The Changing Gila River: Past, Present, and Future

David Gutzler, University of New Mexico

David Gutzler is a Professor in the Earth & Planetary Sciences Department at UNM. He and his students study climate variability and change, with an emphasis on analysis and prediction of climate and surface hydrology variability on time scales of seasons to decades. He has a PhD degree in meteorology from MIT, and is a former editor of the American Meteorological Society's Journal of Climate.

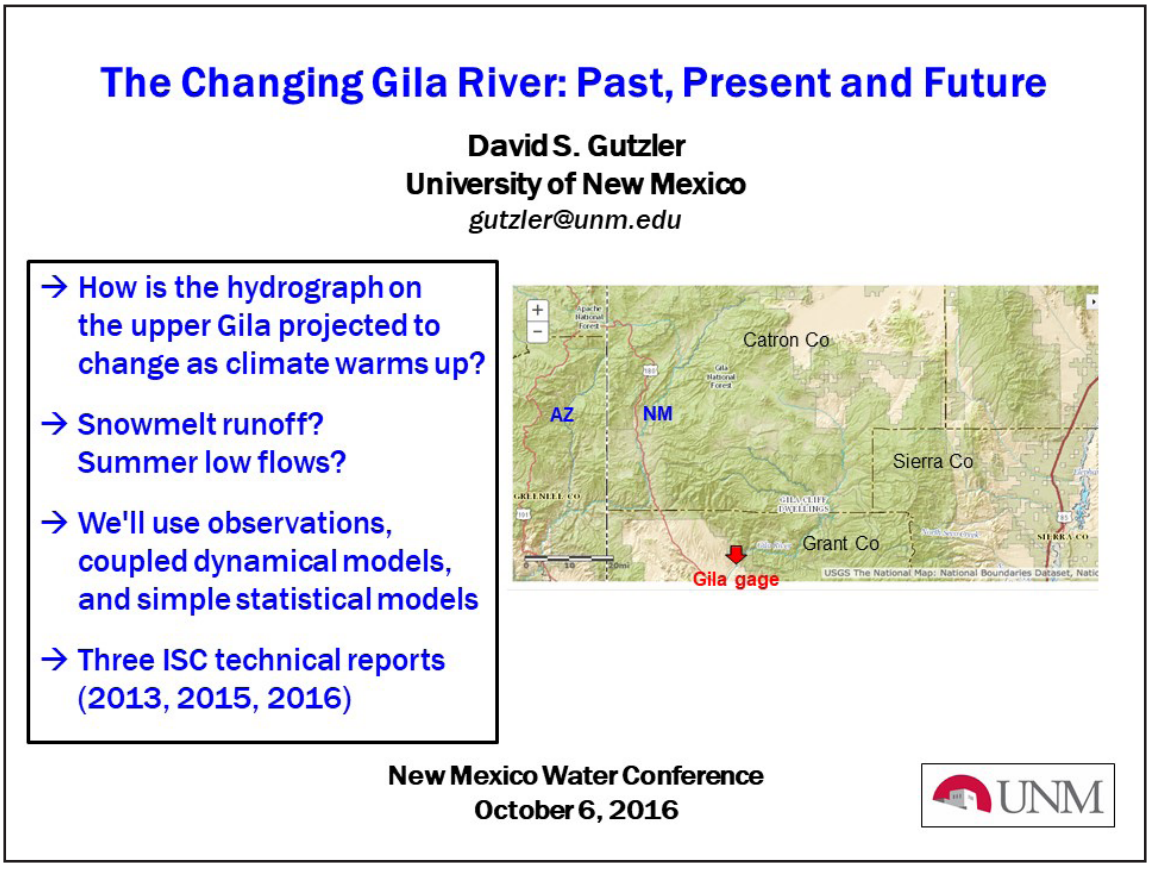

Figure 1. Introduction.

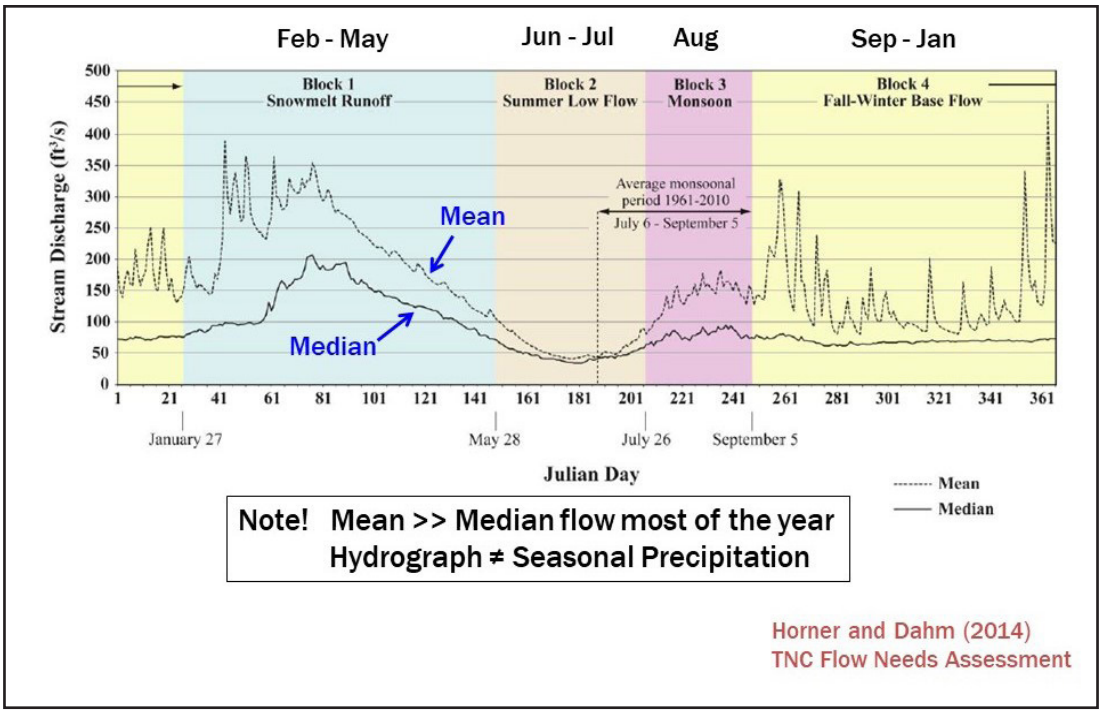

Figure 2. Average annual hydrograph for the Upper Gila River.

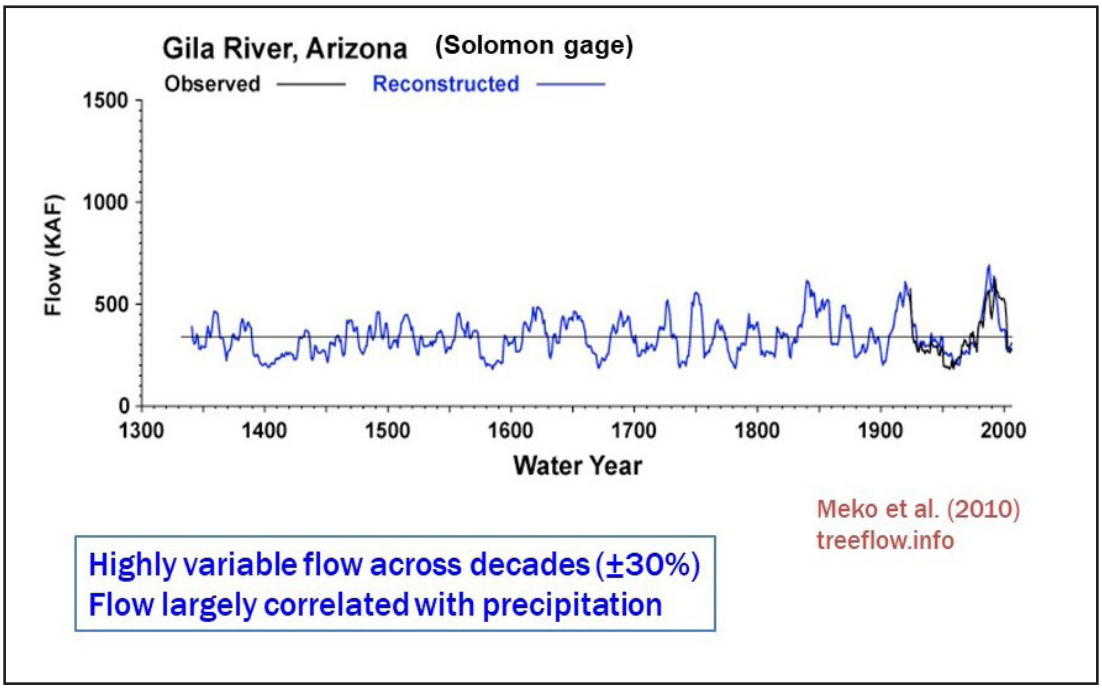

Figure 3. Reconstructed past flows.

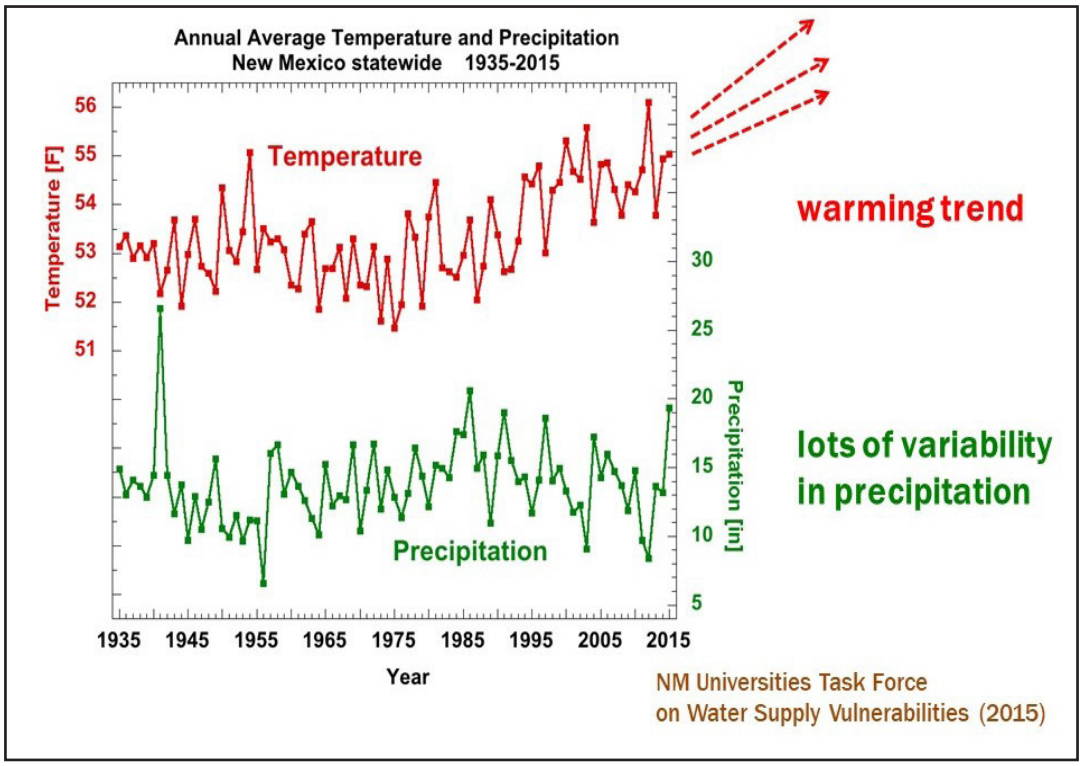

Figure 4. Observed climate variability and change in New Mexico.

