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 4: Results of a Vulnerability Assessment for Pinyon-Juniper Ecosystems in the Four Corners and Upper Rio Grande Landscapes

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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

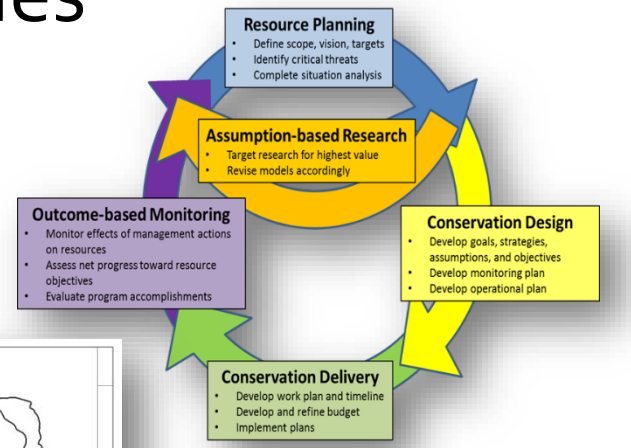
10 minutes

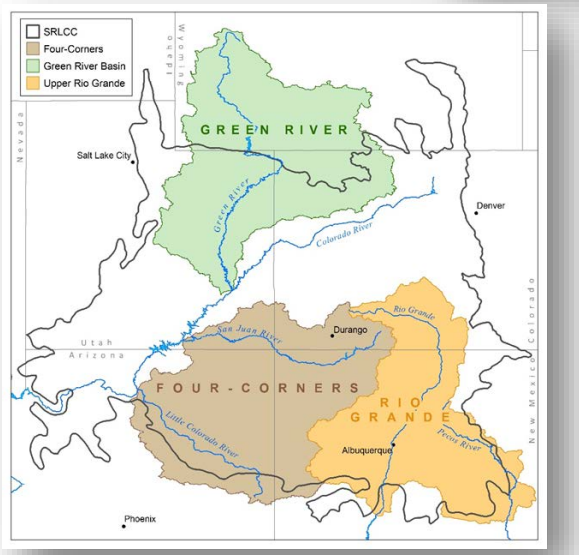
Goals for This Webinar

- 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

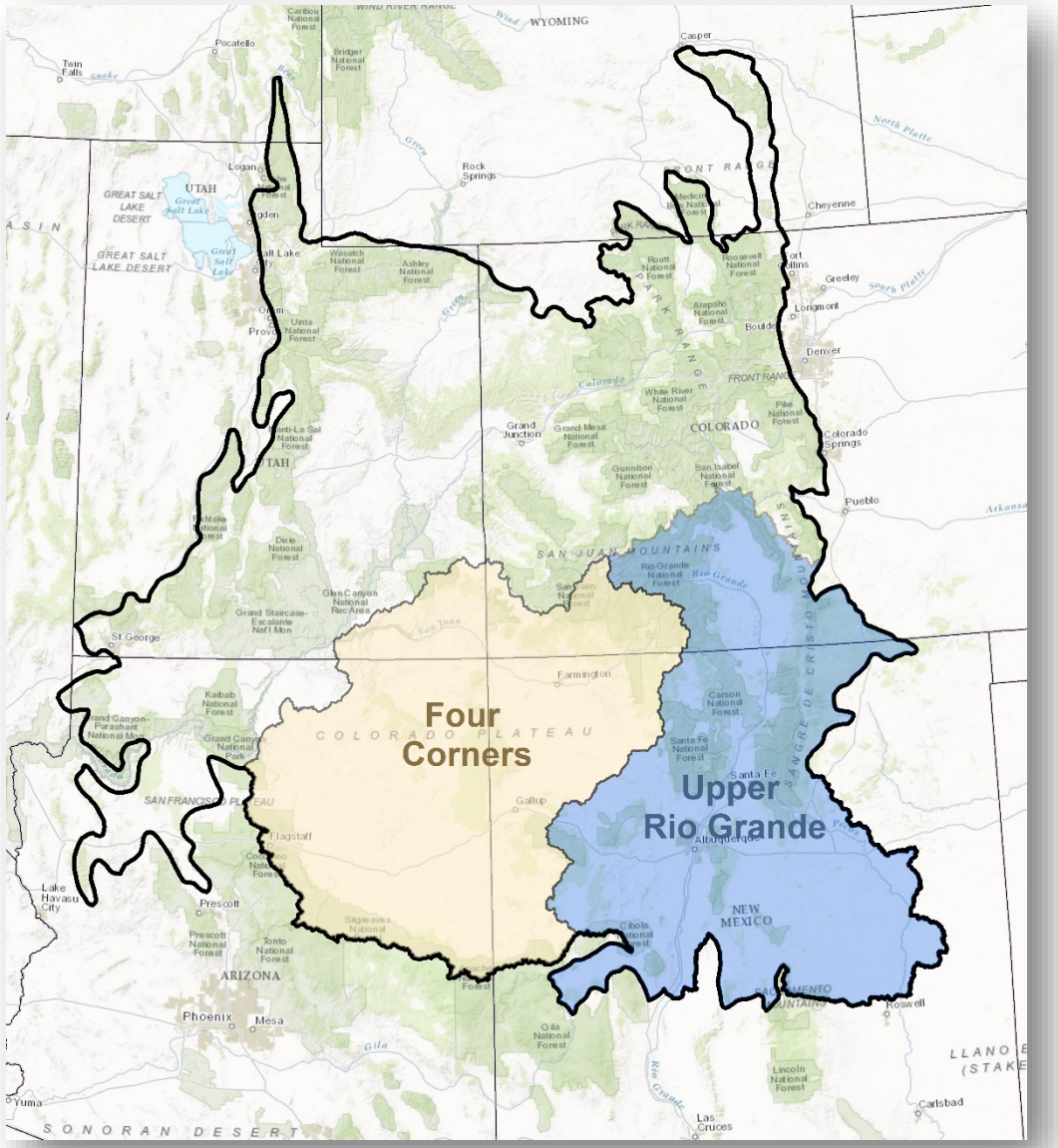
- Identified Focal Resources and Landscapes
- Partnered with RMRS to create Vulnerability Assessments for Focal Resources in Two Landscape
  - Spring 2016 Adaptation Forums
  - Fall 2017 Adaptation Forums





Focal Resources in 2 Landscapes

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



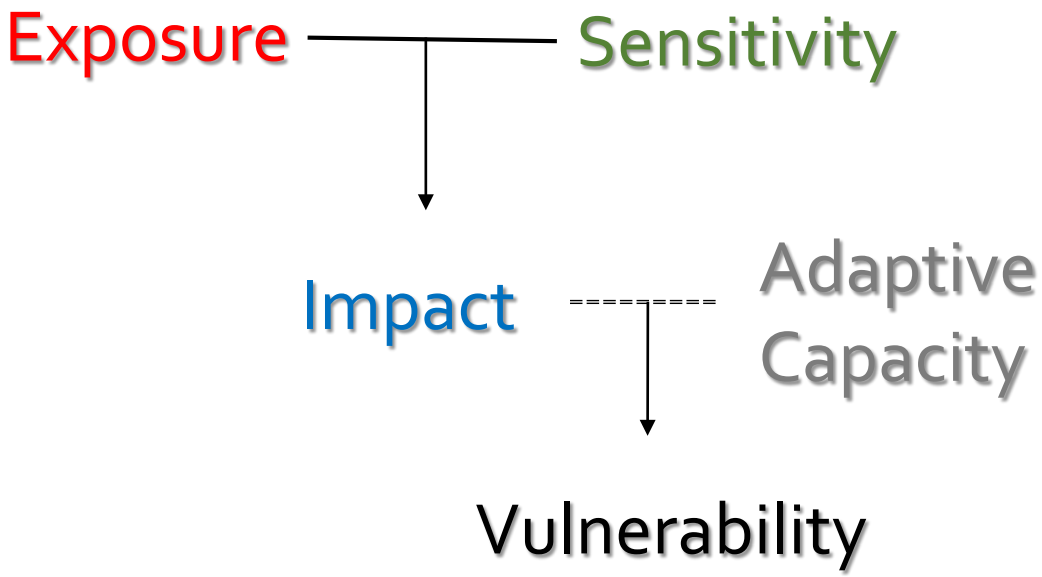
Methods

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

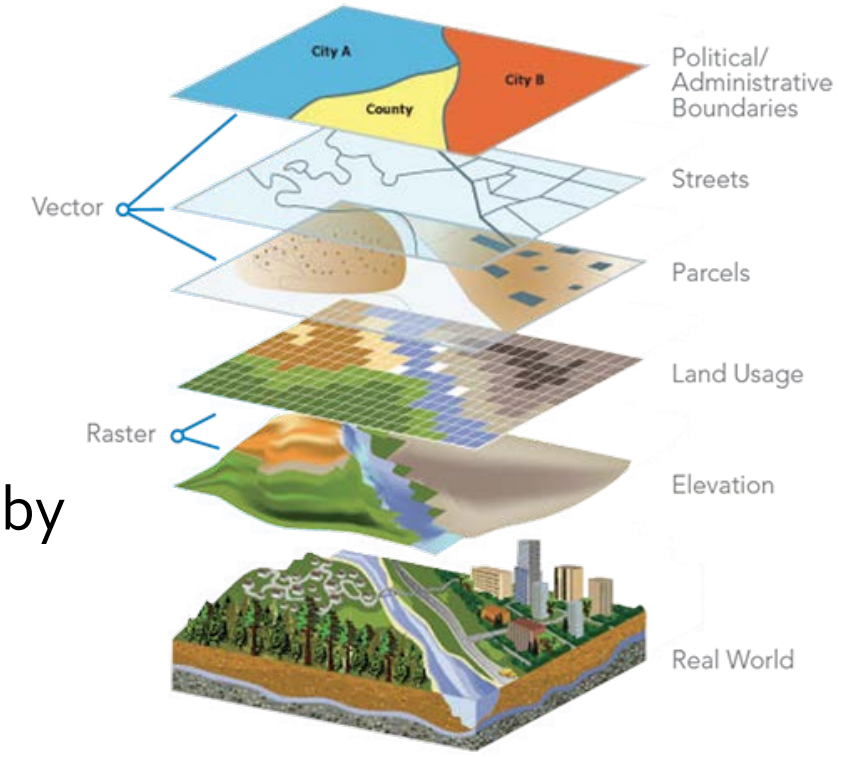
1. Gather data
   - Assess Relevance
   - Assign to Element
2. Create indices
3. Combine E, S, and AC indices to estimate Vulnerability



