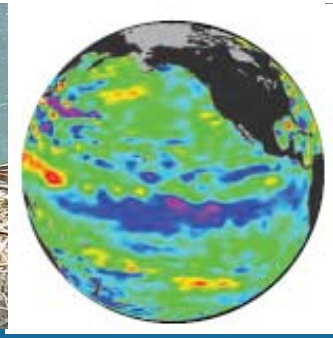
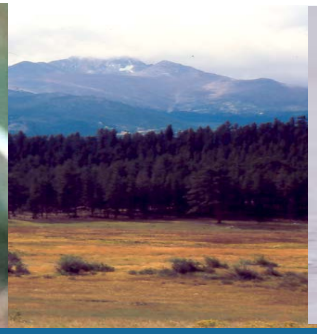
prbo

PRBO Conservation Science

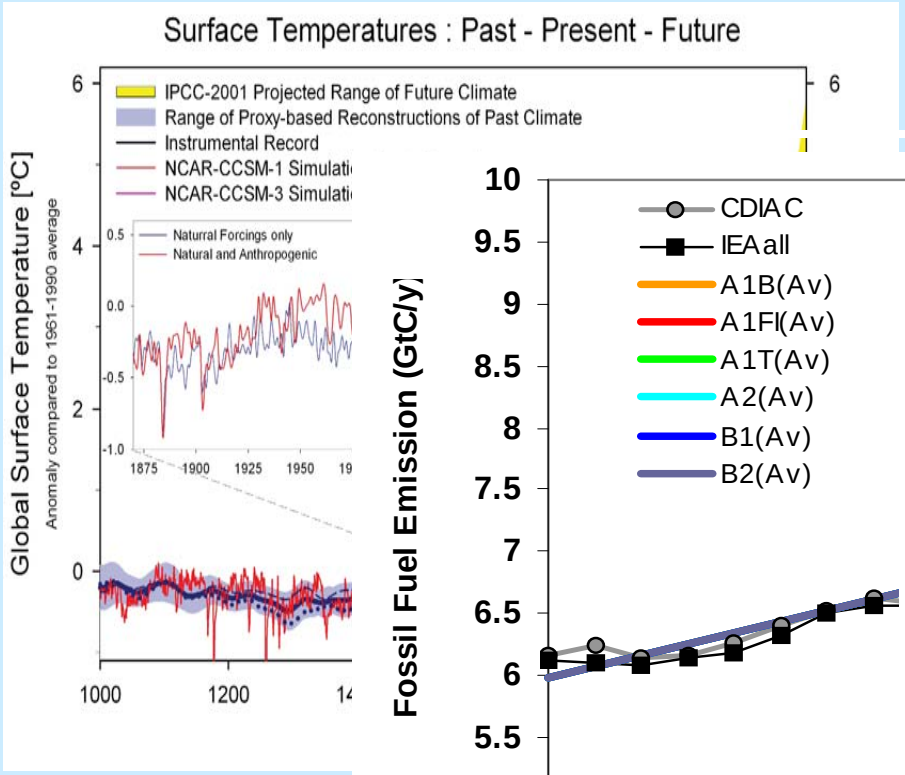




Adaptive Management in an Era of Climate Change: No More Business as Usual?

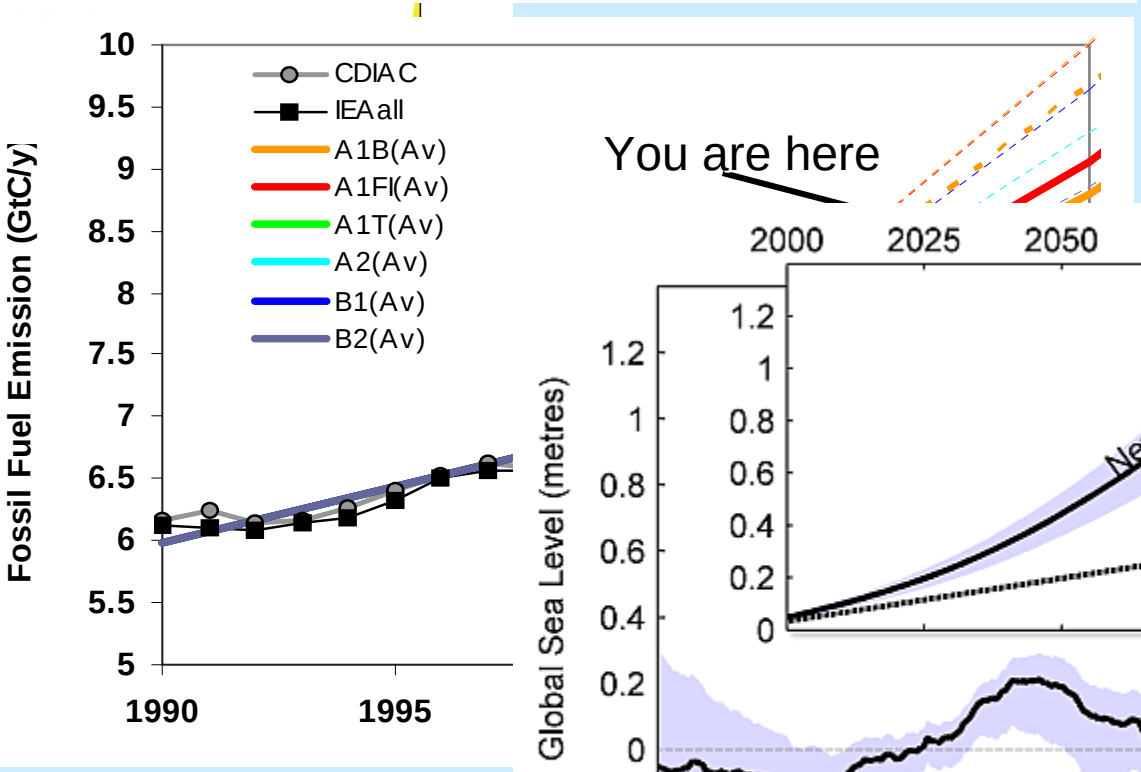
John A. Wiens
California Coastal Conservancy

17 February 2009

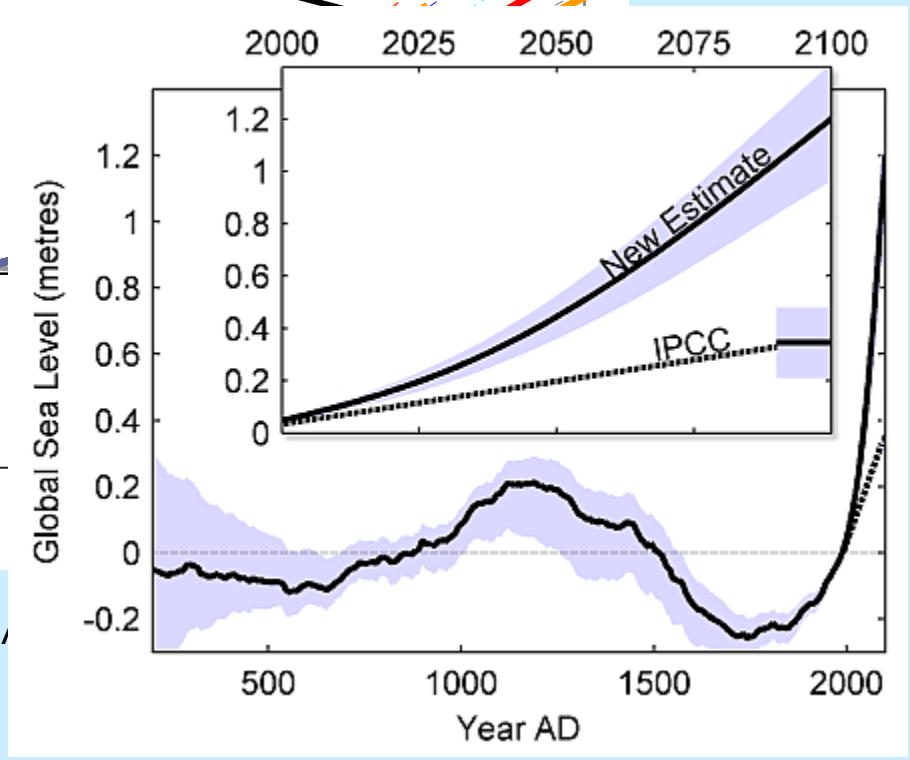
Projections of Global Climate Change



Source: IPCC 20



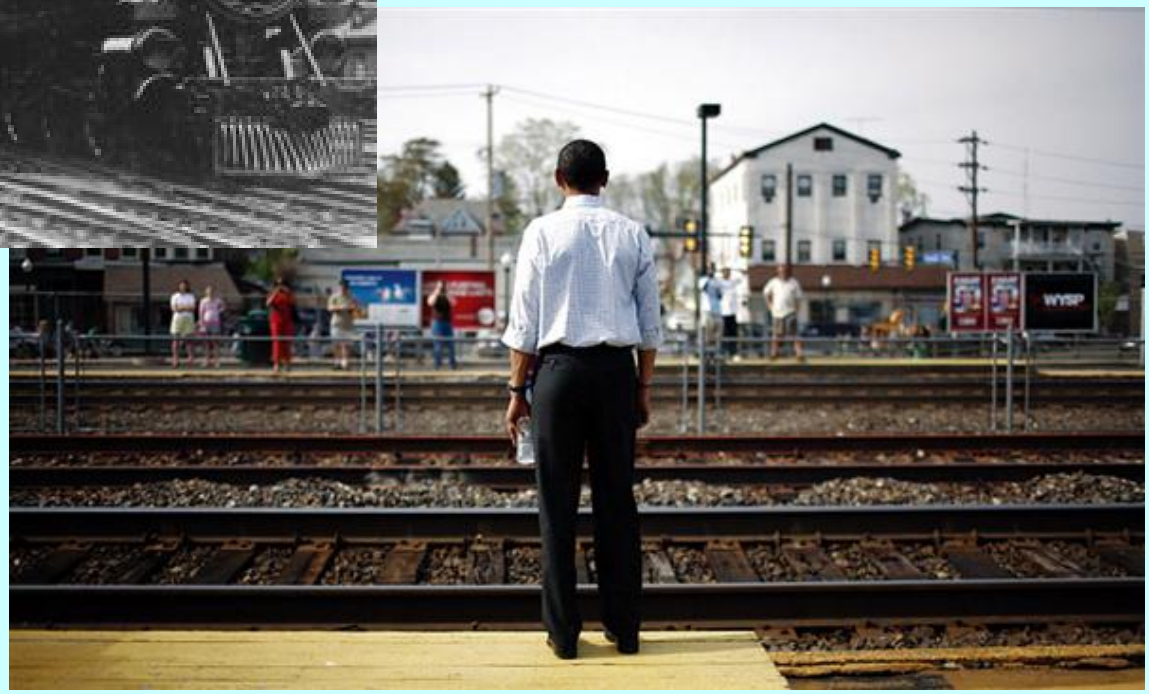
Source: Raupach et al 2007, PNA



Source: Grinsted, A., J. C. Moore, and S. Jevrejeva 2009. Clim. Dyn.

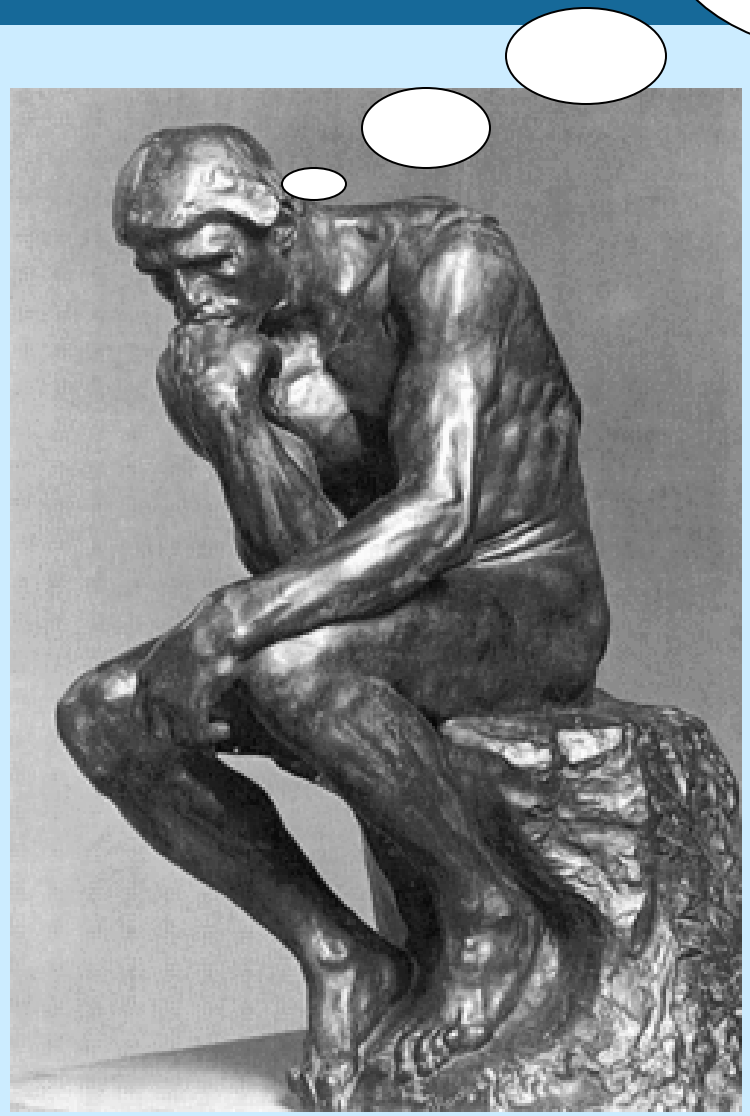
The train has left the station …

… and we're still waiting on the platform



Should We Pursue Mitigation or Adaptation?

