

Climate Change Trends, North Cascades National Park, Ross Lake National Recreation Area, and Lake Chelan National Recreation Area, Washington

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Climate Trends for the Areas within Park Boundaries

- Temperature since 1950 has increased at statistically significant rates (Figures 1-4).
- Precipitation has decreased, but the rates are not statistically significant (Figures 5-8).
- If the world does not reduce emissions from cars, power plants, and deforestation by 40 to 70%, models project substantial warming and slight increases in precipitation (Figures 9-11).

Table 1. Historical and projected changes (data Daly et al. 2008, IPCC 2013; analysis Wang et al. in preparation). The table gives central values. Figures 1, 3, and 5 show the uncertainties.

	1950-2010	2000-2050	2000-2100
Historical			
North Cascades National Park			
temperature	+1.8°C/century (+3.2°F./century)		
precipitation	-15%/century		
Ross Lake National Recreation Area			
temperature	+1.5°C/century (+2.7°F./century)		
precipitation	-13%/century		
Lake Chelan National Recreation Area			
temperature	+2.7°C/century (+4.9°F./century)		
precipitation	-20%/century		
Projected (compared to 1971-2000)			
Low emissions (IPCC RCP 4.5)			
temperature		+2.1°C (+3.8°F.)	+2.9°C (+5.2°F.)
precipitation		+4%	+6%
High emissions (IPCC RCP 6.0)			
temperature		+1.9°C (+3.4°F.)	+3.2°C (+5.8°F.)
precipitation		+3%	+8%
Highest emissions (IPCC RCP 8.5)			
temperature		+2.7°C (+4.9°F.)	+4.9°C (+8.8°F.)
precipitation		+5%	+9%

Figure 1.

Historical Trend in Annual Average Temperature, 1950-2010

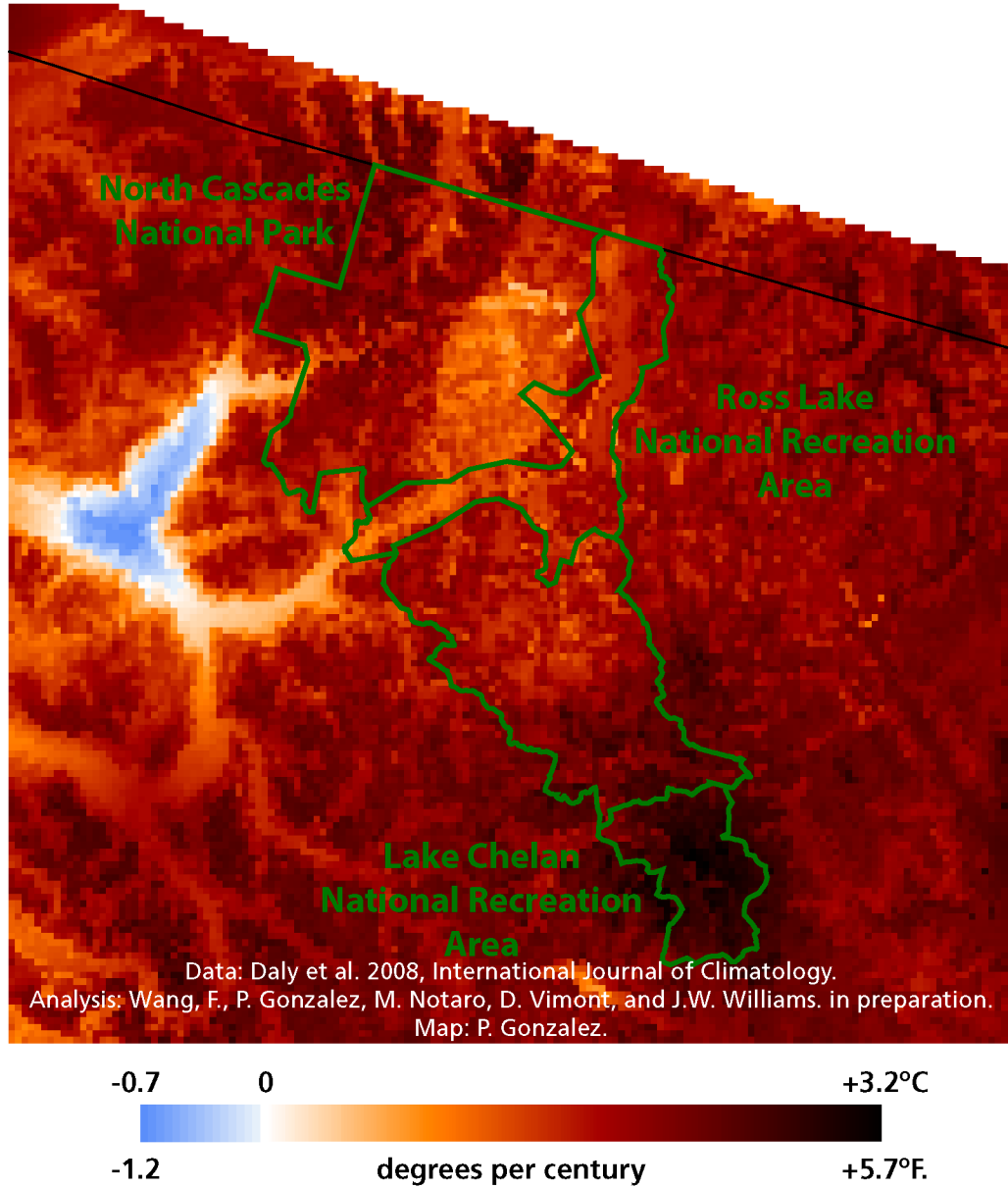


Figure 2. North Cascades National Park. Historical annual average temperature for the area within park boundaries. Note that the U.S. weather station network was more stable for the period starting 1950 than for the period starting 1895. (Data: National Oceanic and Atmospheric Administration, Daly et al. 2008. Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