Step 1. Gather Data

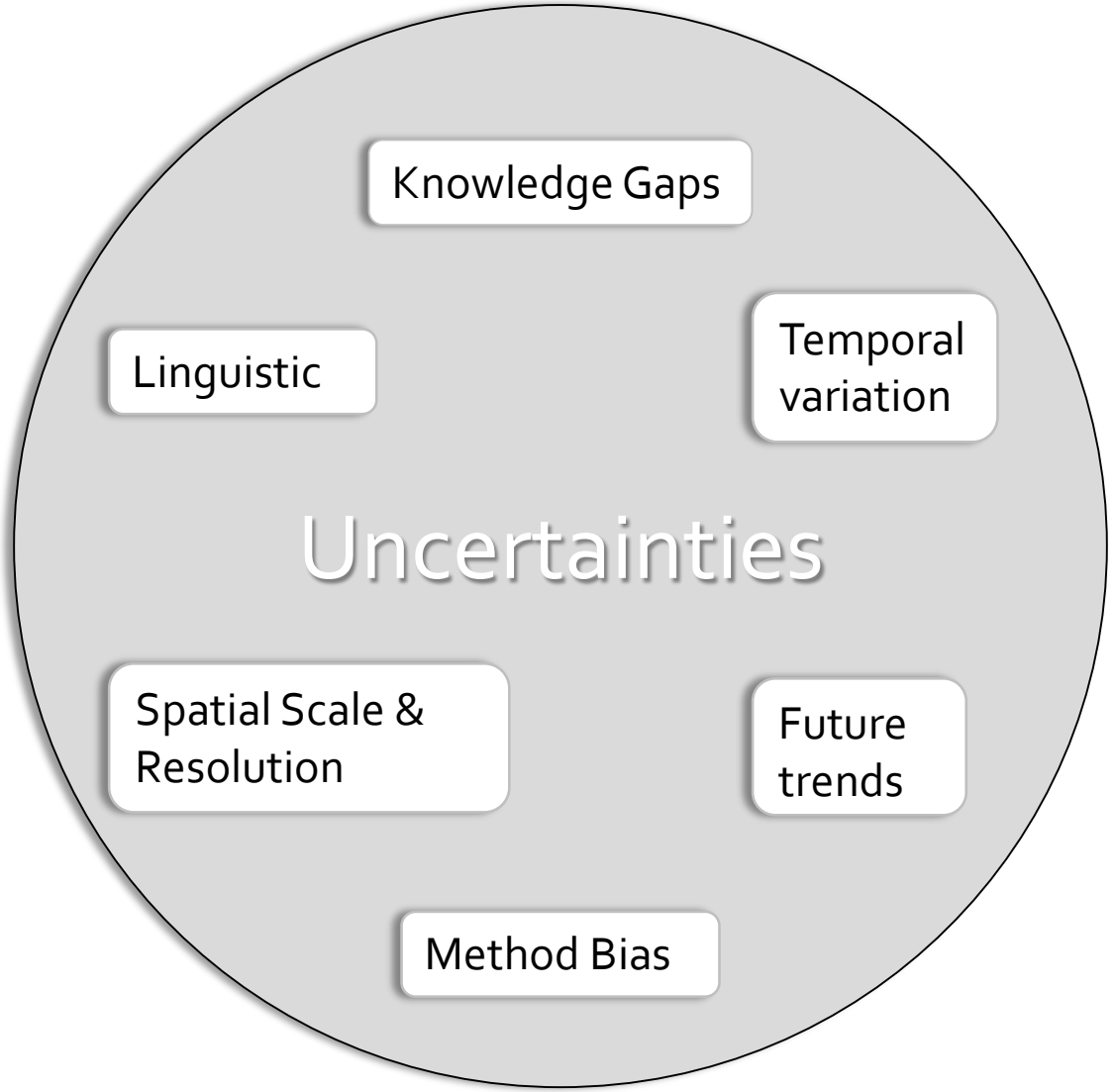
Criteria:

- 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

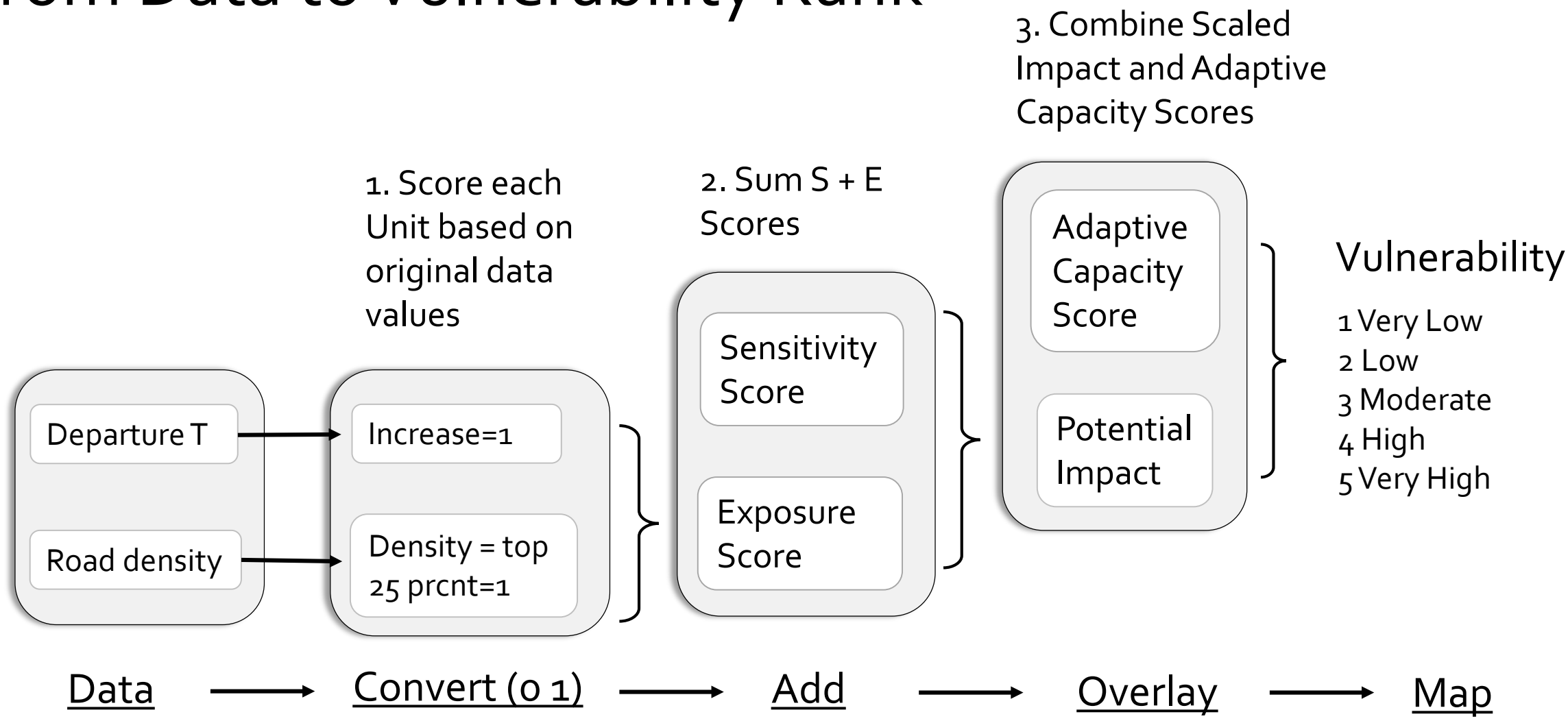
Pros

- 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

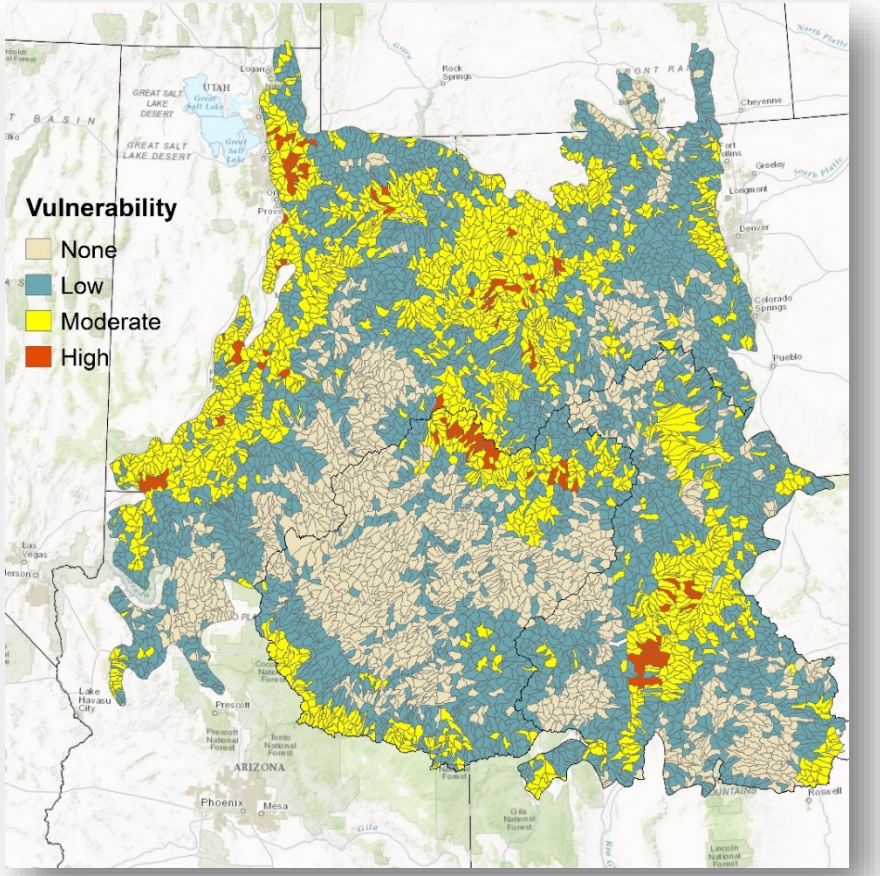
From Data to Vulnerability Rank



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

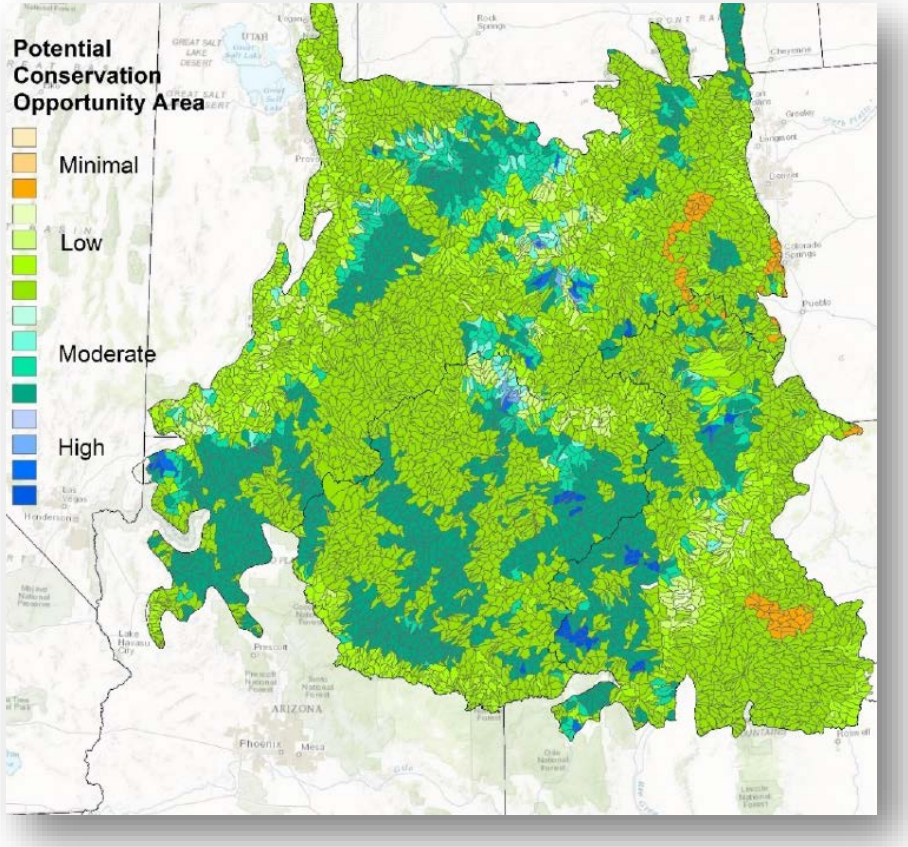


Highlight Opportunities

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



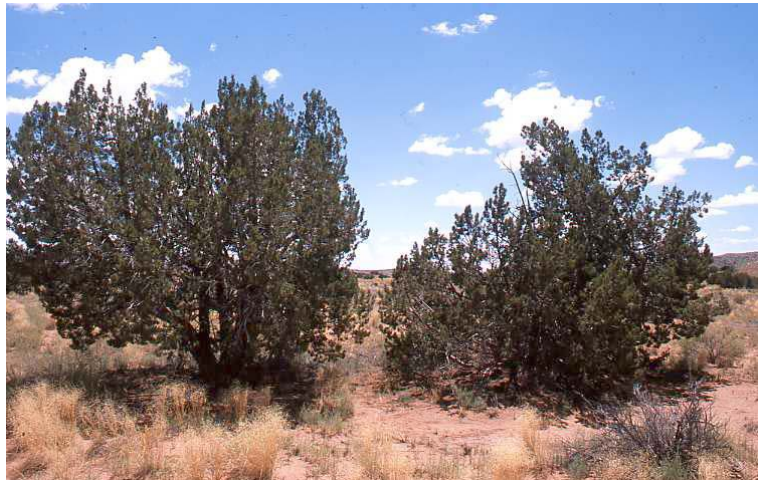
Assessment Results

Pinyon-Juniper: Background

- Predominate species in Focal Areas:
  - Two-needle (Colorado) piñon (*Pinus edulis*)
  - Utah juniper (*Juniperus osteosperma*), one-seed juniper (*J. monosperma*), and Rocky Mountain juniper (*J. scopulorum*)
- Exists between semi-desert grassland/shrubland and mountain mixed conifer habitats (1200 to ~2500 m)
- Important cultural and natural resource
- Obligates: piñon mouse, Stephen's woodrat, piñon jay, gray flycatcher, screech owl, scrub jay, plain titmouse, and gray vireo; many already in population decline

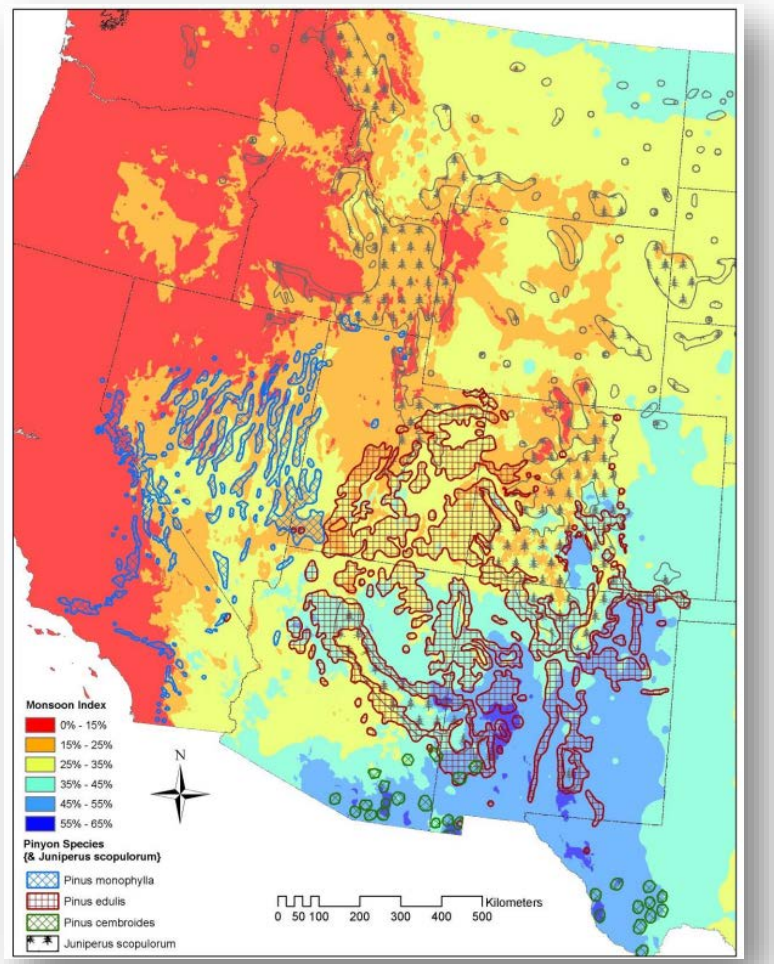
Sources: Holechek 1981; Bosworth 2003; Short and McCulloch 1977; Balda and Masters 1980; Meeuwig et al. 1990; Morrison and Hall 1999; Cryan 2003; Vander Wall et al. 1981; Evans 1988; Zouhar 2001; Anderson 2002; Zlatnik 1999; Zouhar 2001)

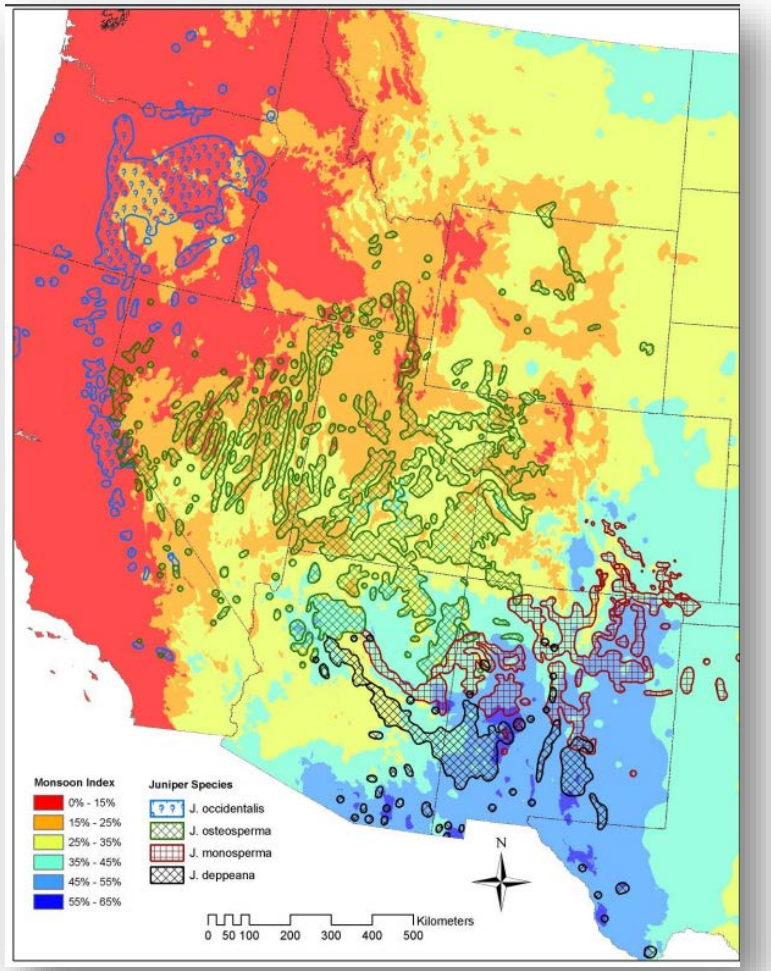
Pinyon-Juniper widespread across focal areas



Romme et al. 2009

Composition, and structure of PJ related to precipitation patterns, disturbances, and substrate.





