

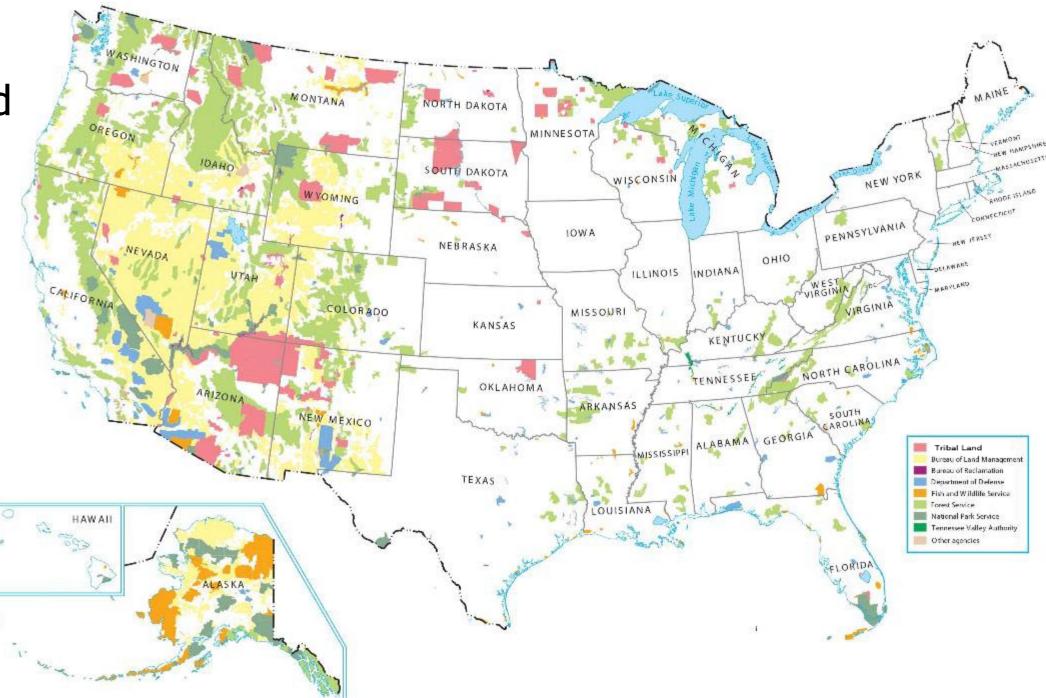
Climate Change Adaptation & Mitigation in the Forest Service

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Mission of the Forest Service: to sustain the health, diversity, and productivity of the nation's forests and grasslands to meet the needs of present and future generations.

Forest Service motto is: "Caring for the Land and Serving People"

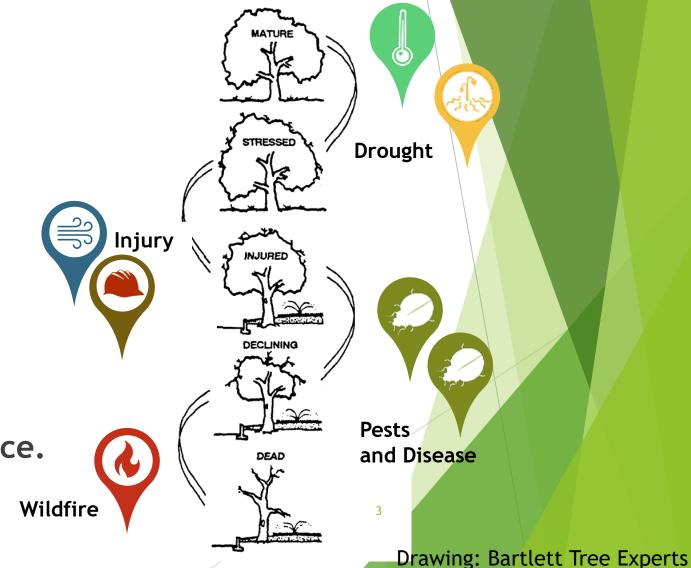
Tribal and Federally Managed Lands



Climate change is a "threat multiplier"

- ► Chronic stress
- **▶** Drought
- **Storms**
- Insect pests
- Forest diseases
- Sea level rise
- Invasive species
- **▶**Wildfire

Interactions make all the difference.





Primary Approaches

Adaptation

Mitigation

Adaptation is the adjustment of systems in response to climate change.









