

Climate Change Summary, Cape Cod National Seashore, Massachusetts

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Climate Trends for the Area within Park Boundaries

- Temperature has increased, but the trend is not statistically significant (Figure 1).
- Precipitation shows a statistically significant increase (Figure 2).
- Models project future warming and increased precipitation (Figures 1 and 2).
- Models project a possible 200-500% increase in extreme precipitation (Walsh et al. 2014).

Table. Rates of climate change per century (data Daly et al. 2008, IPCC 2013; analysis Wang et al. in preparation). The table gives central values. Figures 1 and 2 show uncertainties.

	1950-2010	2000-2050	2000-2100
Historical			
Temperature, annual average	+0.3°C (0.5°F.)		
Precipitation, annual total	+25%		
Projected (compared to 1971-2000)			
Low emissions (IPCC RCP 4.5)			
Temperature, annual average		+2.1°C (3.8°F.)	+2.7°C (4.9°F.)
Precipitation, annual total		+7%	+9%
High emissions (IPCC RCP 6.0)			
Temperature, annual average		+1.8°C (3.2°F.)	+3°C (5.4°F.)
Precipitation, annual total		+7	+9%
Highest emissions (IPCC RCP 8.5)			
Temperature, annual average		+2.6°C (4.7°F.)	+4.6°C (8.3°F.)
Precipitation, annual total		+8%	+13%

Potential Future Vulnerabilities

- A substantial length of coastline in the park is very highly vulnerable to sea level rise and coastal change (Figure 3; Pendleton et al. 2010), possibly flooding marshlands and human infrastructure (Horton et al. 2014). (See also sea level report from Maria Caffrey.)
- Climate change shifted the winter ranges of numerous bird species in the Northeast northward from 1975 to 2004 (La Sorte and Thompson 2007) and shifts could continue.
- Climate change may be hastening flower blooming in Concord, Mass. (Willis et al. 2008).

Figure 1. Temperature.

Historical and projected average annual average temperature for the area within park boundaries. For projections, each bar shows one standard deviation above and below the average of up to 33 climate models. (Data: Daly et al. 2008, IPCC 2013. Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

