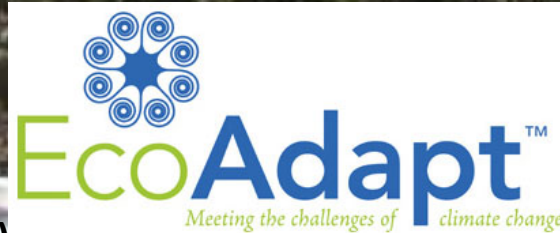


Assessing Adaptive Capacity

Vulnerability Assessment

Eric Mielbrecht
EcoAdapt

(Adapted from a presentation by Sam Veloz)



- “...the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.”

Sensitivity

Exposure

» IPCC 2007

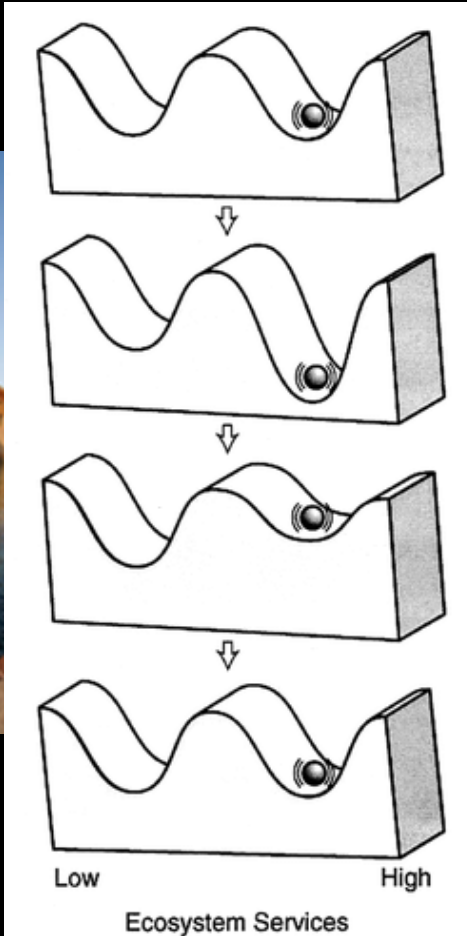
- “Coping range” or “coping capacity”
 - Ability for a system to reconfigure without significant declines in crucial functions

Impacts

Adaptive capacity

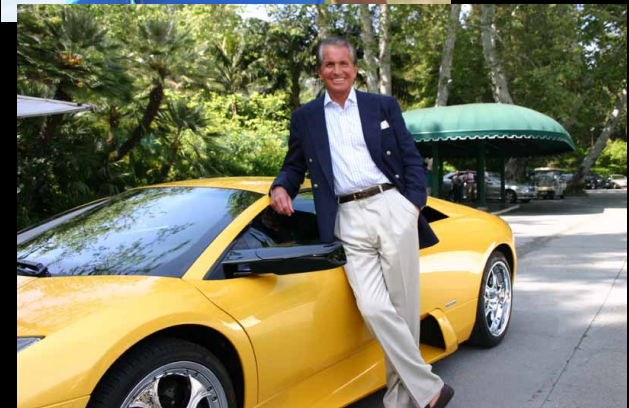
Vulnerability

Adaptive capacity, resilience, and thresholds



- **Sunburn example:**

- Can be intrinsic (reduce sensitivity) or extrinsic (reduce exposure)
- For sunburn, extrinsic adaptations includes sunblock, protective clothes, shelter
- Intrinsic adaptations include UV-induced increase in melanin production (i.e., tanning)