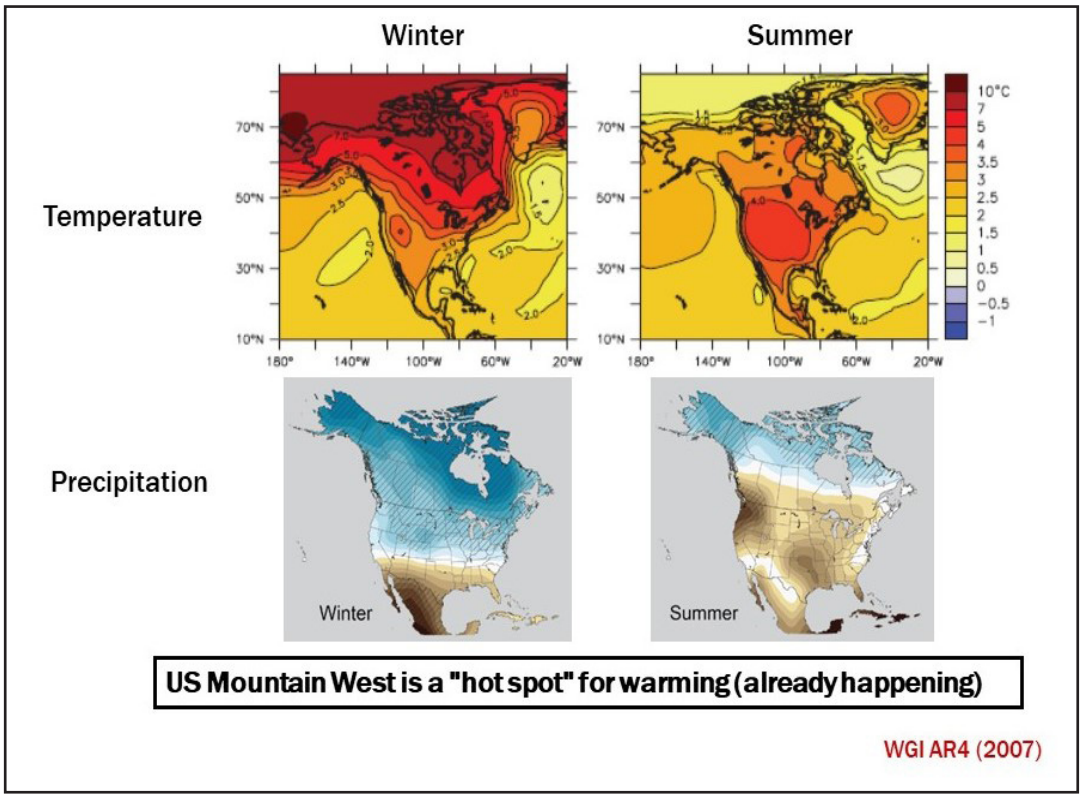

Figure 5. Projected climate change in the 21st century.

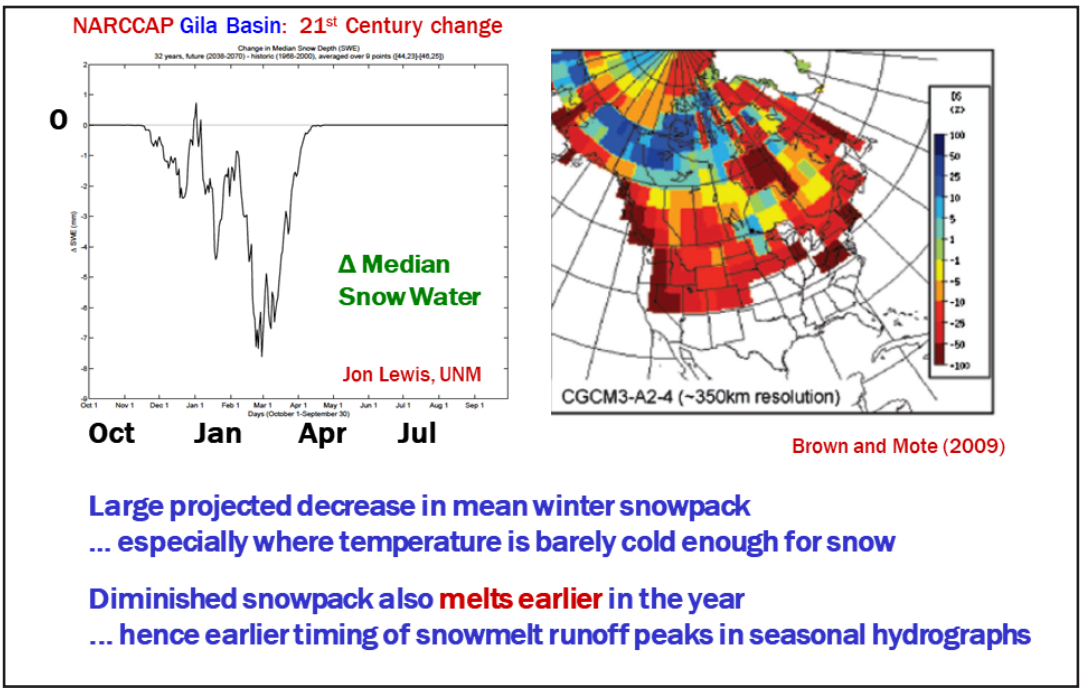

Figure 6. The big projected change of decreasing snowpack.

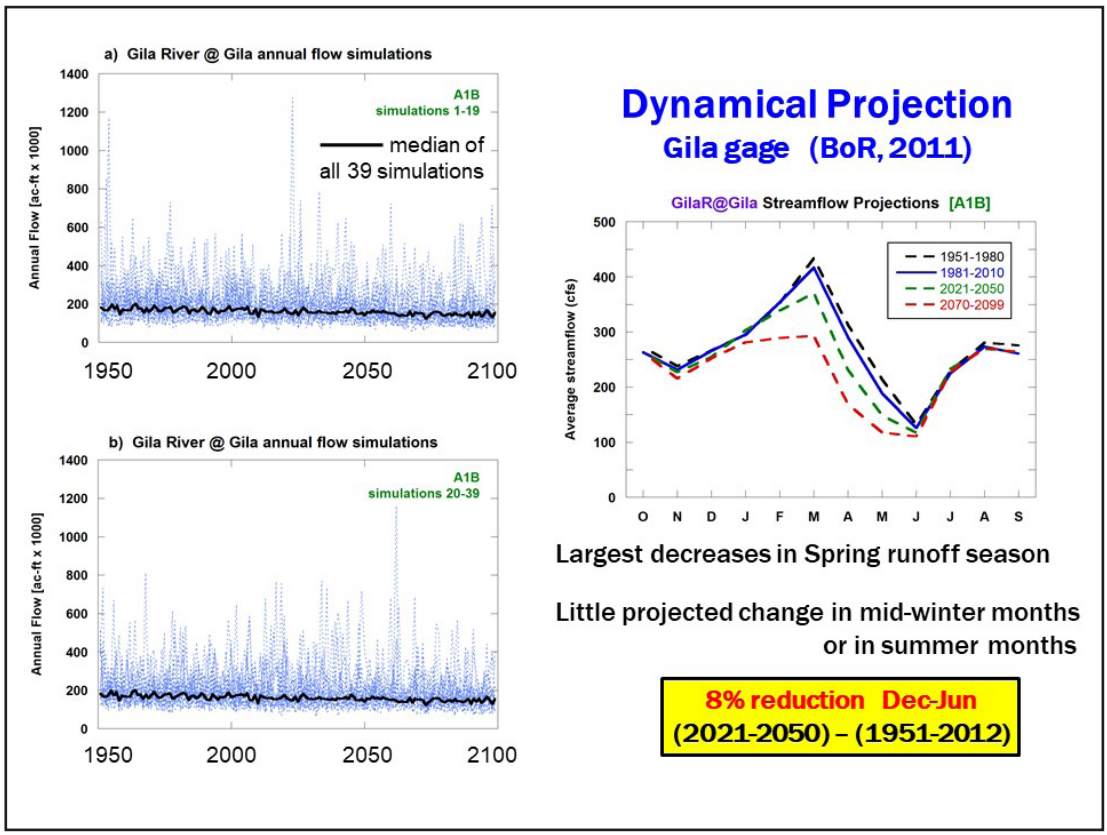

Figure 7. Dynamical projection of Gila gage.

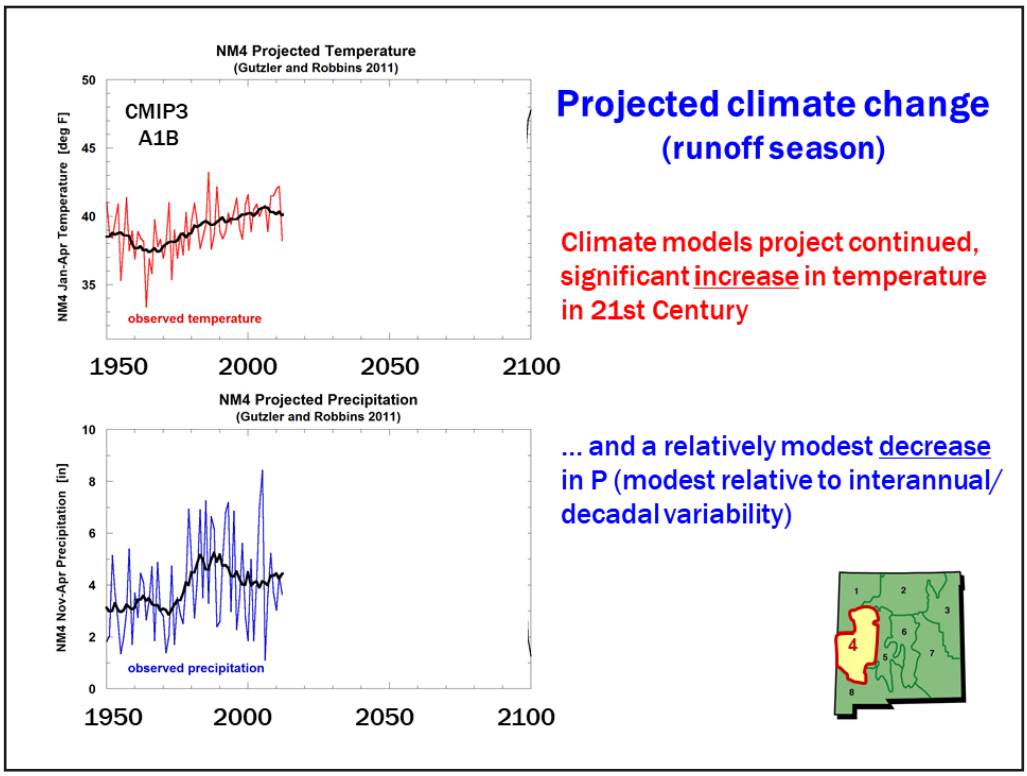

Figure 8. Projected climate change.

