



Water Forward Austin's Integrated Water Resources Plan Task Force Meeting

December 6, 2016



Water Forward - Integrated Water Resources Plan Task Force Meeting

Climate Change and Hydrology Analysis Presentation



CLIMATE AND HYDROLOGY ANALYSIS FOR AUSTIN WATER

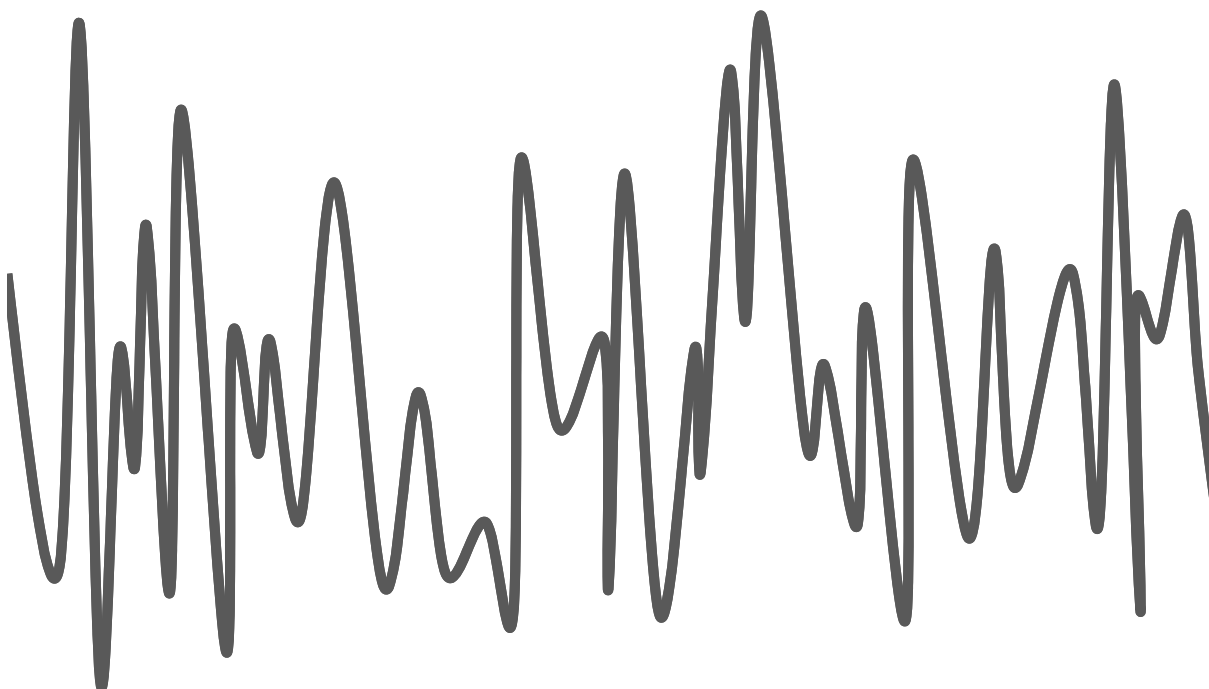
Katharine Hayhoe, Rodica Gelca and Anne Stoner

