

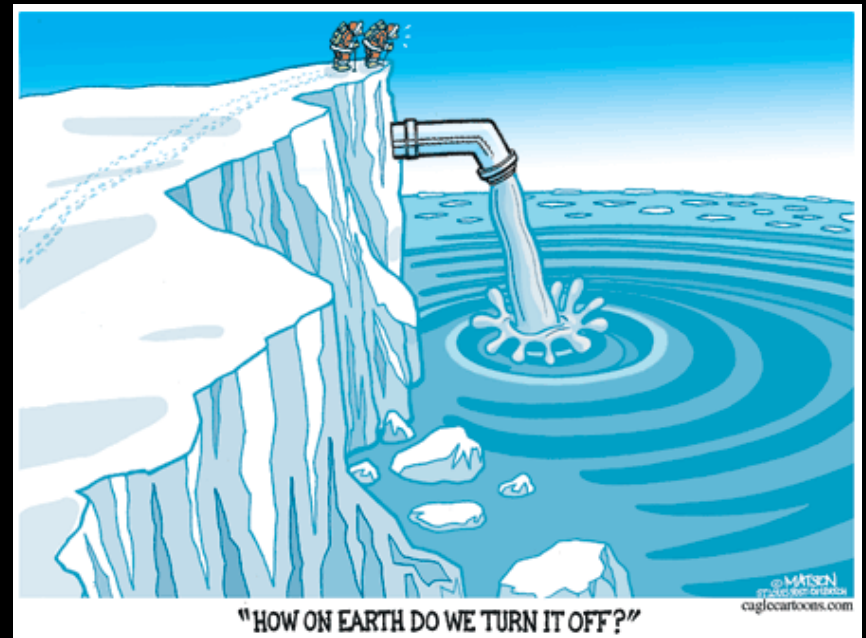
Climate Change and Northern Bobwhites: The State of Our Knowledge, Possible Outcomes, and the Risk of Ignorance

James A. Martin

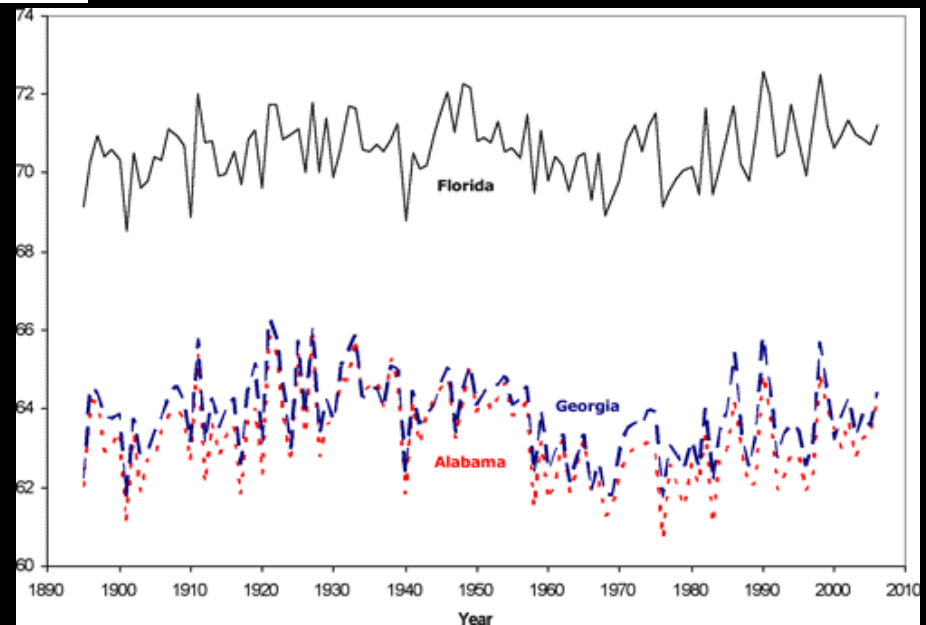
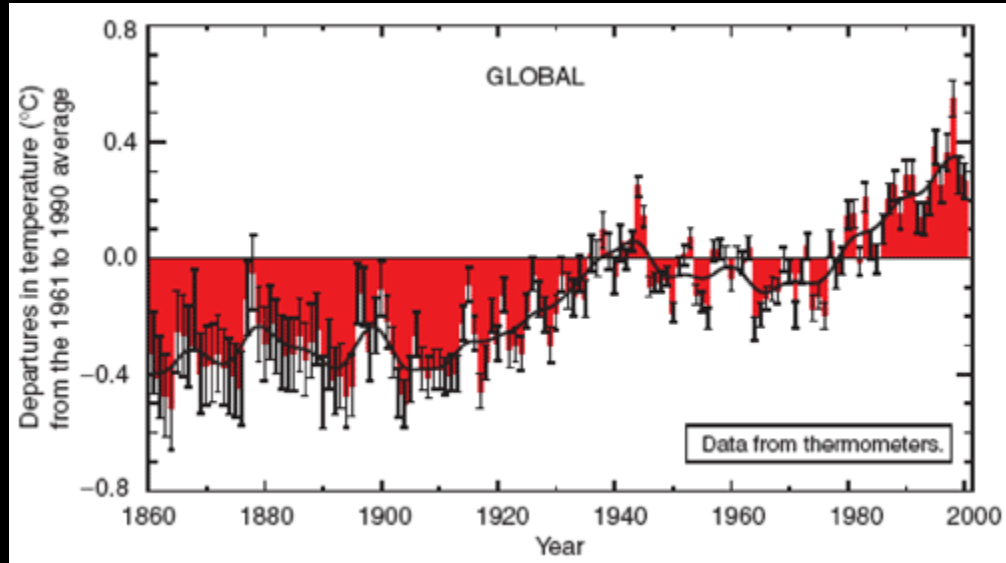
Mississippi State University

