SOUTHERN ROCKIES
Landscape Conservation Cooperative

WELCOME!

Four Corners and Upper Rio Grande Vulnerability Assessment Webinar Series

- ✓ Phone audio: Dial: 866-620-8138; Passcode: 5952203#
- ✓ Mute your phone and turn off computer speakers (prevents echo issue).
- ✓ Introduce yourself in the chat box.
- ✓ Webinar recordings will be posted on the Southern Rockies LCC website.

United States Department of Agriculture

SOUTHERN ROCKIES
Landscape Conservation Cooperative

Webinar 2:
Results of a Vulnerability Assessment for Elk and Mule Deer in the Four Corners and Upper Rio Grande Landscapes

Megan Friggens, Rocky Mountain Research Station

Tzeidle Wasserman, Ecological Restoration Institute

Agenda

Introduction to Four Corner and Upper Rio Grande Assessments

5 minutes

Methods

15 minutes

Focal Resource Results

30 minutes

Takeaways

5 minutes

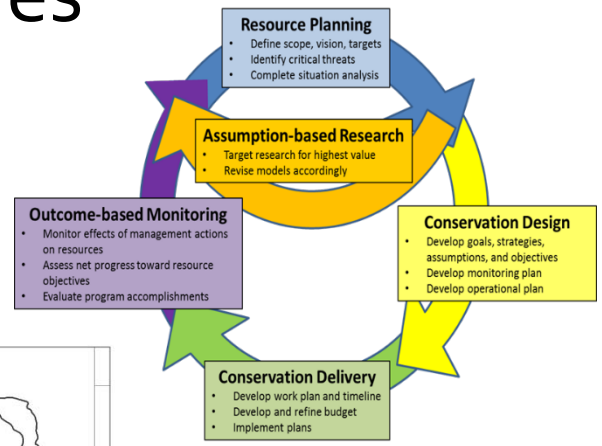
Q&A

10 minutes

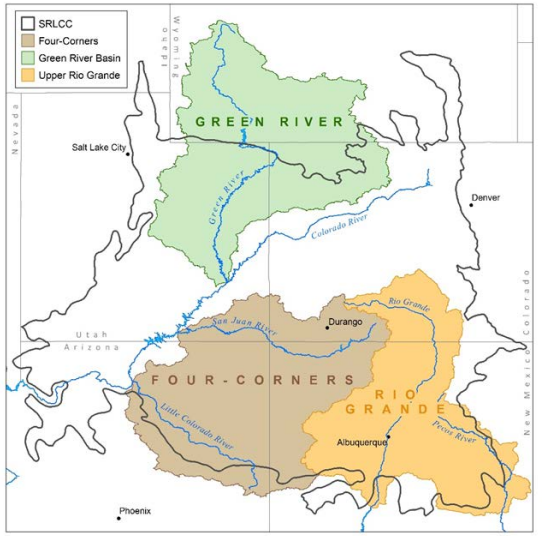
Goals for This Webinar

- Provide overview of assessment results
- Identify additional datasets/needs
- Incorporate feedback from today's discussion in preparation for upcoming Adaptation Forums

The SRLCC has engaged an adaptive management framework to collaboratively develop shared conservation objectives and landscape scale adaptation strategies

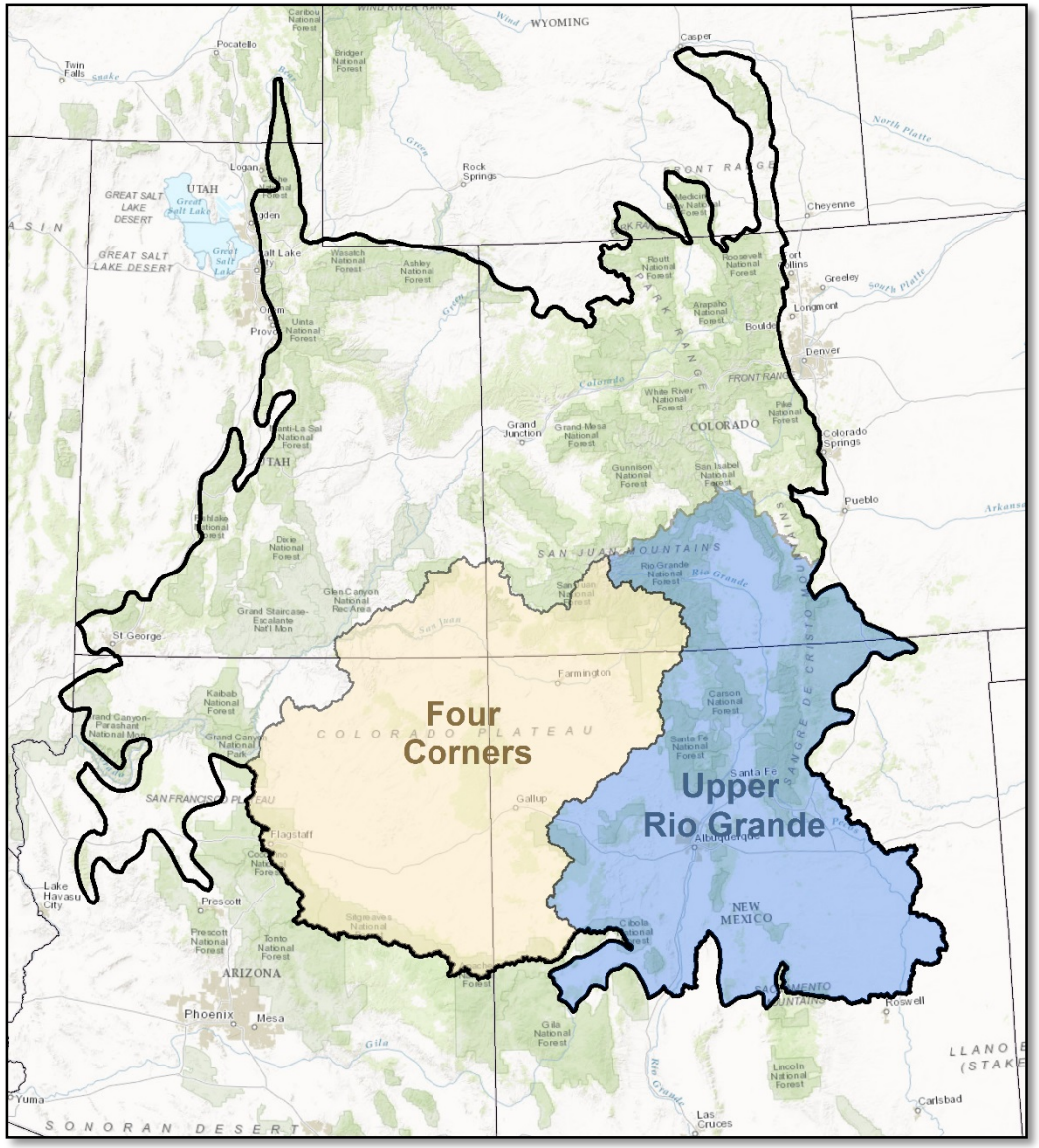


- Identified Focal Resources and Landscapes
- Partnered with RMRS to create Vulnerability Assessments for Focal Resources in Two Landscape
  - Spring 2016 Adaptation Forums
  - Fall 2017 Adaptation Forums



Focal Resources in 2 Landscapes

1. Streamflow/ Native Fish/ Riparian Corridors
2. Mule Deer & Elk
3. Pinyon-Juniper Woodlands
4. Sage-Steppe Habitat



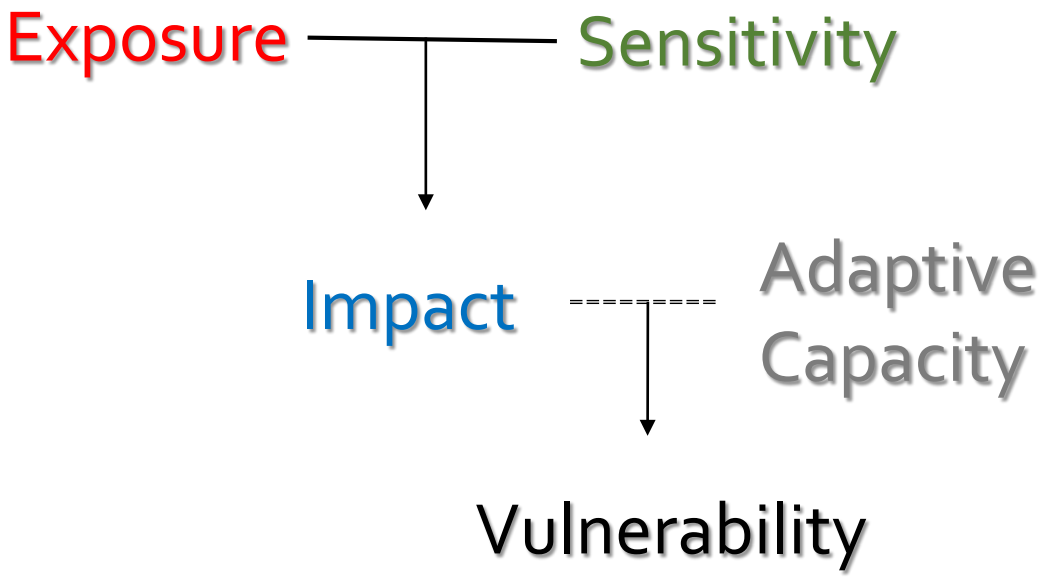
Methods

Framework for Landscape Level Vulnerability Assessment of Focal Resources

VA Element	Definition	Example Spatial Data/Indicators
Exposure	External threat to the target species, system, or place	• Human impacts • Natural disturbances • Climate change
Sensitivity	Qualities that make the target more susceptible to negative impacts from disturbance or threat	• Traits/Conditions associated with increased negative response • Indicators of potential cost of disturbance
Adaptive Capacity	The ability of the target to cope with disturbance or threat	• Traits/conditions associated with resilience • Potential for management intervention

