



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 1: Results of Vulnerability Assessments for Riparian Corridors and Native Fish in 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

10-15 minutes



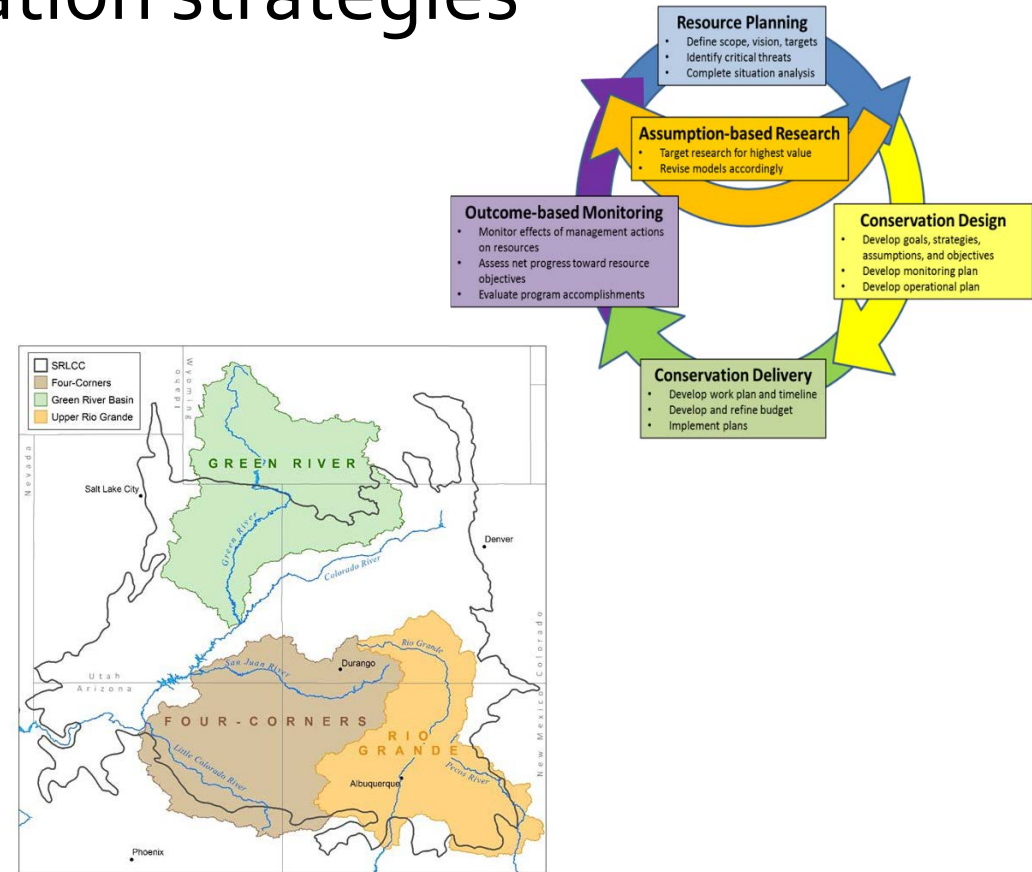
Goals for This Webinar

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



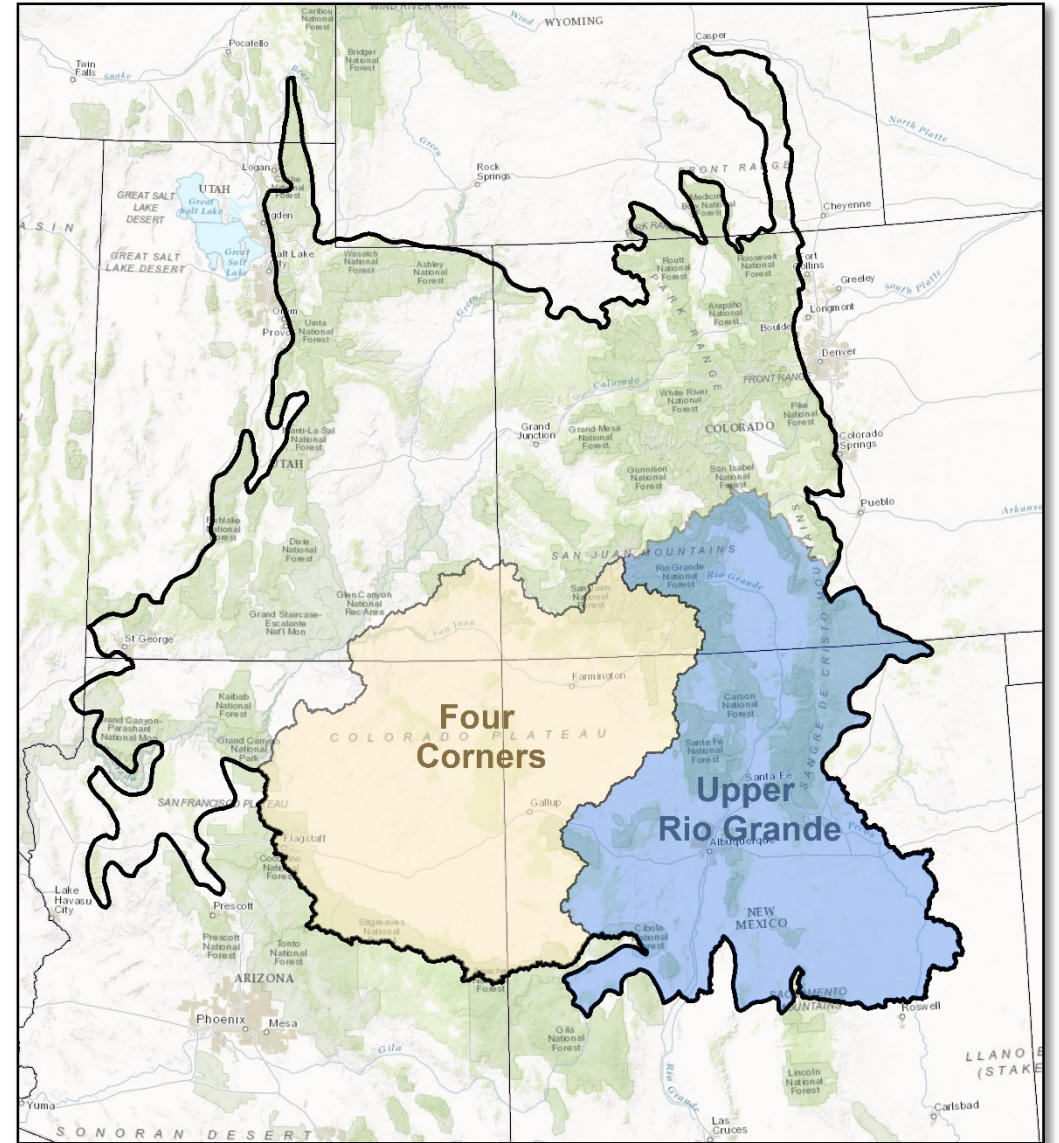
The SRLCC has engaged an adaptive management framework to collaboratively develop shared conservation objectives and landscape scale adaptation strategies

- 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



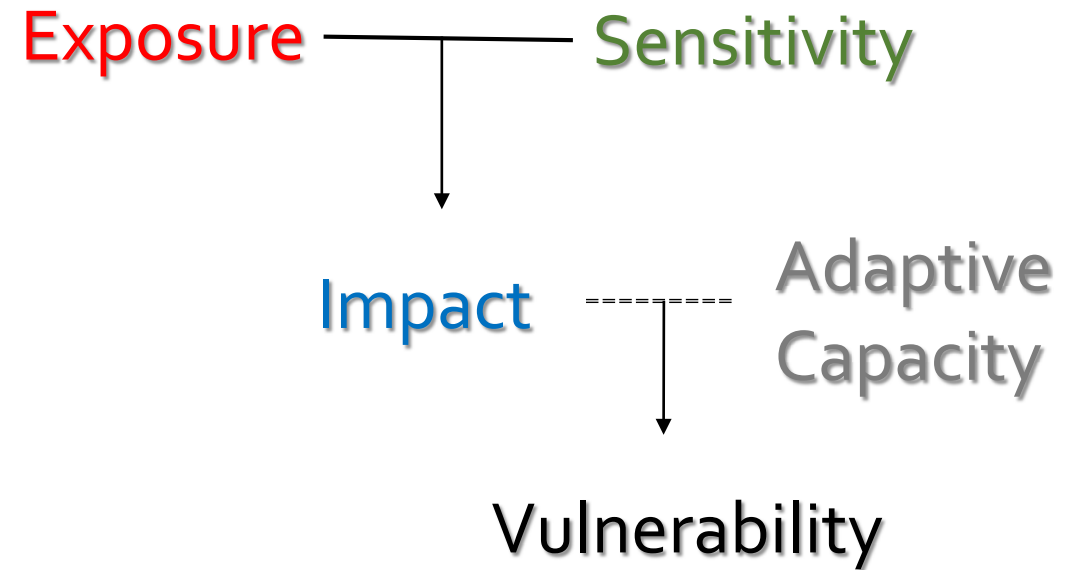
Methods

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	<ul style="list-style-type: none">• Human impacts• Natural disturbances• Climate change
Sensitivity	Qualities that make the target more susceptible to negative impacts from disturbance or threat	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• Traits/conditions associated with resilience• Potential for management intervention

Steps to Quantify Vulnerability

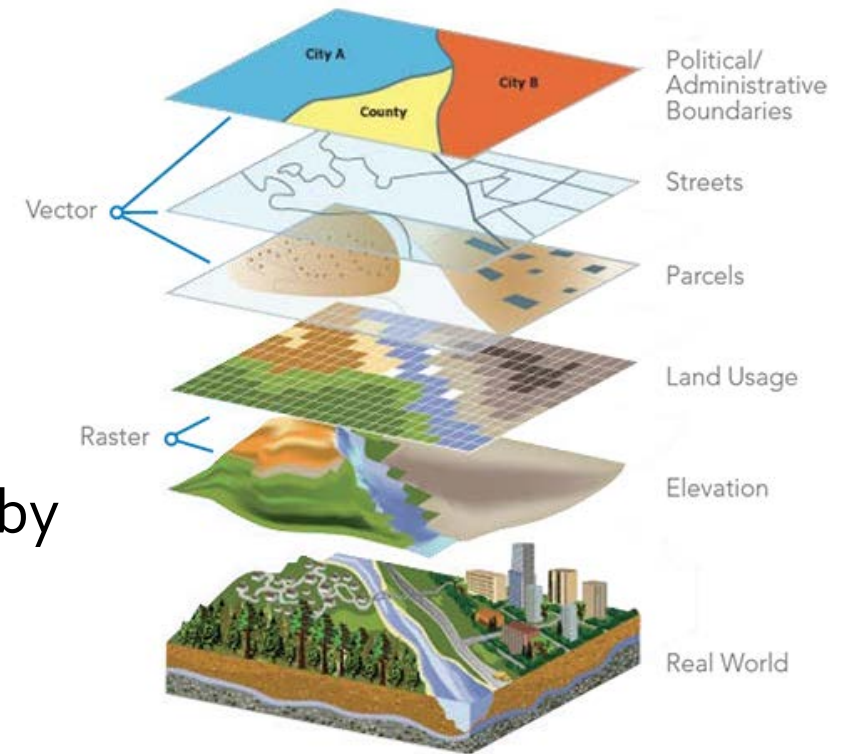
1. Gather data
 - Assess Relevance
 - Assign to Element
2. Create indices
3. Combine E, S, and AC indices to estimate Vulnerability