Premise

- No perturbation has received as much public and scientific attention
- Climate change is a paradigm that includes ecological, climatic, and social processes
- Not trying to make you all into “believers”



What is occurring?



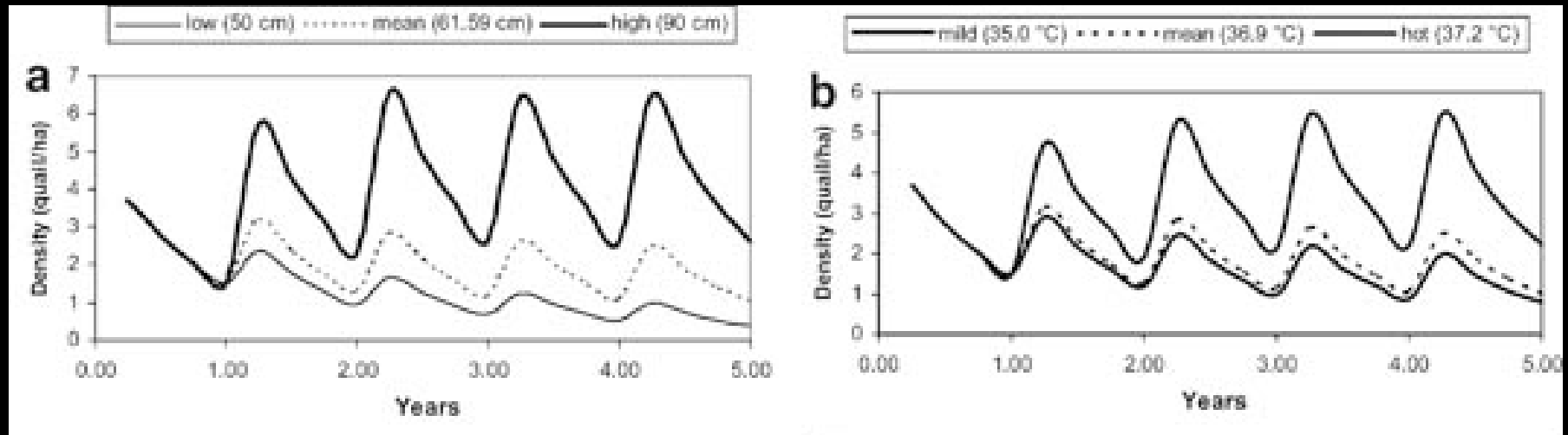
Weather & Bobwhites

- “As July temperature increased over the long-term mean, the number of bobwhites counted increased...but the relationship decelerated at high July temperatures...” -Lusk et al. 2001

