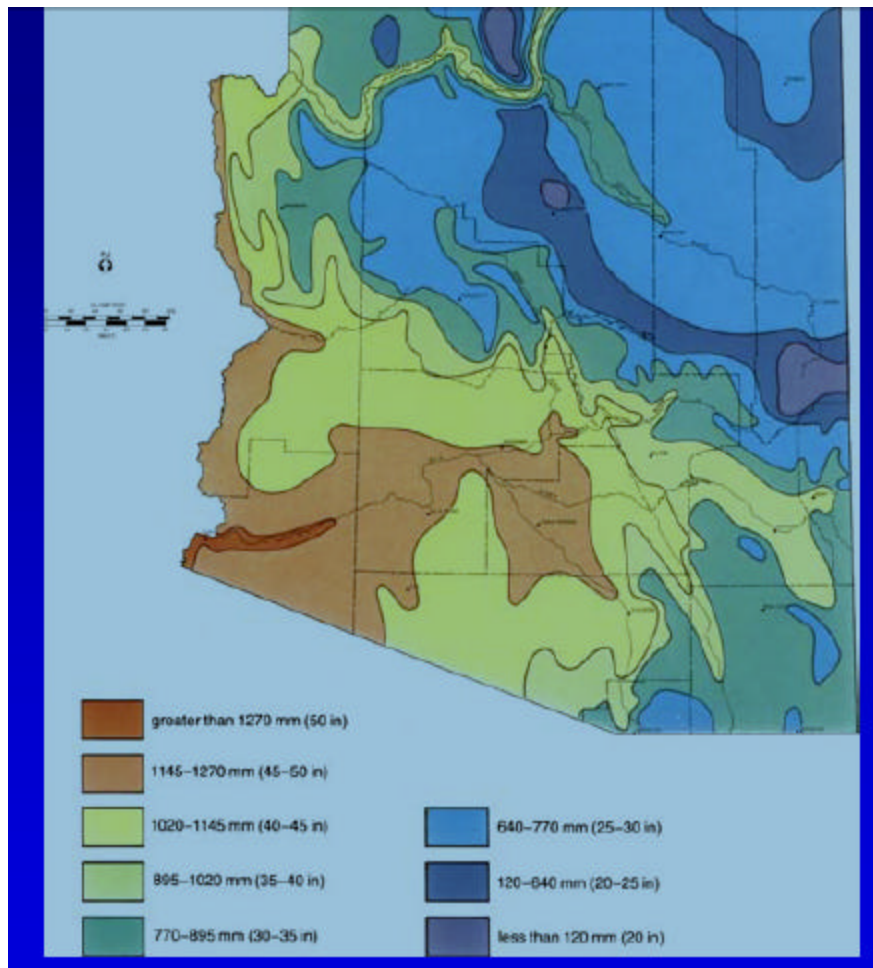


CLIMATE CHANGE IN YAVAPAI COUNTY

In April, 2008, the Citizens Water Advocacy Group (CWAG) co-hosted a presentation by Michael A. Crimmins, Associate Professor at University of Arizona, College of Agriculture and Life Sciences; and an Agricultural Extension Specialist. He talked about past and projected global climate change, how it is shown to be human-induced, and focused on the present and future effects of climate change on Arizona and Yavapai County.