Adaptive capacity at the species level



Species-level adaptive capacity

Phenotypic & behavioral plasticity

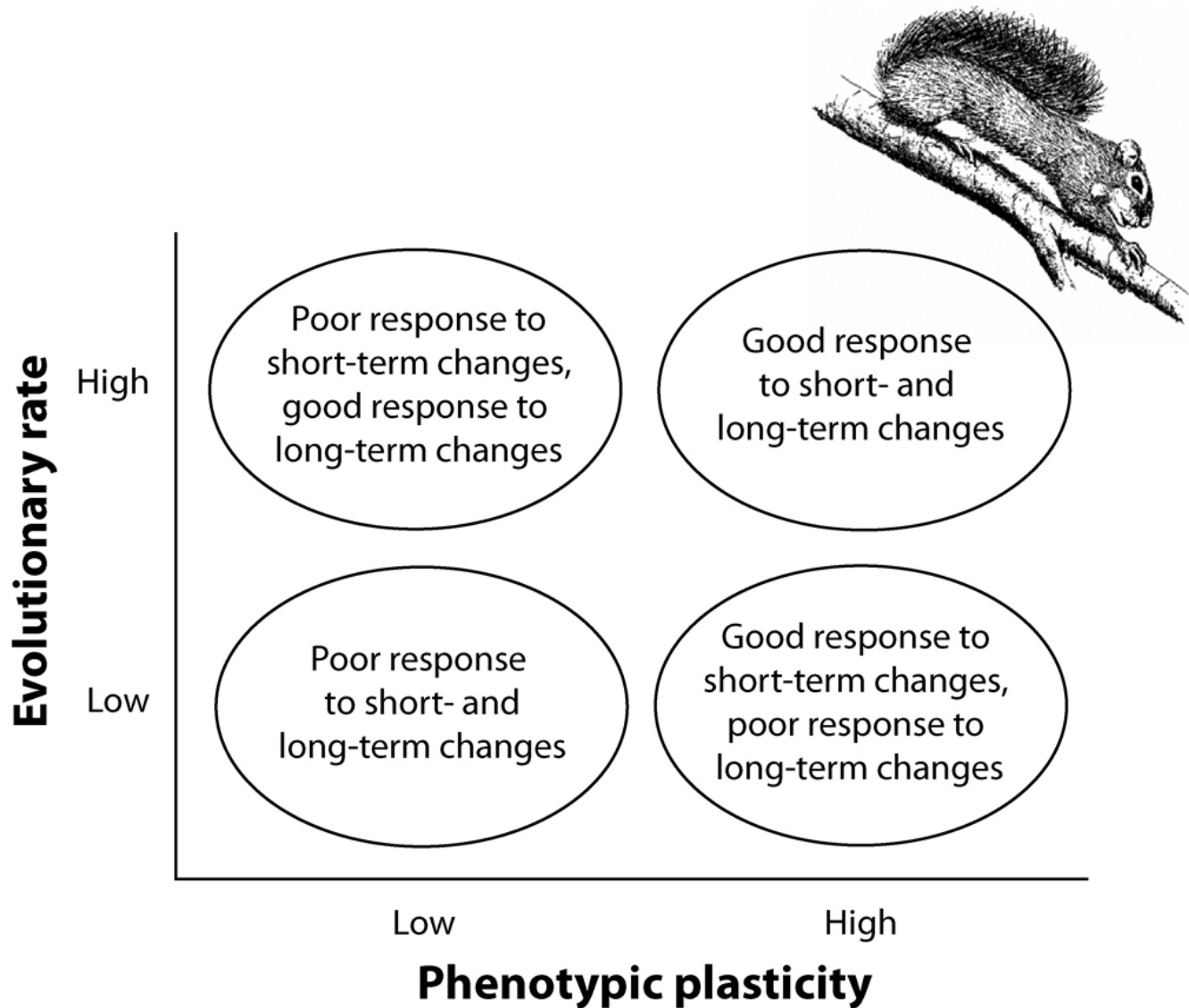
Evolutionary potential

Dispersal

Intraspecific diversity / life history breadth

Management potential

(Others)



Sea turtle nesting beaches

(or eelgrass beds, oyster beds, you name it!)



Measure:

- Slope
- Land use behind beach
- Habitat type behind beach

Adaptive capacity of ecosystems



Ecosystem-level adaptive capacity

Extent & integrity

Resistance, recovery & refugia

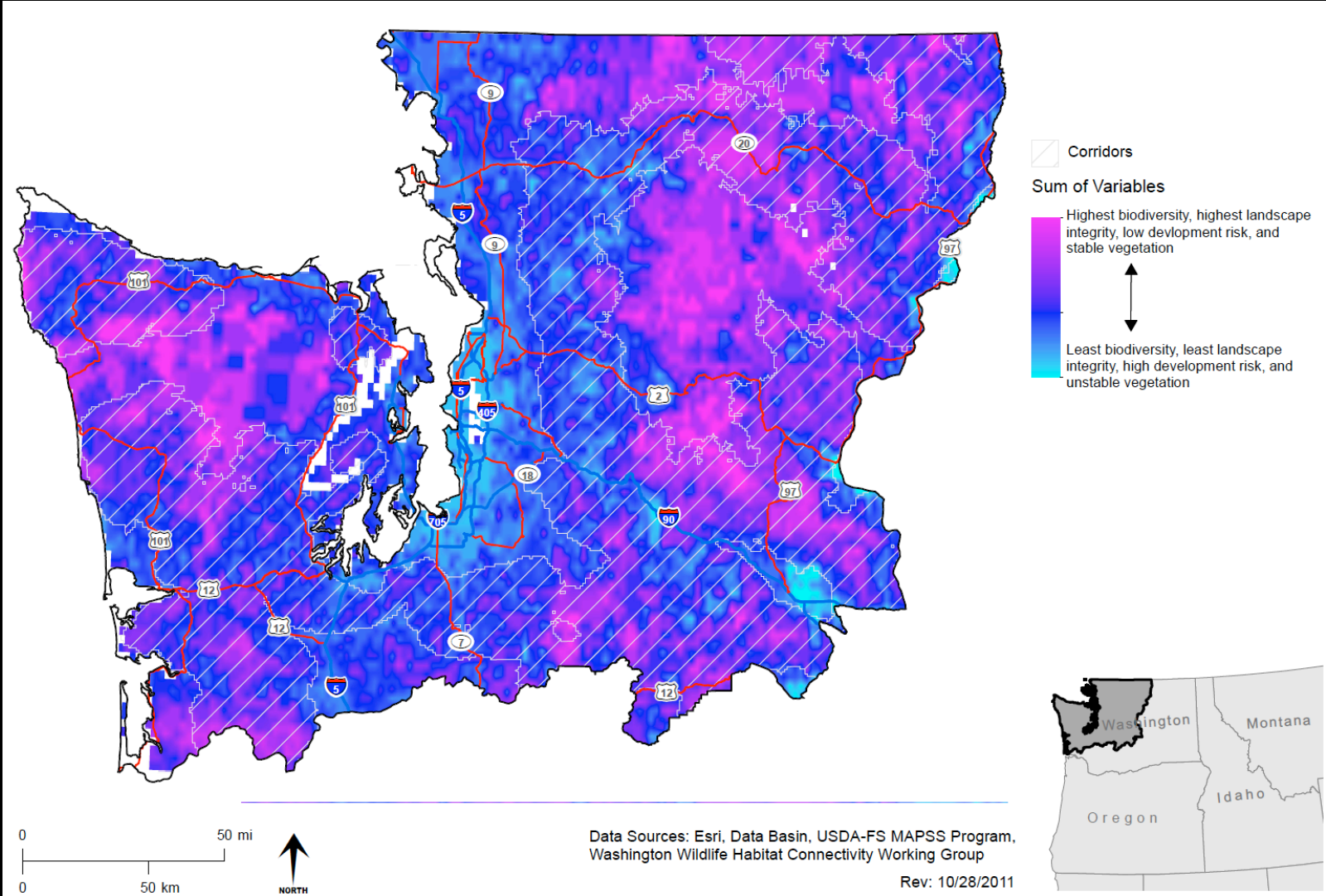
Landscape permeability / connectivity

System diversity: physical / biological

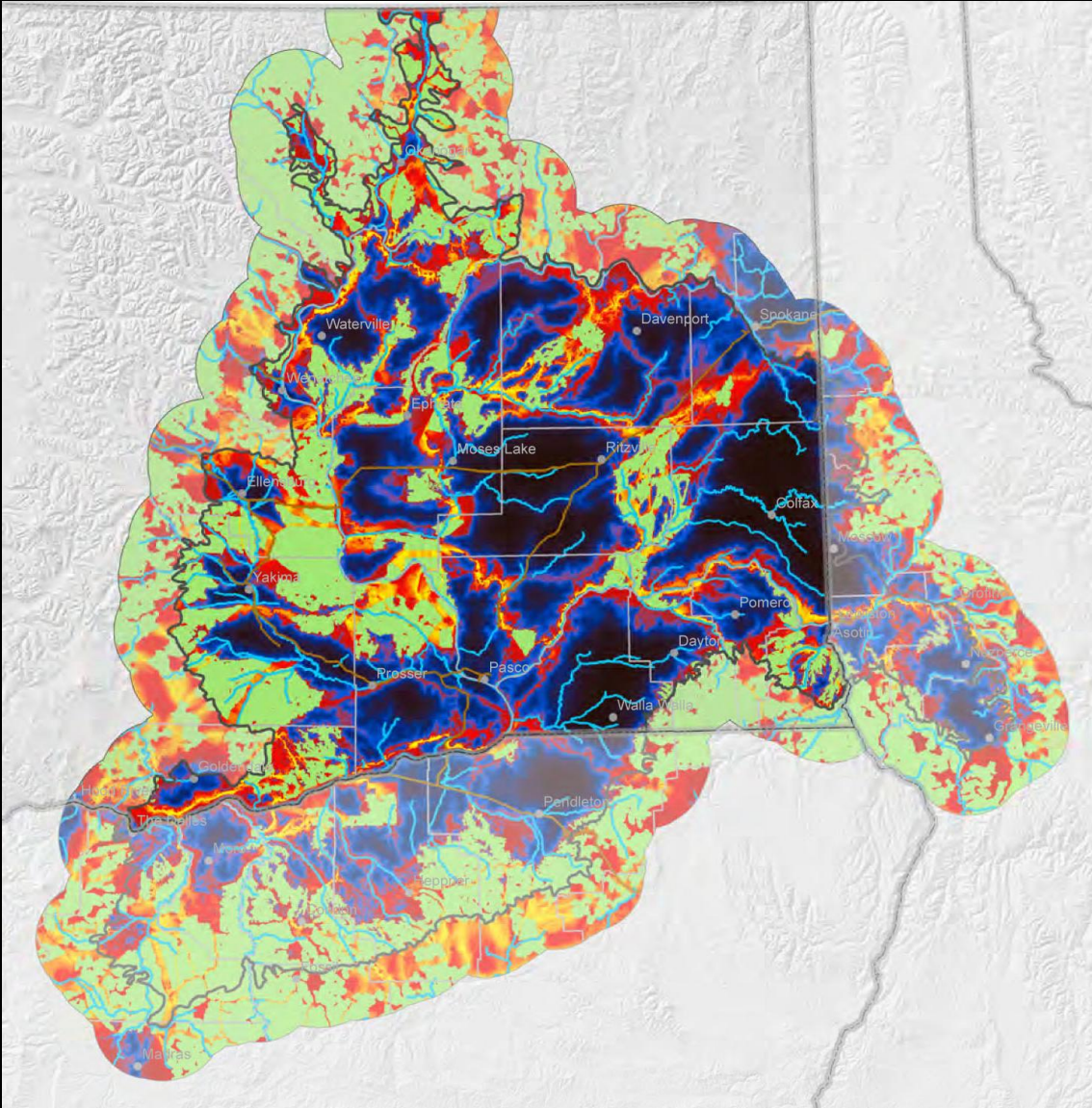
Management potential

(Others)

Refugia



Habitat connectivity



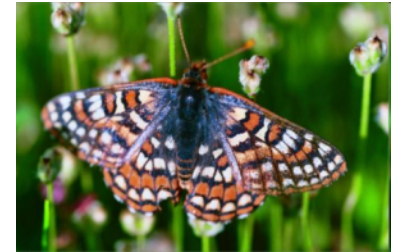
(WHCWG 2012)

Management potential

What is the ability of our institutions to adjust to and respond to change?

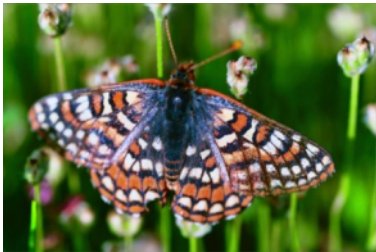
Critical Habitat Rules

Future habitat



Quino butterfly Critical Habitat Ruling includes current, future, and transitional habitat !

Current habitat



Solid evidence for range change, novel host plant use

Activity



Ecosystem Adaptive Capacity Assessment

Please pay close attention to the gray boxes in each section. If time is limiting the project team can populate the non-gray fields although we may ask for participants to review answers later.

Ecosystem: _____

1. Extent and Characteristics

Ecosystems and habitats that are currently widespread in their extent and relatively unfragmented may be more likely to withstand and persist into the future despite non-climate stressors (= more adaptive capacity)

Ecosystems and habitats that are rarer, more fragmented, or narrow in extent = less adaptive capacity

How widespread is the system across the Sierra Nevada? *Please circle.*

Low

Moderate

High

Confidence in extent: *Please circle.*

Low

Moderate

High

To what degree is the system able to resist or recover from the impacts of stressors? *For example, some systems may be intrinsically more resistant to stressors because they have more rapid regeneration times and/or are dominated by r-strategist species. Systems and habitats that recover quickly from the impacts of stressors (e.g. <20 years) may have greater intrinsic adaptive*

Confidence in degree to which the system is able to resist or recover from impacts: *Please circle.*

Low

Moderate

High

Ecosystem Adaptive Capacity

1. Extent & integrity
2. Resistance, recovery, refugia
3. Landscape permeability
4. System diversity
5. Management potential
6. Other adaptive capacity factors