Weather and Bobwhites

- “High precipitation (mean annual precipitation = 90 cm) and mild temperature (mean max. Jul to Aug temp = 35.0° C) scenarios produced the greatest increases in bobwhite density, resulting in densities >5–6 bobwhite/ha...” -Rader et al. 2011

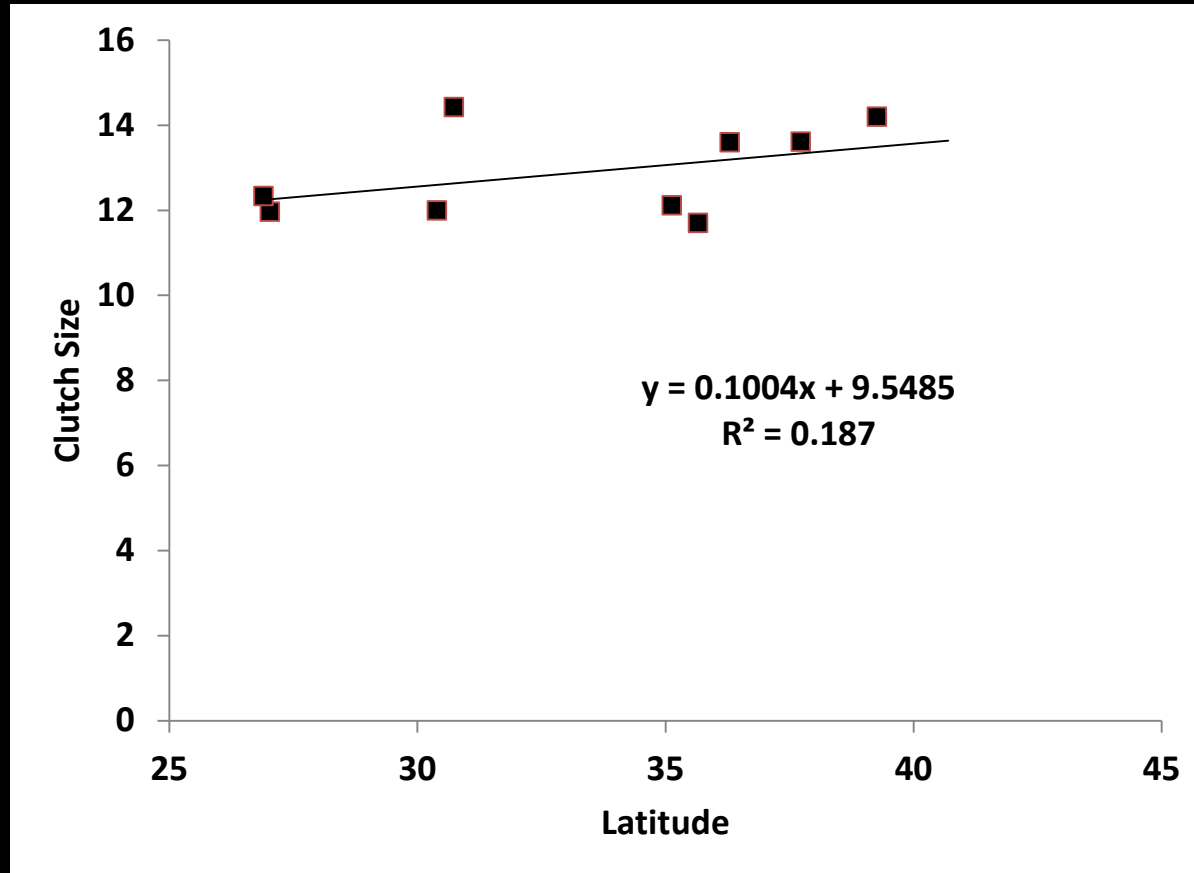
Rader et al. 2011



Weather & Bobwhites

- “Hatchability fluctuated among years, and variation in hatchability was partly explained by variability in summer temperature and precipitations.” —Rolland et al. 2010

Latitude as a Climate Surrogate



Climate Change & Bobwhites

- No doubt NOBO respond to short-term weather patterns
- No doubt NOBO have an optimal climate (a niche)
- However, a great deal of uncertainty how bobwhites would respond (or currently responding) to climate change

Why the uncertainty?