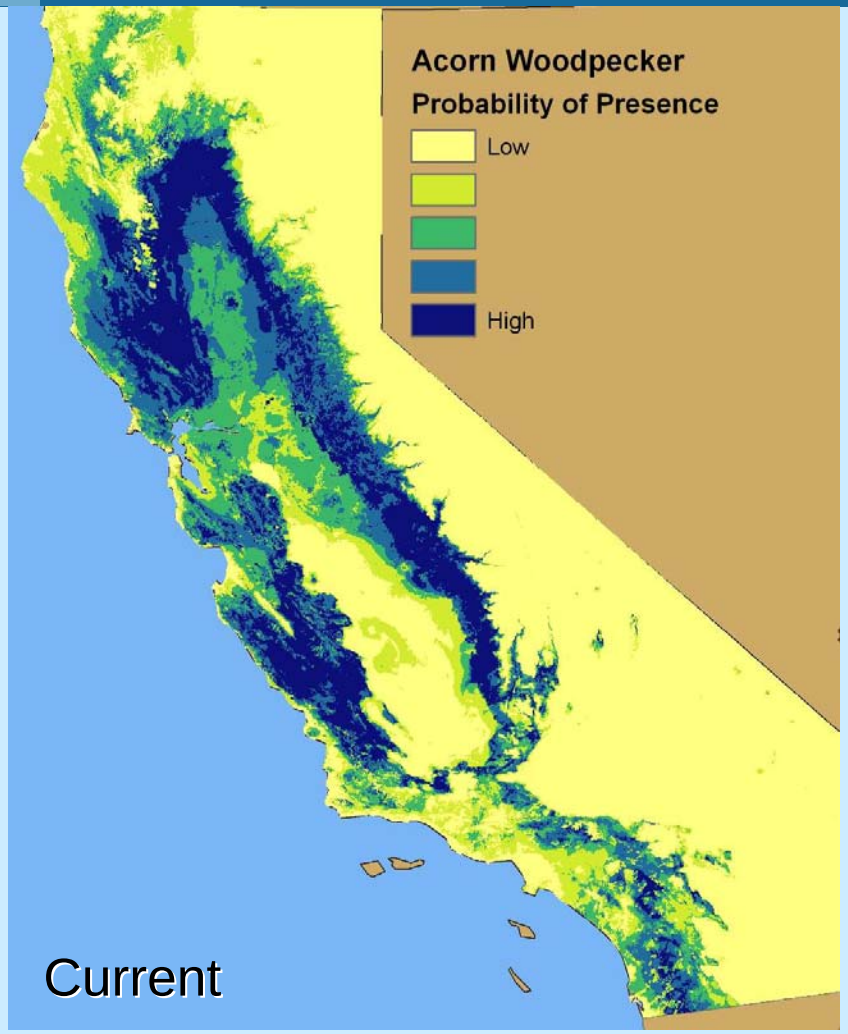
What is Needed?

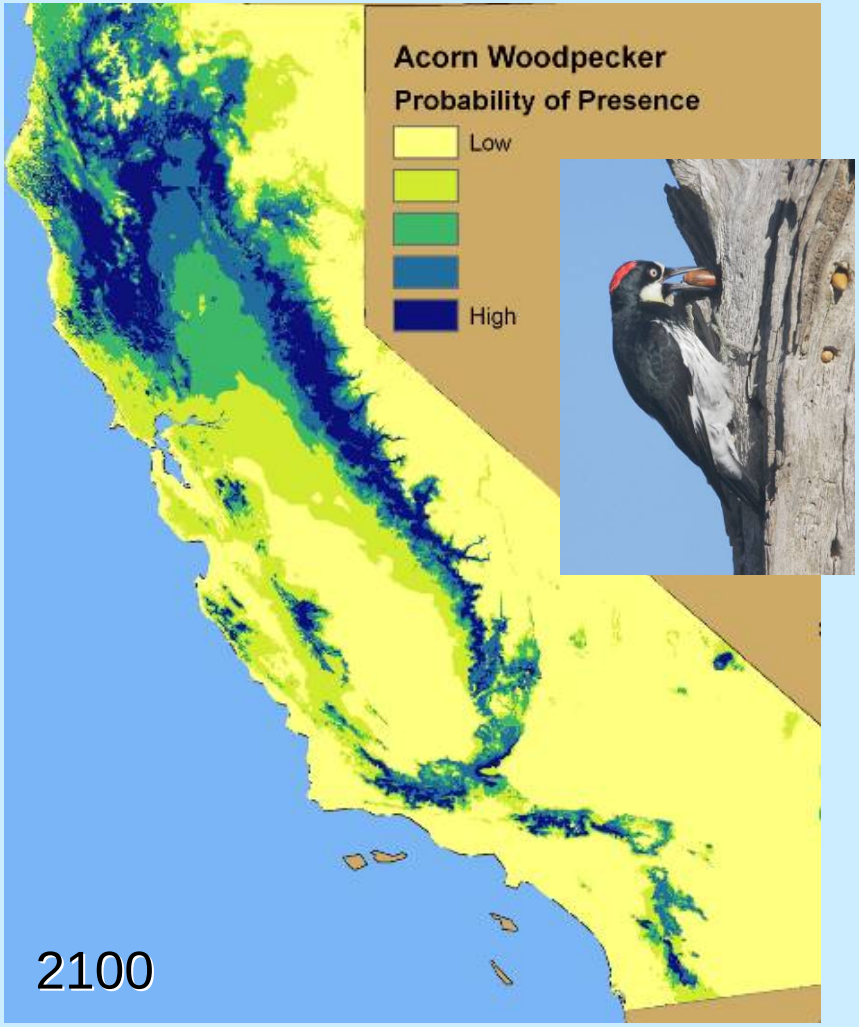


Dealing with Uncertainty

- Model projections of likely changes
- Comprehensive adaptive management

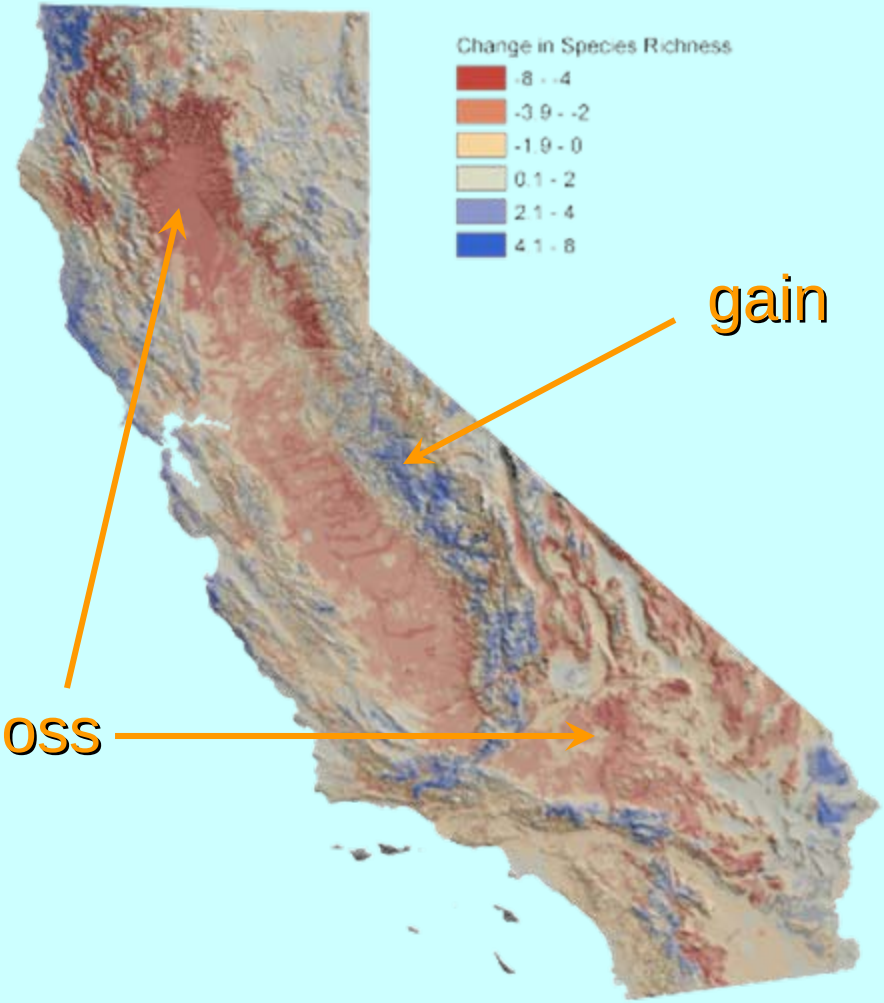
Model Projections of Bird Distributions





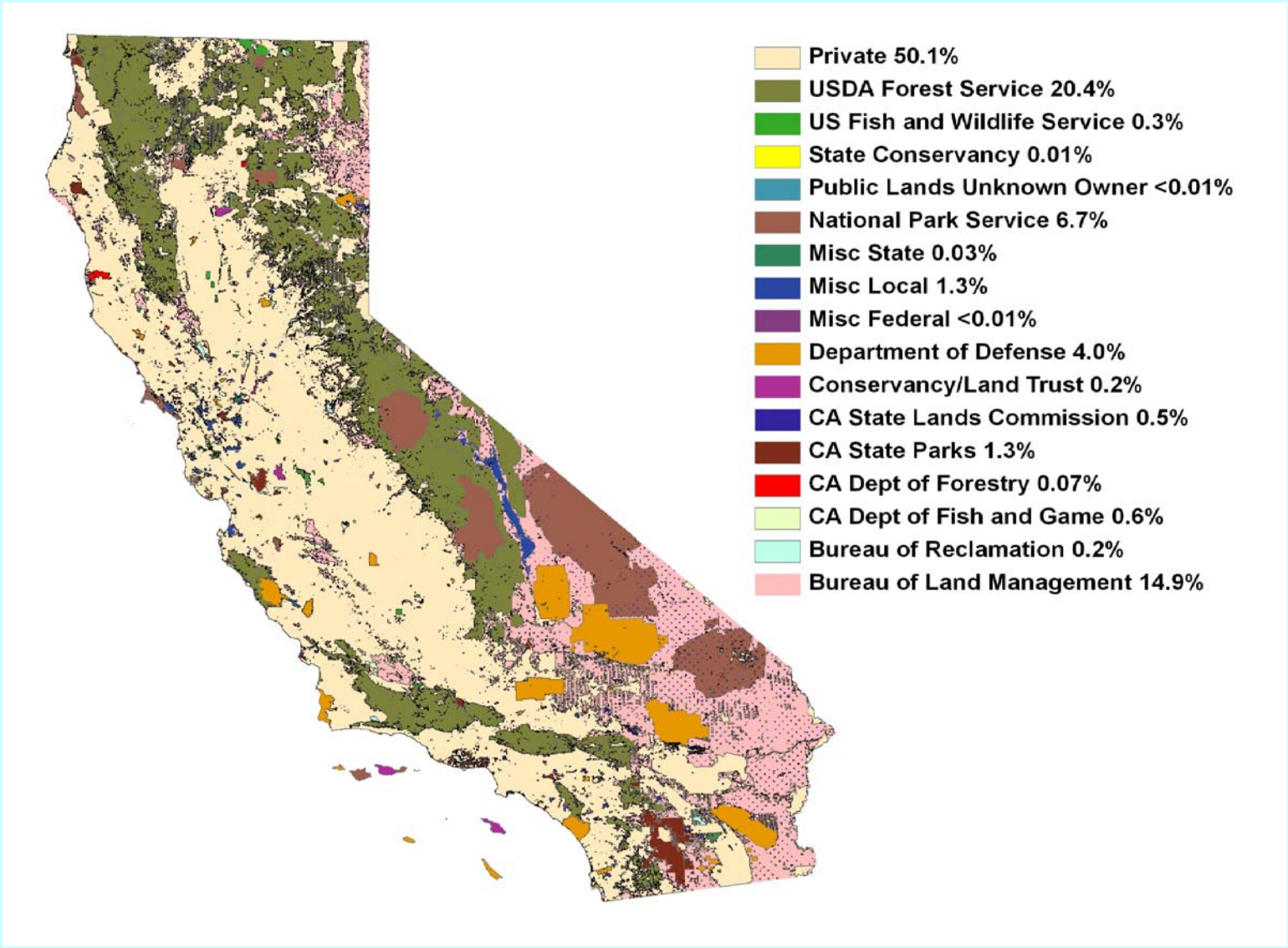
Source: D. Stralberg, PRBO : PRISM climate (C. Daly) + 2080-2099 40-km RCM Scenario A2, NCAR CSM 1.2 (M. Snyder) + vegetation

