

# NatureServe's Climate Change Vulnerability Index: One Year On

Bruce Young, Elizabeth Byers, Kelly Gravuer, Kim Hall,  
Geoff Hammerson, Kristin Szabo

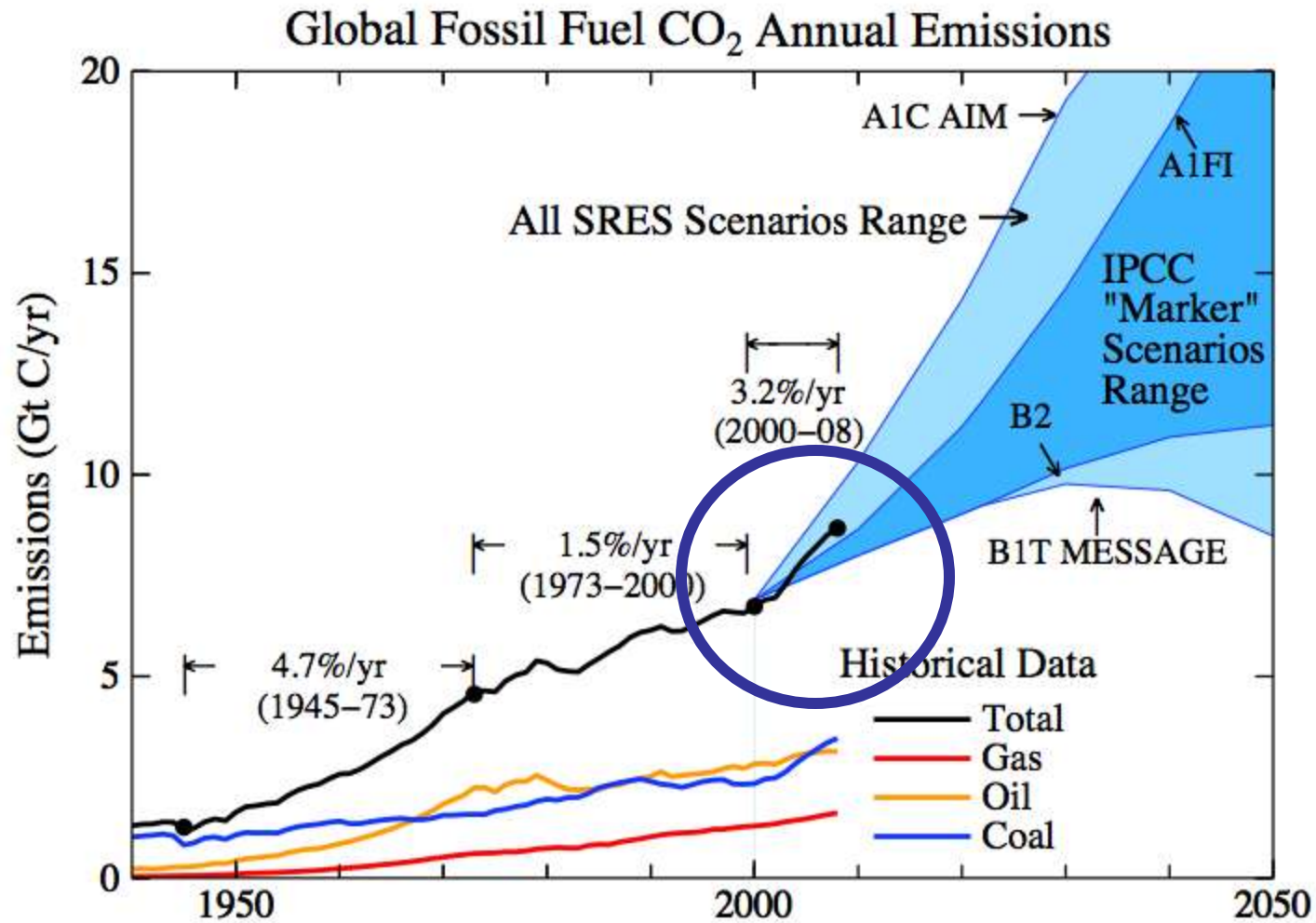


NatureServe

What's new?