Step 1. Gather Data

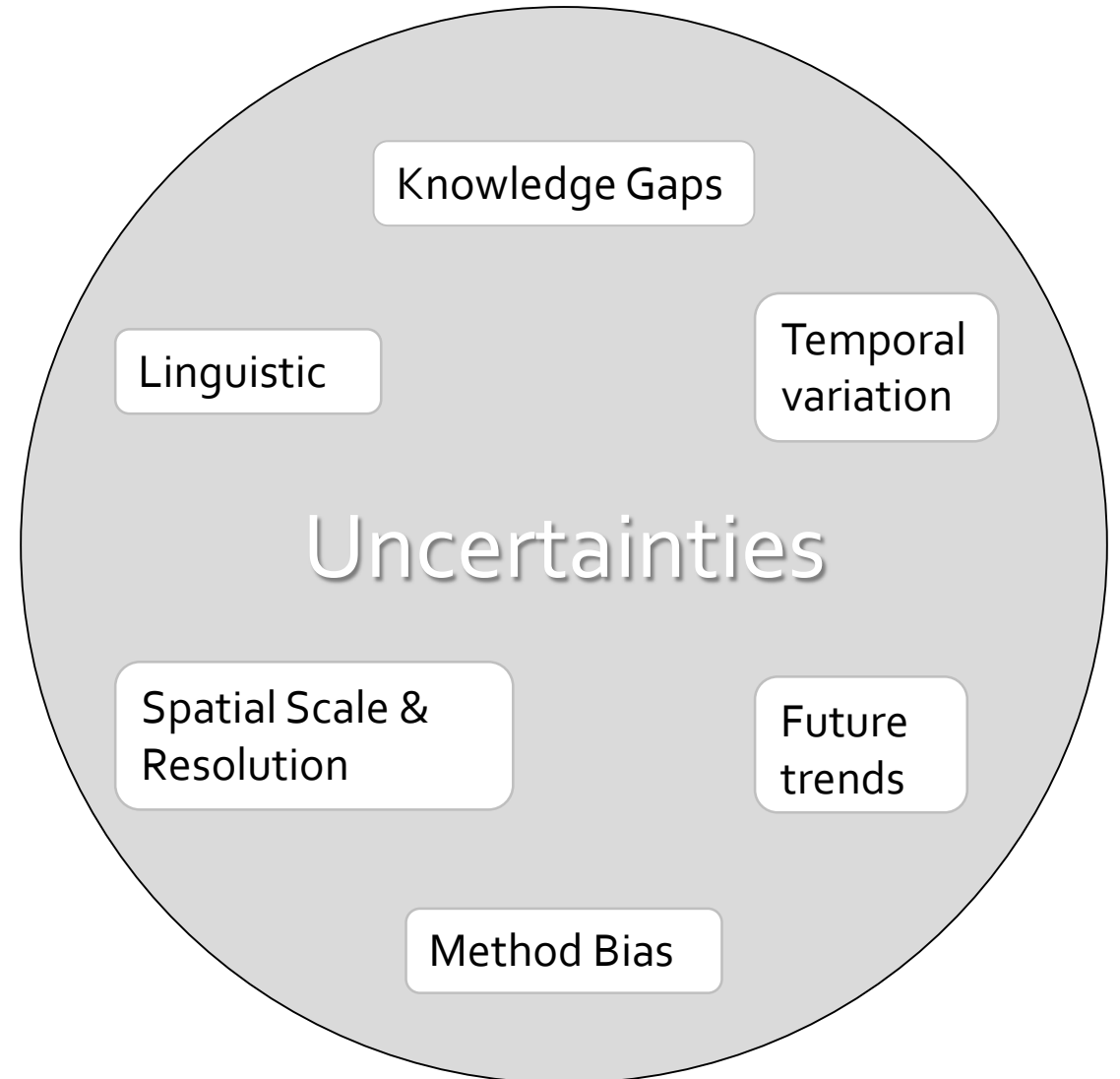
Criteria:

- 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

$$1 + 1 + 1 + 1 = \text{Cumulative score}$$

Pros

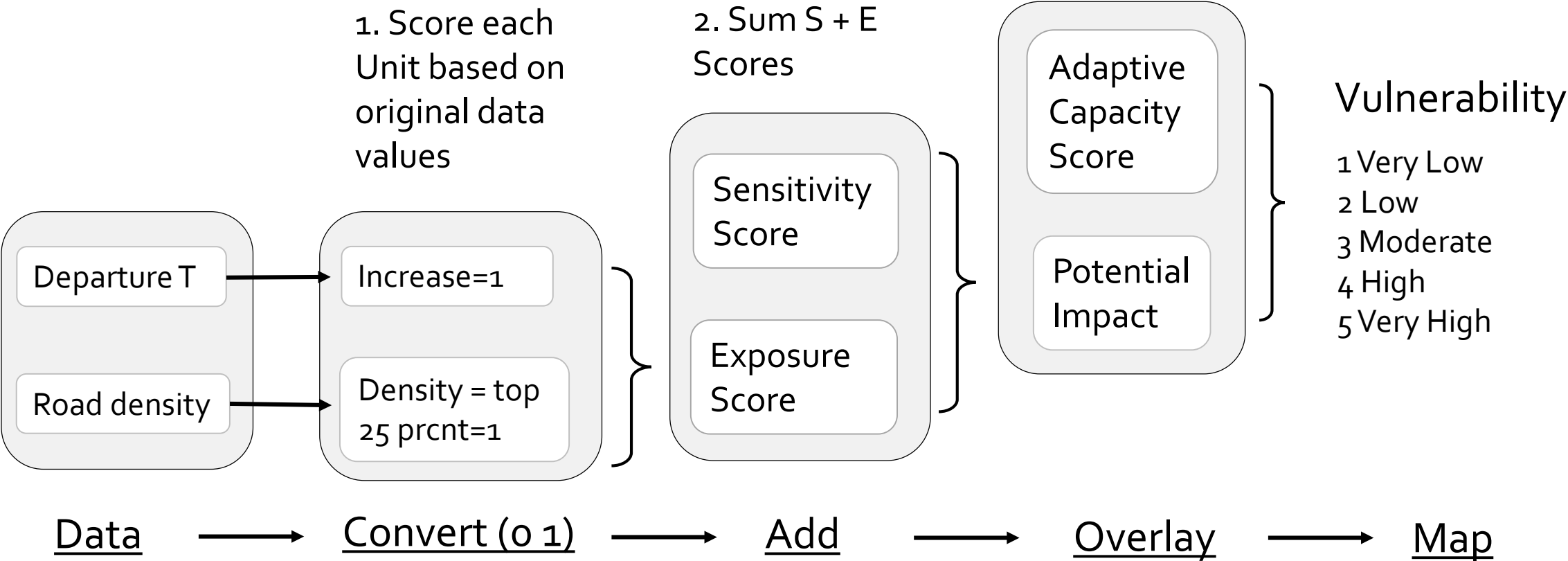
- Easy to interpret
- Easy to manipulate on the fly
- Are able to identify relative differences and more complicated interactions

Cons

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

From Data to Vulnerability Rank

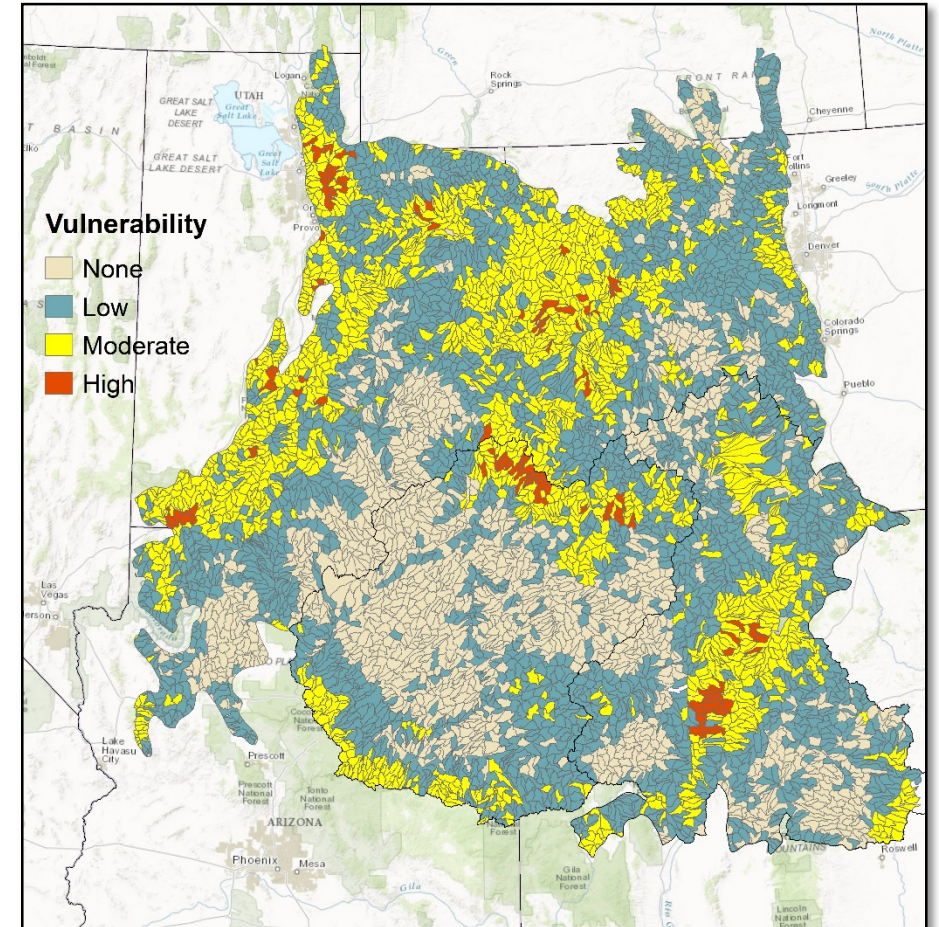
3. Combine Scaled
Impact and Adaptive
Capacity Scores



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

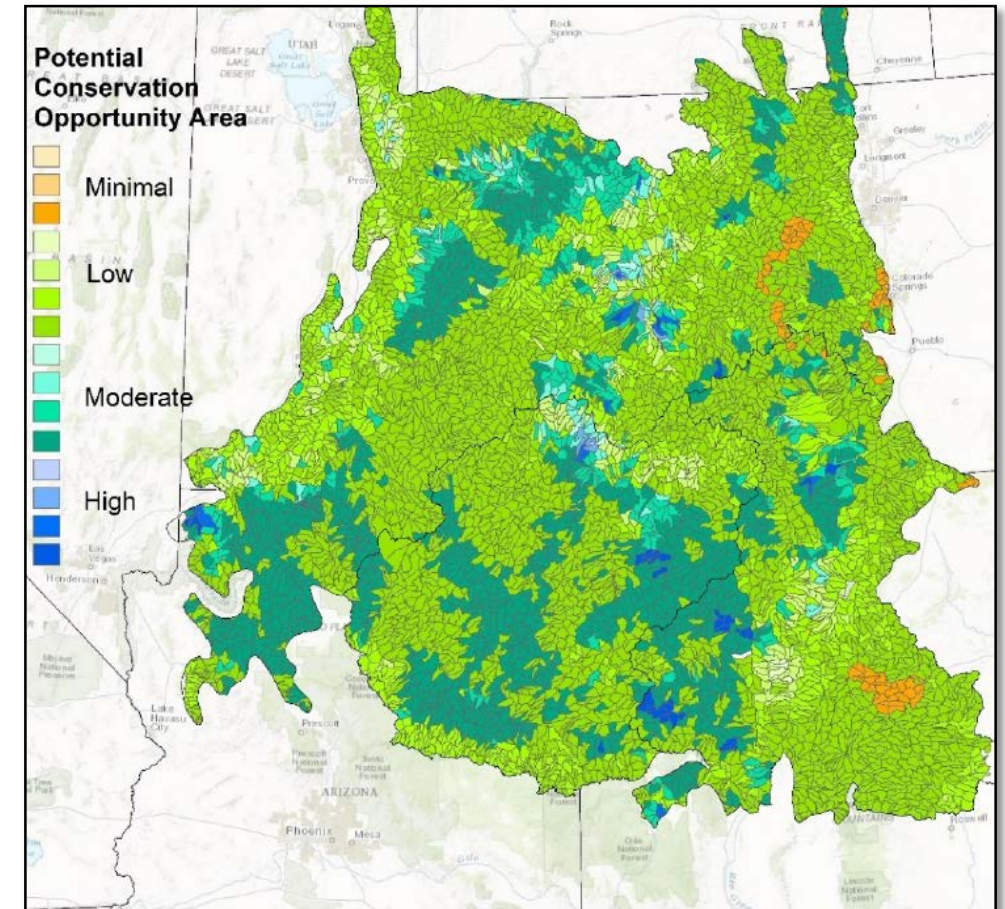
Increasing Vulnerability



Highlight Opportunities

Opportunity		Adaptive Capacity				
Impact		1	2	3	4	5
	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