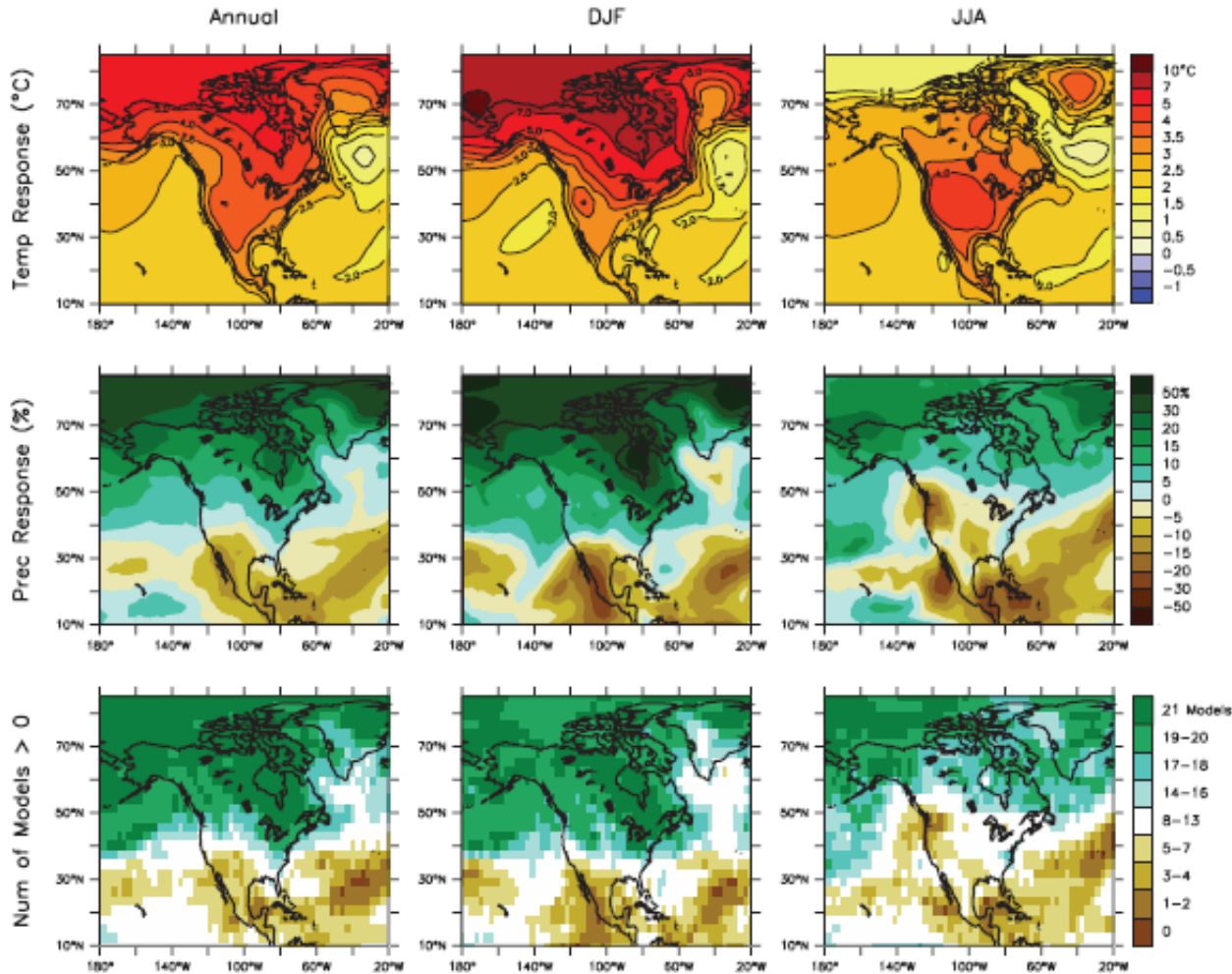
