# Managing Biodiversity
## in a
# Changing Climate


**Wendy Foden**

**Chair: IUCN SSC Climate Change Specialist Group**
**Senior Researcher: University of Stellenbosch**
fodenw@gmail.com

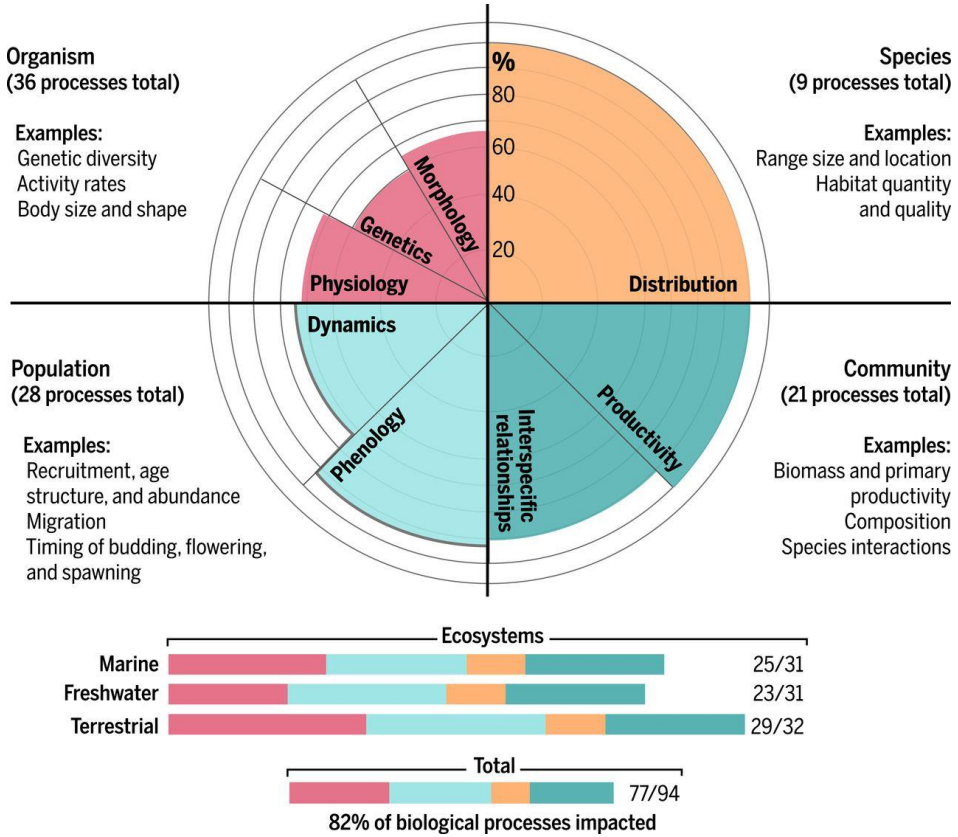

© 2013 Con Foley

# The broad footprint of climate change from genes to biomes to people

SCIENCE sciencemag.org

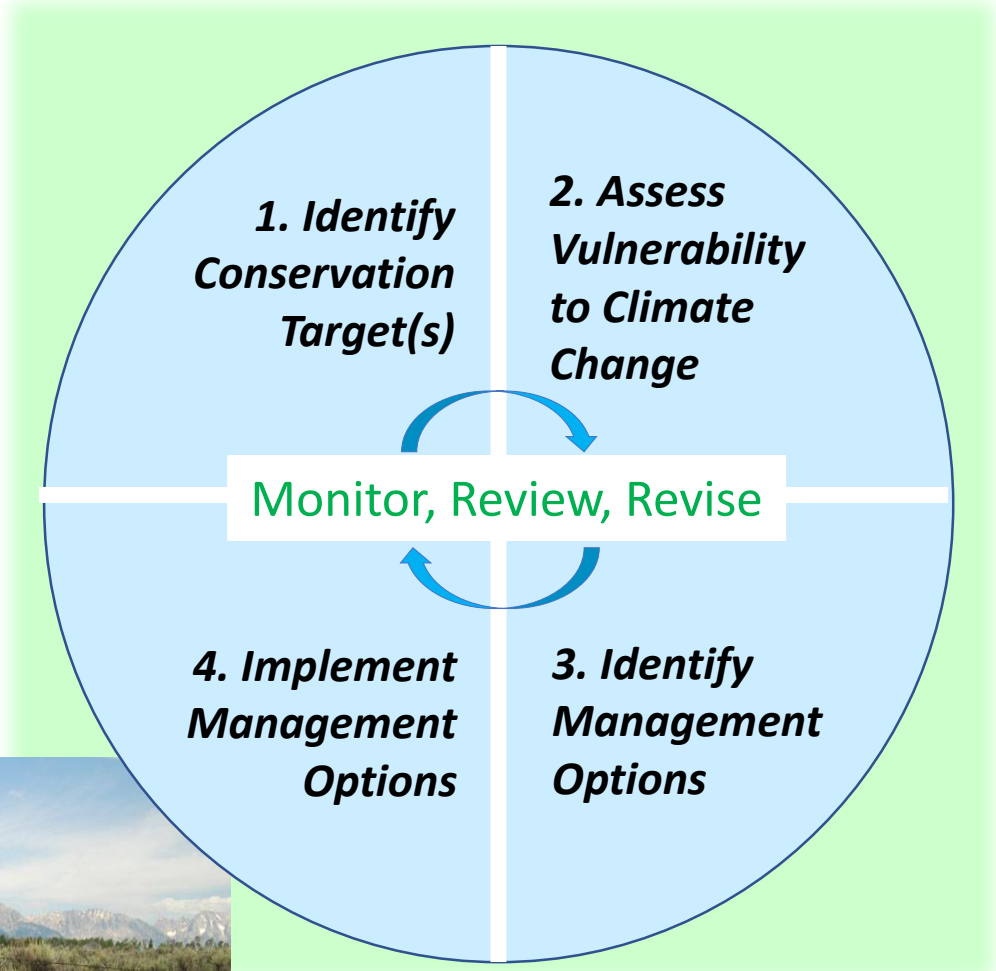