Romme et al. 2009

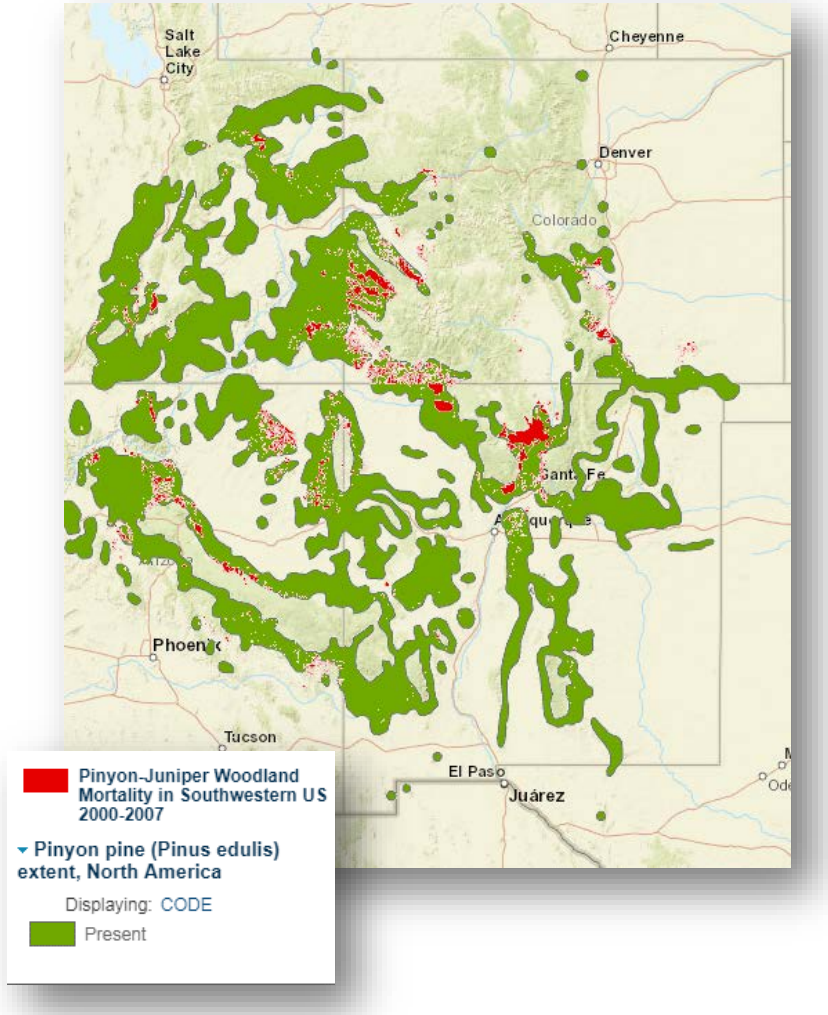
Expansion -Infill -Recovery -Contraction

Tree density and canopy coverage have increased substantially during the past 150 yr

- Grazing
- Fire
- Climate

But, not in all areas:

- More recently, pinyon die-offs have occurred due to drought and insects
- Slow growing/recovery after fire



"Pinyon Pine Dieback and Soil Characteristics" Strittholt via Conservation Planning Atlas

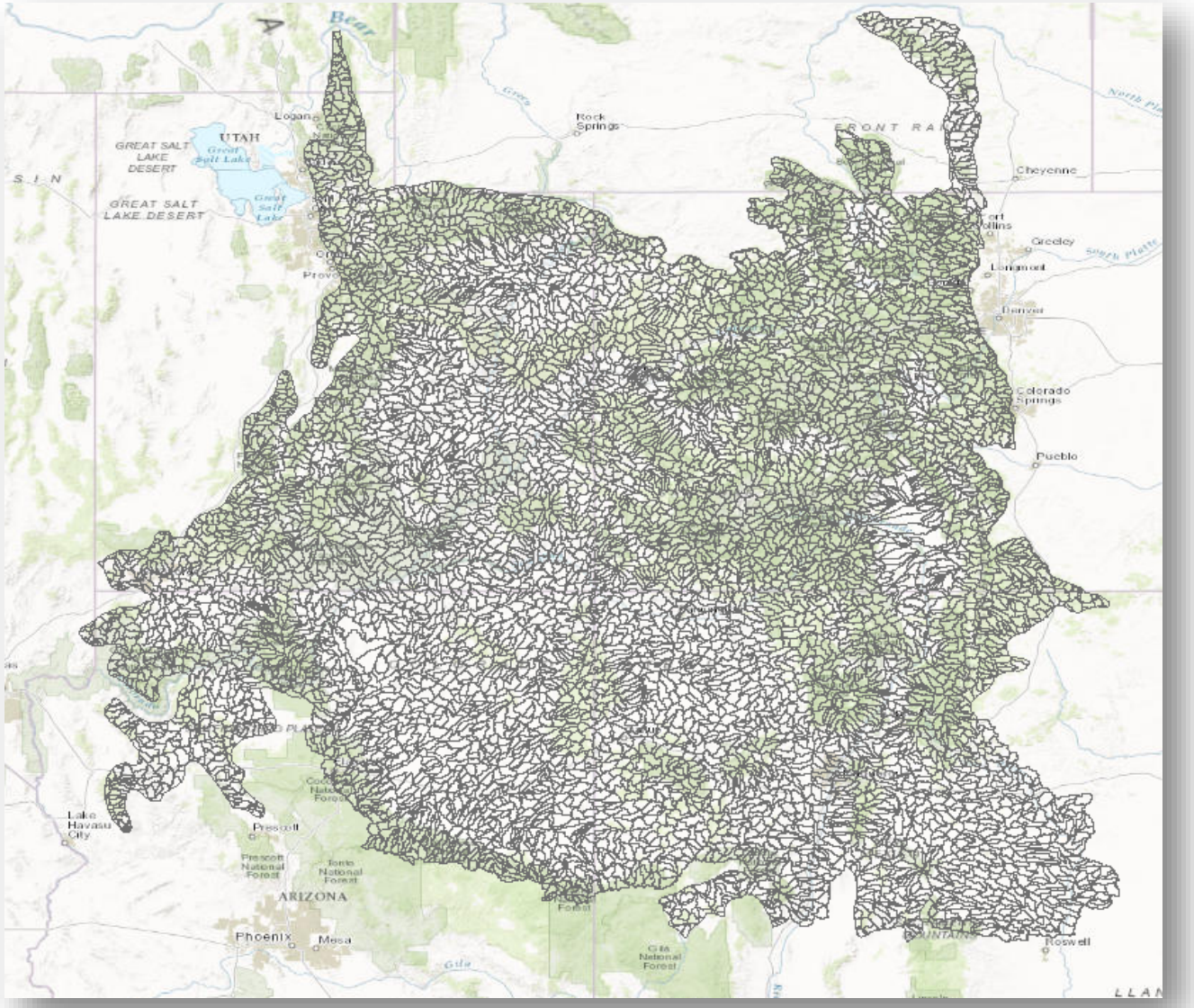
PJ in focal areas are at the boundary of observed increases and die-offs

- Expansion possible under increased precipitation and CO_2 (but could also increase cheatgrass)
- Increase in insect infestations, wildfire, and episodic drought will lead die-offs and reduced pine seed production

(Rehfeldt et al. 2006; Keane et al. 2008; Romme et al. 2008, Friggens et al., in press)

Unit of Analysis

Watershed
HUC 12



Data used

Exposure

1. Change in development and disturbance
2. Change in climate niche
3. Fire Hazard Potential
4. Insect/Disease risk
5. Road density (human activity)

Sensitivity

1. Development & Infrastructure
2. Mechanical disturbance
3. Percent Cover PJ
4. Soil vulnerability (drought)
5. Wildlife diversity