Hotspots of Change in Bird Species Richness

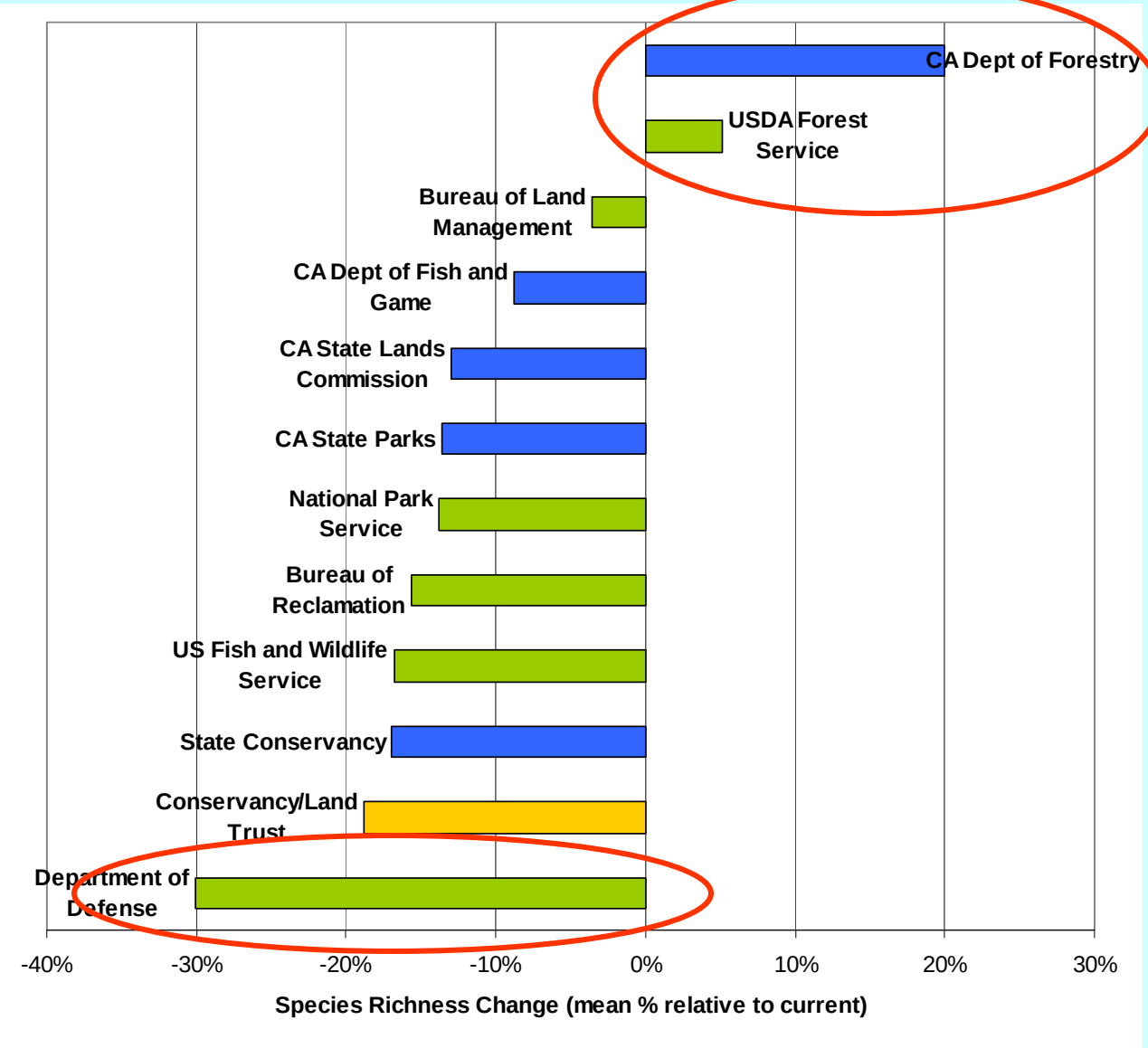


Source: PRBO, Stralberg et al., unpublished

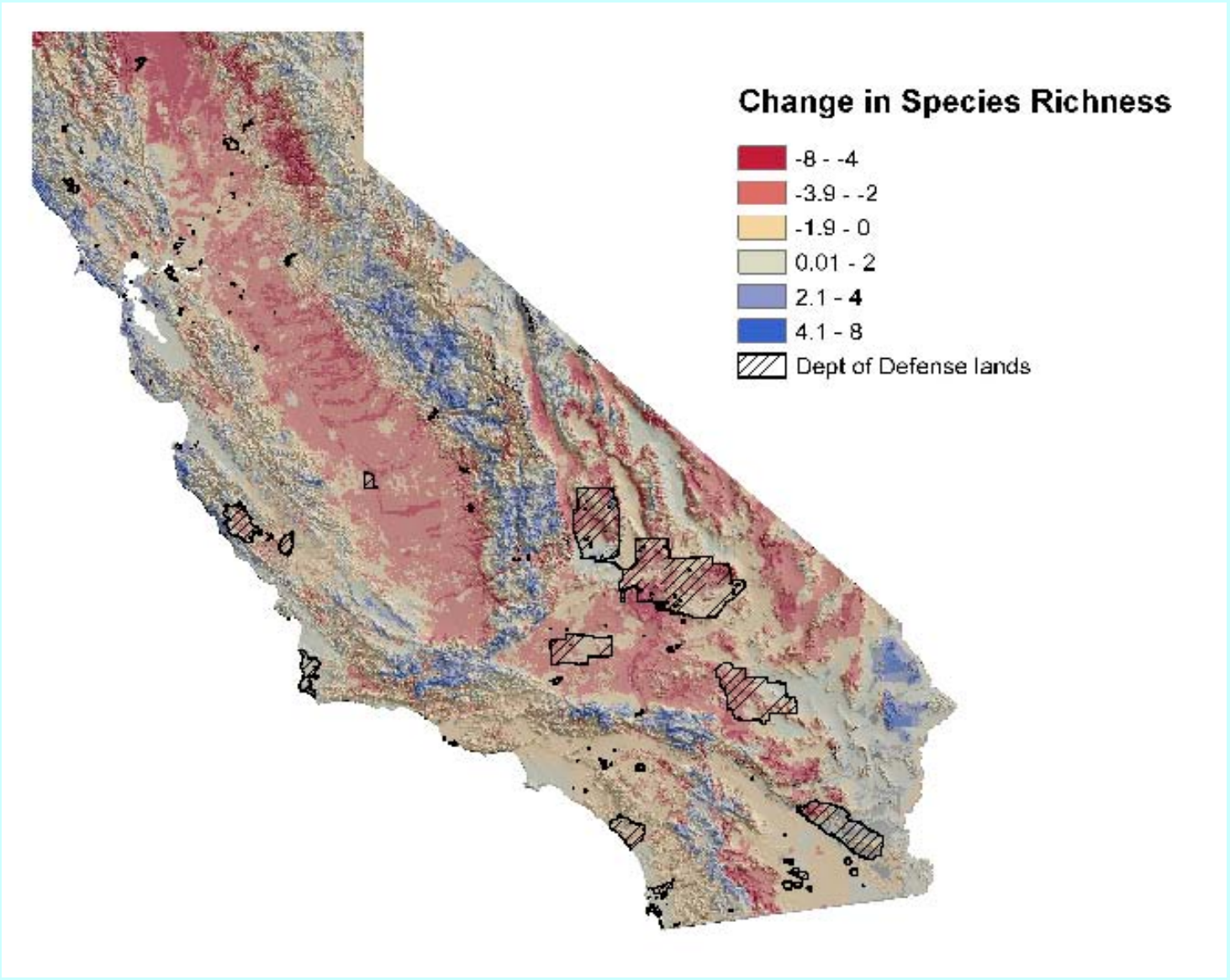
Public Land Ownership in California



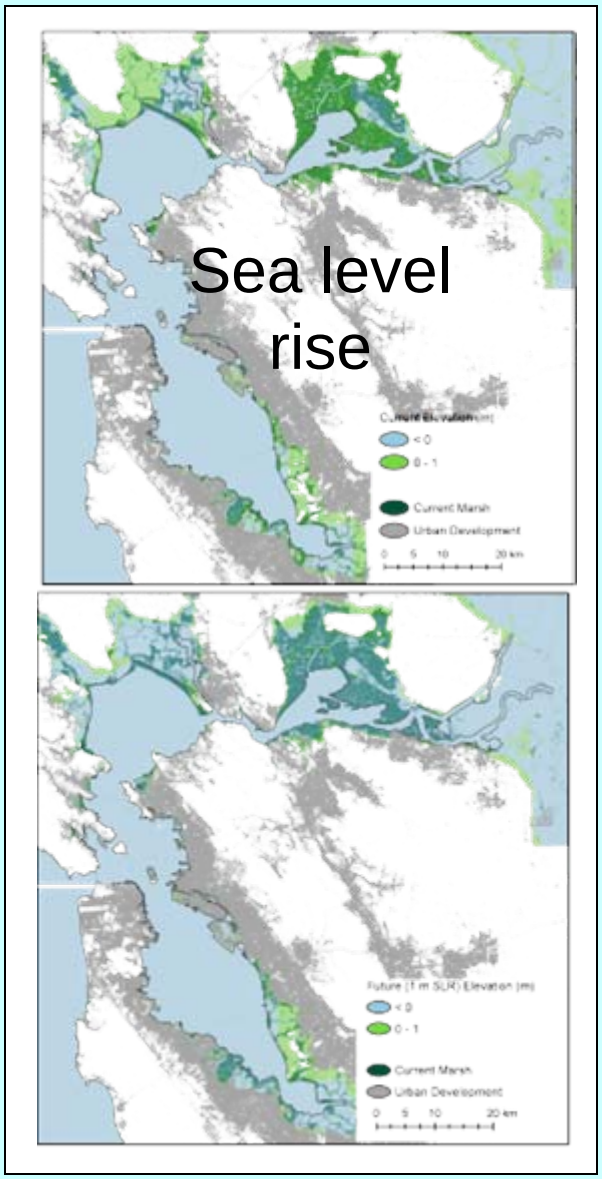
Whose Lands will Win or Lose the Most?



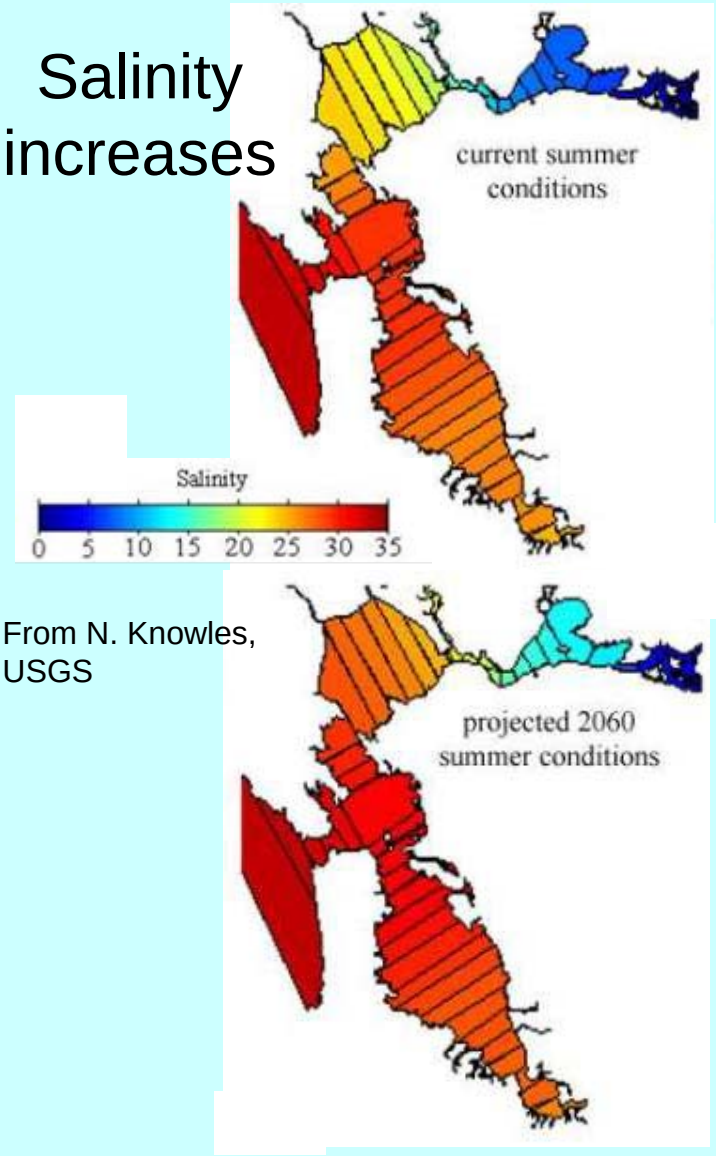
Where are the DoD Lands in California?