Steps to Quantify Vulnerability

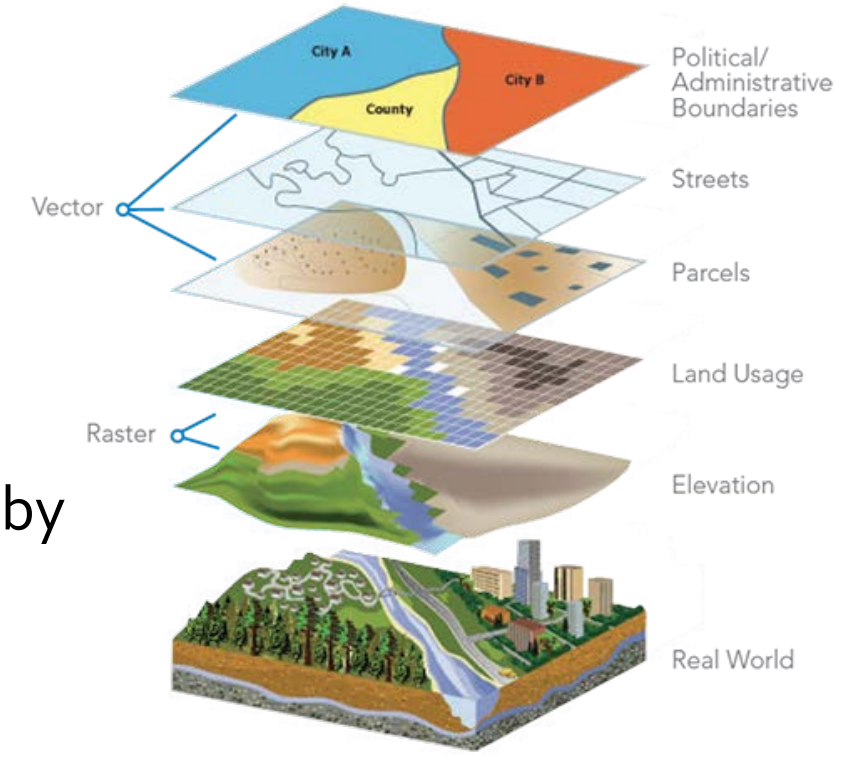
1. Gather data
   - Assess Relevance
   - Assign to Element
2. Create indices
3. Combine E, S, and AC indices to estimate Vulnerability



Step 1. Gather Data

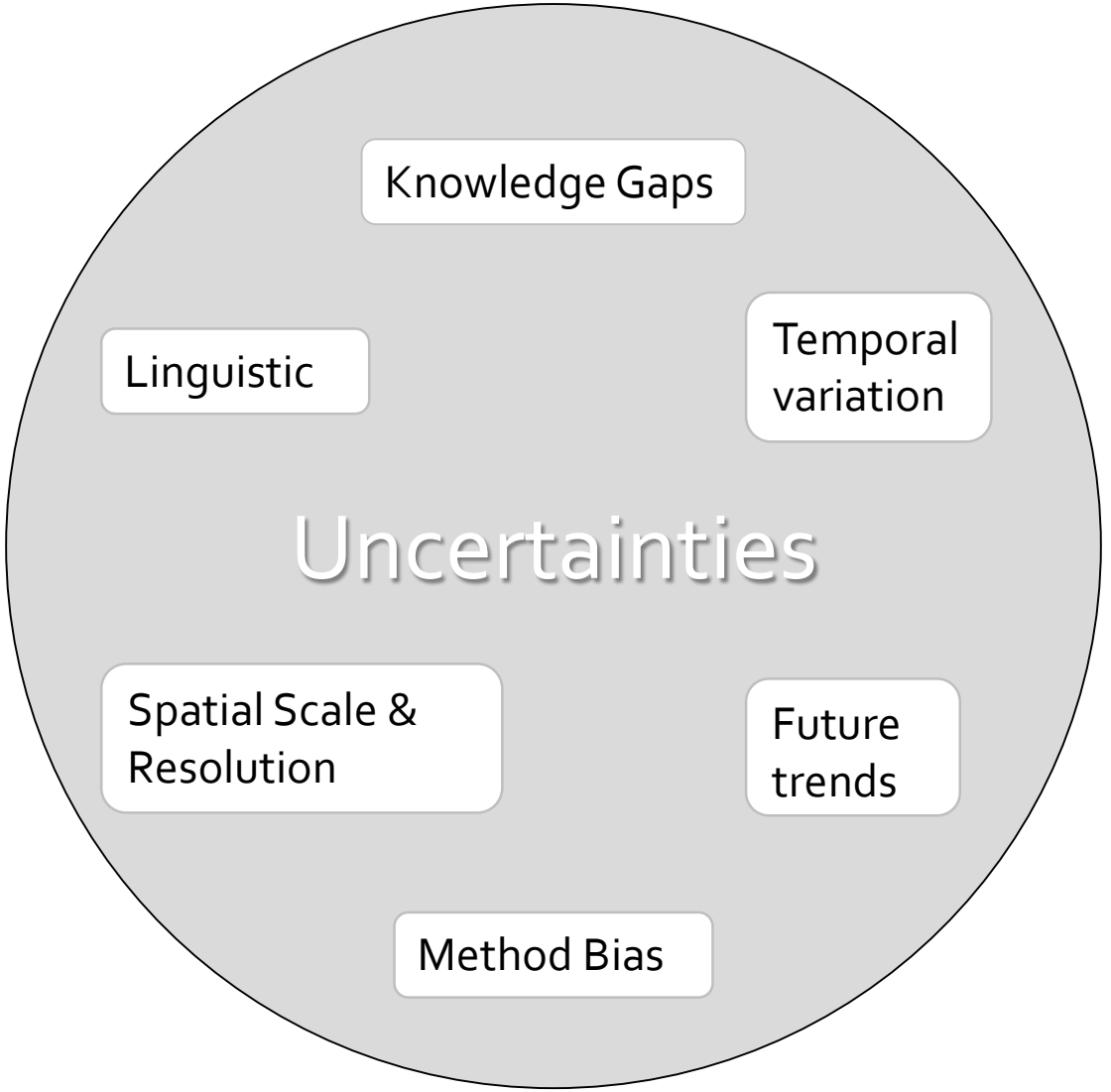
Criteria:

- Spatially explicit
- Available across focal landscape
- Meaningful
- Measurable uncertainty
- Tried to find datasets used and or produced by LCC stakeholders



Challenges with combining existing data

- Resolution and scale of datasets differ and may not match management needs
- Uncertainties and assumptions of underlying datasets
- Uncertainties related to climate projections



Step 2: Indices

1 + 1 + 1 + 1 = Cumulative score

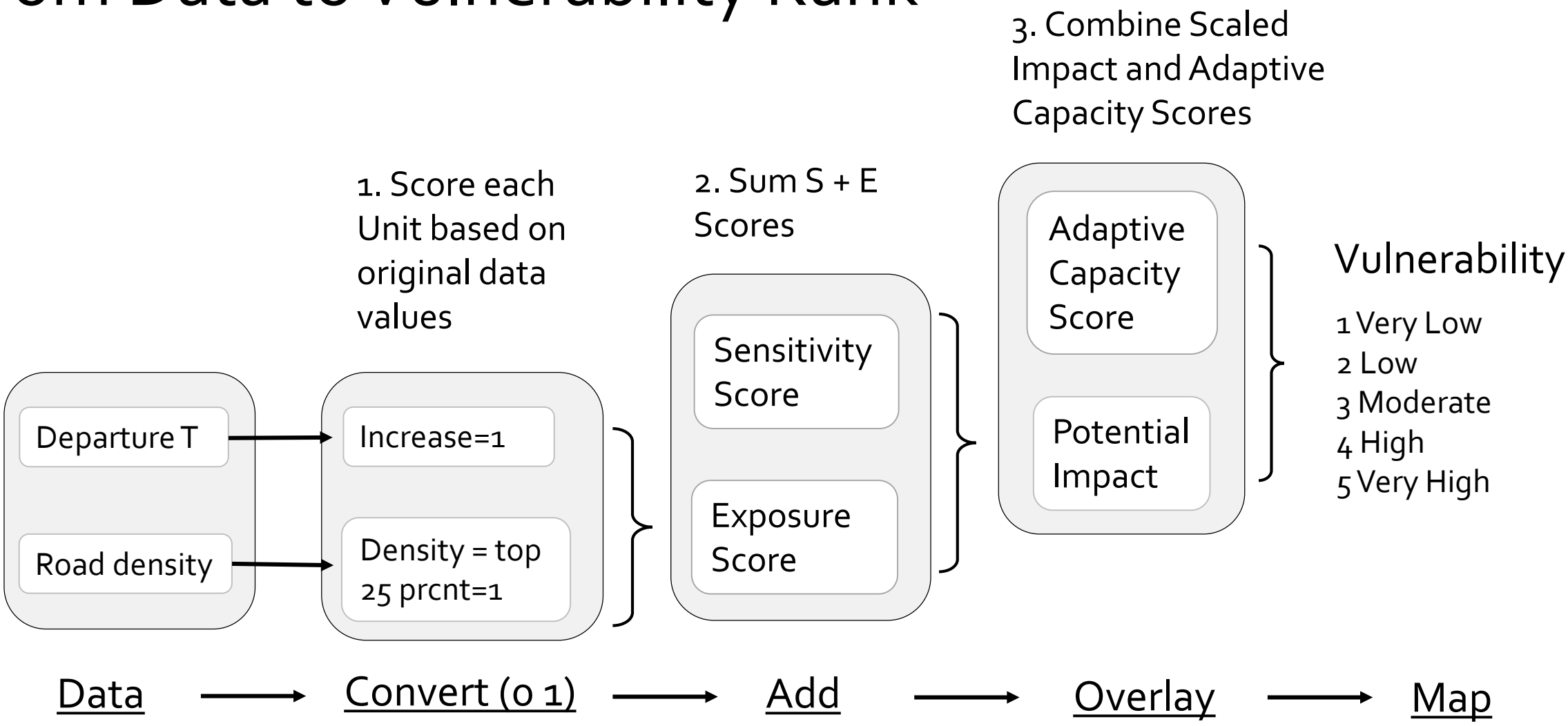
Pros

- Easy to interpret
- Easy to manipulate on the fly
- Are able to identify relative differences and more complicated interactions

Cons

- May be biased and/or misleading
- Not considering differential impacts
- Assumes equal certainty and quality of underlying data