Increasing Potential Success



Assessment Results

Focal Resources



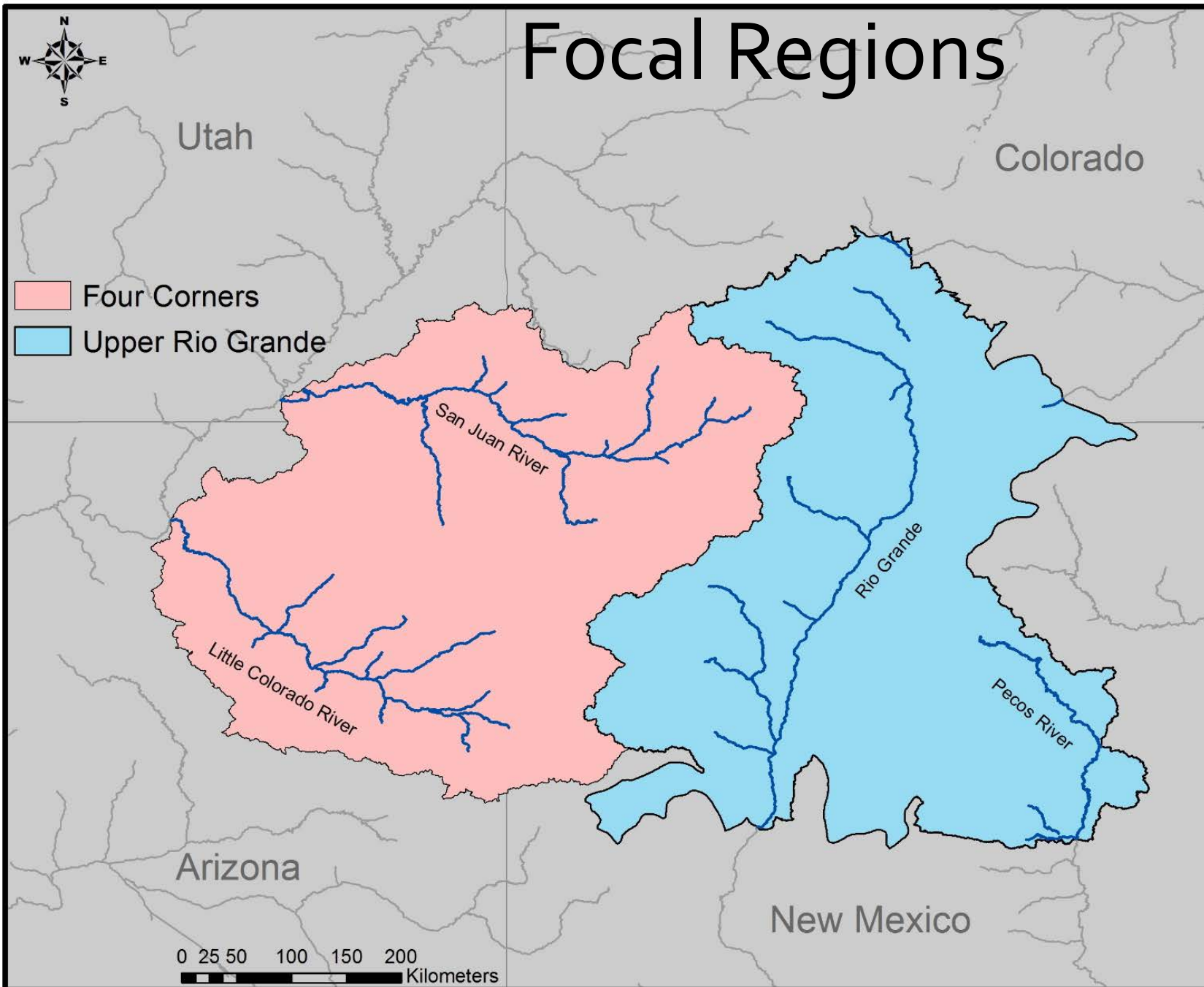
Focal Resource- Coldwater Fish Habitat



Focal Resource- Riparian Corridors



Focal Regions



Four Corners Region

Little Colorado River Basin



San Juan River Basin



Upper Rio Grande Region

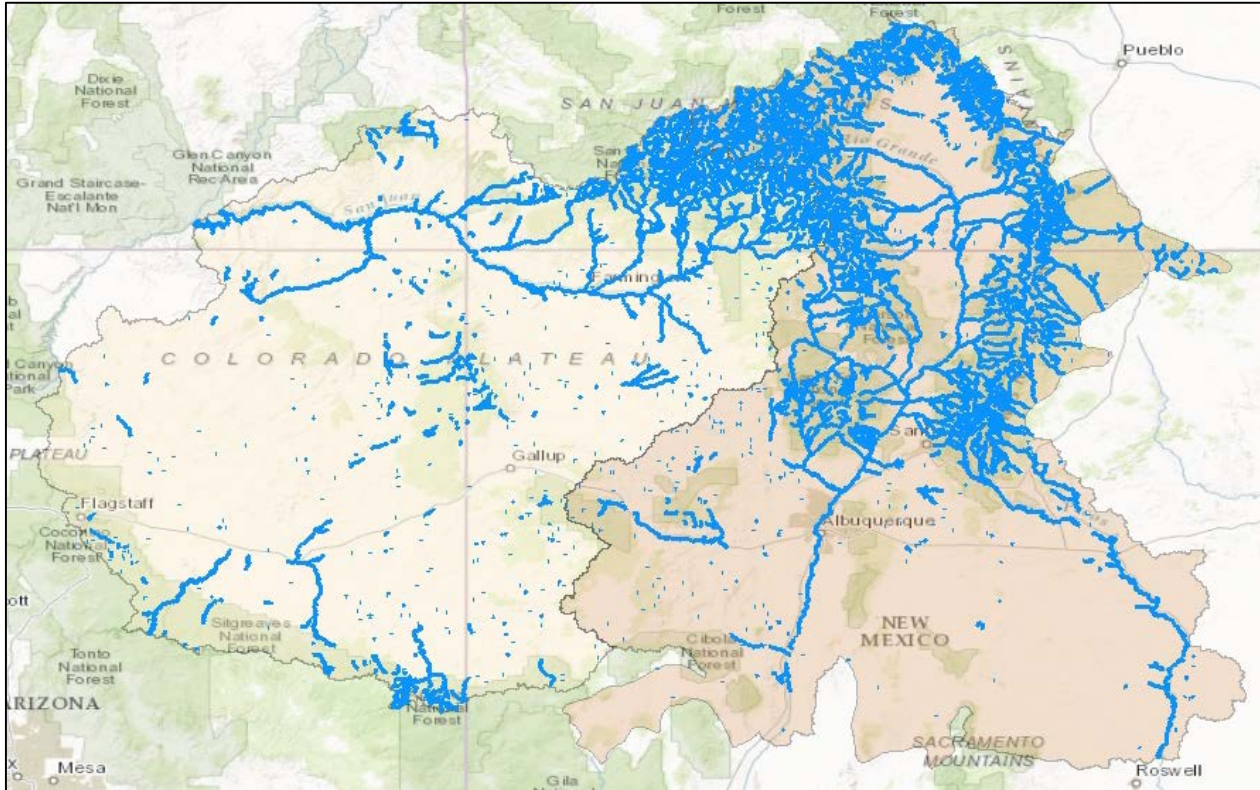


Stream types

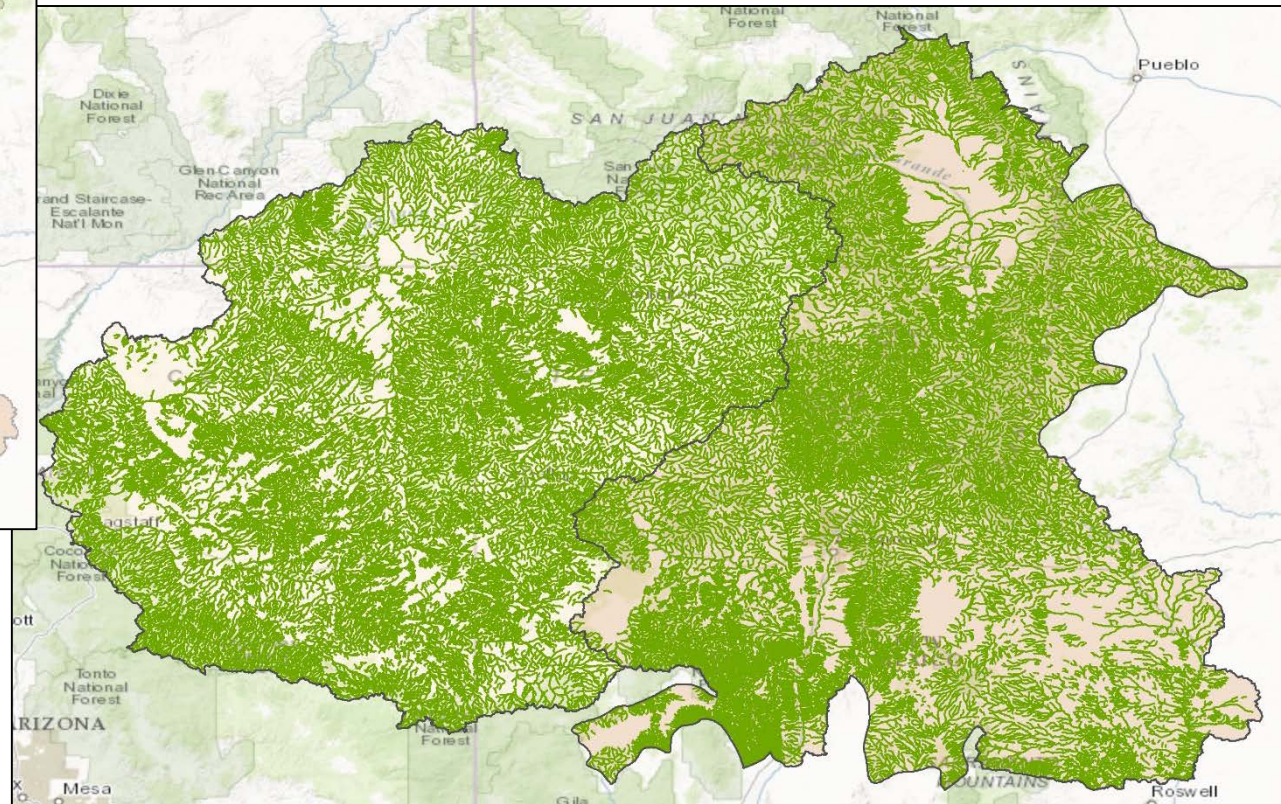


NHDplus Stream Segments

Coldwater fish habitat



Riparian corridors



Assessment Data

Exposure

Sensitivity

Adaptive Capacity

Change in mean annual flow

Change in mean summer flow

Change in mean flow mass timing

Change in cold water temperature

Pollution sources in catchment

Road density

Density of road crossings

Soil erosion index

Nitrogen deposition

Riparian vegetation decrease

Urban development

Agriculture cover

Density of dams

Introduced or managed vegetation

Native trout presence

Sensitive fish species presence

T and E fish species presence

Riparian vegetation decrease

Catchment elevation

Density of dams

Wildfire risk

T and E riparian species presence

Deciduous or wetland vegetation

Cold stream temperatures

Riparian vegetation increase

Riparian shading cover

Reservoir storage

Stream gradient

Beaver capacity

Herbaceous wetland cover

Public land ownership

Protected land designation

Spring density

Catchment elevation

■ Fish

■ Riparian

■ Both

Relevant Data Not Included In This Analysis

Data/Indicator	Reason
Distribution of nonnative fish	Not yet available
Groundwater levels/aquifer extent	Cannot find coverage
Riparian vegetation condition	Cannot find coverage
Disease	Cannot find coverage
Distribution of other sensitive species (birds, herpetofauna, mammals, inverts, plants)	Data aren't compiled yet
Current/future energy development	Data aren't compiled yet

Data: Coldwater Fish Exposure

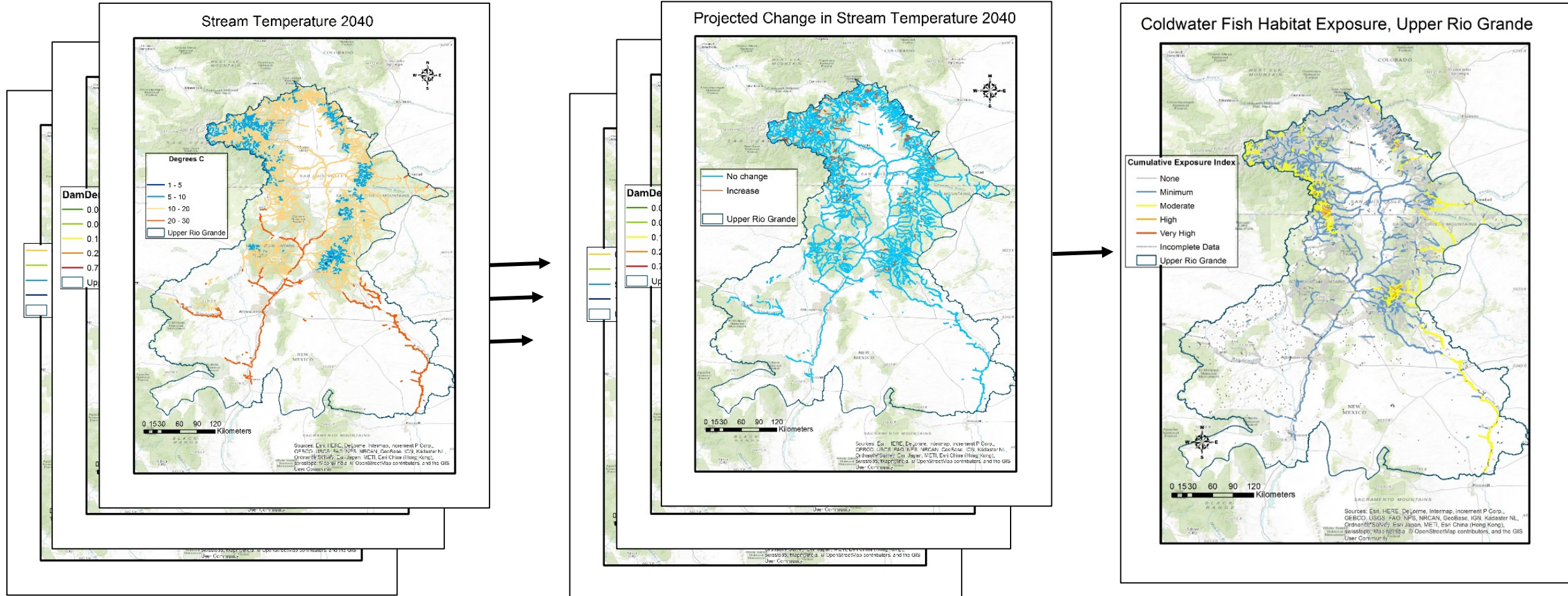
Description	How used	FC results	URG results
Mean annual flow 2040	Decline=1	41% affected	13% affected
Mean summer flow 2040	Decline=1	46% affected	46% affected
Stream temperature 2040	Increase=1	4% affected	5% affected
Pollution sources	$\geq 0 = 1$	<1% affected	<1% affected
Road density	$\geq 10 \text{ km/km}^2 = 1$	<1% affected	<1% affected
Road crossings	$\geq 20 / \text{km}^2 = 1$	<1% affected	<1% affected
Soil erosion index	$\geq 4.0 = 1$	1% affected	1% affected
Nitrogen deposition	$\geq 3.0 = 1$	12% affected	7% affected