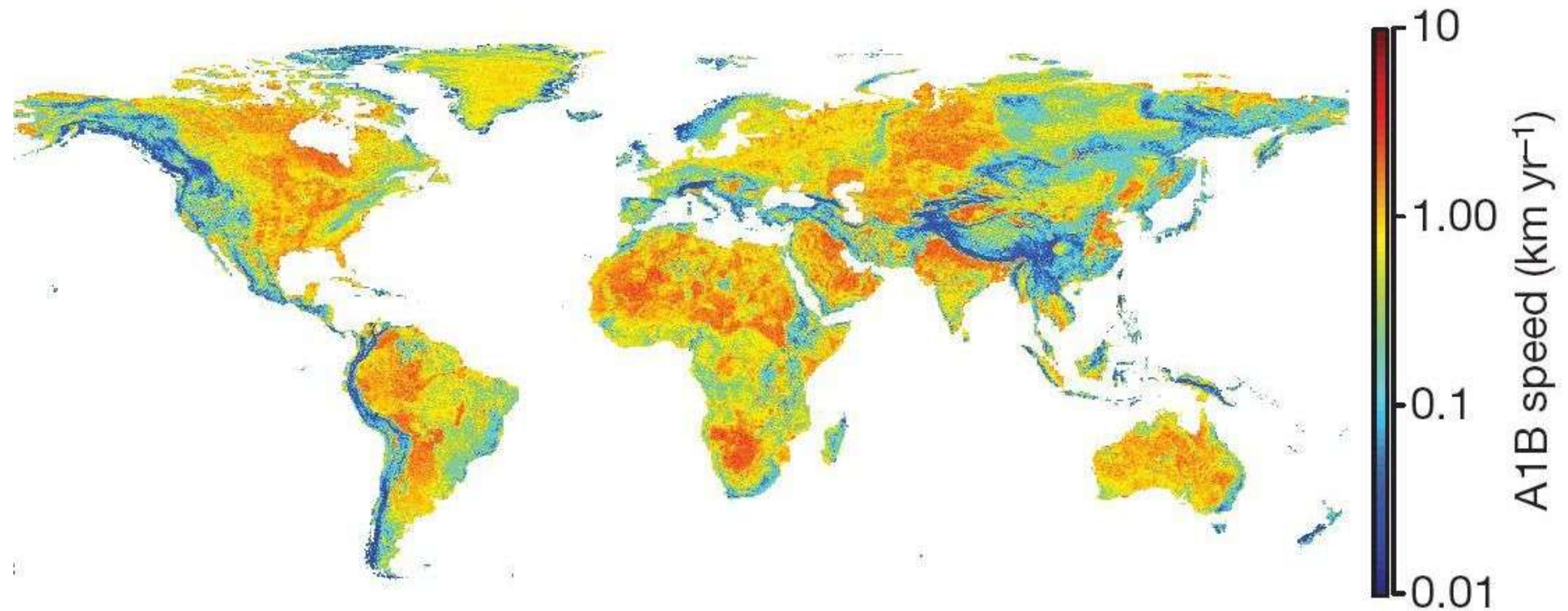


Most animal photos by Geoff Hammerson



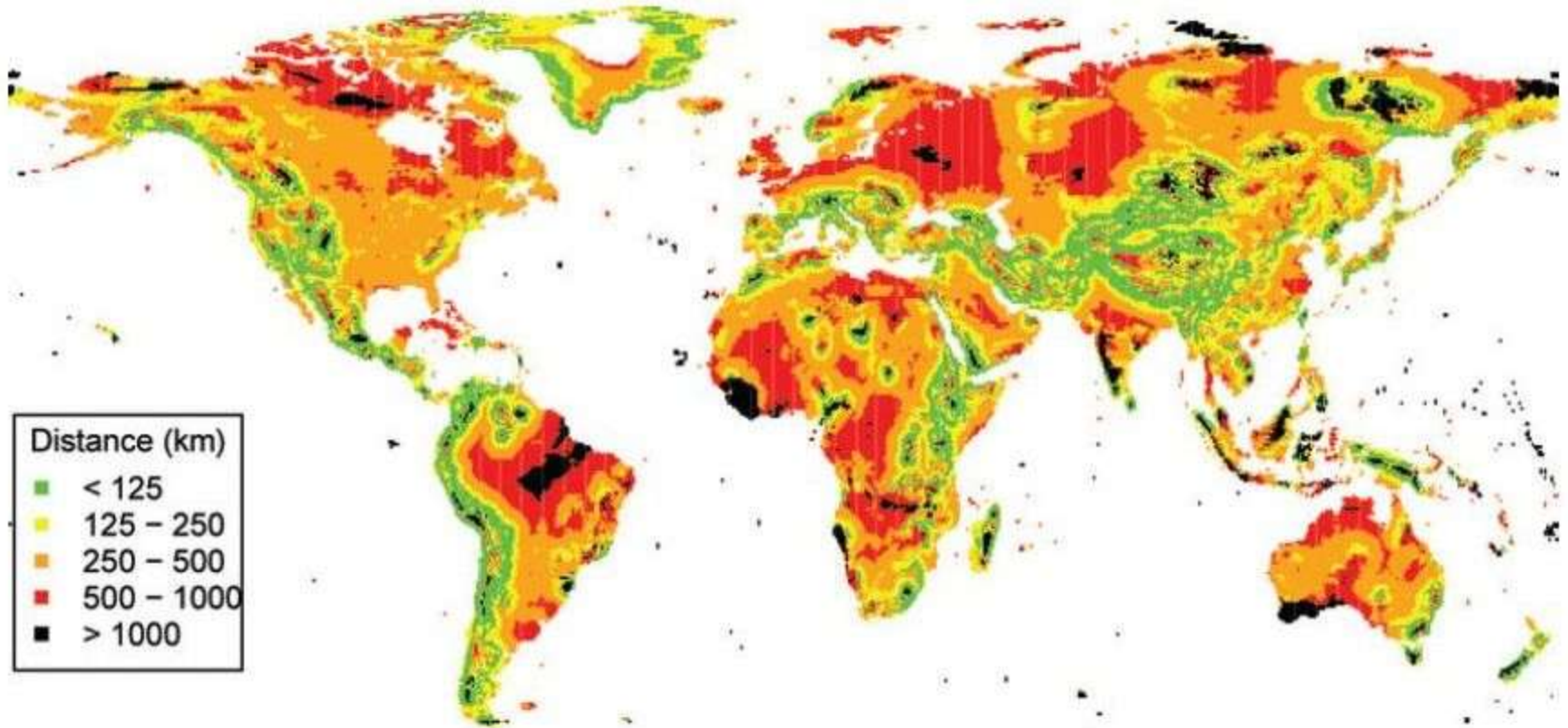
Source: Sato & Hanson, Columbia University

