Climate-Smart Land Management

Guidelines

Sandy DeSimone

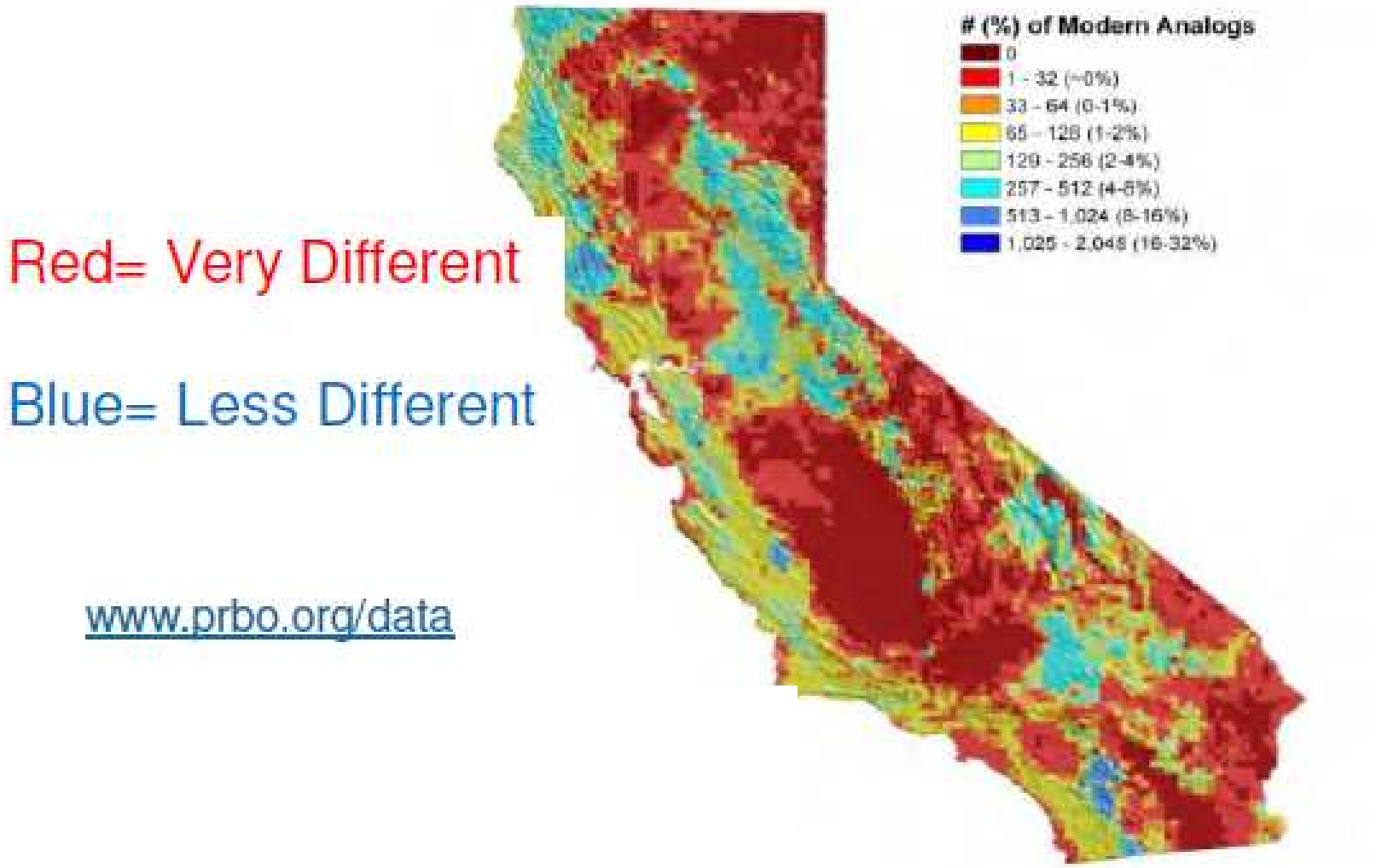
Audubon Starr Ranch Sanctuary

Audubon CALIFORNIA

Acknowledge “progressive thinkers”

Ellie Cohen - Point Blue Conservation Science
Mark Davis - Macalester College
Richard J. Hobbs - University of Western Australia
Erika Zavaleta - University of California Santa Cruz

By 2070: Over 50% of CA with very different "no-analog" bird communities



From E. Cohen Climate Change and Adaptation: Nature-based Solutions for Wildlife and People 2012. Stralberg et al.(PRBO) PLoS One 2009

Actions to prevent “extreme disruptions”:

Mitigation: reduce greenhouse gas emissions and enhance carbon sinks.

Adaptation: actions to reduce the risks and adapt to climate change impacts on the human and natural environment.

Modified from Climate Change and Adaptation: Nature-based Solutions for Wildlife and People. Ellie M. Cohen and PRBO Staff March 7, 2012

Climate-Smart Conservation

...addresses impacts of climate change and other threats to:

- Reduce greenhouse gas emissions and enhance carbon sinks
- Reduce climate change impacts on wildlife and people
- Sustain vibrant, diverse ecosystems.

Cohen, E. 2012. Definition and Principles for Climate Smart Conservation. PRBO Conservation Science. http://climate.calcommons.org

Climate-Smart Conservation Guidelines
A Brief Review

- Protect Space
- Reduce Non-climate Stresses
- Adopt Adaptive Management
- Reduce the Rate and Extent of Climate Change

Hansen, L., Hoffman, J., Drews, C., Meilbrecht, E. 2009.Conservation Biology 24: 63-69.

Nine Guiding Principles

Resources Legacy Fund 2012

California Climate Smart Principles for State Agencies 2012

National Wildlife Federation: nine principles

Quick Guide to
Climate-Smart Conservation

iStockphoto

Climate change already is having significant impacts on the nation's species and ecosystems, and these effects are projected to increase considerably over time. As a result, climate change is now a primary lens through which conservation and natural resource management must be viewed. How should we prepare for and respond to the impacts of climate change on wildlife and their habitats? What should we be doing differently in light of these climatic shifts, and what actions continue to make sense? This *Quick Guide to Climate-Smart Conservation* offers an introduction to designing and carrying out conservation in the face of a rapidly changing climate.

Making Conservation Climate Smart

The fate of our wildlife and wild places depends on steps we take now to prepare for and cope with the growing impacts of a changing climate, a process known as *climate adaptation*. While managers traditionally have looked to the past for inspiration, increasingly we will be faced with future conditions that may have no historical analogs. Making a transition to forward-looking and climate-smart conservation will require that we pay particular attention to the following overarching themes:

Act with intentionality

We must explicitly consider and address climate impacts—both direct and indirect—in our conservation actions, and be able to "show our work." Most adaptation actions will draw from existing conservation techniques, but may differ in when, where, and why they are applied.