From Data to Vulnerability Rank

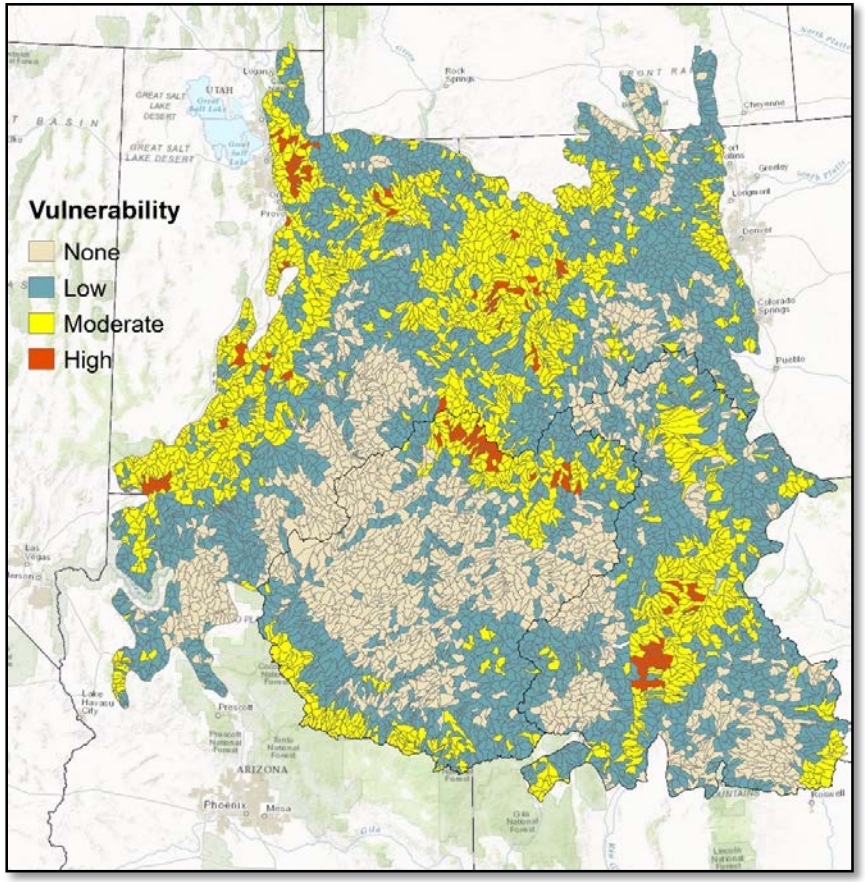


Step 3. Visualize Vulnerability

Vulnerability		Impact (E+S) Value				
Adaptive Capacity		1	2	3	4	5
	1	11	12	13	14	15
	2	21	22	23	24	25
	3	31	32	33	34	35
	4	41	42	43	44	45
	5	51	52	53	45	55

Vulnerability

Lowest
Very Low
Low
Moderate
High
Very High

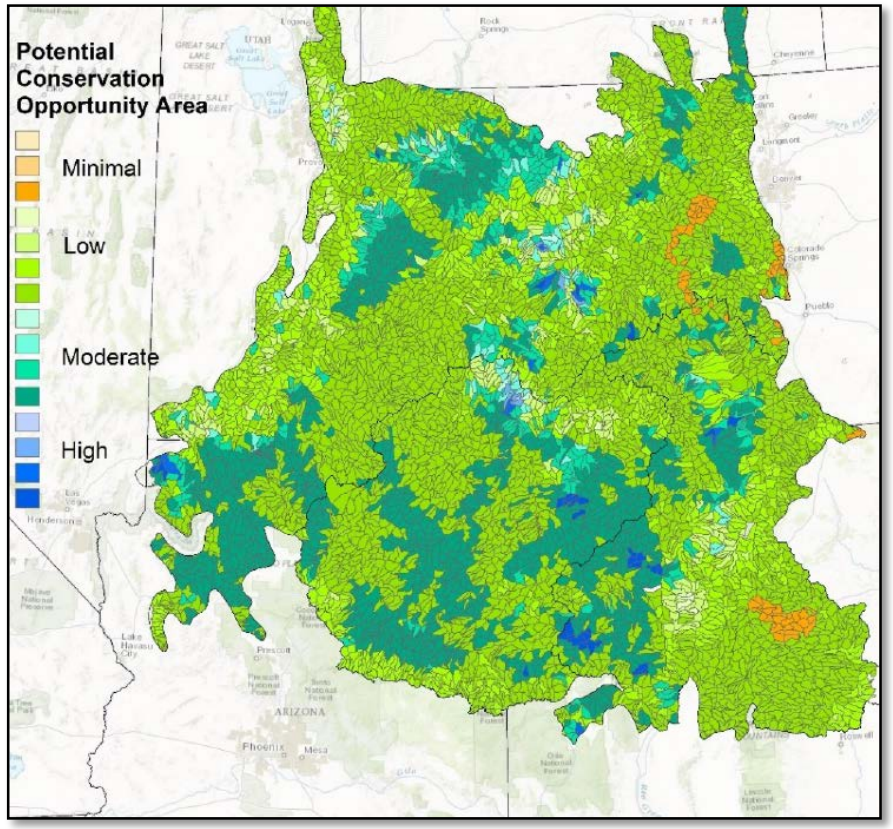


Highlight Opportunities

Opportunity		Adaptive Capacity				
		1	2	3	4	5
Impact	1	11	21	31	41	51
	2	12	22	32	42	52
	3	13	23	33	43	53
	4	14	24	34	44	54
	5	15	25	35	45	55

Opportunity

	Lowest
	Intermediate
	Highest



Assessment Results

Elk & Mule Deer: Background

- Widely distributed across focal area
- Diverse habitat types within SRLCC

- Mostly habitat generalists
- Wide range of habitats occupied (elevational gradient)
- Winter and Summer Range important

- Seasonal migration

- Sensitive to:
  - development (esp. on winter range)
  - changes in forage quality and availability
  - habitat fragmentation

Mule Deer (*Odocoileus hemionus*)

- Widely distributed across West (AK to MX)
  - Diet composed mostly of shrubs
  - Early seral habitat important
  - Need thermal cover

<u>Population fluctuations</u>

- 1860's: Settlement of West & Livestock grazing = overgrazing, changed forage, decreased pops
- Fire and wet years produces high quality forage = pop's rebounded by 1950's
  = competition of resources & lower carrying capacity on landscape

<u>Factors impacting pops:</u>

- fire suppression = habitat changes
- Gas, oil, mineral exploration fragmented habitat
- Urbanization impacts
- Drought impacts

Elk (*Cervus elaphus*)

- Forage on grasses and forbs
- Larger body size, dietary range

  =Competitive advantage
- Occupy an elevational range of habitats
- Can withstand deeper snow
- Fire suppression has changed habitat availability
- Prefer a mosaic of mid to late seral conditions interspersed with openings
- Need thermal cover

Data used

Exposure

1. Development & Infrastructure
2. Change in Development
3. Decrease in winter precipitation
4. Soil/Vegetation vulnerability (Effects of drought)

Sensitivity

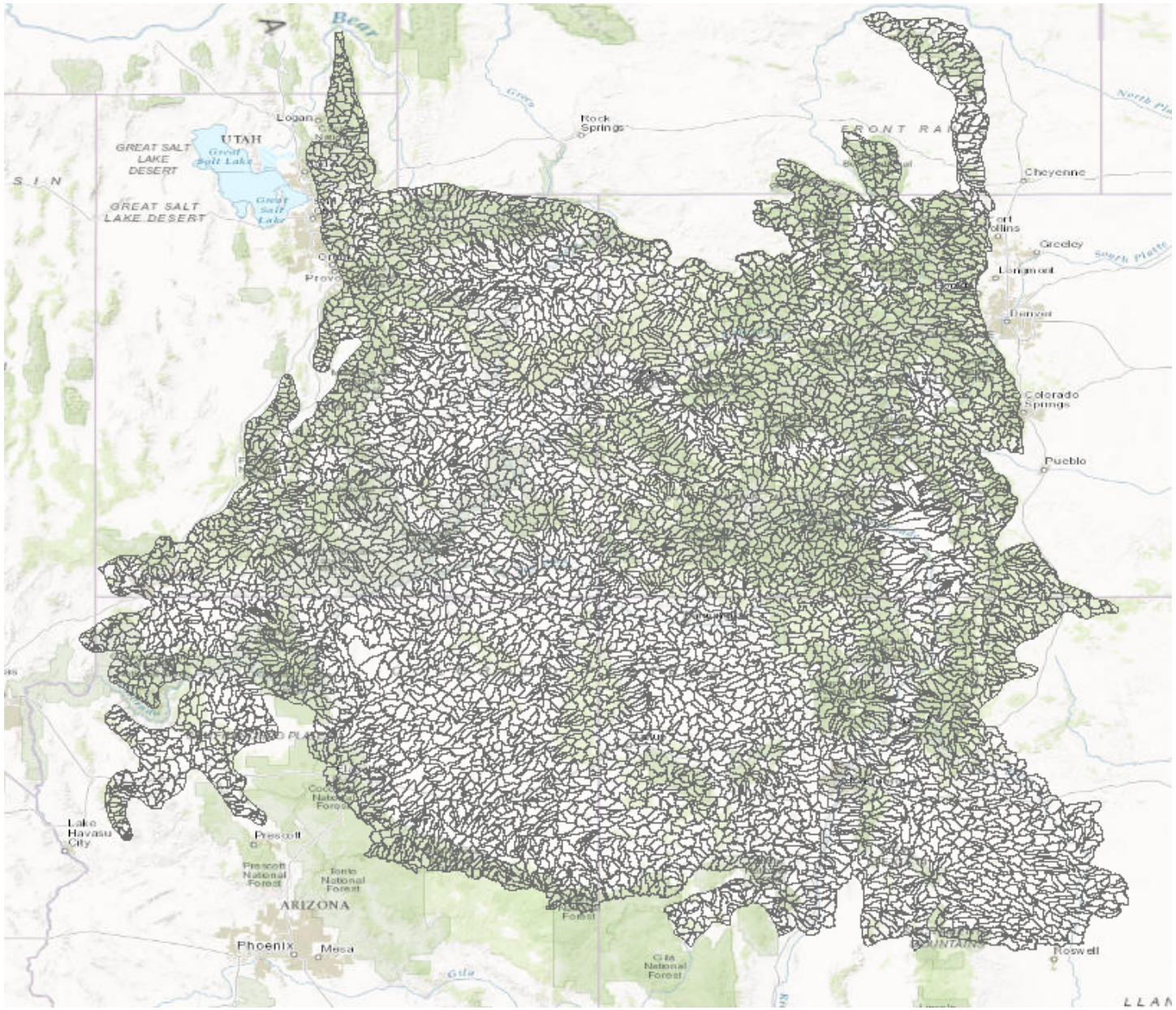
1. Roads
2. Urbanization/ Impervious Surface
3. Vegetation Cover (%)
4. Summer Range (area)
5. Winter Range (area)