Adaptive Capacity

1. Protected areas
2. Percent Cover PJ
3. Change in climate niche

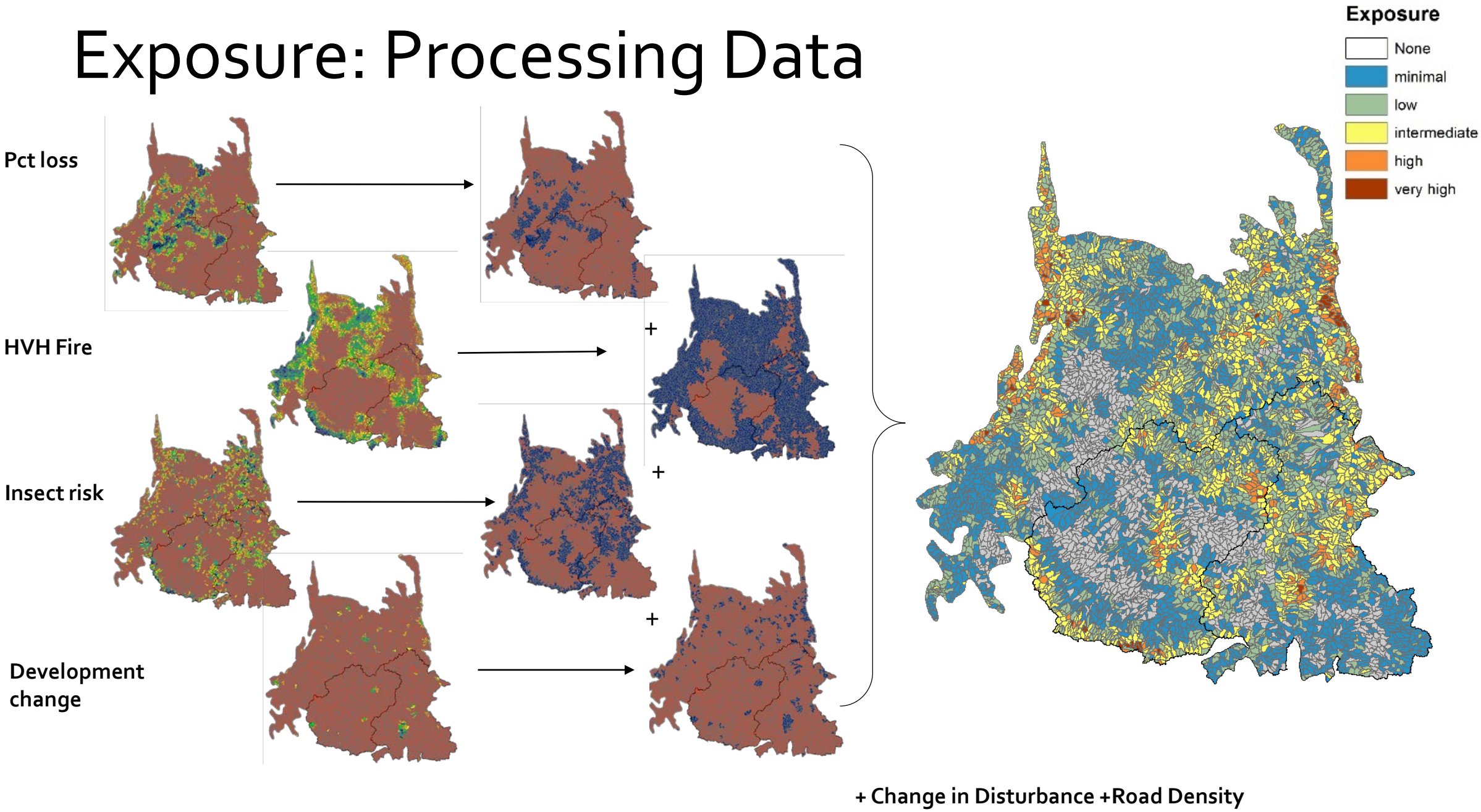
Relevant data not included in analysis

Data/Indicator	Reason
Current Condition (e.g. BPS-EVT comparison) or Intactness measures (energy development)	Working
Invasive species	Exploring datasets
Grazing impacts	No full coverage- BLM and some FS
More specific mapping of Pinyon-juniper (seral stages, species). Meaningful measure of canopy closure, shrub/grass understories.	Target not defined
Geophysical parameters (elevation, etc.)	Relationship not well defined
Forest Health Monitoring Data	Need trend analysis of indicators (biomass, growing > 5", mortality, net growth)

Data: Exposure

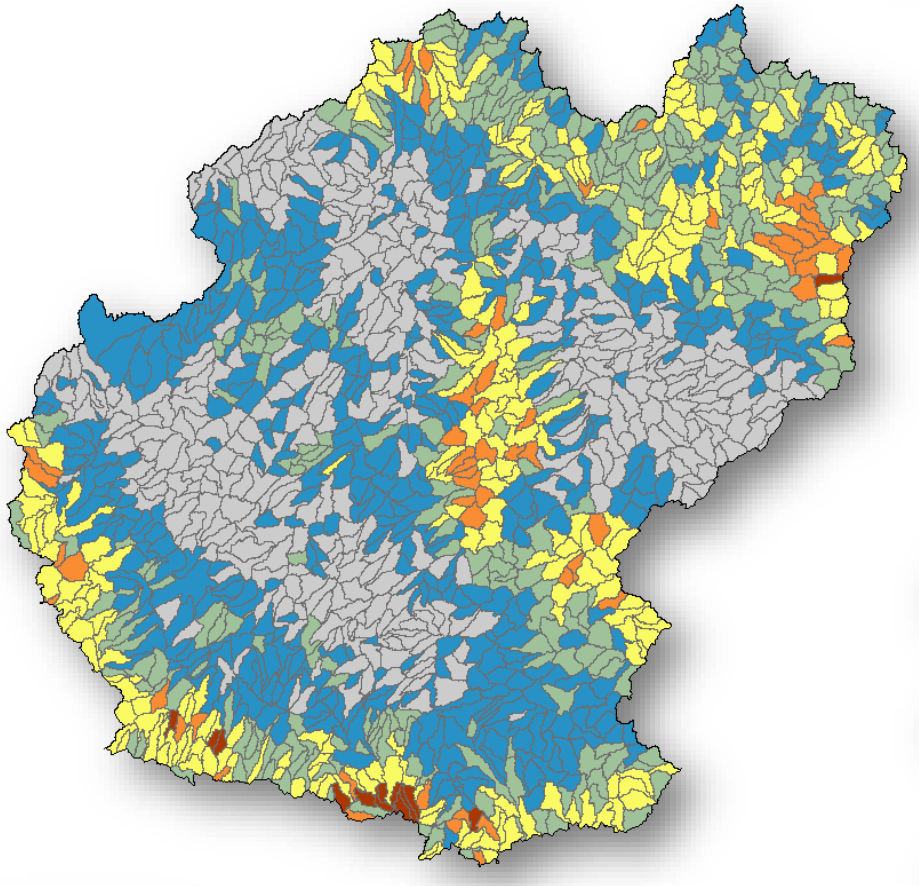
Description	How Used	Percent Affected	
		FC	URG
Change in Mech. Disturbance 2040 (USGS 2014)	Increase =1	17	26
Change in Development 2040 (USGS 2014)	Increase =1	3	6
Change in Great Basin Conifer Woodland Climates 2030 (Rehfeldt 2012, ensemble)	> 30 % decrease=1	16	6
Insect and Disease Risk (USFS 2014)	Threat present=1	27	33
Wildfire Risk (USFS 2014)	High or Very High=1	53	75
Road Density (TIGER 2016)	Top 25 pct= 1	31	18

Exposure: Processing Data



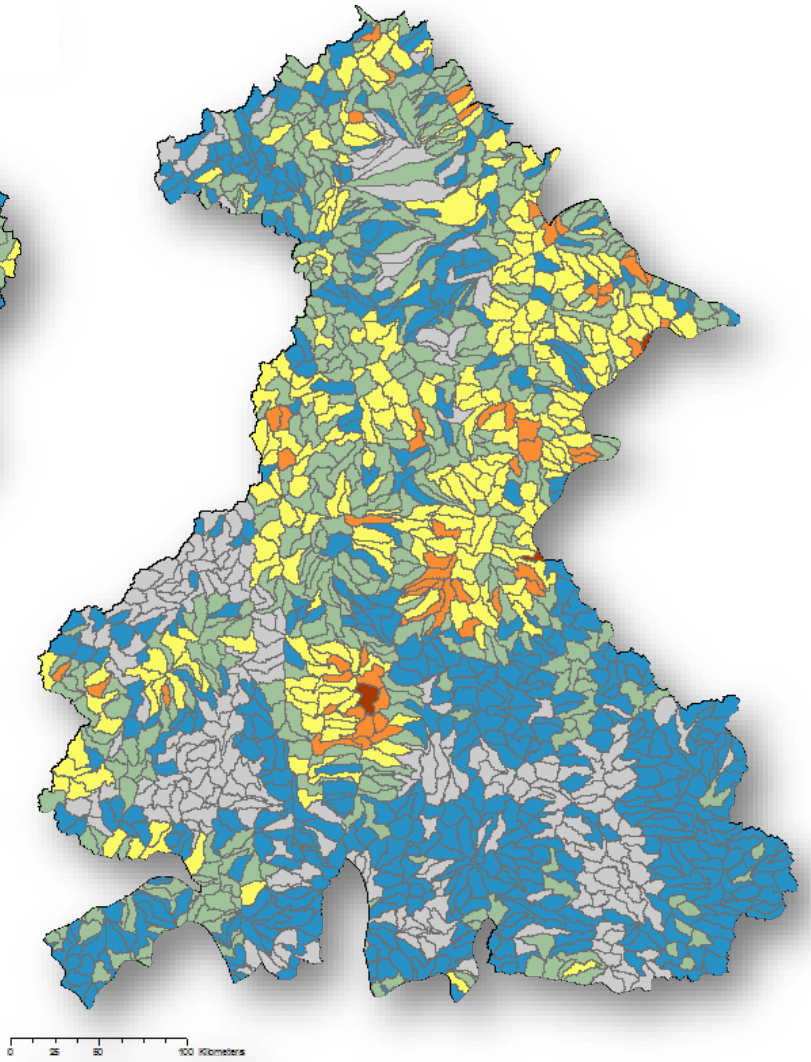
Cumulative Exposure Index

Four Corners



0 25 50 100 Kilometers

Upper Rio Grande



0 25 50 100 Kilometers

Four Corners	Upper Rio Grande
55 % Low	48 % Low
40% Med	48 % Med
4% High	4 % High