Manage for change, not just persistence

Conservation efforts usually strive to maintain existing conditions or restore back to some historical state. Increasingly, we will be faced with managing system transformations, and may need to focus on sustaining ecological functions, rather than historical assemblages of plants and animals.

Reconsider goals, not just strategies

As conditions change, many of our current conservation goals and management objectives may no longer be feasible. Successful climate adaptation will depend not only on adjusting strategies, but also on reevaluating—and revising as appropriate—our underlying conservation goals and objectives.

Integrate adaptation into existing work

Getting climate-smart strategies implemented can benefit from incorporating them in ongoing work and existing decision processes. Helping managers address near-term challenges in ways consistent with longer-term adaptation needs is especially important for putting adaptation into practice.

What is Climate-Smart Conservation?

Climate-Smart Conservation is the intentional and deliberative consideration of climate change in natural resource management, realized through forward-looking goals and linking actions to key climate impacts and vulnerabilities.

NWF Quick Guide 2013: Climate-Smart Conservation http://www.nwf.org

Employ Climate-Smart Conservation Guidelines:

- **Landscape-scale approach**
- **Focus on future possible conditions- not past**
- **Requires flexible & informed management**
- **Takes into account range of possibilities**
- **Benefits wildlife & people**
- **Avoids maladaptation**
- **Promotes collaboration, information sharing**
- **Minimizes carbon footprint**

Adapted from National Wildlife Federation: Climate Smart Conservation Principles
http://www.nwf.org/Global-Warming/Climate-Smart-Conservation.aspx

Climate Change and Adaptation: Nature-based Solutions for Wildlife and People. Ellie Cohen and PRBO Staff. March 7, 2012 ***http://www.prbo.org***

Incorporate climate change into land management

Restoration:

Pt. Blue Conservation Science climate-smart riparian restoration project

Invasive plant management:

Cal-IPC Climate Smart Land Management Workshop

Climate-Smart Invasive Species Management

1. Take a landscape-scale approach.

2. Know future climate scenarios for your region.

3. Track and adjust.

4. Broaden species goals.

5. Include the community.

Doug Johnson, Cal-IPC and Sandy DeSimone, Audubon Starr Ranch 2013

(***Adapted from Climate-smart Ecological Restoration: Guidance and Case Study. Parodi, Gardali, and Seavy. 2012.)***

1. Take a landscape-scale approach:

a. Collaborate and share information with managers, universities, agencies in your region.

Bay Area Ecosystems Climate Change Consortium

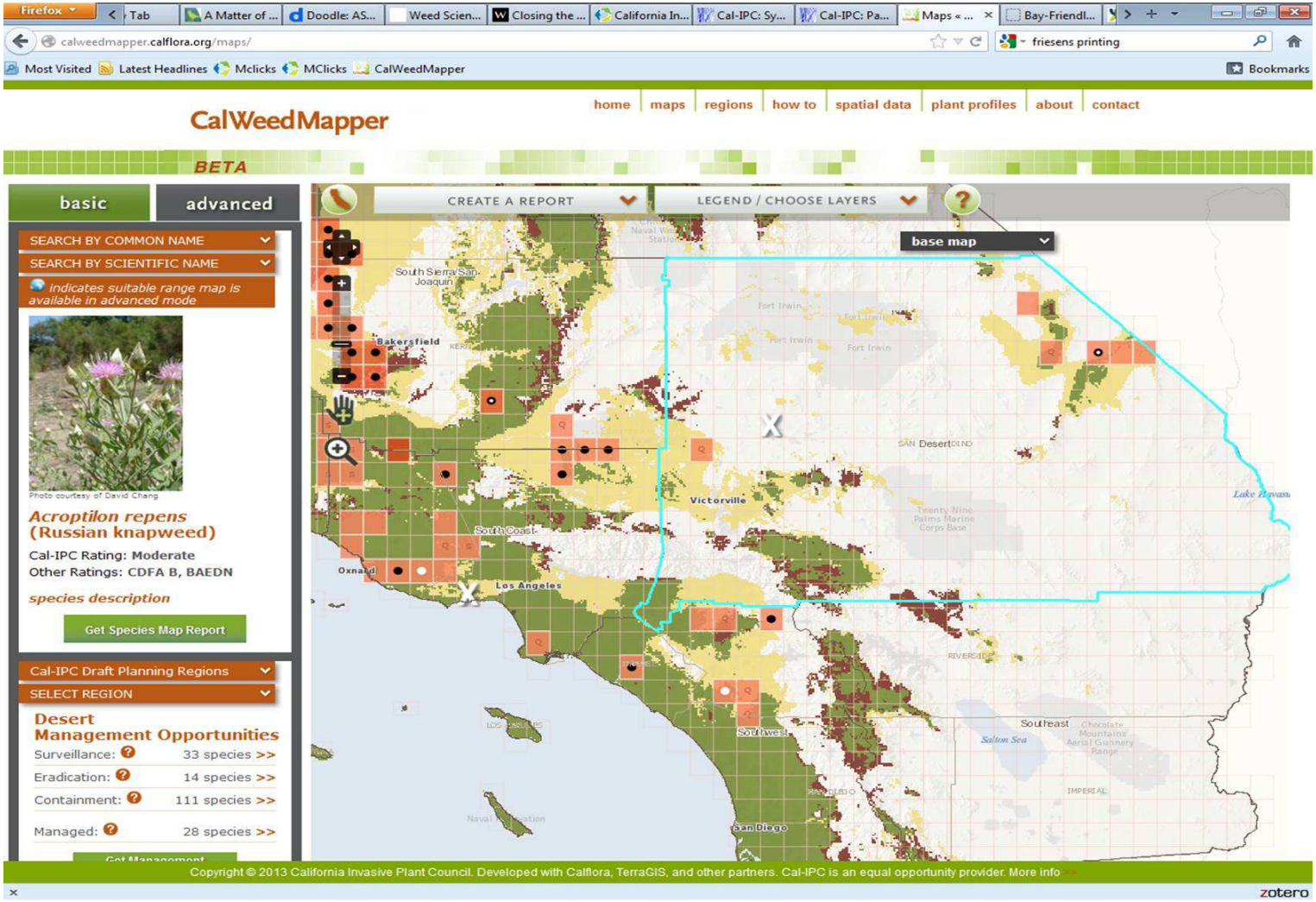
BAECCC

Managers, scientists and others collaborate to understand and reduce the negative impacts of climate change on Bay Area ecosystems.