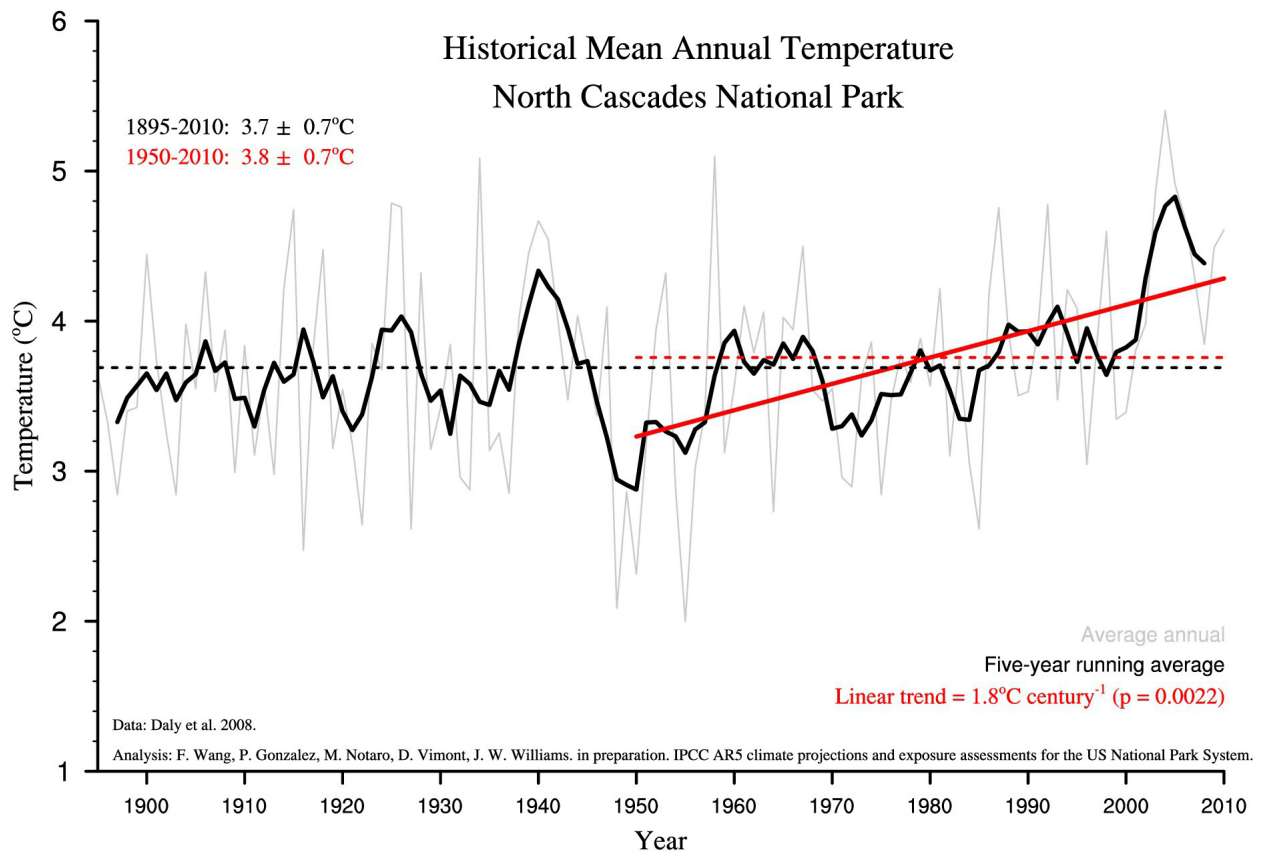


Figure 3. Ross Lake National Recreation Area. Historical annual average temperature for the area within park boundaries. Note that the U.S. weather station network was more stable for the period starting 1950 than for the period starting 1895. (Data: National Oceanic and Atmospheric Administration, Daly et al. 2008. Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