Exposure

- None
- minimal
- low
- intermediate
- high
- very high

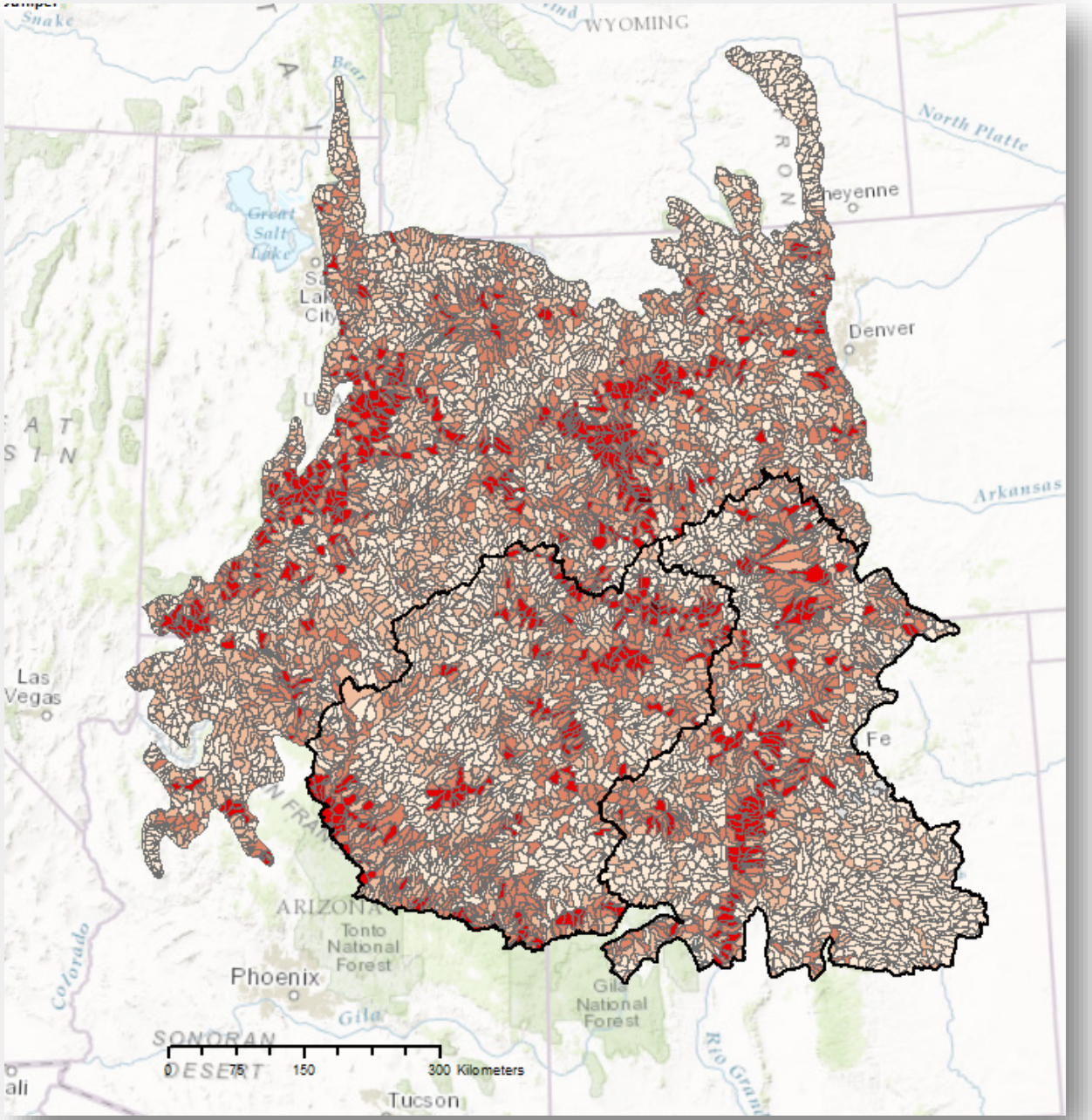
Data: Sensitivity

Description	How Used	Percent Affected FC	Percent Affected URG
Presence of Obligate Species (USGS GAP)	>4 spp=1	95	39
Soil Vulnerability (Peterman et al., 2016)	At least 2 Sensitivity Factors = 1	56	50
Medium/High Intensity Development (MRLC NLCD 2011)	>0 =1	36	34
Impervious surfaces (MRLC NLCD 2011)	Top 25 percent= 1	30	23
Mechanical Disturbance 2005 (USGS 2014)	>0 =1	10	18
Percent PJ (LandFire EVT 2014)	< 30% Cover = 1	71	79

Cumulative Sensitivity

Cumulative Sensitivity

- none
- minimal
- low
- intermediate
- high
- very high

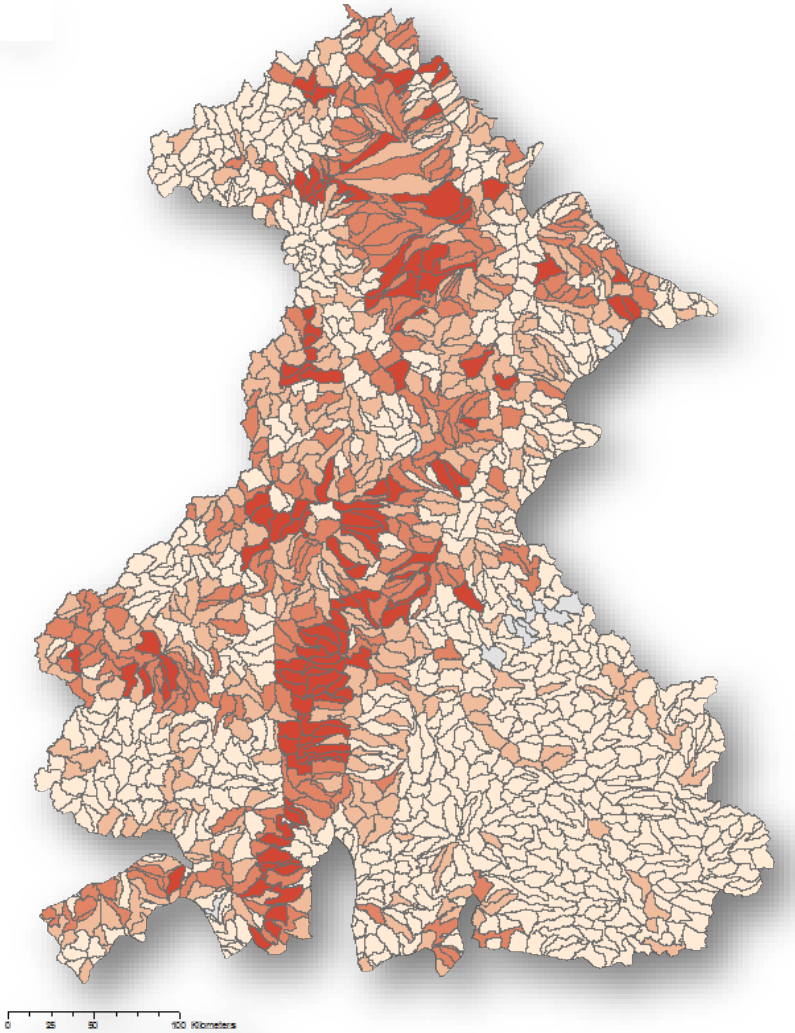


Wildlife Diversity+ Soil Sensitivity + Degree of Development + High pct of Impervious surfaces + Mechanical Disturbance + Low pct cover of PJ

Cumulative Sensitivity Index

Four Corners

Upper Rio Grande



Four Corners	Upper Rio Grande
38% Low	53% Low
49% Med	38% Med
11 % High	9% High

Cumulative Sensitivity

- none
- minimal
- low
- intermediate
- high
- very high

Data: Adaptive Capacity

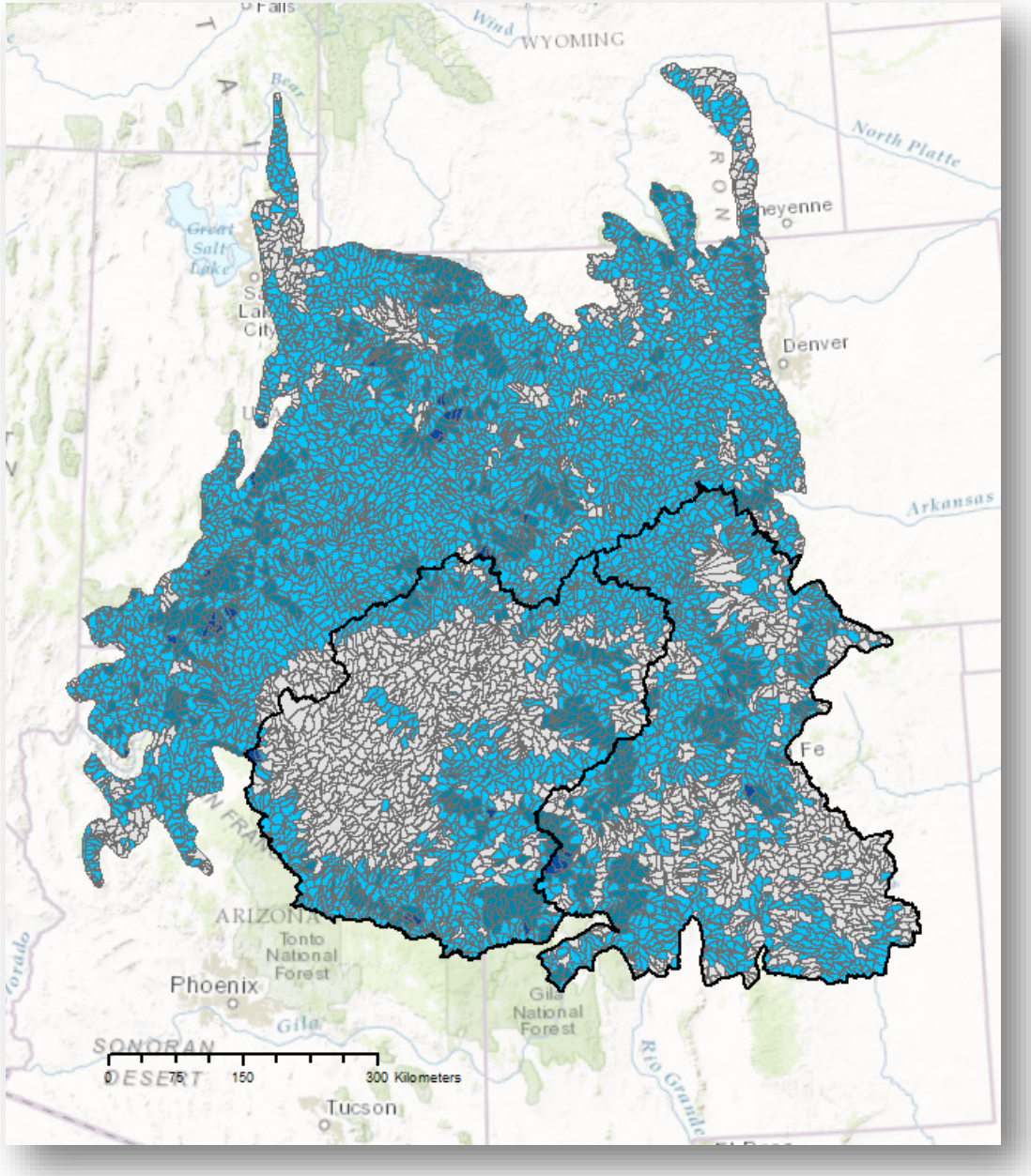
		Percent Affected	
Description	**How Used**	**FC**	**URG**
Protected Areas (USGS GAP)	> 30% GAP 1 or 2 =1	36	50
Gain in GB Conifer Woodland 2030 (Rehfeldt et al. 2012, ensemble)	> 30% = 1	22	18
PJ Cover (Landfire 2014, EVT)	>60% = 1	8	4