11 NOVEMBER 2016 • VOL 354 ISSUE 6313

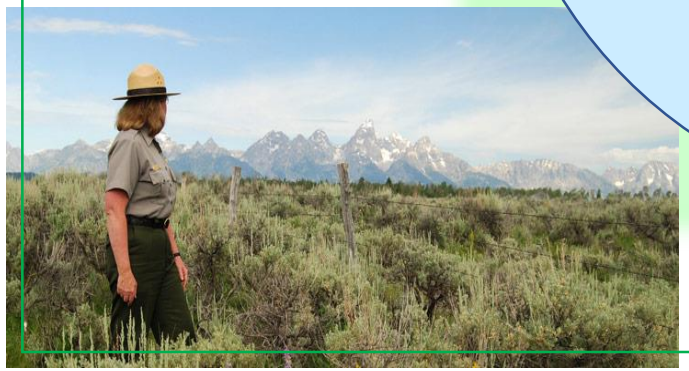
Brett R. Scheffers,* Luc De Meester, Tom C. L. Bridge, Ary A. Hoffmann, John M. Pandolfi, Richard T. Corlett, Stuart H. M. Butchart, Paul Pearce-Kelly, Kit M. Kovacs, David Dudgeon, Michela Pacifici, Carlo Rondinini, Wendy B. Foden, Tara G. Martin, Camilo Mora, David Bickford, James E. M. Watson