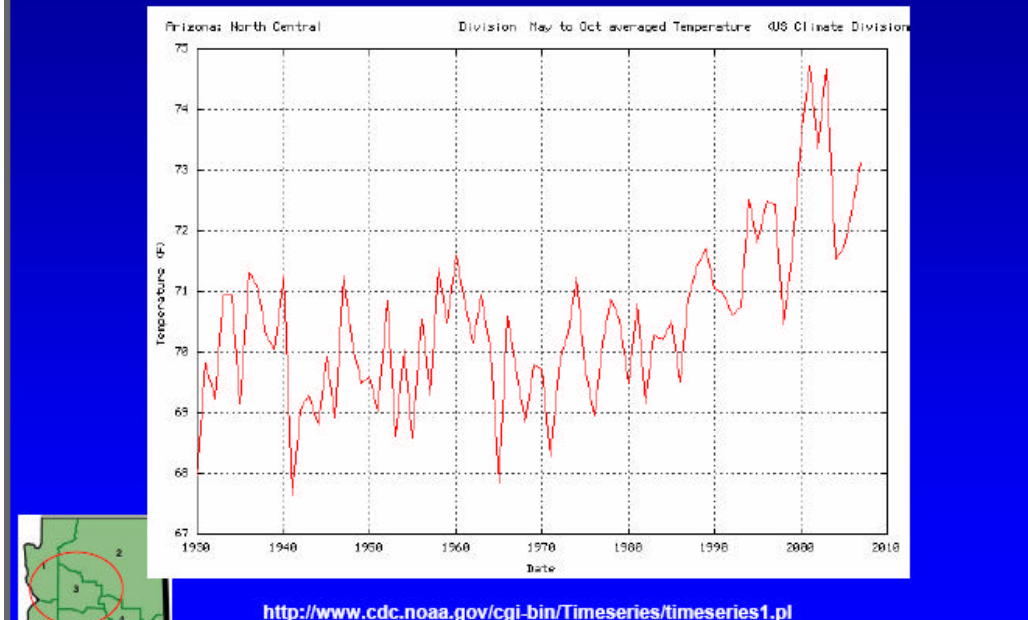
A few of his slides will be shown here with brief explanation by Howard Mechanic.

The following shows the evapotranspiration rates in various sections of the state. The higher this rate, the less water is available for recharge, and the more water is necessary to maintain vegetation. <http://southwest.library.arizona.edu/>

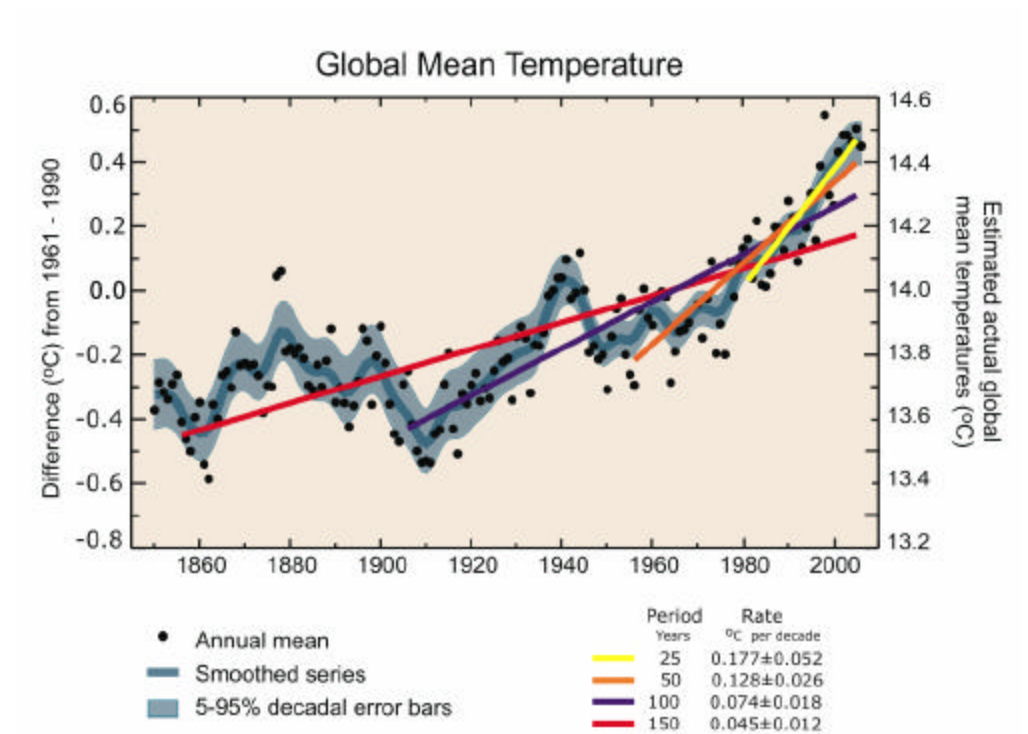


The following graph shows the temperature increase in Yavapai County. While worldwide global warming averages about 1.5 degrees F, in our county the increase from May to October has been close to 4 degrees. It is speculated that this is caused by the fact that this latitude receives warm circulation flows from the tropics.