- Adaptation actions are designed to intentionally address climate change impacts & <u>vulnerabilities</u> in order to meet goals and objectives.
- Ecosystem-based adaptation activities build on existing knowledge.



Wildfire Crisis Strategy

- Firesheds large forested landscapes (~250k ac) and rangelands with a high likelihood that an ignition could expose homes, communities, and infrastructure to wildfire.
- Wildfire Risk Reduction Infrastructure Team to build on capacity to carry out projects.
 - Treat the firesheds at highest risk first then move on to other western firesheds
 - Accelerating treatments over 10 years.
 - Build capacity (FS and partners)
- Work with partners to:
 - ► Treat up to an additional 20 million acres on National Forest System lands over the next 10 years.
 - Treat up to an additional 30 million acres of other Federal, State, Tribal, and private lands.
 - Develop a plan for long-term maintenance beyond the 10 years.



Region 3 Climate Change Adaptation Framework



Overview of Climate Change Vulnerability Assessments

▶ What are CCVAs?

- ► Evaluate exposure, sensitivity and adaptive capacity of ecosystems and values in response to changing climates.
- ► Vulnerability assessments provide a means for evaluating risk
- Quantitative vulnerability assessments have the added value of providing a means for evaluating comparative risk across landscapes and resources.

► Why CCVA?

Climate change represents a unique challenge for natural resource management. Better understanding of vulnerability can inform management approaches, help prioritize efforts, and better understand long term expectations for dynamic systems.

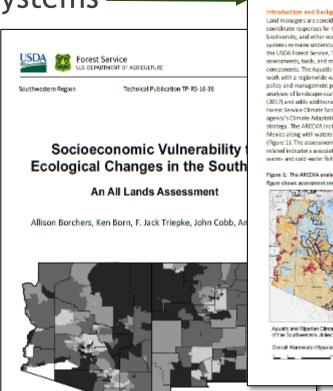
Vulnerability assessments

R3 all-lands climate vulnerability assessment trilogy

- Upland ecosystems
- Aquatic-riparian ecosystems -
- Socioeconomic

Common features

- Data driven
- Quantitative
- **Spatial**
- Linked



≤25% ≤50% ≤75% ≤100% No Data

Agustic-Riparian Climate Change Vulnerability Assessment

USDA Forest Service - Southwestern Region - Teams Enterprise

Land managers are considering oneoing and sotential effects of climate and drought on natural resources t coordinate responses for the protection of ecosystems and their water supply, aquatic and riparian biodiversity, and other ecosystem services (Smith and Friggers 2017). Though climate vulnerability of these systems remains understudied (Mott Lecrois et al. 2017), the Rocky Mountain Research Station (RMRS) of the USDA Forest Service, The Nature Conservancy (TMC), and other organizations have developed assessments, tools, and methods for evaluating specific localities on the vulnerability for key ecosystem. components. The Aquatic Riparian Climate Change Vulnerability Assessment (ARCCVA) complements prior work with a regionwide vulnerability assessment of sufficient the matic detail to support natural resource policy and management prioritization, watershed assessment, monitoring systems, and to support effects analyses of landscape-scale projects. This work builds on an approach established by Smith and Friggens (2017) and adds additional indicators and spatial extent. by The ARCCVA satisfies some requirements of the Forest Service Climate Scorecard and partially fulfills the vulnerability assessment requirement of the agency's Climate Adaptation Framework used to support the subsequent step of building an adaptation stratery. The ARCOVA includes subwatershed-scale reporting (HUCL2) for all lands of Arisona and New Mexico along with watersheds that include Forest Service lands in the Oklahoma and Texas painlandles (Figure 1). The assessment was supported by existing data sources on over two decen intrinsic and climate related indicators associated with watershed condition, riparian and equatic habitat, and the presence of warm- and cold-water fish.

Figure 1: The ABCDVA analysis area for Arizona, New Maxico, Oklahoma, and Team struttfied by MUC12 units. This



Overall Warmwater/Hoorium Valvennell IV Butings

ECOSPHERE

GLOBAL CHANGE

Using climate projections to assess ecosystem vulnerability at scales relevant to managers

F. JACK TREETE, 1-7 ESTERAN H. MOLDOWIN, 2 AND MACHINELISM M. WATERERS

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Citation Telepho, F.J., E.H. Muldavin, and M. M. Waldweg, 2015. Using elimate projections to makes computer values hills at ecoles relevant to managers. Essenbers 2090 e00054, 10 00005452, 2654