DECEMBER 6, 2016

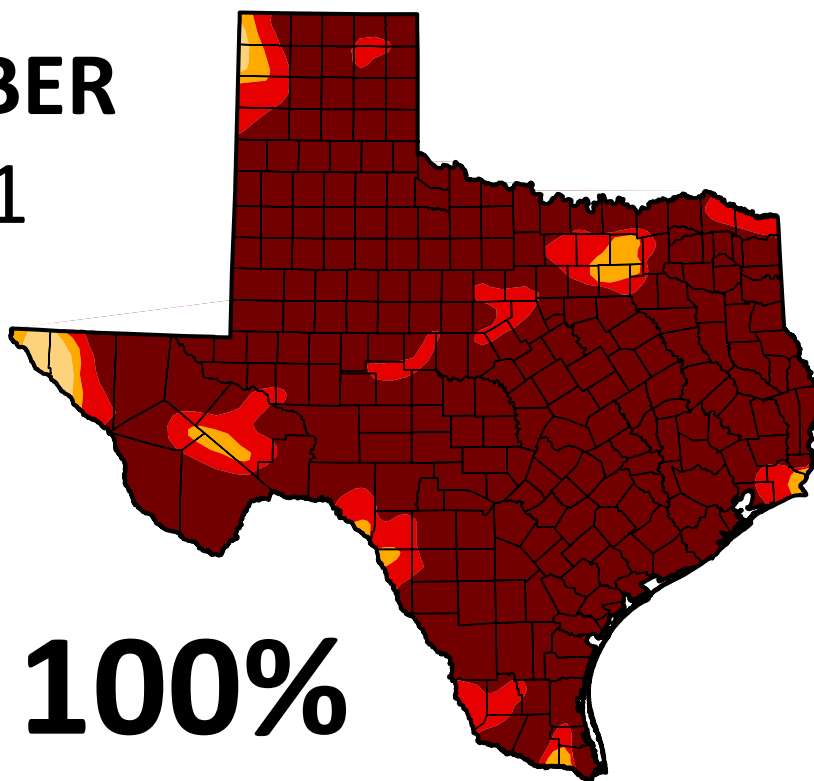
NORMAL CLIMATE



TEXAS CLIMATE

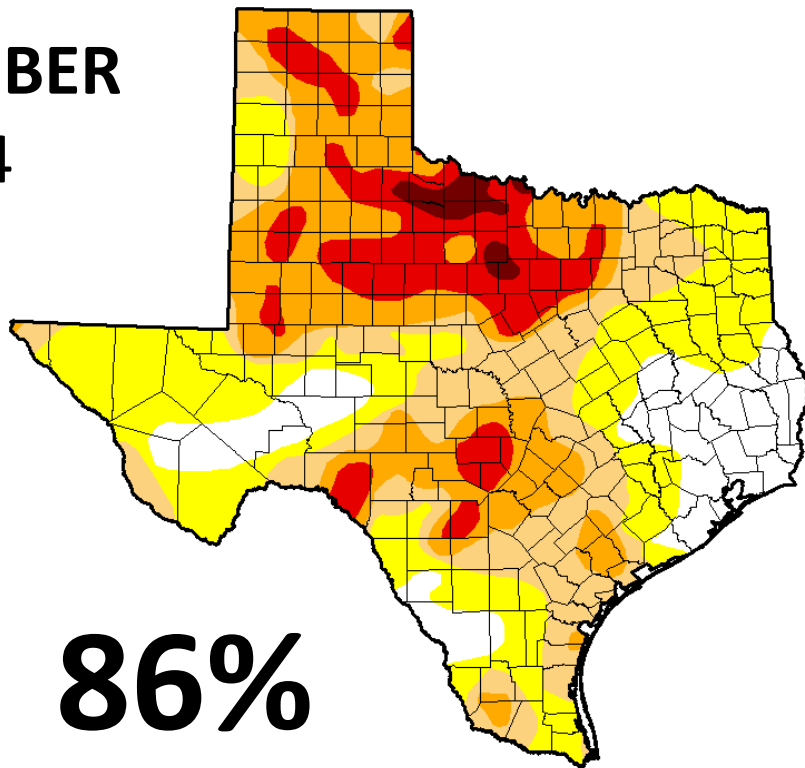


OCTOBER
2011



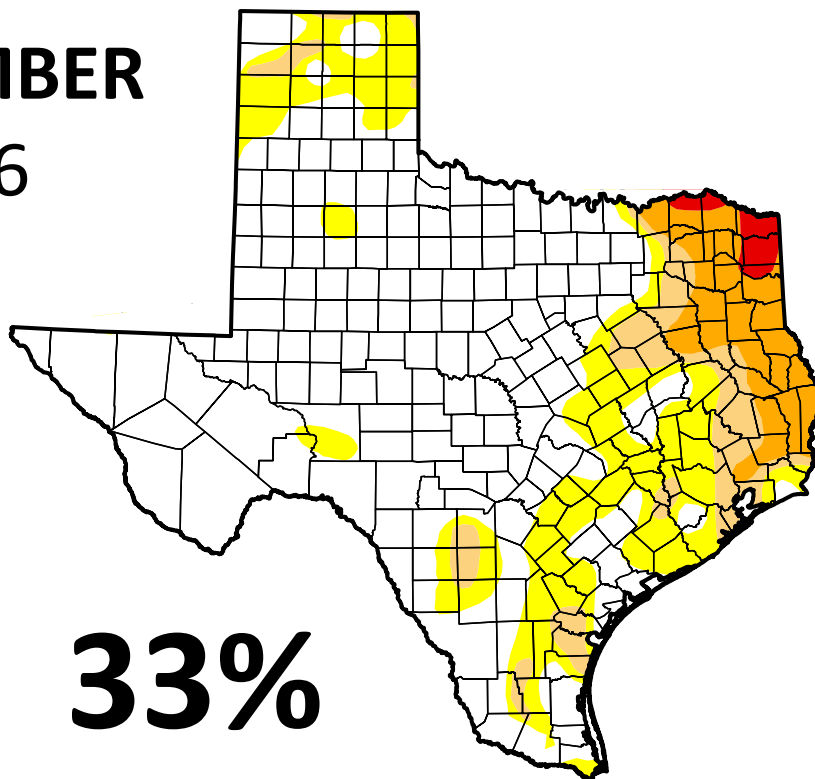
100%

SEPTEMBER
2014



86%

NOVEMBER
2016



33%

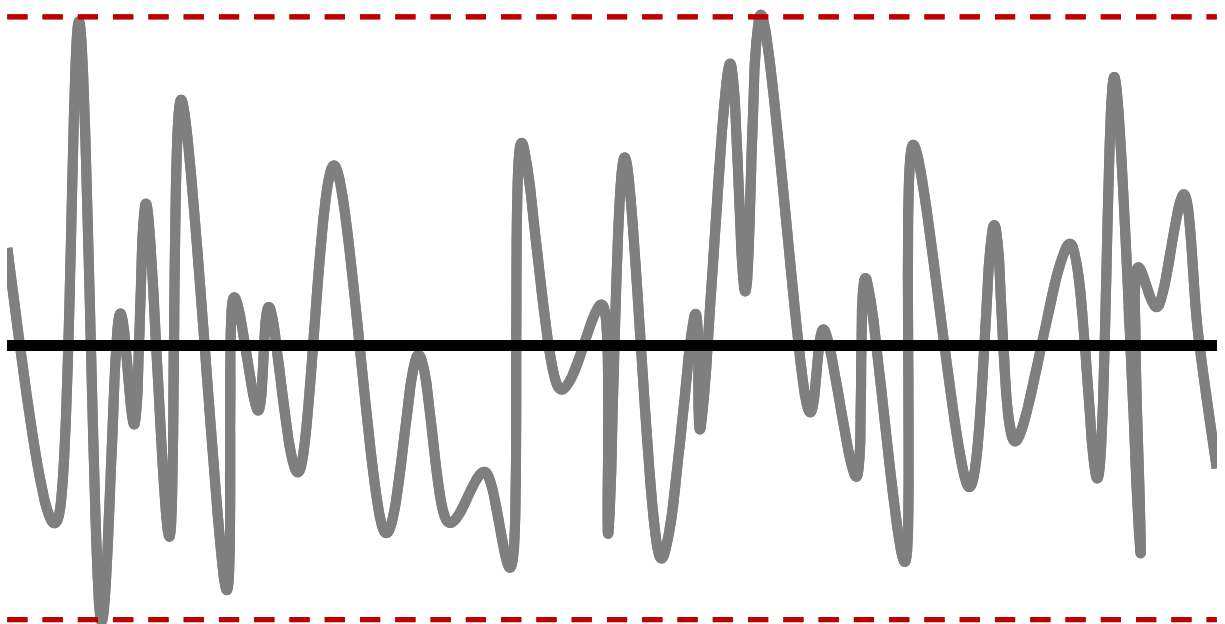
WATER SCARCITY

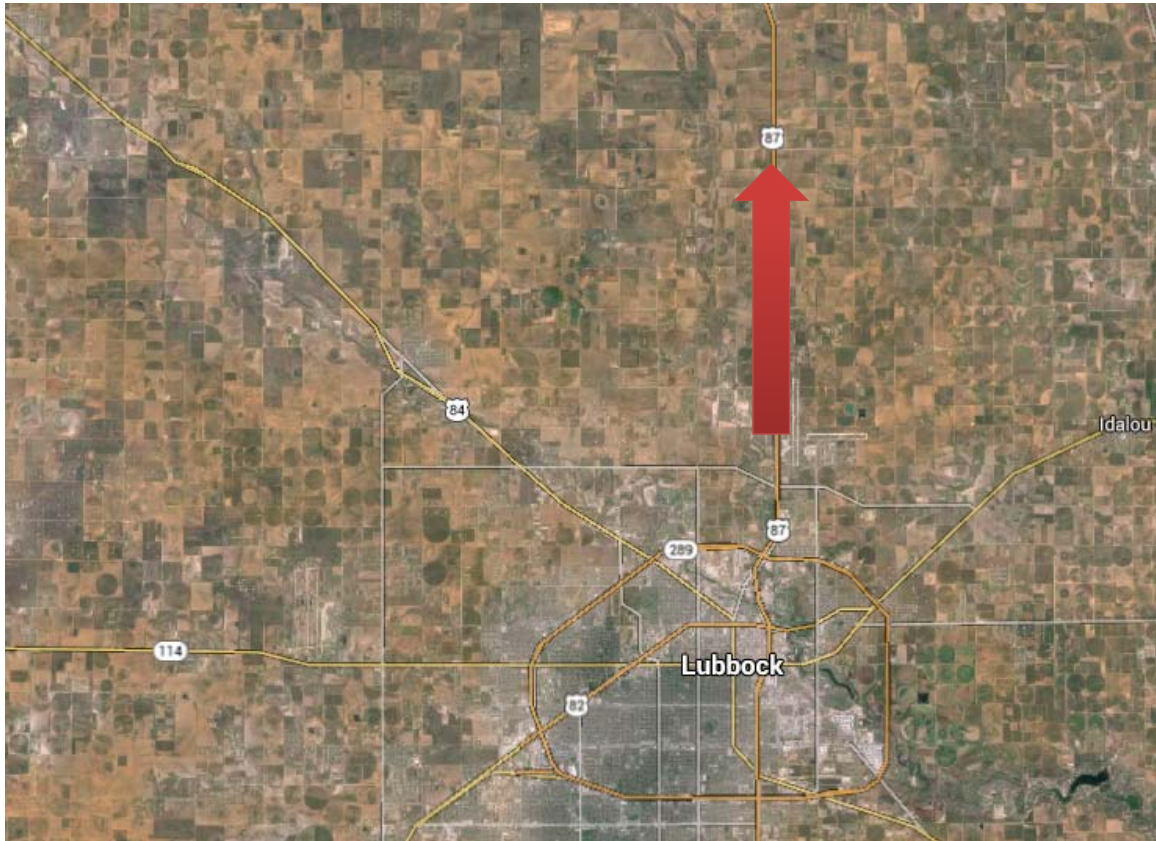


WILDFIRE

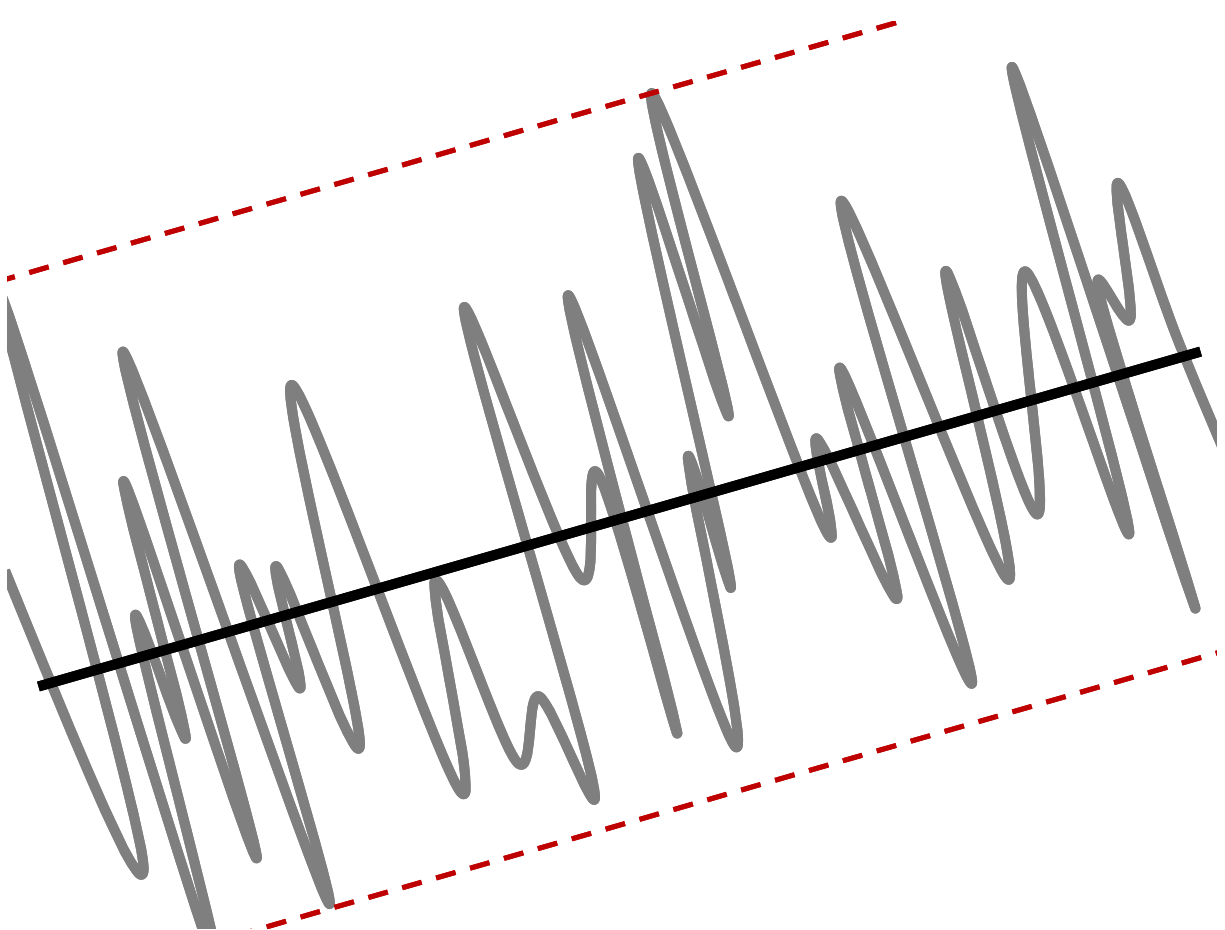
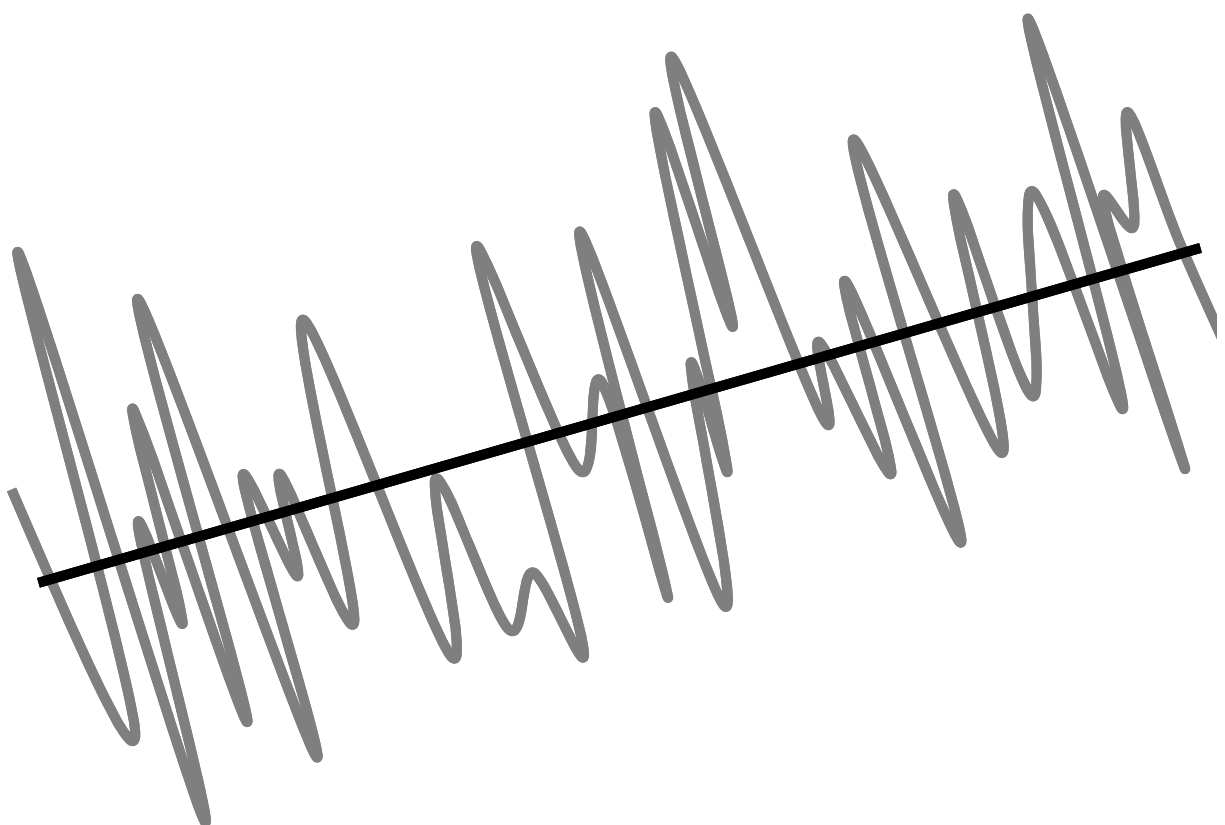


RECORD-BREAKING RAINFALL





Planning for the future
based on the past
is like driving down the road
looking in the rear-view mirror.



CLIMATE ANALYSIS FOR AUSTIN

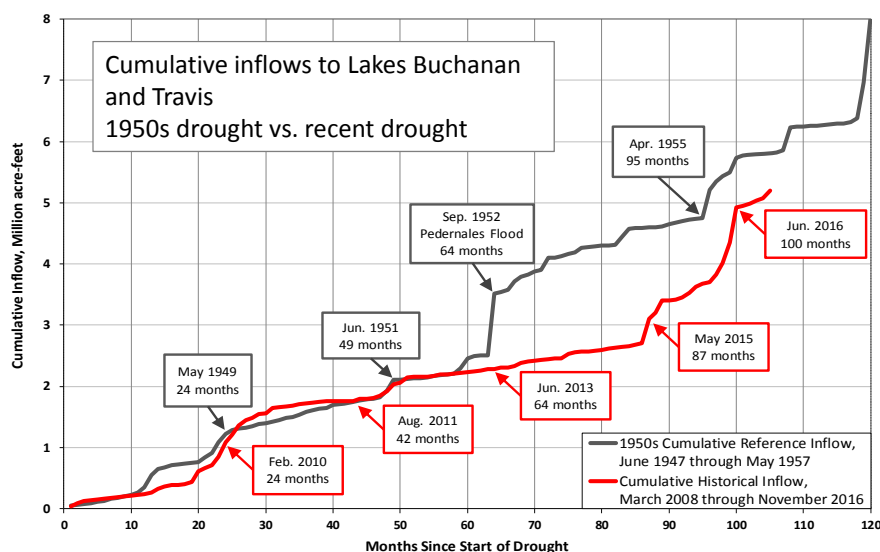
Our climate is already changing, consistent with larger-scale trends observed across the U.S. and the world.

In the future, in Central Texas, we expect:

- Increases in annual and seasonal average temperatures
- More frequent high temperature extremes
- Little change in annual average precipitation
- More frequent extreme precipitation and more drought conditions in summer due to hotter weather

MOTIVATION

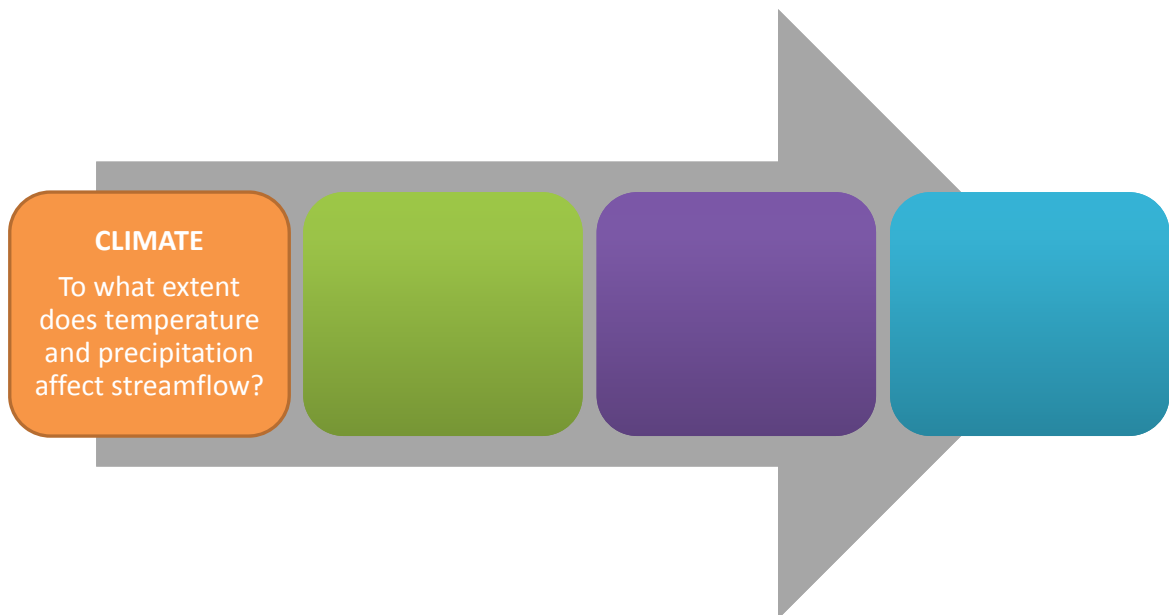
Inflows during the most recent drought were much lower than during the 1950s drought.