Sources: USFS NORWEST, EPA STREAMCAT

Data: Riparian Corridor Exposure

Description	How used	FC results	URG results
Mean annual flow 2040	Decline=1	9% affected	7% affected
Mean summer flow 2040	Decline=1	6% affected	11% affected
Peak flow date	>14 days earlier=1	6% affected	6% affected
Riparian vegetation cover	Decline=1	69% affected	79% affected
Agriculture cover	≥30%=1	3% affected	3% affected
Developed land	≥30%=1	5% affected	5% affected
Introduced vegetation	≥30%=1	8% affected	11% affected
Density of dams	>0=1	11% affected	7% affected

Exposure Mapping



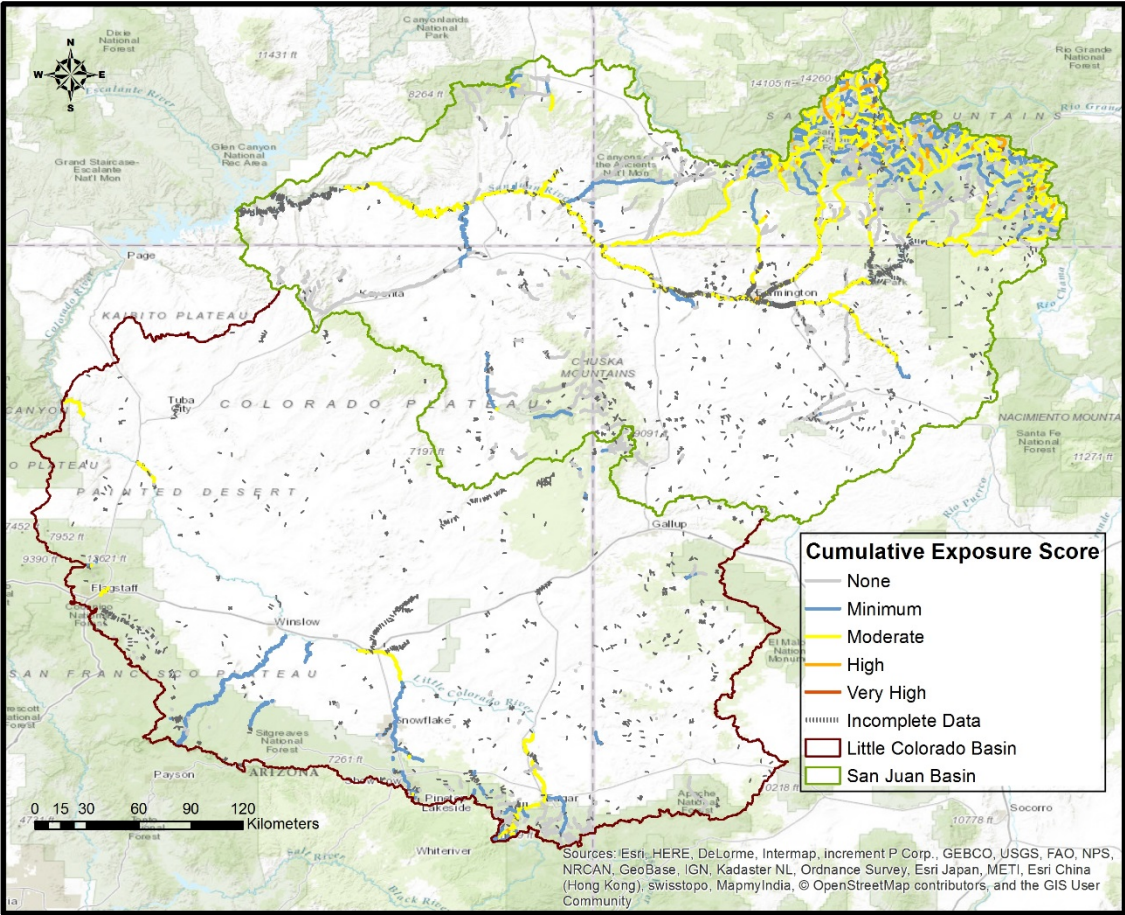
Original data

Coded 0/1

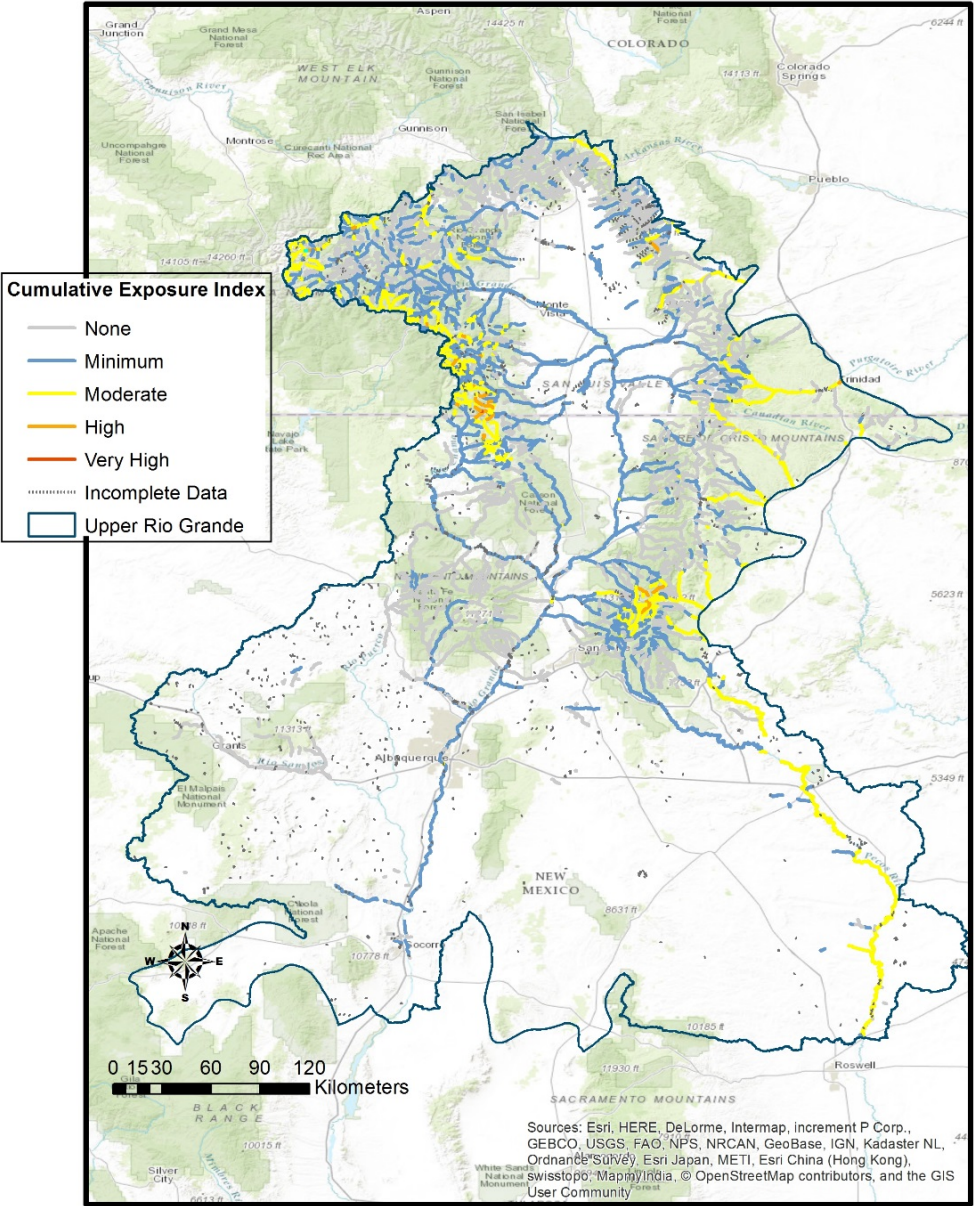
Cumulative scores

Cumulative Exposure Index

Coldwater Fish Habitat Exposure, Four Corners

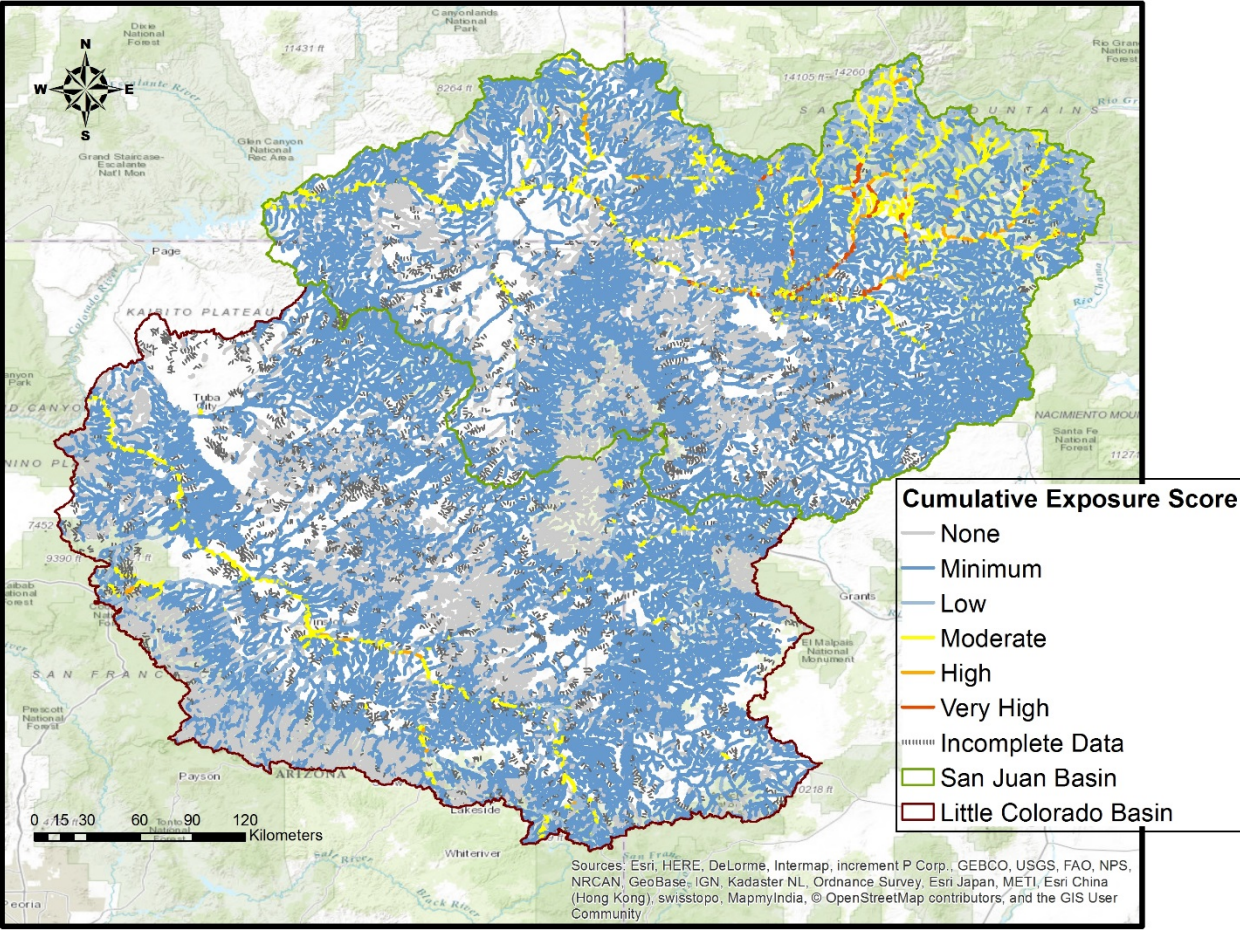


Coldwater Fish Habitat Exposure, Upper Rio Grande

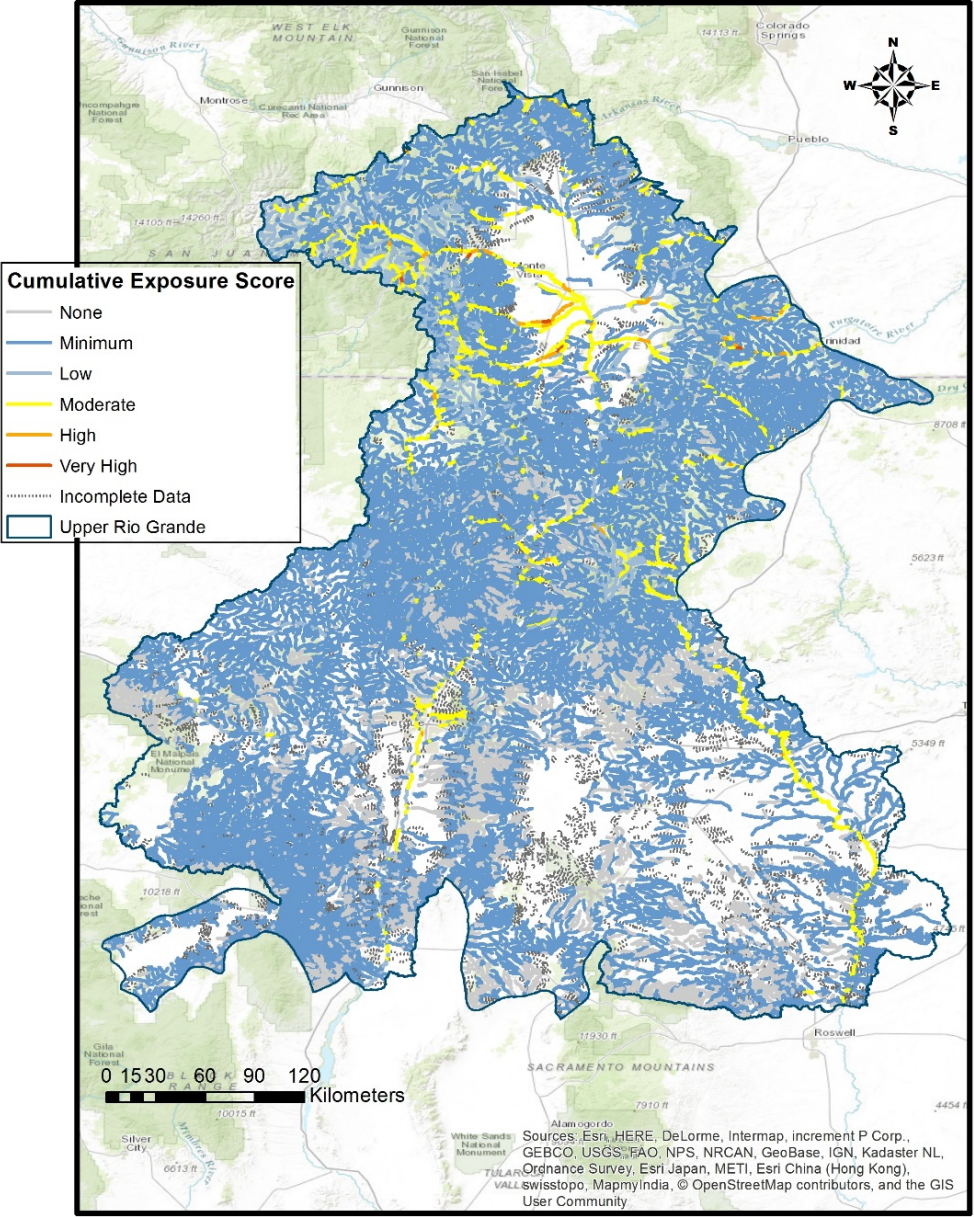


Cumulative Exposure Index