82% of biological processes impacted

# Steps for Developing
# Climate Change Adaptation Strategies

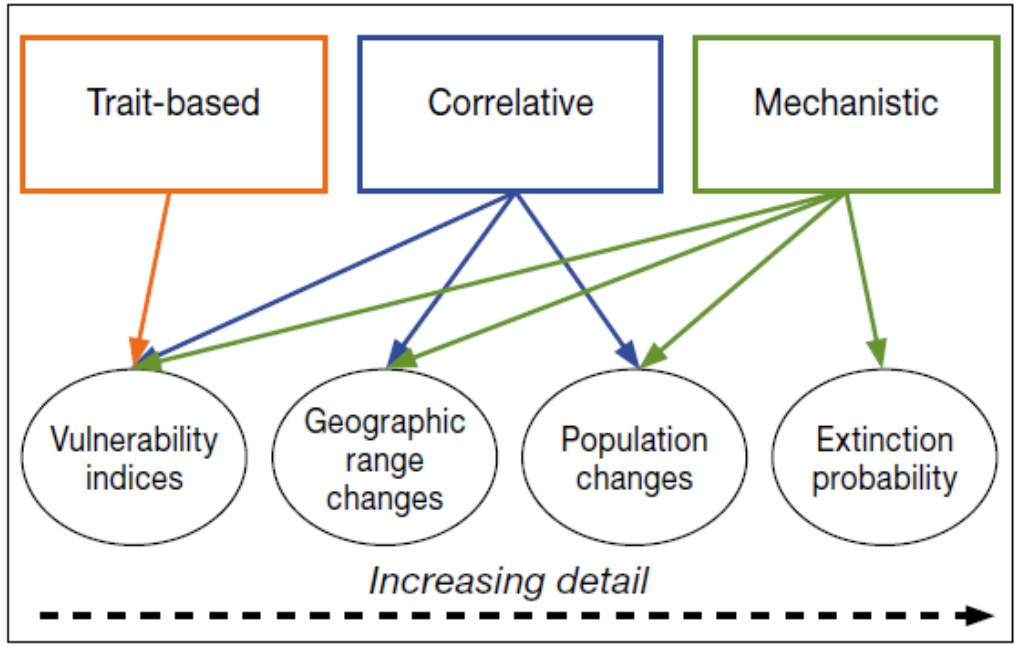


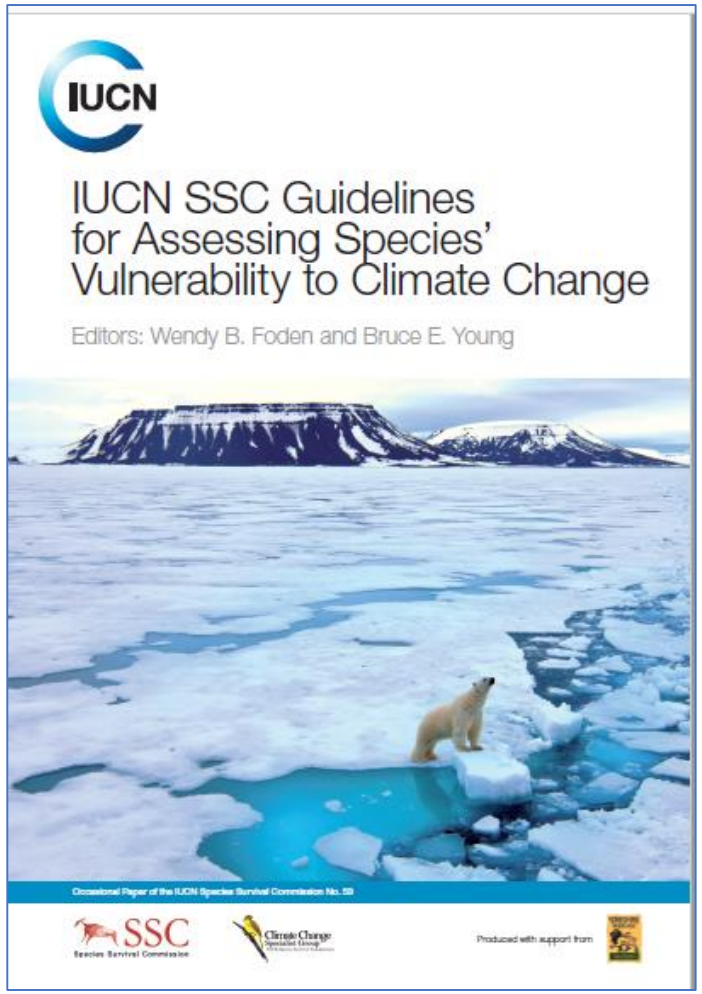



Adapted from Glick, Stein & Edelson, 2011

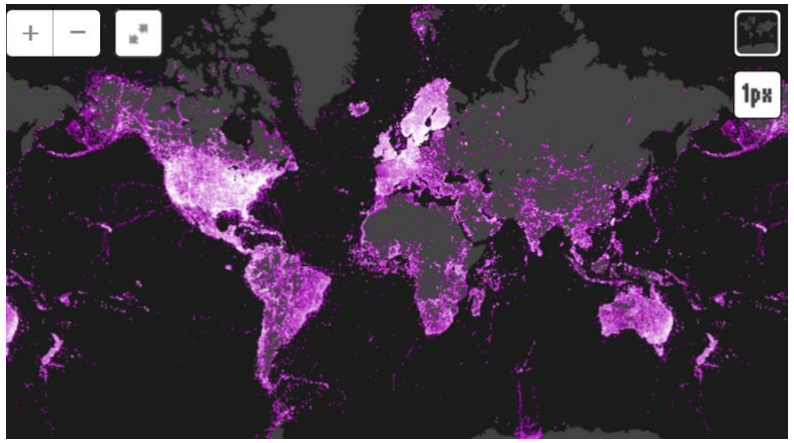
# Assessing Climate Change Vulnerability of Species