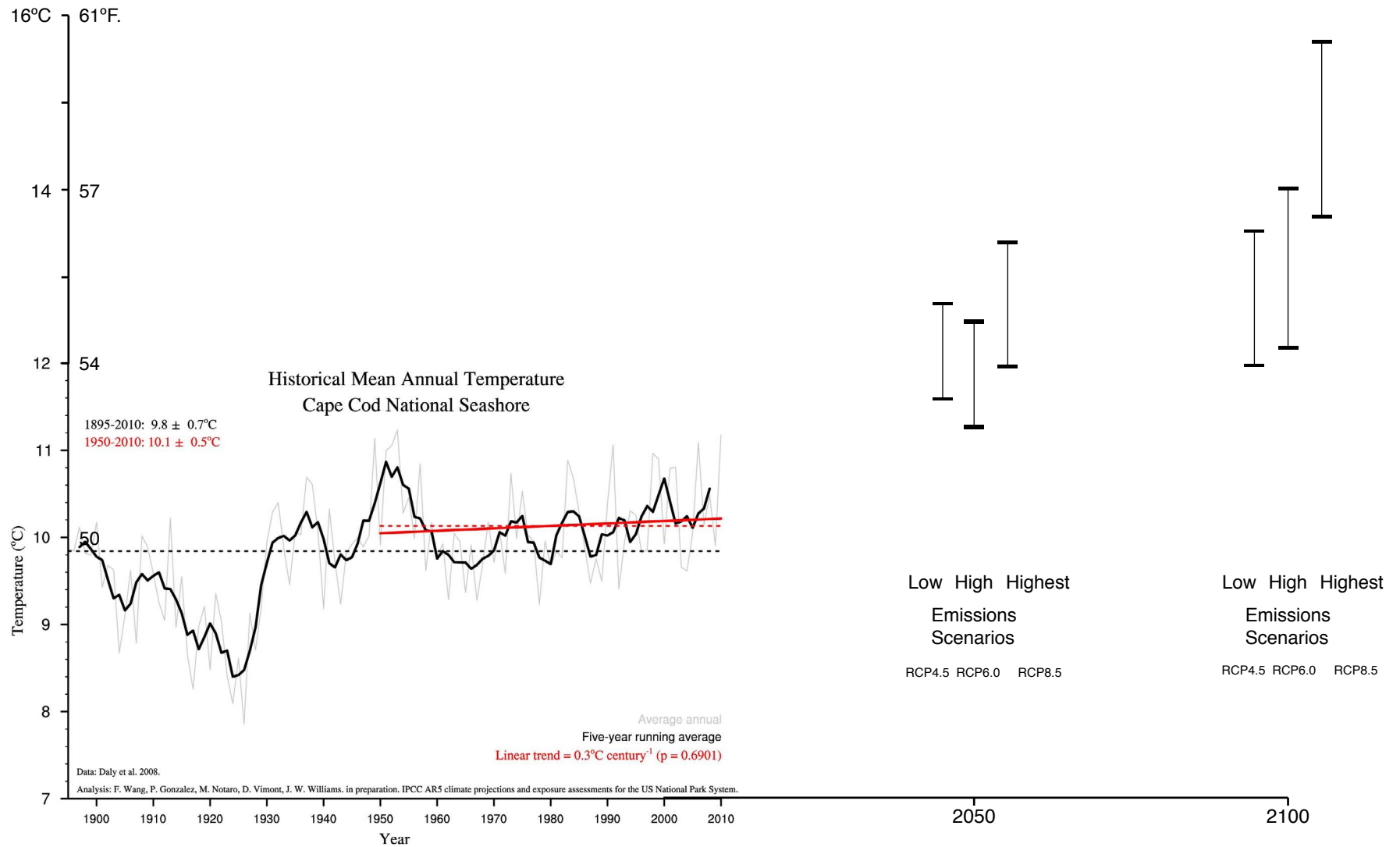


Figure 2. Precipitation.

Historical and projected annual total precipitation for the area within park boundaries. For projections, each bar shows one standard deviation above and below the average of up to 33 climate models. (Data: Daly et al. 2008, IPCC 2013. Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