Adaptive Capacity

1. Winter Precipitation
2. Water Availability
3. Vegetation & Thermal Cover
4. Pinyon-Juniper Woodlands habitat

Unit if Analysis

Watershed HUC 12



Relevant data not included in analysis

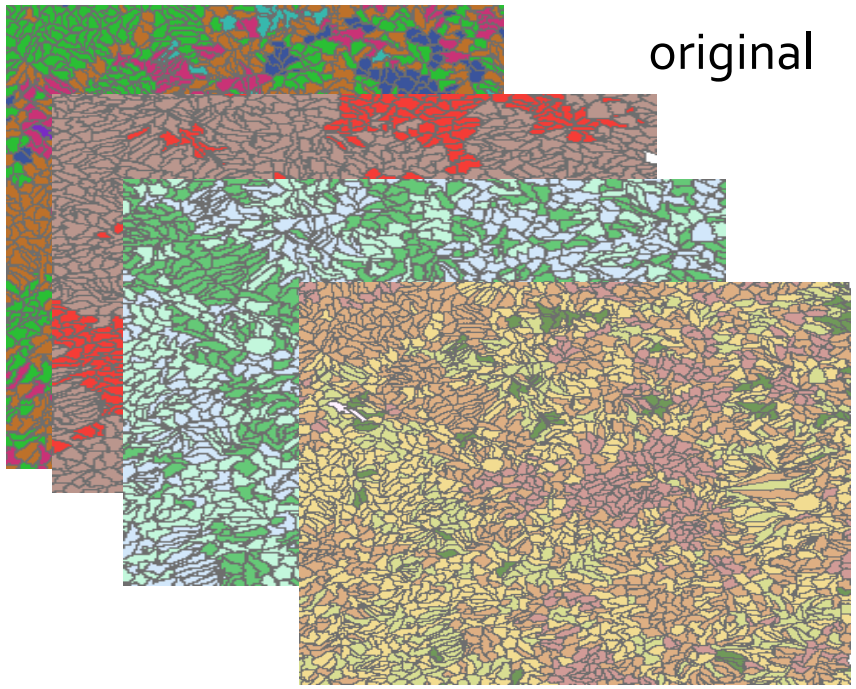
Data/Indicator	Reason
• Invasive species: Cheatgrass presence	Coverage incomplete/incompatible
• Snowpack: depth & timing of runoff	Not yet incorporated
• Chronic wasting disease	Coverage incomplete/incompatible
• Phenology: timing, NDVI, greenness	Exploring Climate Velocity Datasets
• Fencing	Coverage incomplete/incompatible
• Riparian Vulnerability	Not yet incorporated

Data: Exposure

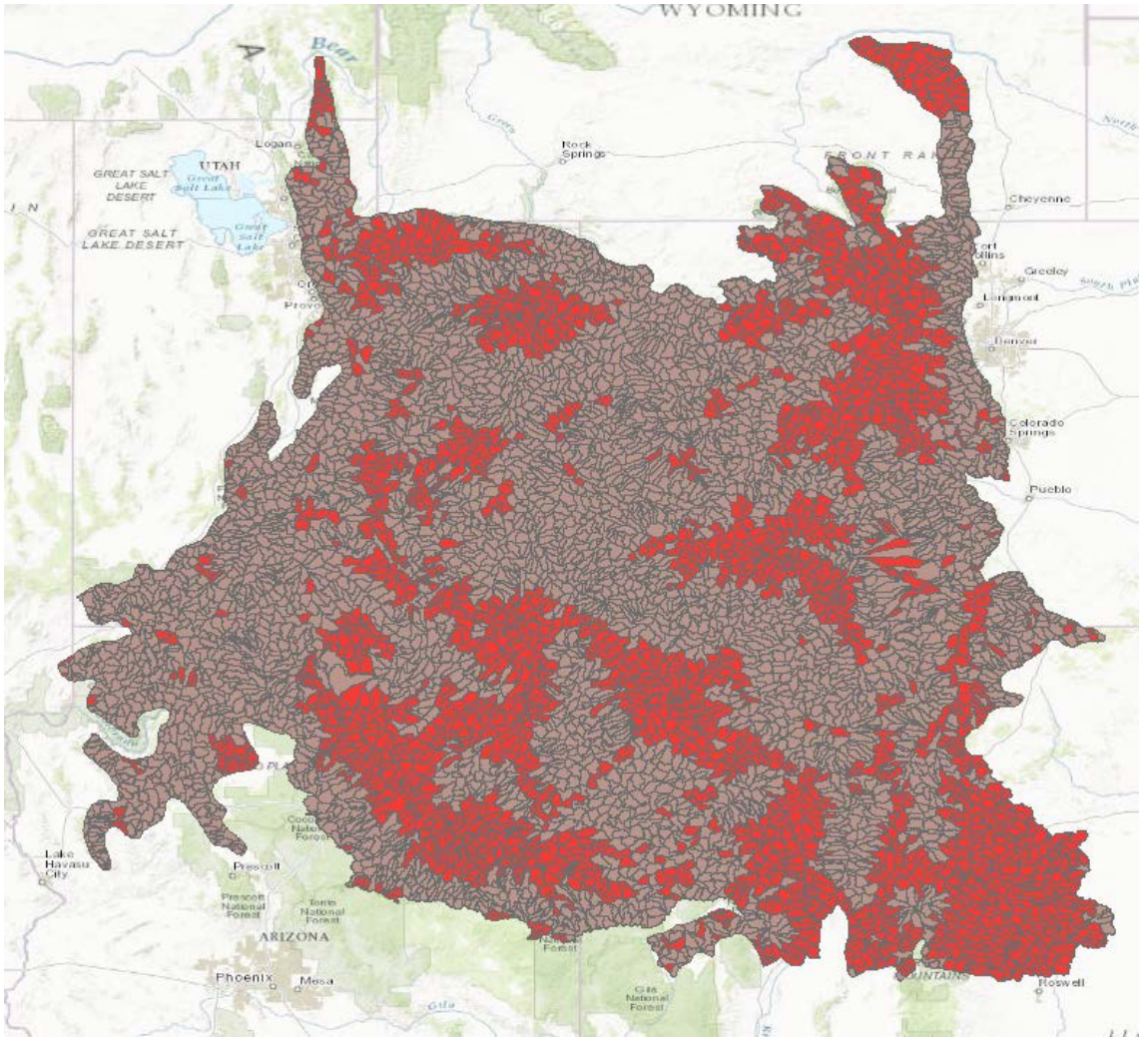
		% affected	
Description	**How used**	**FC**	**URG**
Development med-high (NLCD 2011)	If present =1	37	34.8
Change in Development 2040 (USGS 2014)	Increase =1	3	6.6
Winter precip 2040 (Rehfeldt 2030 ensemble)	Decrease = 1	81.5	29
Soil Vulnerability/Veg change (Peterman et al. 2015)	Change =1	55.5	49.4