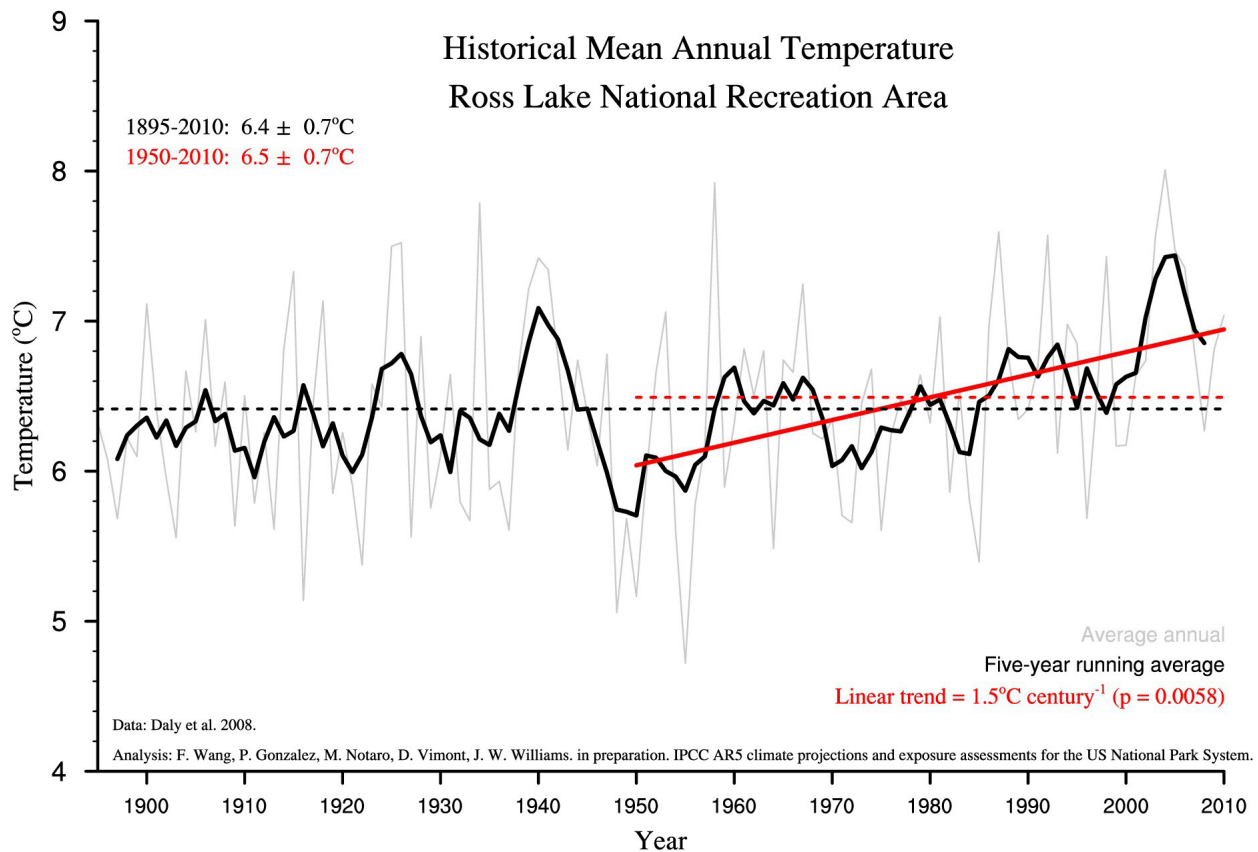


Figure 4. Lake Chelan National Recreation Area. Historical annual average temperature for the area within park boundaries. Note that the U.S. weather station network was more stable for the period starting 1950 than for the period starting 1895. (Data: National Oceanic and Atmospheric Administration, Daly et al. 2008. Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

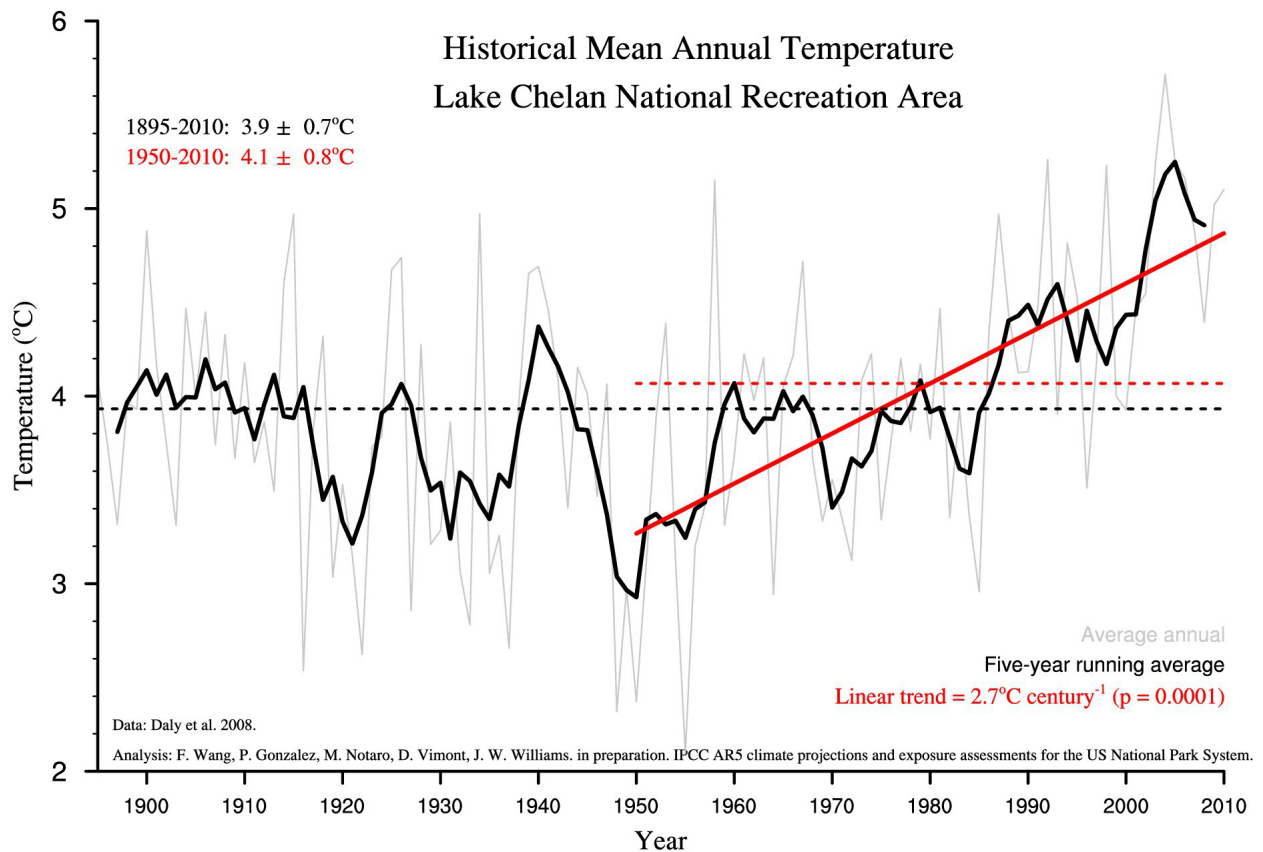


Figure 5.