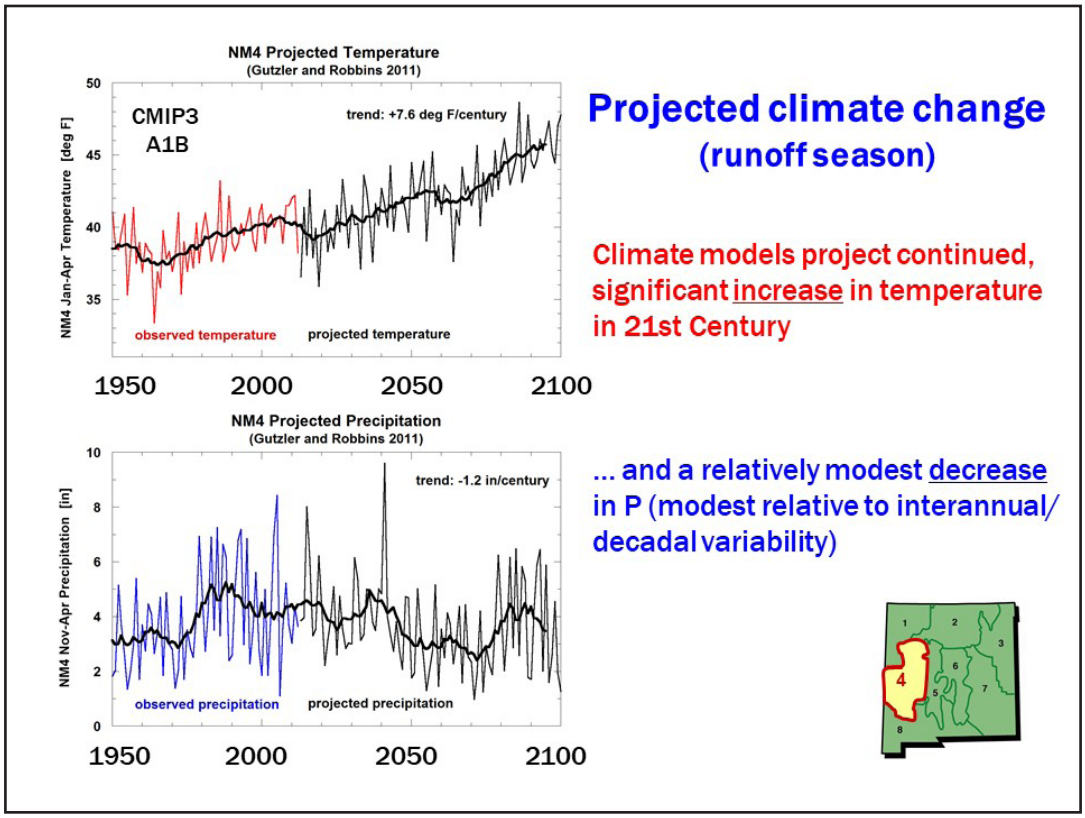

Figure 9. Projected climate change (cont.).

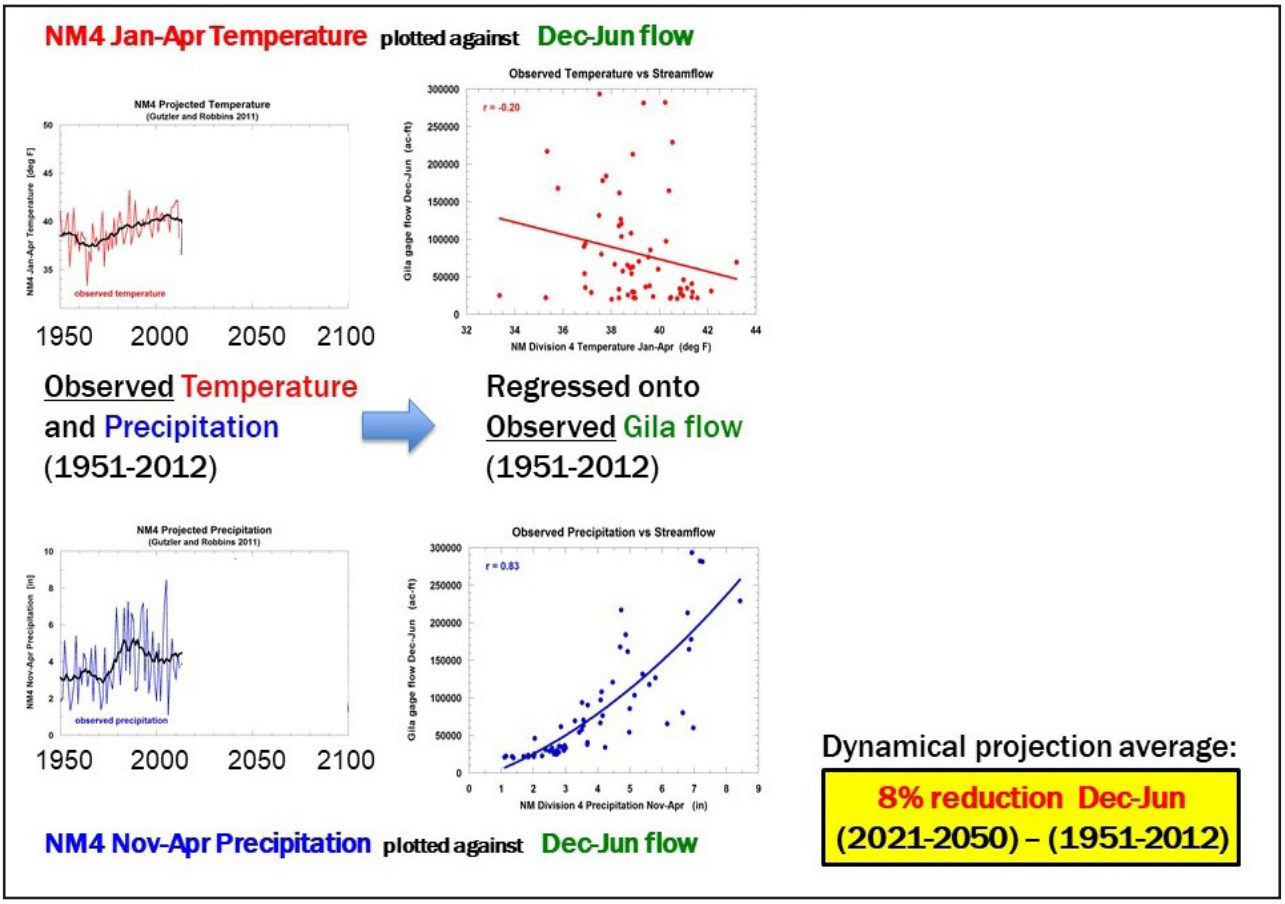

Figure 10. Statistical projection of the Gila gage during runoff season.

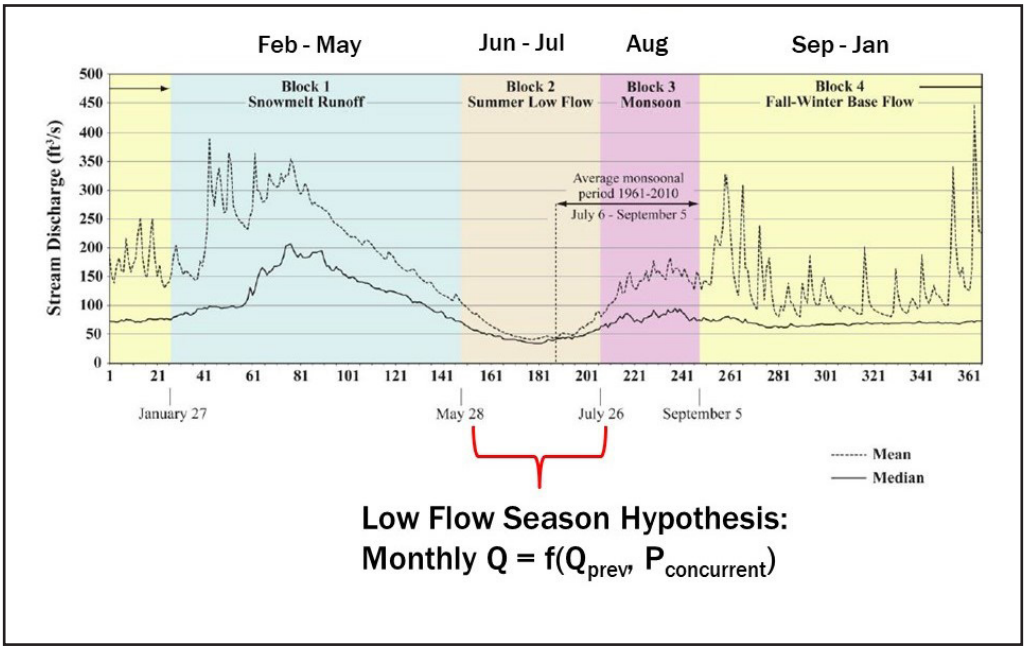

Figure 11. Future of low flows in the upper Gila basin.

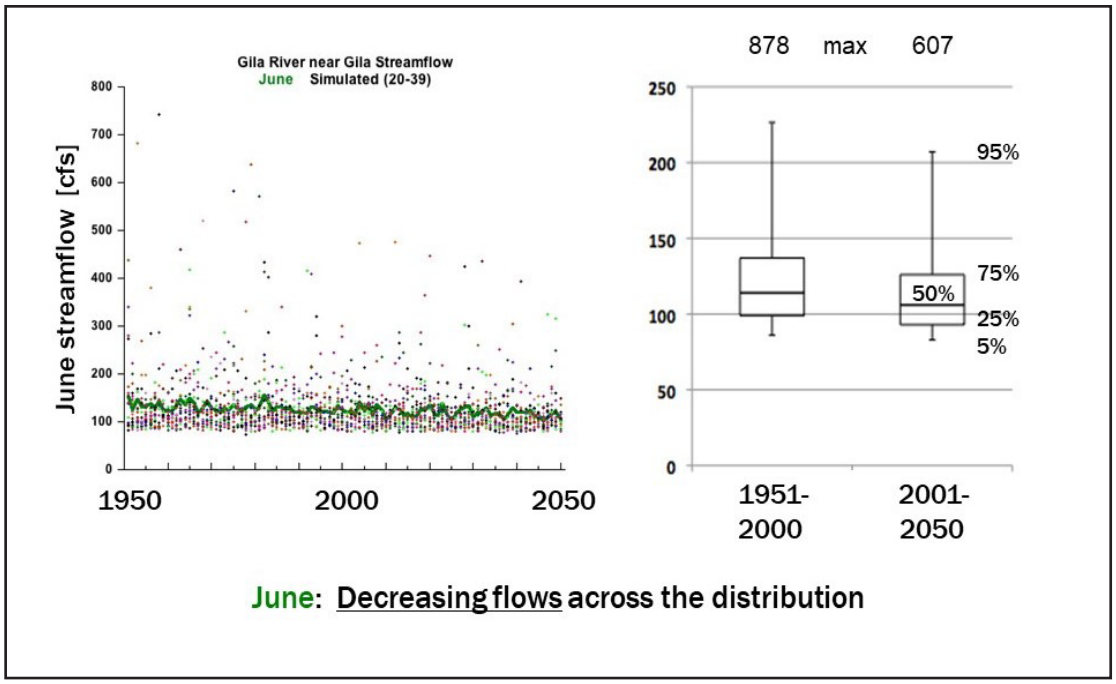

Figure 12. June streamflow.

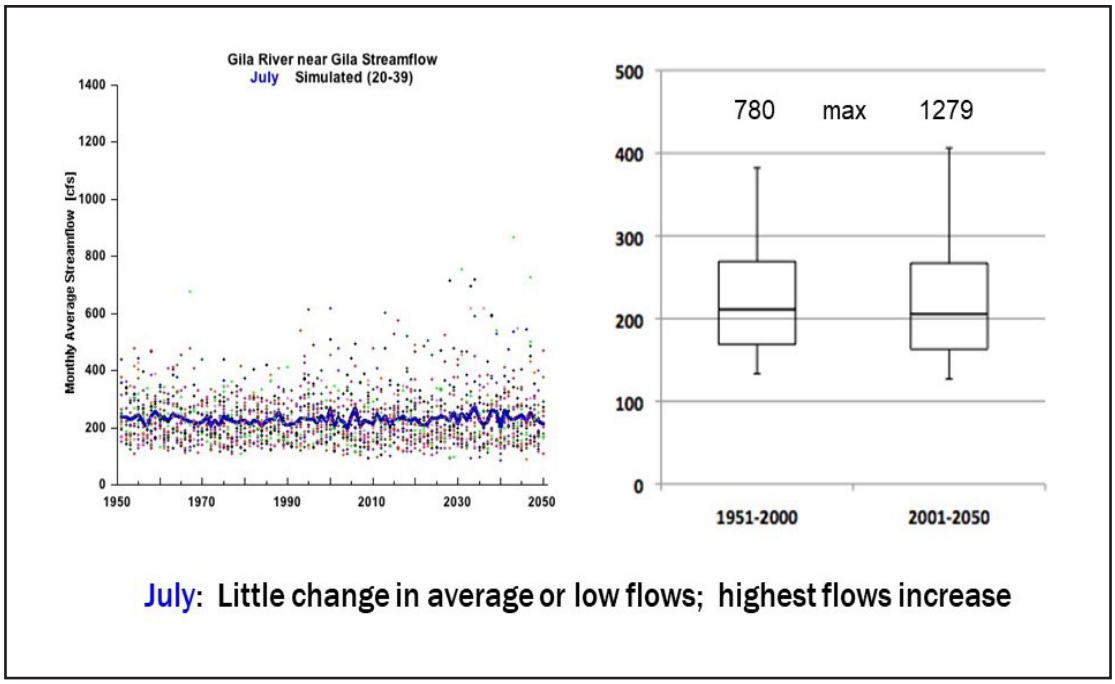

Figure 13. July streamflow.

