

Vulnerability Assessment

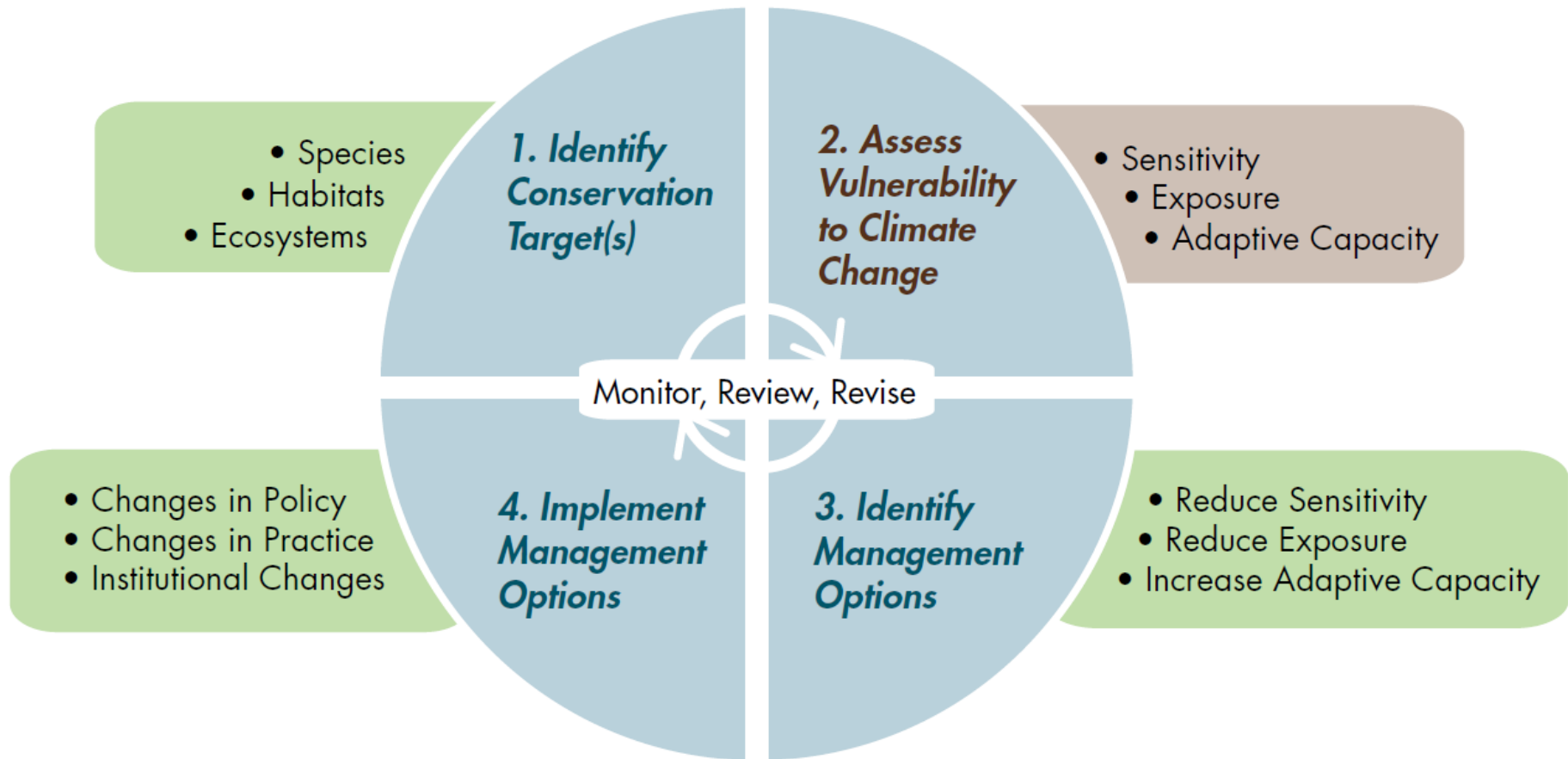
Components and Overview

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U.S. Fish and Wildlife Service
NCTC and the
California Landscape
Conservation Cooperative



Adaptation Framework

Overarching Conservation Goal(s)



Defining Vulnerability

Climate change vulnerability refers to the extent to which a species, habitat, or ecosystem process is susceptible to harm from climate change impacts

- *What* things are most vulnerable
- *Why* they are vulnerable



Why Assess Vulnerability?