Changes in Coastal Wetlands

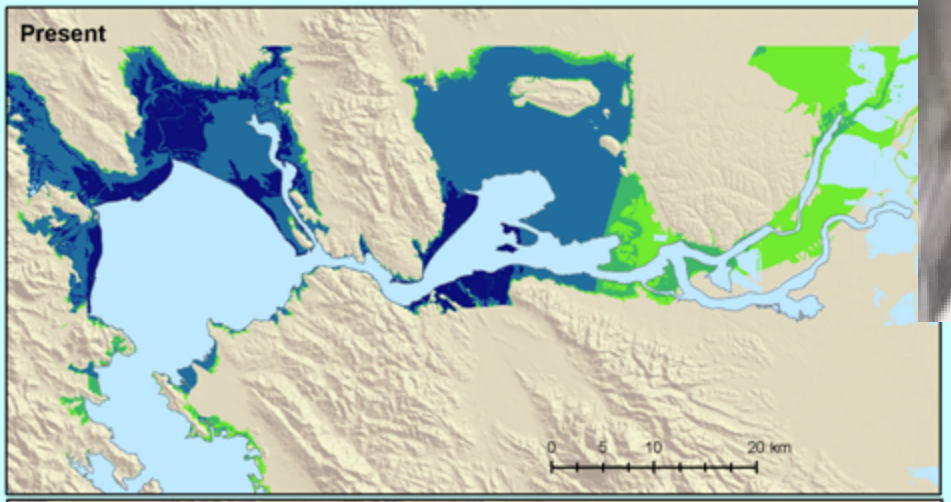


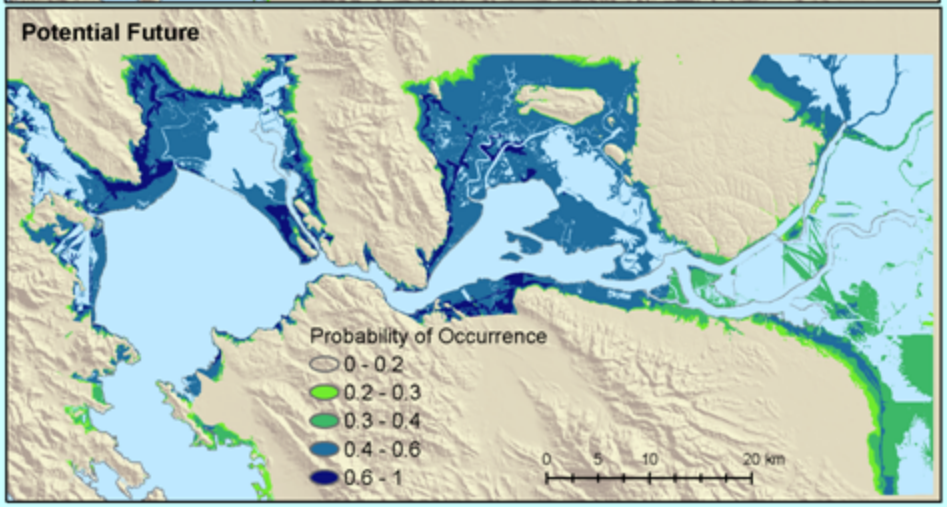
Salinity increases



From N. Knowles, USGS

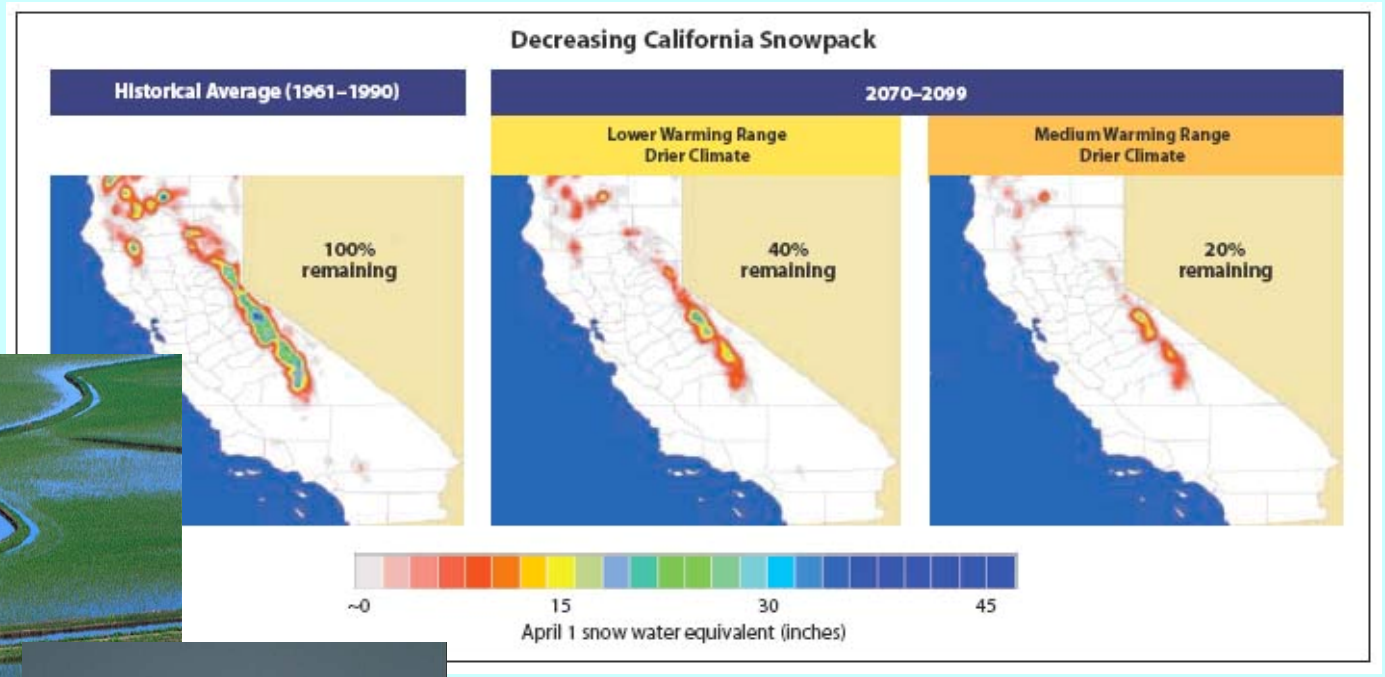
Projected Changes in Common Yellowthroat Distribution





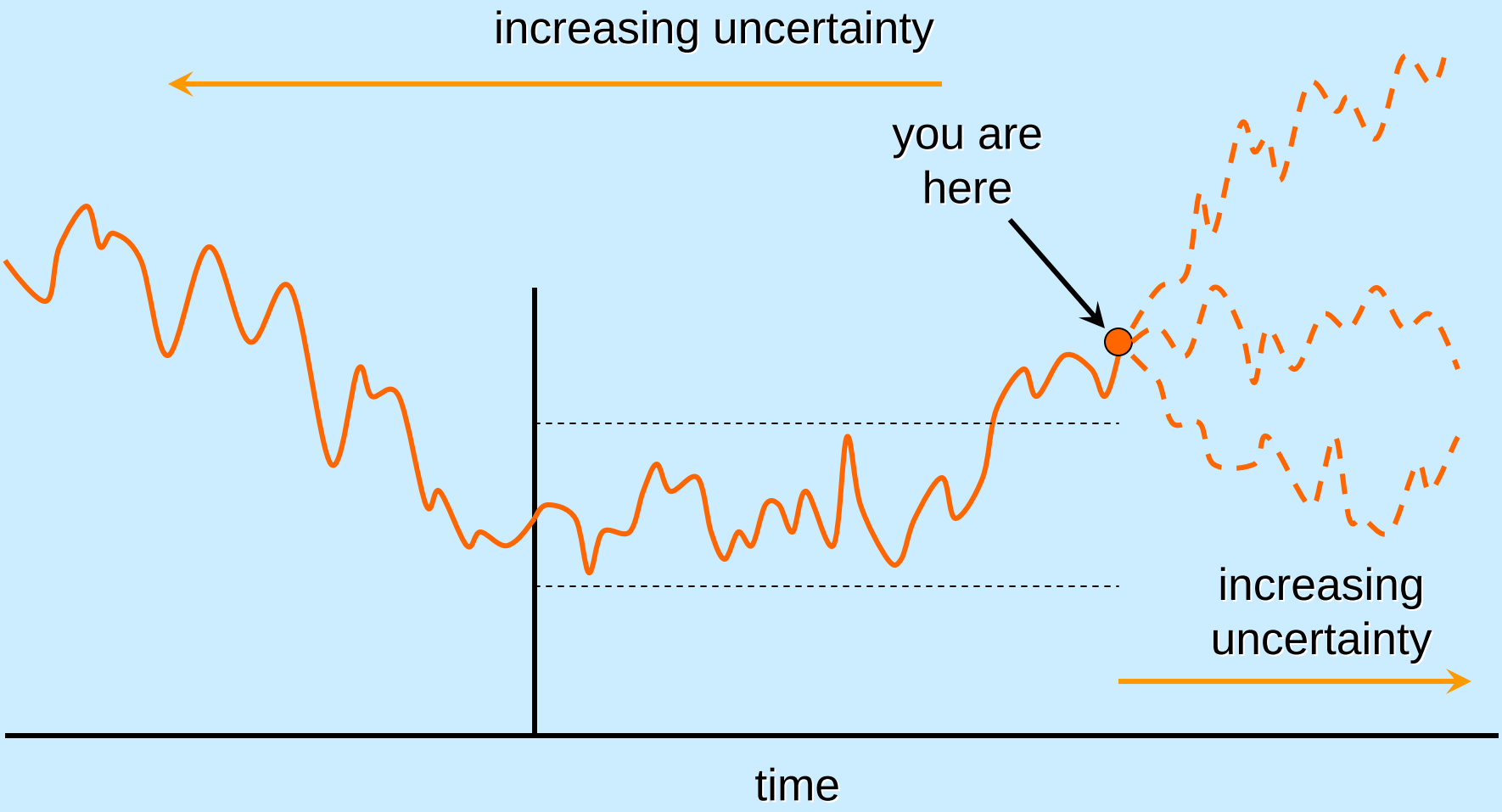
SF Bay
Salinity increase / Elevation decrease (1 m SLR, no sediment accretion)