Commonly used approaches

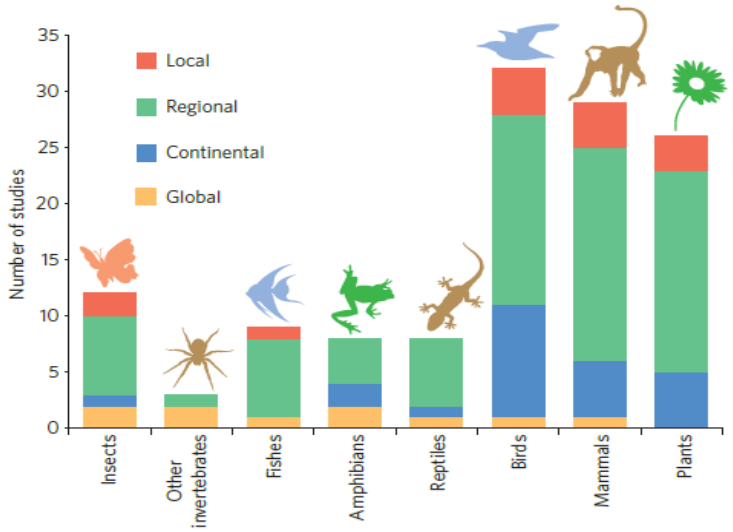


# Global Coverage of Climate Change Vulnerability Assessment of Species

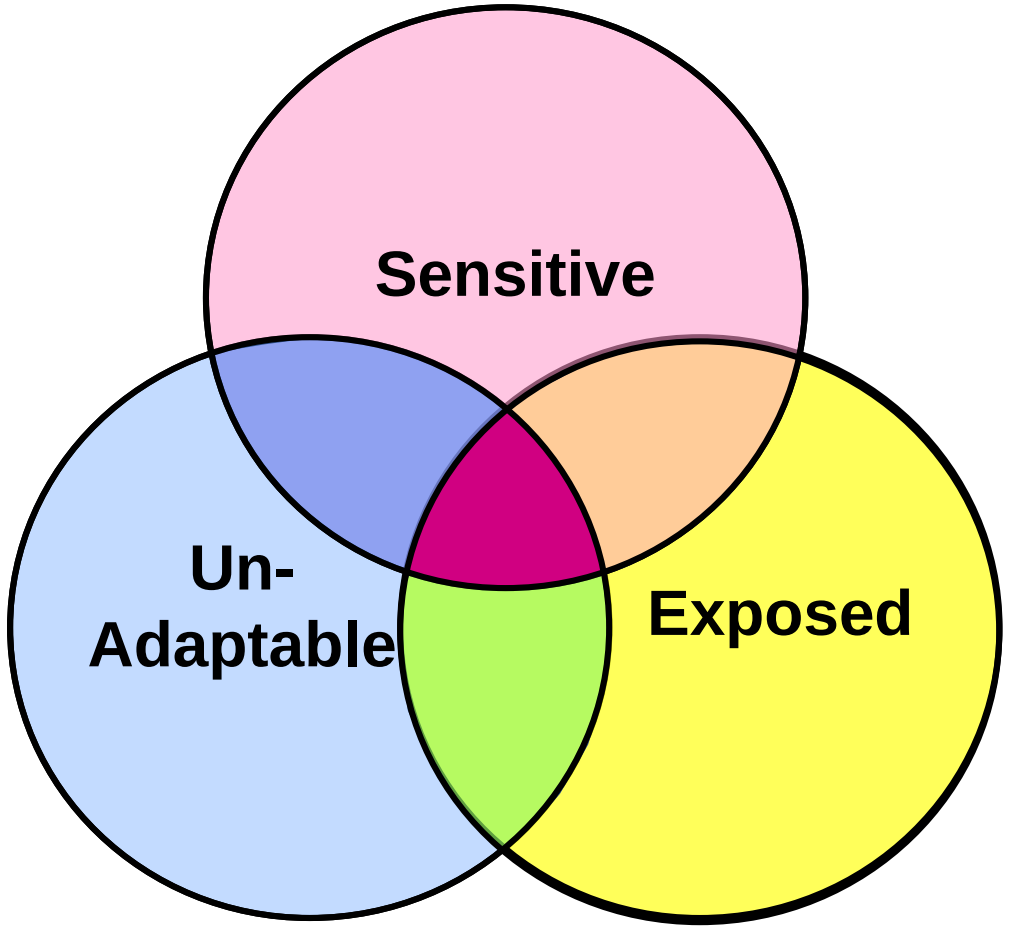



Concentrations of GBIF species distribution records: 2010-2015




Number of climate change vulnerability assessment studies (Pacifici et al. Nature Climate Change, 2014)