Confidence

Low

Medium

High

Support from theory

Support from model results

Support from data or trends in the existing environment

Degree of consensus in expert opinion

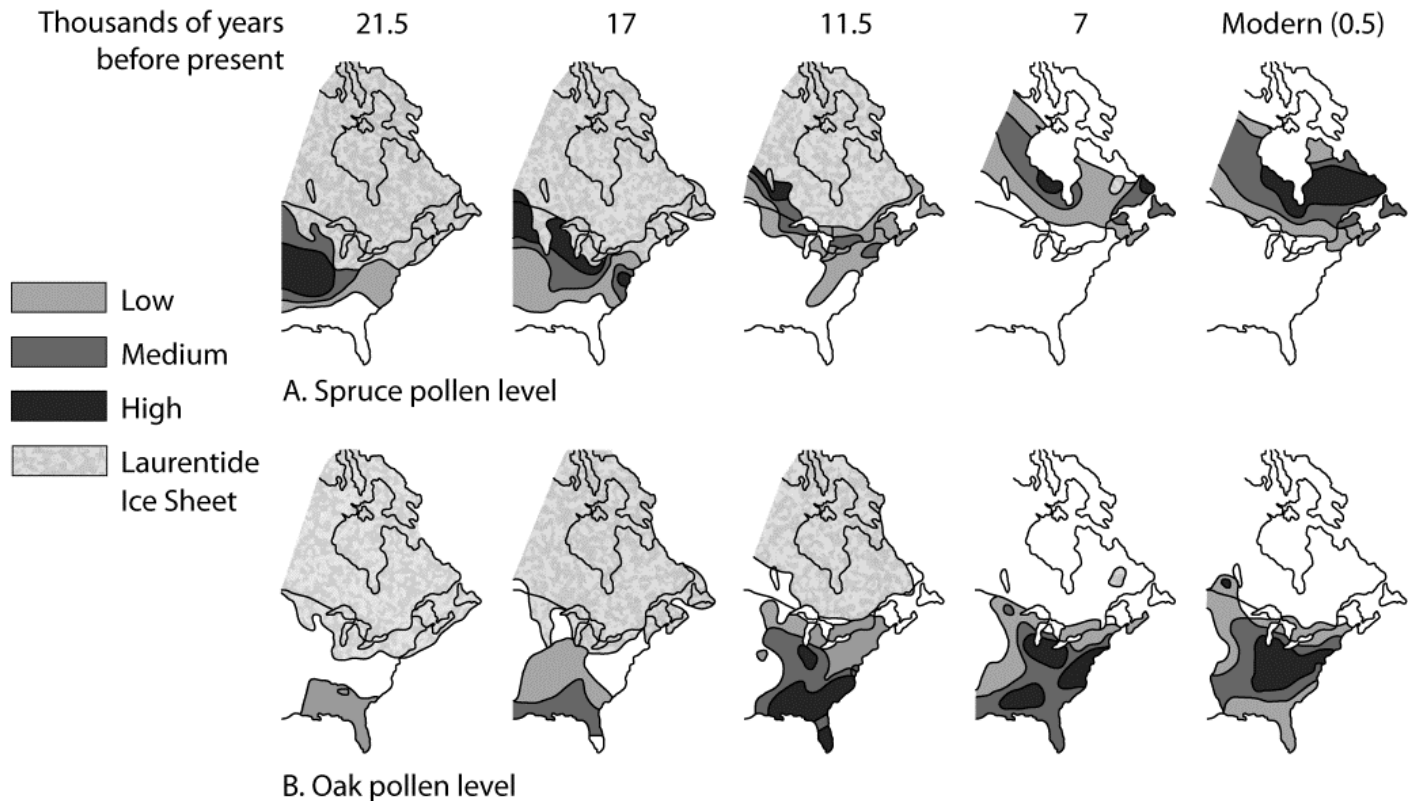
Working groups

Factors Affecting Adaptive Capacity