Riparian Corridors Exposure, Four Corners



Riparian Corridors Exposure, Upper Rio Grande



Data: Coldwater Fish Sensitivity

Description	How used	FC results	URG results
Native trout	Presence=1	7% affected	5% affected
Sensitive fish	Presence=1	9% affected	4% affected
T and E fish	Presence=1	1% affected	0% affected
Riparian vegetation cover	Decline=1	85% affected	90% affected
Elevation	<2280 m=1	56% affected	33% affected
Density of dams	>0=1	40% affected	31% affected
High/very high fire risk	≥30%=1	29% affected	14% affected

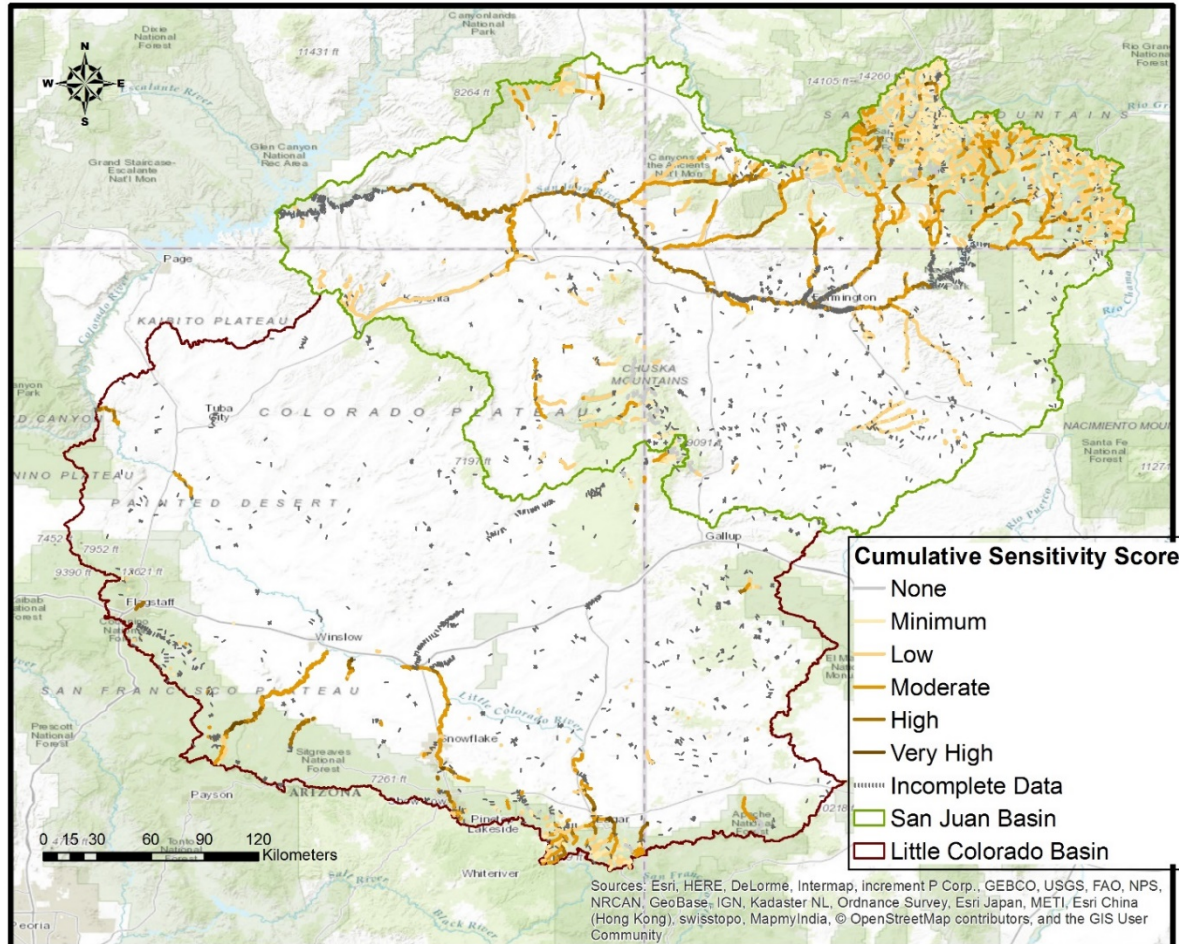
Sources: USFWS, FISHNET₂, LANDFIRE, EPA STREAMCAT

Data: Riparian Corridor Sensitivity

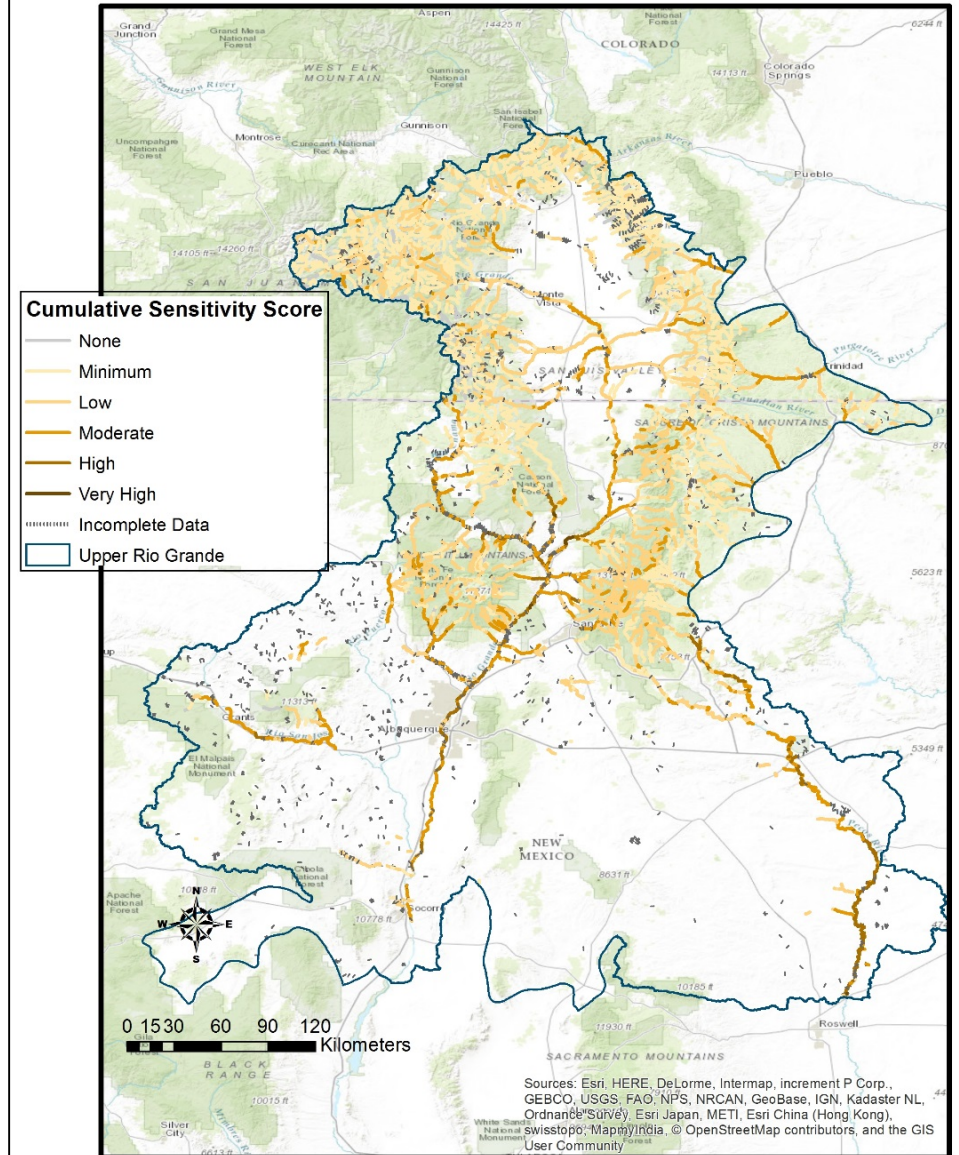
Description	How used	FC results	URG results
High/very high fire risk	$\geq 30\% = 1$	13% affected	10% affected
T and E riparian species	Presence=1	2% affected	3% affected
Deciduous/wetland vegetation	Presence=1	7% affected	9% affected