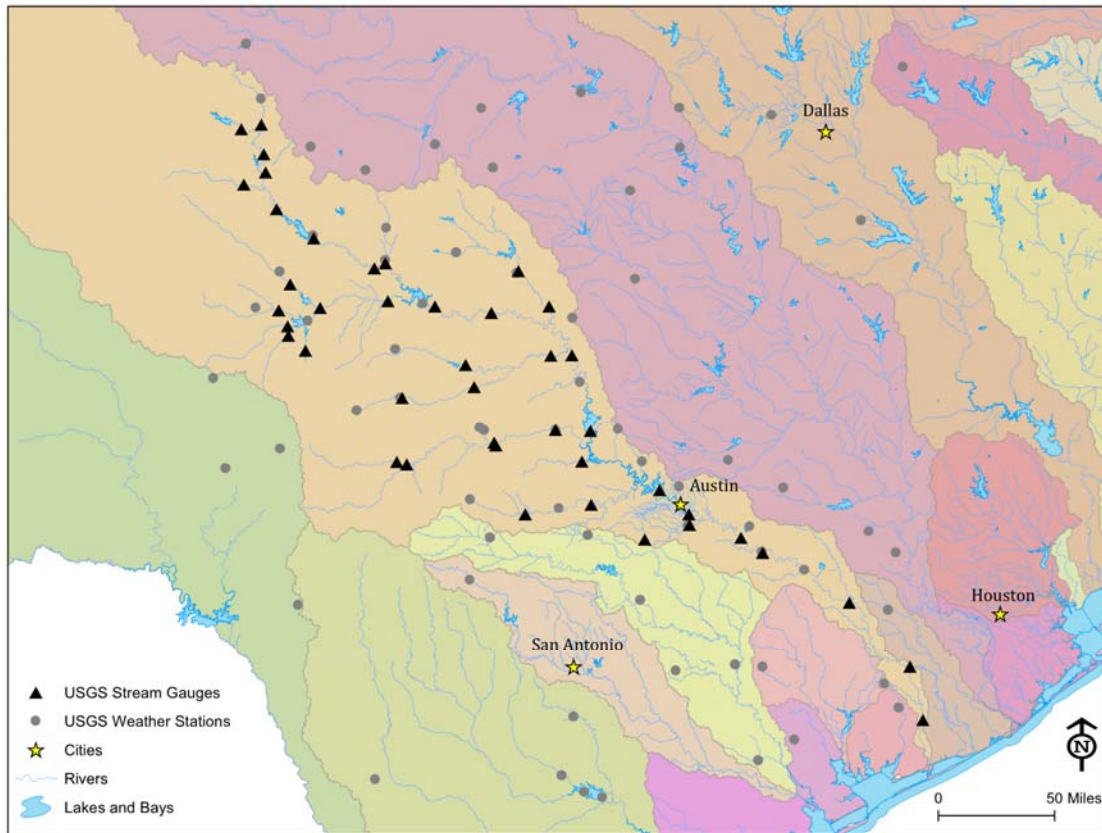


MOTIVATION

Inflows during the most recent drought were much lower than during the 1950s drought.

This study seeks to develop hydrologic projections to evaluate how a changing climate might affect future water supply in Austin and how to plan for it.



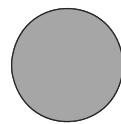


OBSERVED DATA



**STREAMFLOW
GAUGES**

Daily streamflow,
scaled to match
naturalized monthly
flows

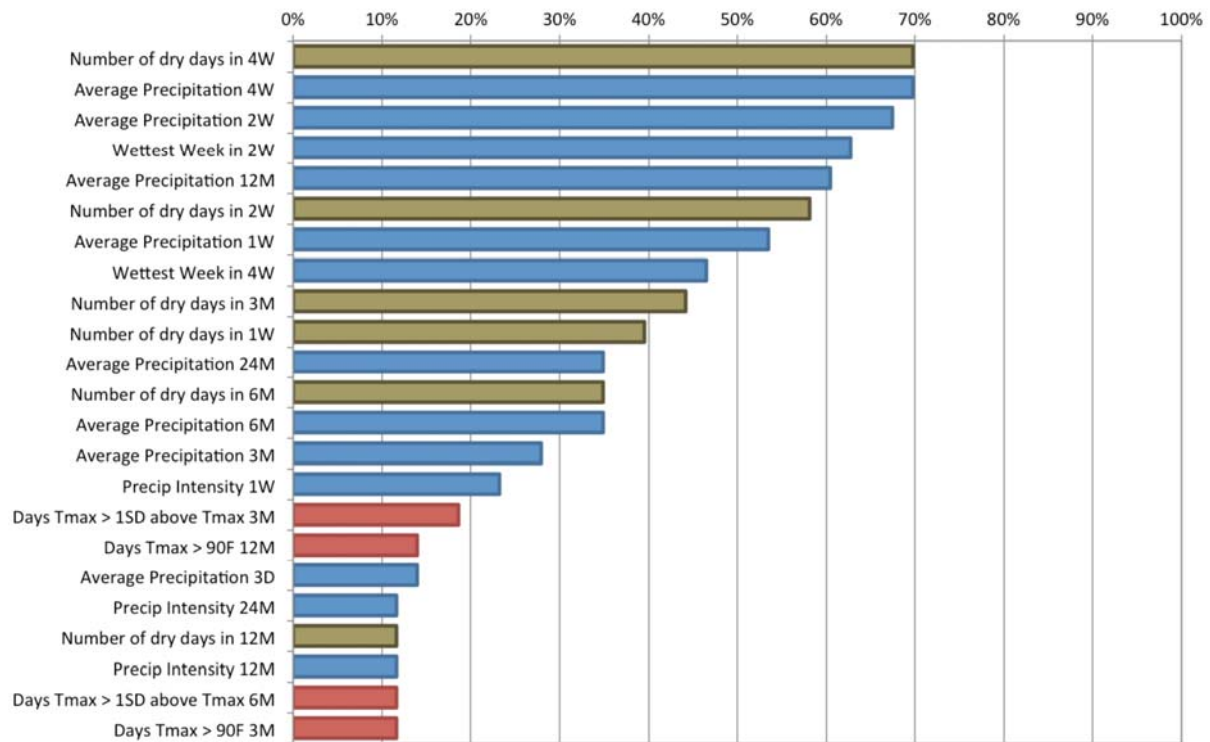


**WEATHER
STATIONS**

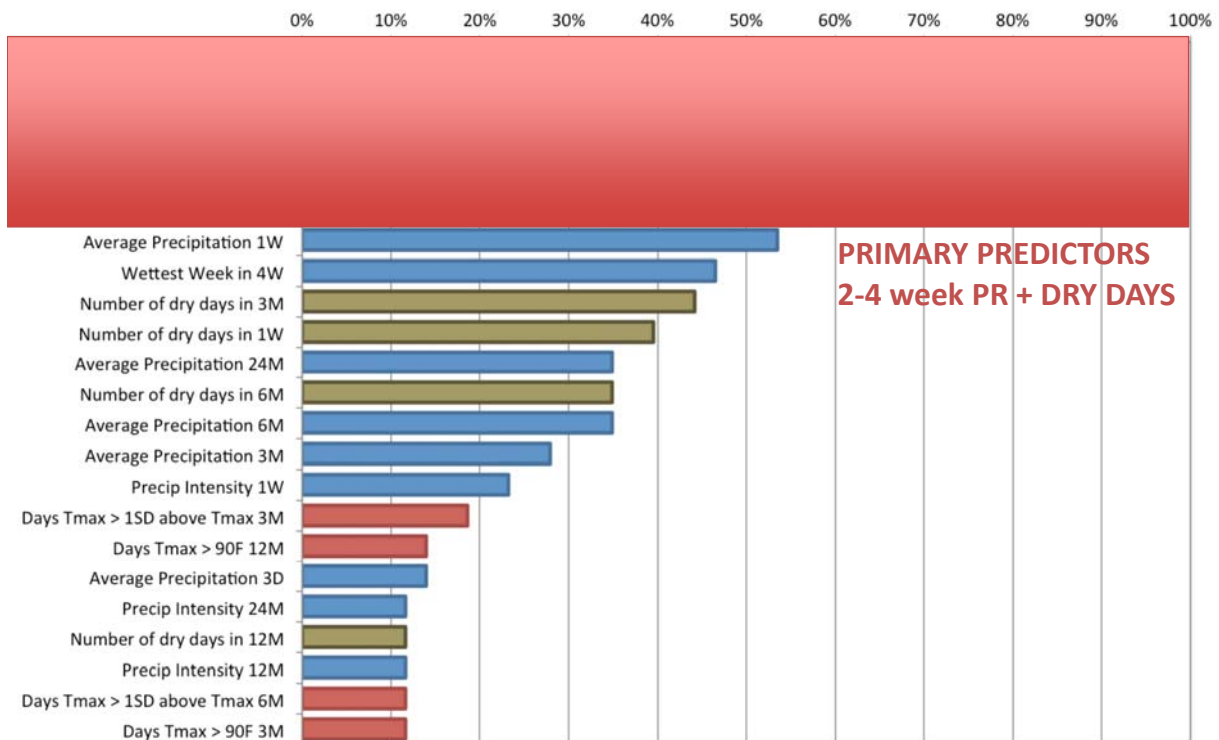
Daily temperature
and precipitation

1940 - 2013

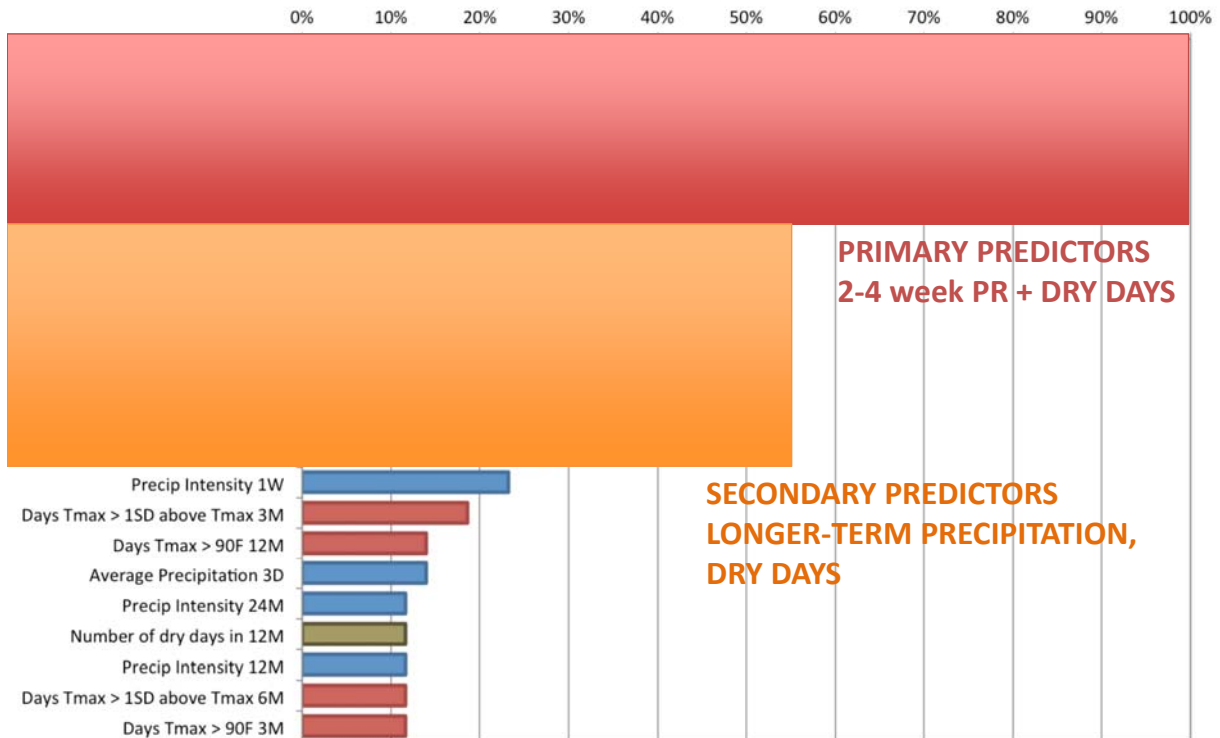
How often is this variable in the top 10 best predictors for a gauge?



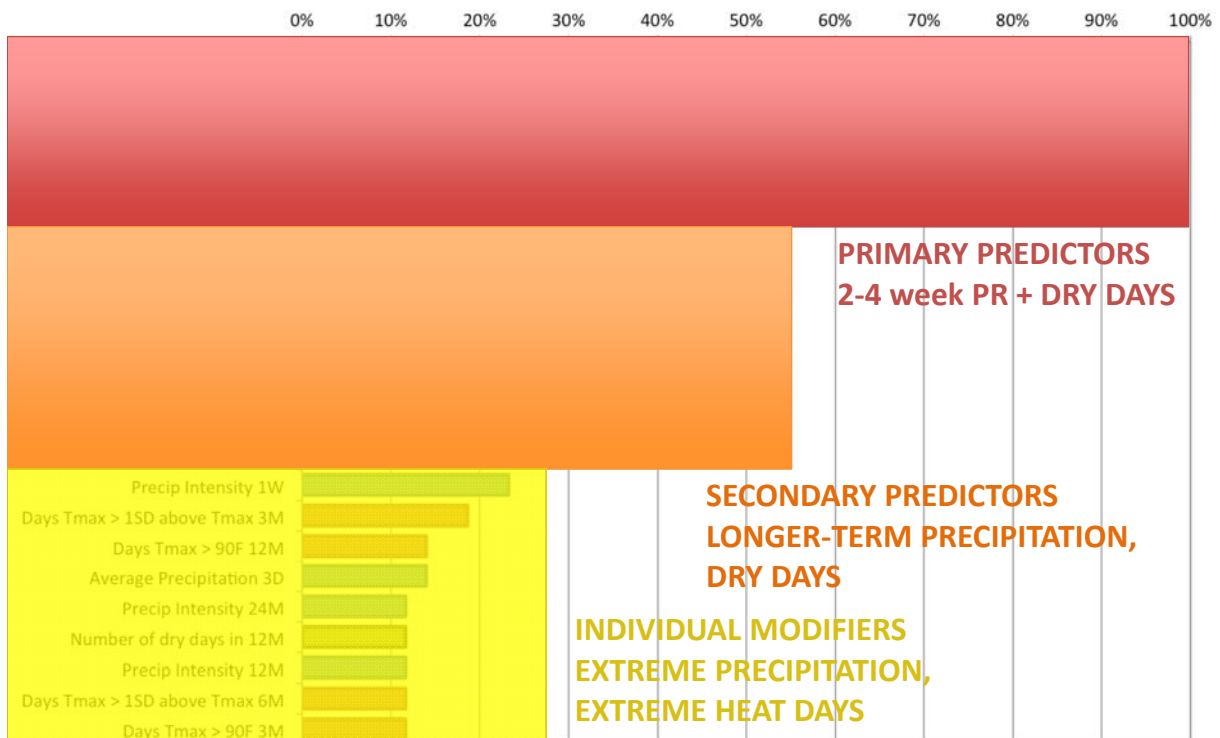
How often is this variable in the top 10 best predictors for a gauge?