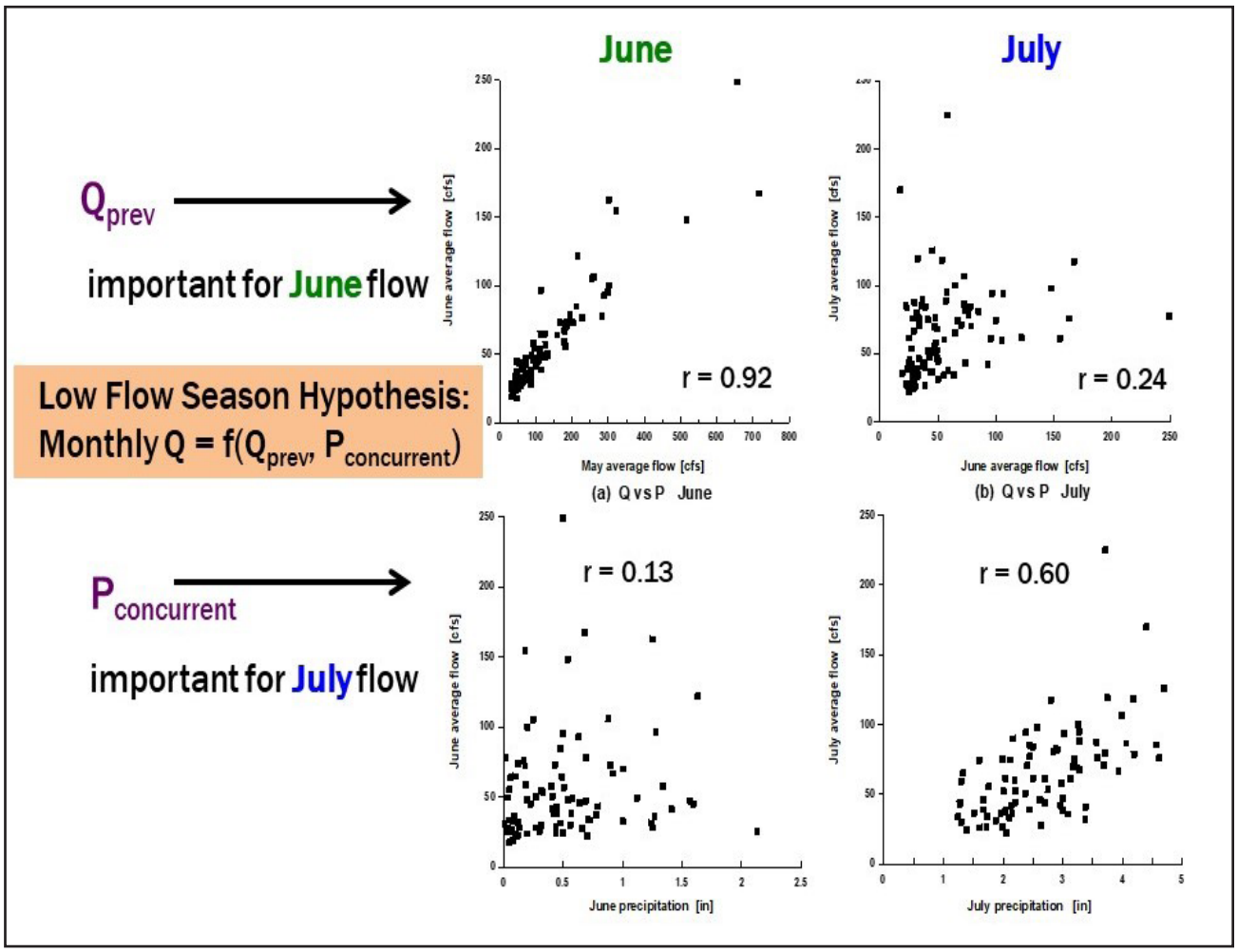

Figure 14. Predictors of observed low-flow monthly streamflow.

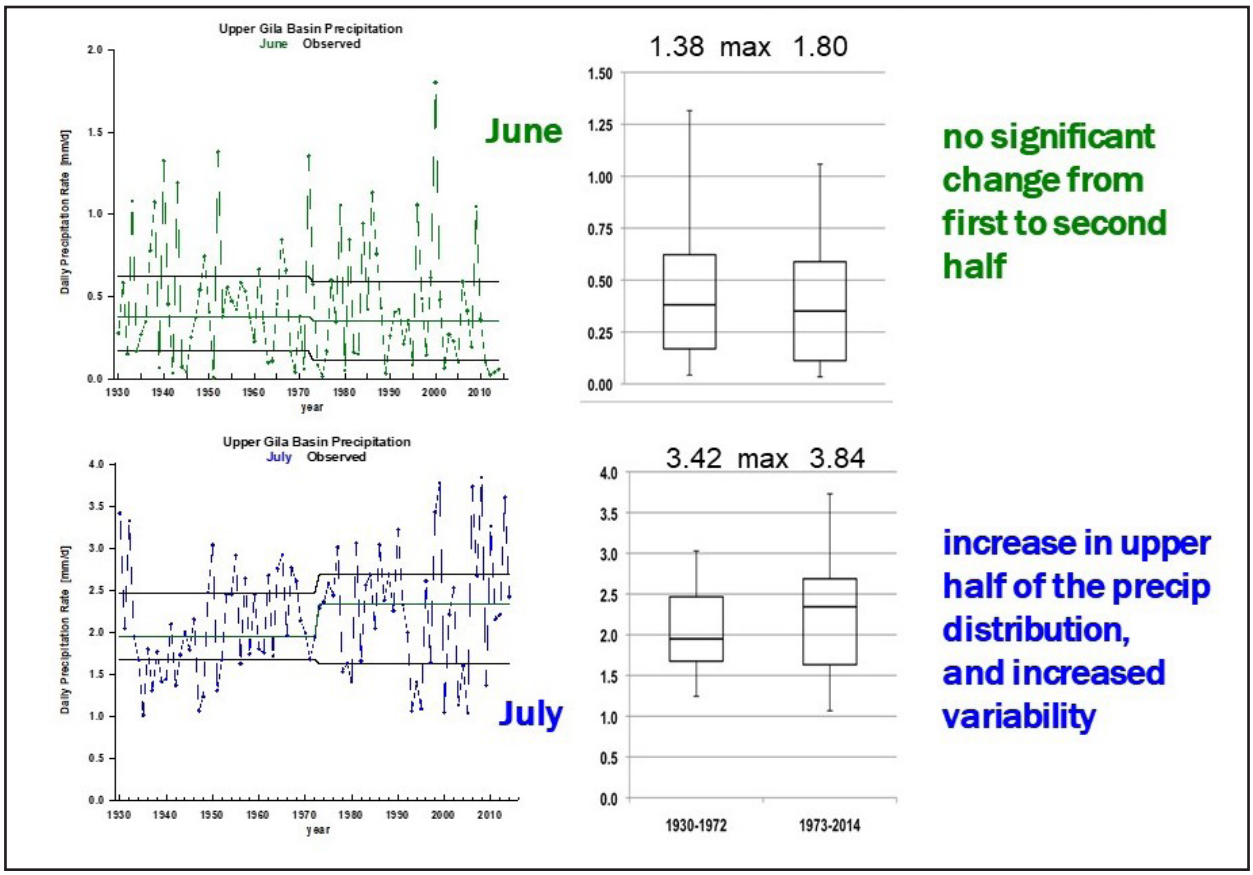

Figure 15. Low-flow months: observed precipitation variability.

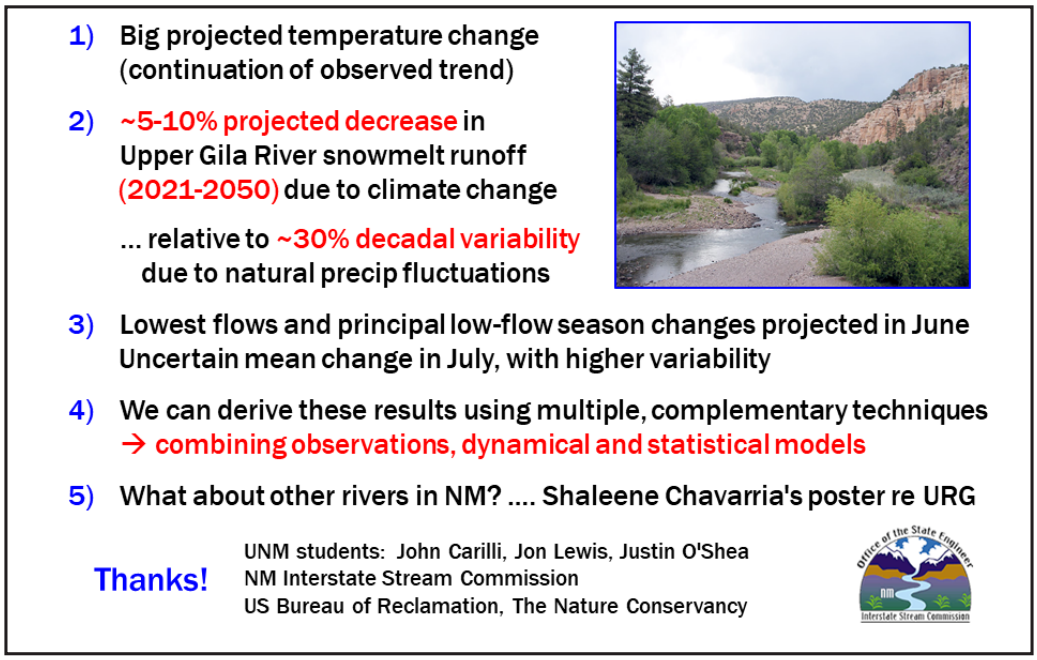

Figure 16. Climate change and the Upper Gila River.