1. Take a landscape-scale approach.

b. Set priorities for invasive plant targets and actions with an emphasis on early detection. *

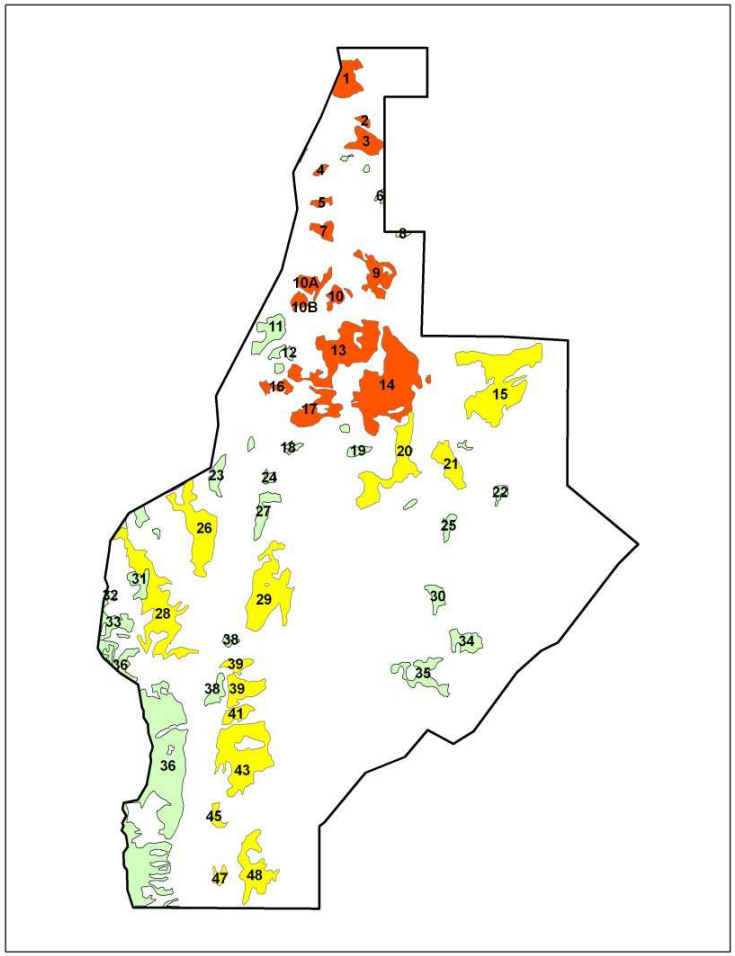
Regional landscape



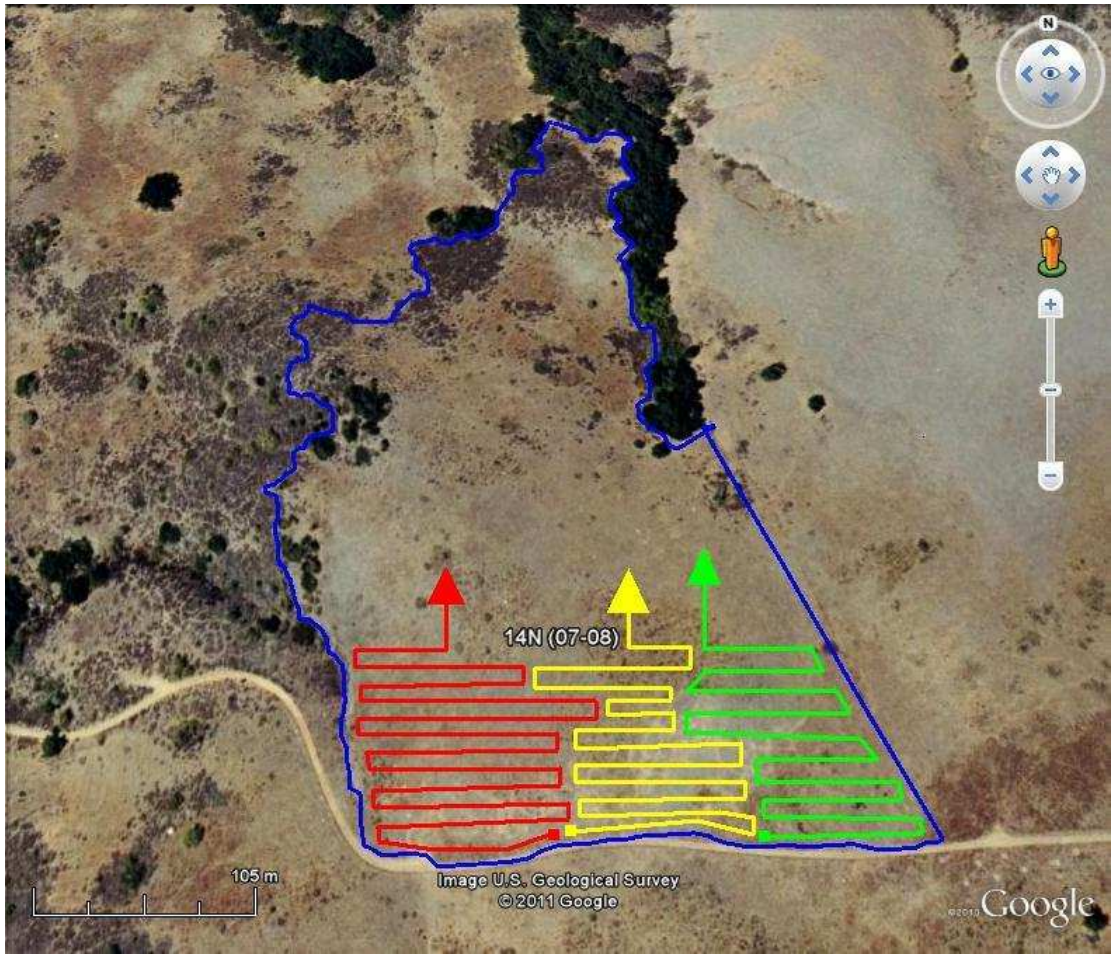
1. Take a landscape-scale approach:

b. Set priorities for invasive plant targets and actions with an emphasis on early detection.

Local landscape



"FLYING" at Audubon Starr Ranch



2. Know future climate scenarios for your region: *

a. Collect the range of projections available from agencies, universities and NGOs.