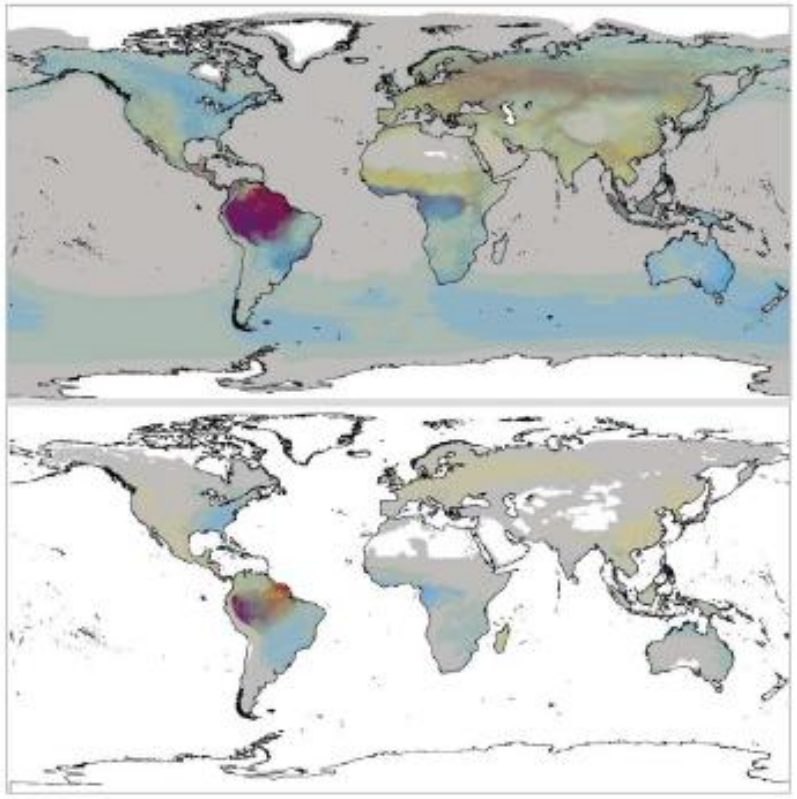
# Which species are most vulnerable to climate change?



