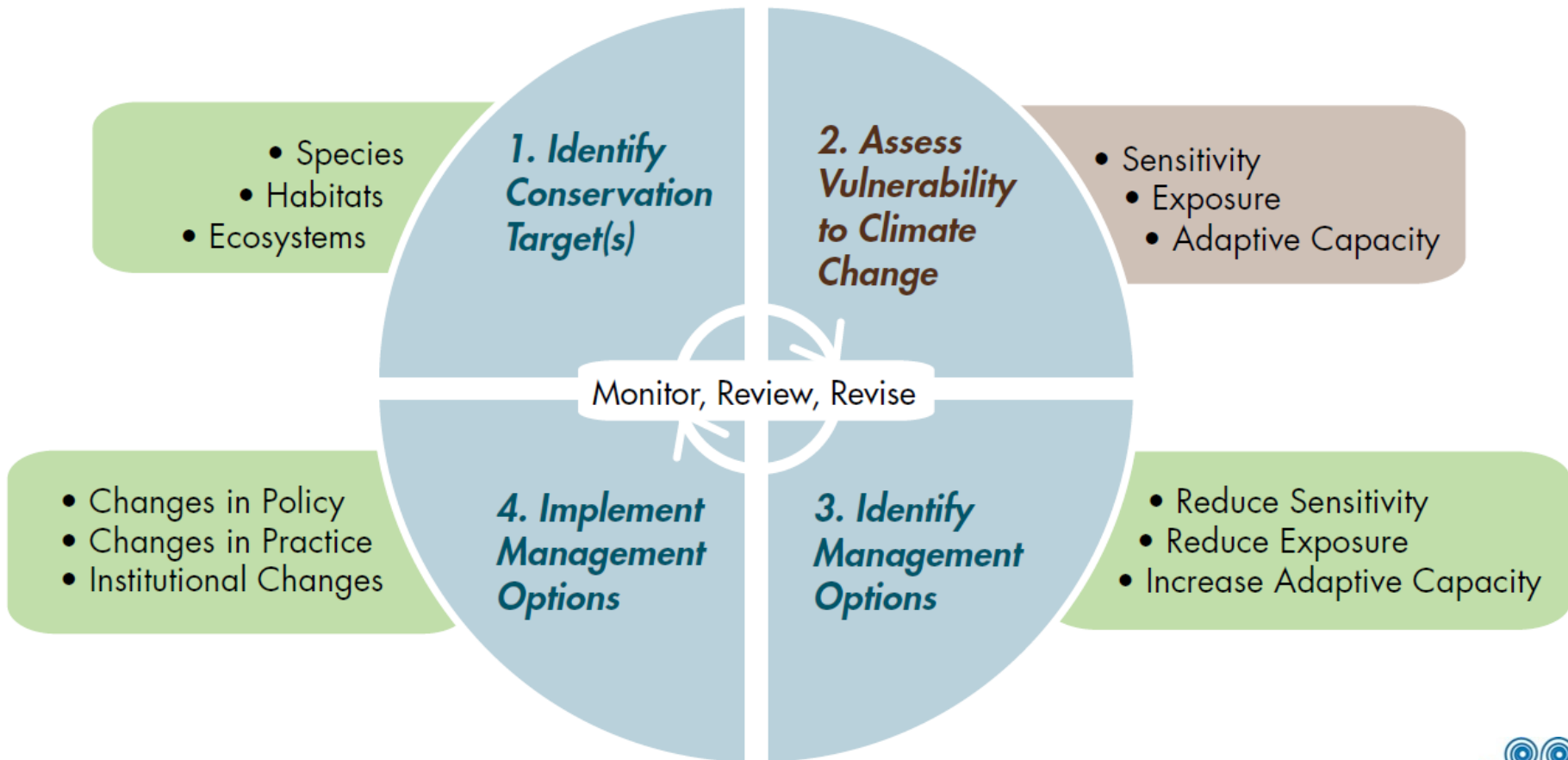


# Moving from Vulnerability to Adaptation



# Adaptation Planning Framework

## Overarching Conservation Goal(s)



# Defining Adaptation

**Adaptation** refers to efforts to reduce the negative effects of or respond to climate change



**Adaptation actions** explicitly incorporate climate considerations, and aim to alleviate the impacts of climate change by increasing resilience and/or decreasing vulnerability.