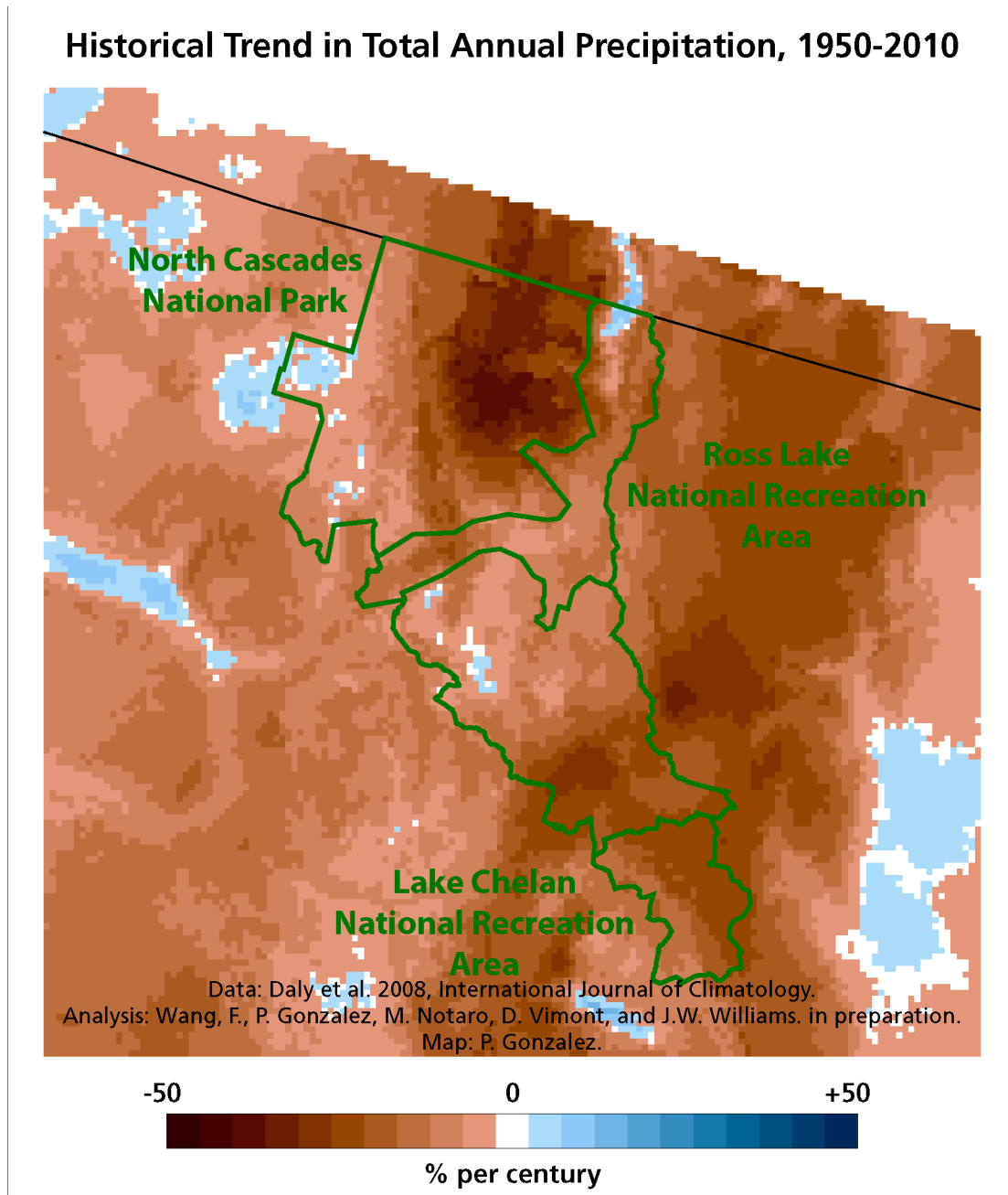


Figure 6. North Cascades National Park. Historical annual total precipitation for the area within park boundaries. Note that the U.S. weather station network was more stable for the period starting 1950 than for the period starting 1895. (Data: National Oceanic and Atmospheric Administration, Daly et al. 2008. Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