Cumulative Adaptive Capacity

Cumulative Adaptive Capacity

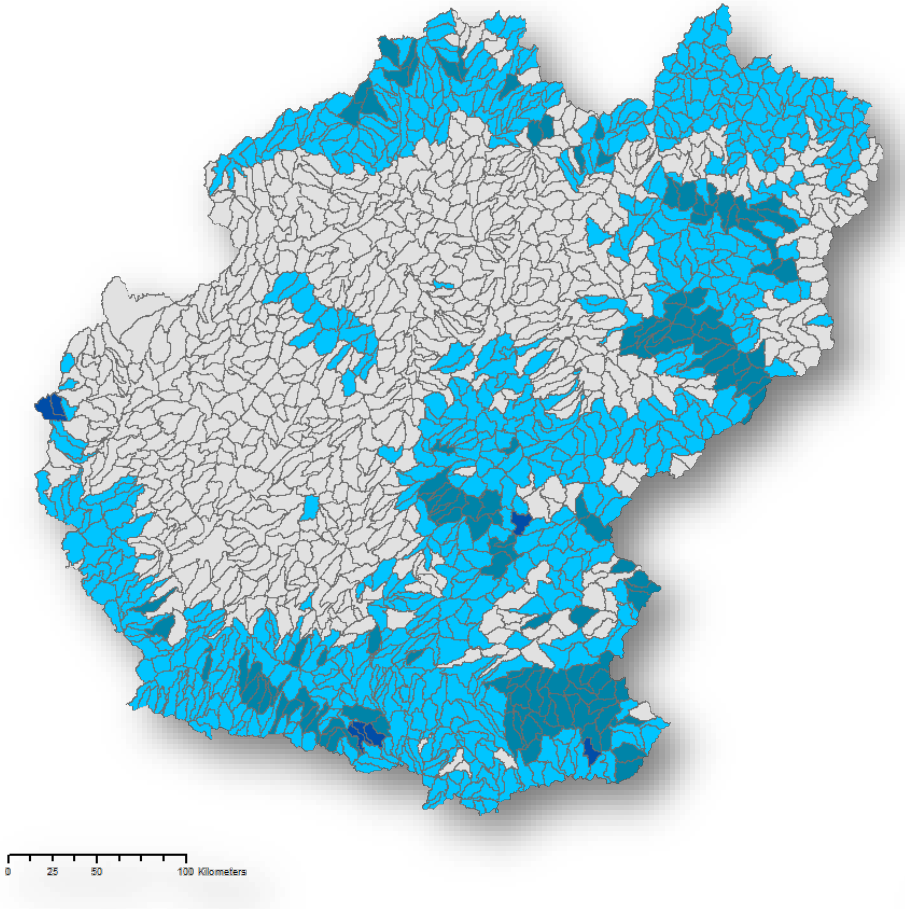
- None
- low
- intermediate
- high

PAD 1&2 + Gain in PJ climate niche + High Existing PJ cover

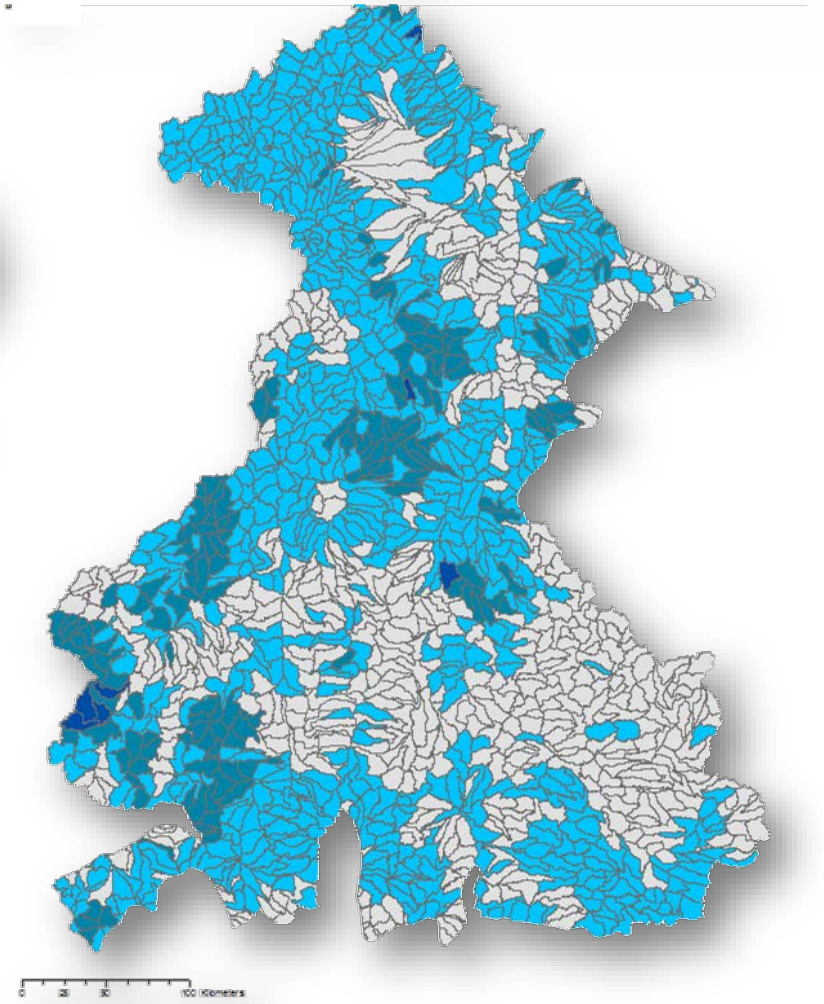


Cumulative Adaptive Capacity Index

Four Corners



Upper Rio Grande



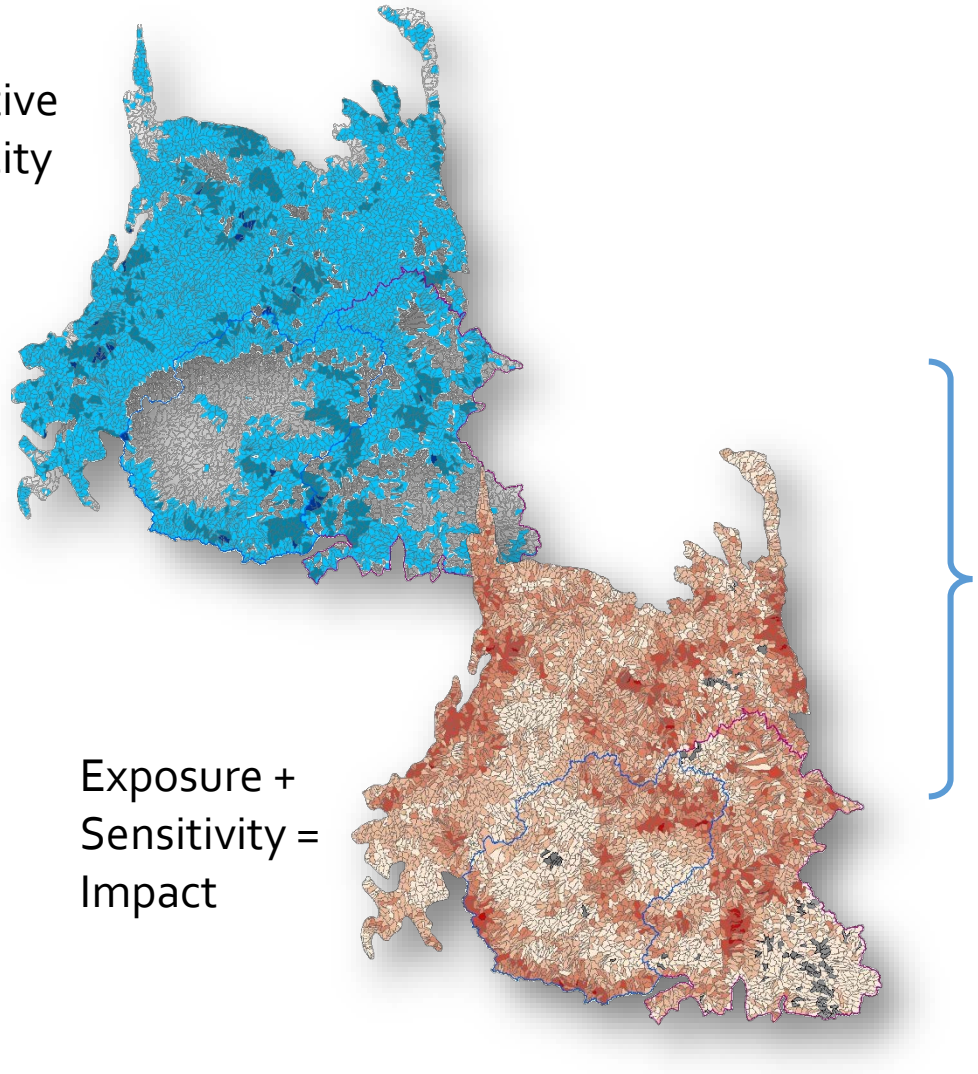
Four Corners	Upper Rio Grande
45% None	37% None
44% Low	51% Low
9 % Med	10 % Med
1 % High	<1 % High