# IUCN's Trait-based Assessment of Climate Change Vulnerability

Birds

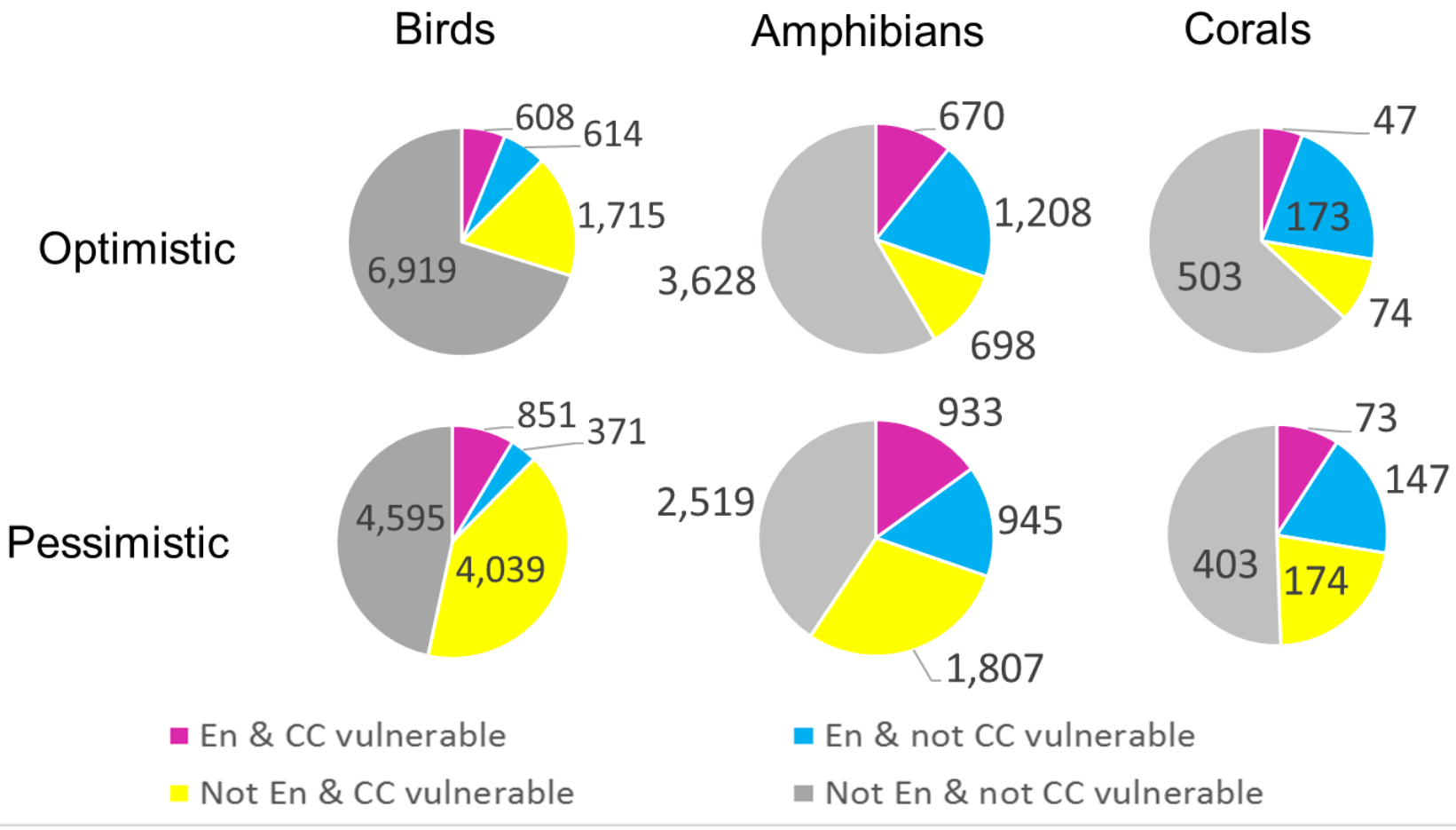
Amphibians



Foden et al, PLOS ONE, 2013

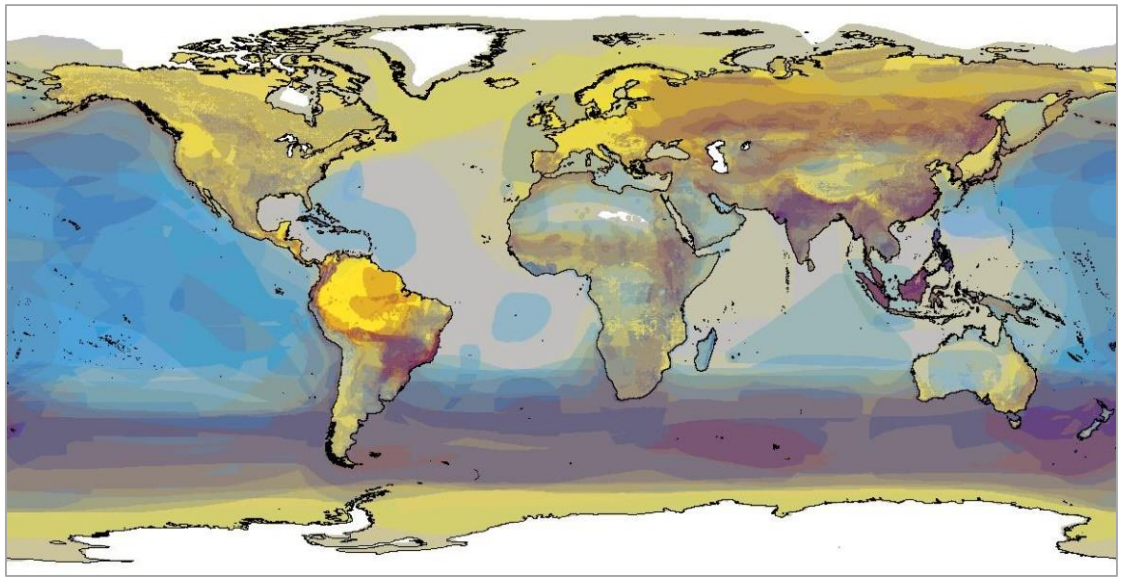
Corals (warm-water reef-building)