# Vulnerability



## Adaptation Strategies



**Resistance**



**Resilience**



**Transition**

**Increase Knowledge**

**Engage Coordination**

# Resistance Strategies



**Prevent** the effects of climate change from reaching or affecting you.

## Examples:

- Manage forest vegetation, and reduce fire severity and patch size
- Increase proactive management to prevent invasive weeds
- Reduce erosion potential to protect municipal water supplies
- Identify and protect aquifer recharge zones



# Resilience Strategies



**Weathering** the impacts of climate change by avoiding the effects of or recovering from changes.

## Examples:

- Repair, replace, and reroute trails and trail bridges to increase resilience to higher peak flows
- Promote native genotypes and adapted genotypes of native species
- Employ a risk-diversification approach to forest management and silvicultural practices



# Transition Strategies



**Intentionally** accommodate change and enable resources to adaptively respond to changing and new conditions.

## Examples:

- Facilitate change to desired species assemblages
- Promote connected landscapes that can facilitate species migration along climatic gradients
- Identify and protect refugia
- Accept loss of recreation sites and/or adjust the timing or route of access



# Applying Vulnerability Assessment Results in Adaptation Planning

- **Reduce Sensitivity**

- *Example:* Actively plant drought-tolerant native species in an area projected to get drier (*resilience*)



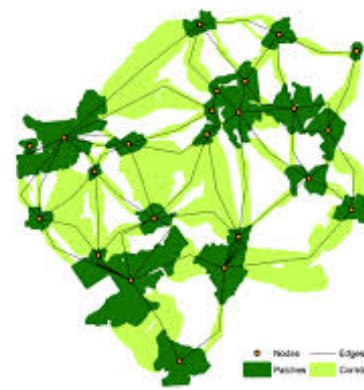
- **Reduce Exposure**

- *Example:* Replant riparian vegetation to limit water temperature increases (*resistance*)



- **Enhance Adaptive Capacity**

- *Example:* Support connectivity across the landscape between different populations (*transition*)