# “Velocity” of Climate Change



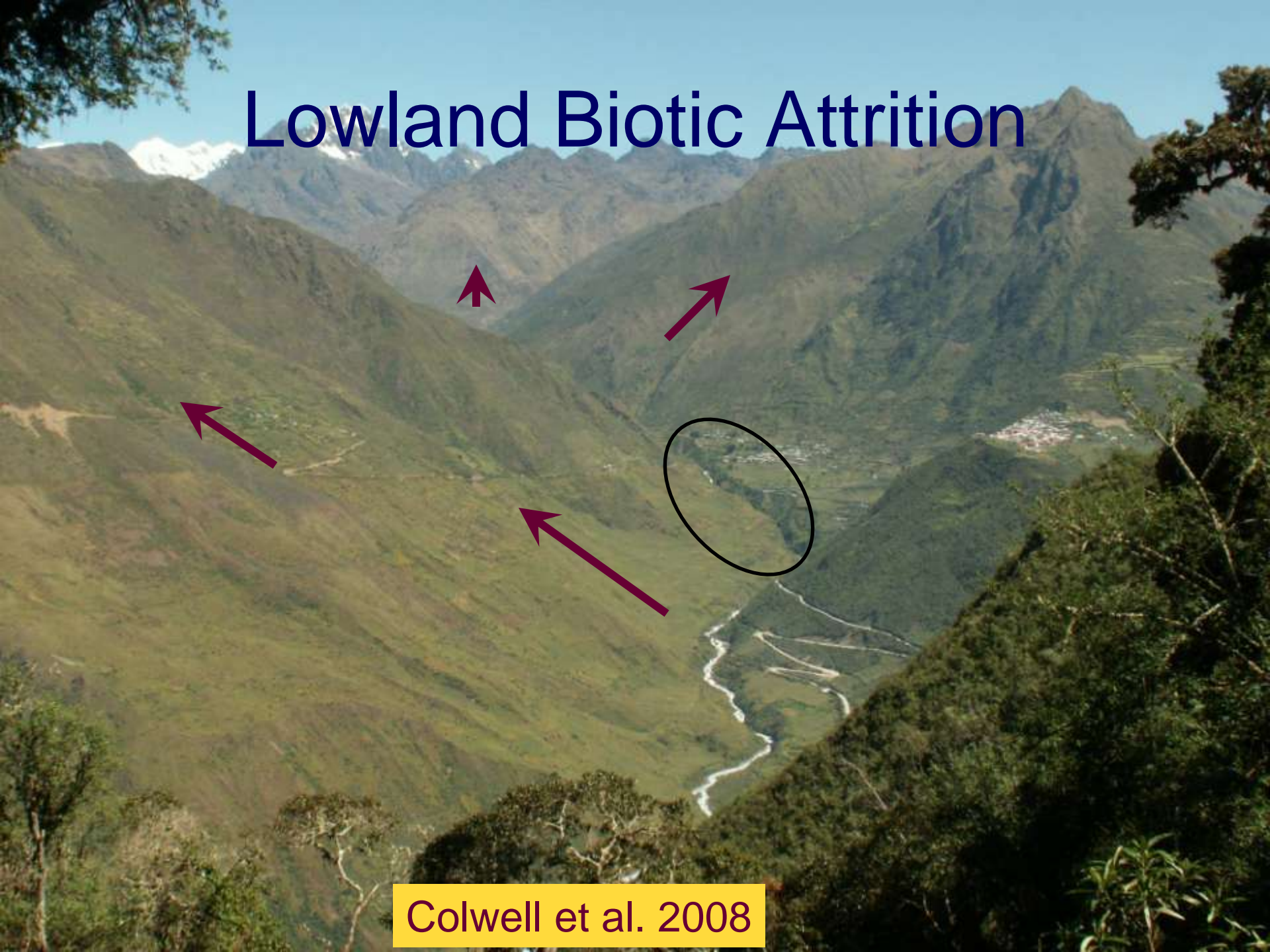
Loarie et al. 2009

# Distance to Cool Refuges



Wright et al. 2009

# Lowland Biotic Attrition



Colwell et al. 2008

# Vulnerability of Andean Ecosystems

- Páramo
- Cloud Forest
- Aquatic Habitats
- Seasonal Andean Forest
- Humid Puna
- Dry Puna
- Dry Andean Forest

Highly Sensitive

Sensitive

Washington, D.C. February 2010





*1980 Summer Minimum*

**Satellite observations show the Arctic has been losing sea-ice for the past 30 years.**



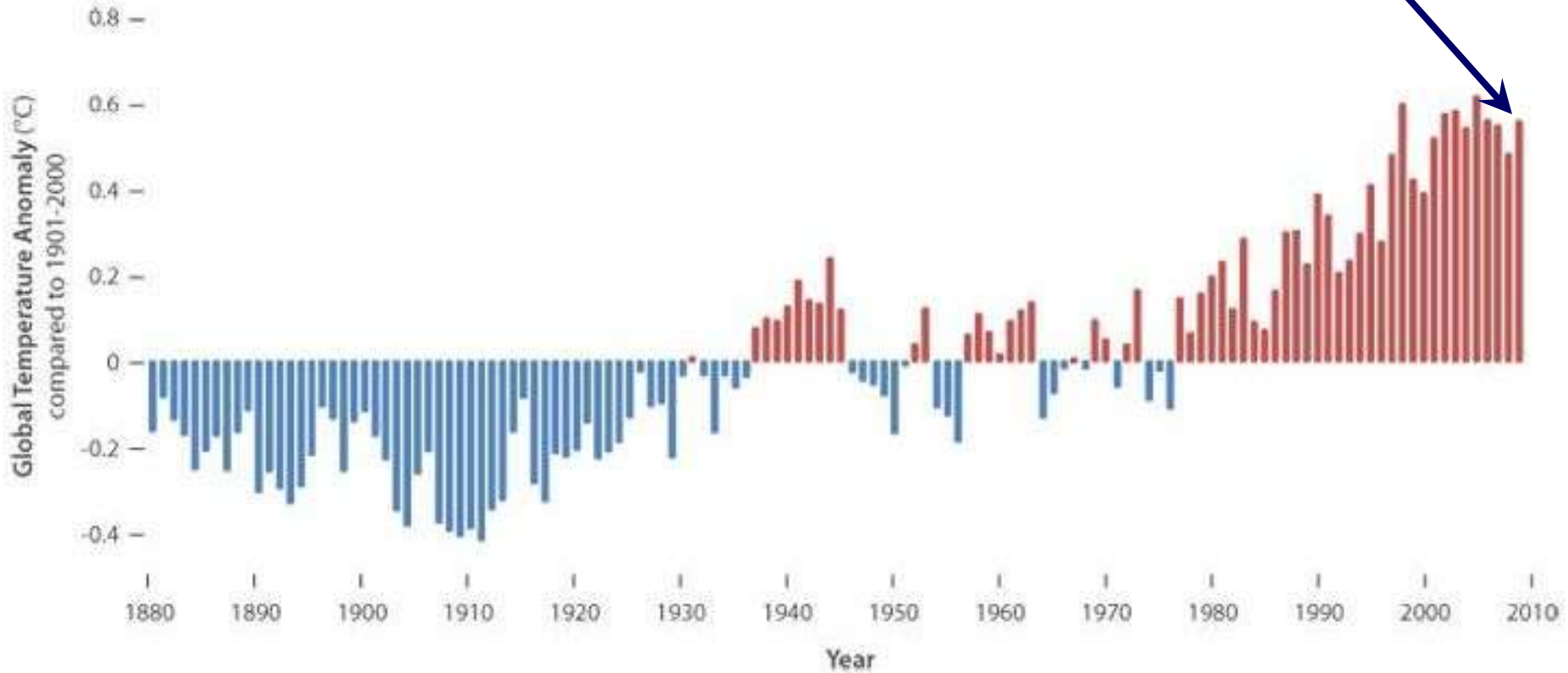
*2007 Summer Minimum*



*2008 Summer Minimum*



2009: 2nd hottest year on record (tie)  
*(Feb 2010: 6<sup>th</sup> hottest on record)*