Exposure Indicators: Individual data

original



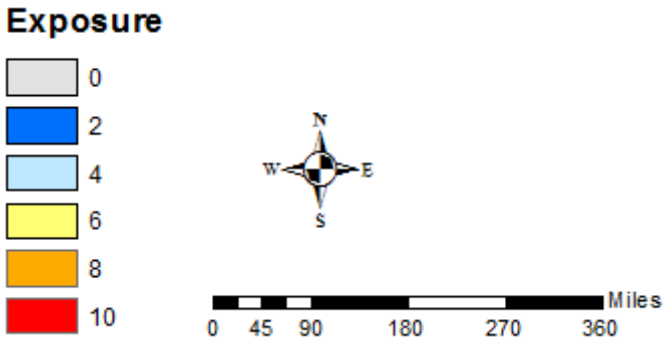
Binary Map 0-1 for each variable

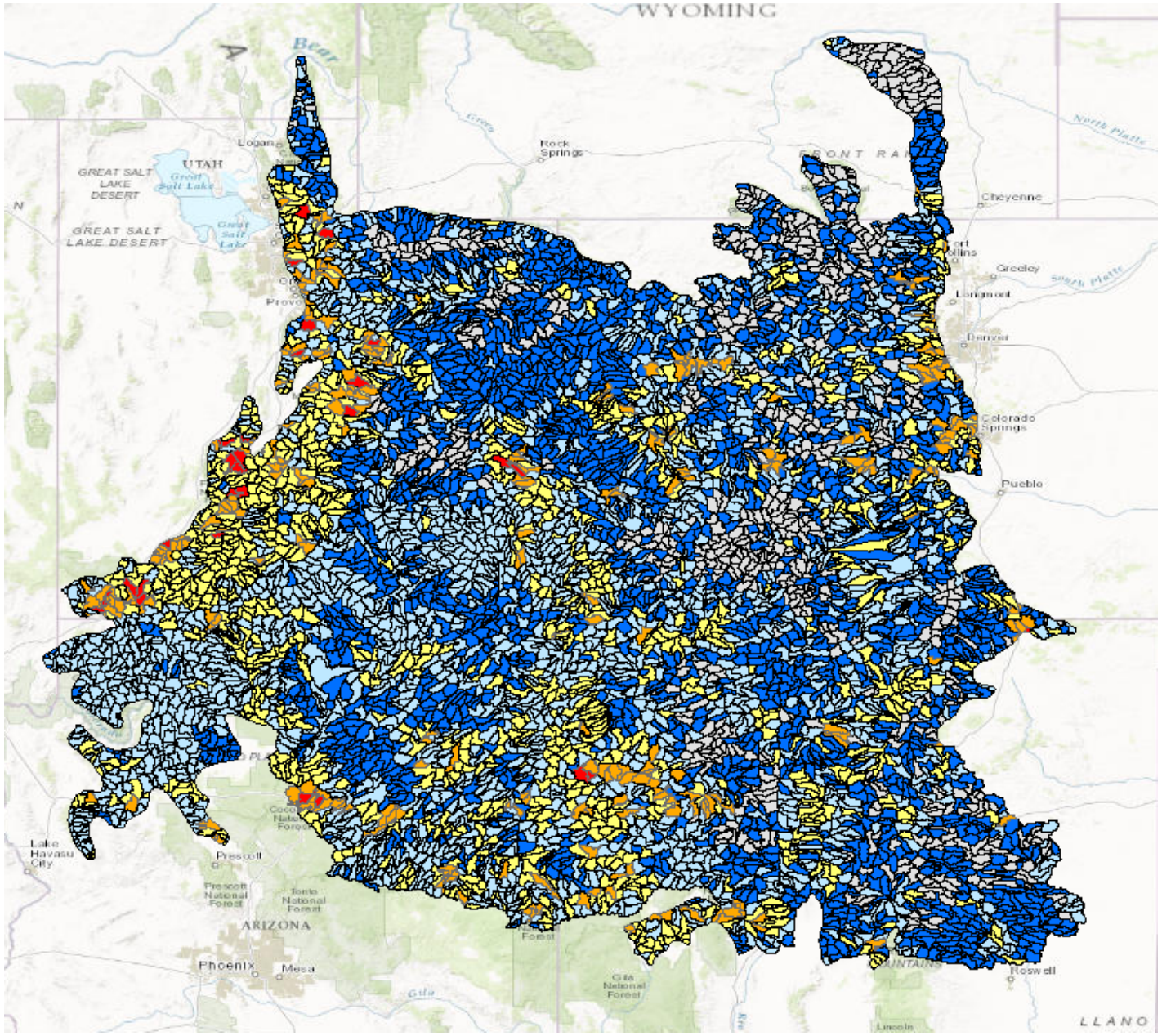


Cumulative Exposure

Development + Imperviousness + Winter precip + Soil Vulnerability

1 +1+0+1

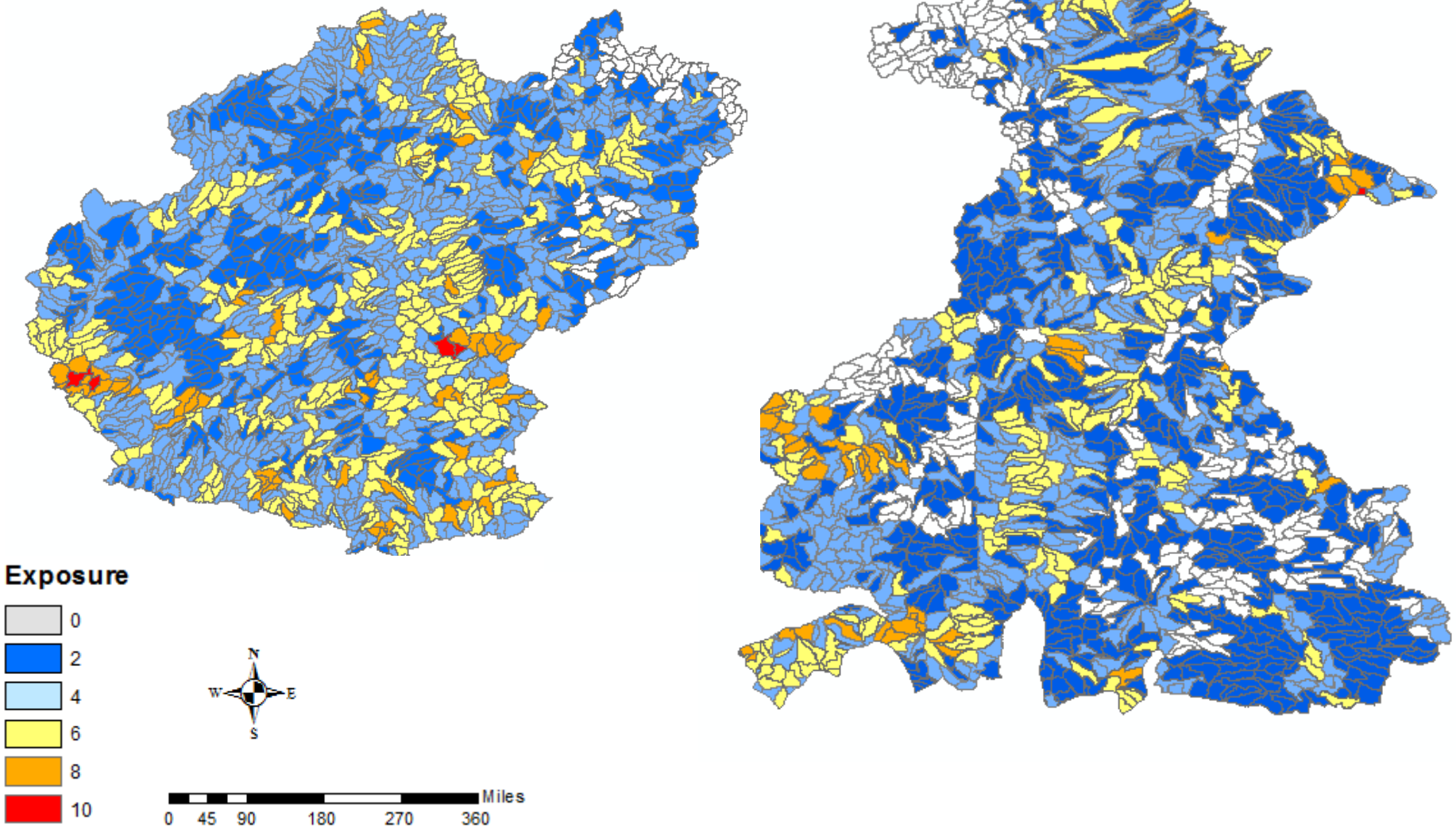




Cumulative Exposure Index

FC

URG

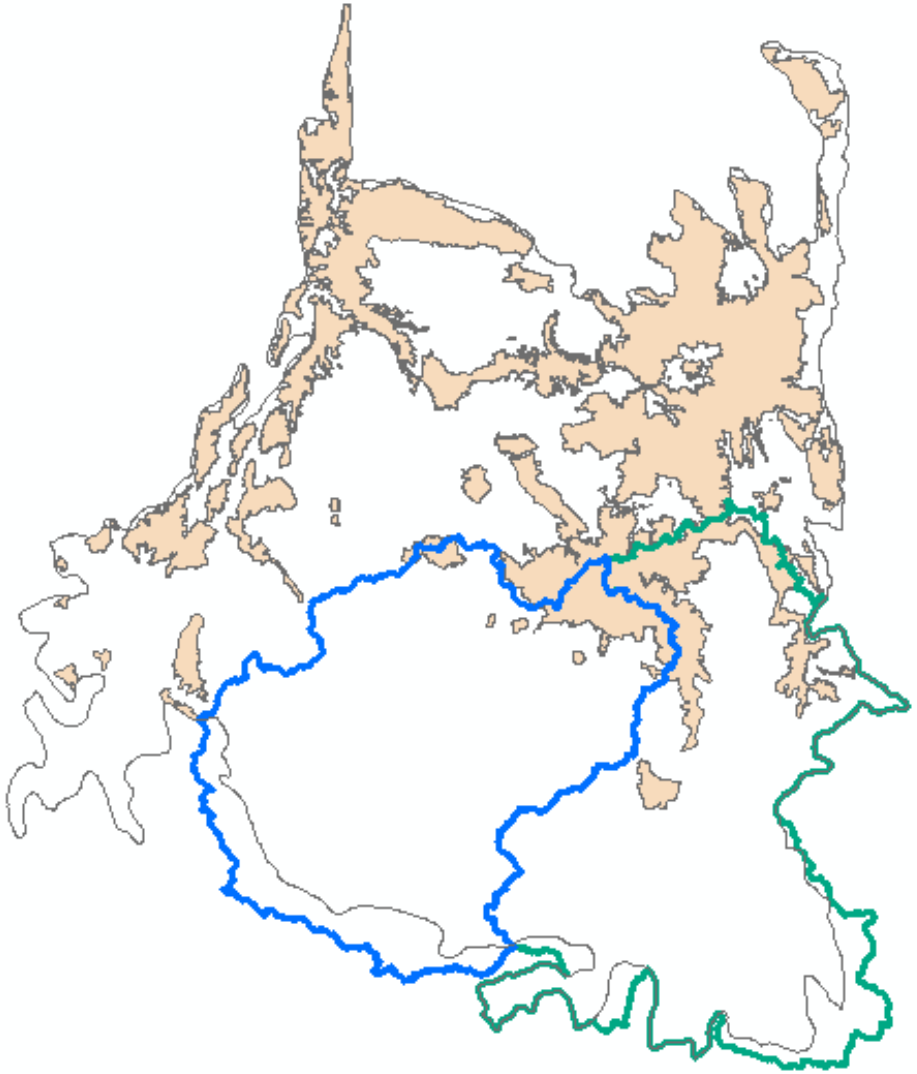


Four Corners	Upper Rio Grande
24 % High	13 % High
45 % Moderate	25 % Moderate
31 % Low	44 % Low

Data: Sensitivity

Description	How used	% affected FC	% affected URG
Road Density (Tiger 2016)	>25th percentile density =1	63.2	39.2
Impervious Surface (NLCD 2011)	>25th percentile threshold =1	32.7	24.1
Vegetation Cover (LANDFIRE EVC 2014)	Low cover (<40%) =1	80.9	44.5
Summer Range (Univ. of Utah)	Present =1	9.4	19.3
Winter Range (Univ. of Utah)	Present=1	5.1	1.7