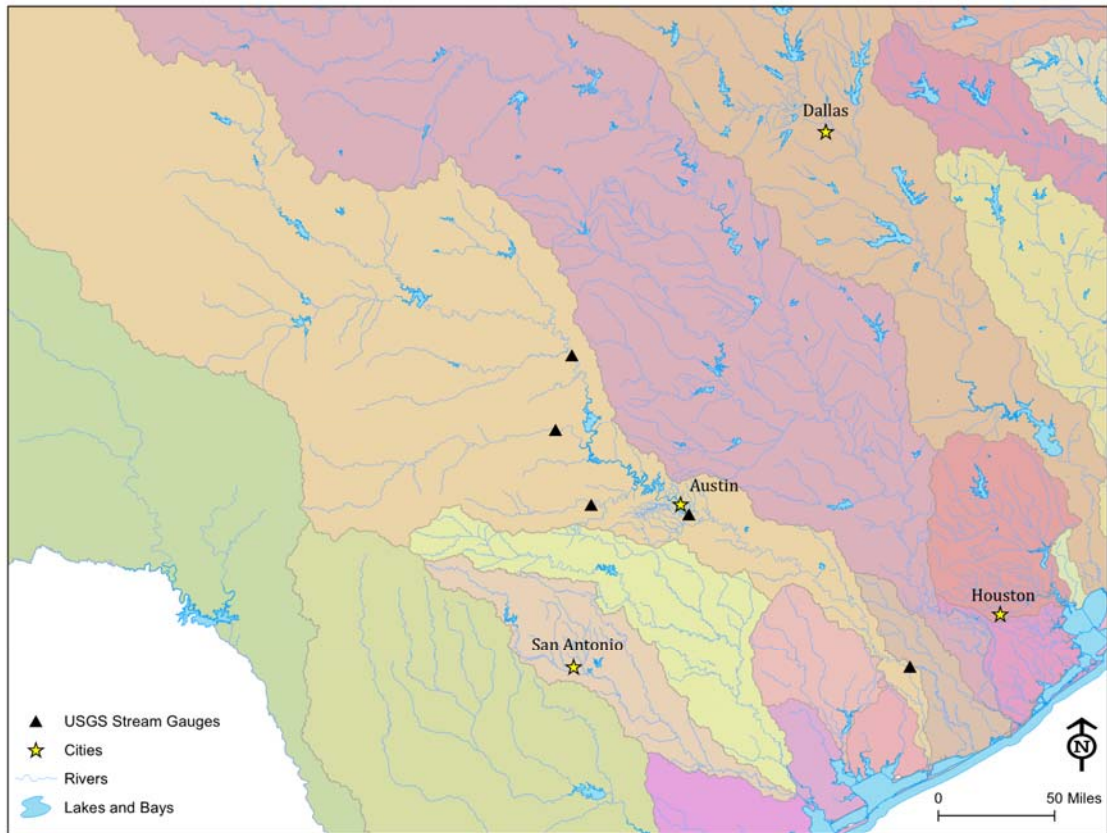


How often is this variable in the top 10 best predictors for a gauge?



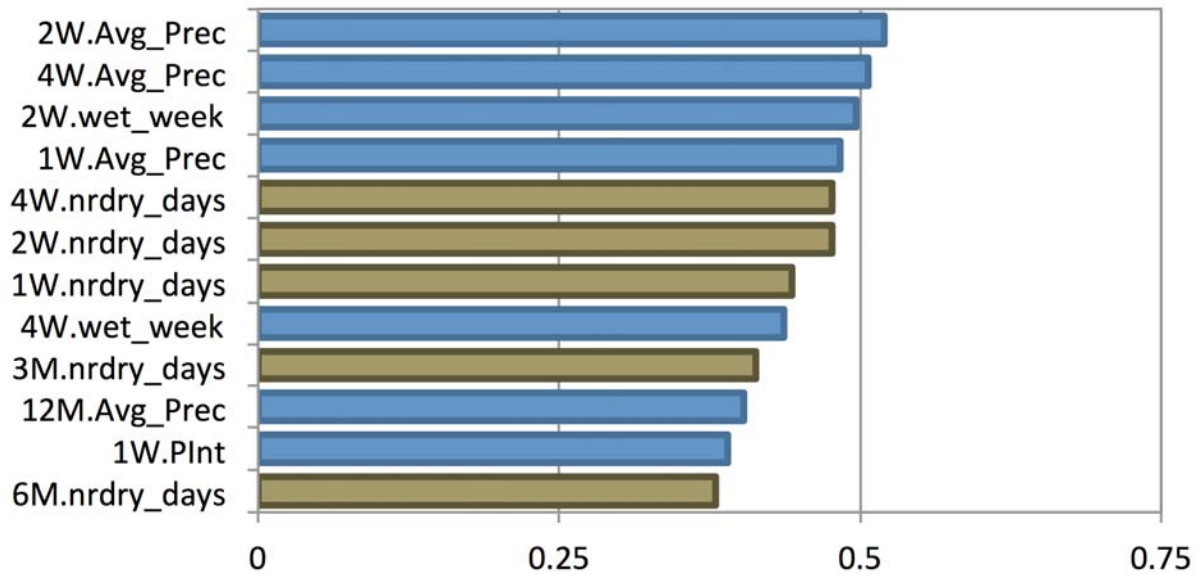
How often is this variable in the top 10 best predictors for a gauge?





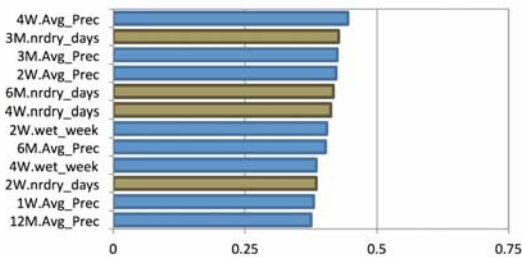
TOP STREAMFLOW PREDICTORS

Colorado River at San Saba

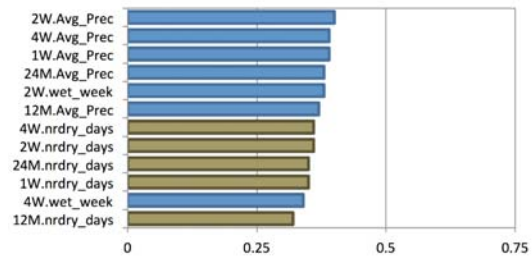


TOP STREAMFLOW PREDICTORS

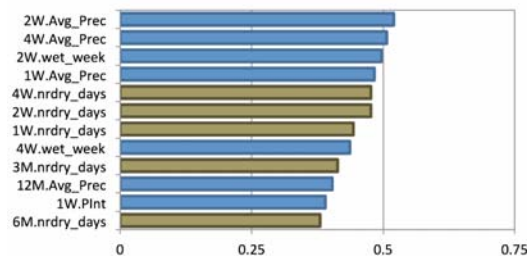
Colorado River at Austin



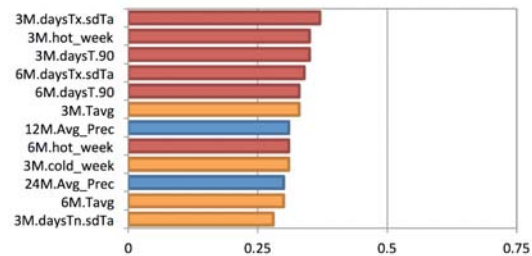
Pedernales at Johnson City



Colorado River at San Saba



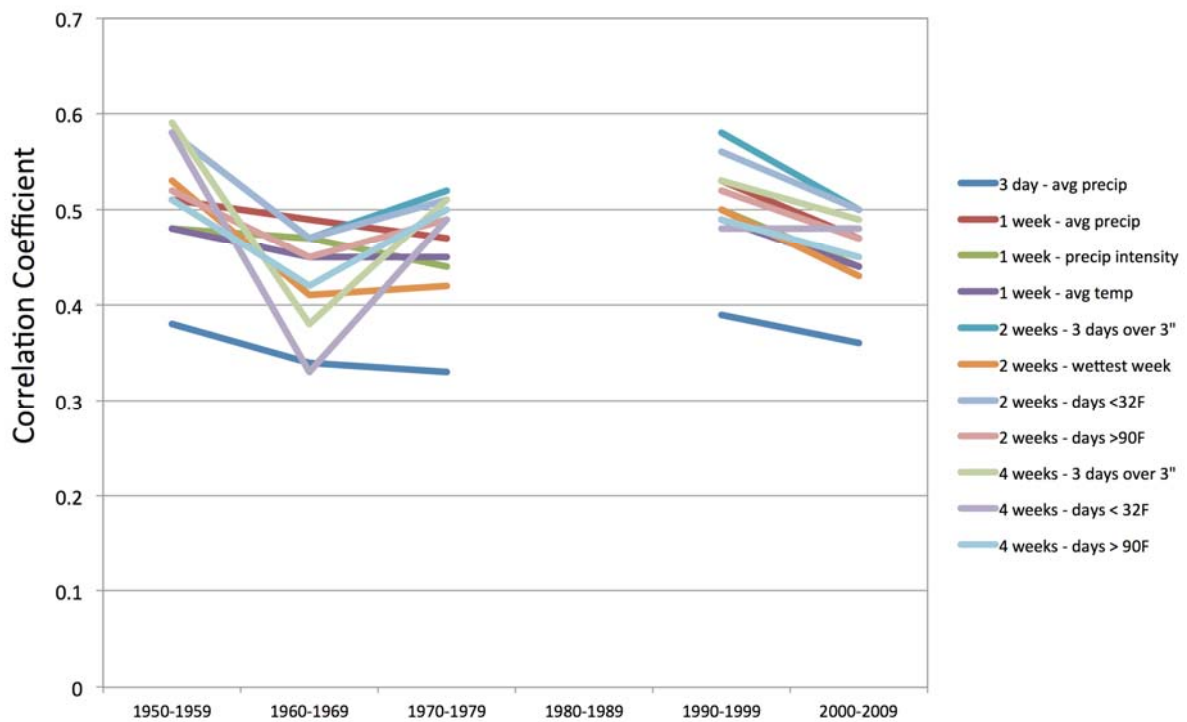
Llano River at Llano



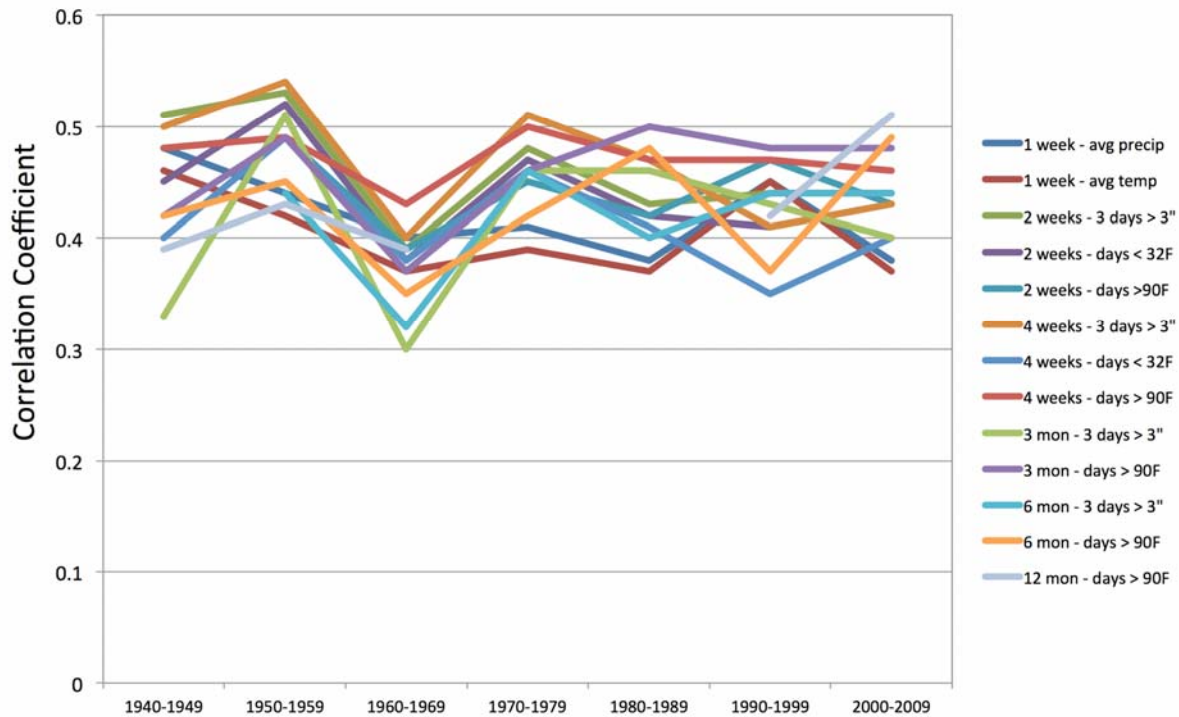
CLIMATE

To what extent
does temperature
and precipitation
affect streamflow?