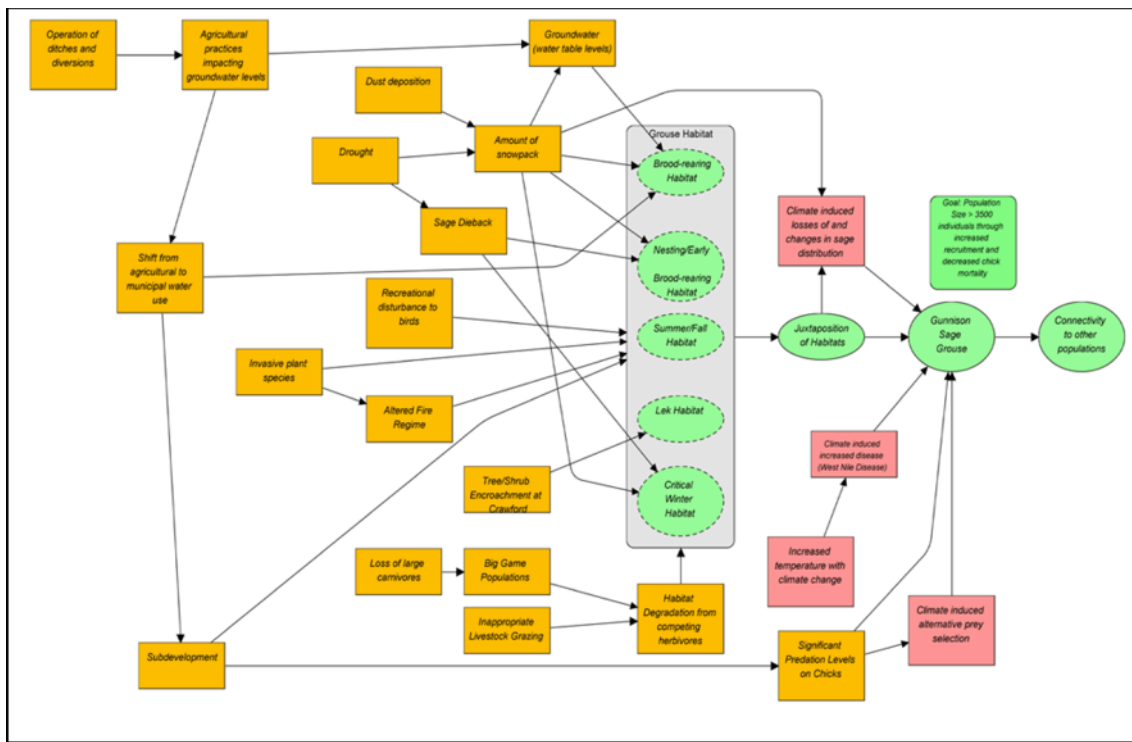


# Case Study #1: Gunnison Basin sage-grouse



↑ Temperature, Drought, Erosion

↓ Water table



Built a conceptual model to diagram factors that affect Gunnison sage-grouse population size and habitat condition



# Goal: Build wet meadow resilience for sage-grouse

↑ Temperature, Drought, Erosion  
↓ Water table

## Priority adaptation strategies

1. Retain water in most vulnerable brood-rearing habitats
  - Permanently tie water to land via easements
  - Improve irrigation practices
  - Restore seeps, springs; remove headcuts, gullies; raise water table
2. Improve and restore nesting and wintering habitats
  - Improve/re-establish leeward mtn shrub habitats via fencing, planting
  - Maintain and expand perennial grass and forb cover
  - Abate/prevent cheatgrass encroachment
3. Improve zoning laws and other policy options to protect habitat and maintain land uses
  - Transfer development rights
  - Protect habitats via subdivision planning



# Goal: Build wet meadow resilience for sage-grouse



↑ Temperature, Drought, Erosion

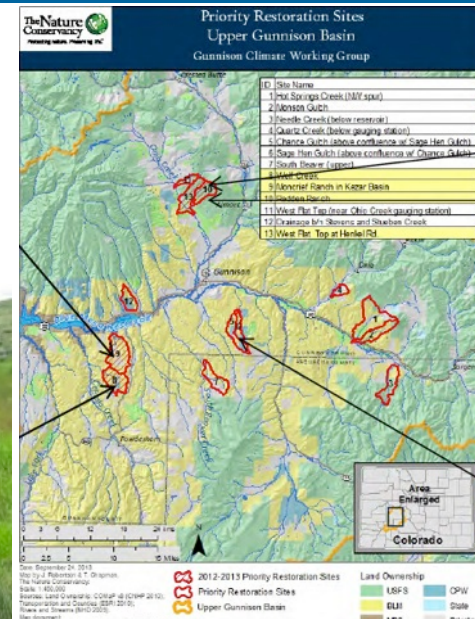
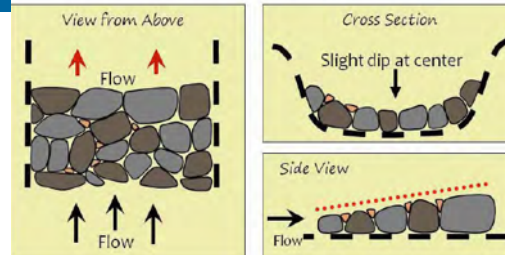
↓ Water table