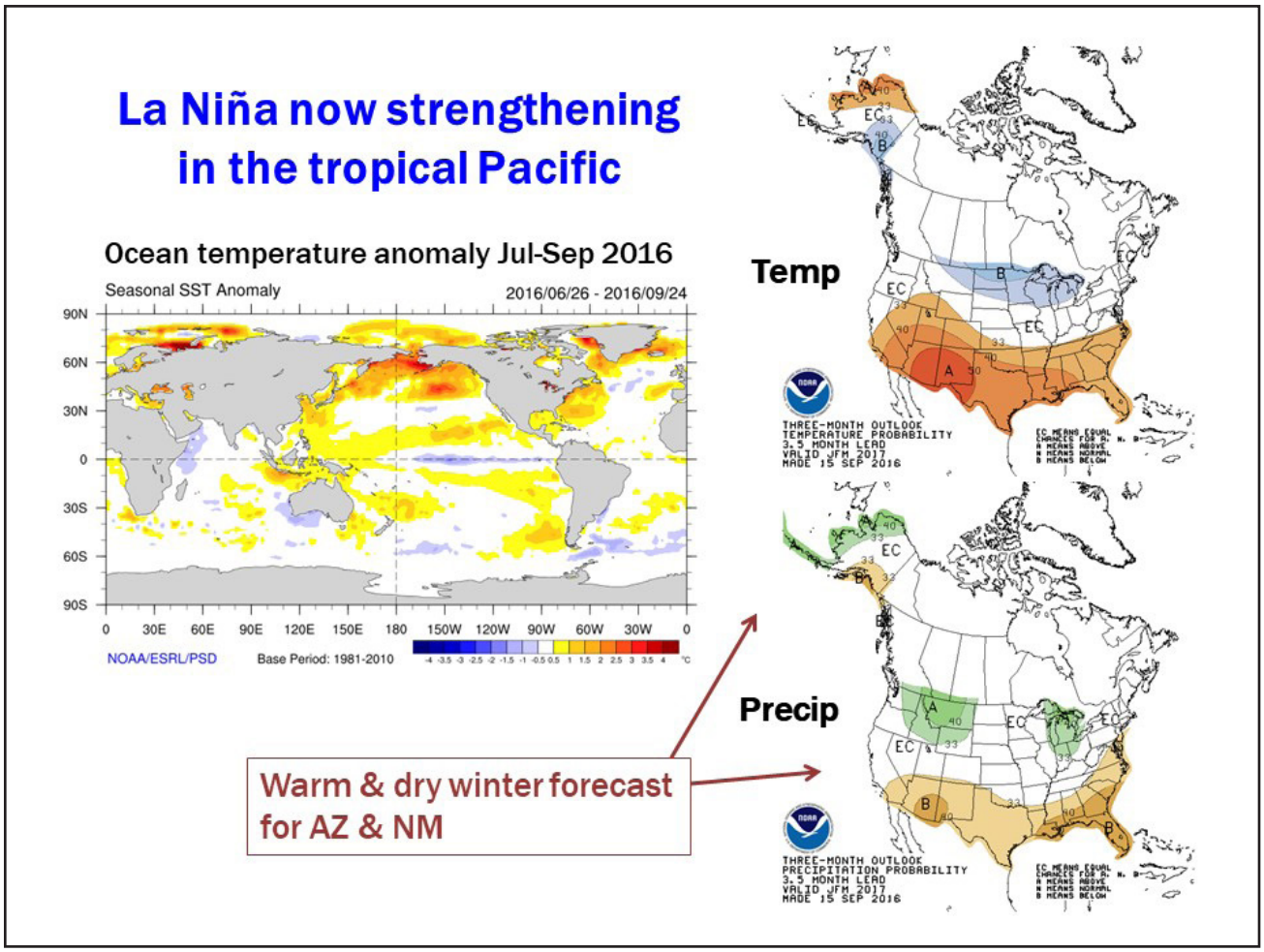

Figure 17. La Niña now strengthening in the tropical pacific.

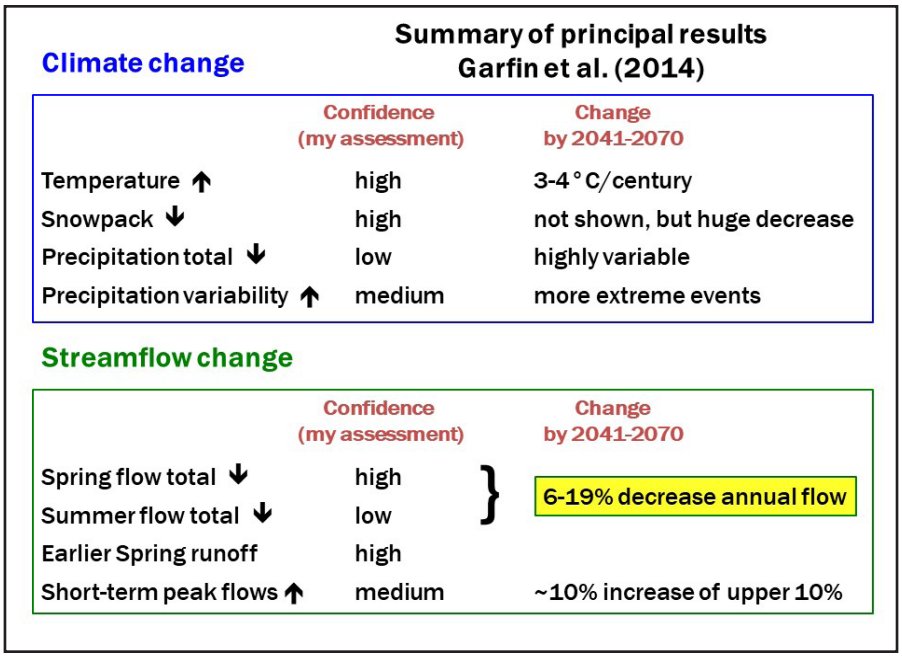

Figure 18. Summary of principal results.

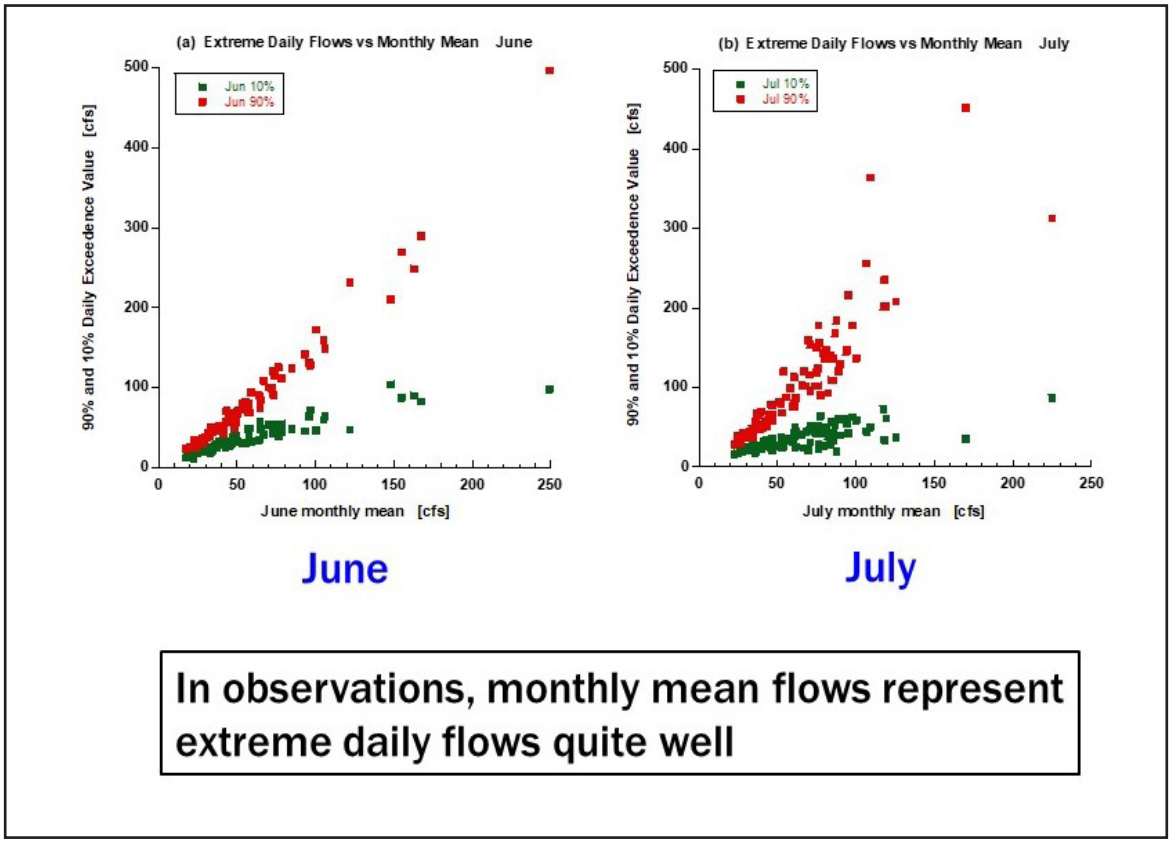

Figure 19. Monthly mean v. extreme flow.

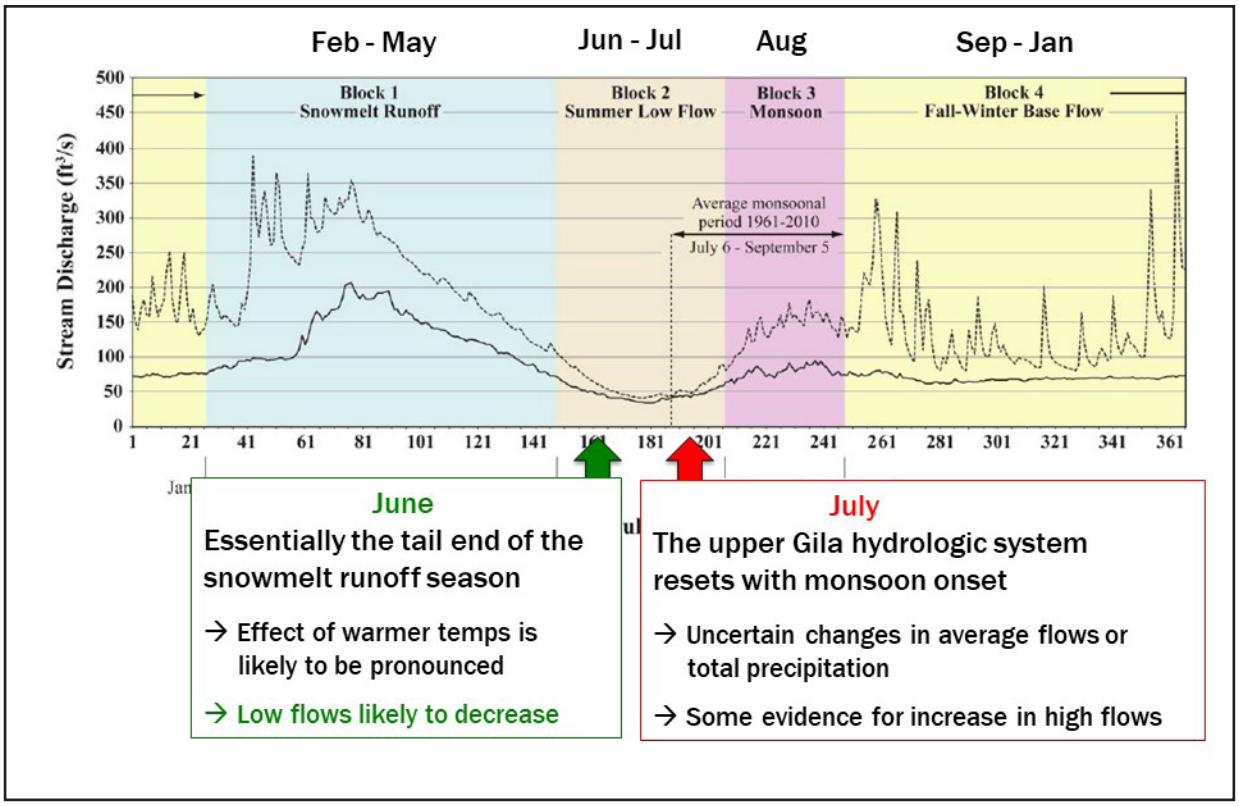

Figure 20. Future of low-flows in the upper Gila basin.