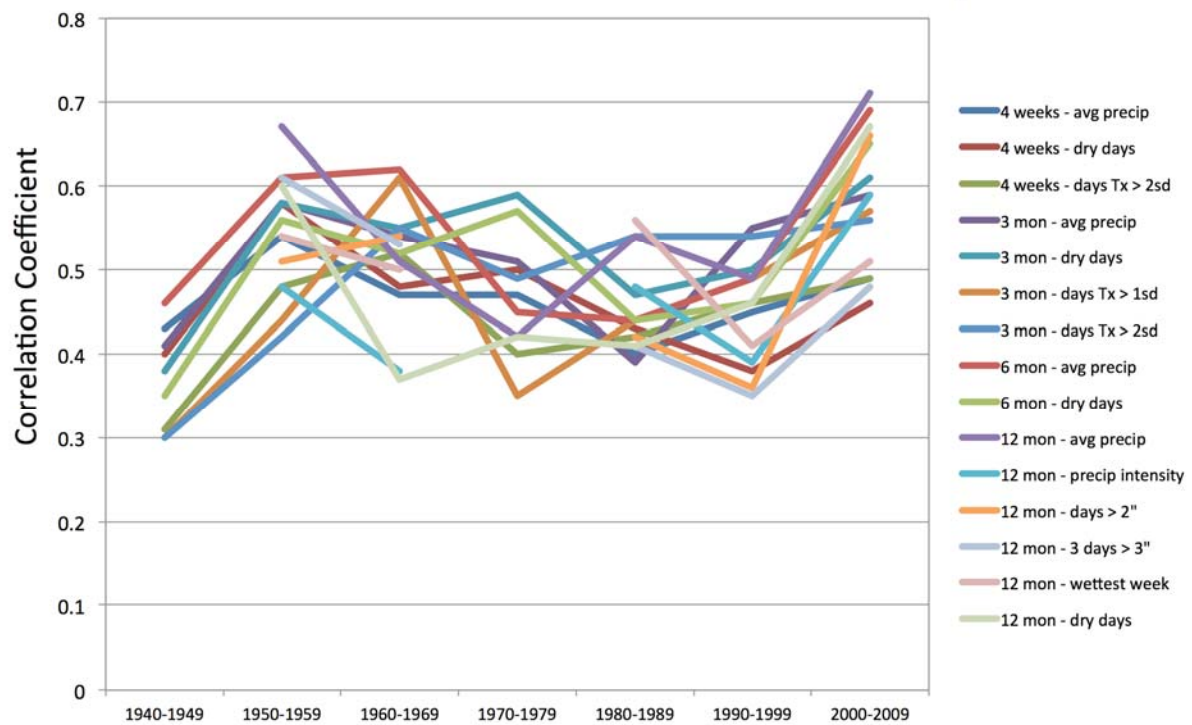
Colorado River at San Saba



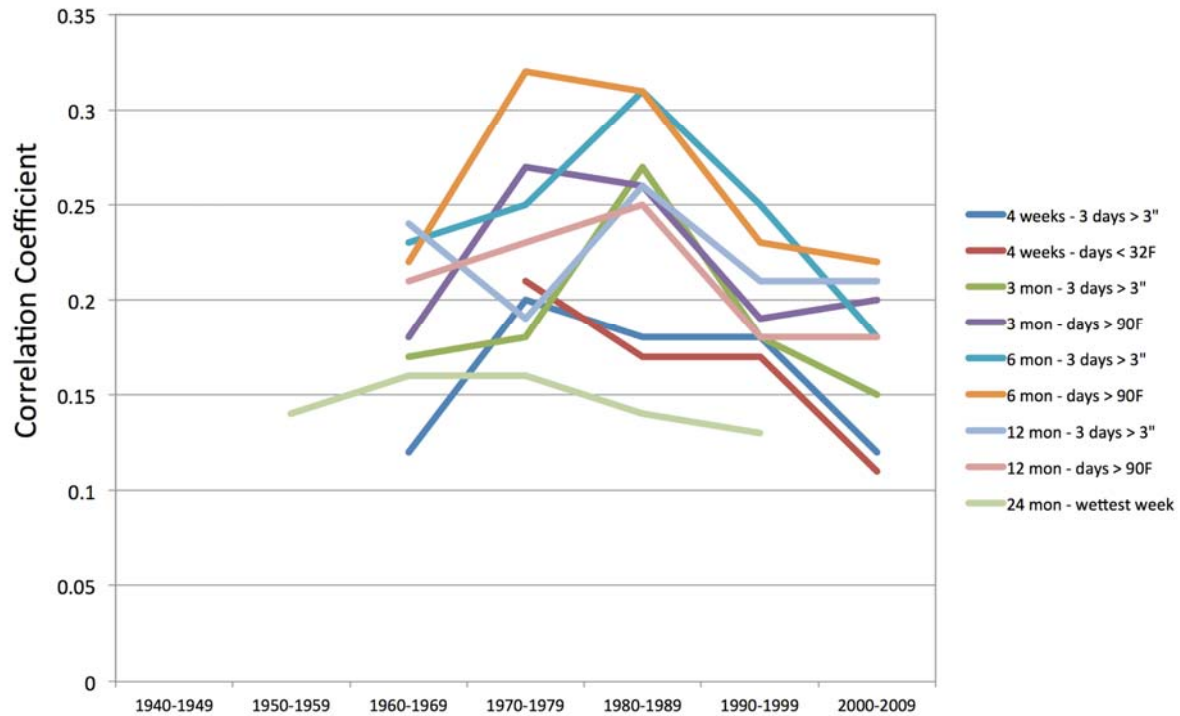
Colorado River at Austin



Pedernales River at Johnson City

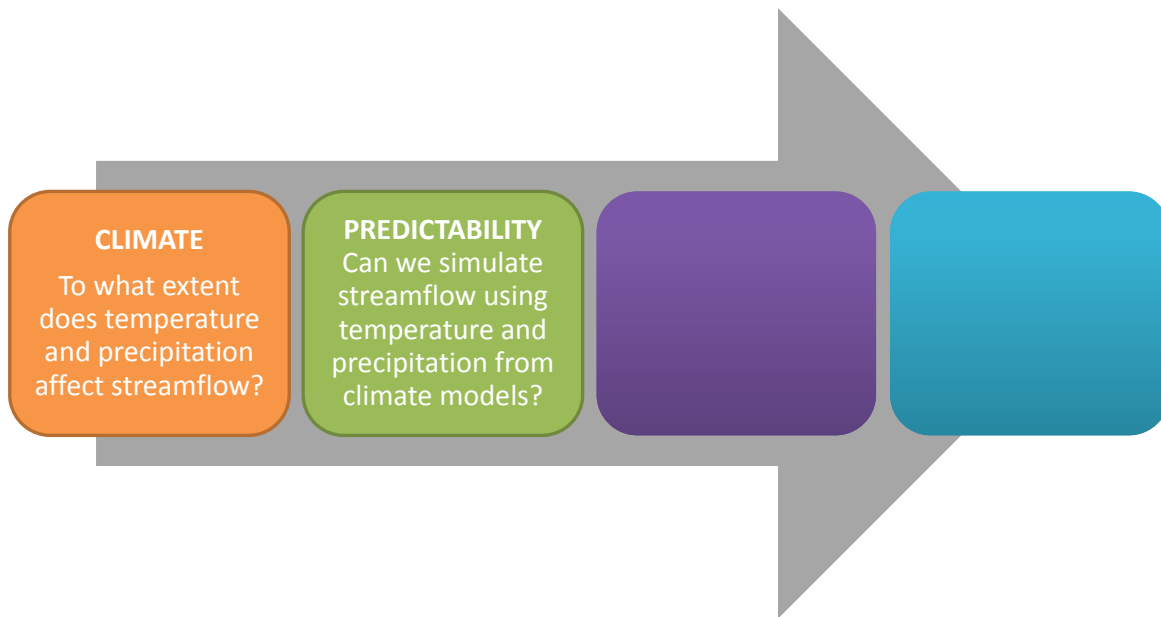


Colorado River at Wharton

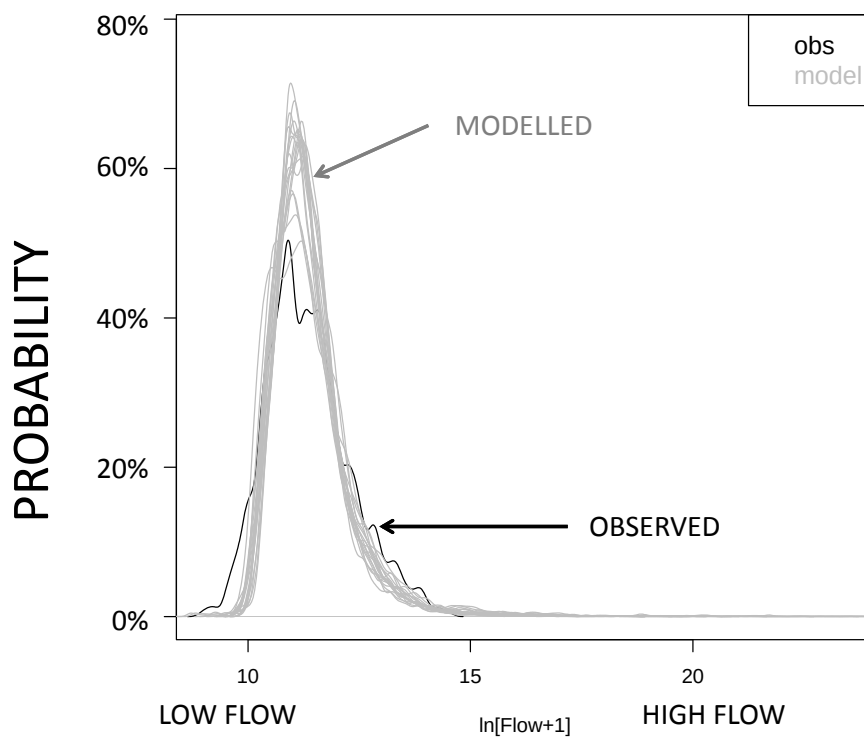


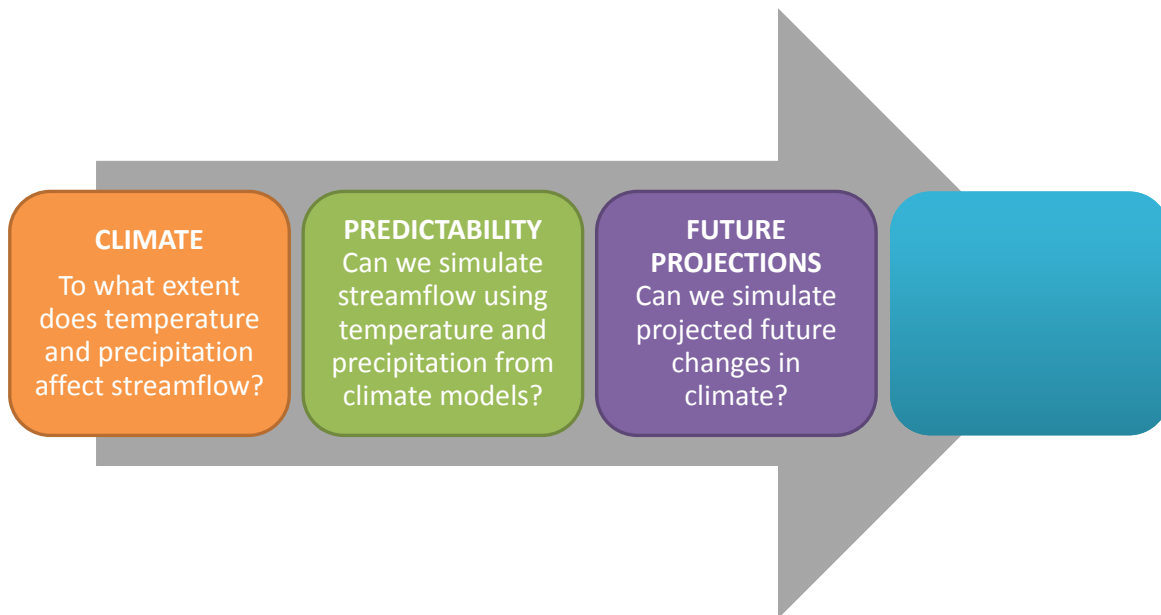
CLIMATE

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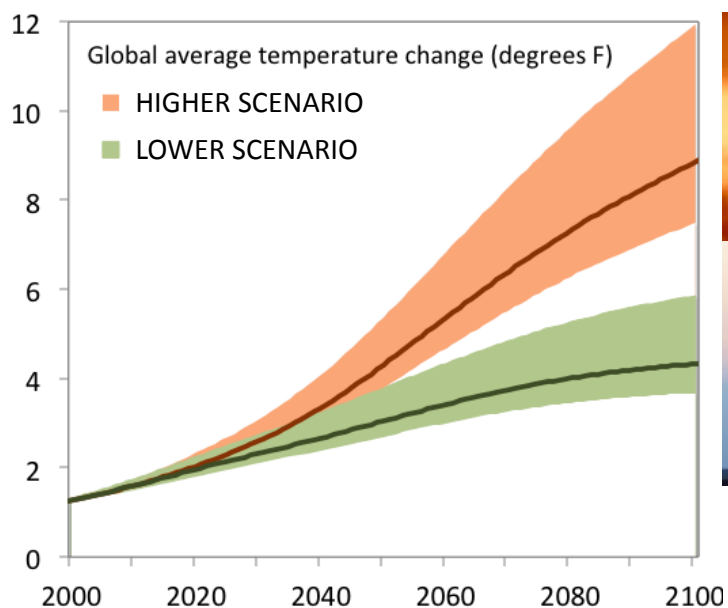