Data from University of Utah & NASA DEVELOP Project

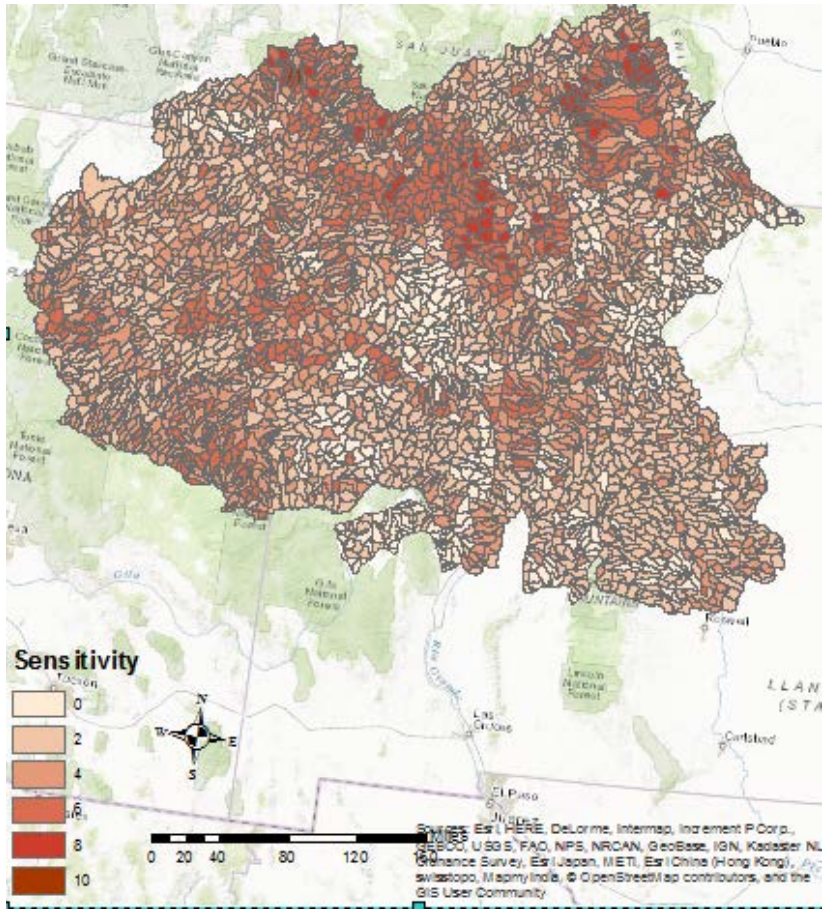


Mule Deer Summer Range

Mule Deer Winter Range

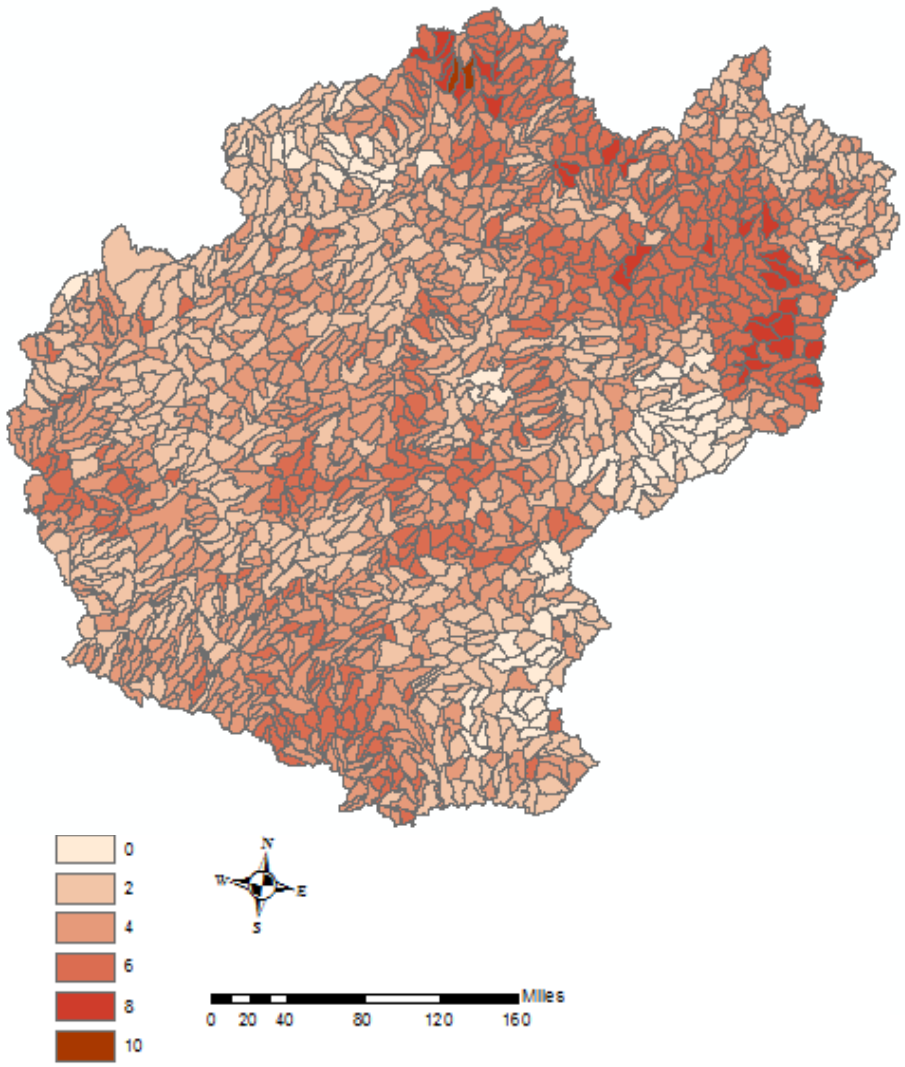
Cumulative Sensitivity

Road density + Urbanized + Veg Cover +Summer Range + Winter Range

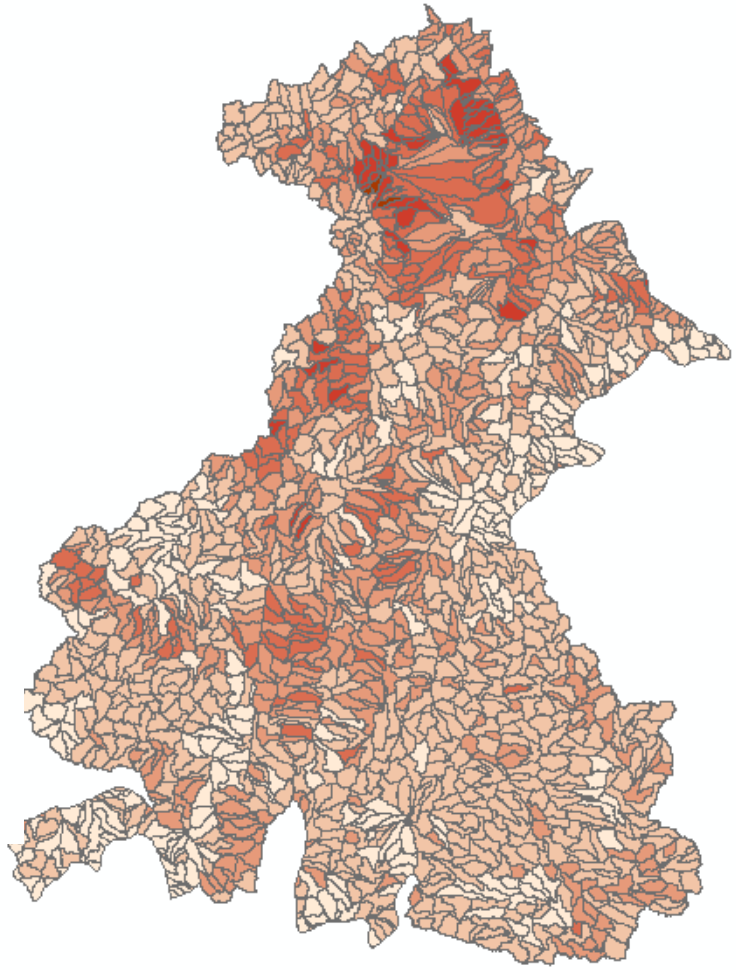


Cumulative Sensitivity Index

FC



URG



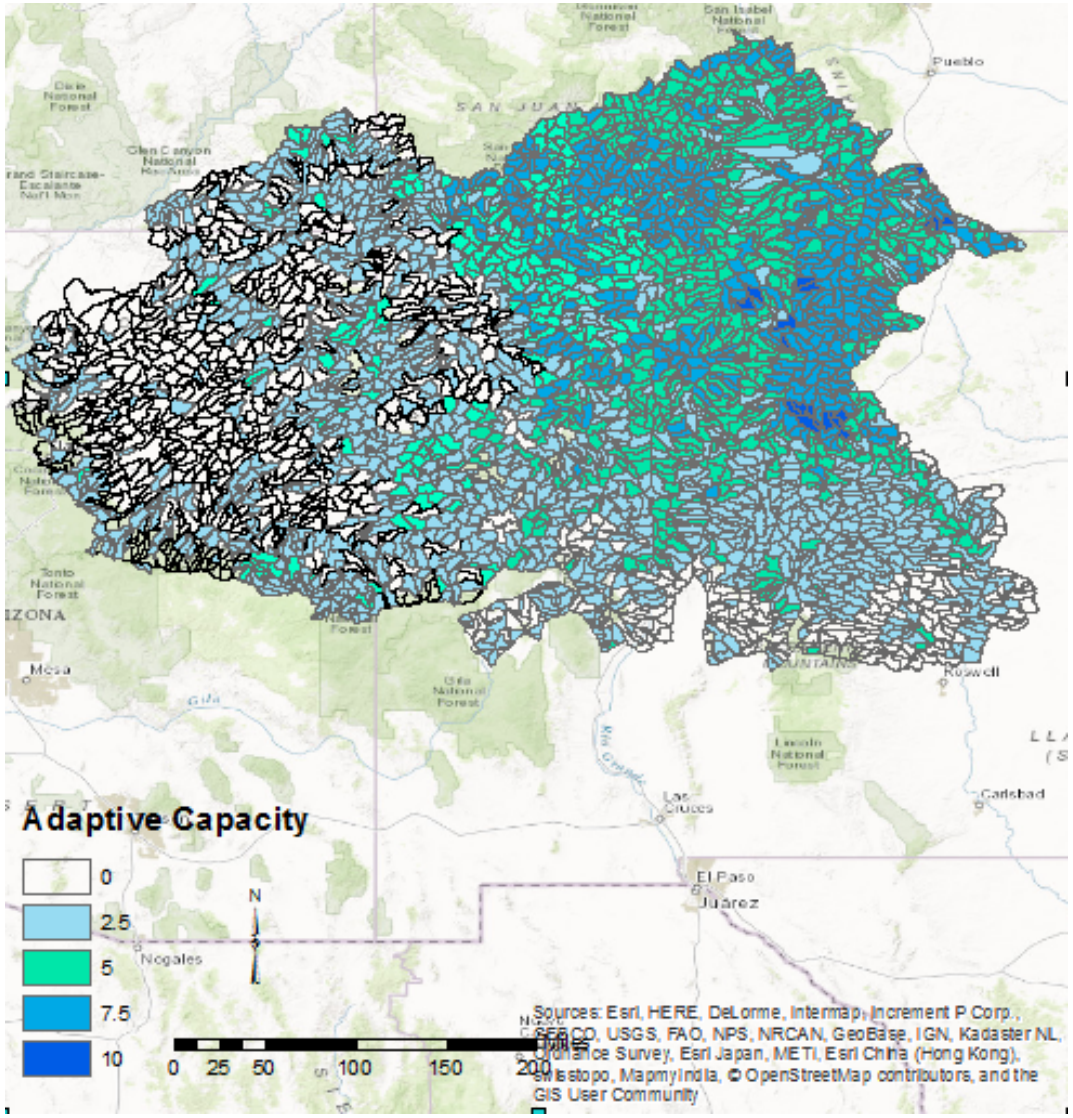
Four Corners	Upper Rio Grande
25.8 % High	12.1 % High
41.7 % Moderate	27.2 % Moderate
32.4 % Low	60.7 % Low

