Vulnerability Assessments for Species and Ecosystems in the Four Corners and Upper Rio Grande Regions

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

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• Stephanie Mueller, NAU, Data
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• The Staff at the SRLCC: John Rice, Kevin Johnson, Mary McFadzen, Jered Hansen
• The Many Who Participated in Workshops, Working Group and Science Committee Meetings
Today’s Webinar

Vulnerability Assessments and Related Products

➢ What they are
➢ Where to find them
➢ How to use them
Assessments for Five Focal Resources in Two Landscapes

- Pinyon-Juniper Ecosystems
- Sagebrush Ecosystems
- Native Fish & Riparian
- Mule Deer & Elk

Map: Four Corners and Upper Rio Grande areas.
Vulnerability Assessments for Species and Ecosystems in the Four Corners and Upper Rio Grande

Objectives:

• Review current status and ongoing activities for focal resources within each landscape
• Identify relevant spatial data that can be used to assess vulnerability of SRLCC resources at landscape scales
• Develop framework for creating spatially explicit vulnerability assessments
• Demonstrate application by assessing vulnerability of focal resources
Why Vulnerability Assessments?

- Organize and communicate complex information
- Take into account uncertainty
- First step to identify adaptation options
- Spatially explicit for landscape level outputs

\[ \text{Exposure} \quad \text{Sensitivity} \]
\[ \text{Impact} \quad \text{Adaptive Capacity} \]
\[ \text{Vulnerability} \]
Timeline of Activities

2015

Data Collection

2016

Literature Review

Preliminary

Assessments

2017

Adaptation Forums I

• Feedback about focal resources
• Feedback on potential data and indicators

2018

Adaptation Forums II

• Feedback on preliminary Assessments
• Identify Priorities

Final Assessments

Upload data products

Webinar Series
Outcome of These Efforts

Spatial datasets representing threats, issues, conditions summarized by HUC12 or stream reach

Climate and non-climate stressors
Condition, status
Resiliencies

Vulnerability Assessments for Focal Resources

Vulnerability Assessment Framework for use with spatial data
Process for Assessing Vulnerability

Select data for focal resource and time period of interest

Use framework to create spatially explicit vulnerability assessments
Select different data for different focal resources and/or time periods
Use data for other Vulnerability Assessment methods or analyses

- Risk Assessments
- Climate Smart Conservation
- Workshops
- Landscape Conservation Design
Assessment Framework

• Impact integrates the degree of change (exposure) and the likely response to that change (sensitivity)

• Vulnerability is the susceptibility of a resource to adverse effects given impacts and its capacity to adapt to those changes
How it Works

Step 1. Select indicator datasets to represent Exposure, Sensitivity, Adaptive Capacity

Step 2. Reclassify (0/1)

Step 3. Generate Cumulative scores for Exposure, Sensitivity, Adaptive Capacity
Exposure + Sensitivity → Impact → Vulnerability

Assessment Outputs

Adaptive Capacity
Assessment Products

• Datasets and Maps
  • Original processed data
  • Datafiles associated with specific assessments

• Accessory Documents for Datasets

• Vulnerability Assessments Reports

• Webinar Recordings

• Workshop Reports
## Datasets

### Climate Change, Disturbance & Threat Indicators
- Agriculture cover
- Developed land
- Pollution sources
- Dams in watershed
- Change prcp
- Wildfire potential
- Urbanization
- Road density
- Change Mean annual flow
- Change Mean summer flow
- Change Center of Flow Mass Timing
- Riparian vegetation cover

### Susceptibility Indicators
- Mean elevation
- Erosion potential
- Loss of climatic niche
- Presence of invasive/non native
- Current temperature/prcp regimes
- Current development

### Value Indicators
- Native species presence
- Deciduous/wetland vegetation
- T&E species
- Riparian vegetation cover
- T&E riparian species
- Winter or summer range
- Water sources

### Adaptive Capacity

#### Intrinsic
- Current condition
- Riparian vegetation/shading cover
- Slope
- Beaver capacity
- Herbaceous wetland cover
- Presence of Springs