# Are the threatened species also the climate change vulnerable ones, or are they different?

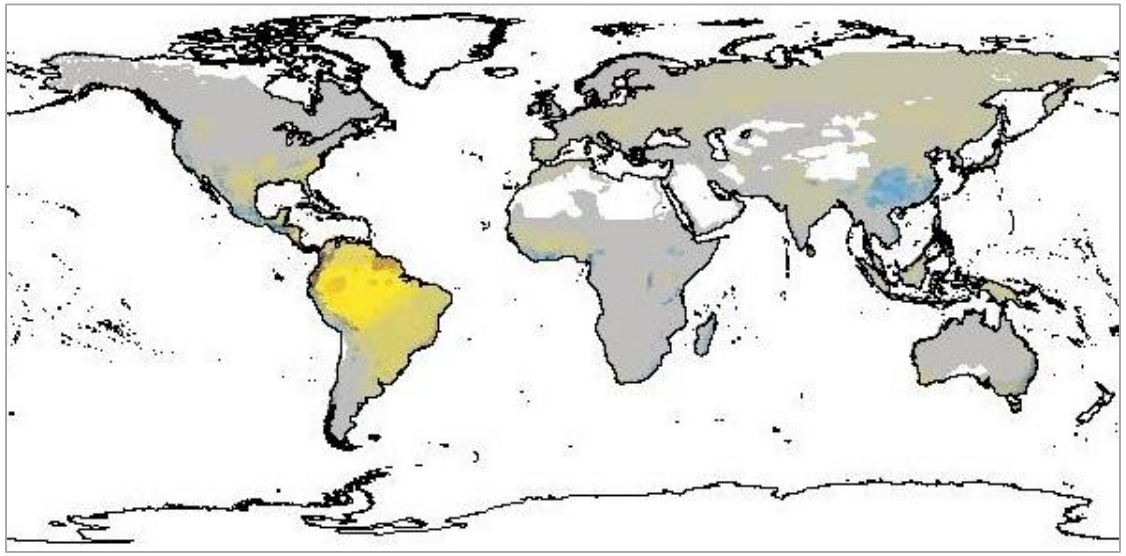


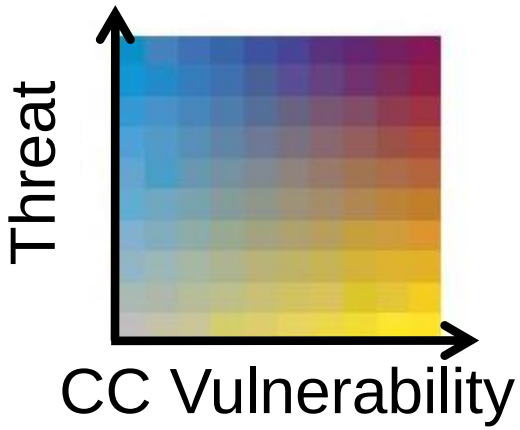
# Climate Change Vulnerability
## vs. Other Threats (IUCN Red List Status)

a.



b.






**Total numbers** of species of:

a. birds
b. amphibians

# Climate Change IMPACTS on biodiversity

1) **Climate change is already here.**

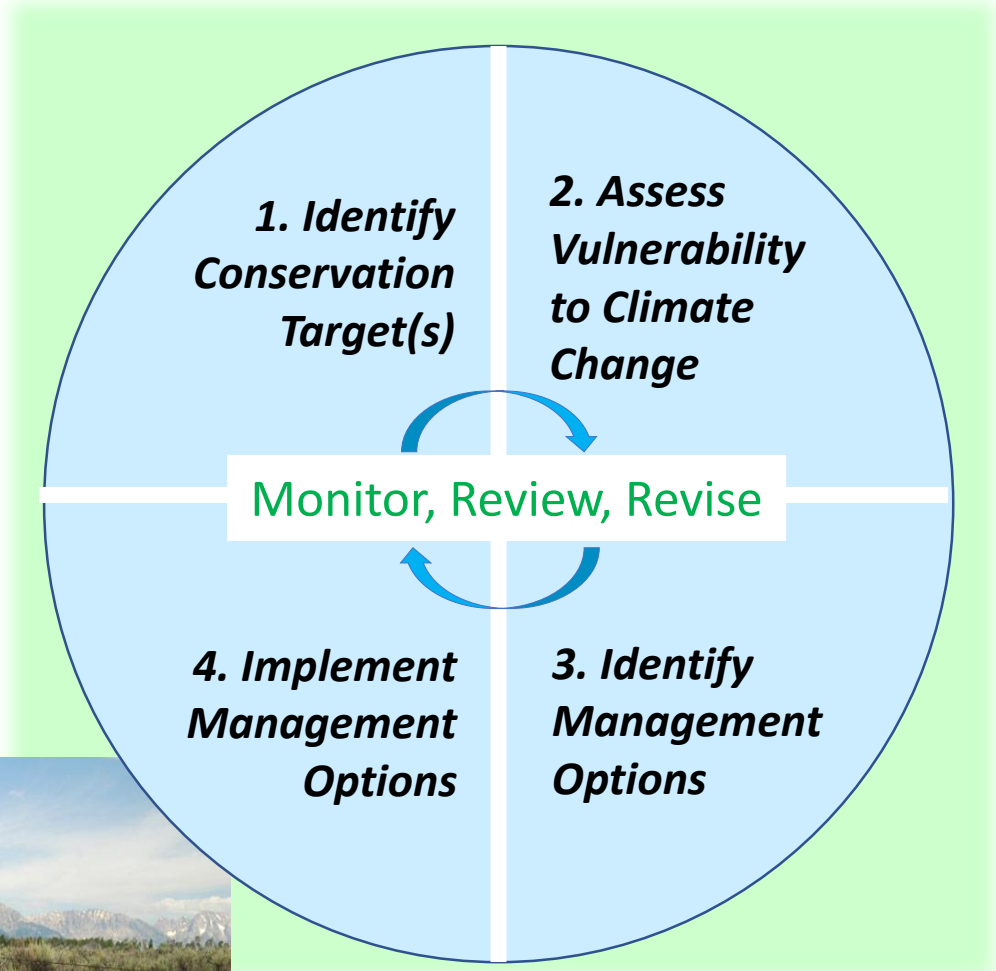
2) Climate change operates through **a wide range of mechanisms,** and **interacts with other threats** (e.g. disease, habitat loss, overharvesting). **Expect the unexpected.**