Abstract. Land managers require information about the ongoing and potential effects of future climats to coordinate responses for ecosystems, species, and framan communities at scales that are operationally meaningful. Our study formed on the subscribility for all unland contraten types of Arizona and New Mexico in the couthwestern United States. Local vulnerability across the two state area was represented by the level of departure for late 21st-century dimate from the characteristic use-1990 dimate envelope of the accession, type at each given location, resulting in a probability surface of climate impacts for the two-state eres and an uncertainty assessment based on agreement in results among multiple global climate models valuenthility and low uncertainty, reflecting significant agreement among climate model projections to the southwestern United States. We then tested our results in relation to encoding ecological processes that have both regional and global change implications and discovered significant relationships with wildfire severity, upward tree species recruitment, and the encreachment of scrub into semidesert grassland. The testing below) determine the efficacy of the vulnerability surface, as a product of selectively high spotial and thematic resolution, in supporting local planning and management decisions. Most important, this study links climate and changes in vegetation by ecosystem processes that are already ongoing. The results affirm the value of dimate model downeading and show that this portable approach to correlative modeling has value in determining the location and magnitude of potential climate-related impacts.

Key sends: directe covelages directe expresses directe sensitivity directe value oblity, discriminant analysis, lim severity; global change model validation sends encouchment

Beceived 12 July 2019; accepted 15 July 2019. Corresponding Belton Debra R.C. Peans.

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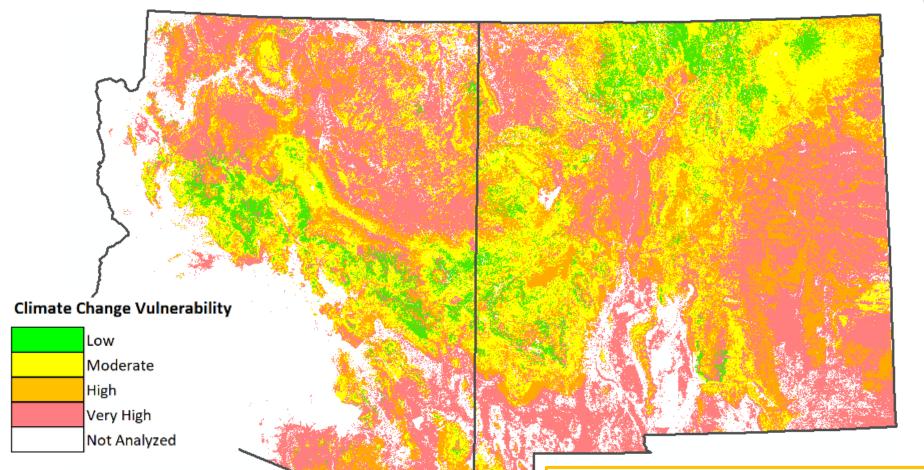
Assessing ecosystem vulnerability at subregional scales is a critical need for resource spe-

resources (Friggers et al. 2013, Gutzler 2013 Hand et al. 2018). Evaluating vulnerability and framework that also includes characterizing dalists making on-the-ground management change and shouldsting strategy and then decisions. This is an important step in evaluating responding to assessment results through manfuture impacts to ecosystems and, in turn, to agement and moritoring (Halofsky et al. 2018). associated biota, watersheds, and socioeconomic. Accordingly, it is necessary to understand

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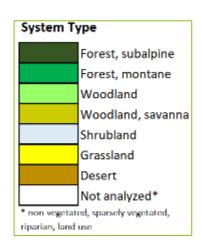
Vulnerability assessments -- Upland ecosystems (CCVA)*