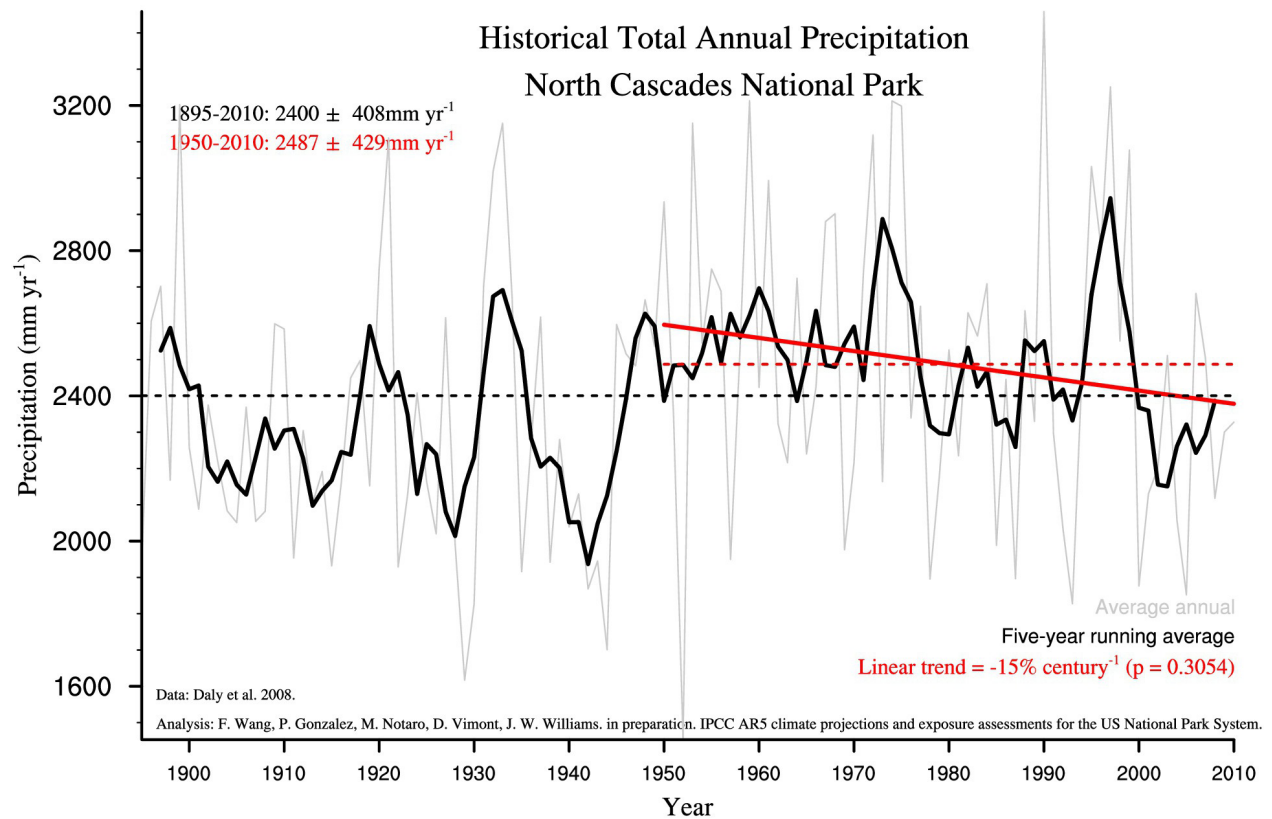


Figure 7. Ross Lake National Recreation Area. Historical annual total precipitation for the area within park boundaries. Note that the U.S. weather station network was more stable for the period starting 1950 than for the period starting 1895. (Data: National Oceanic and Atmospheric Administration, Daly et al. 2008. Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

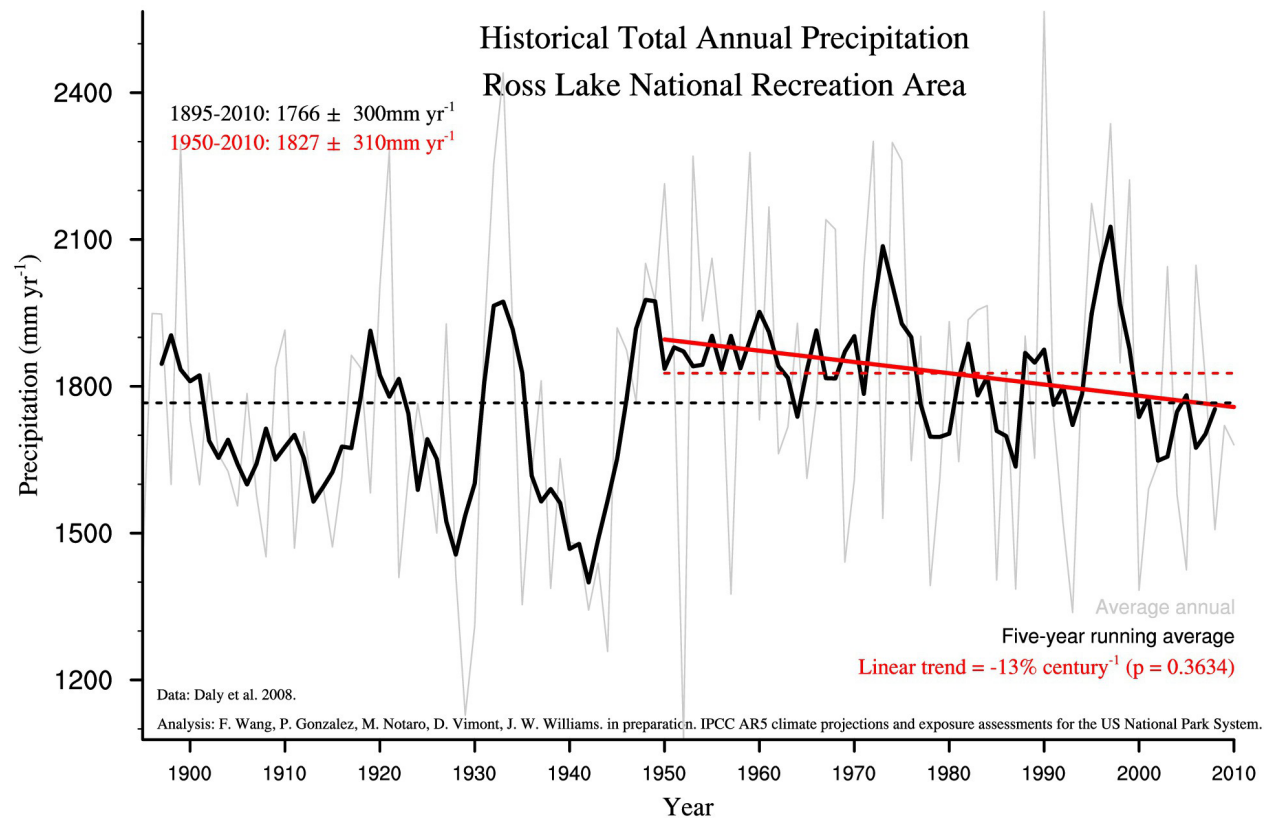


Figure 8. Lake Chelan National Recreation Area. Historical annual total precipitation for the area within park boundaries. Note that the U.S. weather station network was more stable for the period starting 1950 than for the period starting 1895. (Data: National Oceanic and Atmospheric Administration, Daly et al. 2008. Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