TACCIMO
Template for Assessing Climate Change Impacts and Management Options

USDA **Template for Assessing Climate Change Impacts and Management Options (TACCIMO)**

Projected Effects of Climate Change in California: Ecoregional Summaries Emphasizing Consequences for Wildlife 2011

cal-adapt

LOCAL CLIMATE SNAPSHOTS

http://cal-adapt.org/tools/factsheet/

2. Know future climate scenarios for your region:

b. Plan for a range of conditions and extremes. *

We often aim for the (recent) past

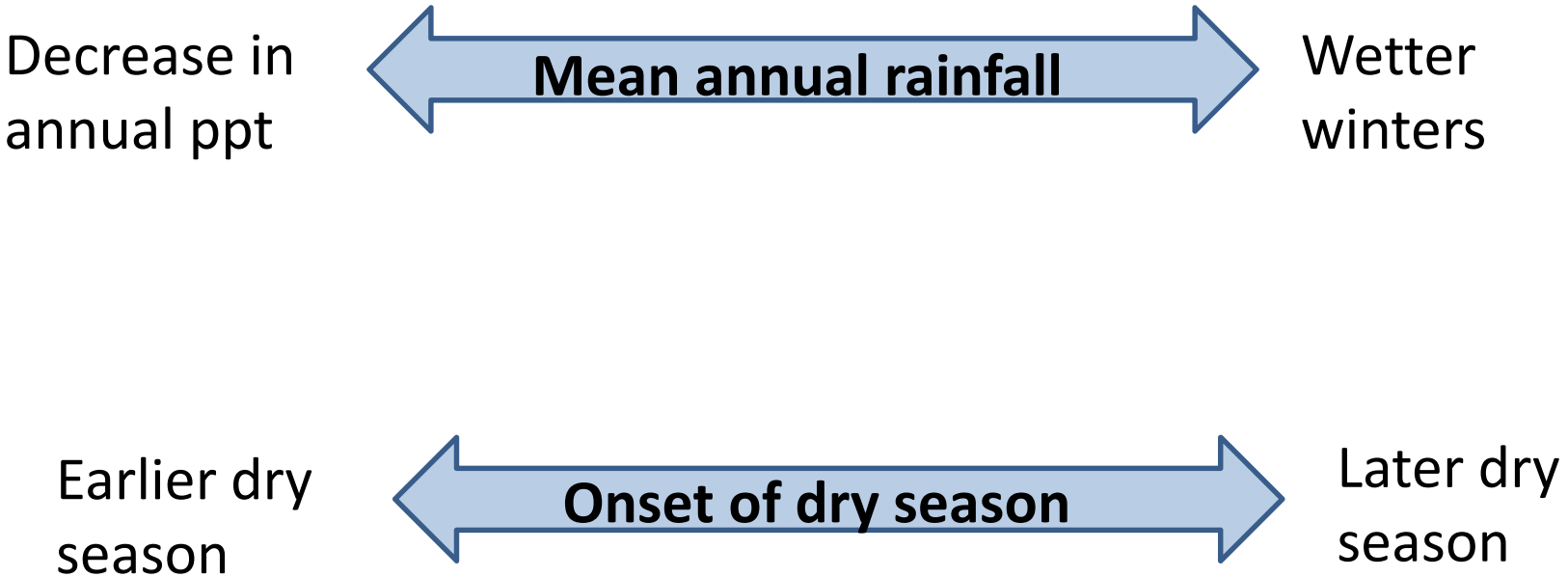
- Goal - resilience
- Time scale for baseline: a few hundred years

Resilience

Future climate extremes

E. Zavaleta. 2013. Building Resilience: how can we steward nature through climate change: Conservation Science Webinar Series. USFWS NCTC.

Local climate projection uncertainties



2. Know future climate scenarios for your region:

c. Focus on future possible conditions not past. *

"Resilience is central but not enough.
We can't make it stay the same."

E. Zavaleta. Conservation Science Webinar Series. USFWS NCTC

Be Flexible! Ready to try new approaches. Stay informed.

Practice the Rule of TEN

TEST
&
EXPERIMENT
NOW

From Principles for Climate Smart Conservation. Ellie Cohen, Pt. Blue Conservation Science. Climate Smart Actions for Natural Resource Managers. November 29, 2012.

3. Track and adjust: *

a. Monitor results of projects, test alternate strategies and be ready to shift strategies based on results.

Climate-Smart Riparian Project

Gardali, Seavy, Parodi

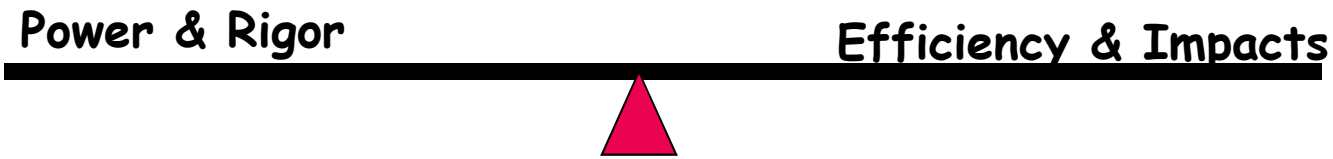
3. Track and adjust:

a. Monitor results of projects, test alternate strategies and be ready to shift strategies based on results.

Value of "quick and dirty" data for land managers currently under debate and discussion

(*DeSimone 2013 Restoration Ecology*, Cabin et al. 2010 *Restoration Ecology*, Giardina et al. 2007 *Restoration Ecology*, *Klein 2007 Cal-IPC News)*