Data: Adaptive Capacity

Description	How used	% available FC	% available URG
Winter Precip (Rehfeldt 2030 ensemble)	Increase =1	18.4	71.3
Water Availability Distance to Perennial Streams (1.5 km)	>10% area = 1	43.3	50.4
Thermal Cover (>40%) (LANDFIRE EVC)	>60% of area = 1	7.8	26.9
Pinyon-Juniper Woodlands (LANDFIRE EVT)	Presence (>10% w/i watershed) =1	20.5	12.7

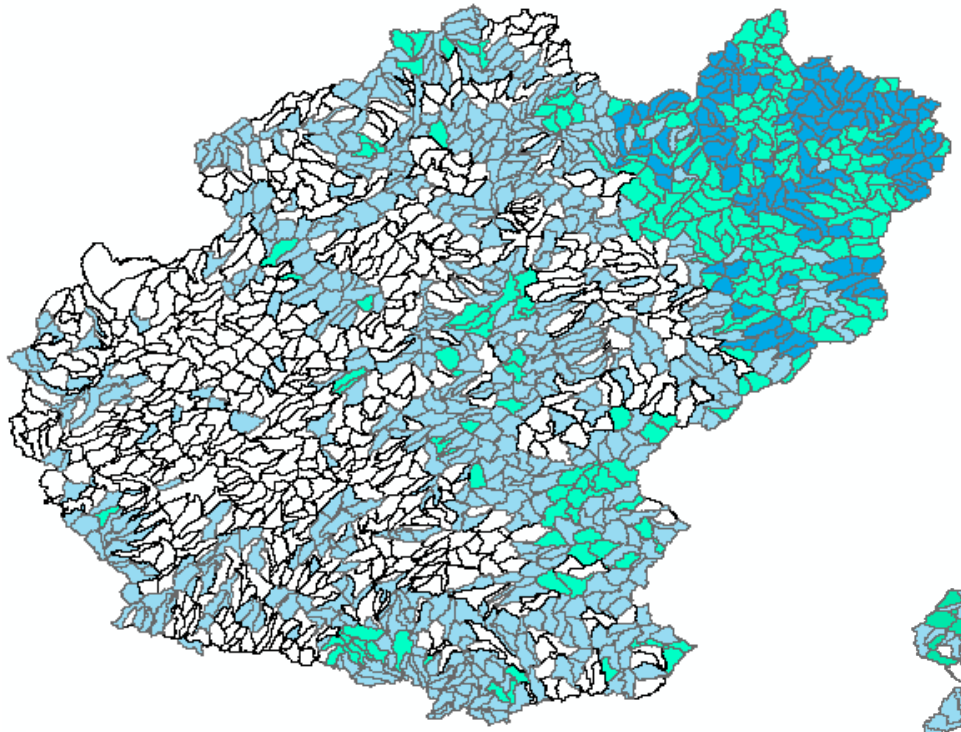
Cumulative Adaptive Capacity

Winter Precip + Water Source + Thermal Cover +PJ Woodlands

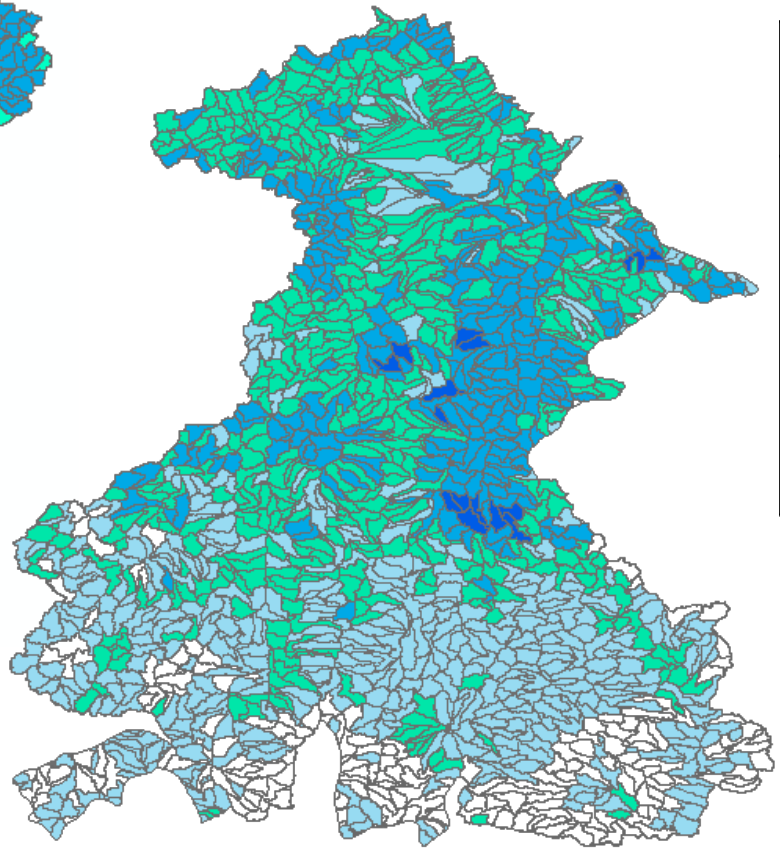


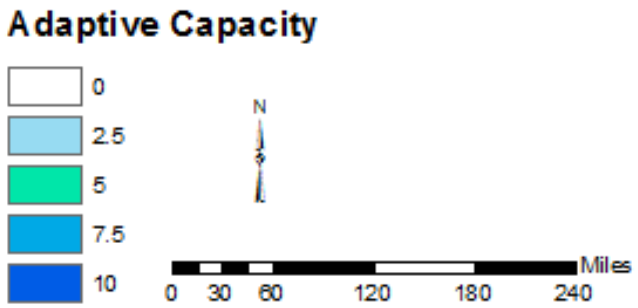
Cumulative Adaptive Capacity Index

FC



URG

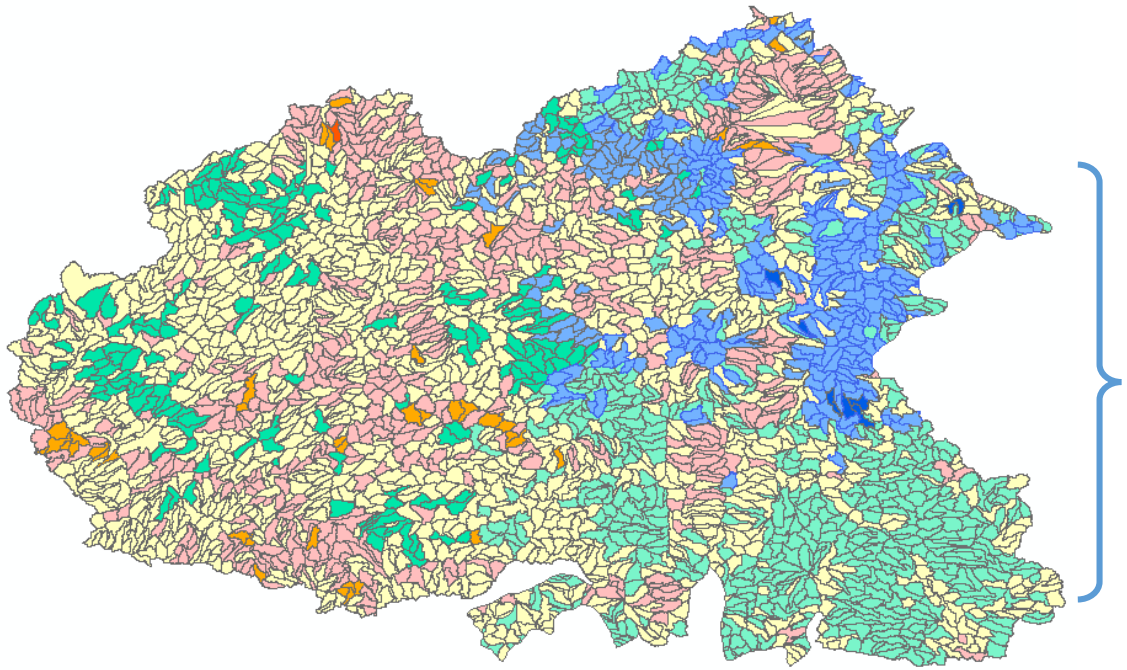




Four Corners	Upper Rio Grande
8.2 % High	19.7 % High
13.9 % Moderate	33.8 % Moderate
77.9 % Low	46.5 % Low