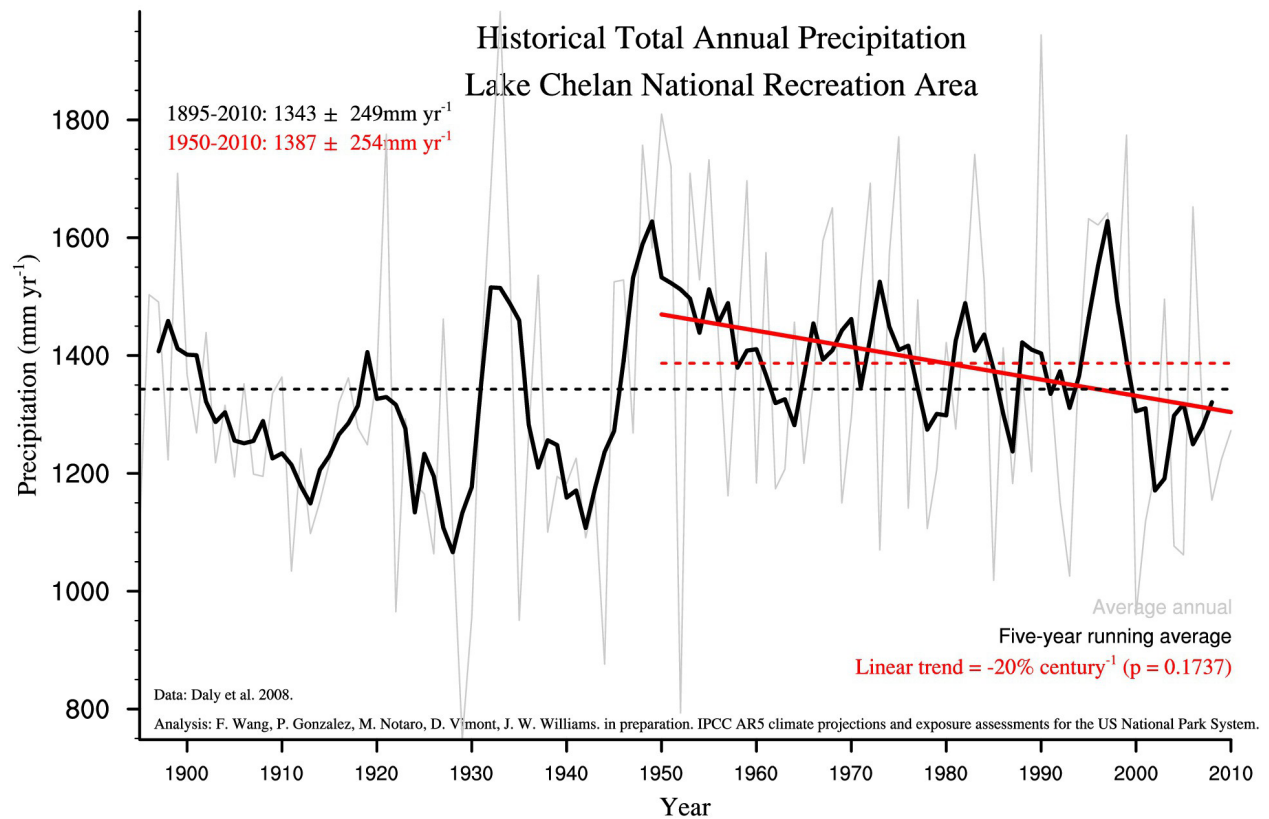


Figure 9. North Cascades National Park. Projections of future climate for the area within park boundaries. Each small dot is the output of a single climate model. The large color dots are the average values for the four IPCC emissions scenarios. The lines are the standard deviations of each average value. (Data: IPCC 2013, Daly et al. 2008; Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