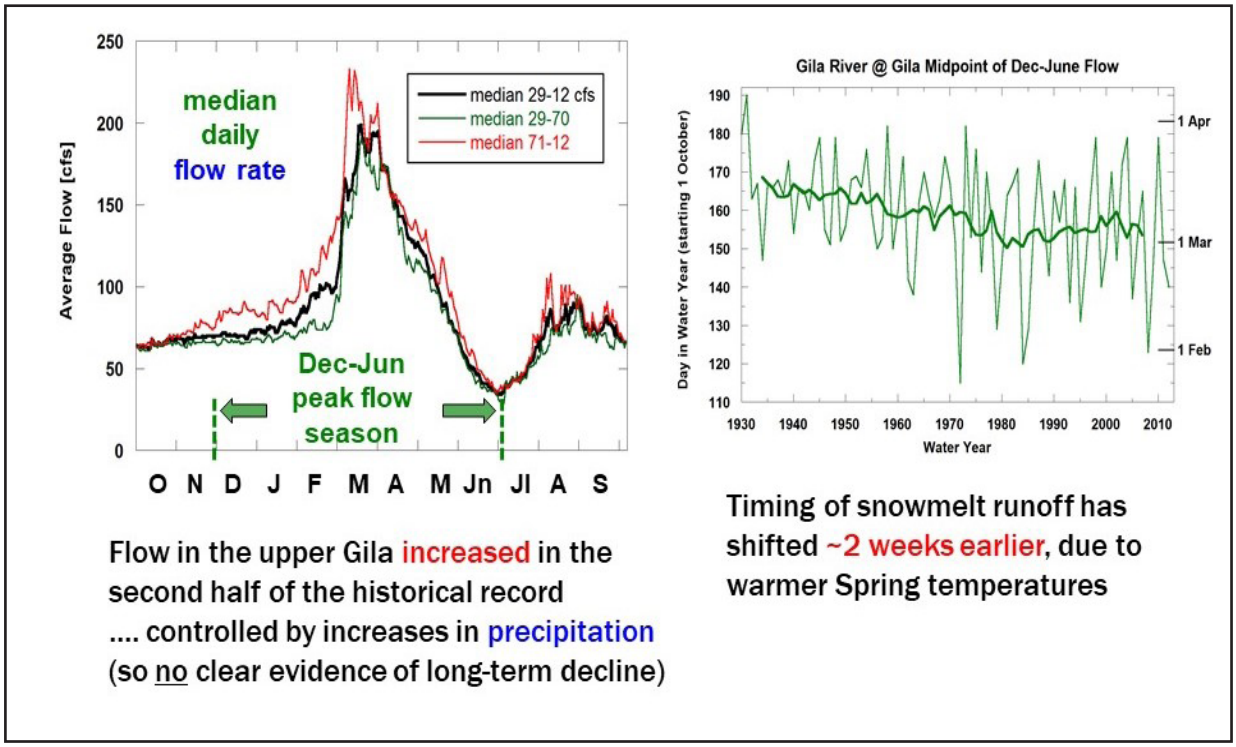

Figure 21. Evidence for projected changes in observed flow.

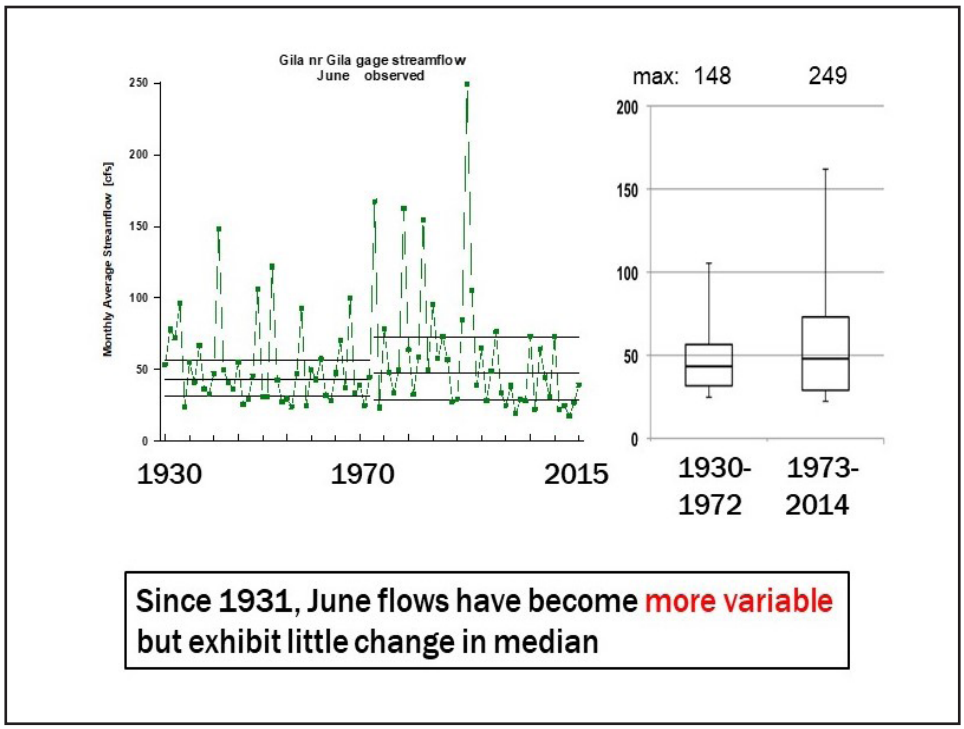

Figure 22. Observed evidence for decreasing flows in June.

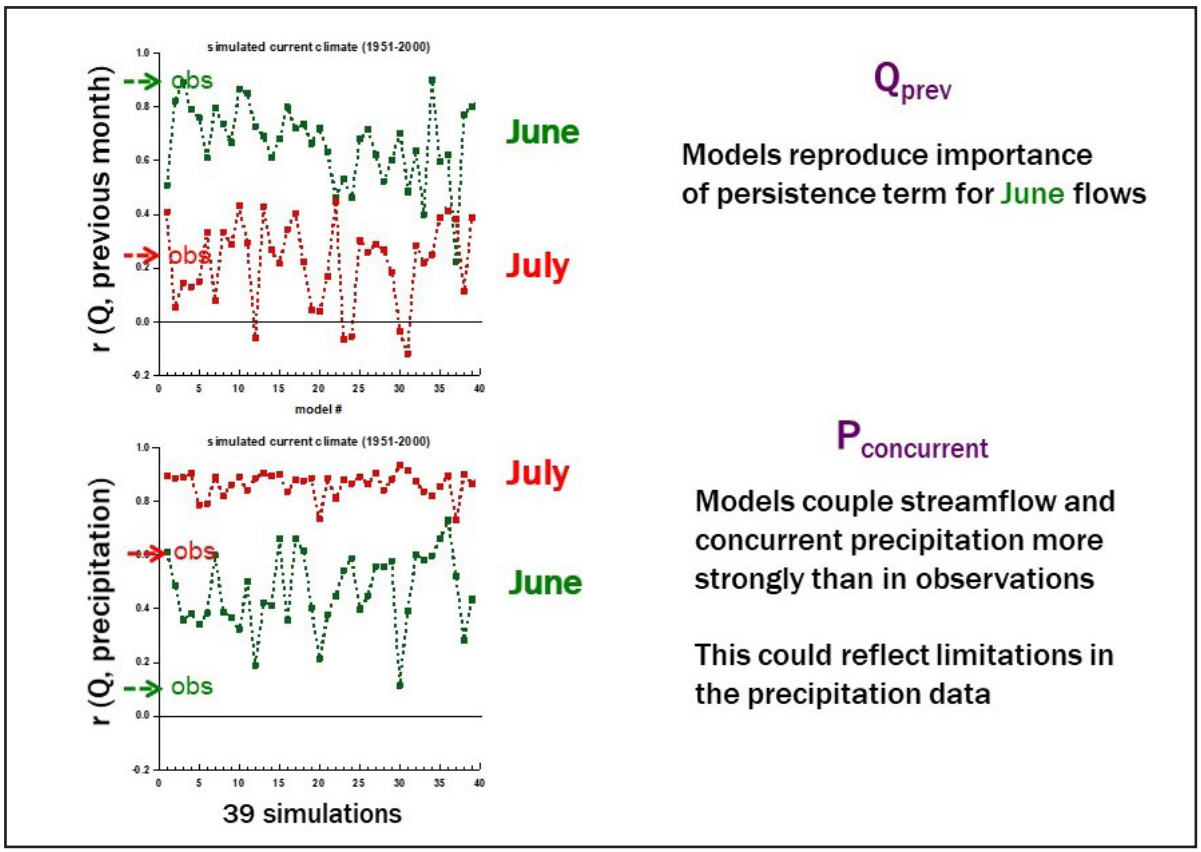

Figure 23. Predictors of simulated low-flow monthly streamflow.

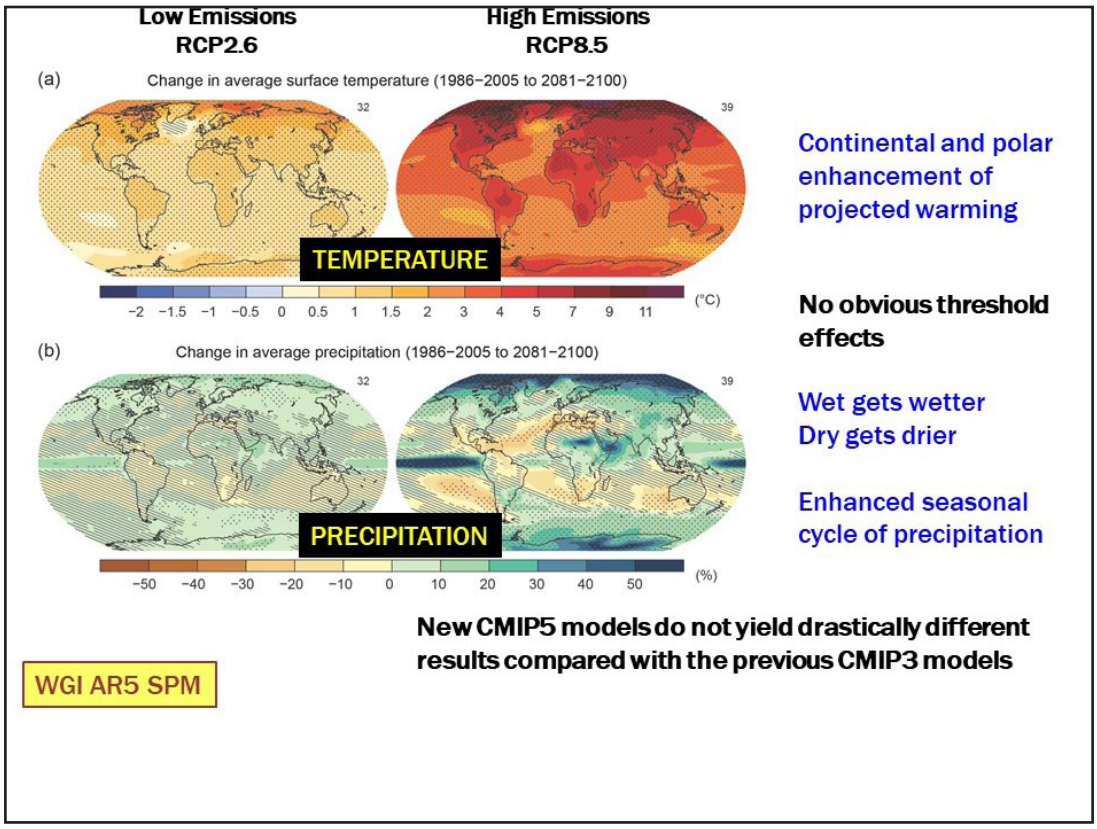

Figure 24. Projected 21st Century Changes.

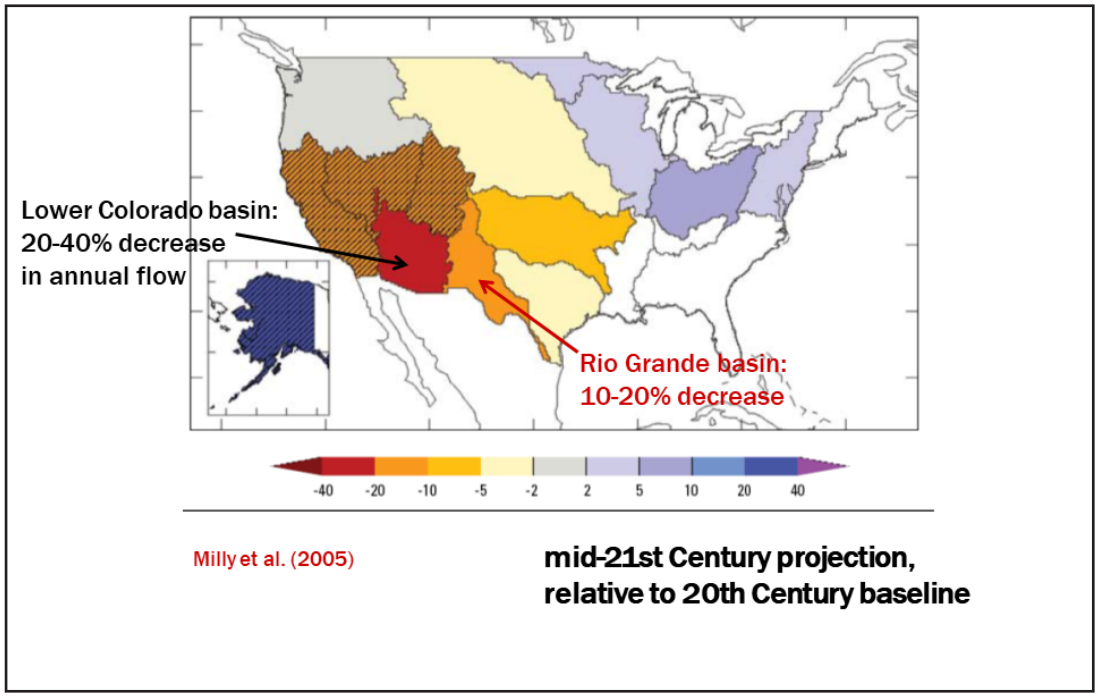

Figure 25. Projected streamflow changes North America.