Vulnerability assessments **can help:**

- Prioritize species and systems for management actions
- Develop management strategies to address climate change
- Efficiently allocate resources

What vulnerability assessments **do not:**

- Make a conservation decision for you



Key Steps for Undertaking a Vulnerability Assessment

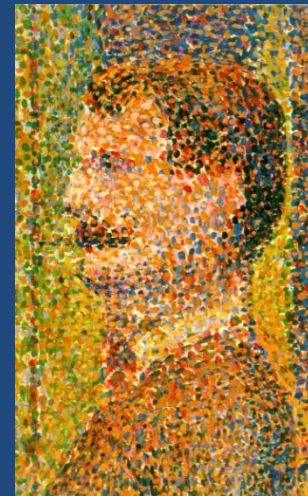
1. Determine objectives and scope
2. Gather relevant data and expertise
3. Assess the components of vulnerability
4. Apply assessment results in adaptation planning



Step 1:

Determine Scope & Objectives

- Audience and user needs
- Assessment targets
 - Species, habitats, ecosystems
- Scale
 - Temporal and spatial
- Appropriate approach
 - No “one size fits all”
- Project Management Triad
 - Time
 - Cost
 - Detail



Step 2: Gather Relevant Data & Expertise

- Review existing literature
- Reach out to experts
- Obtain/develop climate and ecological response projections
- Where you can find this information:
 - Climate Commons
 - TACCIMO

Both give information and data to you in an organized, digested fashion

Collaboration Station: The California Climate Commons

The Climate Commons homepage climate.calcommons.org



Document Library



Extensive but focused searchable library of documents and articles geared toward informing conservation.

vulnerability assessment



Doc	Doc Title	Doc Type	Doc Date
Document 1	Document 1 Title	Document 1 Type	Document 1 Date
Document 2	Document 2 Title	Document 2 Type	Document 2 Date
Document 3	Document 3 Title	Document 3 Type	Document 3 Date
Document 4	Document 4 Title	Document 4 Type	Document 4 Date
Document 5	Document 5 Title	Document 5 Type	Document 5 Date
Document 6	Document 6 Title	Document 6 Type	Document 6 Date
Document 7	Document 7 Title	Document 7 Type	Document 7 Date
Document 8	Document 8 Title	Document 8 Type	Document 8 Date
Document 9	Document 9 Title	Document 9 Type	Document 9 Date
Document 10	Document 10 Title	Document 10 Type	Document 10 Date

Featured Project: A Method for Assessing Climate Change Vulnerability of Rare Plants in California



Articles highlight the latest research, case studies, and climate change science concepts.

How can the Climate Commons assist your conservation project?

Data Catalog

Data relevant to applying climate change science to resource management can be discovered from a wide variety of sources. The Commons lets you see what's available and decide what's useful for your project.



Compare across resources, click on tags for instant search

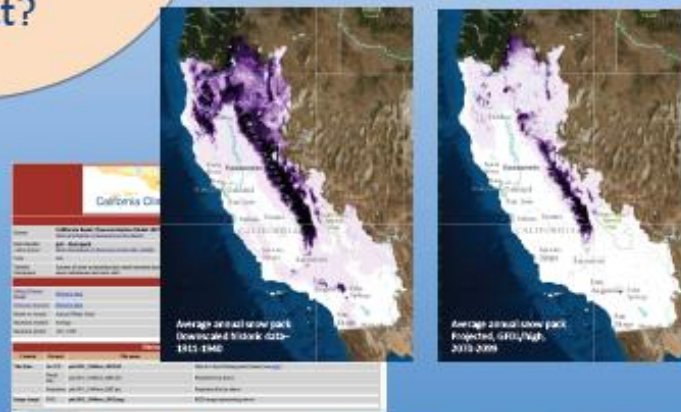


Catalog records describe the data and link to the source of the data and any related documents, websites, and tools.

Clicking on the type and theme keywords lets you find everything else with those tags.