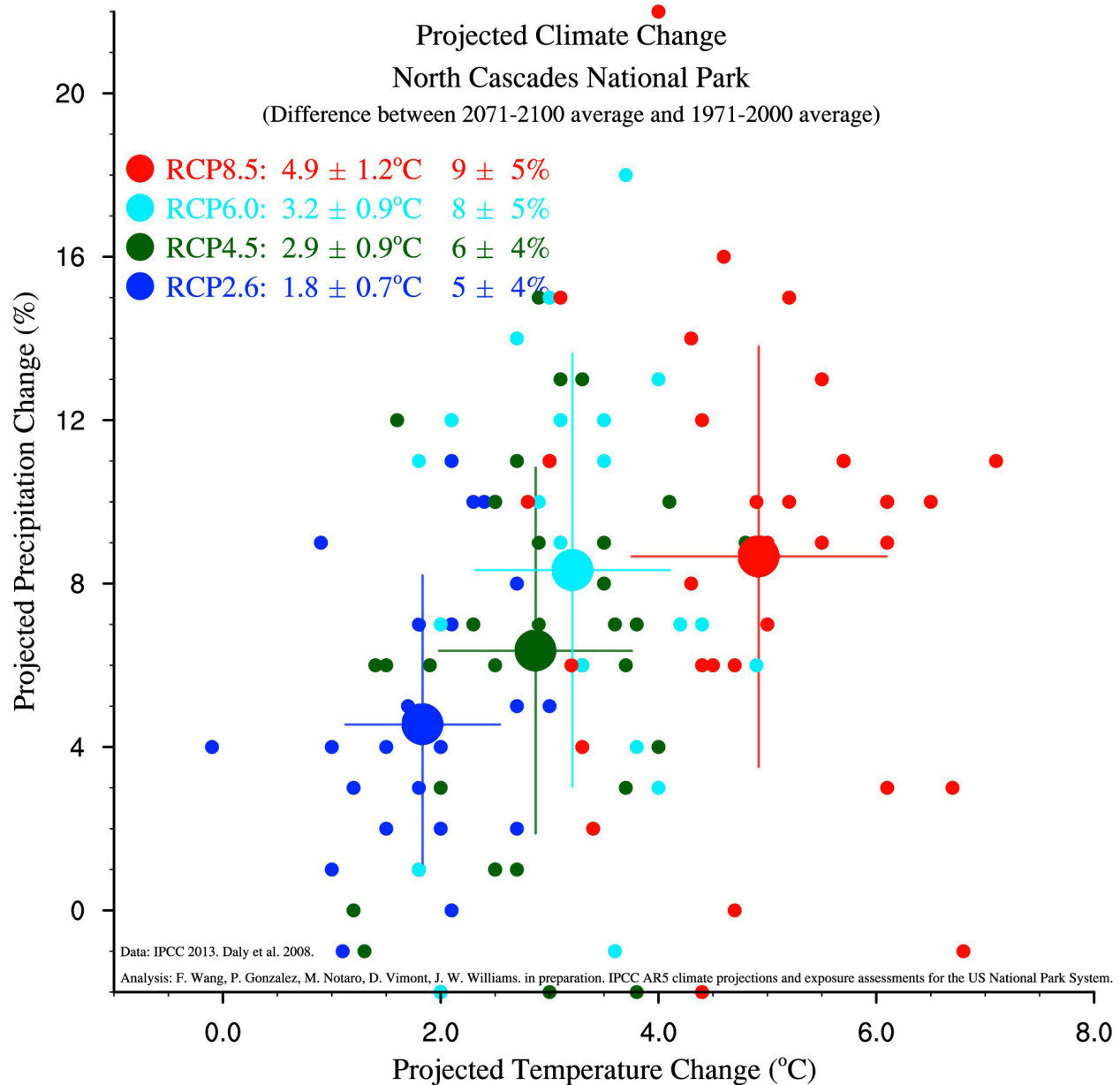


Figure 10. Ross Lake National Recreation Area. Projections of future climate for the area within park boundaries. Each small dot is the output of a single climate model. The large color dots are the average values for the four IPCC emissions scenarios. The lines are the standard deviations of each average value. (Data: IPCC 2013, Daly et al. 2008; Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