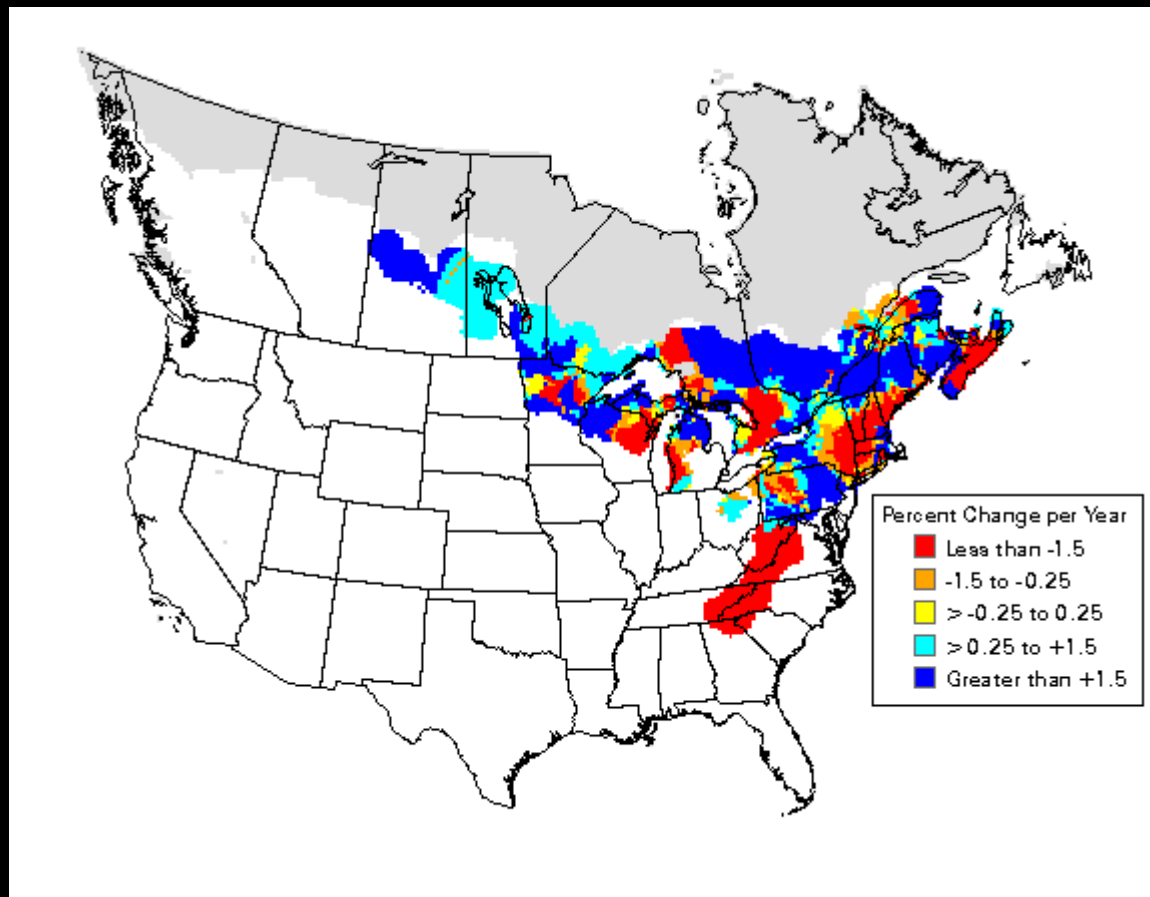