Adaptive management dilemma – pluralistic approach – how to balance…



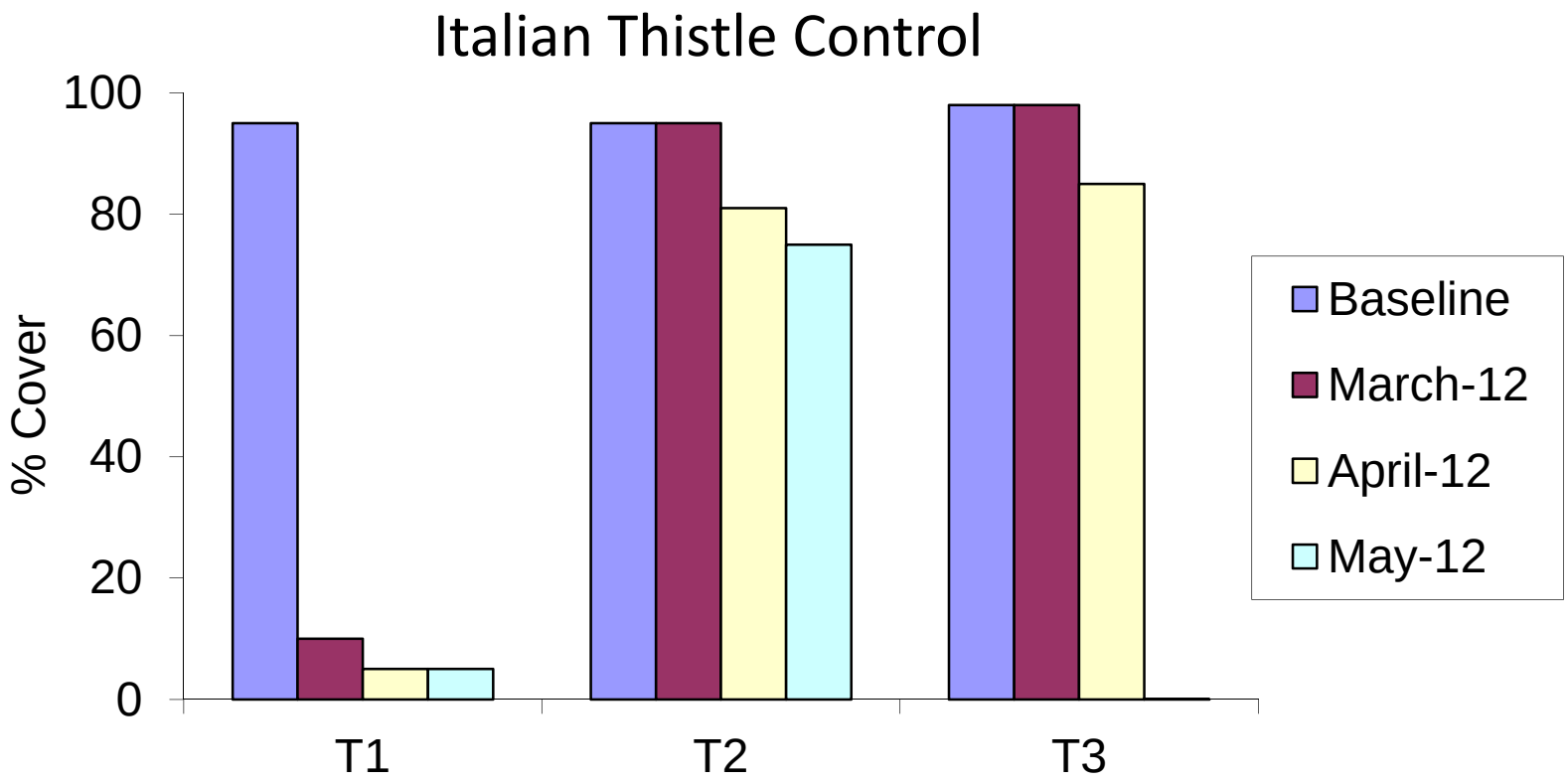
Ecological Intuition = scientific literature + on site experiments & monitoring

Quick and Dirty Data Help!!!

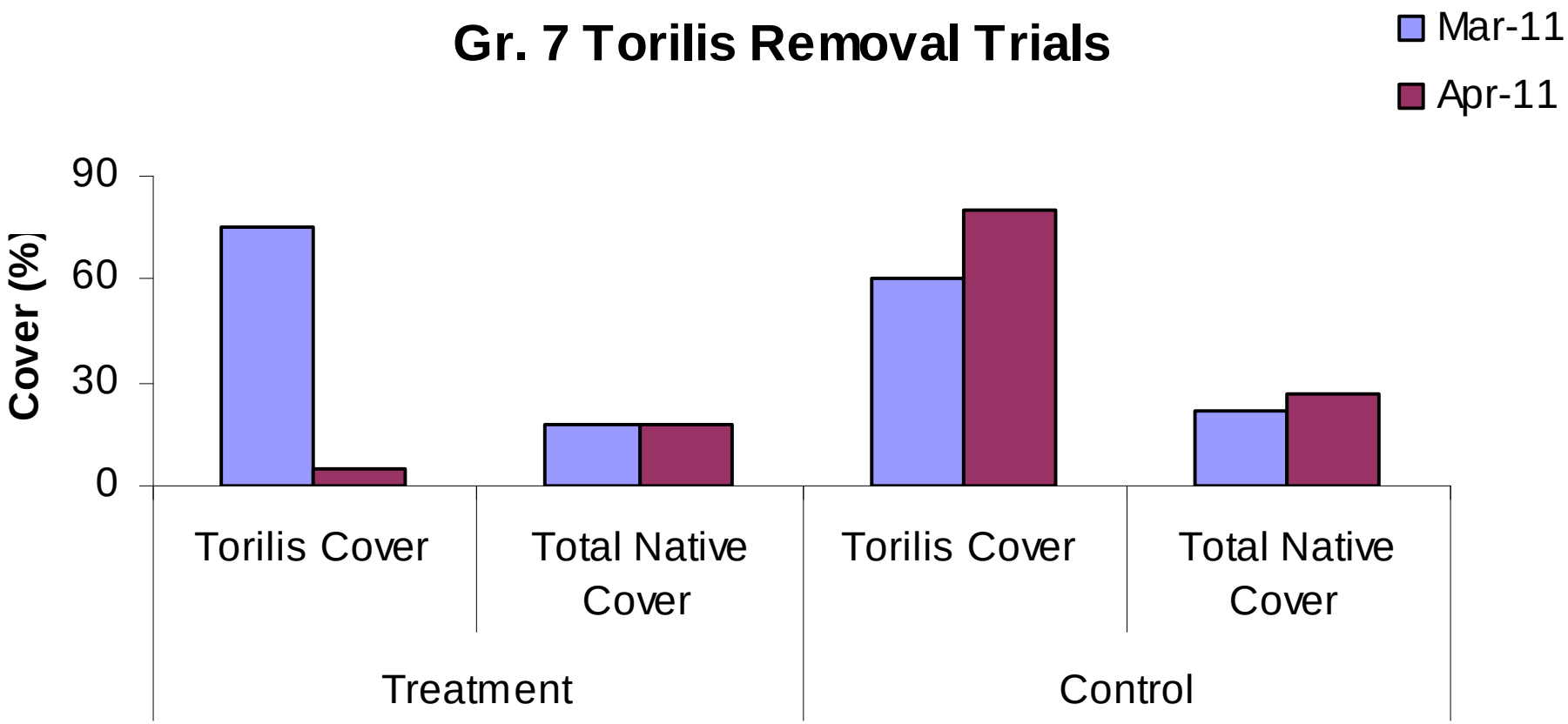
DeSimone 2013 Restoration Ecology

Treatments

T1: **Brush cut** at **rosette stage**, repeat 1X/mo.
T2: Use m**achete** to do a high (**mid stalk**) cut of flowering stalk, repeat if rebolted
T3: **Brush cut** all photosynthetic surfaces at **bolt stage**, repeat if rebolted



Quick and Dirty Data → Informed intuition



Quicker and Dirtier!