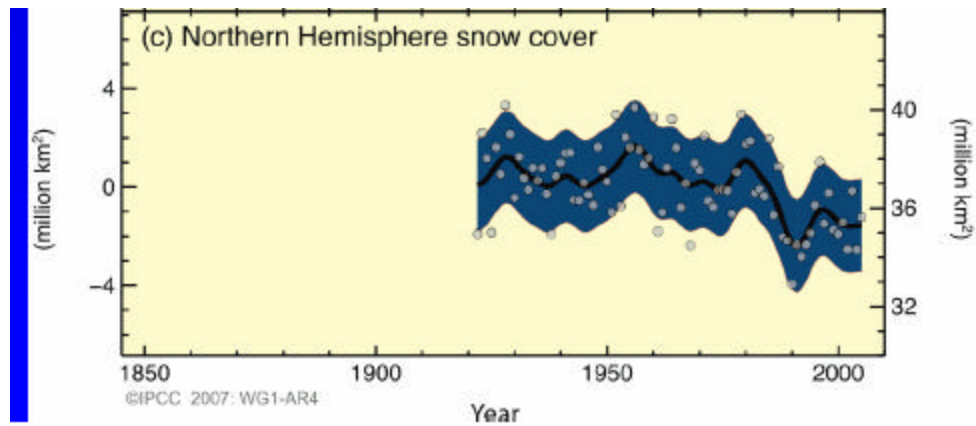
Temperature: 1930-2007



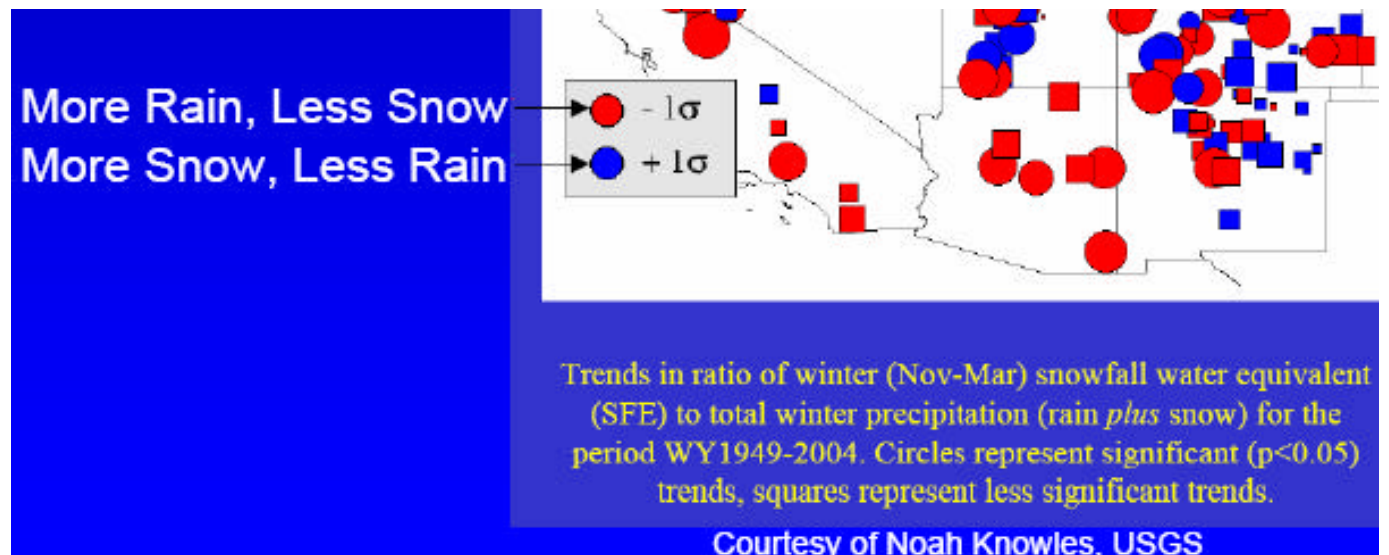
The following shows worldwide temperature increases.