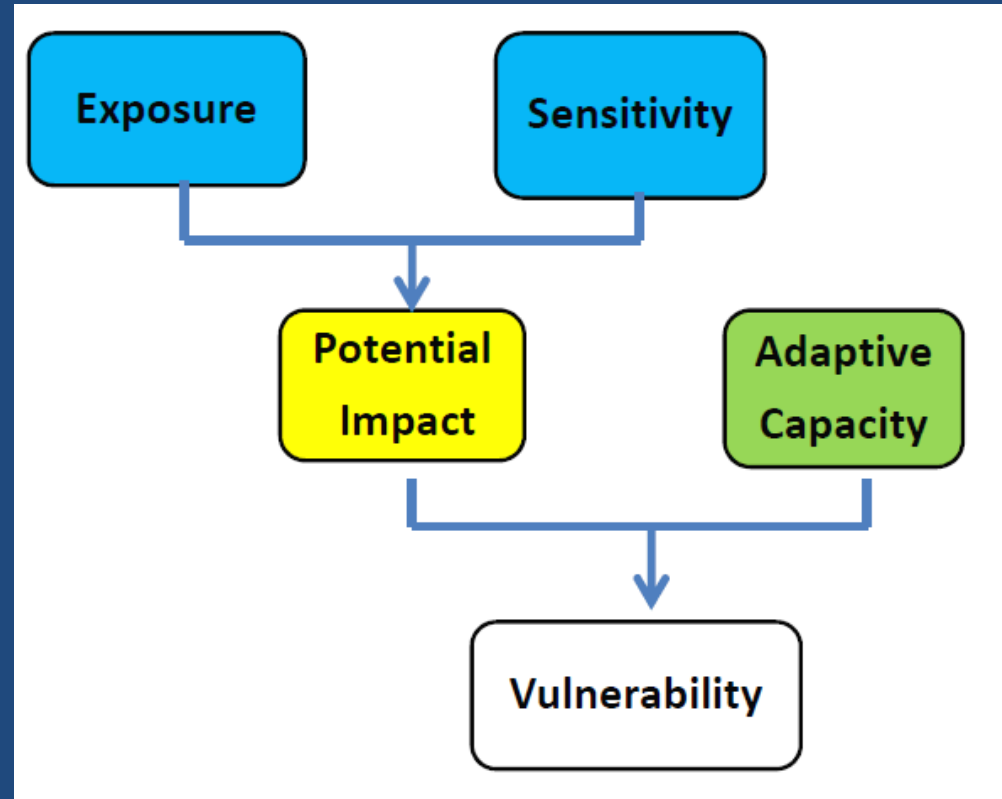
Access to Downscaled Climate Model Data



The Commons hosts data that was previously difficult to get because of size and complexity. The data may be downloaded with documentation with a free Commons account. A forum dedicated to the dataset lets you get answers from the data originator.

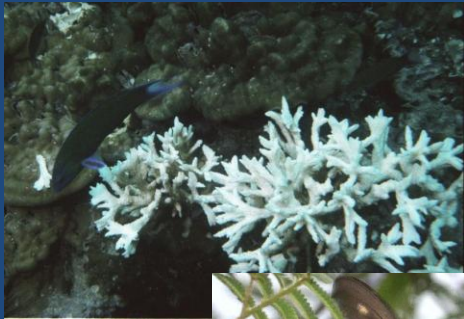
Step 3: Assess Components of Vulnerability

- Assess sensitivity, exposure, and adaptive capacity
- Estimate overall vulnerability
- Document confidence levels and uncertainties



Assessing Sensitivity

Measure of whether and how a species or system is likely to be affected by a given change in climate

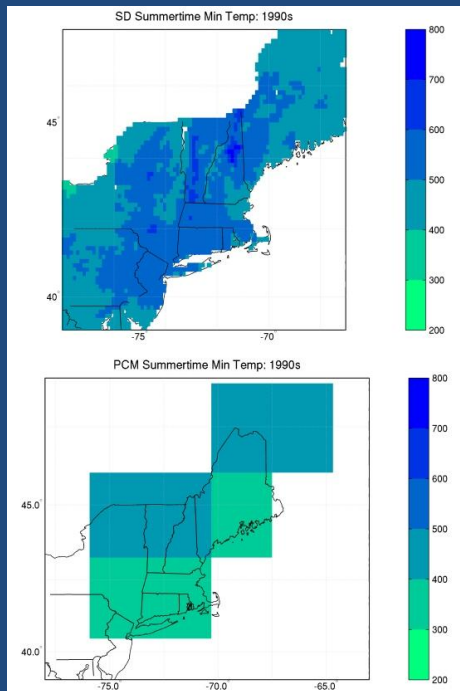


Factors affecting sensitivity of species, habitats, ecosystems:

- Specialized habitat or microhabitat requirements
- Narrow environmental tolerances or physiological thresholds
- Dependence on specific environmental triggers
- Dependence on interactions with other species

Assessing Exposure

Measure of how much of a change in climate or other environmental factor a species or system is likely to experience



Factors to consider when assessing exposure:

- **Climate models**
 - shifts in temperature, precipitation
 - Increasing availability of finer scale data (e.g., downscaling)
- **Ecological response models**
 - Sea level inundation
 - Climate related vegetation shifts
 - Landscape impediments to dispersal

Assessing Adaptive Capacity

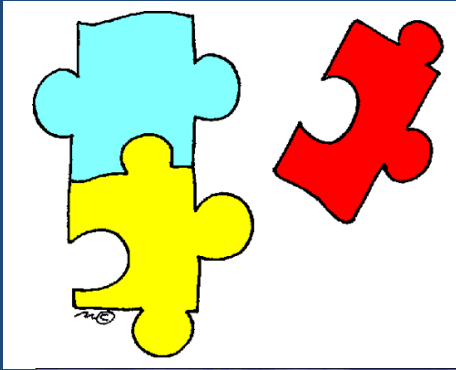
Ability to accommodate or cope with climate change impacts with minimal disruption



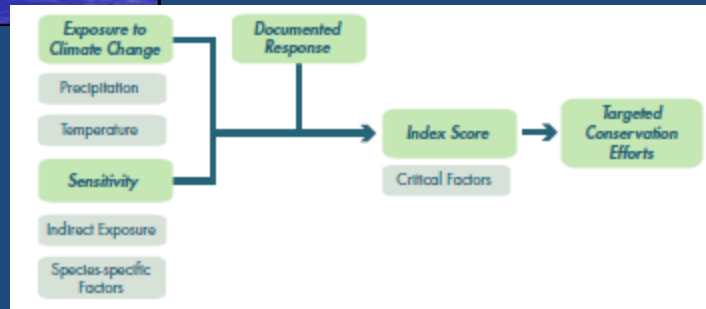
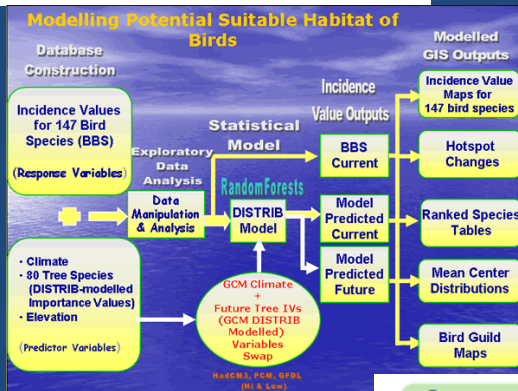
Factors that can influence amount of adaptive capacity of your system:

- Intrinsic factors
 - “Plasticity”
 - Dispersal abilities
 - Evolutionary potential
- Extrinsic factors
 - Existence of barriers to habitat migration
 - Loss of natural functions
 - Institutional capabilities

Putting the Pieces Together



- Detailed modeling efforts
 - In-house or commissioned
- Vulnerability indices
 - e.g., NatureServe Index
- Expert elicitation
 - Supplement and/or supplant modeling



Addressing Uncertainty

- Natural resource management has always faced uncertainty
 - Anxiety about uncertainty often leads to “analysis paralysis”
 - Don’t deny it, embrace it
- Three types of uncertainty
 - Climate predictions
 - Ecological responses
 - Management effectiveness
- Distinguish between uncertainty in trend vs. rate and magnitude



Likelihood Scale	
Terminology	Likelihood of the Occurrence/Outcome
Virtually certain	>99 percent probability of occurrence
Very likely	>90 percent probability
Likely	>66 percent probability
About as likely as not	33 to 66 percent probability
Unlikely	<33 percent probability
Very unlikely	<10 percent probability
Exceptionally unlikely	<1 percent probability