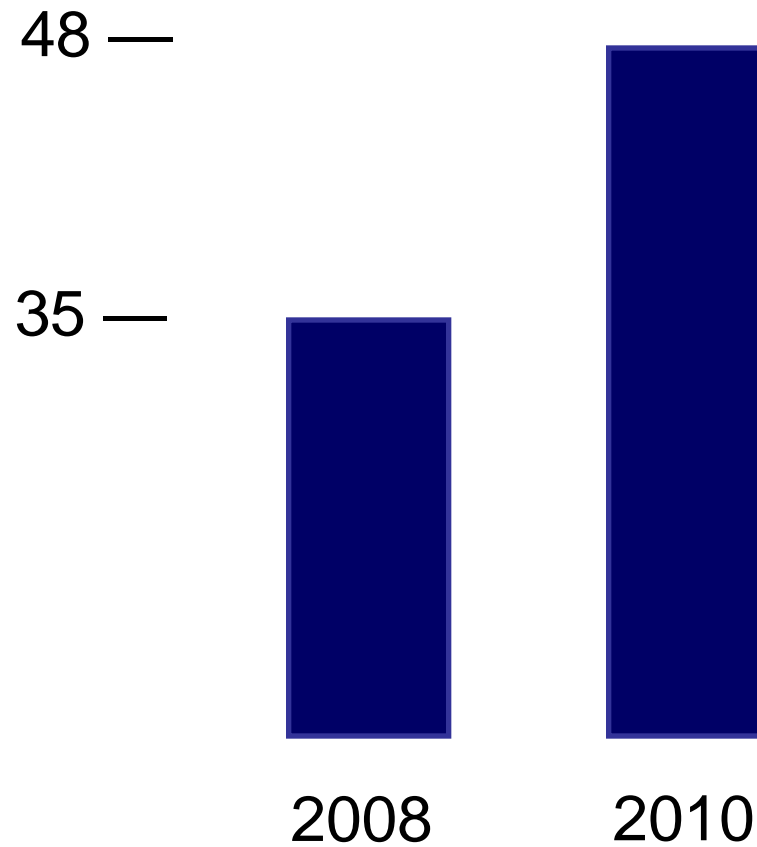
Sources: NASA, NOAA

# Politics

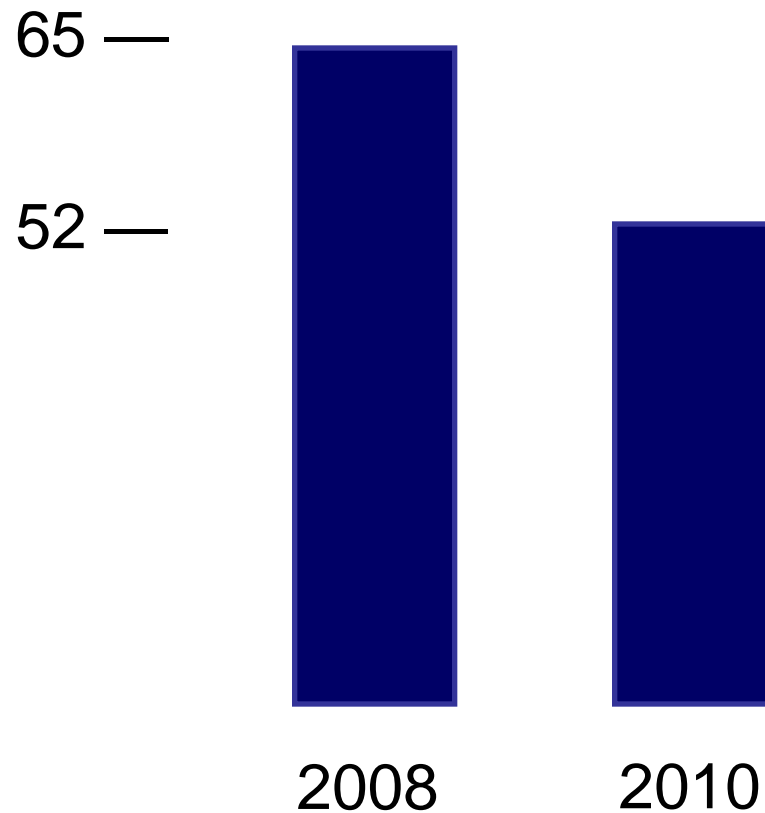
- “Climategate”
- IPCC Himalayan glacier error
- Copenhagen collapse



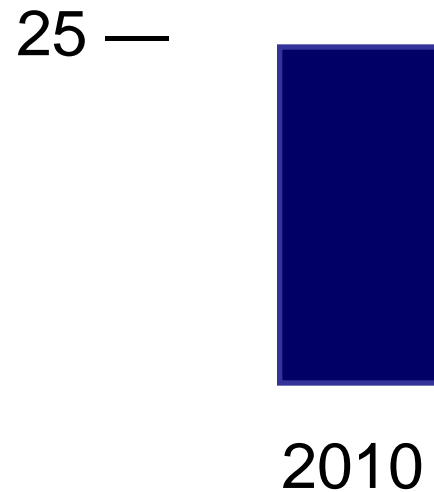
# Public Opinion: % believe Global Warming is “Greatly exaggerated”



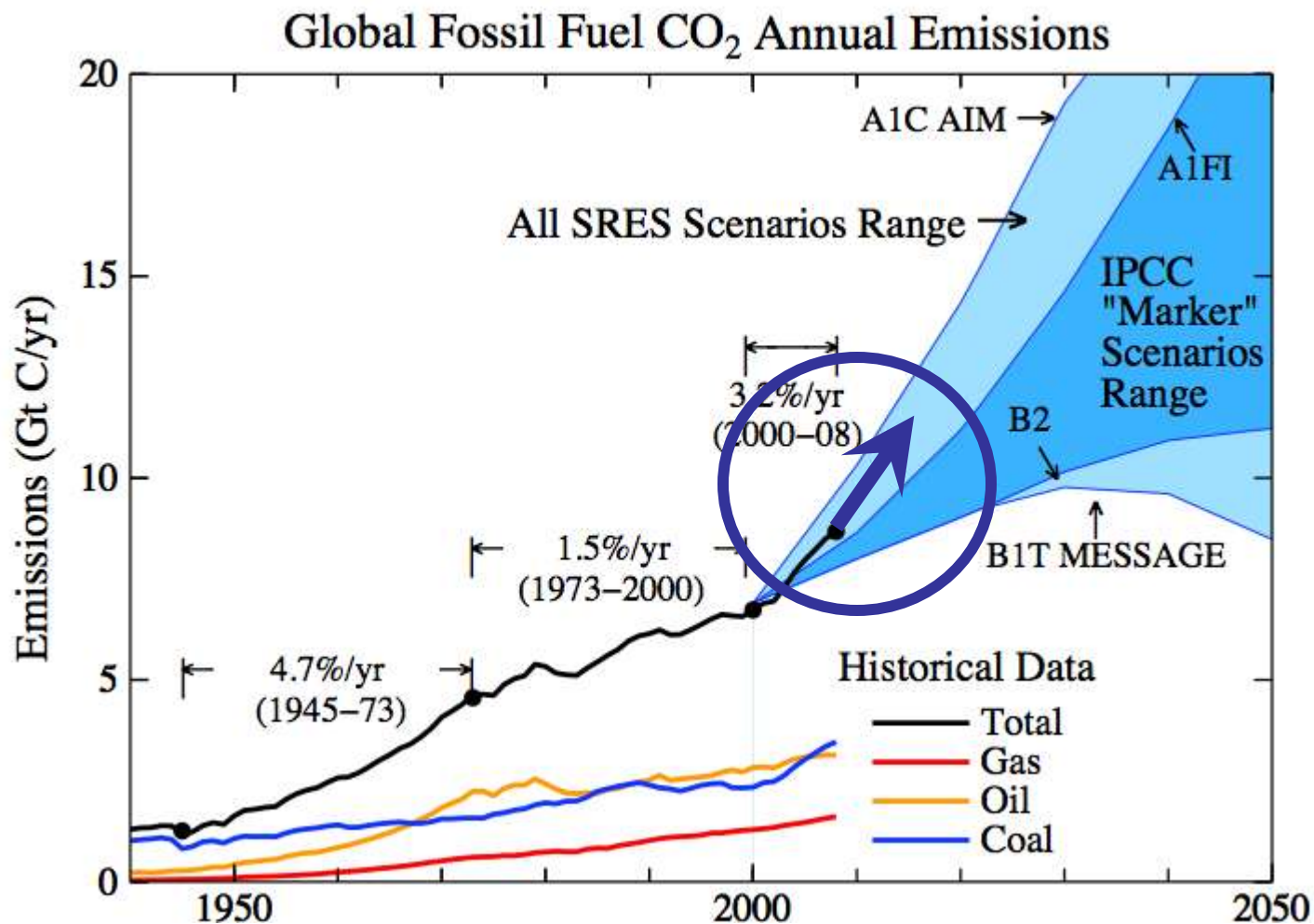
# % agree “Most scientists believe that global warming is occurring”