DeSimone 2013 Restoration Ecology

4. Broaden species goals: *

Evaluate benefits as well as impacts of established non-natives to wildlife and people

Initial phases of a new non-native introduction

Go for it! (remove)

(If the non-native status of a species is clear)

Early Detection

Shackelford et al. Biological Conservation 2013

Established non-native populations

Assess impacts

Impacts to biodiversity, ecosystem function, resilience

Shackelford et al. Biological Conservation 2013

BUT Managers need parameters we can measure:

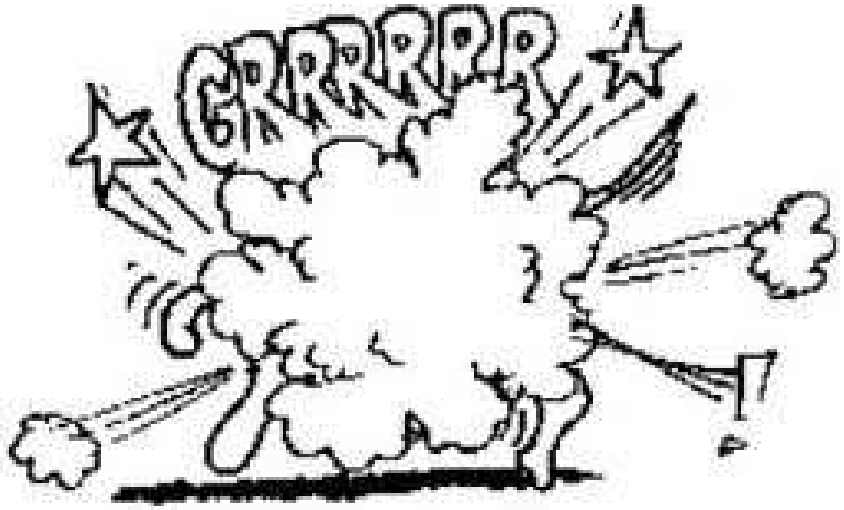
- **Ecosystem function: biotic-biotic interactions**

  e.g. Habitat for wildlife (observable)

- **Does the established non-native have positive or neutral effects ?**

Effects of periwinkle on small mammals and invertebrates

The Native/Non-Native Debate



Hard questions, complex decisions

Land management in a changing climate requires

Humans Rely on Healthy Ecosystems!

Ecosystem Services

Ecosystem Services: Strategic decisions

Consider positive and neutral effects of non-native species on project goals

Phragmites in North America Eric Kiviat 2013. AoB Plants

Native and introduced genotypes

Considered noxious weed in many states

Builds and stabilizes soils

Phytoremediation - sequesters heavy metals

Carpobrotus affine acinaciformis (Spain). Bartomeus, Vila, and Santamaria. 2008. *Oecologia*

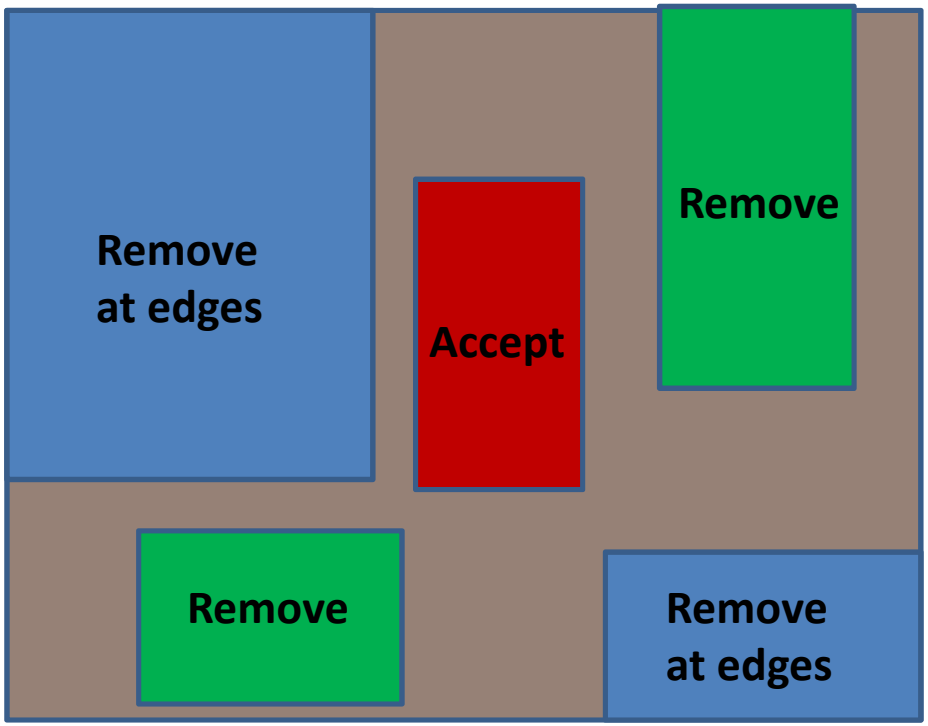
Invasive non-native species

Facilitates the visit of pollinators to native species

Ecosystem services of non-native species:

Strategic decisions

Management mosaics



Assess impacts of established non-native populations

Where climate and land use are changing rapidly, non-native species

- more likely than native species to persist
- can provide ecosystem services, other benefits

Non-native species

- will increasingly be viewed as benign or desirable
- will make contributions to society and to achieving conservation objectives

Schlaepper, Sax, and Olden. 2010. The Potential Conservation Value of Non-Native Species. Conservation Biology.

Negative, positive, and neutral effects of non-native species require

Complex decisions

Consider:

- Goals of project
- Ease of containing non-native species beyond project boundaries

  e.g. Generalist or specialist habitat requirements
- Extremes of projected climate for your area
- Future negative effects non-native species

Dynamic view of nature

Schlaeppfer, Sax, and Olden 2010 Conservation Biology

5. Include the community: *

Recruit local children and adults to help as volunteers.

Outreach increases public support for invasive species control and restoration as well as appreciation of wild landscapes.


UNIVERSITY OF
Oxford

Climate-Smart Land Management Planning

1. Climate-smart invasive plant management guidelines
2. Climate-smart restoration guidelines (Seavy)
3. Vulnerability assessment
4. Scenario planning (Seavy)
5. Matrix (Seavy)