Step 4: Apply assessment results in adaptation planning

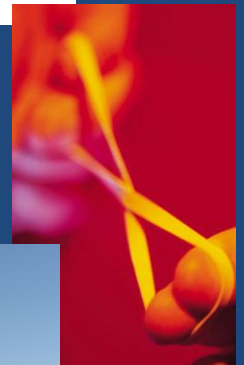
- **Reduce Sensitivity**
 - Example: Actively plant drought-tolerant species in an area projected to get drier
- **Reduce Exposure**
 - Example: Identify and protect cold water refugia
- **Enhance Adaptive Capacity**
 - Example: Remove coastal armoring to facilitate wetland accretion



Other Adaptation Questions

What if you can't reduce vulnerability?

- Do we still do what we are already doing to try to “buy time”?
- Do you decide to “let nature take its course”?
- Do you actively facilitate a transition to some new state?
- Should we change our conservation goals?





Sierra Nevada Vulnerability Assessment and Adaptation Strategy

USFS Region 5 Vulnerability Assessment Project

- About
 - Overall goal
 - Feeds into bioregional assessment as part of the Forest Plan revision
 - Main partners
 - Geographic scope
 - Funding sources, timeline



Project Objectives

- Assess the vulnerability of a suite of **focal resources** to climate change
- Identify **potential actions** that reduce sensitivity and exposure or enhance adaptive capacity of these resources
- Identify **implementable management responses** to climate change in the Sierra Nevada



Work Plan

1. Convene committees
2. Select focal resources
3. Vulnerability assessment workshop
4. Spatial analysis
5. Adaptation planning workshop
6. Finalize products



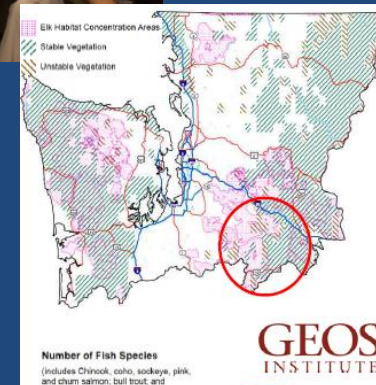
Planning Template (CAPT)

Statement: _____

national park system for the enjoyment, education, and inspiration of this and future generations.

the sequoia groves and high Sierra regions of the park; and its natural evolution, and to provide appropriate opportunities for the enjoyment of these resources.

Priority (total)	(Future) Conditions	(Vulnerabilities)	Thematic Strategies	Management Alternatives/Tools	Developmental Inputs
	TED	Identify each critical attribute vulnerabilities (exposure risk, sensitivity to changing conditions, ability to adapt to change)	Use the strategies Worktable to pick strategies relevant to each critical attribute objective	Identify relevant tools in the "tool box" For example, for fuels reduction your choices may be mechanical thinning, prescribed fire, wildfire, mow, plant fire resistant species, etc.	Stakeholder Value Legal mandates etc.
		Stressors Pick List: Air Pollution, Altered Fire Regime, Climate change, Loss of snowpack, Sustained drought, Flood events, Invasive Species, Pathogens, Blister rust, Other Diseases	Change Adaptation Strategies Pick List: Do nothing Manage for Persistence: Resist change Build resilience Manage for Change: Facilitate		



Vulnerability Assessment Workshop

When: March 5-7, 2013

Where: California LCC, Modoc Hall, Sacramento
State University

Participants: Land managers, planners, natural
resource specialists, science and community
partners, conservation practitioners

For more information contact:

Jessi Kershner, jessi@ecoadapt.org

More Resources

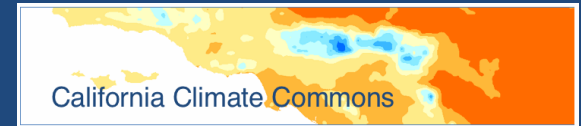
- California LCC

www.californialcc.org



- Climate Commons

climate.calcommons.org

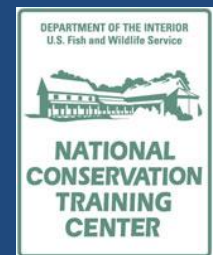


- TACCIMO

www.taccimo.sgcp.ncsu.edu



- NCTC Climate Change Learning Center



- Scanning the Conservation Horizon:
Guide to Vulnerability Assessment