# % of Weather Forecasters that Believe “Global warming is a scam”



# The Result:


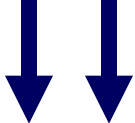






# Climate Change Vulnerability Index

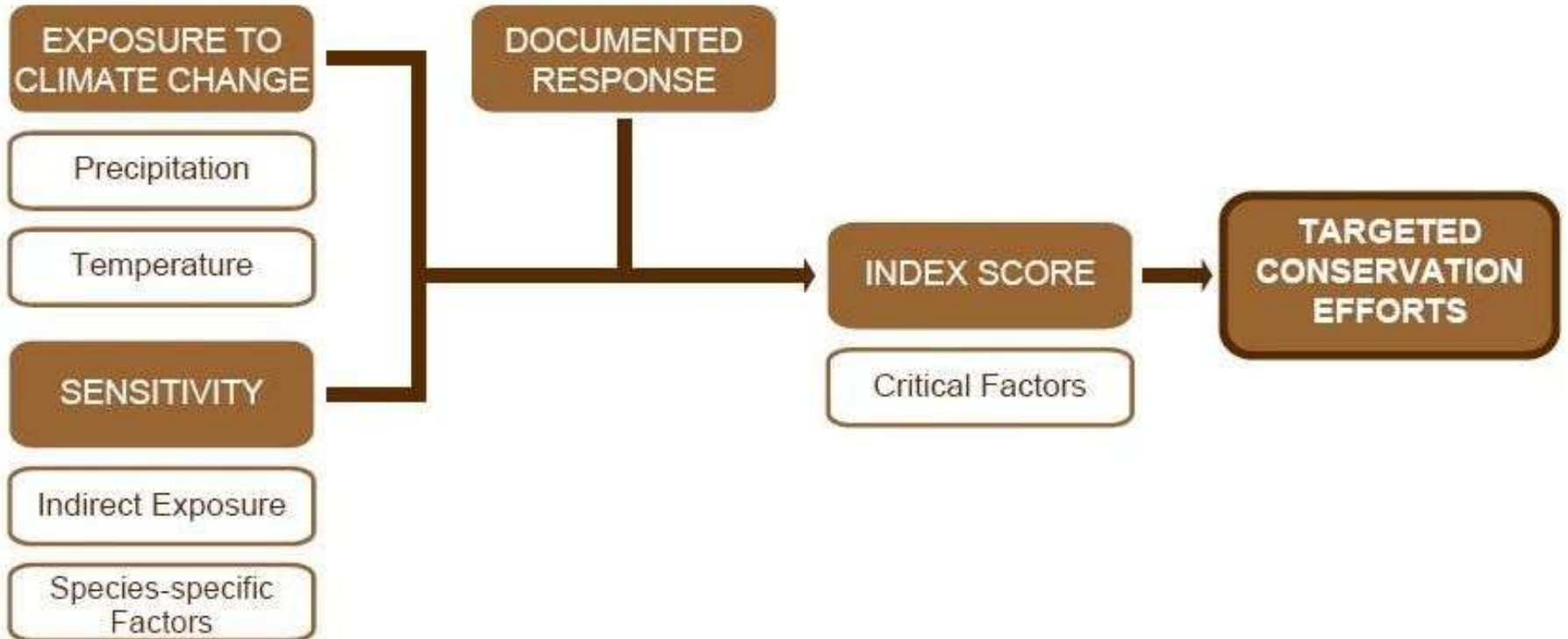


- Excel workbook
- Requires distribution & natural history info
- Rapid
- Predicts whether a species will decline, remain stable, or increase
- Identifies factors causing vulnerability
- Complementary to NatureServe Conservation Status Ranks

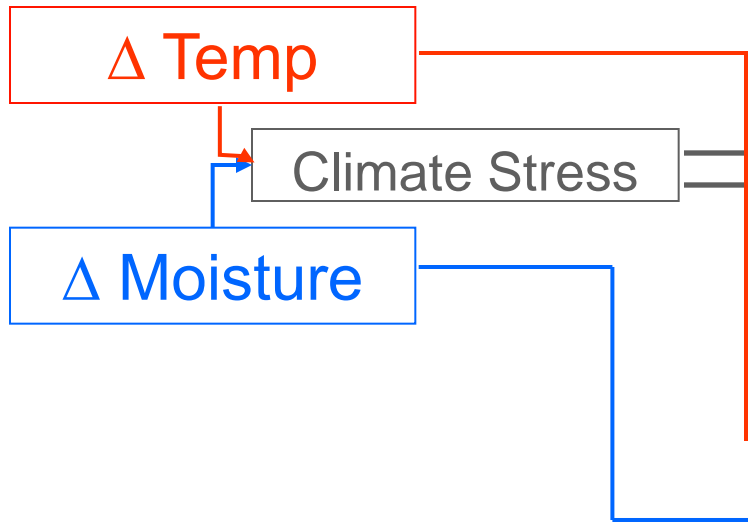
# Index Scores

	Extremely Vulnerable
	Highly Vulnerable
	Moderately Vulnerable
	Not Vulnerable/Presumed Stable
	Not Vulnerable/Increase Likely
	Insufficient Evidence