Impacts of Hydrological Changes

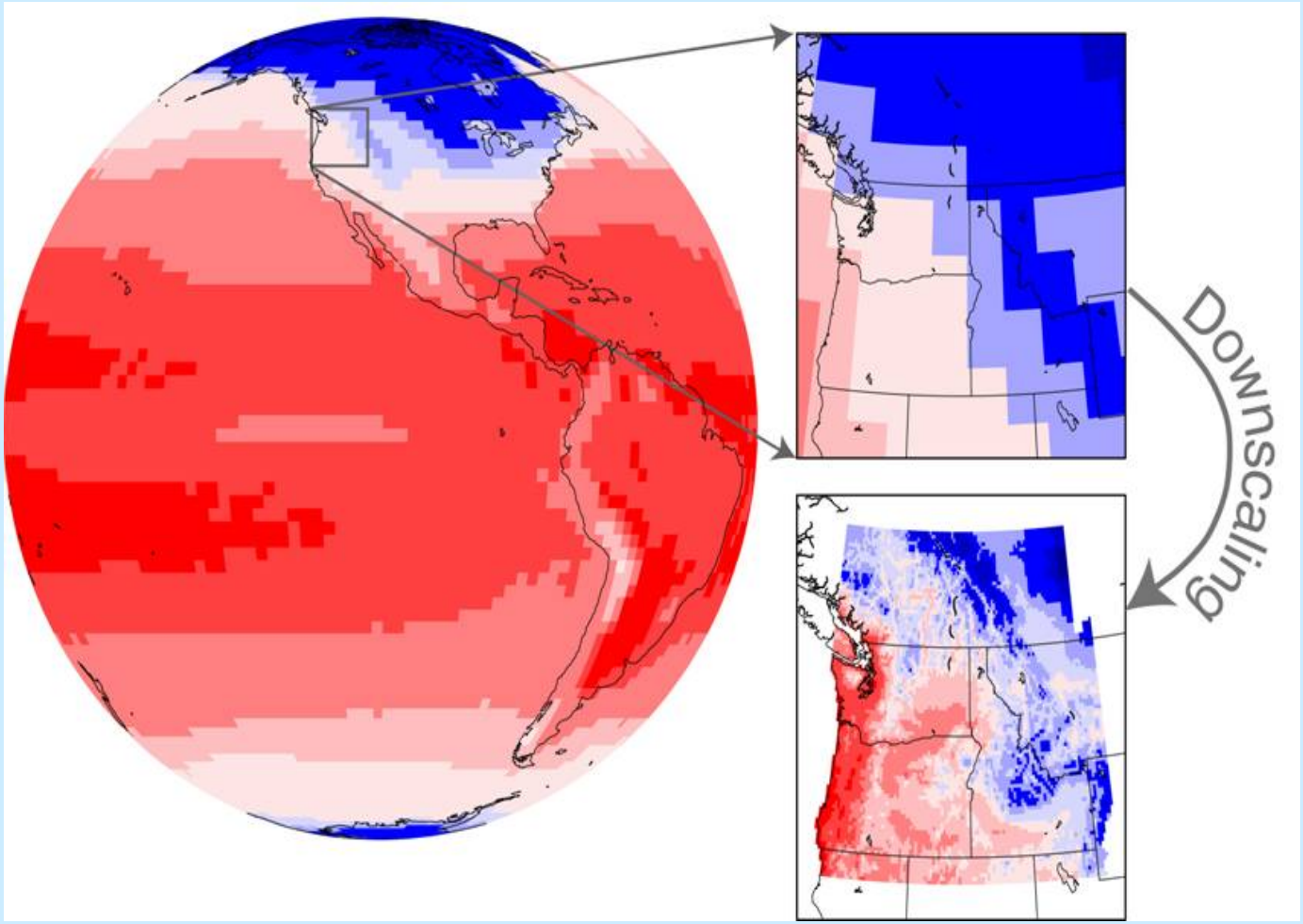


Source: CEC(2006). Our Changing Climate: Assessing Risks to California. http://www.climatechange.ca.gov/biennial_reports/2006report/