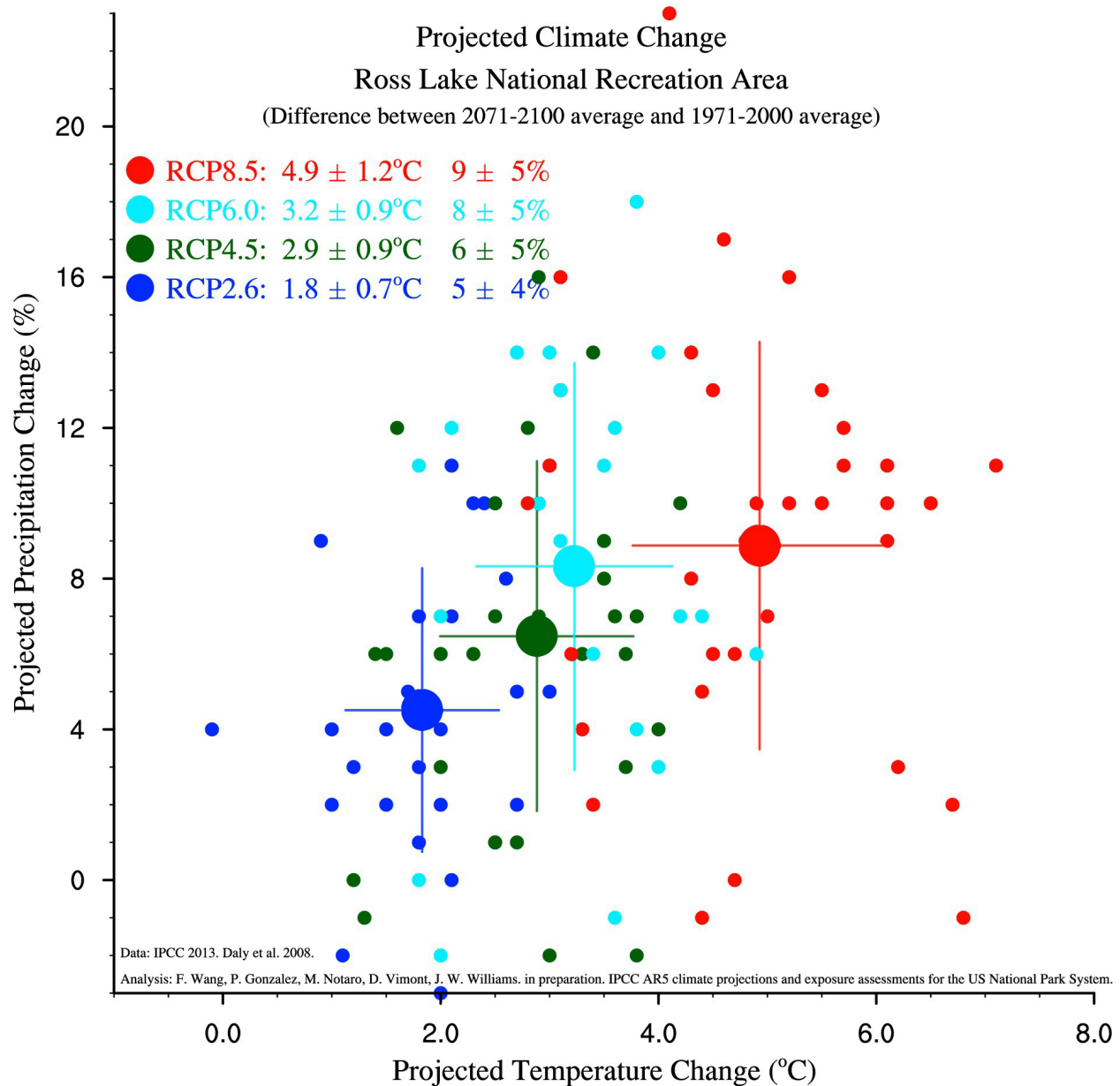
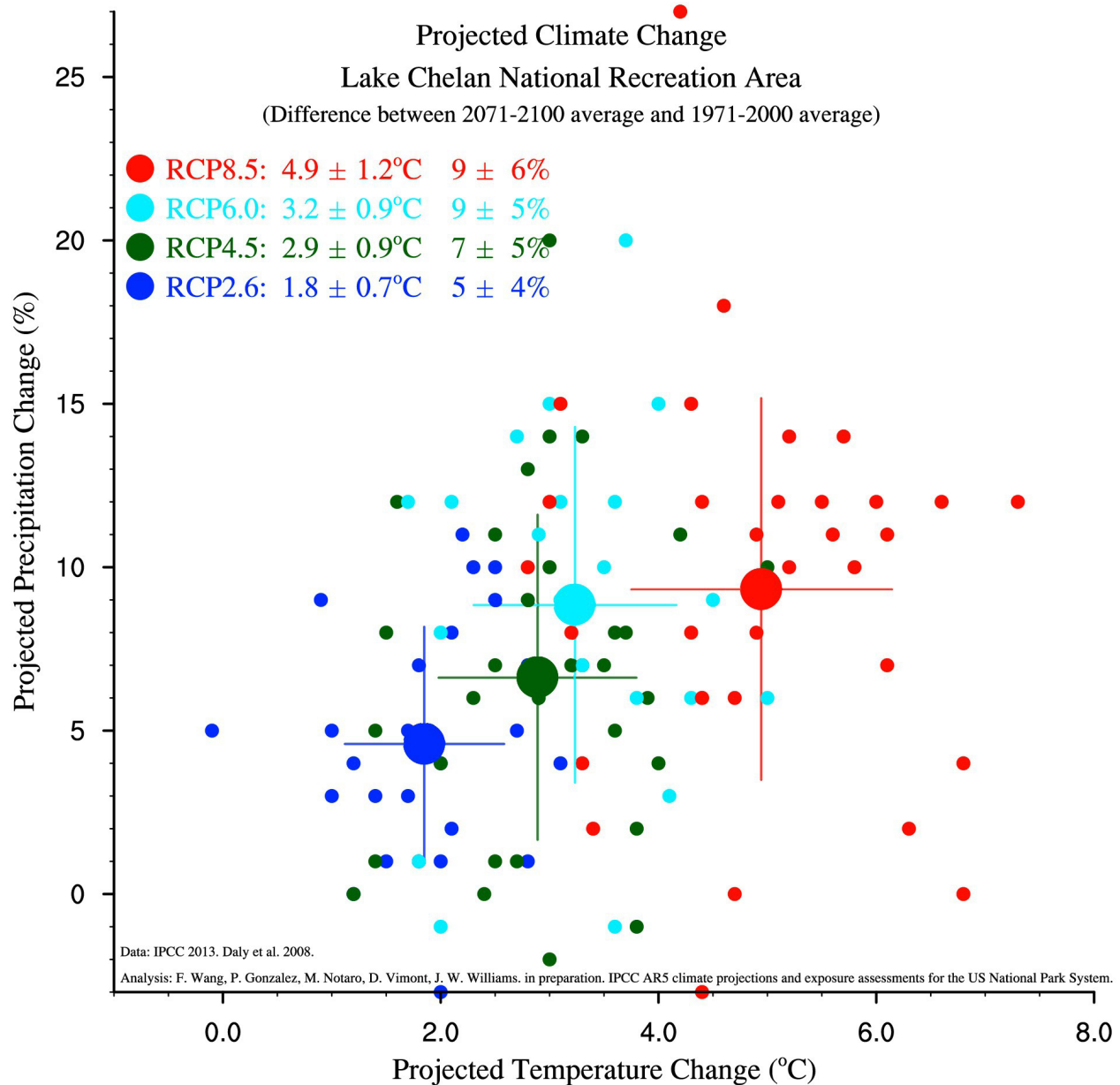


Figure 11. Lake Chelan National Recreation Area. Projections of future climate for the area within park boundaries. Each small dot is the output of a single climate model. The large color dots are the average values for the four IPCC emissions scenarios. The lines are the standard deviations of each average value. (Data: IPCC 2013, Daly et al. 2008; Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).



References

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