Vulnerability Assessment

Integrates climate change into natural resource management

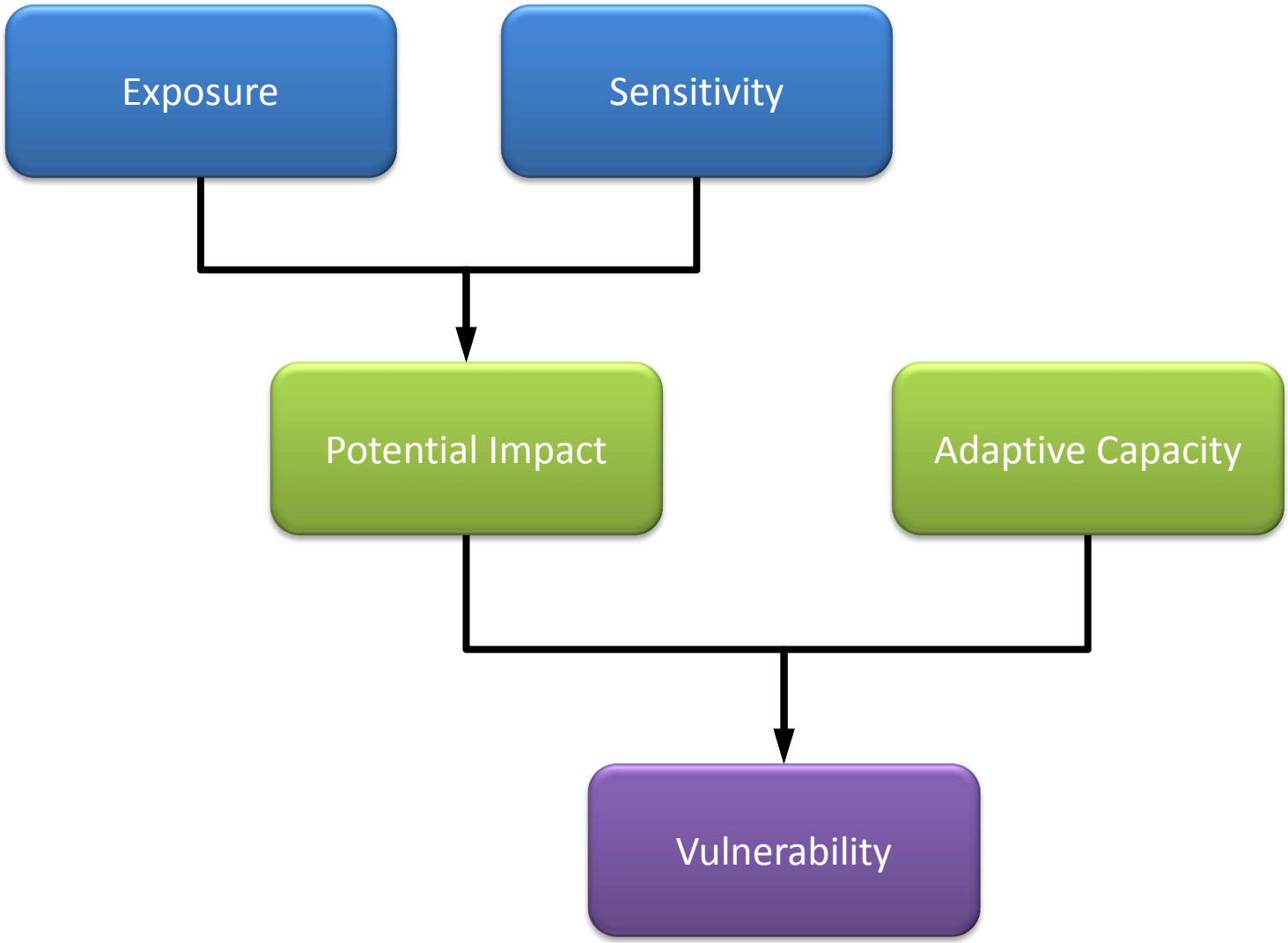
Determines:

1. What species or habitats are most likely to be impacted by climate change

2. Why they are likely to be vulnerable

Kirk Klausmeyer The Nature Conservancy

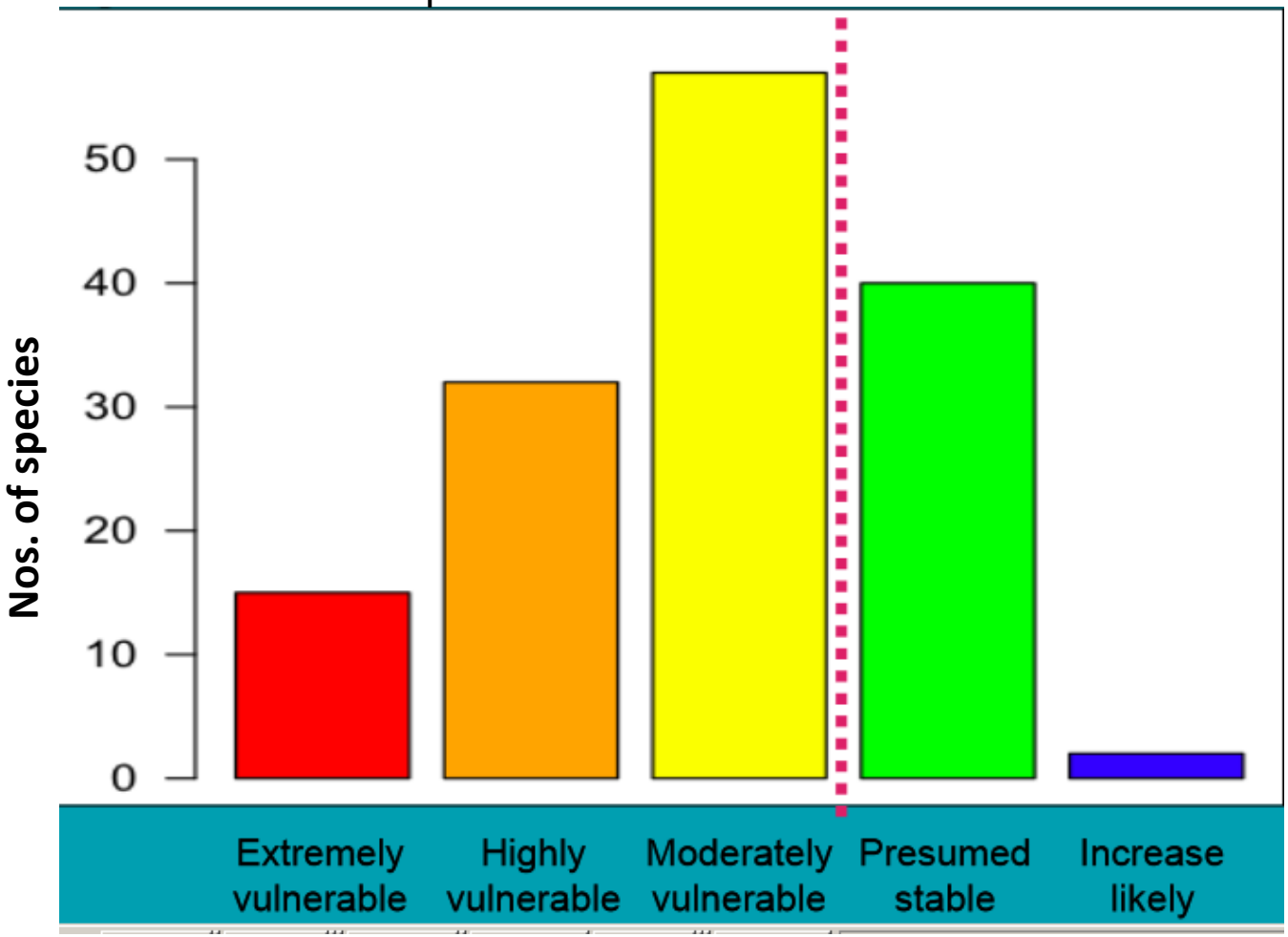
From Glick et al, 2011, Scanning the Conservation Horizon: A Guide to Climate Change Vulnerability Assessment