Cumulative Sensitivity Index

Coldwater Fish Habitat Sensitivity, Four Corners

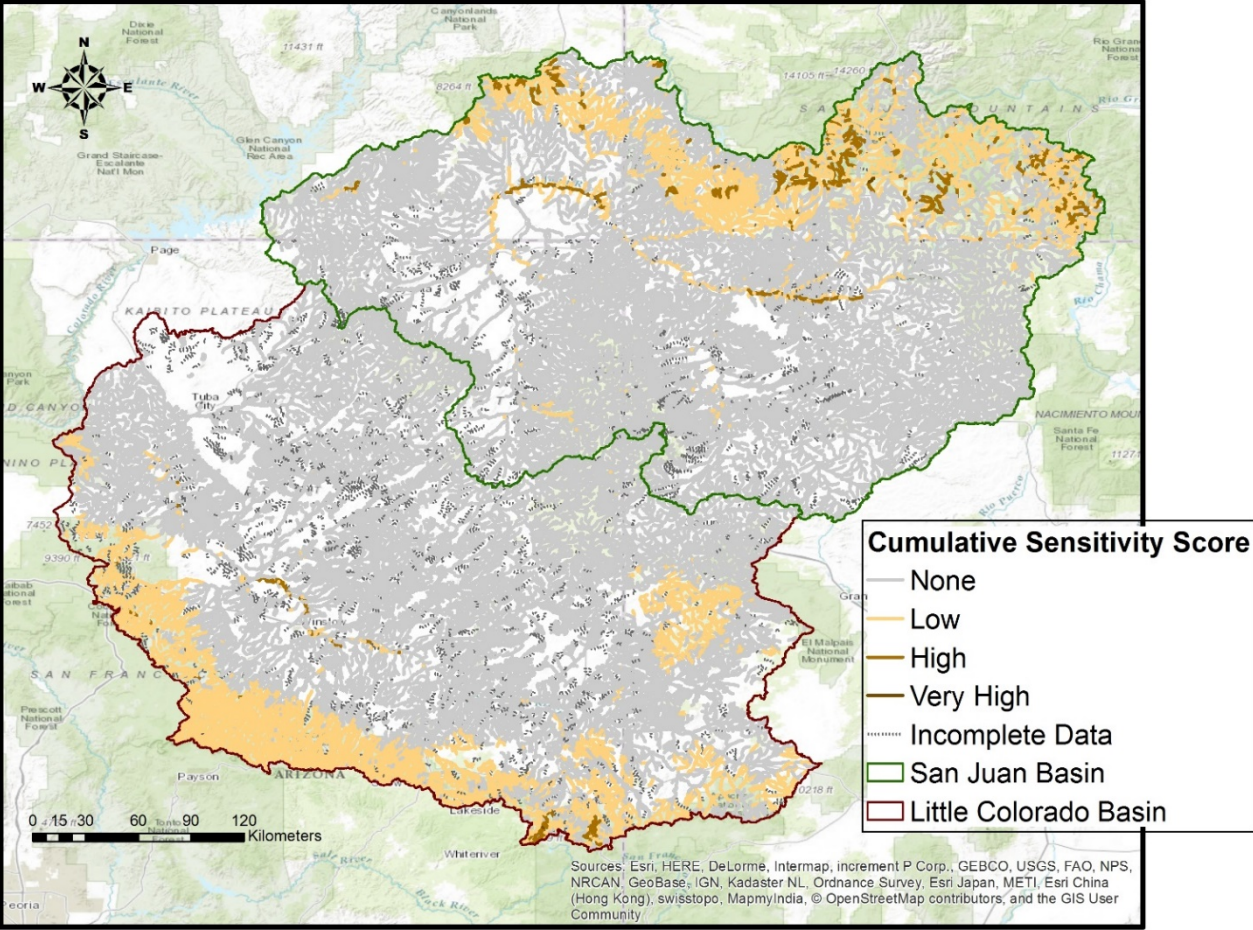


Coldwater Fish Habitat Sensitivity, Upper Rio Grande

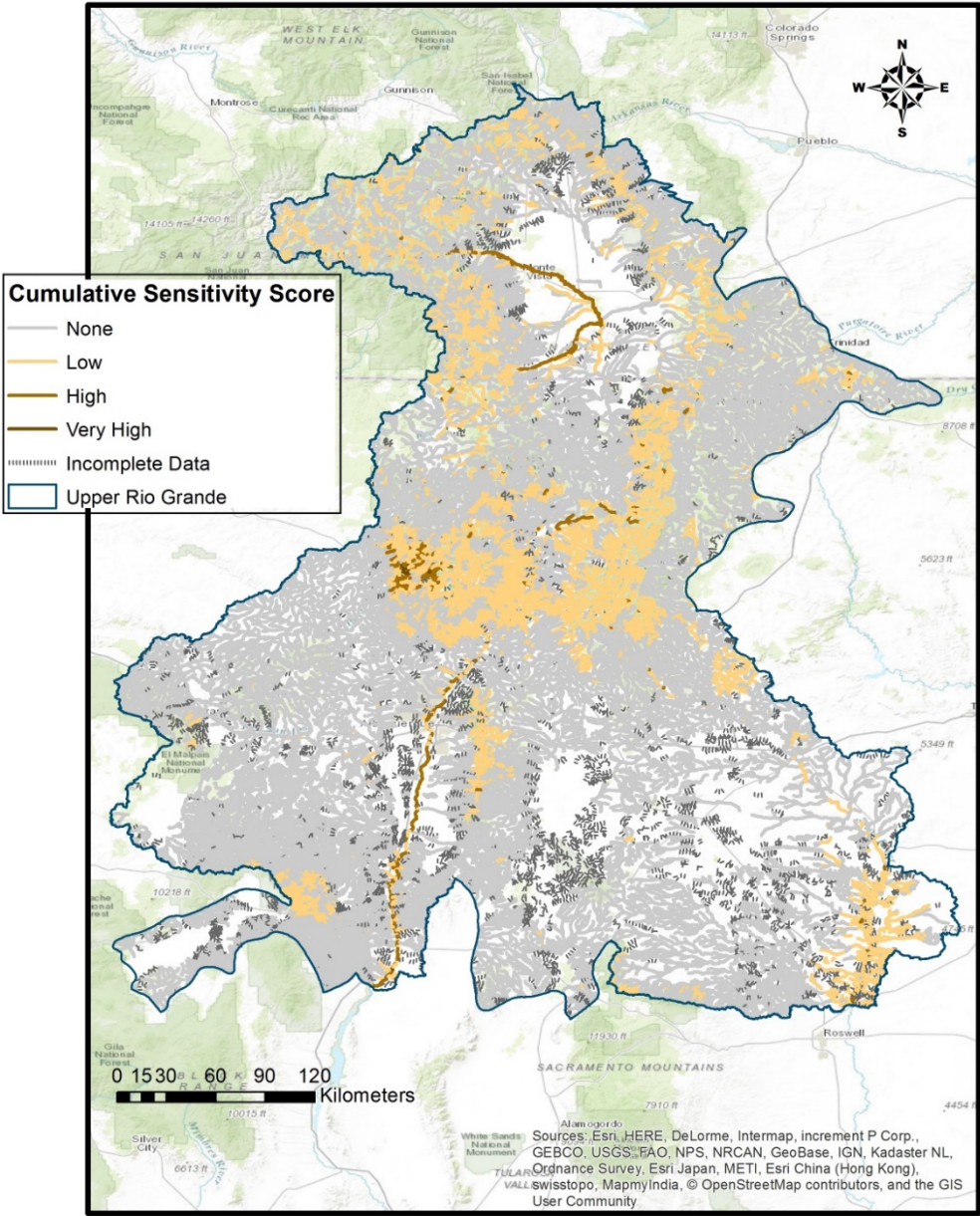


Cumulative Sensitivity Index

Riparian Corridors Sensitivity, Four Corners



Riparian Corridors Sensitivity, Upper Rio Grande



Data: Coldwater Fish Adaptive Capacity

Description	How used	FC results	URG results
Cold stream temperatures	$<9^{\circ}=1$	9% affected	11% affected
Riparian vegetation cover	Increase=1	1% affected	1% affected
Shading cover	$\geq 10\%=1$	1% affected	1% affected
Reservoir storage	$\geq 10\text{m}^3/\text{km}^2$	39% affected	30% affected
Stream gradient	$<20\%=1$	97% affected	99% affected
Beaver capacity	$>0=1$	33% affected	43% affected
Herbaceous wetland cover	$>0=1$	6% affected	20% affected
Public land	$\geq 70\%=1$	73% affected	55% affected
Protected land	$\geq 70\%=1$	11% affected	13% affected
Spring density	$>0=1$	7% affected	6% affected

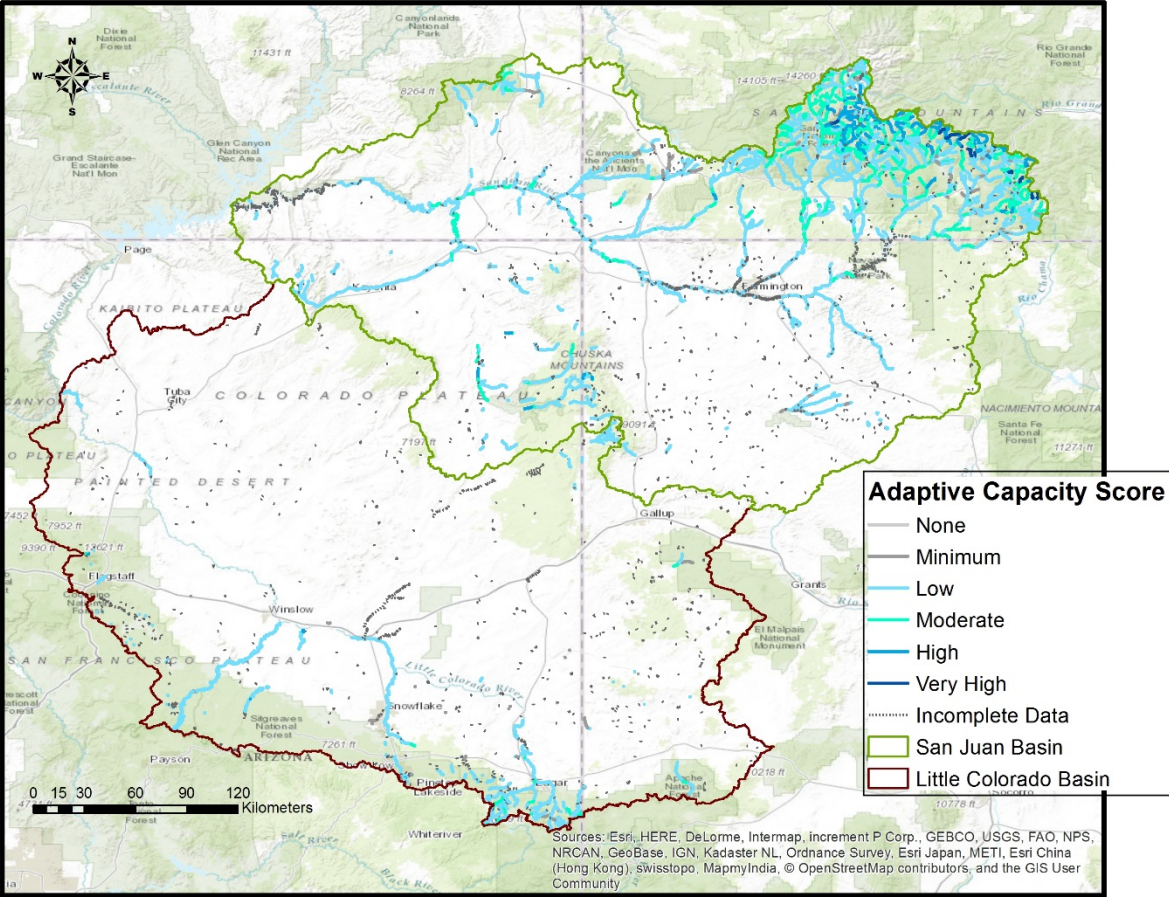
Sources: USFS NORWEST, LANDFIRE, EPA STREAMCAT, USGS PADUS, NHDplus

Data: Riparian Corridor Adaptive Capacity

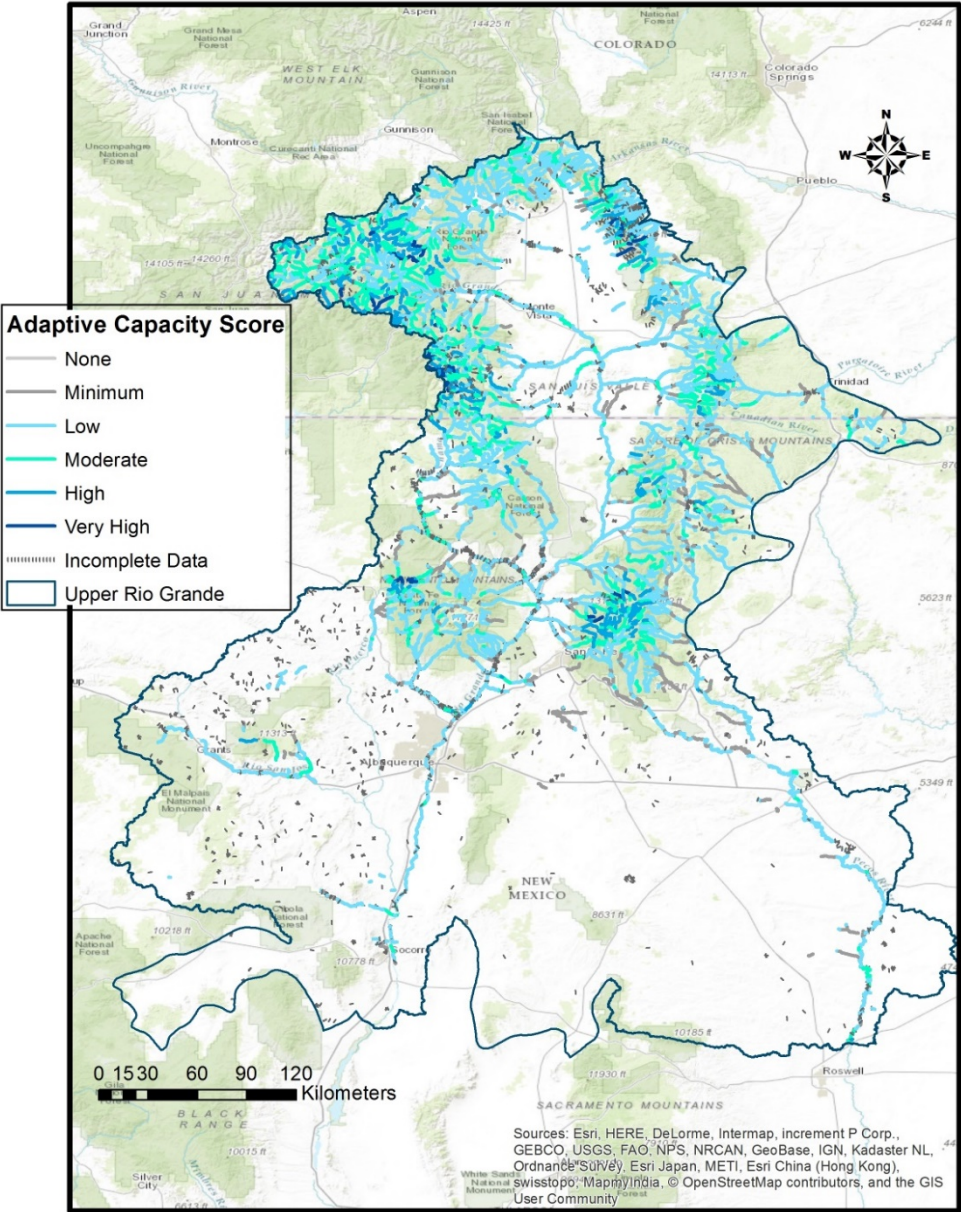
Description	How used	FC results	URG results
Elevation	$>2280 \text{ m}=1$	11% affected	34% affected
Reservoir storage	$\geq 10 \text{ m}^3 / \text{ km}^2$	11% affected	11% affected
Public land	$\geq 70\%=1$	78% affected	50% affected
Protected land	$\geq 70\%=1$	3% affected	7% affected