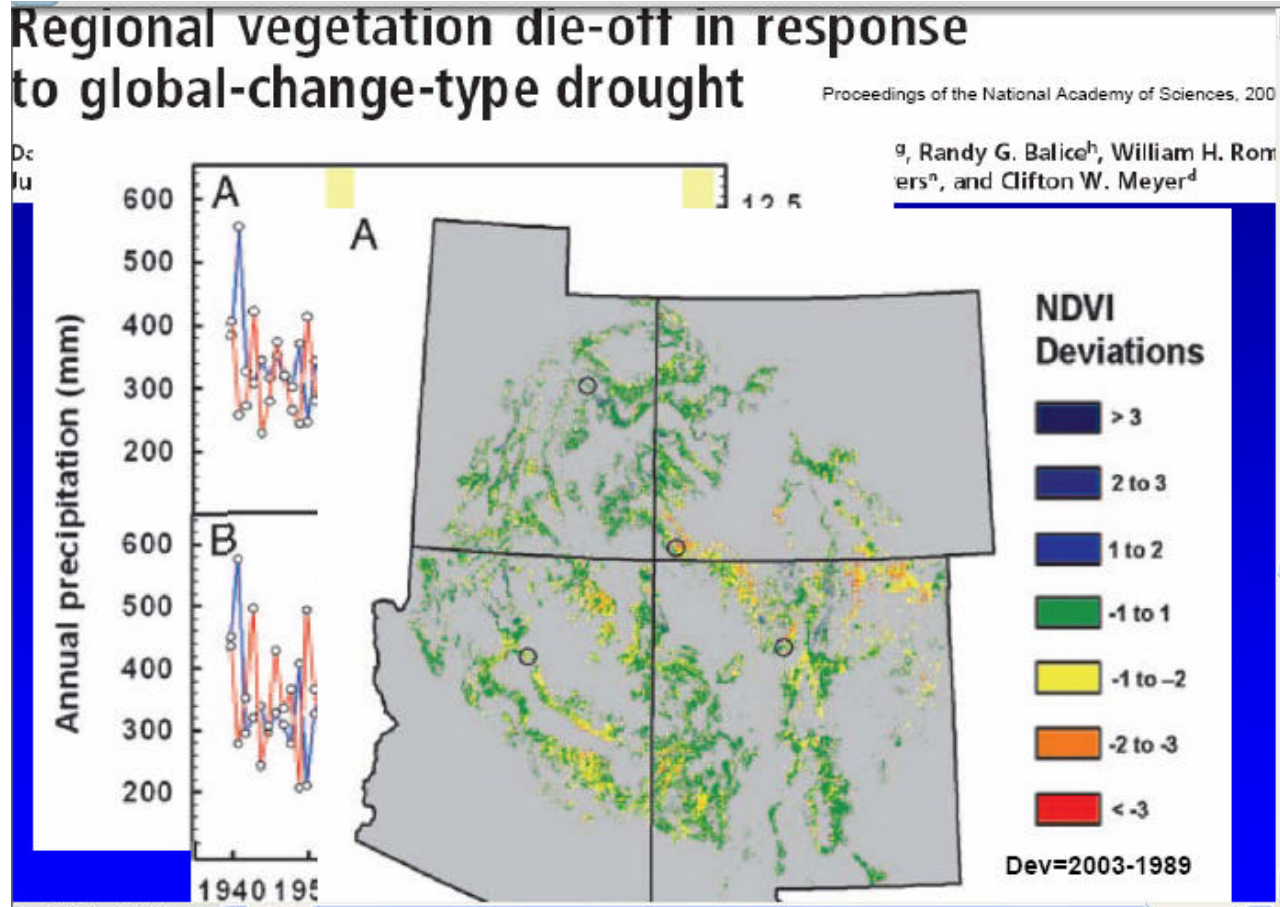
The following shows the reduction in Northern Hemisphere snowpack. Since slow release of melted snowpack provides most of the surface water in our area, reduction in snowpack means reduction in usable water.



The following shows areas where some snowfall of the past now falls as rain. Even if precipitation stays the same, if there is less snowfall there is less usable water.