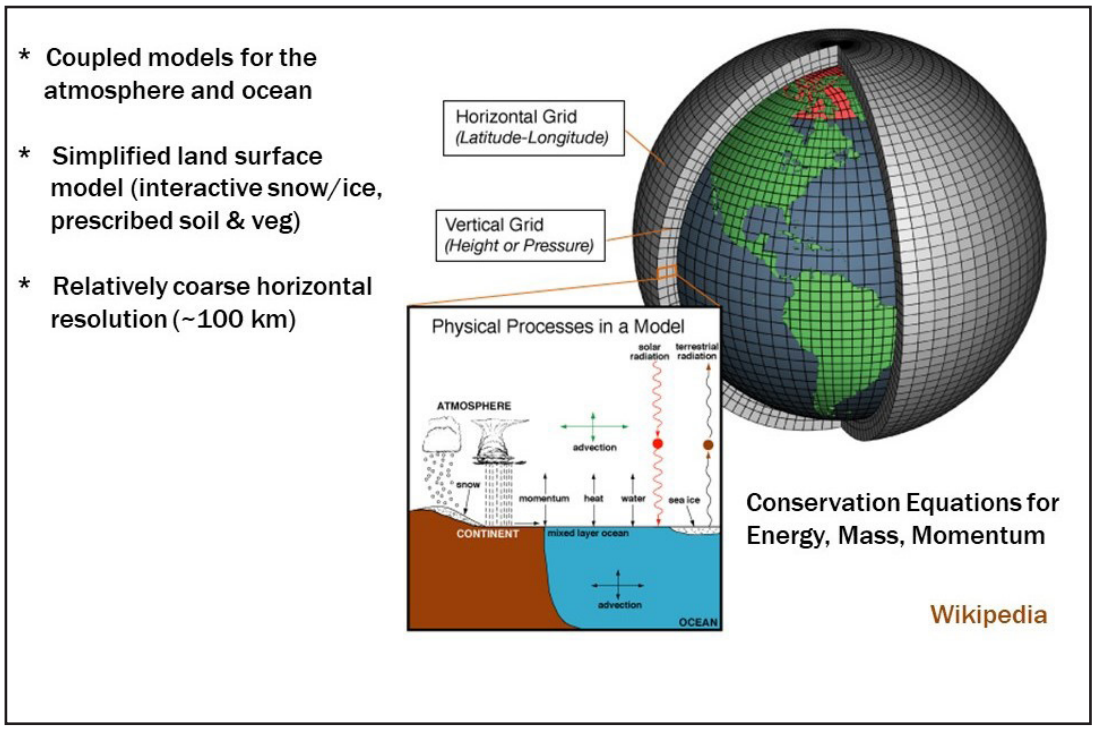

Figure 26. Global climate model.

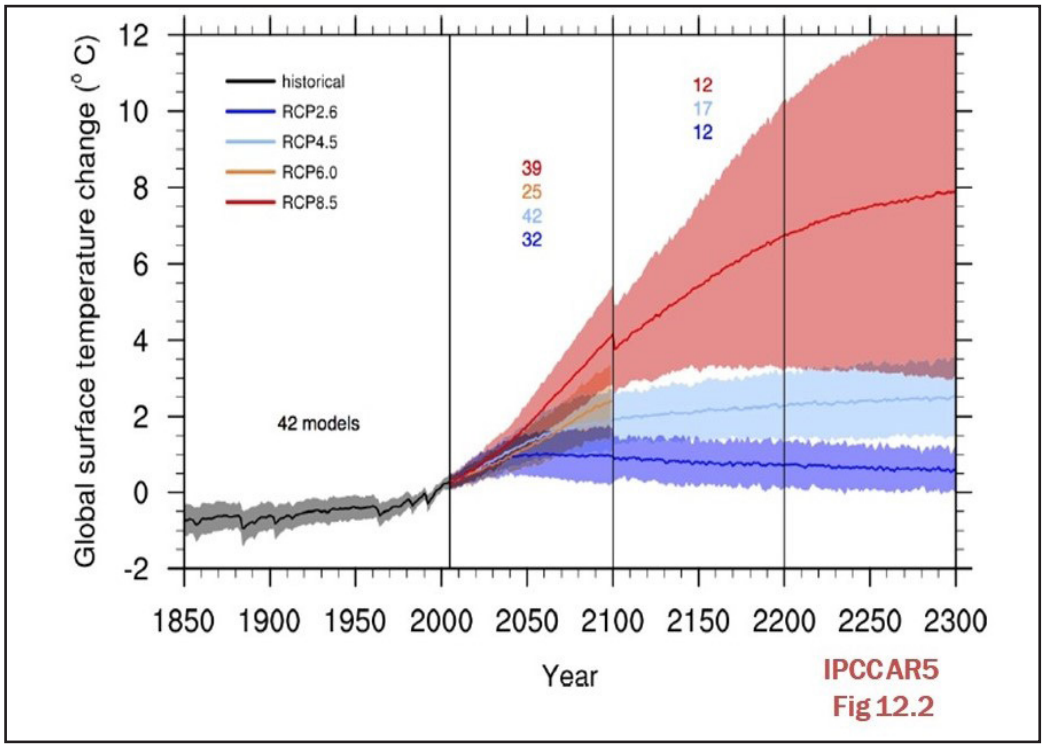

Figure 27. Projection of future global temperature change assuming that GHG increases are the dominant forcing.

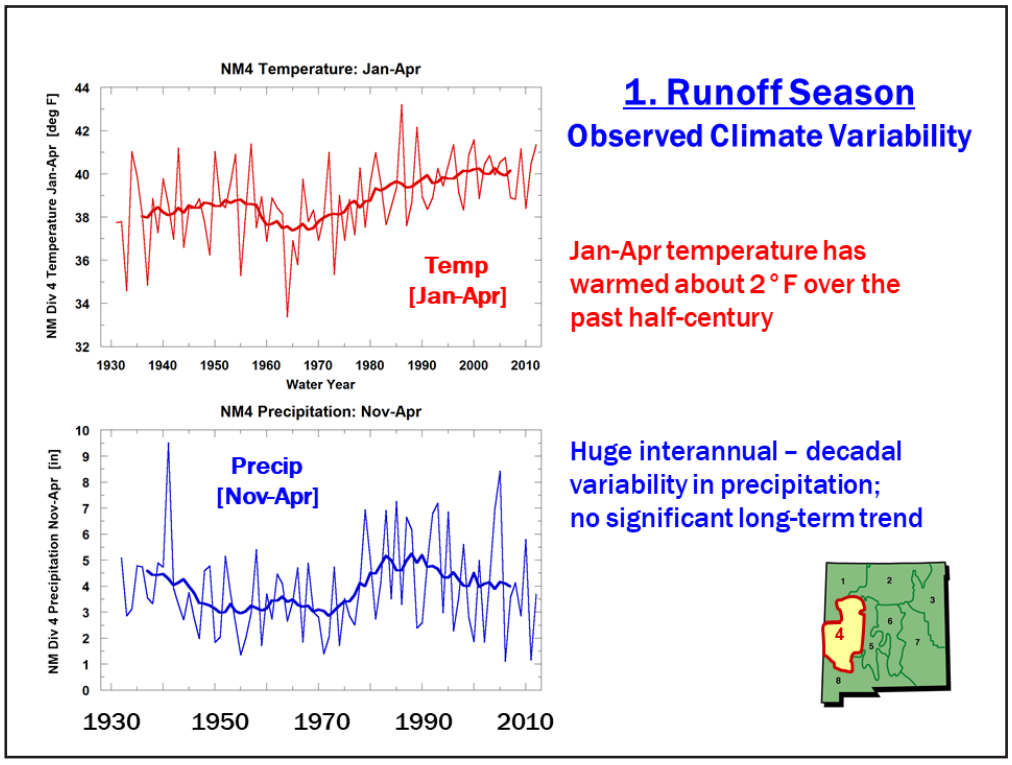

Figure 28. Observed climate variability during runoff season.

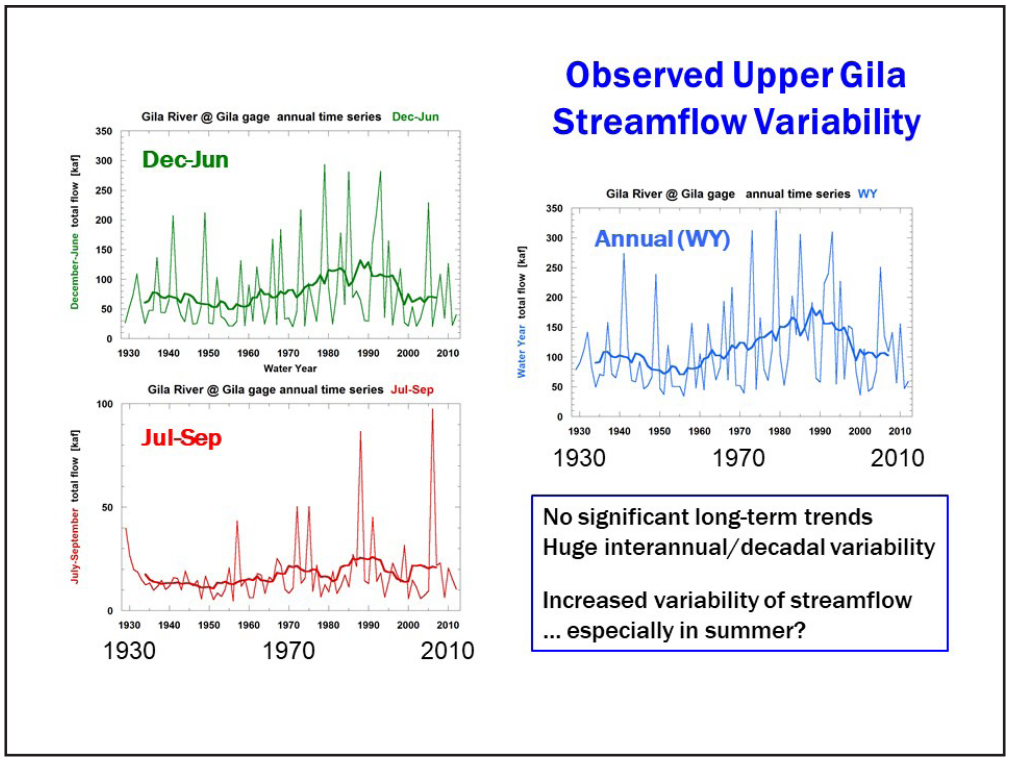

Figure 29. Observed streamflow variability in Upper Gila.