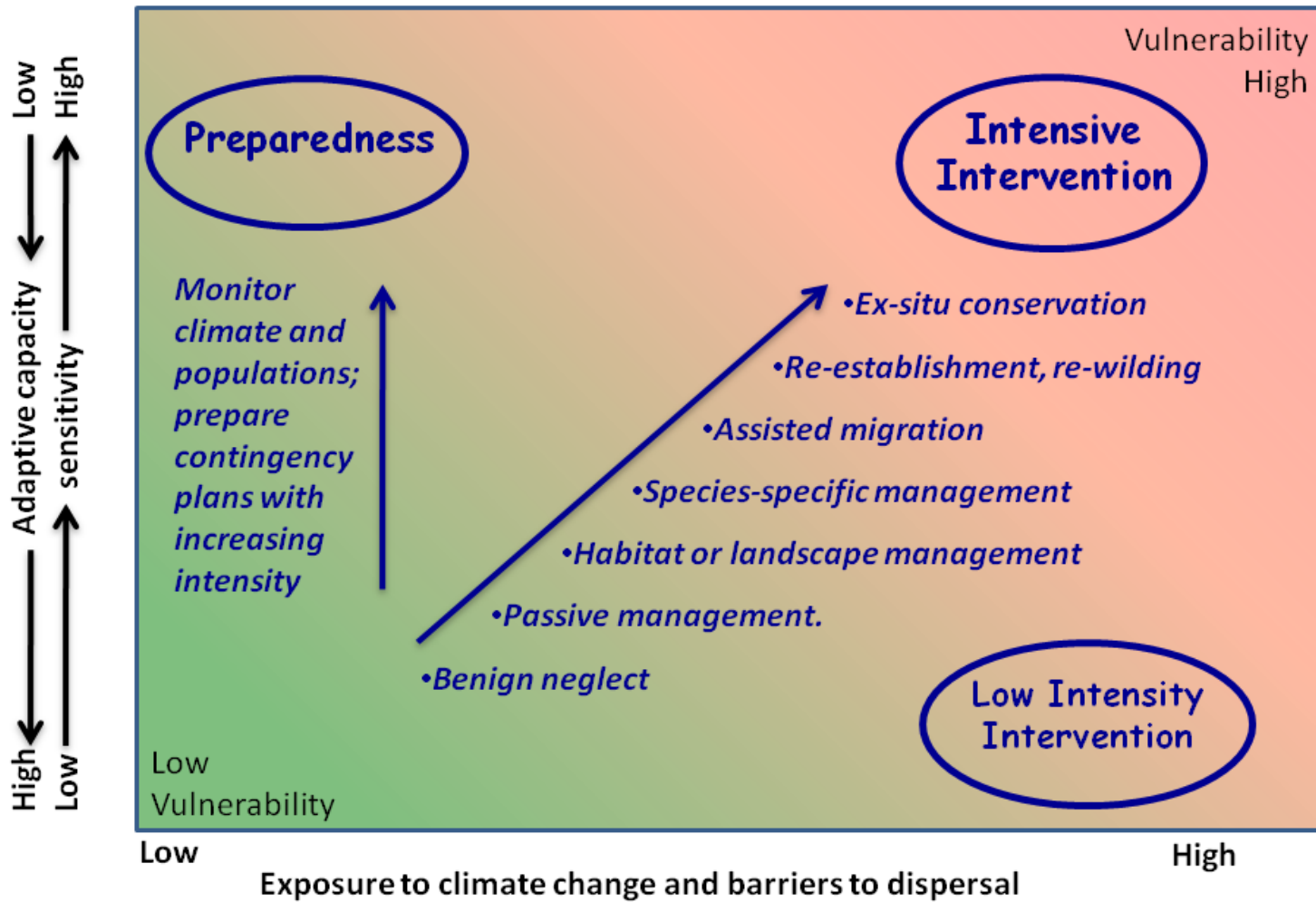
- Genetic diversity
- Phenotypic plasticity
- Behavioral plasticity
- Dispersal ability
- Landscape permeability
- Management potential



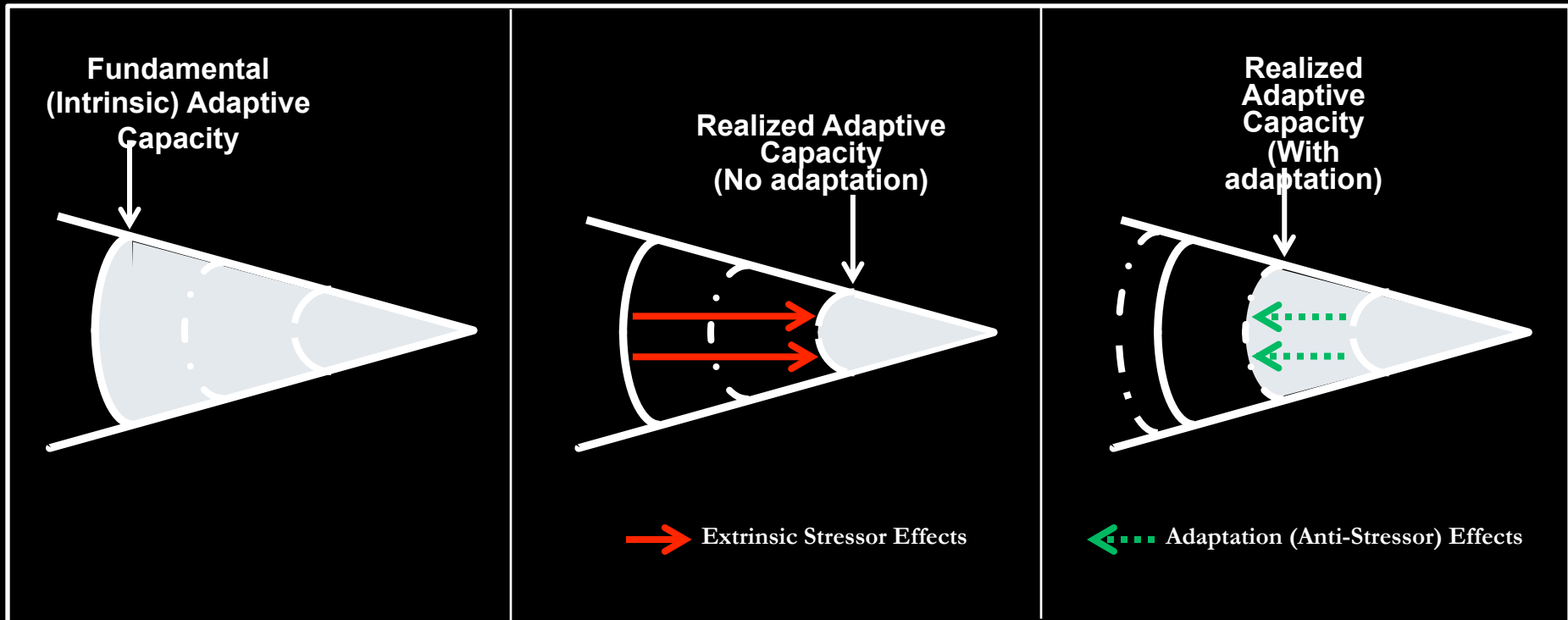
Lessons from the past and present: species respond idiosyncratically