Figure 11.12. Temperature and precipitation changes over North America from the MMD-A1B simulations. Top row: Annual mean, DJF and JJA temperature change between 1980 to 1999 and 2080 to 2099, averaged over 21 models. Middle row: same as top, but for fractional change in precipitation. Bottom row: number of models out of 21 that project increases in precipitation.

Christensen, J.H., B. Hewitson, A. Busuioc, A. Chen, X. Gao, I. Held, R. Jones, R.K. Kolli, W.-T. Kwon, R. Laprise, V. Magaña Rueda, L. Mearns, C.G. Menéndez, J. Räisänen, A. Rinke, A. Sarr and P. Whetton, 2007: Regional Climate Projections. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press. Cambridge, United Kingdom and New York, NY, USA

Effects to other birds?

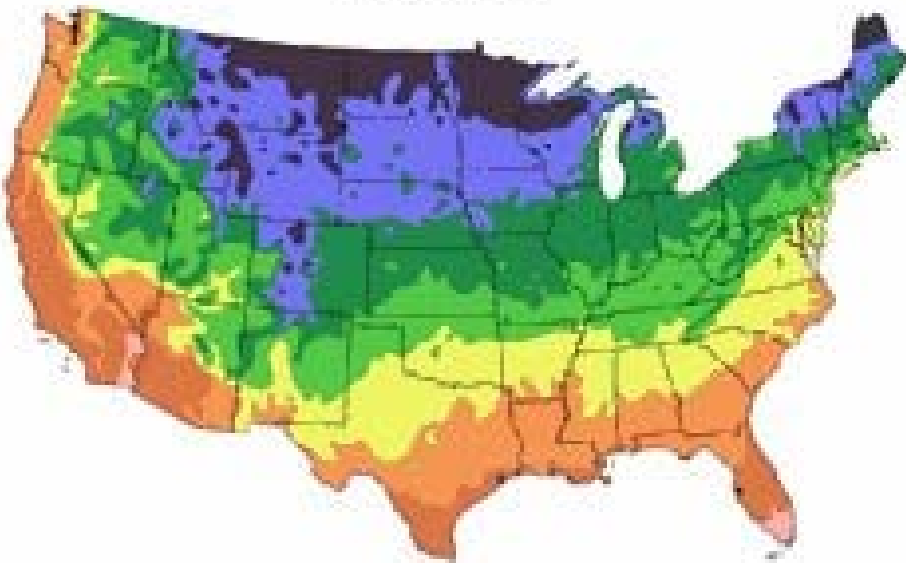
Blackburnian Warbler



- “Climate change altered community richness the most when species had narrow niches,With high interspecific dispersal variance, the best dispersers tracked climate change, out-competed slower dispersers and caused their extinction.” Urban et al. 2012

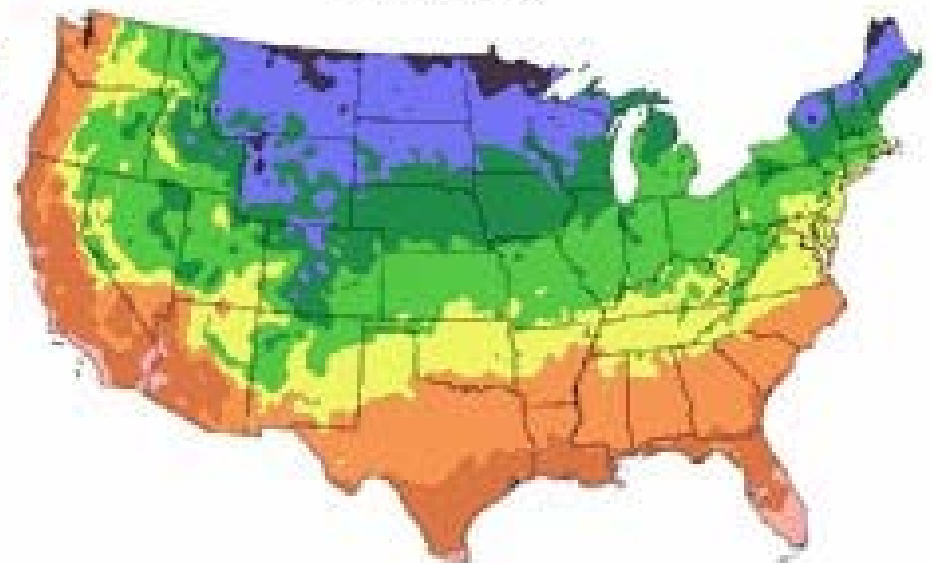
Plant Shifts?