Colorado River at Austin

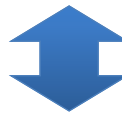
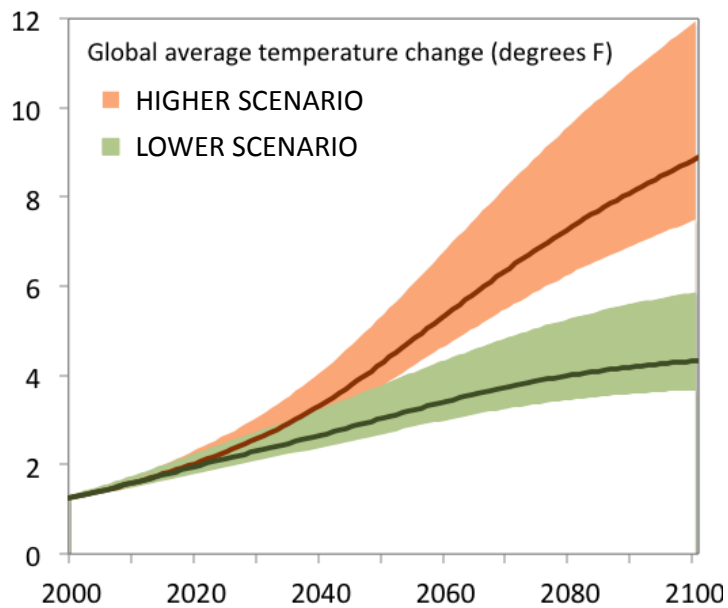