Putting all this theory to use



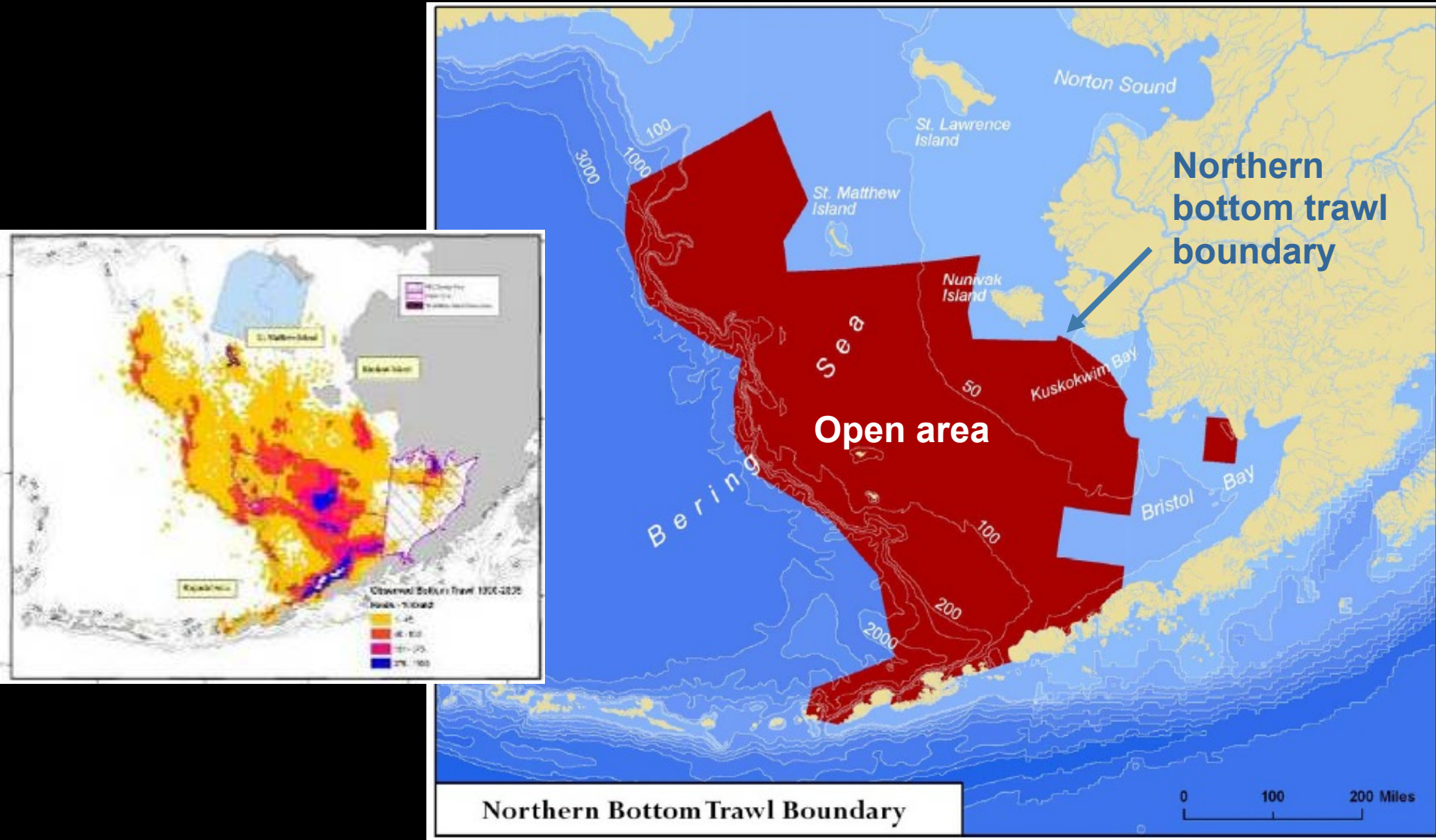
Fundamental vs. Realized Adaptive Capacity



Courtesy Jordan West & Susan Julius

Northern Bottom Trawl Boundary:

If you don't know, don't go





Tue Aug 12 13:43:43 2003



Fri Oct 28 13:25:44 2005

Institutional Aspects of Adaptive Capacity

What is the ability of our institutions to adjust to and respond to change?