Cumulative Adaptive Capacity Index

Coldwater Fish Habitat Adaptive Capacity, Four Corners

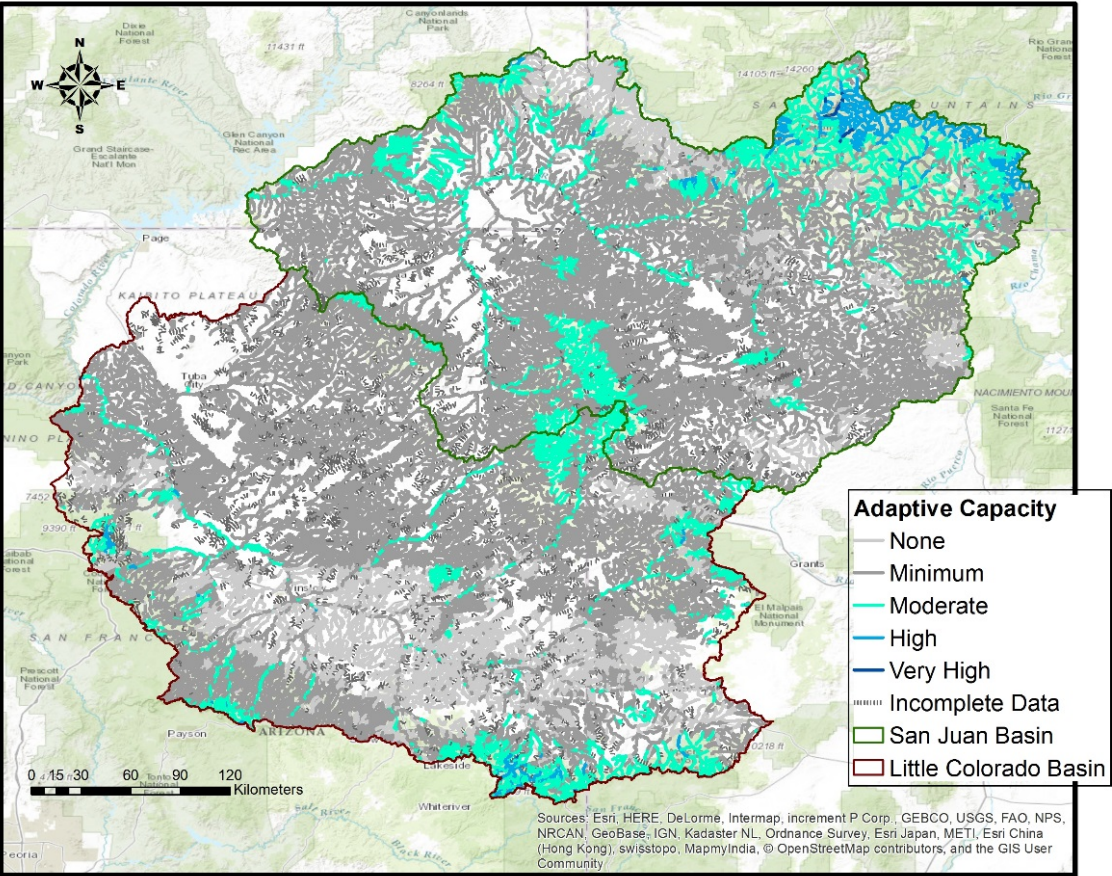


Coldwater Fish Habitat Adaptive Capacity, Upper Rio Grande

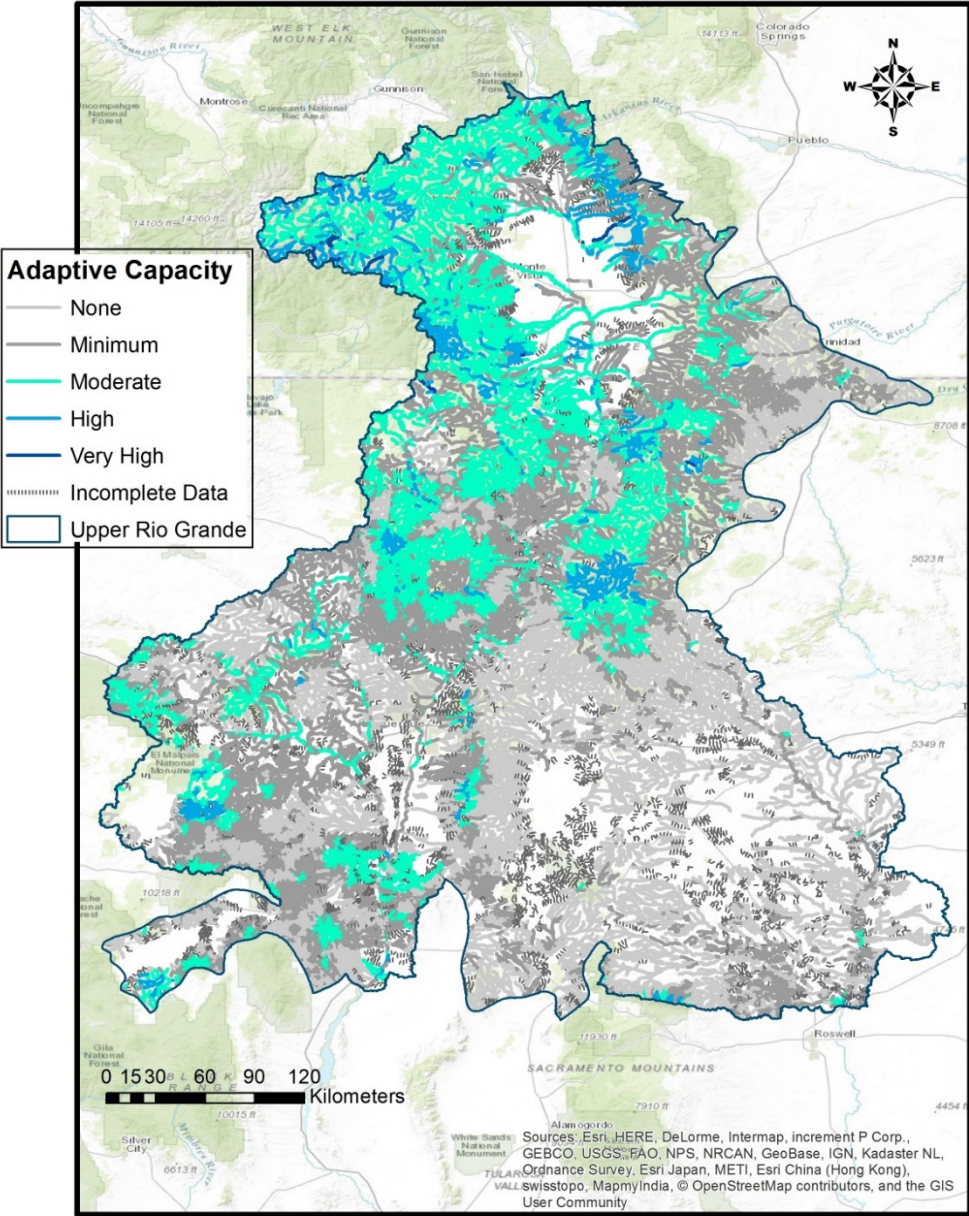


Cumulative Adaptive Capacity Index

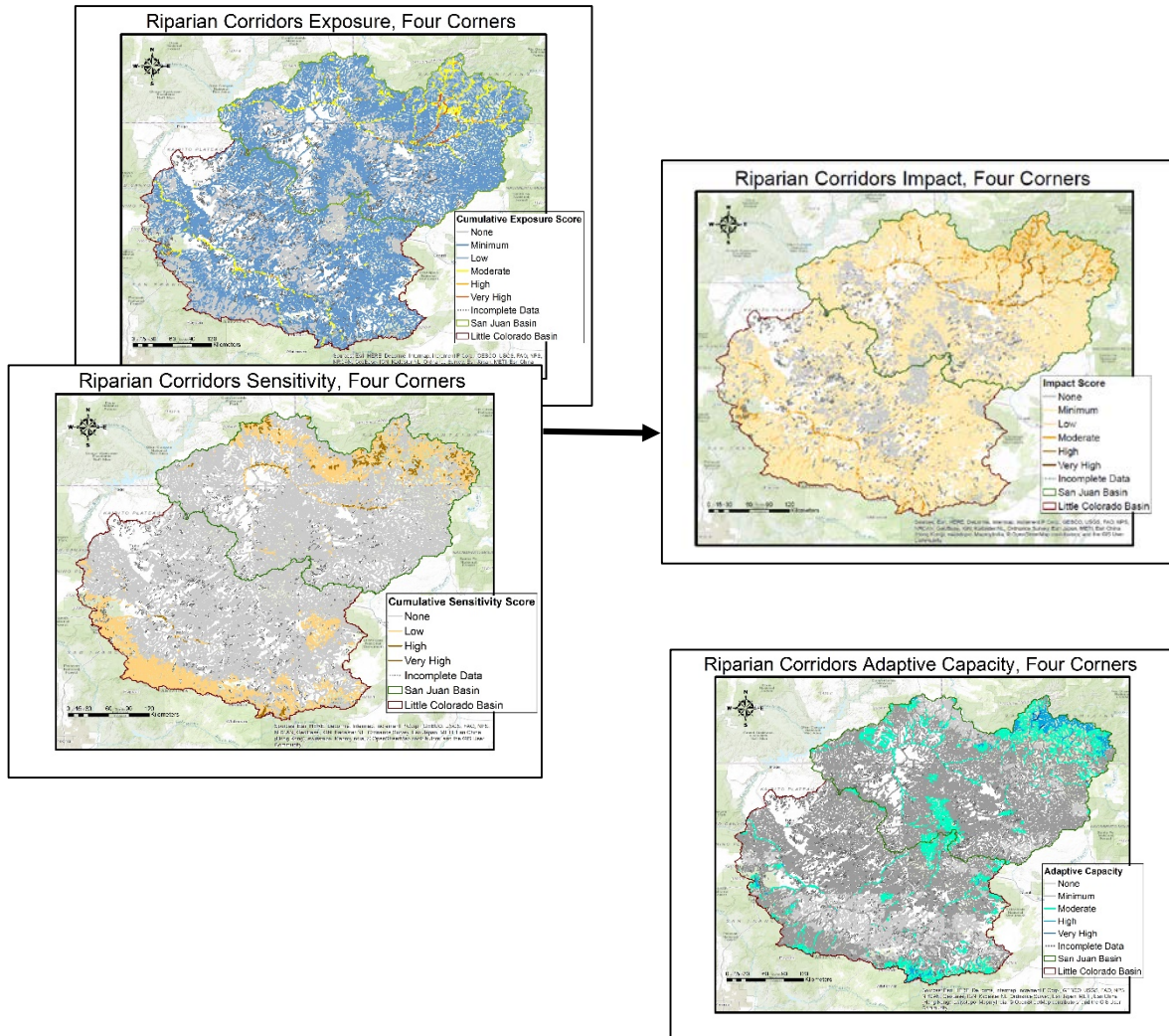
Riparian Corridors Adaptive Capacity, Four Corners



Riparian Corridors Adaptive Capacity, Upper Rio Grande



Vulnerability Calculation



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: Coldwater Fish Habitat



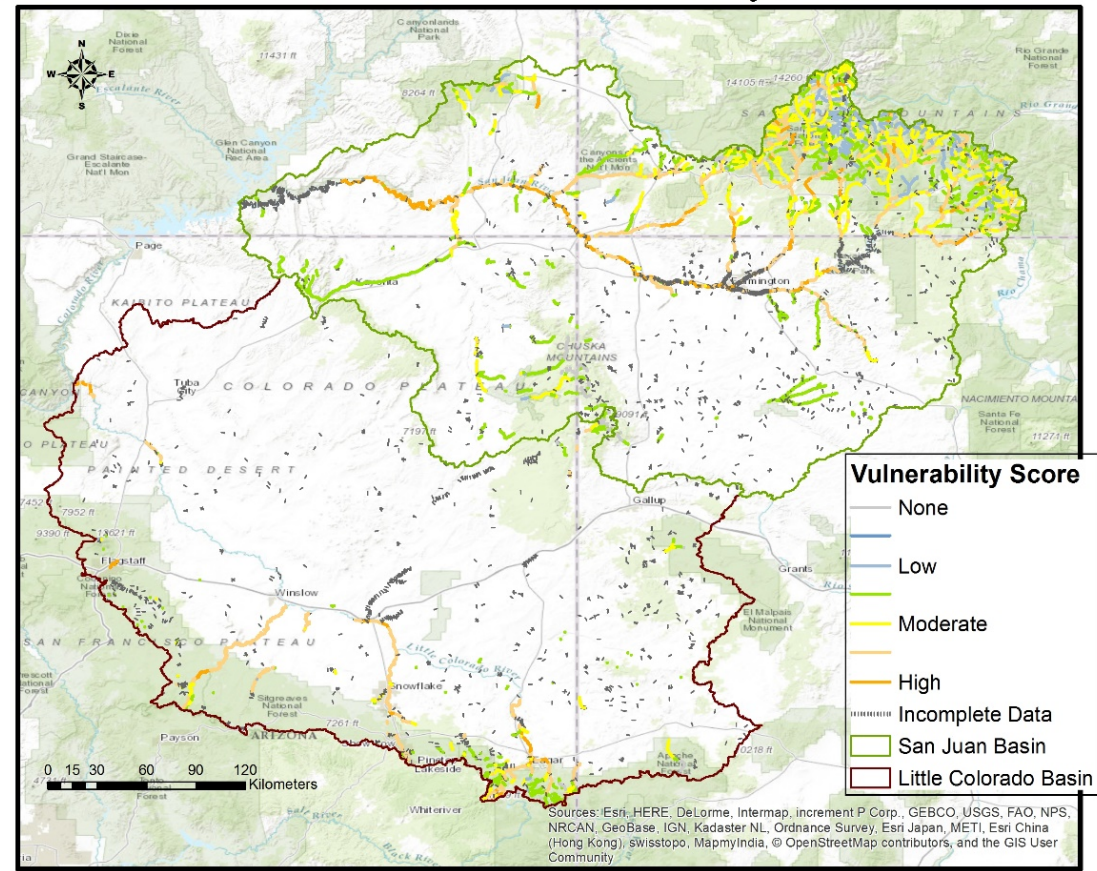
Exposure + Sensitivity/Adaptive Capacity