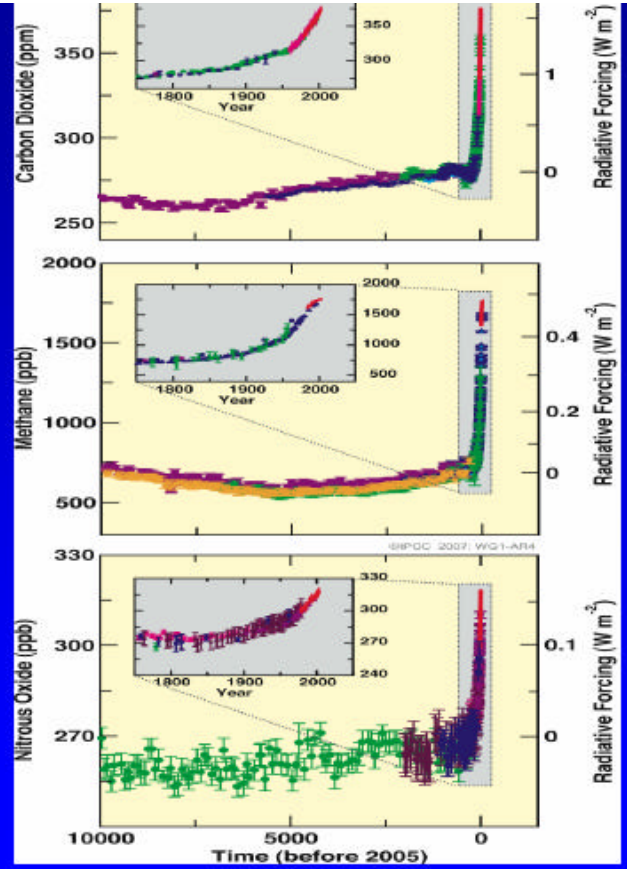
The following shows areas of increasing vegetative die off. Climate change may be occurring so fast that other species may not have time to move into climatic niches that are in remote areas.



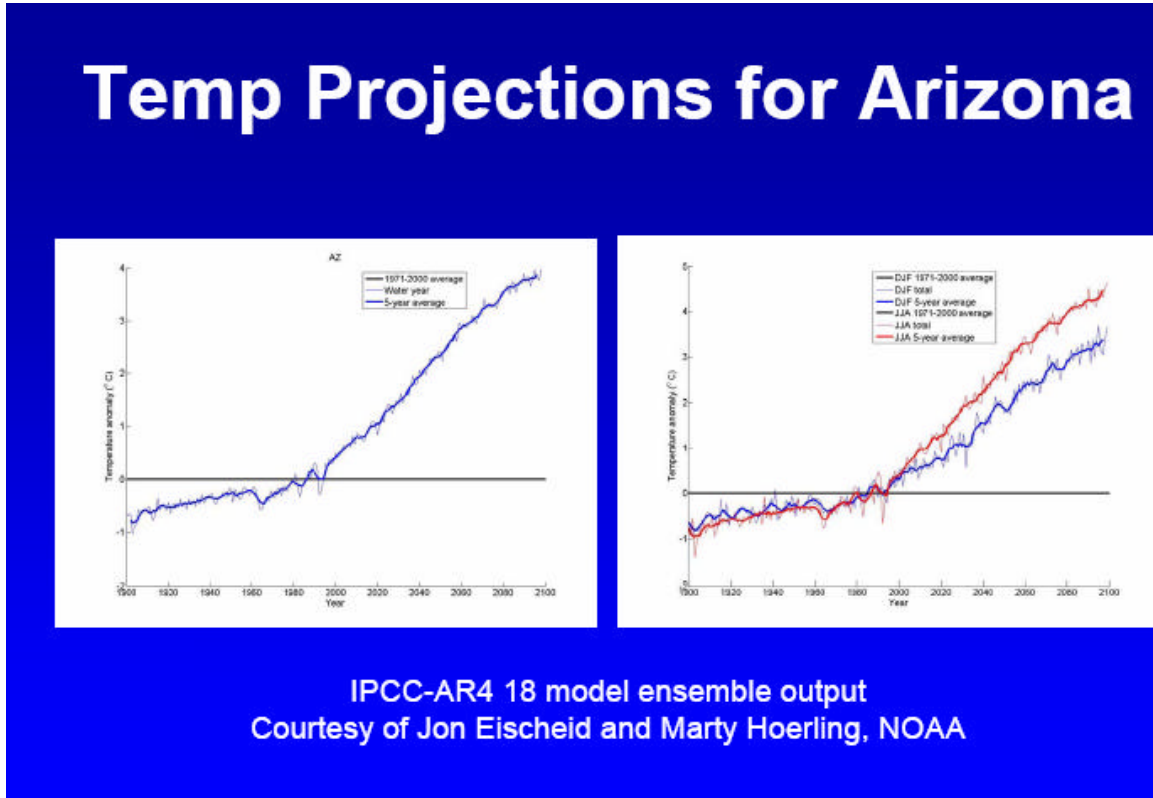
The following shows recent increases in CO₂. This increase is clearly related to human-induced changes cause by the industrial revolution and use of fossil fuels.