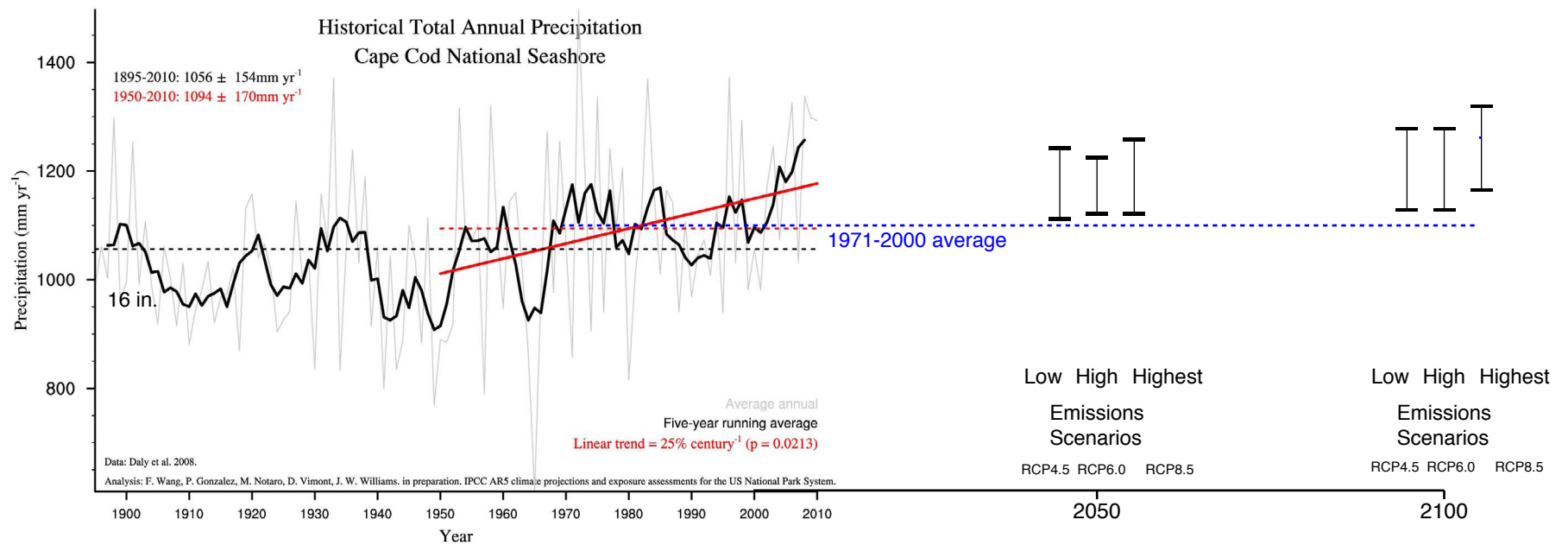
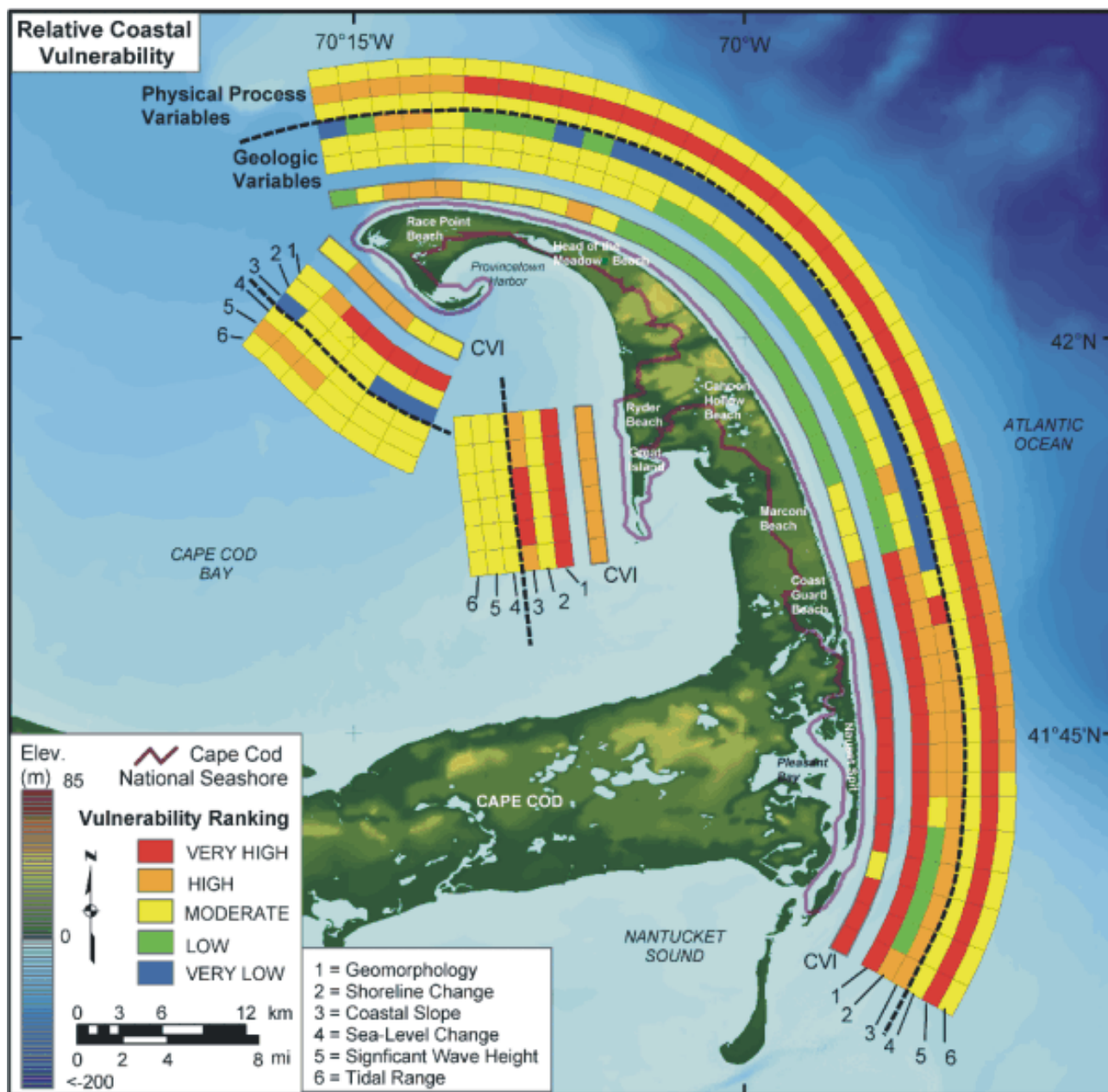


Figure 3. Vulnerability of the coastline of Cape Cod National Seashore to sea level rise and coastal change (Pendleton et al. 2010).



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