Summary stats

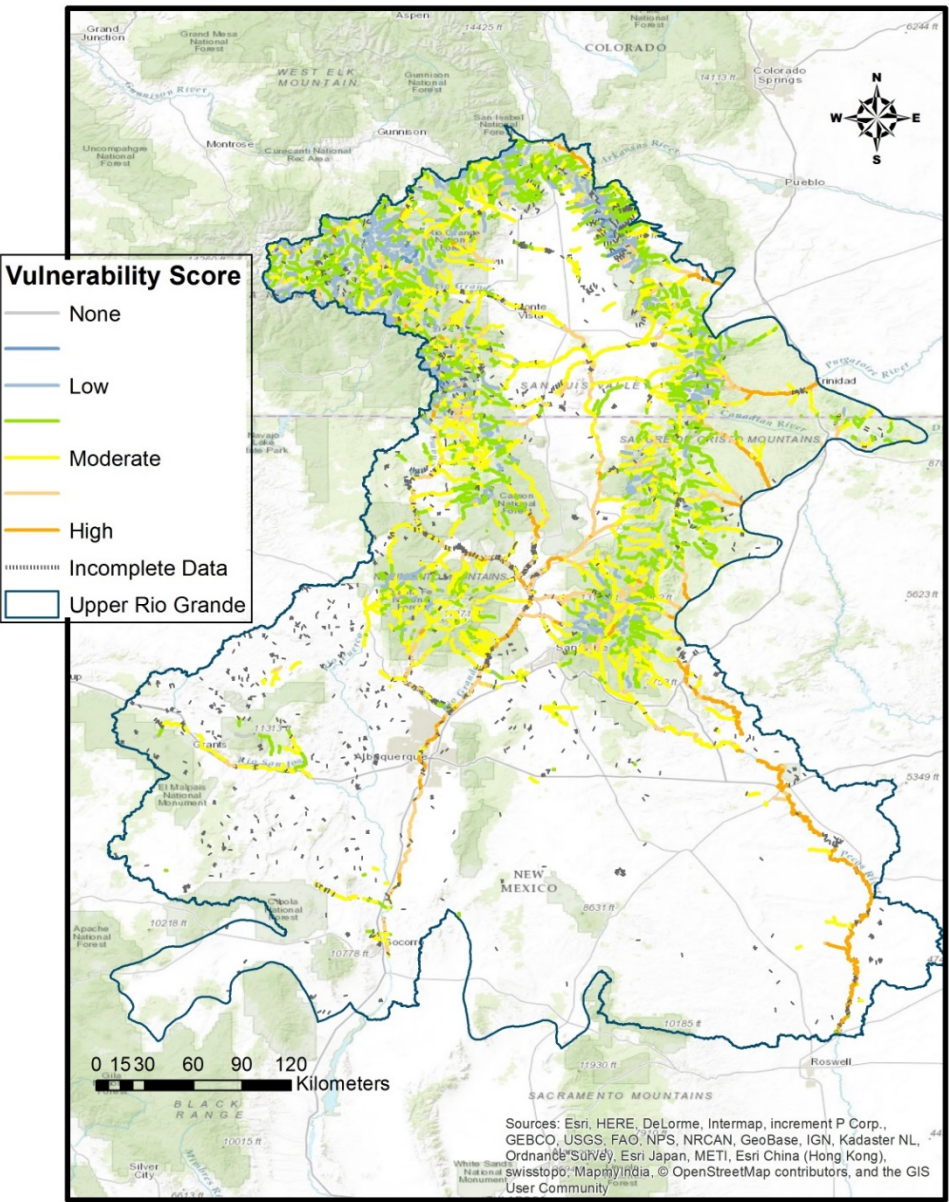
Four Corners	Upper Rio Grande
48% High	19% High
14% Moderate	42% Moderate
34% Low	38% Low

Vulnerability: Coldwater Fish Habitat

Coldwater Fish Habitat Vulnerability, Four Corners



Coldwater Fish Habitat Vulnerability, Upper Rio Grande



Vulnerability: Riparian Corridors



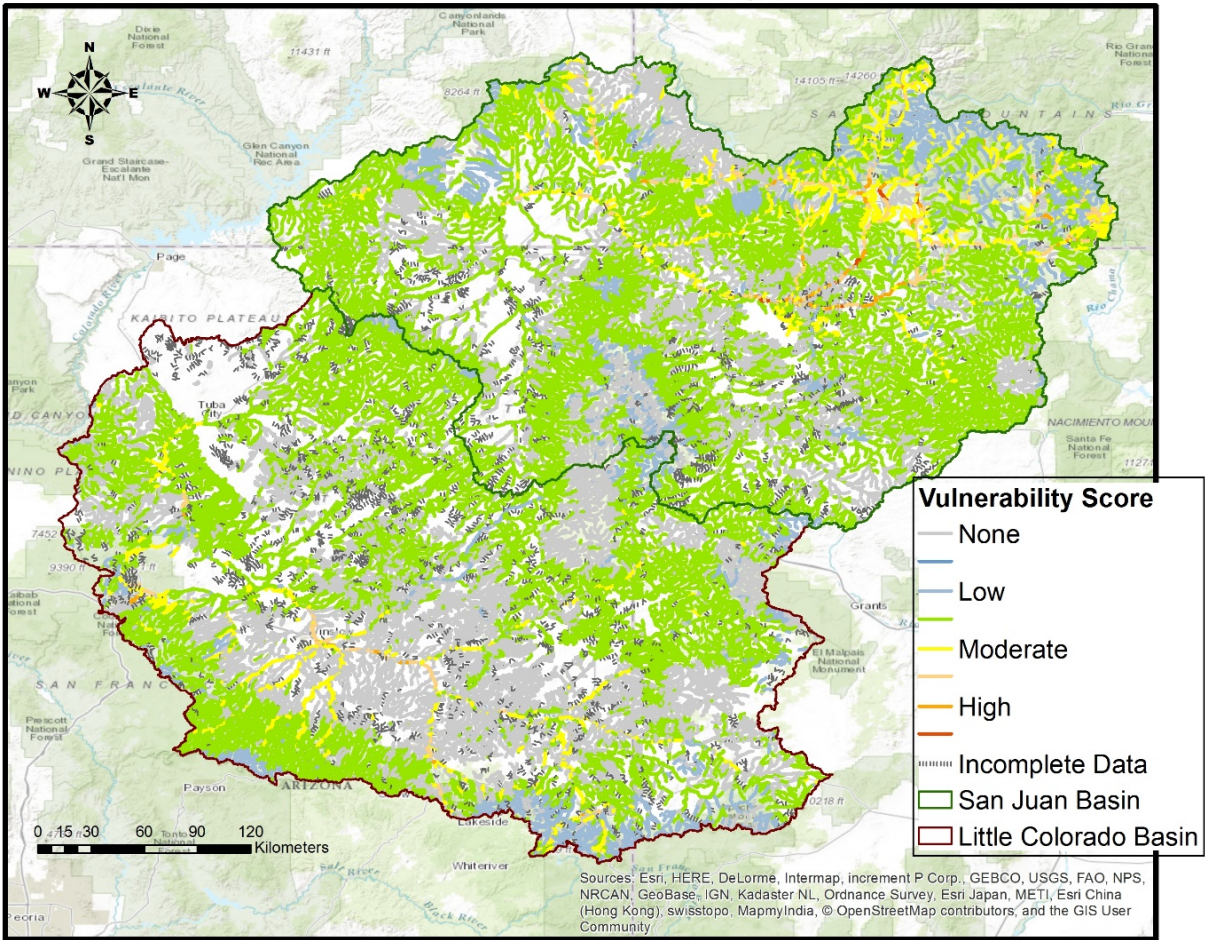
Exposure + Sensitivity/Adaptive Capacity

Summary stats

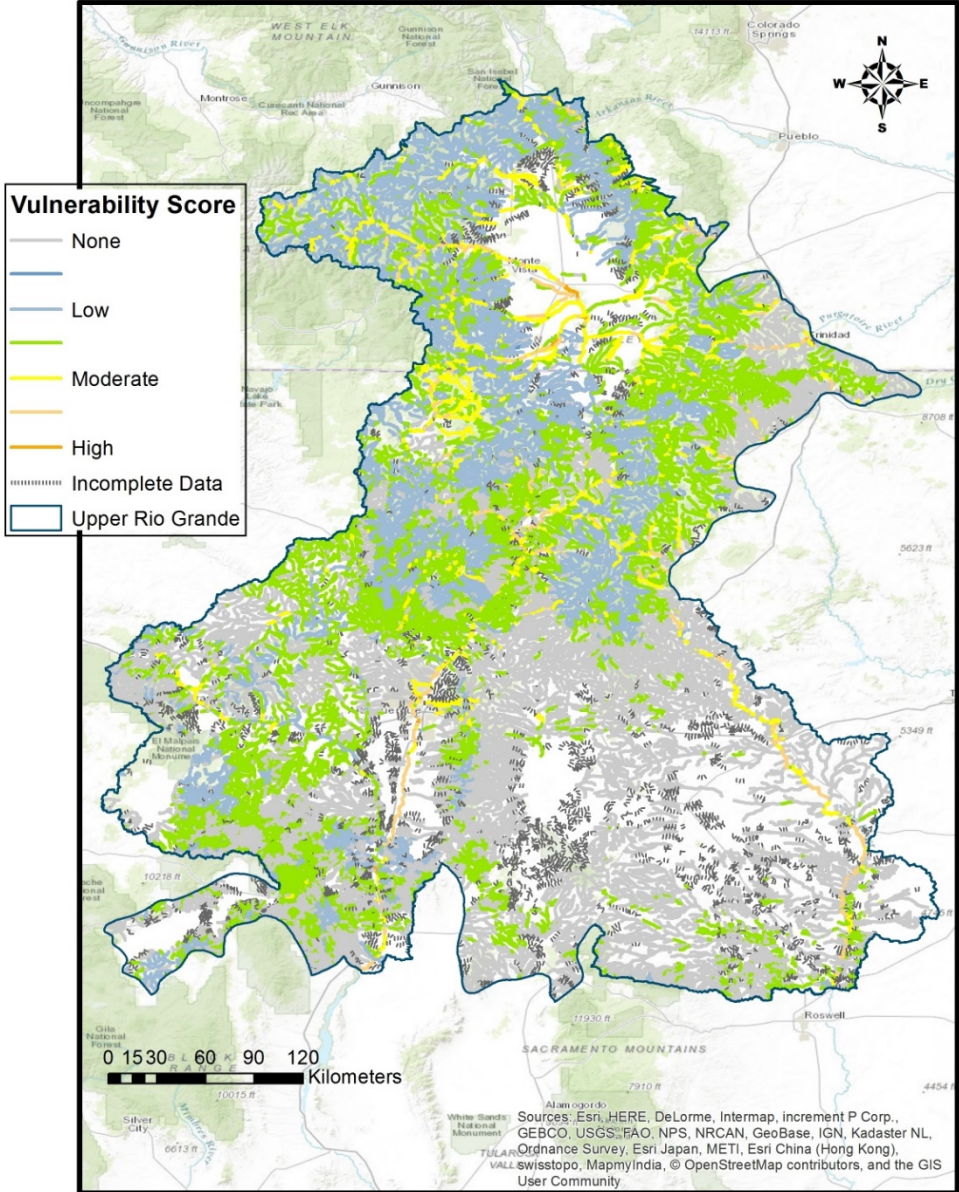
Four Corners	Upper Rio Grande
3% High	2% High
6% Moderate	6% Moderate
55% Low	50% Low

Vulnerability: Riparian Corridors

Riparian Corridors Vulnerability, Four Corners



Riparian Corridors Vulnerability, Upper Rio Grande



Conclusions

- Our assessment revealed differences in vulnerability of native fish habitat between focal regions.
- Stream segments with lower vulnerability are present in the San Juan Mountains and in the mountains of northern New Mexico.
- Vulnerability of riparian corridors is greater at lower elevations, where impacts are high.

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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