## Actions

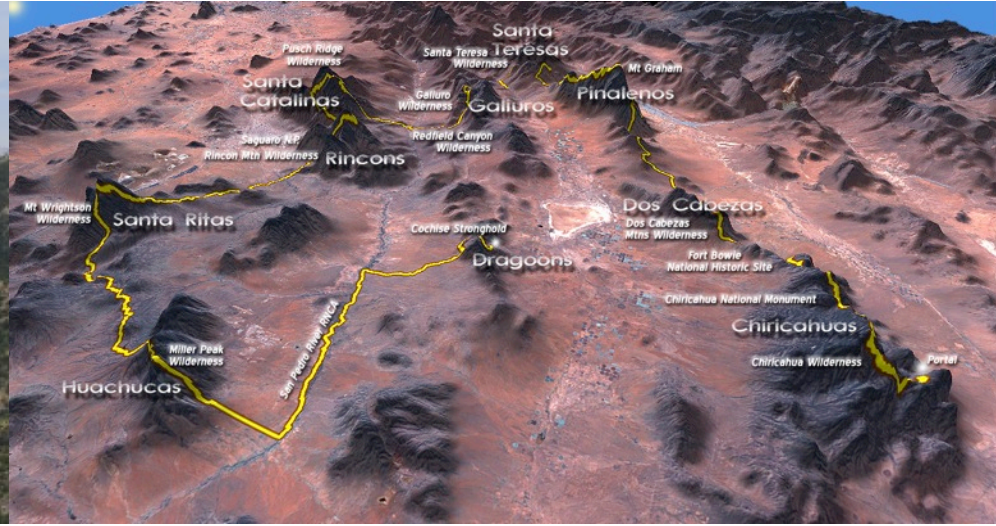
- One rock dams
- Media Luna
- Monitoring

### One Rock Dam

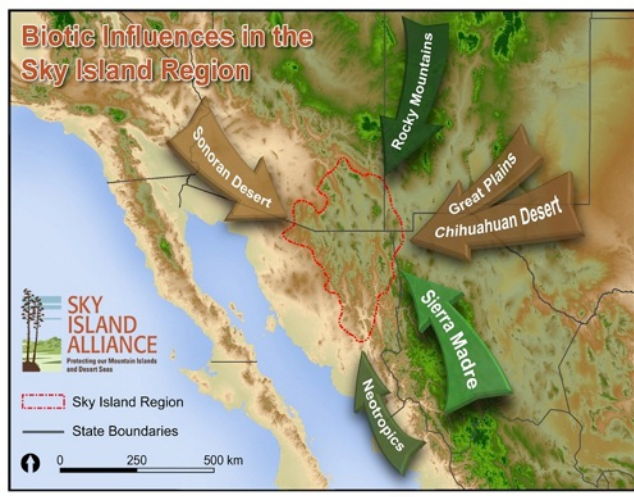
= 1 rock high + uniform surface



# Case Study #2: Seeps & springs in the Sky Islands



↑ Fire, Air Temperatures, Drought      Altered Precipitation Patterns



# Goal: Restore seeps and springs in the Sky Islands

↑ Fire, Air temperature, Drought  
Altered precipitation patterns



## Priority adaptation strategies

1. Create climate-smart spring restoration methodologies
  - Develop a springs restoration manual and conduct trainings on its use
2. Restore upland habitat to increase recharge and decrease erosion (include fire considerations)
  - Assess upland grazing management for spring benefit/detriment
  - Adapt prescribed fire planning to consider springs locations
  - Conduct springs assessments ahead of planned restoration treatments
3. Improve infrastructure at spring sites to conserve water and provide habitat
  - Identify and implement evaporation-reducing devices for cattle tanks
  - Repair/restore infrastructure to conserve water
  - Identify springs where renovation or improvement of agriculture water sources help take pressure off springs as water source



# Goal: Restore seeps and springs in the Sky Islands



## Actions



- Conducted spring inventories and assessments using trained volunteers and professional staff and instituted a citizen scientist “Adopt-A-Spring” monitoring
- Repaired a spring-fed pond and installed native plants
- Installed fencing around perennial spring on private property
- Installed wildlife entry/exit ramps at developed springs for endangered frogs
- Developed a spring restoration guidebook for the region

# Questions?

More examples available at  
[CAKEx.org](http://CAKEx.org)