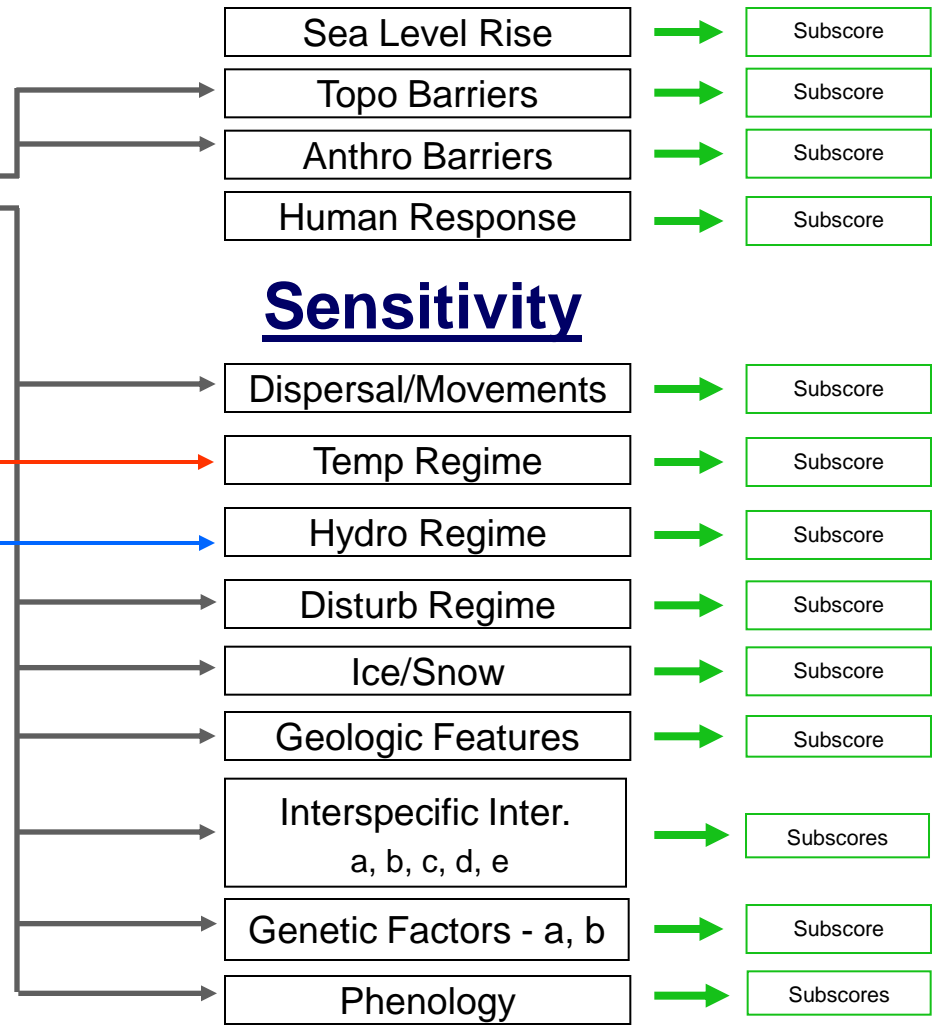
# NatureServe Climate Change Vulnerability Index



# Direct Climate Exposure



# Indirect Climate Exposure



**$\Sigma$  = Overall Score**

# Release 2.0

K65

**The NatureServe Climate Change Vulnerability Index**  
**Release 2.0** 20 April 2010; Bruce Young, Elizabeth Byers, Kelly Gravuer, Kim Hall, Geoff Hammerson, Alan Redder  
 With input from: Jay Cordeiro, Kristin Szabo  
 Funding for Release 2.0 generously provided by the Duke Energy Corporation.



\* = Required field

Geographic Area Assessed:  \*

Assessor:

Species Scientific Name:  \* English Name:

Major Taxonomic Group:  \* G-Rank:

Relation of Species' Range to Assessment Area:  \* S-Rank:

Check if species is an obligate of caves or groundwater aquatic systems:  (Must be marked with an "X" for accurate scoring of these species.)

Assessment Notes (to document special methods and data sources)

Clear Form

**Section A: Exposure to Local Climate Change** (Calculate for species' range within assessment area)

**Temperature \***

Severity	Scope (percent of range)
>5.5° F (3.1° C) warmer	<input type="text"/>
5.1-5.5° F (2.8-3.1° C) warmer	<input type="text"/>
4.5-5.0° F (2.5-2.7° C) warmer	<input type="text"/>
3.9-4.4° F (2.2-2.4° C) warmer	<input type="text"/>
< 3.9° F (2.2° C) warmer	<input type="text"/>
Total:	0 (Must sum to 100)

**Hamon AET:PET Moisture Metric \***

Severity	Scope (percent of range)
< -0.119	<input type="text"/>
-0.097 - -0.119	<input type="text"/>
-0.074 - -0.096	<input type="text"/>
-0.051 - -0.073	<input type="text"/>
-0.028 - -0.050	<input type="text"/>
> -0.028	<input type="text"/>
Total:	0 (Must sum to 100)

**Section B: Indirect Exposure to Climate Change** (Evaluate for specific geographical area under consideration)

Mark an "X" in all boxes that apply.