Sources of Uncertainty

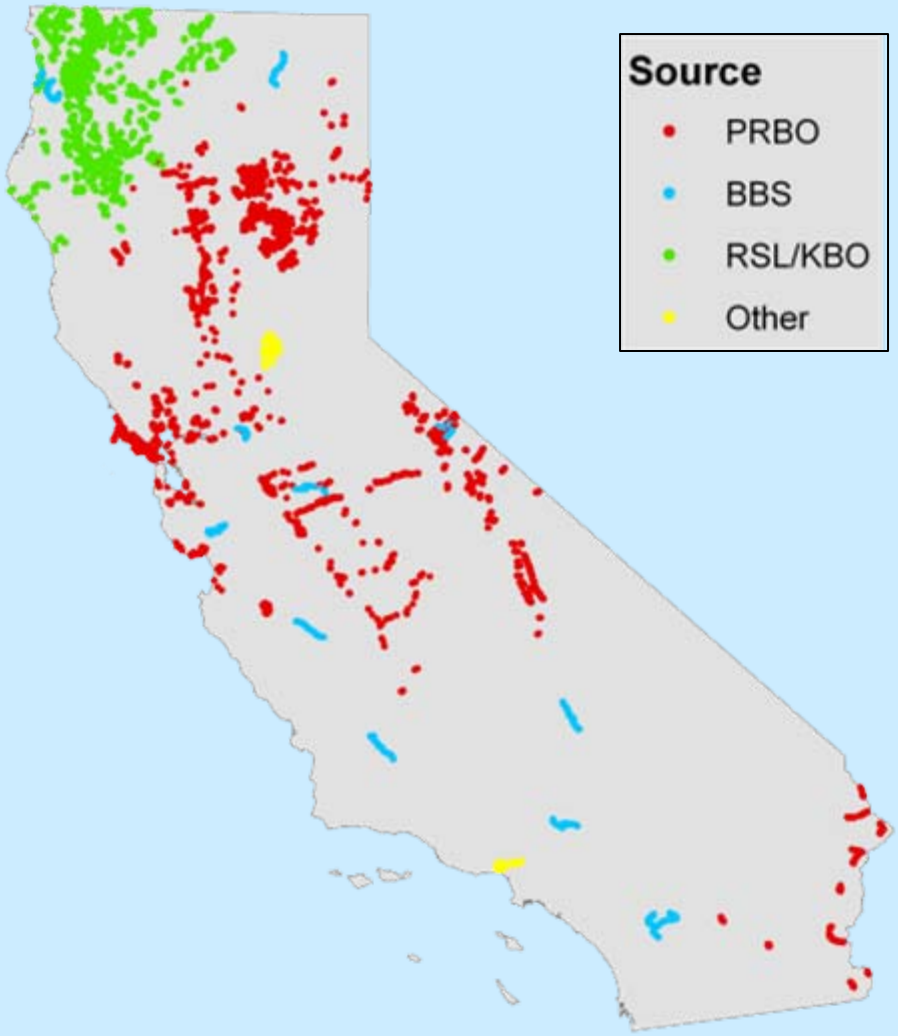


Modeling and Downscaling

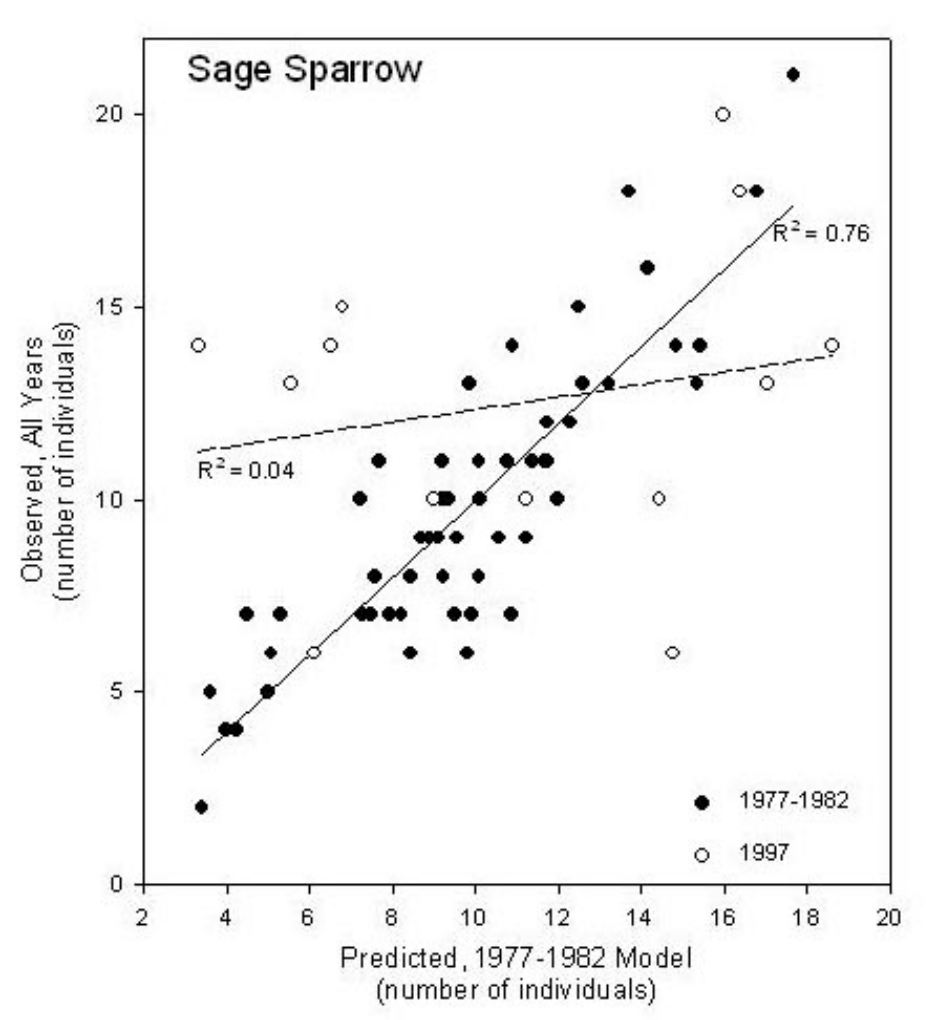


Source: Climate Impacts Group, Univ. Washington

Quantity and Quality of Data

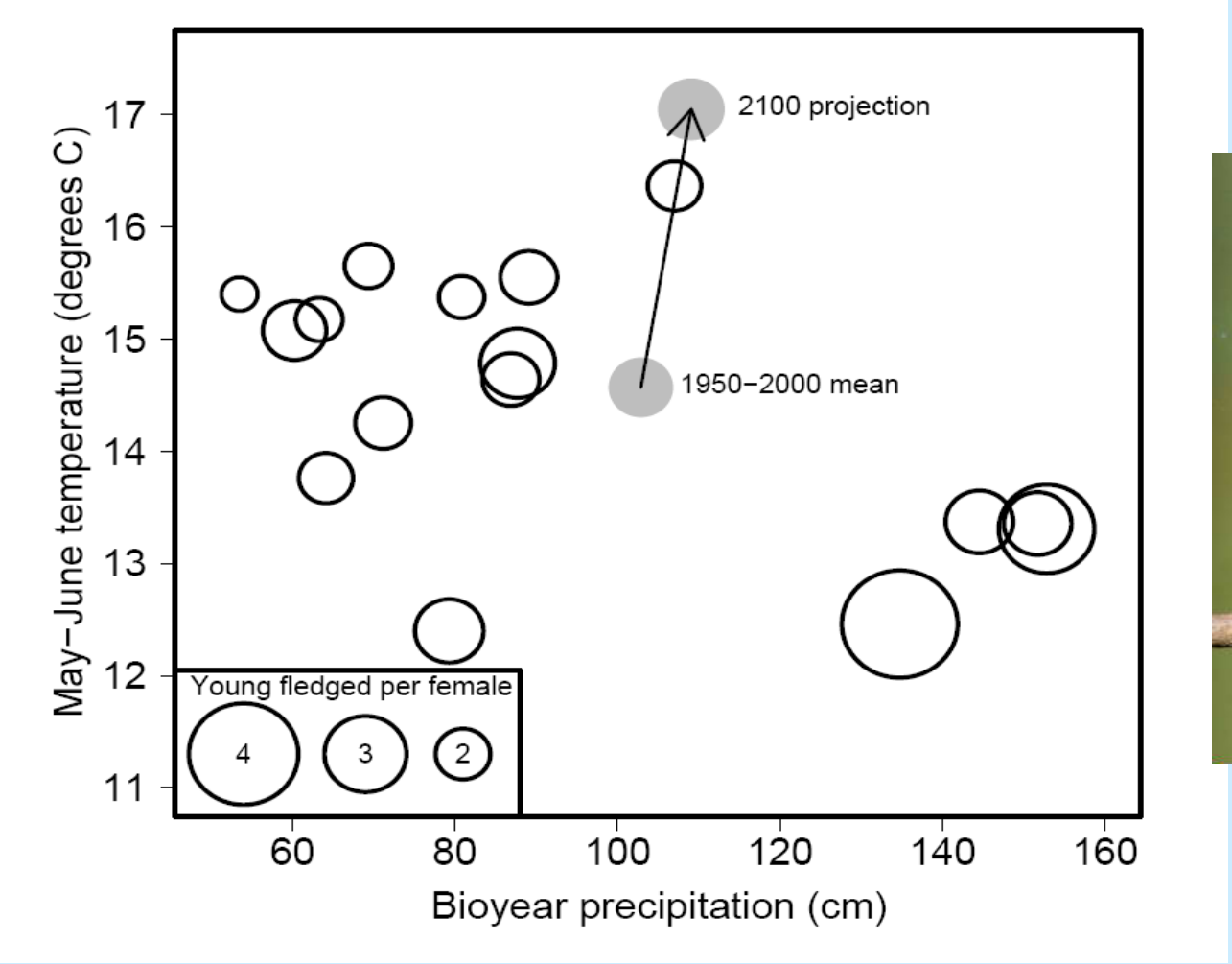


Ecological Niche Modeling Assumptions



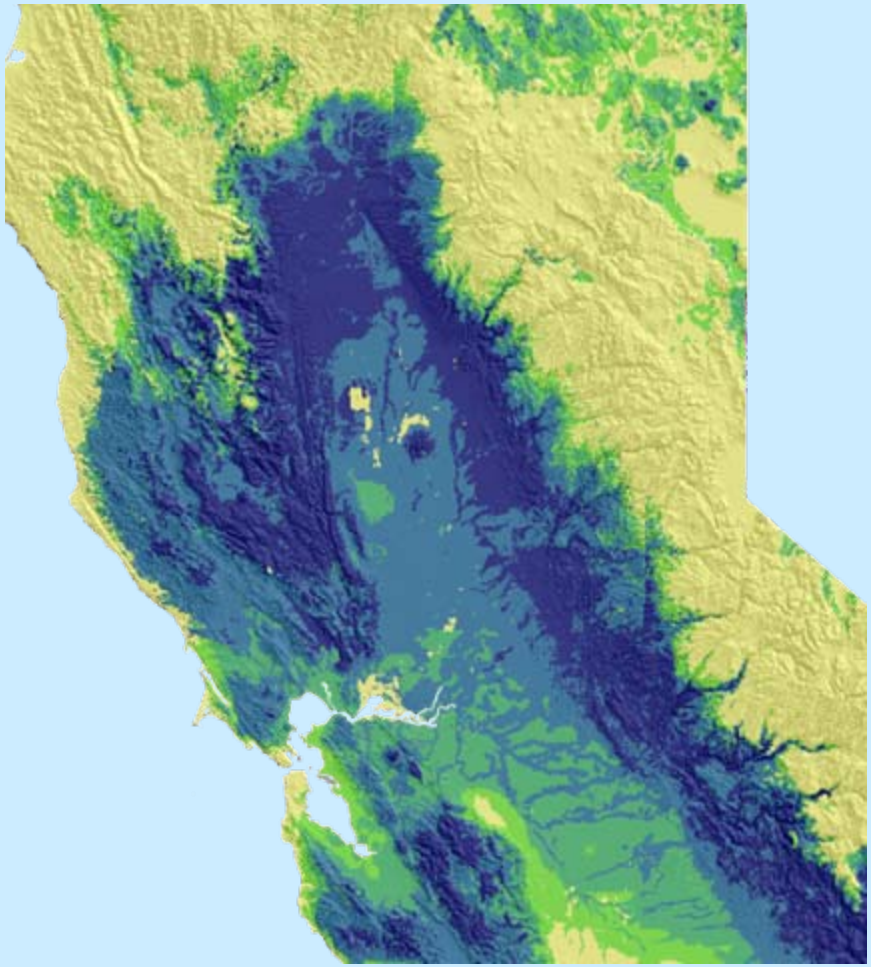
Source: J. Rotenberry and J. Wiens, unpublished

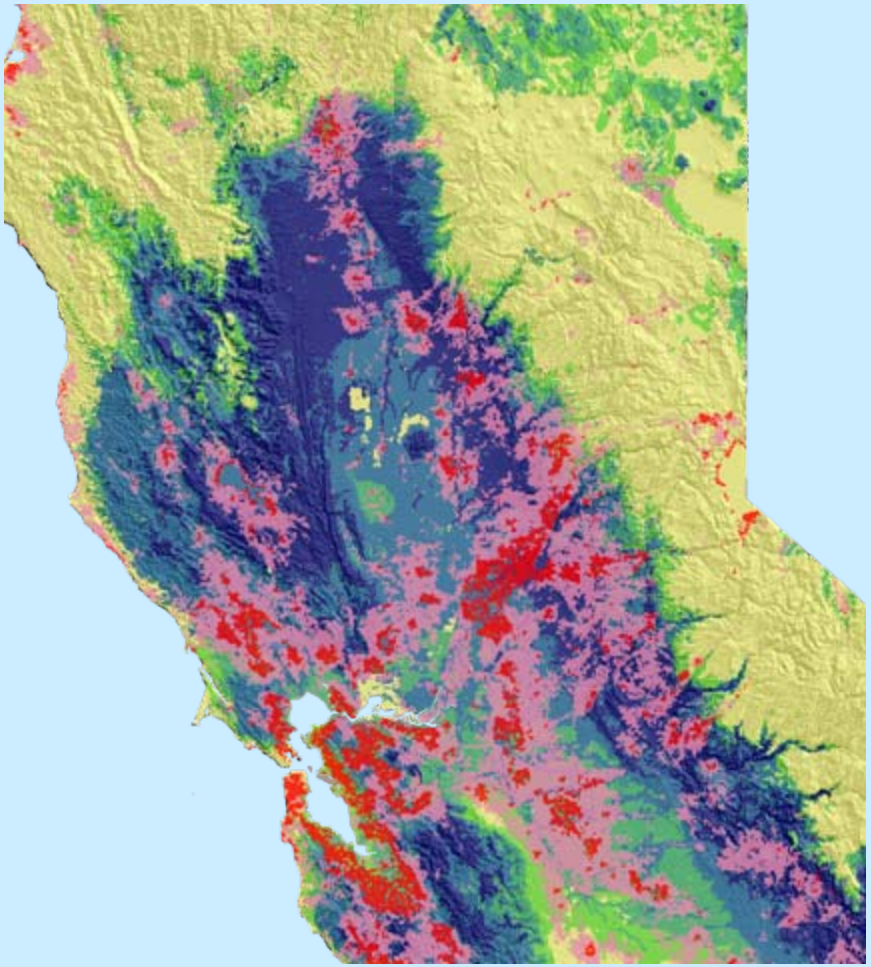
Demography: Climate and Song Sparrow Reproduction in Marin County



Source: N. Seavy et al. 2008 *The Auk*

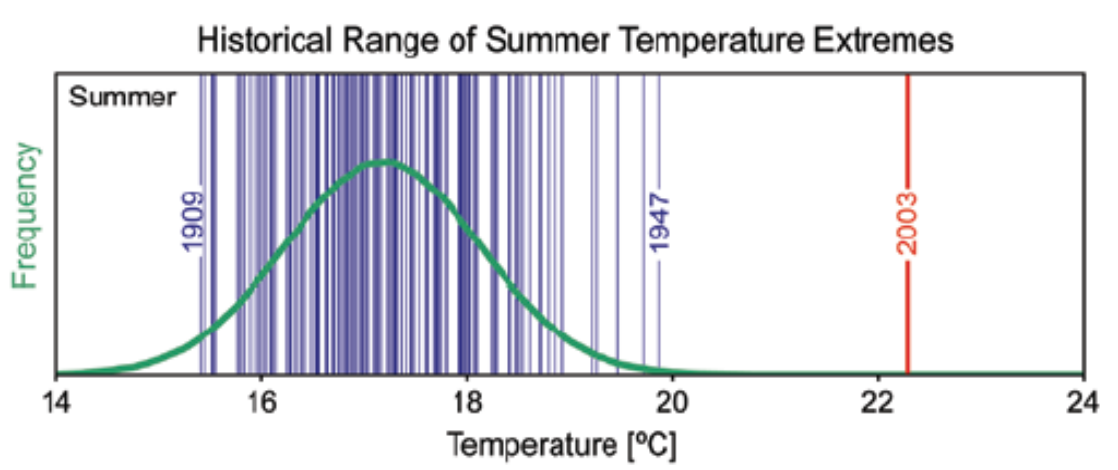
The Effects of Land Use: Oak Titmouse Projections

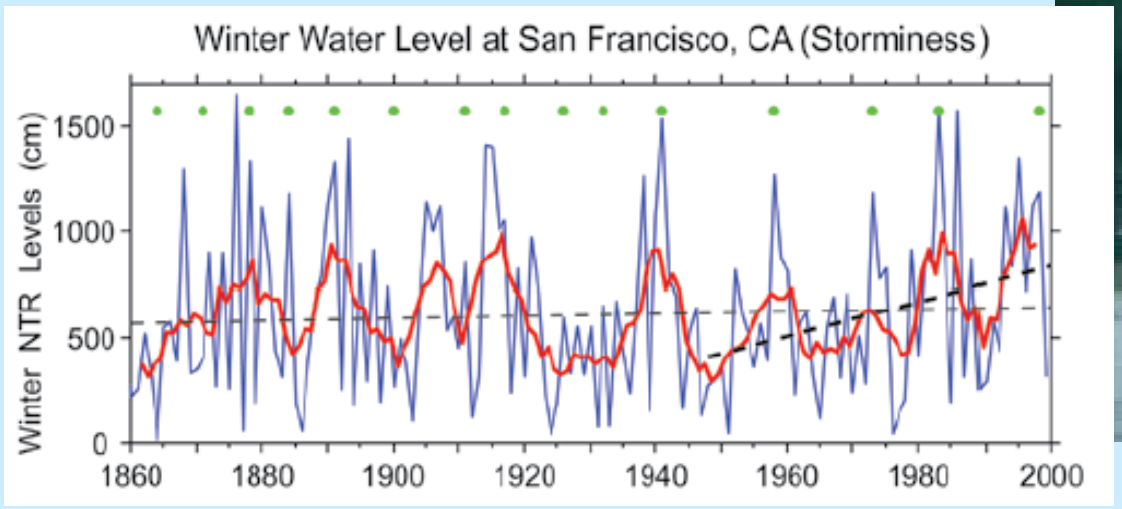




Source: PRBO analyses: PRISM climate (C. Daly) + 2080-2099 40-km RCM Scenario A2, NCAR CSM 1.2 (M Snyder) + vegetation; 2020 development projections from D. Theobald

Extreme Events and Thresholds



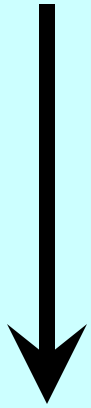


Source: U.S. Climate Change Science Program

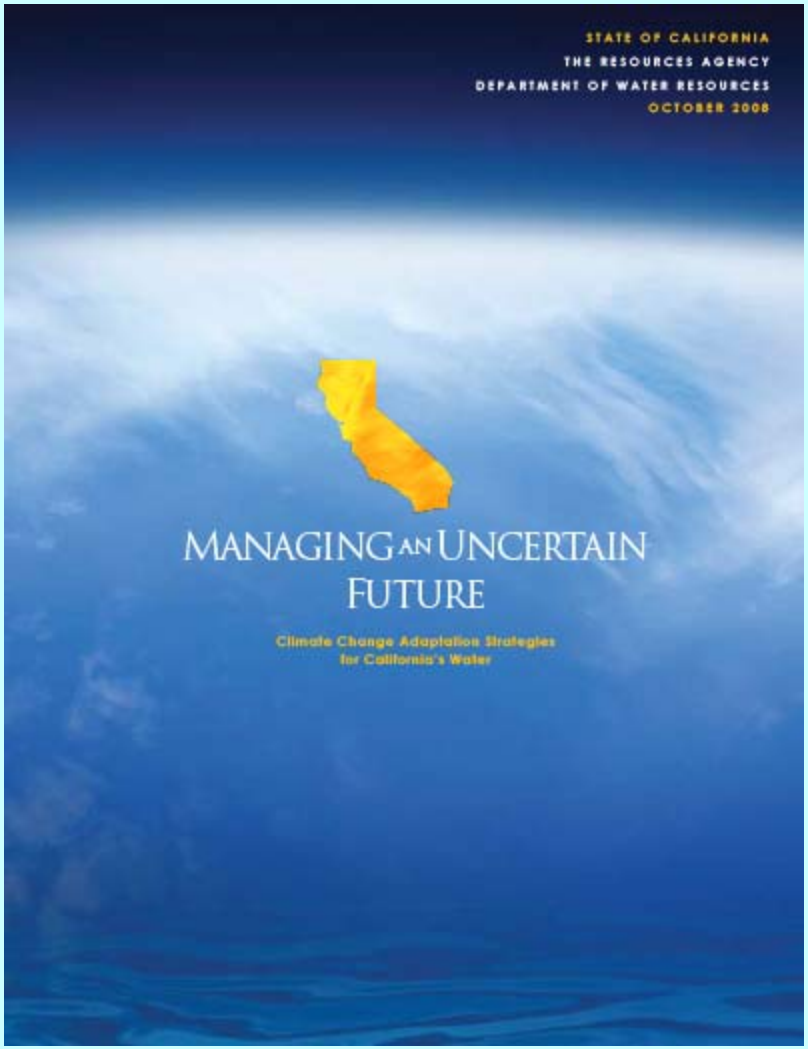
What Else?