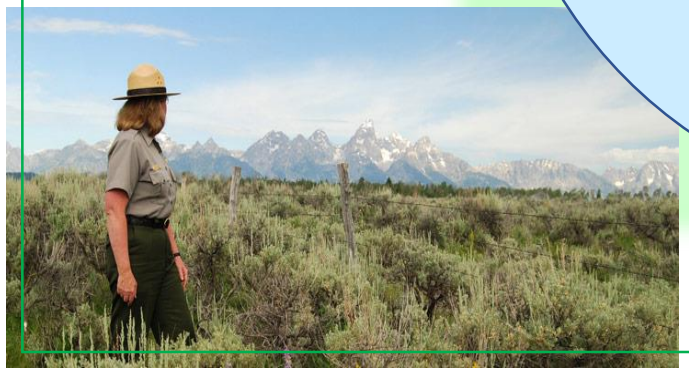
**3) Species and ecosystems are responding in diverse ways.** Some responses are **adaptive** (e.g. range shifts, timing changes), but **others are not.**

4) Most **assessments of species extinction risk and protection currently fail to consider climate change**

5) **Human responses to climate change** (e.g. changing land use, migration, hard infrastructure) **may be amongst the biggest threats** to biodiversity

# Steps for Developing
# Climate Change Adaptation Strategies

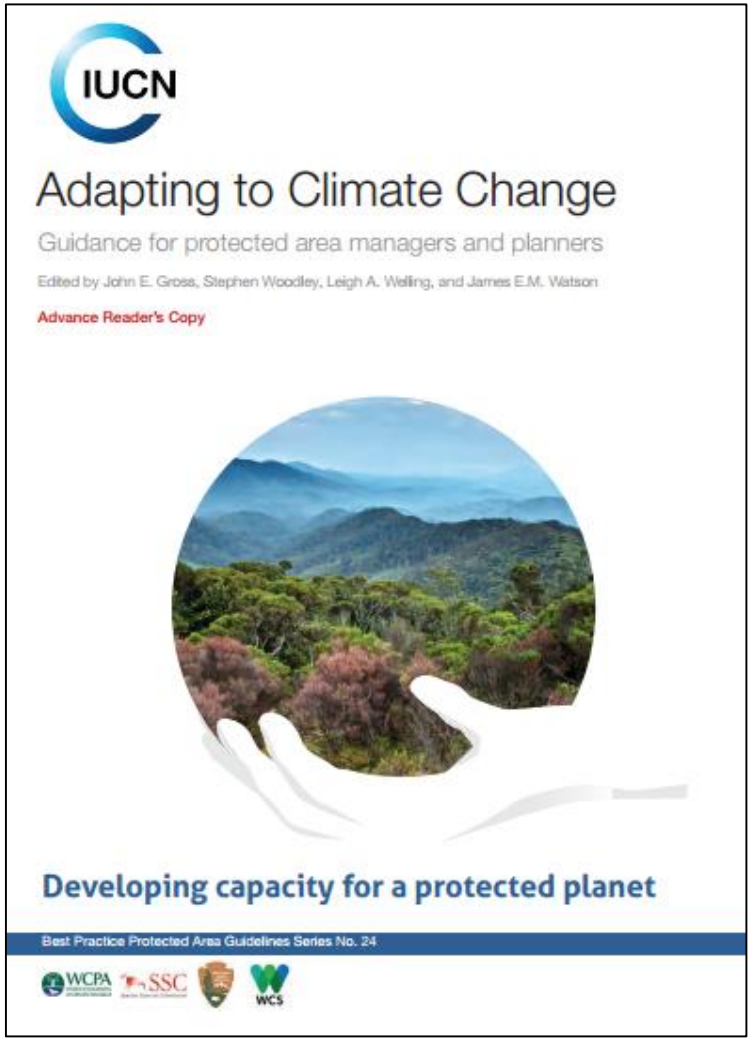


Adapted from Glick, Stein & Edelson, 2011

# Examples of
# Adaptation Action Types

- **Reduce stressors** that amplify climate impacts (e.g. nutrient runoff, invasives)
- Preserve and **enhance connectivity**
- Sustain or **restore ecosystem processes** (e.g. restore forest)
- Identify and **protect climate refugia**
- Protect areas that **provide future habitat** for displaced species



# Principles for Managing Biodiversity in a Changing Climate

1. Manage for change, not just persistence
2. Reconsider goals, not just strategies
3. Consider the broader landscape context
4. Integrate adaptation into existing work
5. Safeguard people and nature
6. Monitor to track impacts & effectiveness of actions
7. Promote rapid evidence-led learning