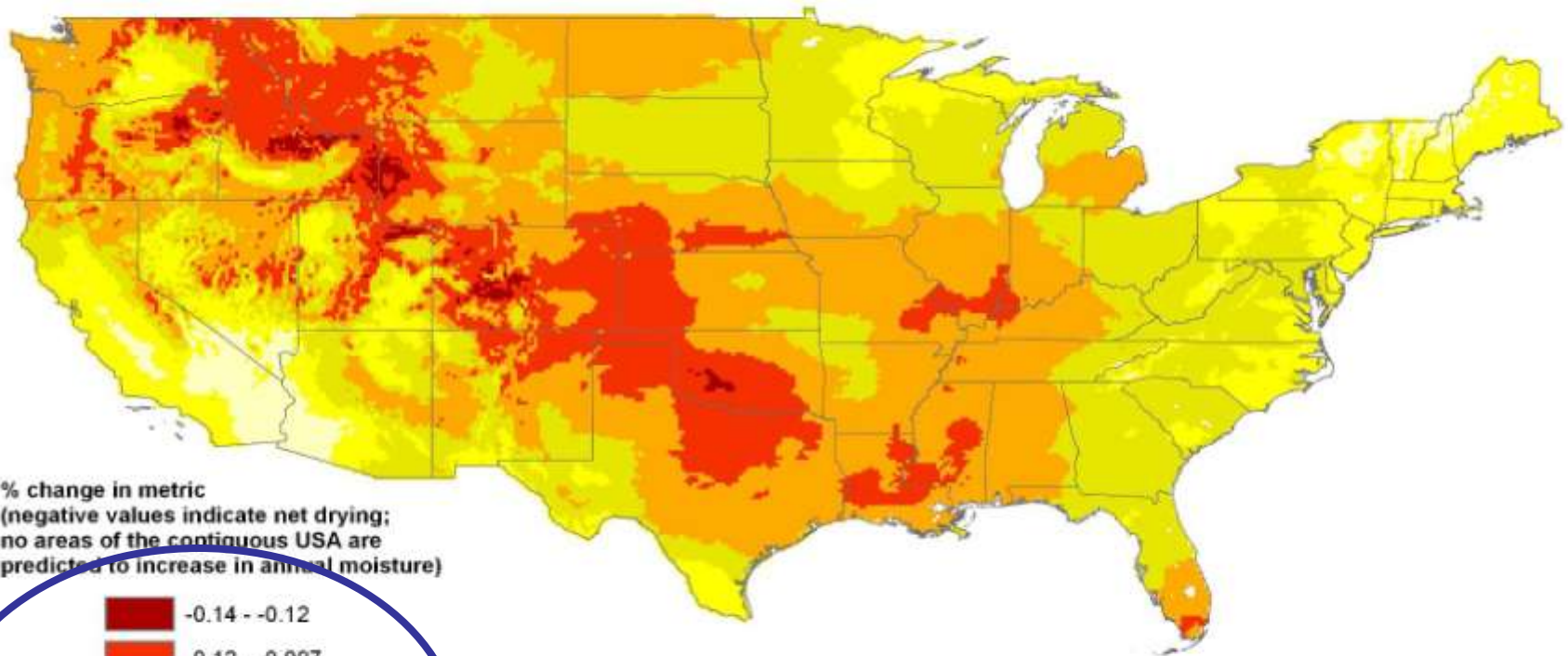
Effect on Vulnerability						
Greatly increase	Increase	Somewhat increase	Neutral	Somewhat decrease	Decrease	Unknown
						X

**Factors that influence vulnerability** (\* at least three required)

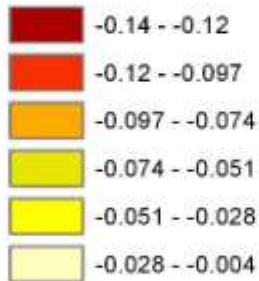
1) Exposure to sea level rise

# Predicted Annual Change in Hamon AET:PET Moisture Metric, 2040-2069

Medium emissions A1B, 16-model ensemble average  
based on ClimateWizard.org analysis



% change in metric  
(negative values indicate net drying;  
no areas of the contiguous USA are  
predicted to increase in annual moisture)



This map is designed for use with NatureServe's  
Climate Change Vulnerability Index factors A and C2bii.  
Map created on 14 April, 2010.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
88								X		4) Occurrence of protected areas in modeled future (2050) distribution									
89																			

**Climate Change Vulnerability Index**  
for *Ovis canadensis* in Nevada

Copy Data to Results Table

Highly Vulnerable

Confidence in Species Information  
Moderate

\* Histogram below

Notes:

**Definitions of Index Values**

Extremely Vulnerable (EV): Abundance and/or range extent within geographical area assessed extremely likely to substantially decrease or disappear by 2050.

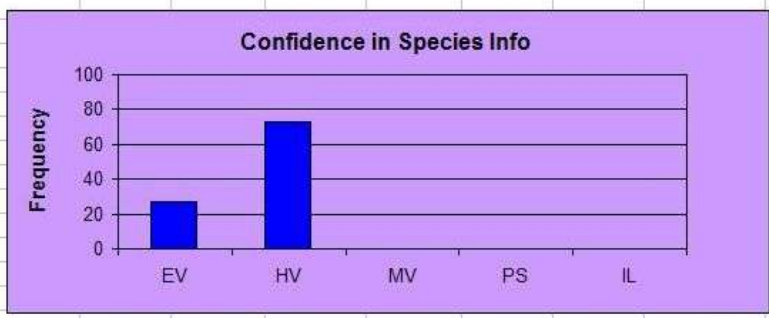
Highly Vulnerable (HV): Abundance and/or range extent within geographical area assessed likely to decrease significantly by 2050.

Moderately Vulnerable (MV): Abundance and/or range extent within geographical area assessed likely to decrease by 2050.

Not Vulnerable/Presumed Stable (PS): Available evidence does not suggest that abundance and/or range extent within the geographical area assessed will change (increase/decrease) substantially by 2050. Actual range boundaries may change.

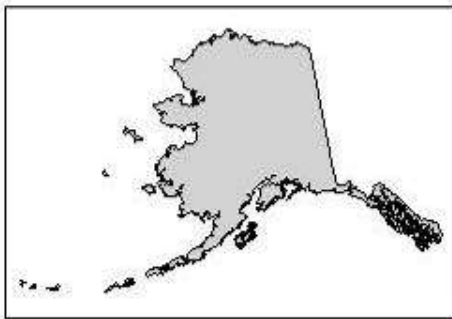
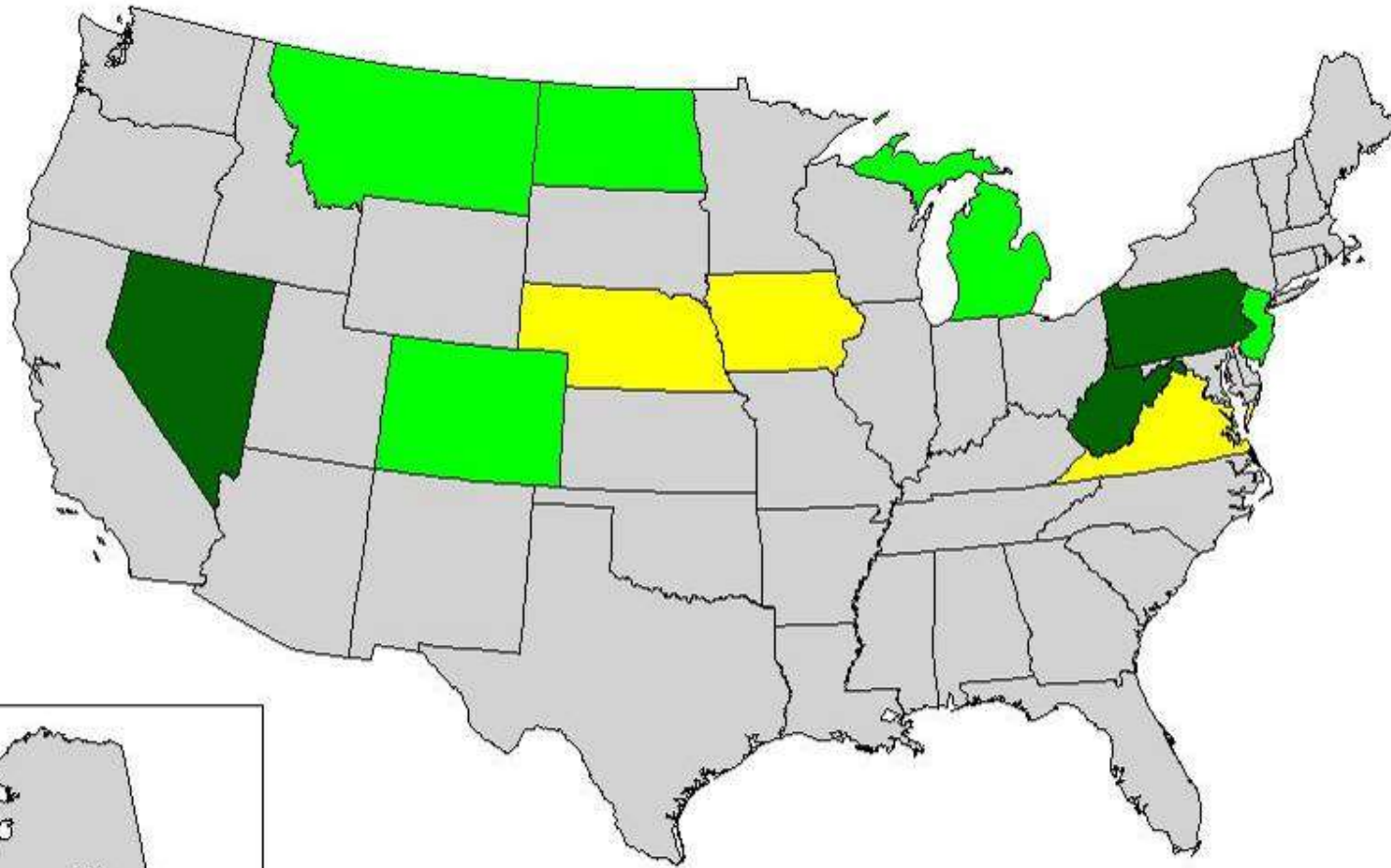
Not Vulnerable/Increase Likely (IL): Available evidence suggests that abundance and/or range extent within geographical area assessed is likely to increase by 2050.