#### Management Potential
- Public land
- Protected land
- Reservoir storage
DataSets are available on ScienceBase and the Conservation Planning Atlas
CPA for Spatial Data and Visualization

https://srlcc.databasin.org/galleries/
Datasets are organized by focal region but also available for the entire LCC.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Range</th>
<th>How used</th>
<th>Affected watersheds FC</th>
<th>Affected watershed URG</th>
</tr>
</thead>
<tbody>
<tr>
<td>T and E riparian species</td>
<td>0 to 3 species per watershed</td>
<td>1 if ≥ 1 species present</td>
<td>3%</td>
<td>8%</td>
</tr>
<tr>
<td>T and E aquatic species</td>
<td>0 to 2 species per watershed</td>
<td>1 if ≥ 1 species present</td>
<td>6%</td>
<td>4%</td>
</tr>
<tr>
<td>Wildfire risk</td>
<td>0 to 37% high or very high</td>
<td>1 if % high/very high &gt; 0</td>
<td>35%</td>
<td>30%</td>
</tr>
</tbody>
</table>
Figure 2.34. Vulnerability scores for riparian corridors in the Four Corners region.
Interactive PDFs
Where to find these products:

Spatial datasets, reports, pdfs, and other related products

Visualize and download spatial datasets
Presentations, Workshop reports, etc.
How do we use these Vulnerability Assessments?

Began to explore this question during 2017 Adaptation Forums

Process to continue with Adaptation Forums in 2018

Figure 8.—The vulnerability determination considers an ecosystem’s sensitivity to climatic changes, its exposure to those changes, and its capacity to adapt to those changes with minimal disruption (Glick et al. 2011, Levine and Tirpak 2008).
Assessments tell us:

1. Where resources are most vulnerable
2. How resources are vulnerable
How do we use this information?

- Several Guidelines and approaches for developing adaptation options
- Identify priorities and needs
- Identify actions

From: Theobald et al., Green River Basin Presentation
Where are resources most vulnerable?

Four Corners

Upper Rio Grande

Sagebrush Vulnerability
Reduce Exposure

Sagebrush, Four Corners

Sagebrush, Upper Rio Grande
Facilitate Adaptive Capacity

Riparian Corridors Adaptive Capacity, Four Corners

Riparian Corridors Adaptive Capacity, Upper Rio Grande
Where do conservation opportunities exist?

“It will be increasingly important to prioritize actions for adaptation based both on the vulnerability of resources and on the likelihood that actions to reduce vulnerability will be effective”

From nrs.fs.fed.us gtr_nrs87
Once High Priority Areas Have Been Identified, Specify Adaptation Strategies/Actions

- Explored process during 2017 Adaptation Forums
- Participants identified priority needs and actions for each focal resource based on assessment output
Priority Statements for Riparian Corridors

#1 - Support and enhance riparian buffers, via incremental water storage to enhance local water resources and water recharge in the Little Colorado River region (particularly the lower LCR region)

#2 - Reduce exposure and increase adaptive capacity for free-flowing San Juan River tributaries to protect natural river functions (e.g., floodplain functionality) and to enhance native biodiversity

#3 - Protect headwater environments of the San Juan Mountains to maintain/enhance hydrological drivers / ecosystem services now and into the future.

Workshop reports: SRLCC Focal Area Webpage
#1 - Support and enhance riparian buffers, via incremental water storage to enhance local water resources and water recharge in the Little Colorado River region (particularly the lower LCR region)

- Restoration and enhancement of local water resources through:
  - Grade control structures
  - Beaver mimicry
  - Stormflow mitigation measures
  - Management of invasives

- Determine the extent of tamarisk

- Explore partnerships - determine who is doing what already

- Enact post-forest fire erosion mitigation measures

- Monitor post-fire regeneration (e.g., at the Rodeo-Chediski Fire)