Estimate Vulnerability

Impact = Exposure + Sensitivity

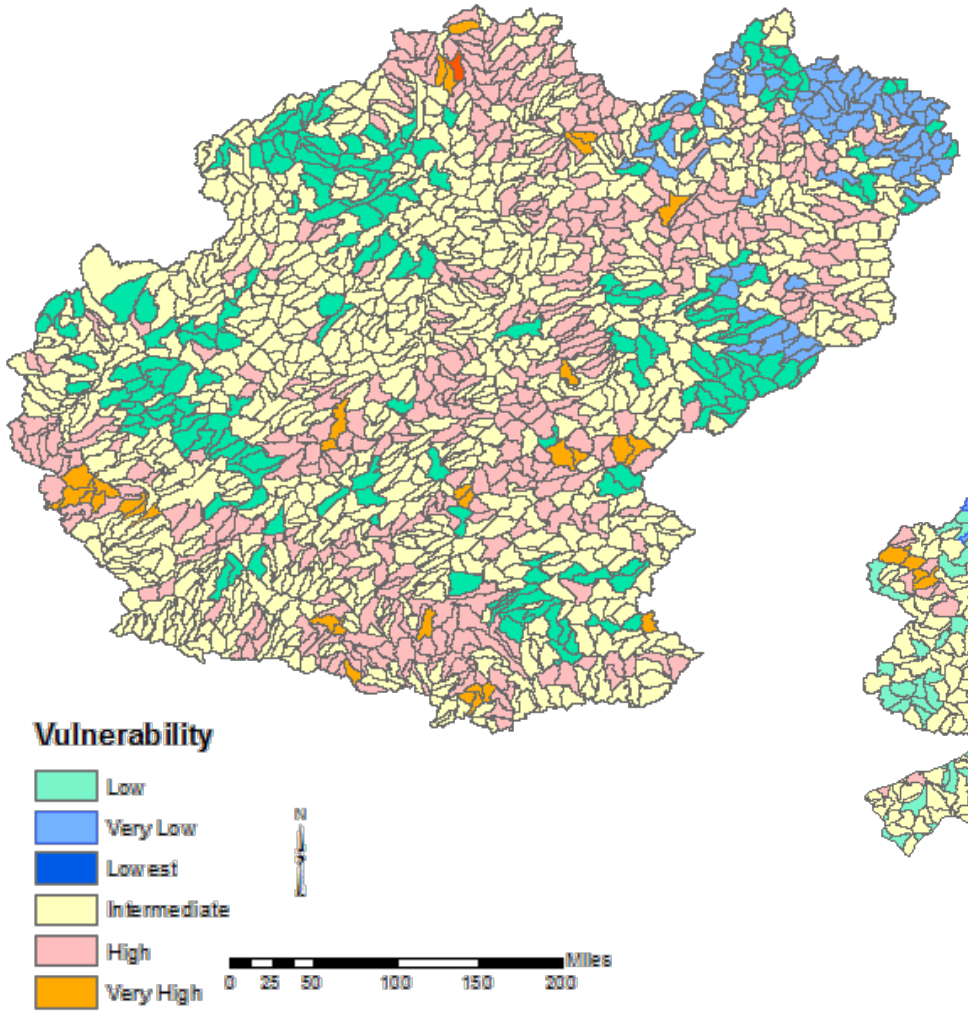


Adaptive Capacity + Impact

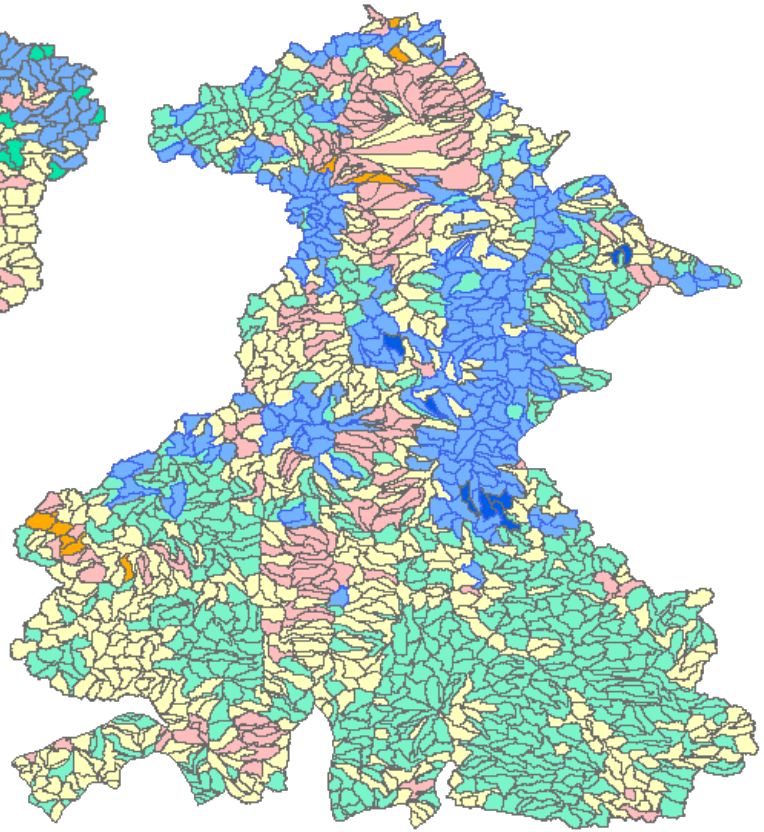
Vulnerability		**Impact (E+S) Value**				
		1	2	3	4	5
Adaptive capacity Value	1	Low	Intermediate	High	Very High	Highest
	2	Low	Intermediate	High	Very High	Very High
	3	Very Low	Low	Intermediate	High	Very High
	4	Very Low	Very Low	Intermediate	High	High
	5	Lowest	Very Low	Intermediate	Intermediate	High

Vulnerability

FC



URG



Exposure +
Sensitivity/Adaptive Capacity

Summary stats

Four Corners	Upper Rio Grande
28.5 % High	11.5% High
54 % Moderate	33.8 % Moderate
17.5 % Low	54.7 % Low

Summary

- URG had many watersheds with low vulnerability (55%)
- FC: many watersheds with moderate vulnerability (54%)

- Winter and Summer range are limiting in both FC and URG
  -No data on tribal lands included

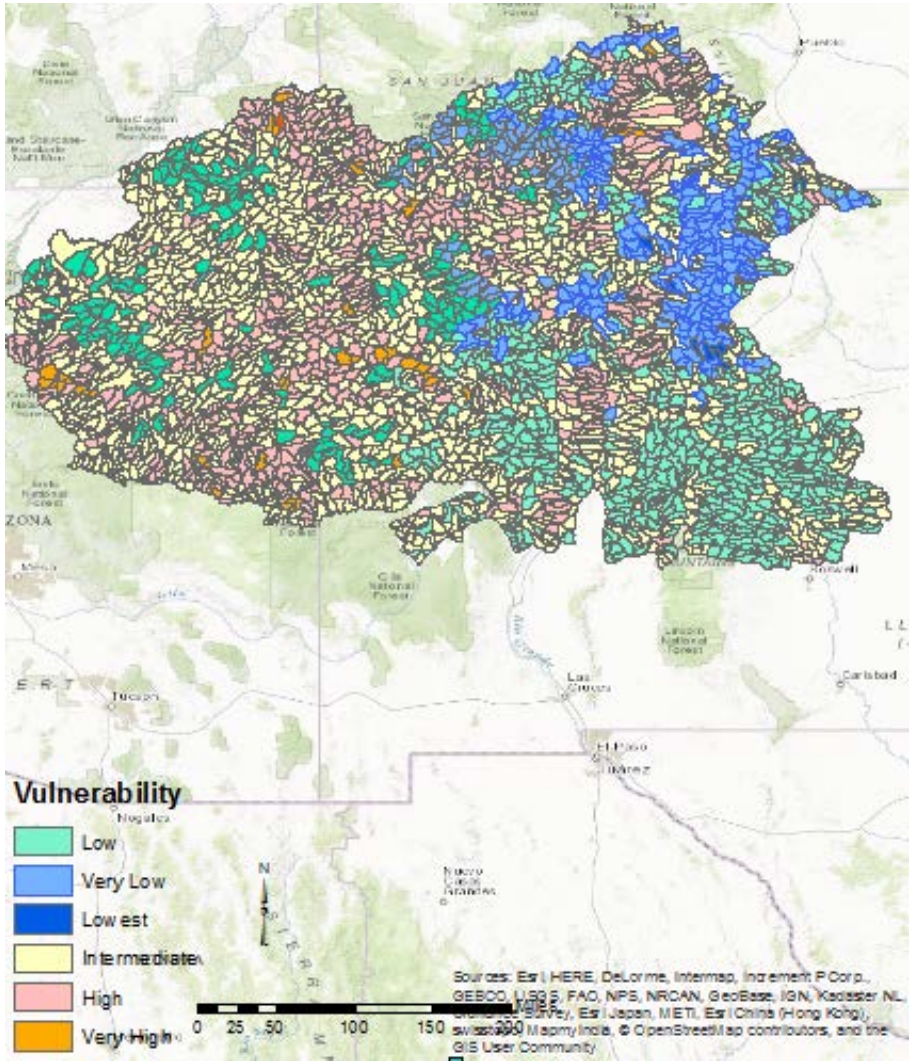
- Mixture of habitat types and elevational ranges in URG

- URG: More high elevation habitat, more riparian habitat
- FC: More PJ Habitat throughout landscape

- URG: Higher Adaptive Capacity
- FC: Low Adaptive Capacity

- URG: Low Exposure (44%), Low Sensitivity (61%), twice as much Adaptive Capacity as FC, Low Vulnerability (55%)

- FC: Moderate Exposure (45%), Low Adaptive Capacity (78%), watersheds with Moderate Vulnerability (54%)



Takeaways

Creating Products to:

- Estimate Exposure, Sensitivity, and Adaptive Capacity of Focal Resources
- Assess Vulnerability and Opportunity
- Identify critical areas of interest, importance, or priority

Appropriate Uses:

- Output *cannot* support local scale management decisions or conclusions
- Output *can* distinguish relative vulnerabilities across landscapes and identify or prioritize:
  - Areas for additional, fine scale study
  - High action needs (e.g. critical threats or sensitivities)
  - Common areas of interest

Adaptation Forums

Using assessments to identify management priorities

How do the results of these assessments match with where you are already working and your current priorities?

How do we use this information to move forward to develop collaborative actions and implement LCD?

"This really is an innovative approach, but I'm afraid we can't consider it. It's never been done before."


Thank You!
meganfriggens@fs.fed.us
Tzeidle.Wasserman@nau.edu