FUTURE CHANGE DEPENDS ON OUR CHOICES



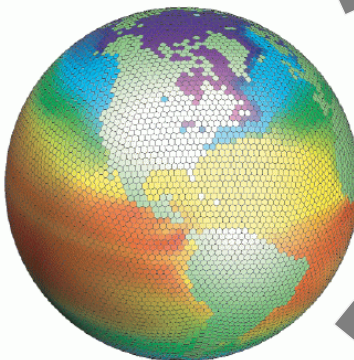
FUTURE CHANGE DEPENDS ON HOW SENSITIVE THE PLANET IS



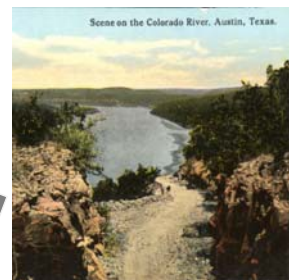
GAUGE-SPECIFIC FUTURE PROJECTIONS



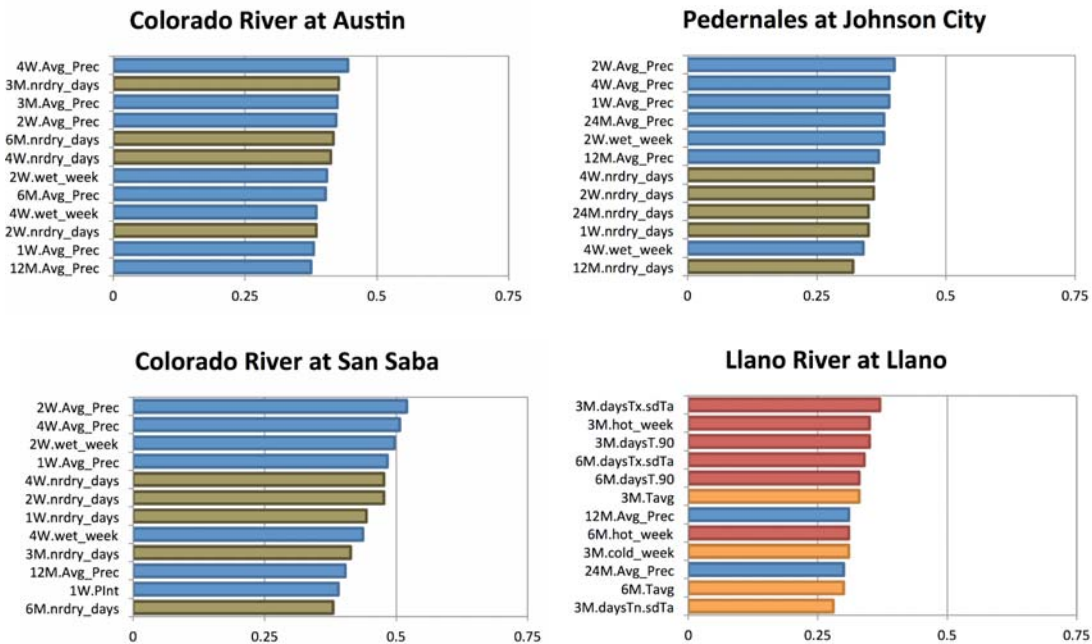
2 FUTURE SCENARIOS



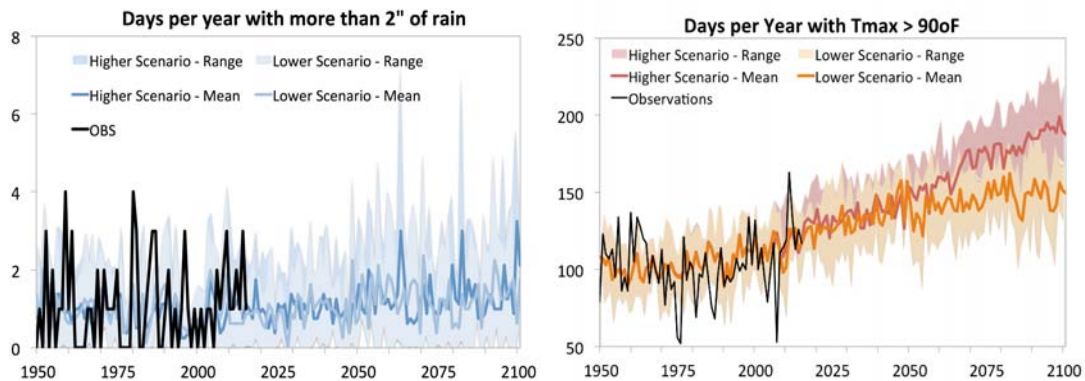
20 GLOBAL CLIMATE MODELS



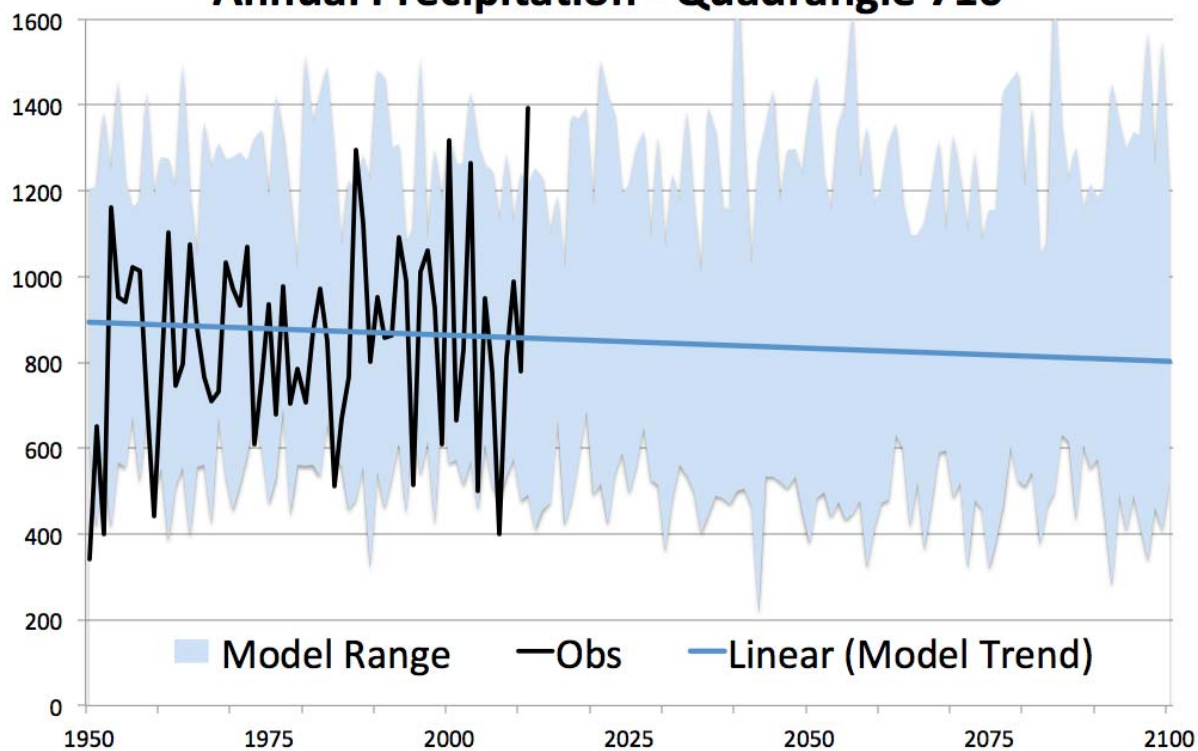
TOP STREAMFLOW PREDICTORS



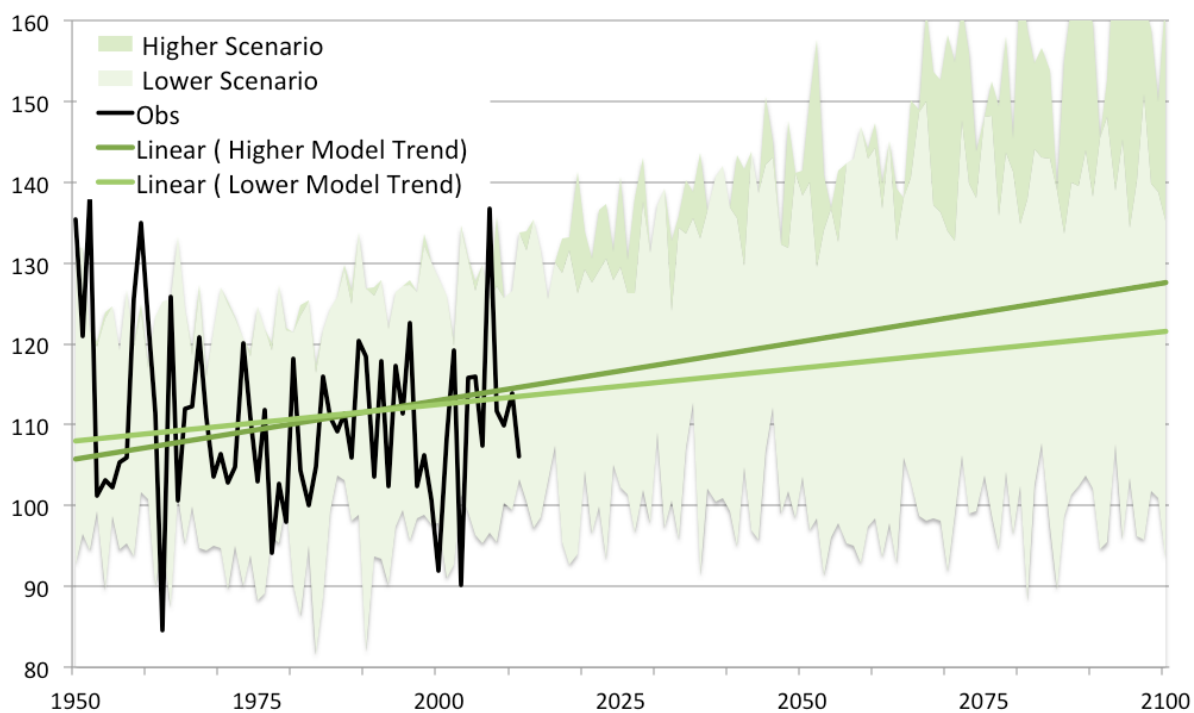
HISTORICAL OBSERVATIONS AND FUTURE PROJECTIONS

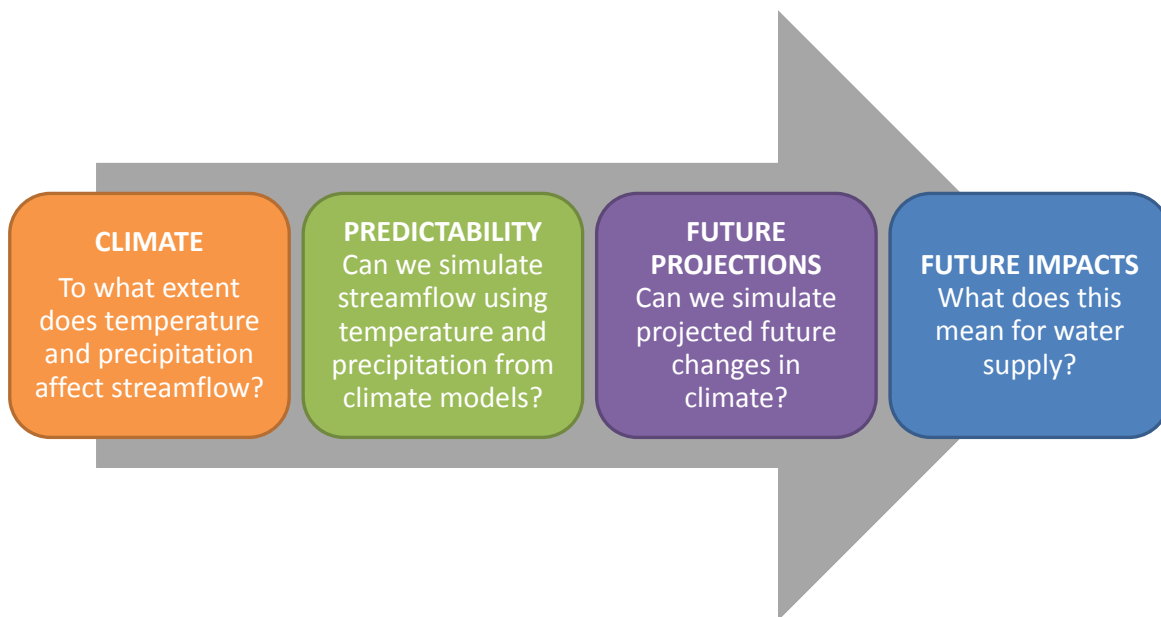


Annual Precipitation - Quadrangle 710

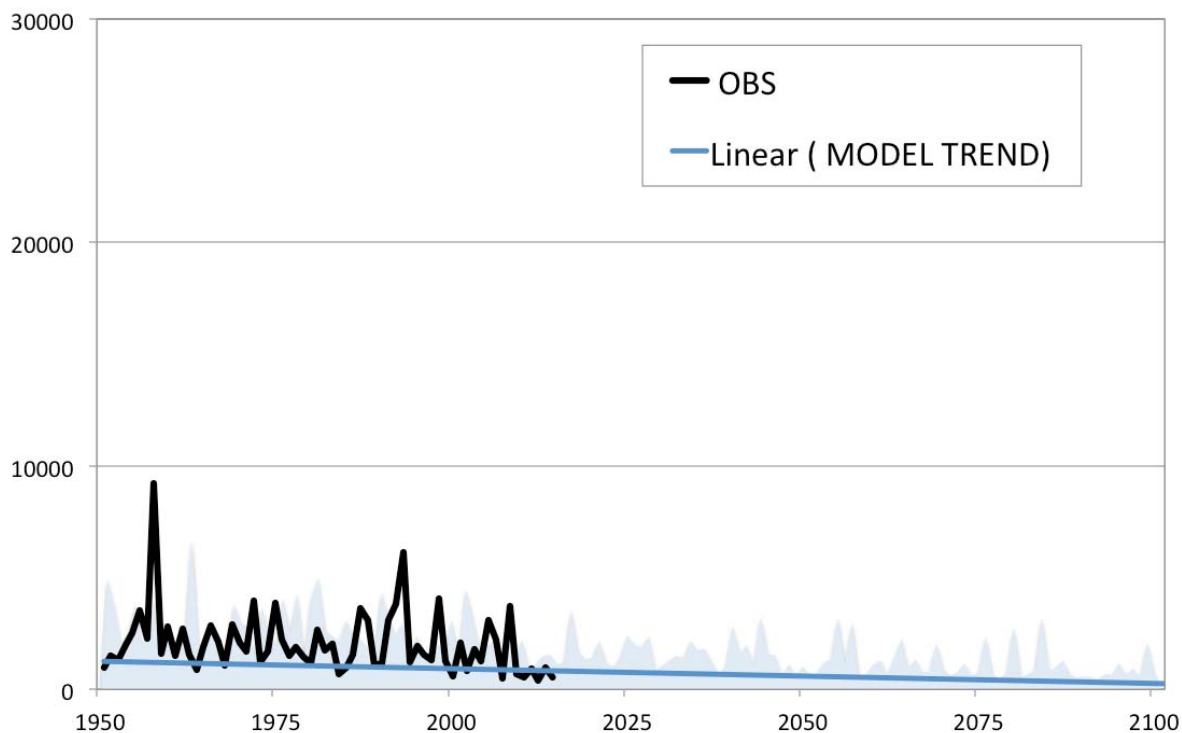


Annual Evaporation - Quadrangle 710

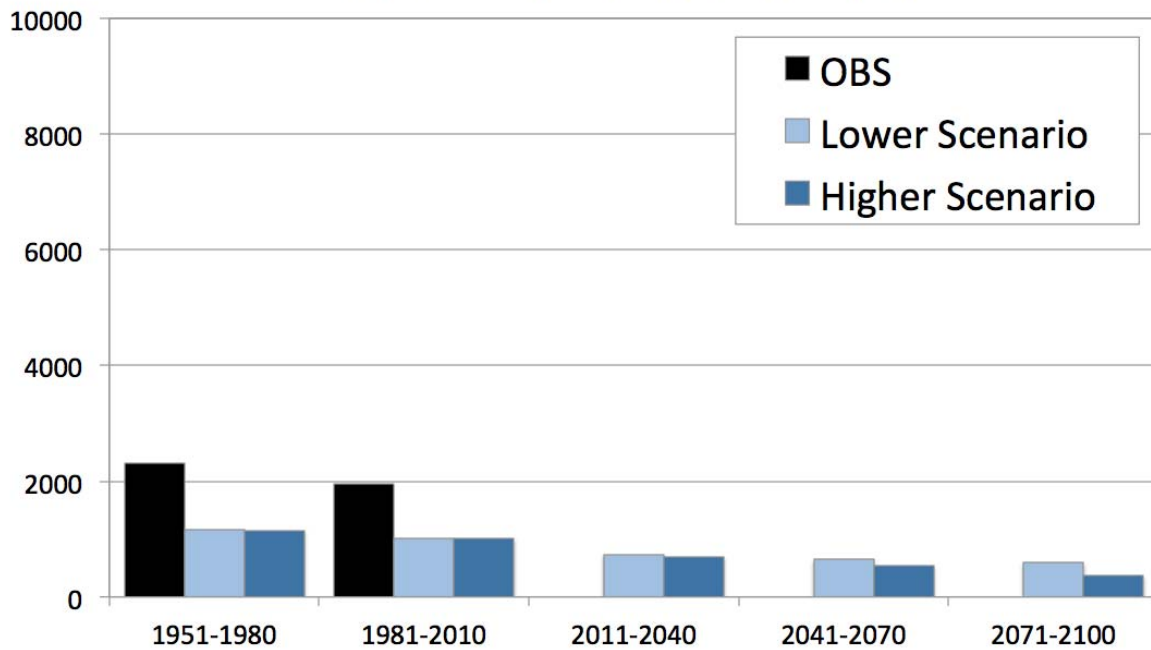




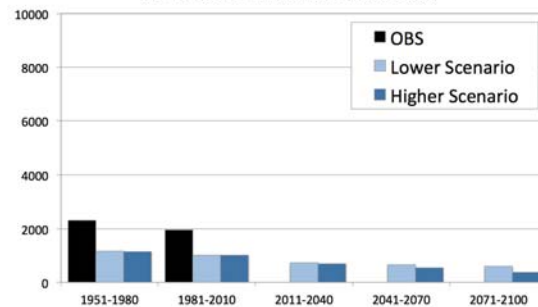
Colorado River at San Saba



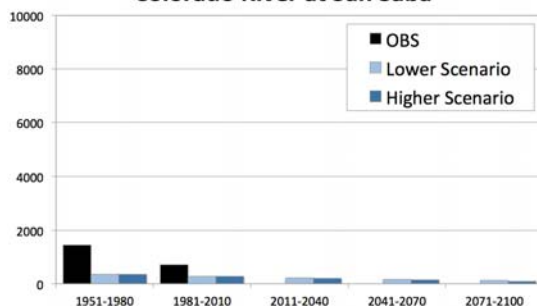
Annual Streamflow Colorado River at San Saba



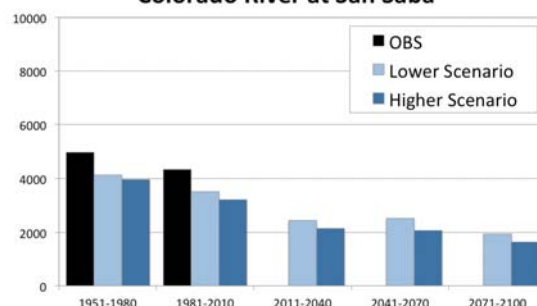
Annual Streamflow Colorado River at San Saba



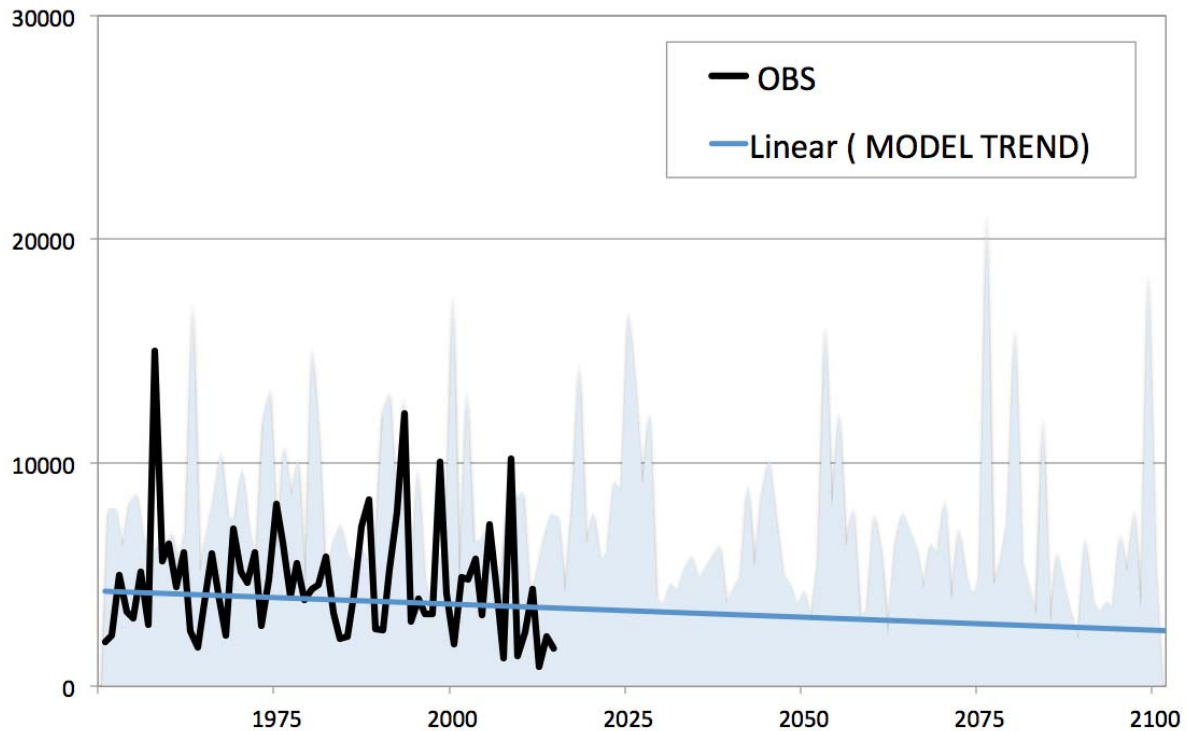
Lowest 3 Years of Streamflow Colorado River at San Saba