- Connect with permittees, ranchers, and sportsmen’s groups on a public education campaign to increase their understanding of best practices with respect to riparian buffers

- Pursue an Active Management Area designation

- Develop adaptive management protocols with stakeholders

- Assist with migration or restoration of drought-tolerant genotypes - riparian and uplands

- Initiate grazing BMP’s (rotational; exclosures; water tanks)

- Reduce or remove invasive species

- Restore meadow and spring recharge function
Many guidelines and “libraries” available to help identify adaptation actions

- **Forest Adaptation Resources: Climate Change Tools and Approaches for Managers.** GTR NRS-87
- **Strategies for Managing the Effects of Climate Change on Wildlife and Ecosystems,** prepared by the Heinz Center.
- **Biodiversity Management in the Face of Climate Change: a Review of 22 Years of Recommendations** by N.E. Heller and E.S. Zavaleta.
- **Managing for Multiple Resources under Climate Change: National Forests** by L. Joyce et al.
- **Climate Change and Forests of the Future: Managing in the Face of Uncertainty** by C.I. Millar et al.
- **Adaptation to Climate Change in Forest Management** by D.L. Spittlehouse and R.B. Stewart
- **Responding to Climate Change on National Forests: a Guidebook for Developing Adaptation Options** by D.L. Peterson et al.
- **Climate Project Screening Tool: an Aid for Climate Change Adaptation** by T.L. Morelli et al.
- **Adapting to Climate Change at Olympic National Forest and Olympic National Park** by J.E. Halofsky et al.
Adaptation Partners has elicited expertise on management responses to climate change from land managers in the U.S. Forest Service, National Park Service, and other organizations throughout the western United States. Specifically, adaptation options in the Library were developed by resource specialists during workshops convened to examine climate change vulnerability assessments. During these workshops, land managers identified (1) the most important climate change sensitivities to natural resources, (2) general strategies for adapting to climate change, and (3) within each strategy, specific tactics that can be implemented in on-the-ground management.

Click on the arrows below to see lists of related publications, climate change sensitivities, and associated adaptation strategies and tactics.

- Publications
- Adaptation Synthesis: Forest Vegetation
- Adaptation Synthesis: Non-Forest Vegetation
- Adaptation Synthesis: Riparian/Wetland
- Adaptation Synthesis: Water Resources
- Adaptation Synthesis: Fisheries

**Sensitivities to climate change:**
- Increased flood frequency and higher peak flows may reduce egg-fry survival for fall spawners and yearling parr winter survival
- Lower low flows will reduce fish habitat quality
- Lower low flows will increase pre-spawn mortality for summer run and stream-type salmon and steelhead

**Adaptation strategies:**
- Increase in-stream flows with dry-season water conservation to reduce withdrawals

**Adaptation tactics:**
- Increase efficiency of irrigation techniques
- Reduce summer withdrawals on federal lands
- Consider alternative water supplies for federal lands to retain in-stream flows
- Coordinate with downstream partners on water conservation education

- Warmer stream temperatures will reduce thermal heterogeneity in streams and increase thermal stress on many life stages of fish
- Warmer stream temperatures may favor non-native fish species
- Warmer stream temperatures may create more favorable conditions for diseases and parasites
Adaptation Forums 2018

• Link vulnerability assessments and conservation action
• Develop library of potential management actions
• Stay tuned....
Summary

• A lot of data and information available

• Focal Resources:
  • Reports
  • Maps
  • Workshop outcomes

Pinyon-Juniper Ecosystems
Sagebrush Ecosystems
Native Fish & Riparian
Mule Deer & Elk
Summary

• Access:
  • SRLCC Website> Focal Areas
  • Conservation Planning Atlas
  • ScienceBase

• Check back frequently as we continue to update and upload files!
Thank you!!

https://srlcc.org

https://srlcc.databasin.org/galleries/

https://www.sciencebase.gov/catalog/item/5693e56ee4b09c7f9a21a41d?community=Southern+Rockies+Landscape+Conservation+Cooperative

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