But what kind of “systems” are we talking about????

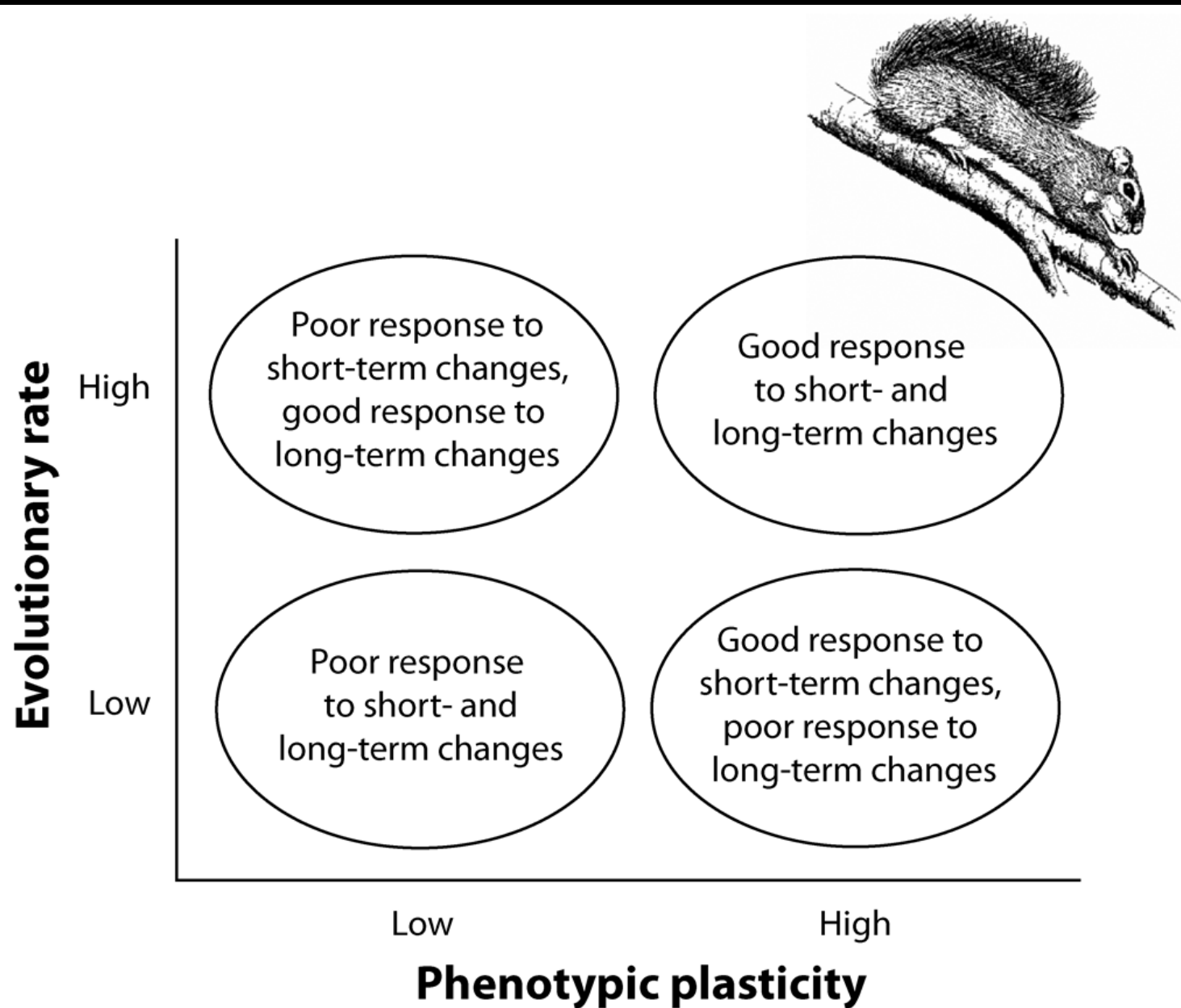


“the capacity for self-renewal”
-- Aldo Leopold

Social System Applications

- Rooted in biological/ecological concept of “adaptability”
- Embraced in assessing vulnerability and adaptation of social/human systems
- Key adaptive capacity attributes in social systems include:
 - Health
 - Literacy
 - Governance
 - Economic wealth

Genetic, phenotypic & behavioral plasticity



Climate breadth