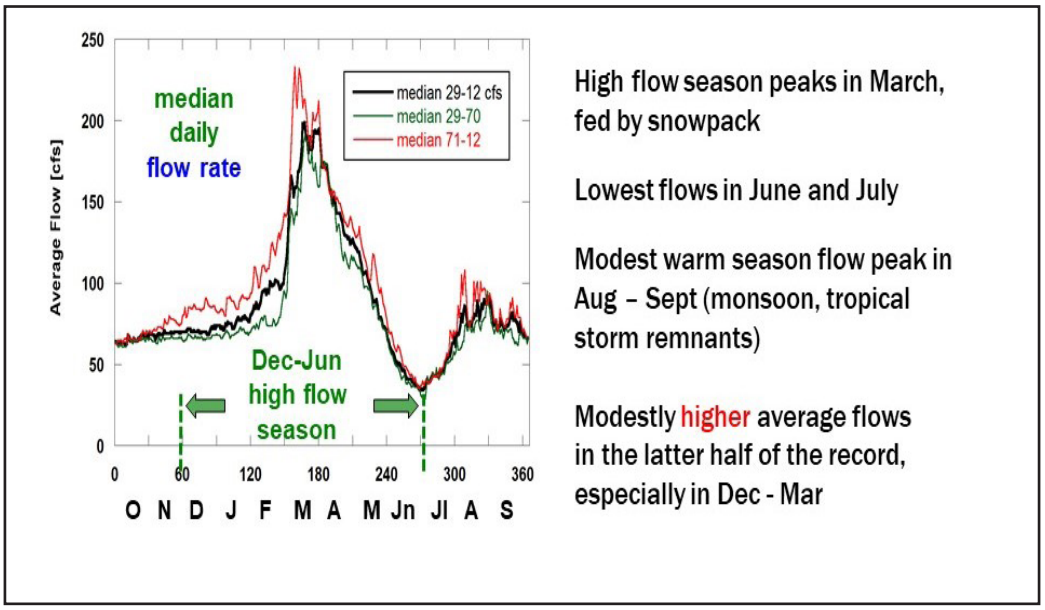

Figure 30. Gila gage at Upper Gila River.

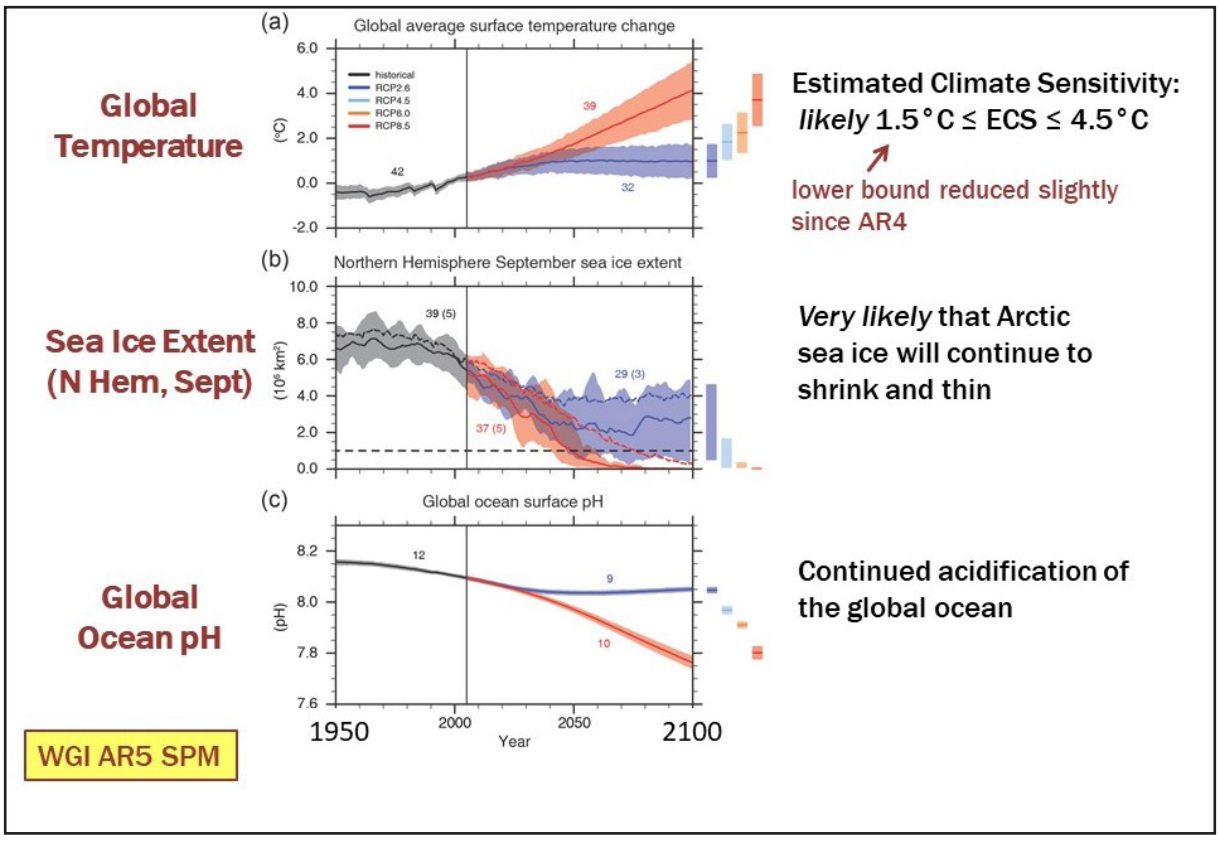

Figure 31. Projected 21st century changes.

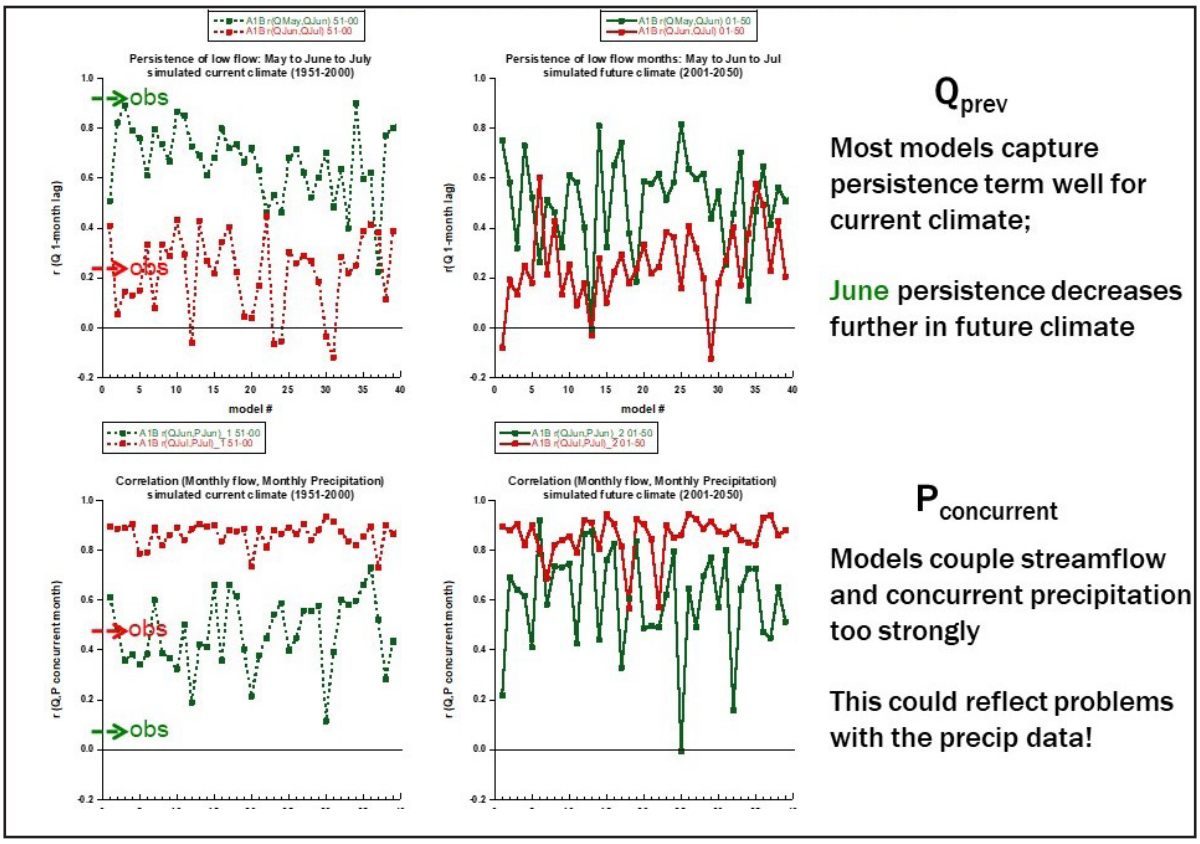

Figure 32. Month-to-month persistence of flow.

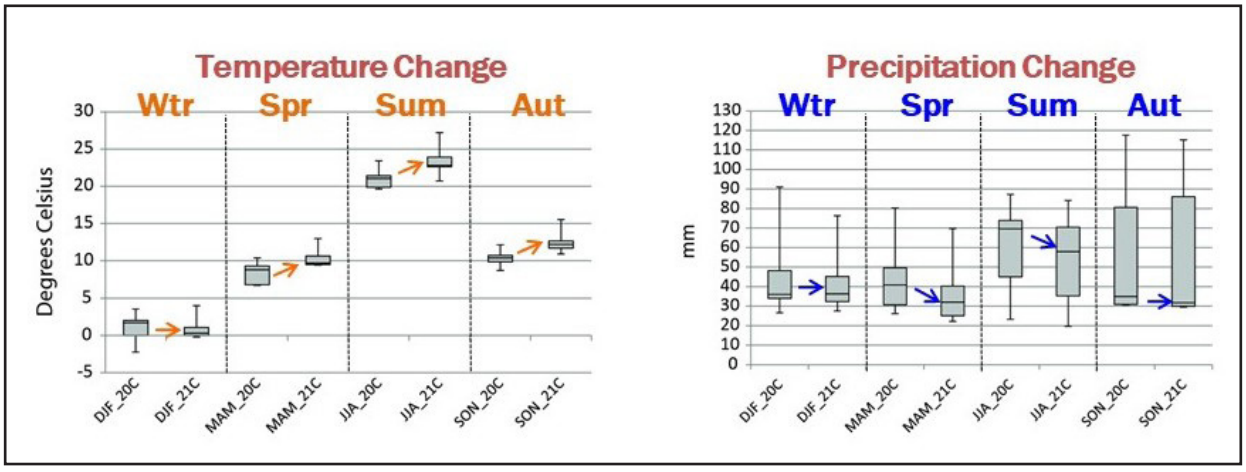

Figure 33. Garfin and others principal results: climate change.

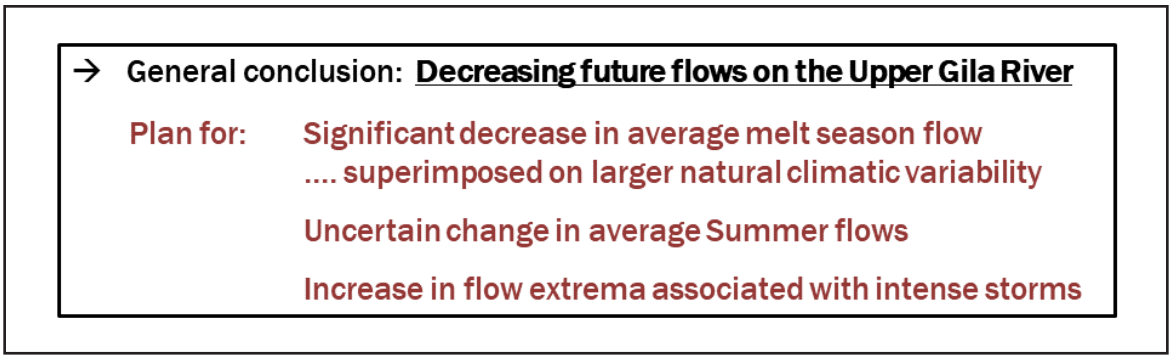

Figure 34. Conclusions: TNC Chapter 3 "Climate and Hydrology of the Upper Gila Basin."