1990 Map



After USDA Plant Hardiness Zone Map, USDA Miscellaneous
Publication No. 1475, Issued January 1990

2006 Map



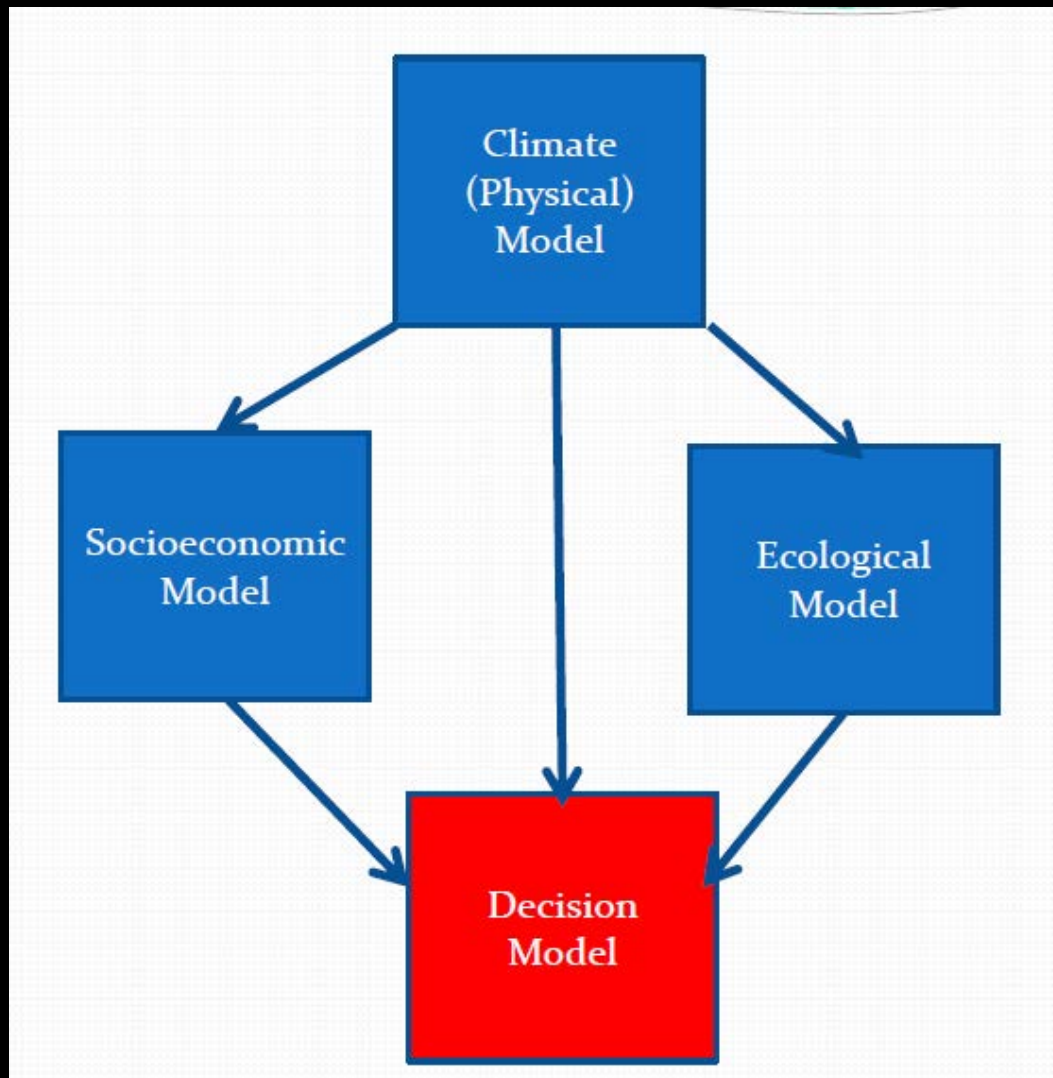
National Arbor Day Foundation Plant Hardiness Zone Map
published in 2006.