Changes in greenhouse gases over the past 10,000 years

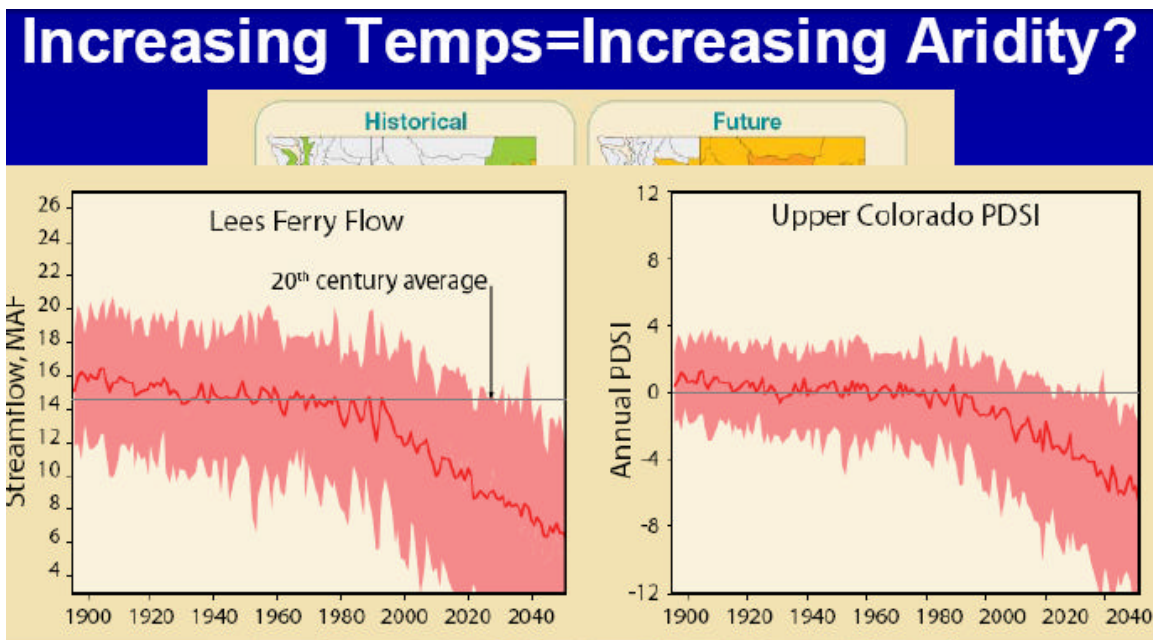
IPCC 2007



The following shows ranges of projected temperature increases in Arizona.



The next slide shows the range of projected decreases in surface water flows as a result of higher temperatures. Even if precipitation remains constant, surface water flows will decrease with higher temperatures primarily because of higher evapotranspiration rates.



Implications for Arizona

- Higher temperatures
 - Higher evaporation and transpiration rates (increased water loss in reservoirs, faster drying of soils following precip events, more stress on vegetation)
 - Less snow/more rain in winter; less snowpack for spring runoff, earlier pulse of precip/less water available in summer
 - Longer growing seasons; more extreme events
- Precipitation
 - Projections are lower confidence
 - Higher temperatures on same precipitation variability: more intense drought periods
 - Increasing variability → more flooding with intervening drought periods

Summary

- “The understanding of anthropogenic warming and cooling influences on climate has improved since the TAR, leading to a *very high confidence* that the global average net effect of human activities since 1750 has been one of warming...” Summary for Policymakers, AR4, IPCC 2007
- **Observations:** increasing temps, earlier snowmelt/decreasing snowpack, retreating glaciers
- **Projections:** Temperatures will continue to rise (high confidence), Precipitation projections are less certain but variability will likely increase.
- **Mitigation?: *Not much time left until 450 ppm!***
Delayed warming due to lagged response in Oceans; stabilization of GHGs now will still lead to more warming (~1°C) over next 50 years