Kirk Klausmeyer The Nature Conservancy. Vulnerability Assessment Overview
http://climate.calcommons.org

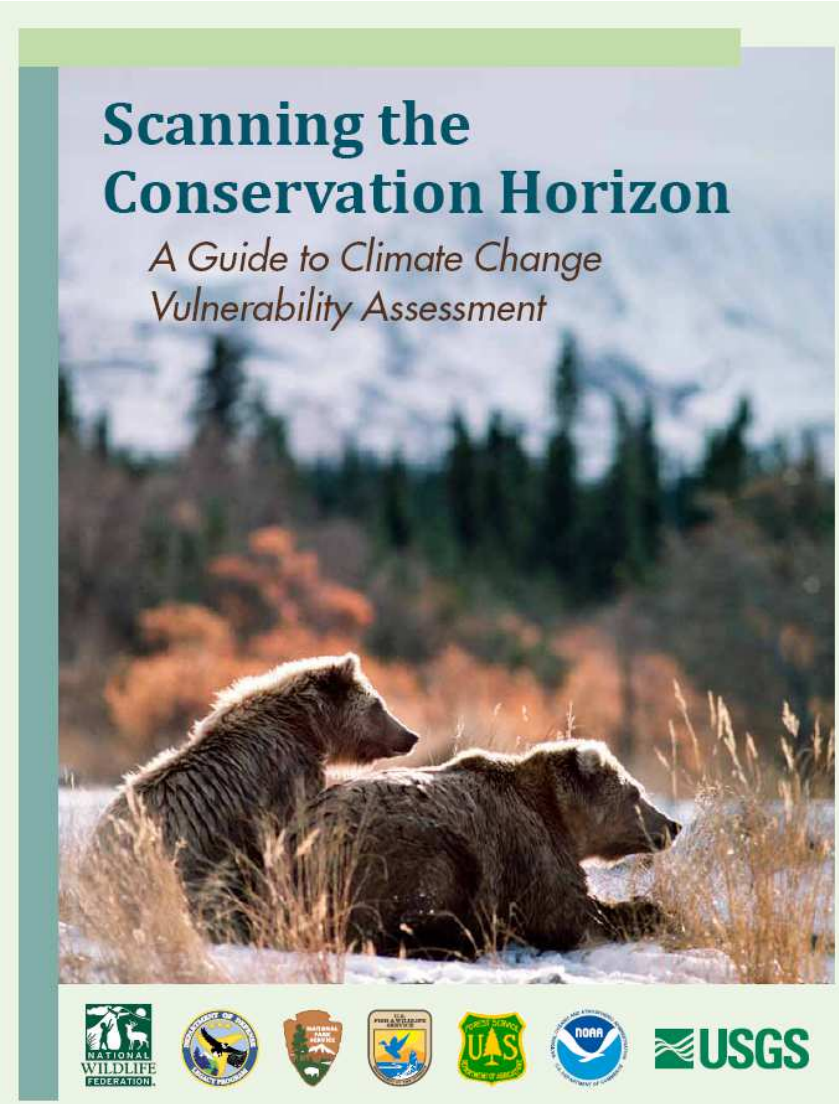
Climate Change Vulnerability Index

CA Department of Fish and Wildlife



99 of 156 species are “vulnerable” to climate change

Anacker, Leidholm, Schoenig, Gogol. Climate Change Vulnerability Assessment for Rare Plants. CA Dept of Fish and Wildlife. http://climate.calcommons.org



California Climate Commons

Resources for Conducting a Vulnerability Assessment

Deanne DiPietro
Kirk Klausmeyer
Rebecca Fris

www.nwf.org/vulnerabilityguide

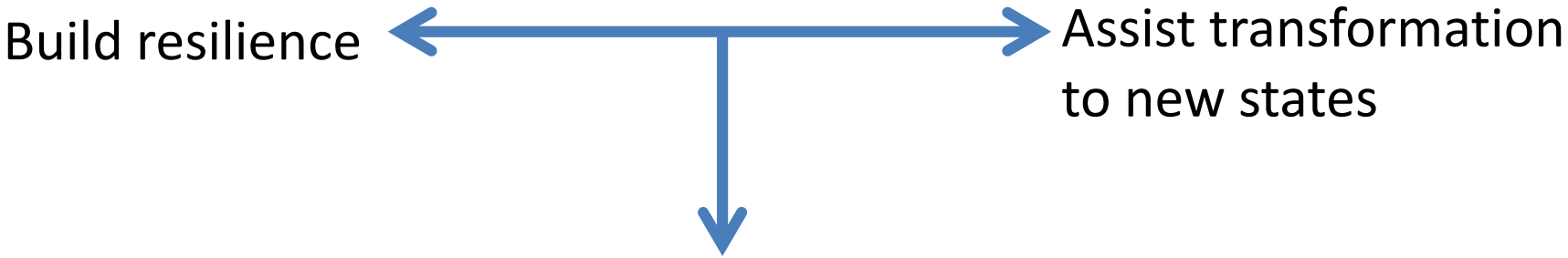
http://climate.calcommons.org/

Vulnerability assessment: costs high

Time and $$$

Not quick and dirty enough for land managers with limited time and budget??

Scenario-based Planning



Tools for making decisions in an uncertain world

Scenario-based planning

Build a diverse portfolio – safest approach is a diverse one

E. Zavaleta. 2013. Building Resilience: how can we steward nature through climate change: Conservation Science Webinar Series. USFWS NCTC

Climate change must not blow conservation off course

- Consider all threats when deciding which species and habitats to protect
- Do not assume that some threats are more important than others.

Tingley, Estes, and Wilcove. Comment in Nature August 2013 Vol. 500.

"The unique Florida Everglades deserve protection, despite being highly vulnerable to climate change."

Climate-smart land management:

- climate projections for your region
- other important factors (e.g. nitrogen deposition, clay soils, etc.)

THINK OUT OF THE BOX!!!

Be flexible and daring
and (figure out how to!):

Practice Climate-Smart Land Management