- Dispersal
- Species interactions
- Source-sink dynamics
- Adaptation and evolution

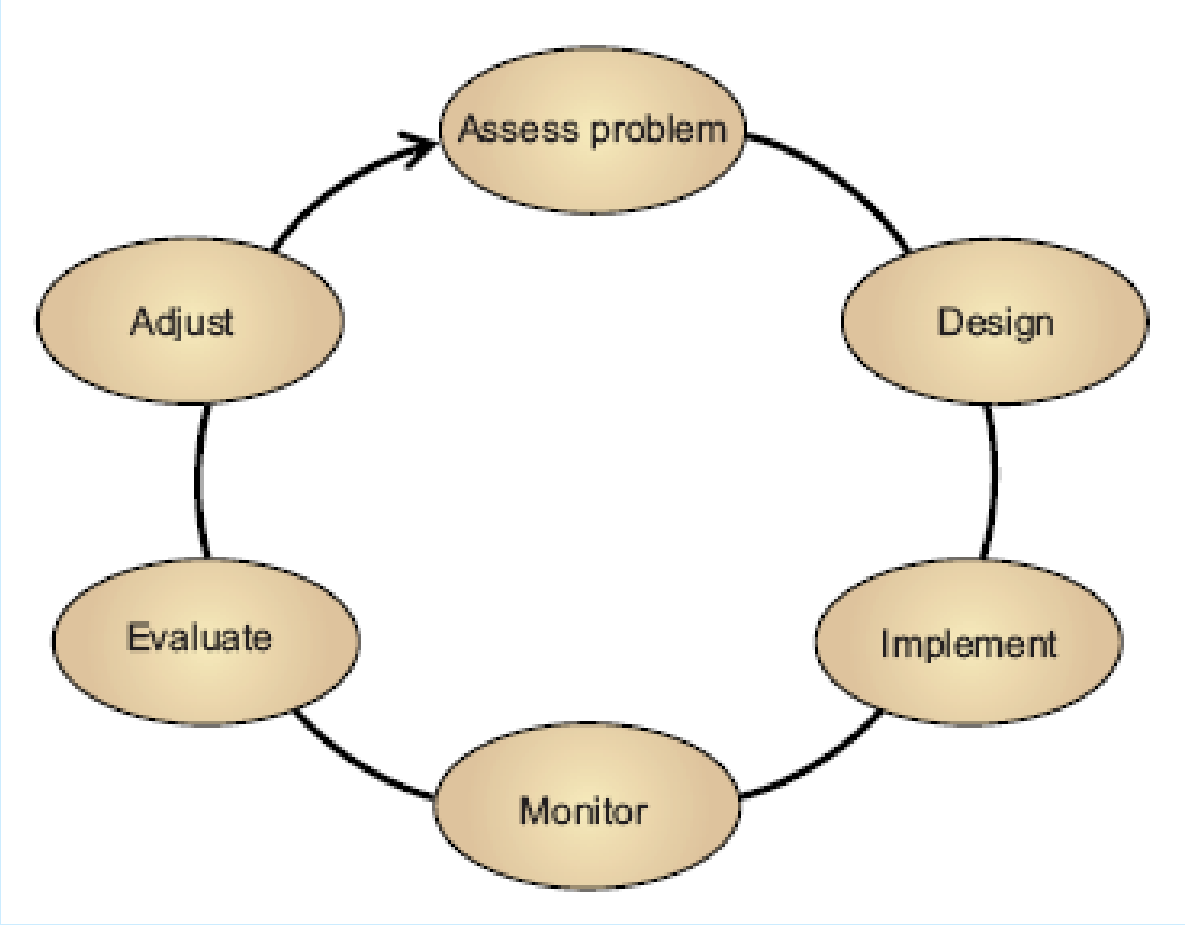
No-analog Futures



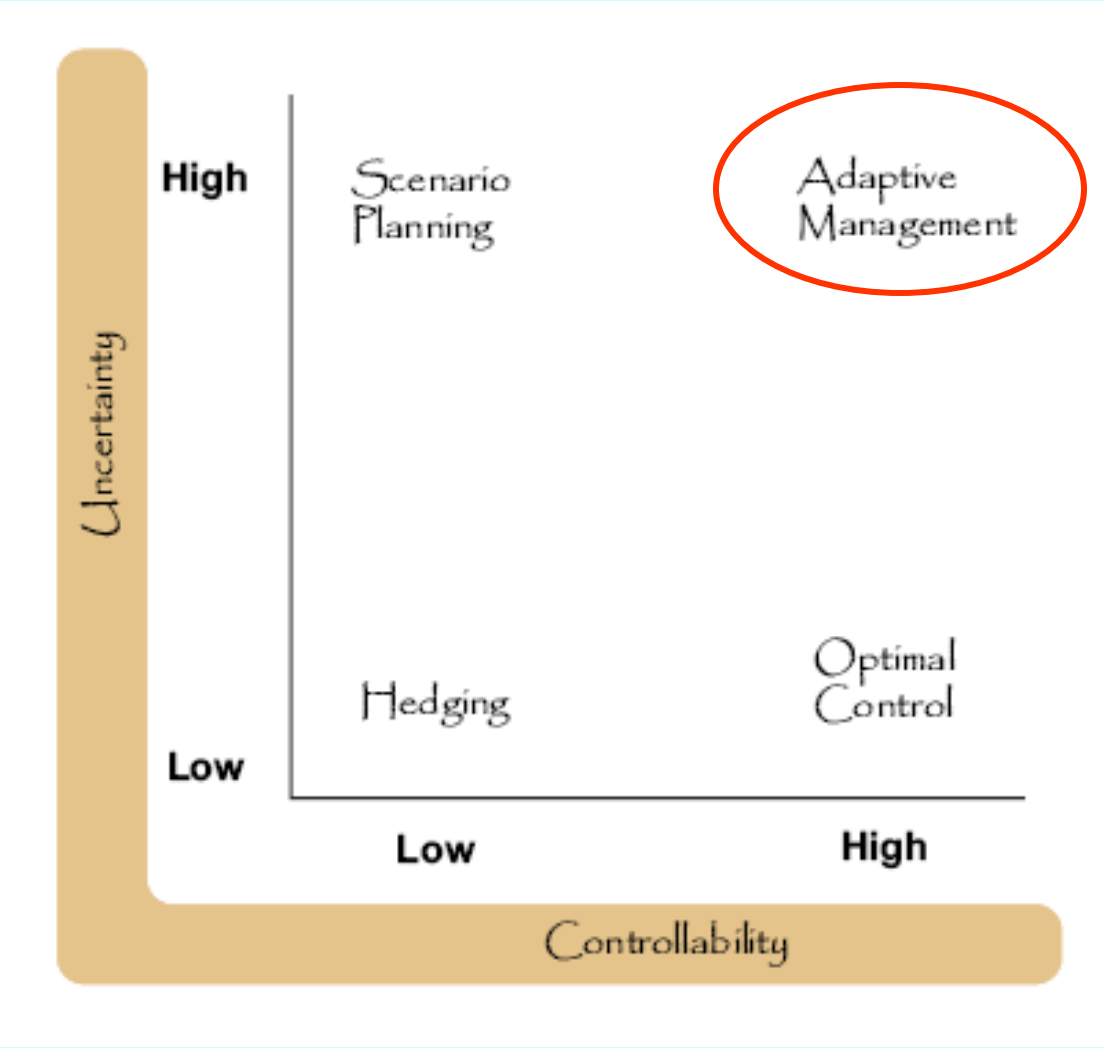
No-analog Management



Comprehensive Adaptive Management



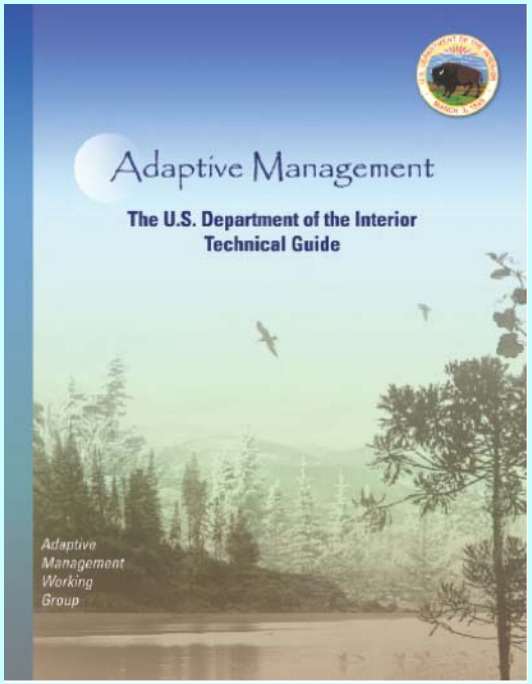
Adaptive Management is not the Solution for Everything



Source: Williams et al. 2007. Department of Interior Adaptive Management Technical Guide

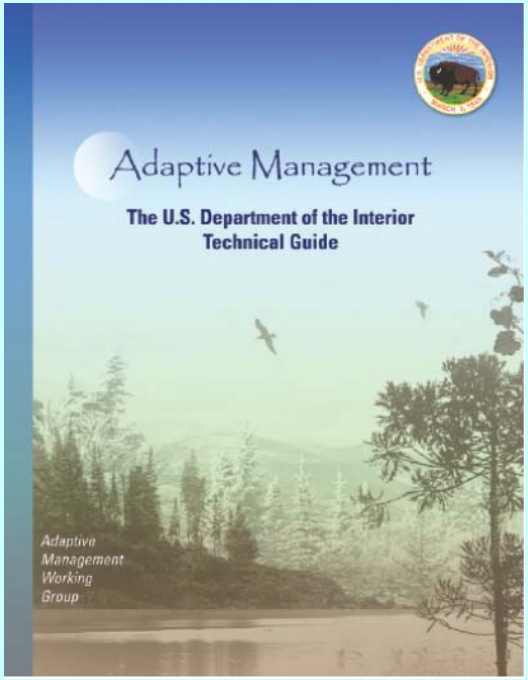
What does it Take?

- A management choice is to be made
- Learning can be applied
- Clear and measurable objectives can be identified
- Information will reduce uncertainty
- Monitoring is feasible
- The institutional context exists

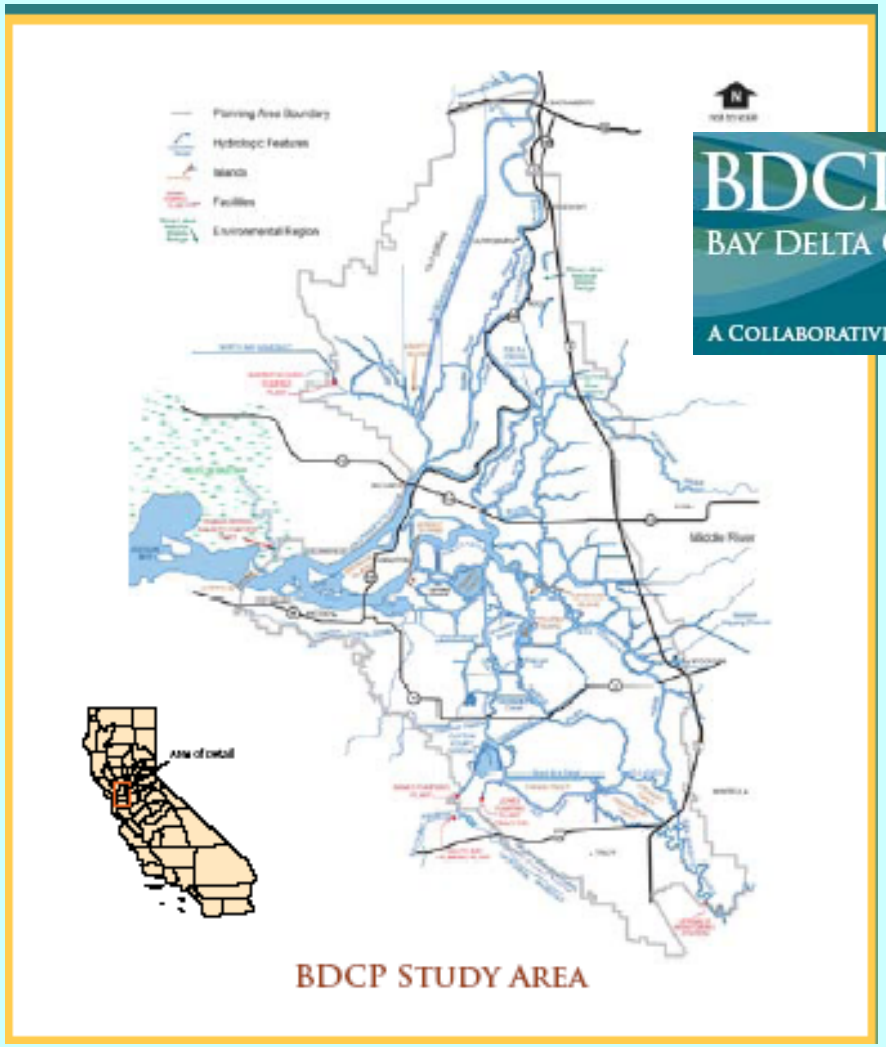


When Won't it Work?