Cumulative Adaptive Capacity

- None
- low
- intermediate
- high

Estimate Vulnerability

Adaptive Capacity

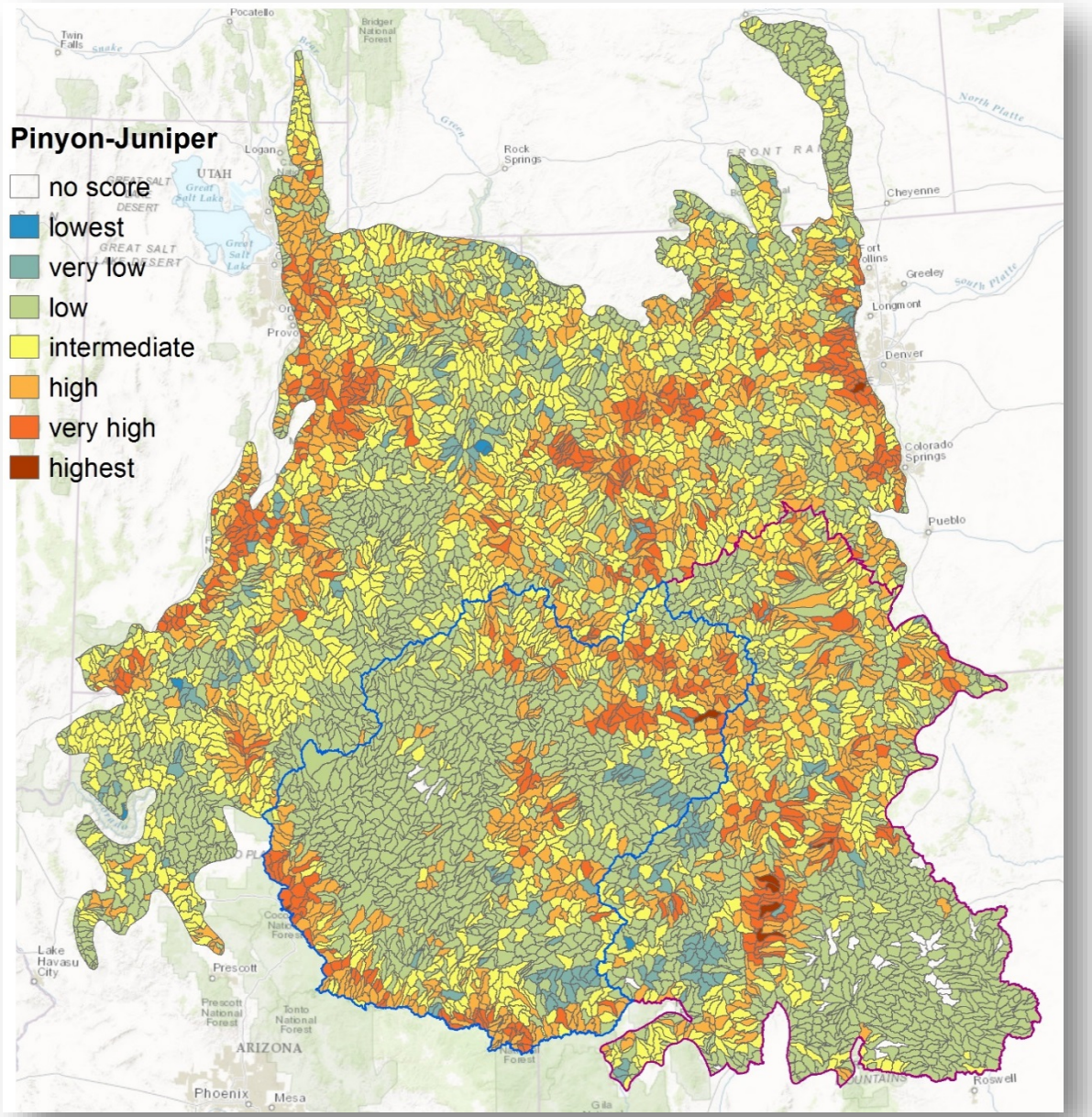


Exposure + Sensitivity = Impact

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

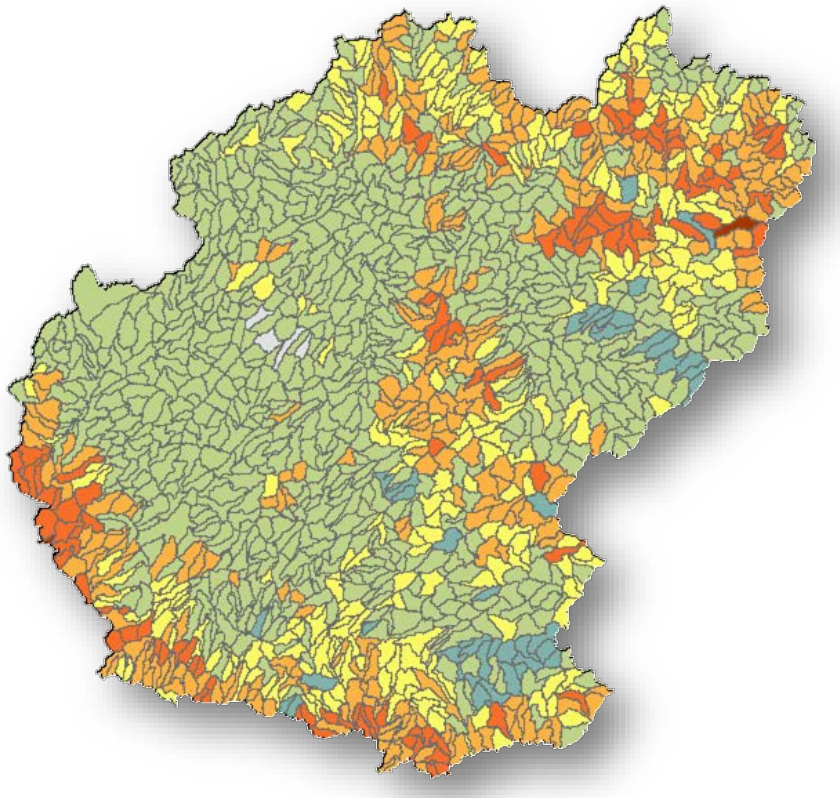
Vulnerability

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

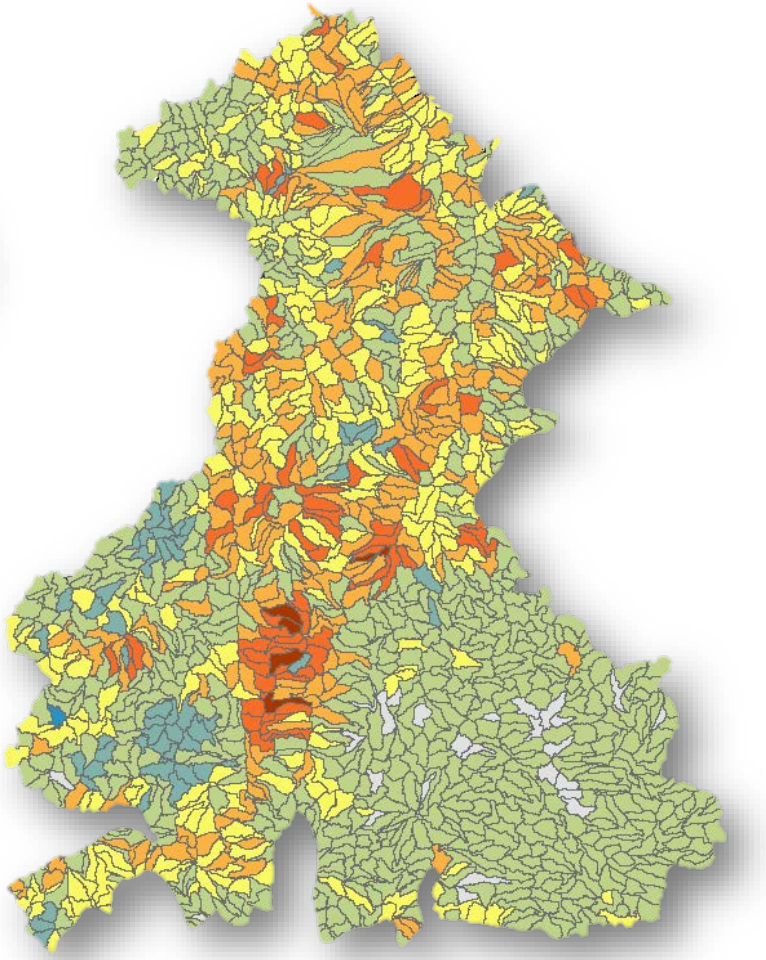


Vulnerability

Four Corners



Upper Rio Grande



Four Corners	Upper Rio Grande
55% Low	55% Low
19% Med	22% Med
26% High	35% High

highest

Summary

1. In Four Corners, vulnerability was highest east of Farmington, along the NM/AZ border, and north of Apache-Sitgreaves and Coconino National Forests.
2. In the Upper Rio Grande, vulnerability was greatest near urban areas (Albuquerque) and along the Rio Grande Corridor.

- Essentially, for both Focal Areas, vulnerability was high where Pinyon-Juniper habitat exists
- Need to evaluate how much of this pattern is driven by predictors used to estimate vulnerability
- PJ habitats encompass variety of forms- this analysis does not address seral stages, infilling and canopy closure which may have relevance to PJ health and persistence over time.

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!
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