What if?

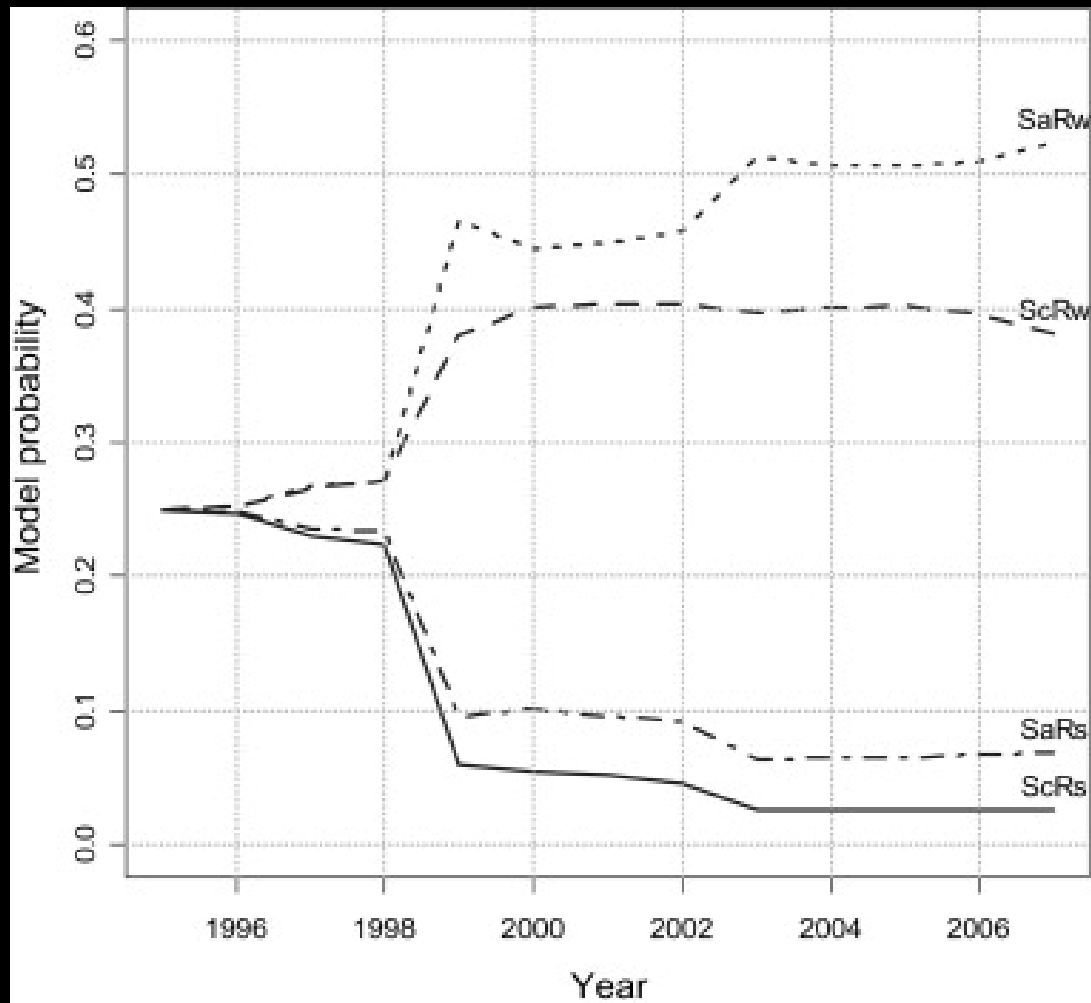
- Bermuda grass outcompeted Fescue in Kentucky
- Fire ant distribution included Kansas
- West Texas had more frequent droughts
- It rained more in south Florida



What do we do?



Use of SDM and ARM



What if we do nothing?



Questions?