- Decision making occurs only once
- Monitoring cannot provide useful information
- Conflicting objectives cannot be resolved
- Management can only address part of the problem
- Risks are unacceptably high
- Commitment to monitoring is lacking

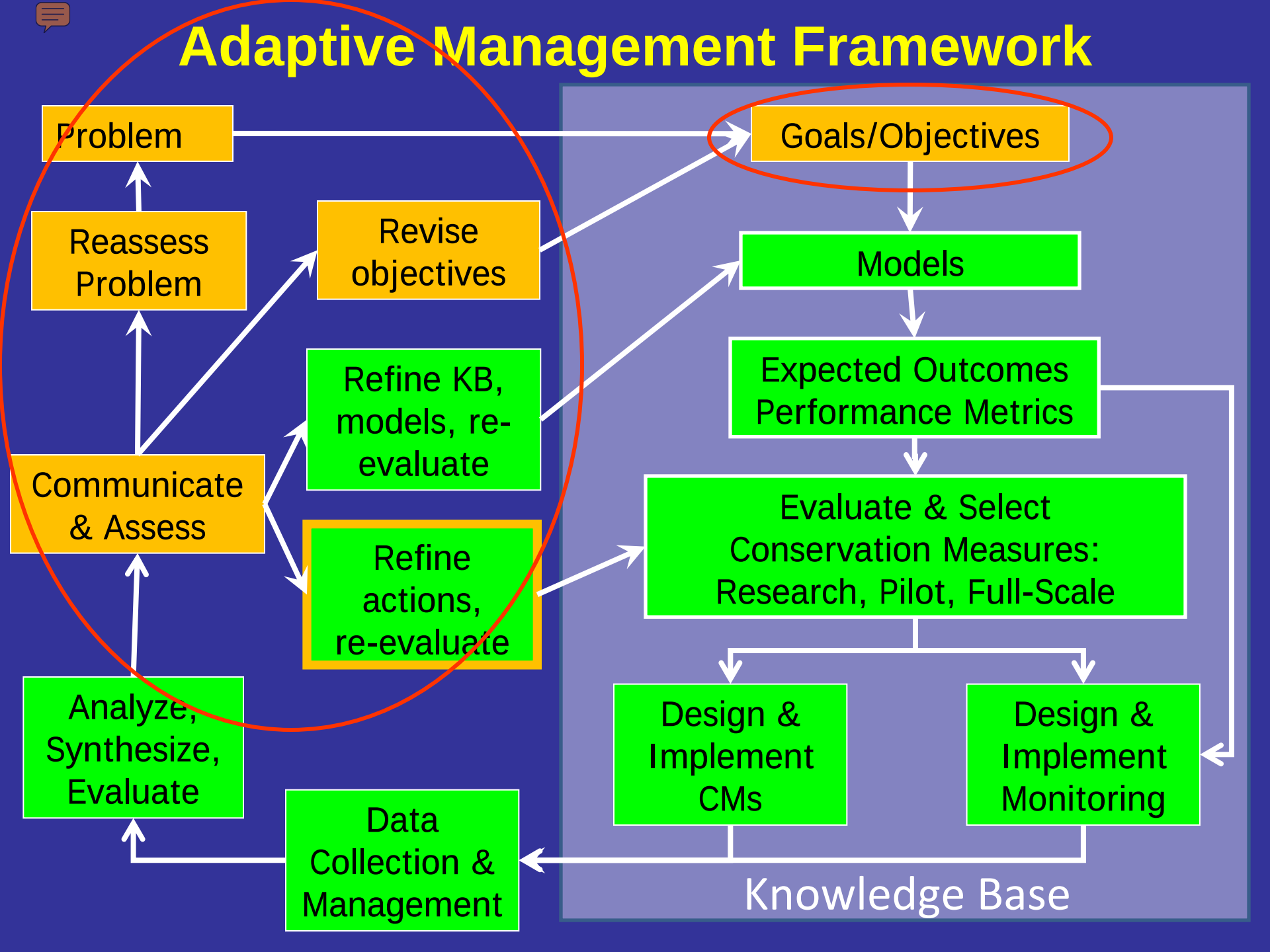


Adaptive Management in the Bay Delta Conservation Plan

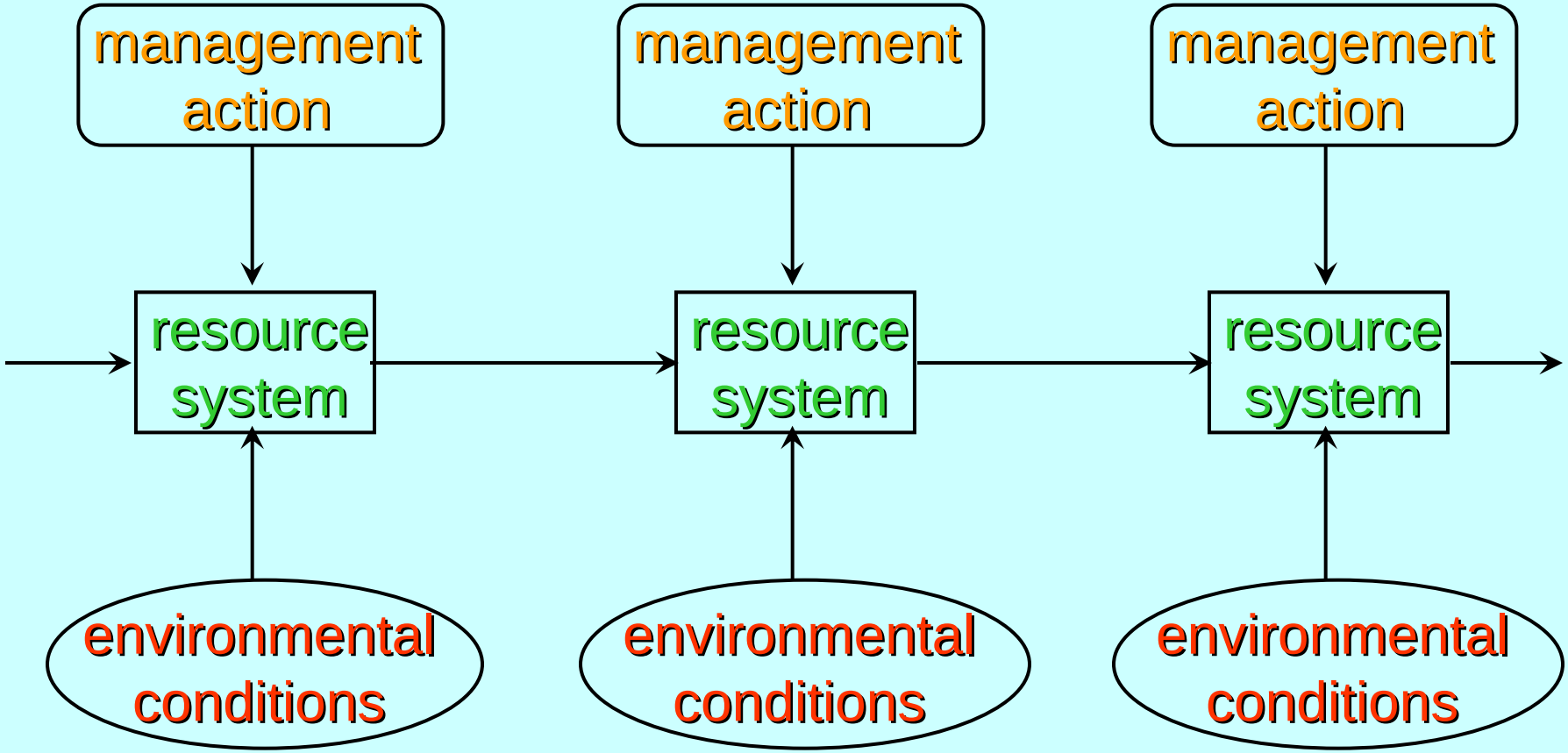


BDCP
BAY DELTA CONSERVATION PLAN
A COLLABORATIVE APPROACH TO RESTORE THE DELTA ECOSYSTEM AND PROTECT WATER SUPPLIES

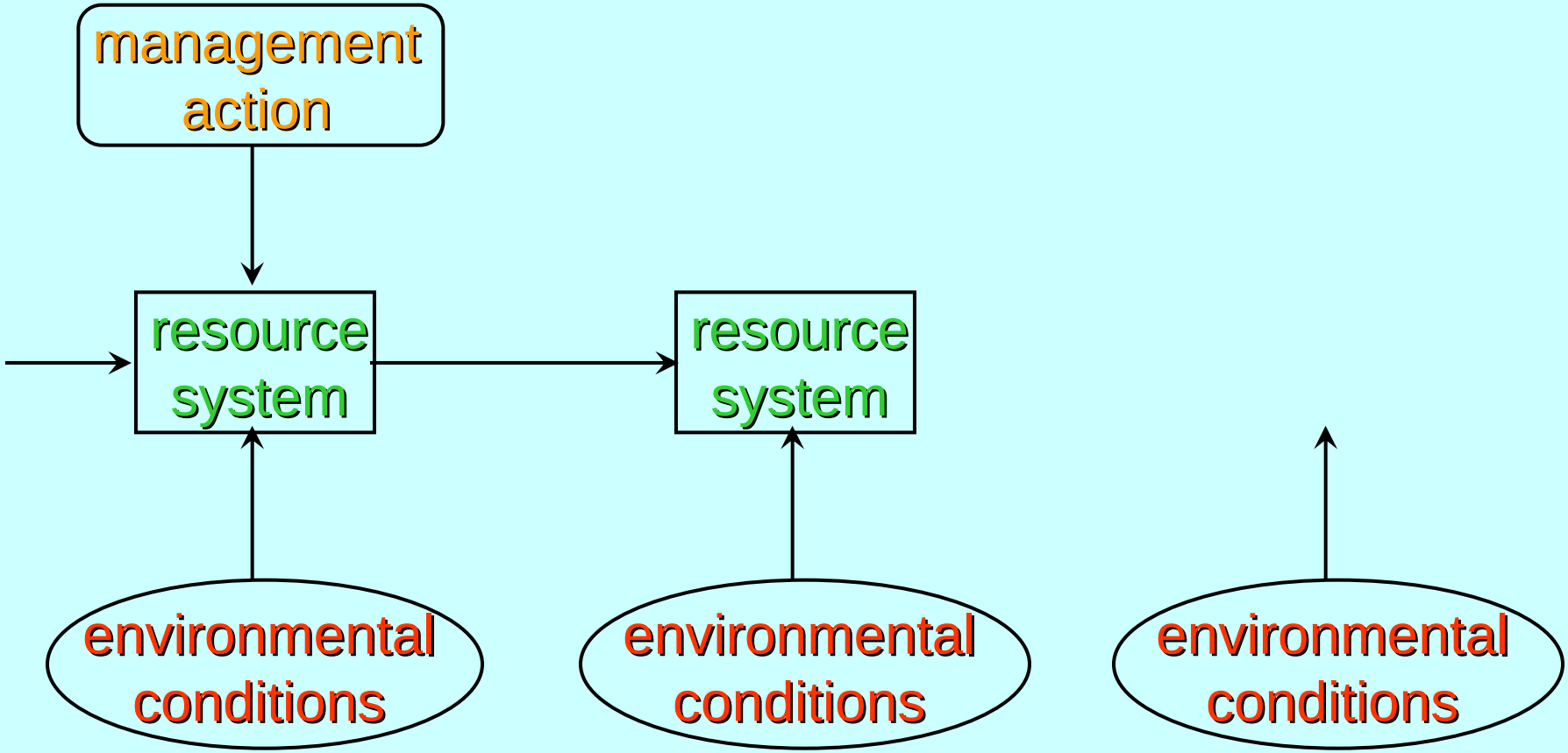
Adaptive Management Framework



Adaptive Management is Dynamic



But Learning may not Keep Pace with Environmental Change



What are the Take-away Messages?

- Nature sets the rules, and Nature can change the rules
- We're helping to change the rules
- Climate change is moving us into a future rife with uncertainties
- This will make everyone's work more difficult -- and more urgent
- Partnerships and collaborations are essential

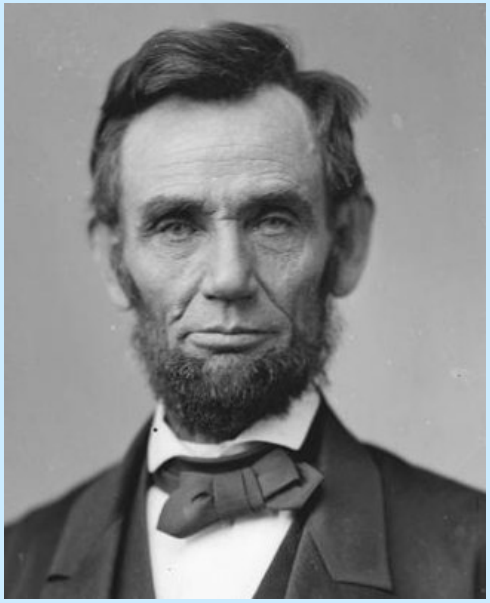
What Needs to be Done?

- Develop next-generation models to project future conditions – these will provide a glimpse of probable futures for which we should plan

- Make *strategic* Adaptive Management commonplace – otherwise, we won't know whether what we are doing is working and we will fall farther and farther behind

And Finally …

“The dogmas of the quiet past, are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise -- with the occasion. As our case is new, so we must think anew, and act anew.”



- Abraham Lincoln, 1862

Thanks!