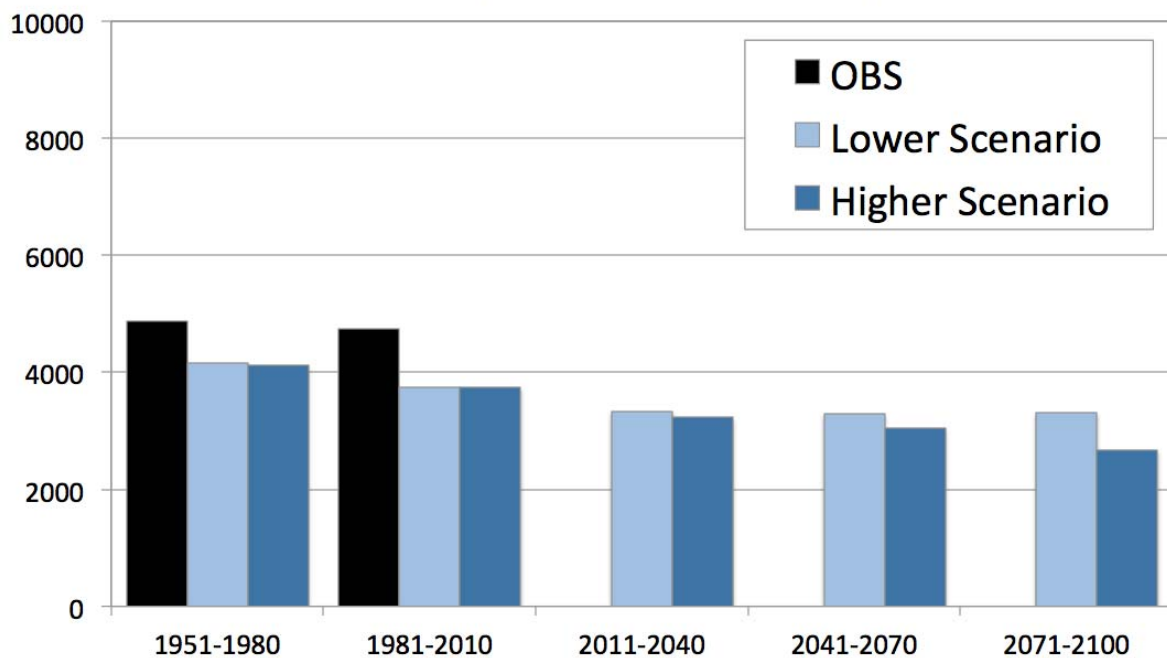
Highest 3 Years of Streamflow Colorado River at San Saba



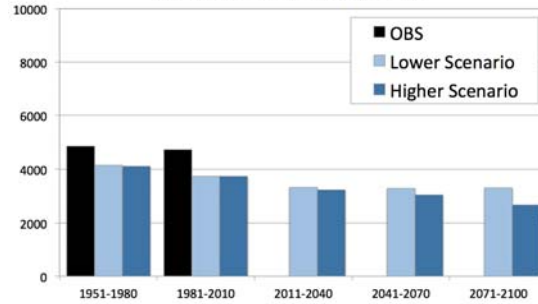
Colorado River at Austin



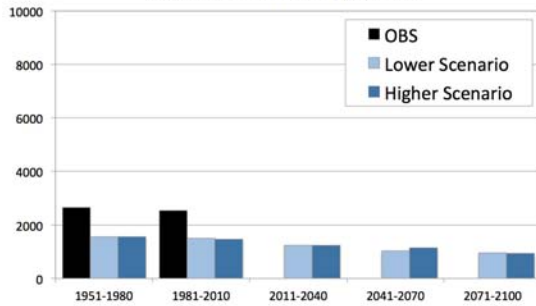
Annual Streamflow Colorado River at Austin



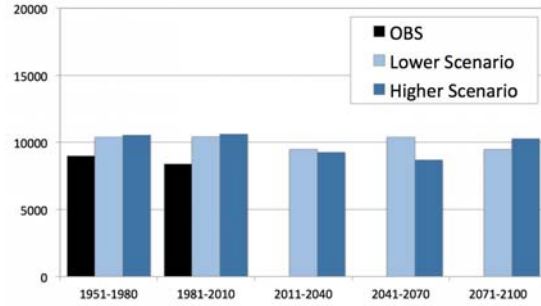
**Annual Streamflow
Colorado River at Austin**



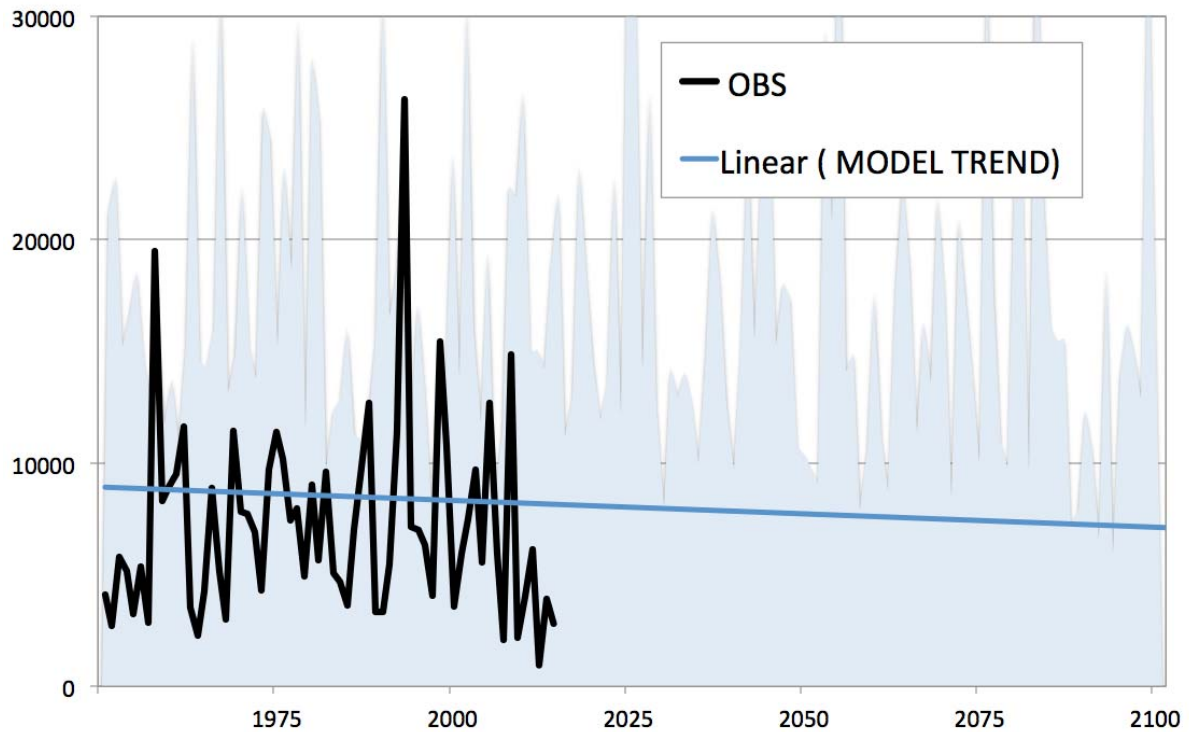
**Lowest 3 Years of Streamflow
Colorado River at Austin**



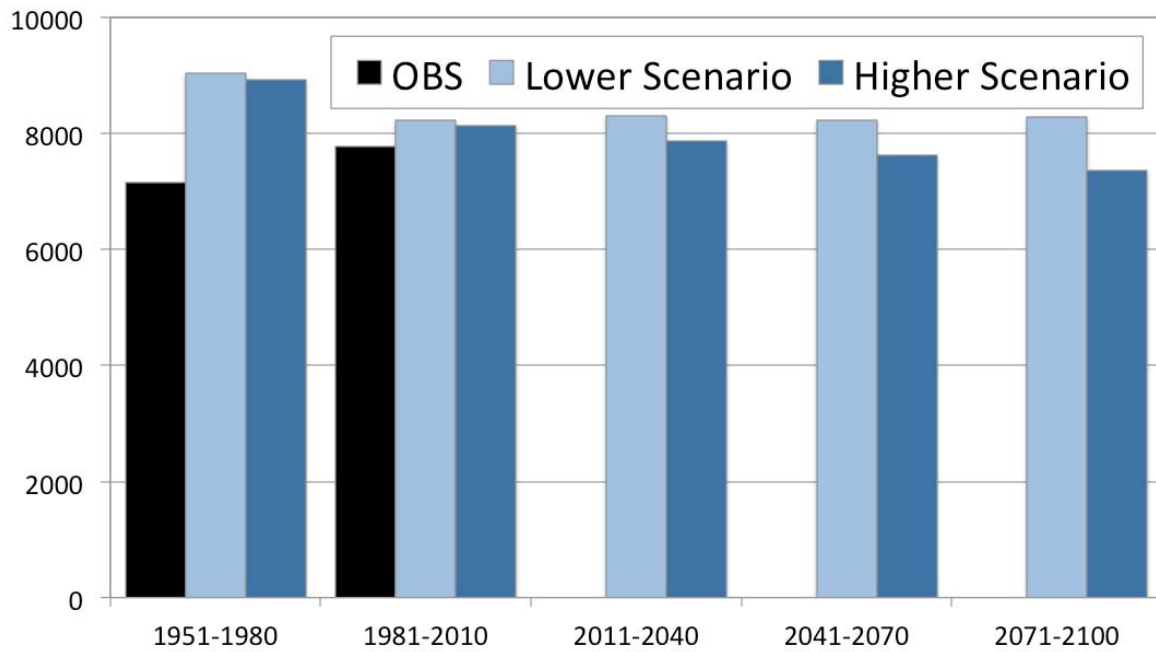
**Highest 3 Years of Streamflow
Colorado River at Austin**



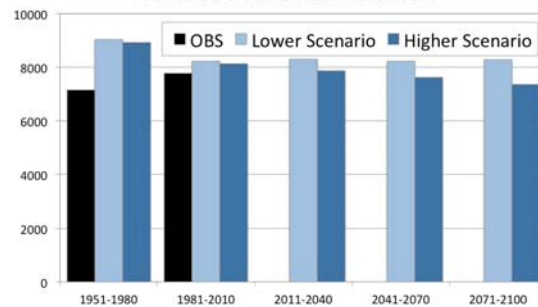
Colorado River at Wharton



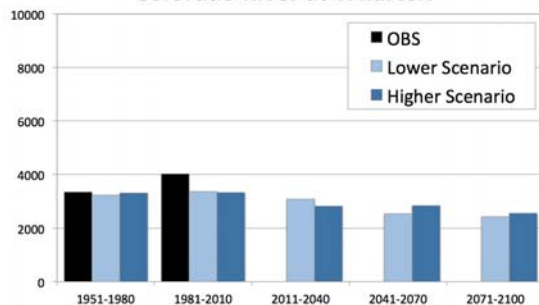
Annual Streamflow Colorado River at Wharton



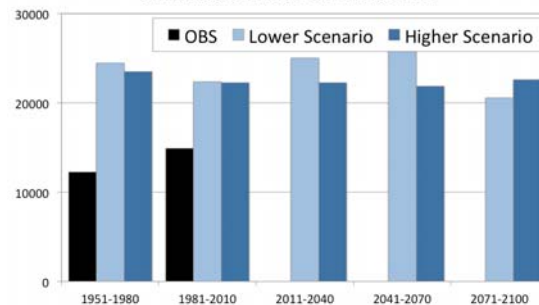
Annual Streamflow Colorado River at Wharton



Lowest 3 Years of Streamflow Colorado River at Wharton



Highest 3 Years of Streamflow Colorado River at Wharton



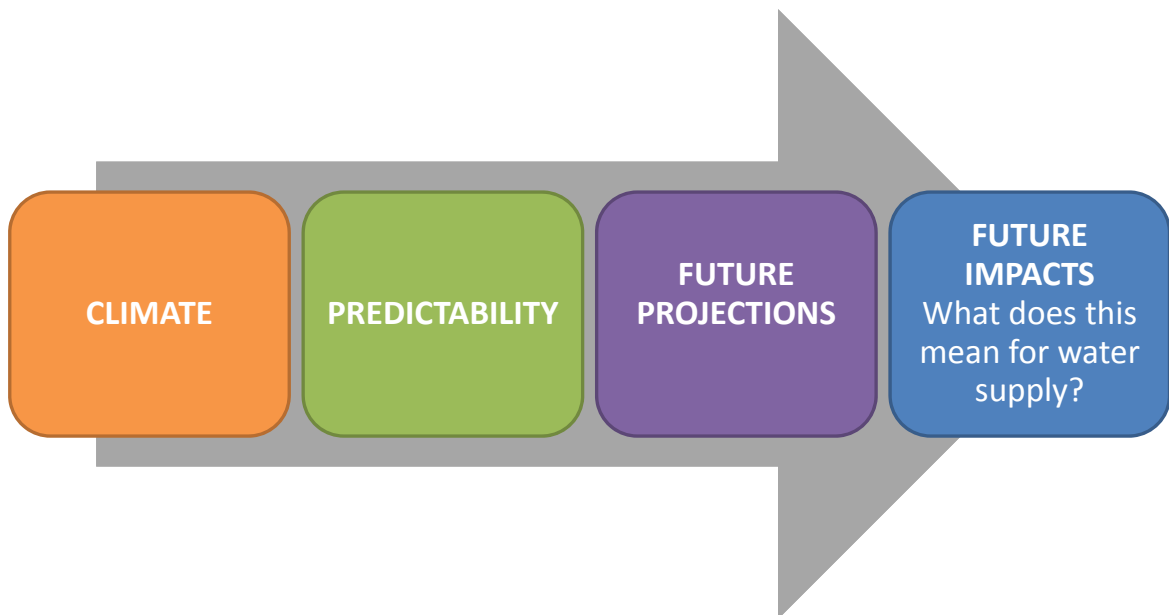
NEXT STEPS

Develop seasonal models.

Finalize analysis results.

Provide streamflow inputs to the WAM gauges for 1950-2100.

Provide monthly precipitation and evaporation for the TWDB quadrangles.



THE END

QUESTIONS?

61

2017 Task Force Meeting Dates

62

Proposed 2017 Task Force Meeting Dates

January 5th
February 7th
March 7th
April 11th
May 2nd
June 6th

July 11th
August 1st
September 5th
October 3rd
November 7th
December 5th

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Next Task Force Meeting Date

Disaggregated Demand Model Overview
December 13th, 2-4pm

Glen Bell Service Center
Tom Medders Training Room

3907 South Industrial Drive
Austin Texas 78744

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