Insufficient Evidence (IE): Available information about a species' vulnerability is inadequate to calculate an Index score.



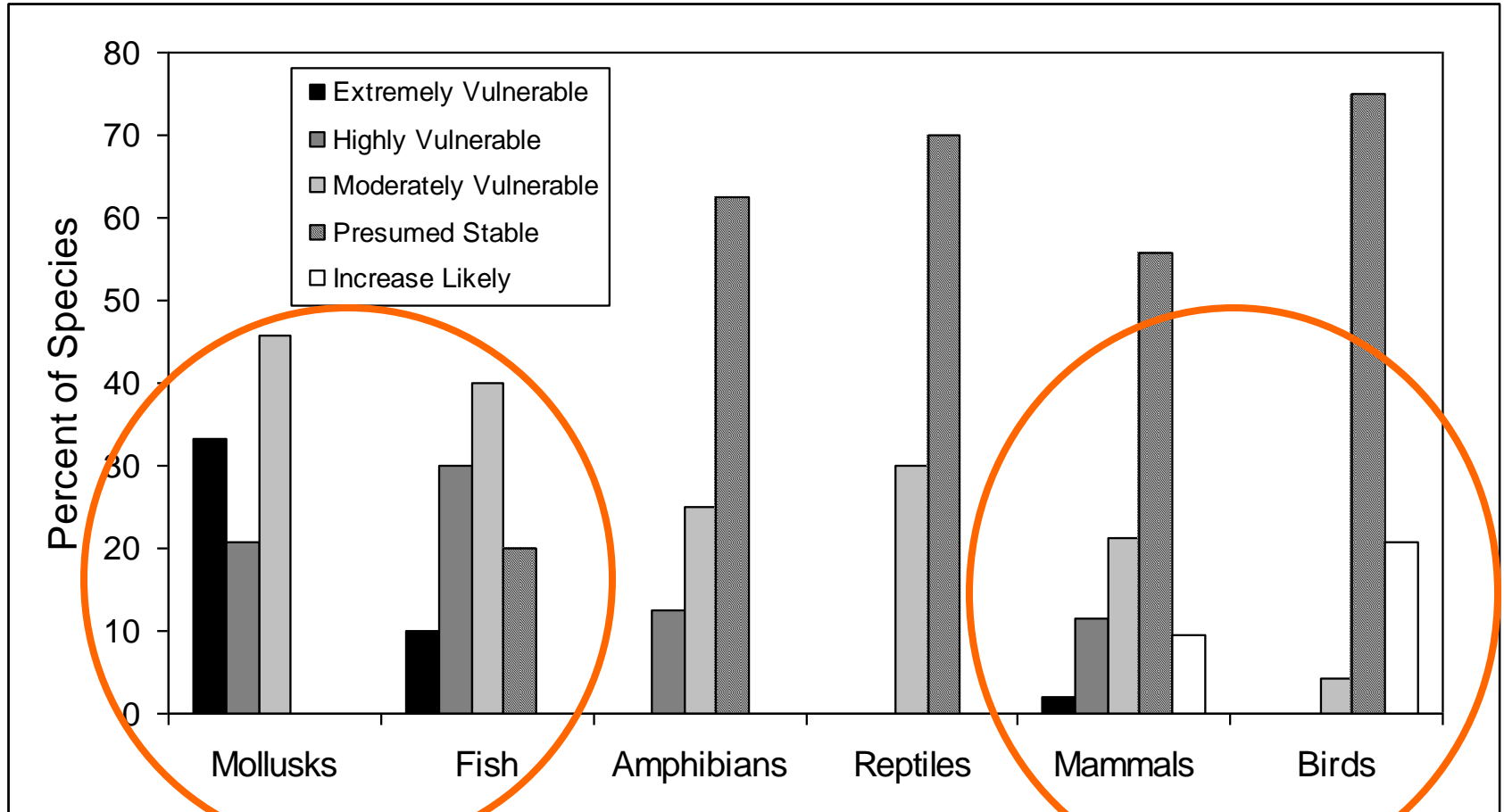
Results of a Monte Carlo simulation (1000 runs) of the data entered in the Index.

# Who's Using the Index?



-  In Progress
-  Doris Duke
-  Experimenting

# Nevada: 216 Species



# Surprises



© UW Burke Museum

*All Highly Vulnerable in Nevada*

# Additional Resources

- Webinar
- Training Session
- NatureServe guidance

[www.natureserve.org/climatechange](http://www.natureserve.org/climatechange)

# What the Vulnerability Index Does for You

- Digests huge scientific literature
- Allows rapid screening
- Identifies key factors



➔ *A good place to start*

# Your Comments