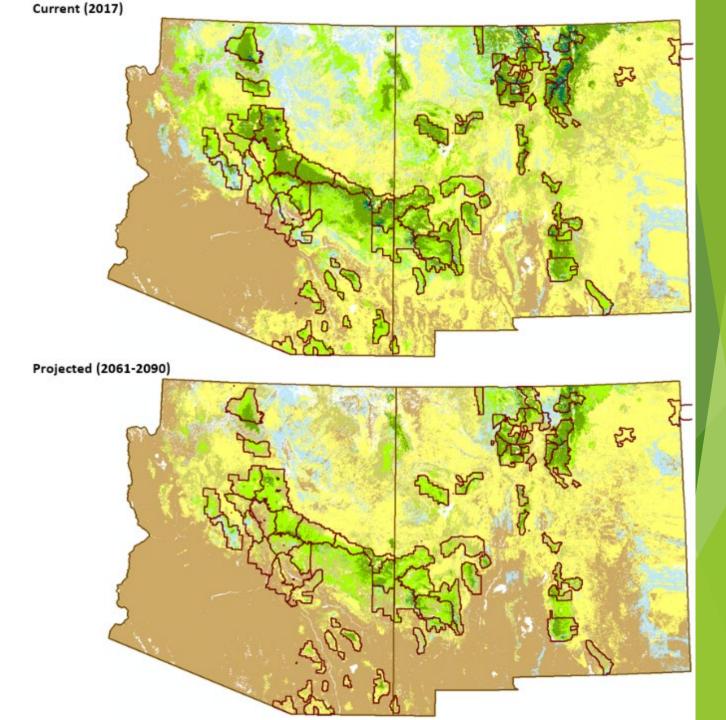


*Expected departure of future (2100) climate from reference condition climate envelope (1961 - 1999)

	Vulnerability		Uncertainty Category		
ERU	Category	%	Low	Mod	High
All ERUs analyzed	Low	6%	2%	4%	0%
(588,237km²)	Moderate	24%	1%	16%	7%
	High+	70%	48%	22%	0%
	Uncertainty total		50%	42%	8%

Vulnerability assessments





Climate Change Adaptation Framework





United States Department of Agriculture

United States Department of Agriculture

Forest Service

Southwestern Region

Forestry Report FR-R3-XX-XX

DRAFT February 2022







SW Fire Menu

1: Sustain fire as a fundamental ecological process – Resistance, Resilience, Transition

- 1.1: Restore or maintain fire in fire-adapted ecosystems
- 1.2: Develop fire use strategies in altered or novel ecosystems where fire can play a beneficial role

2: Reduce biotic and abiotic stressors affecting fire regimes – Resistance, Resilience

- 2.1: Remove and prevent establishment of non-native invasive species
- 2.2: Maintain or improve the ability of forests to resist pests and pathogens that may alter fuel regimes
- 2.3: Limit, selectively apply, and monitor land uses that increase fire risk or threaten fire resilience

3: Reduce the risk of unacceptable fire - Resistance, Resilience

- 3.1: Protect fire-sensitive and vulnerable ecosystems from fire
- 3.2: <u>Alter forest</u> structure and composition to reduce the risk and spread of unacceptably severe fire
- 3.3: Establish or maintain fuel breaks to stop the spread of unacceptable fire

4: Limit the effects of unacceptable fire and promote post-fire recovery – Resistance, Resilience

- 4.1: Promote habitat connectivity and increase ecosystem redundancy
- 4.2: Maintain or create fire refugia
- 4.3: Stabilize and enhance the physical fire footprint
- 4.4: Promote recovery of native vegetation and habitat

5: Maintain and enhance structural and species diversity using fire and fuels treatments – Resilience

- 5.1: Maintain or increase structural diversity from stand to landscape scale
- 5.2: Promote diversity within and among communities to enhance fire resilience

Primary Approaches

Adaptation

Mitigation

Primary Approaches

- Mitigation
 - R3 microgrants program
 - ► Greening Fire Team
 - ► Carbon Partnership Program
 - Carbon Assessments
 - Orphaned wells / ultra emitters

Greening Fire Team



Solar panels being used by the Lolo Interagency Hotshots (Missoula, MT) to recharge radio batteries.

The portable power source keeps the crew from having to dispose of ~80 AA disposable batteries daily (~8,800/yr).

- Re-chargeable batteries + solar panels for handheld radios
- Fire hose diverted from landfill
 → much of it goes to zoos for animal enrichment!
- Solar powered chainsaws



Questions?

Resources

- ► Tackling the Climate Crisis EO: https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/
- ► USDA Climate-Smart Agriculture and Forestry Strategy May 2021: https://www.usda.gov/sites/default/files/documents/climate-smart-ag-forestry-strategy-90-day-progress-report.pdf
- ► Federal Climate Adaptation Plans: https://www.sustainability.gov/adaptation/
- ► Forest Service Climate Adaptation Plan:

https://www.usda.gov/sites/default/files/documents/4 NRE FS ClimateAdaptationPlan 2022.pdf

- ► Forest Service Wildfire Strategy: https://www.fs.usda.gov/managing-land/wildfire-crisis
- ► Tools & Data related to climate change: https://www.fs.usda.gov/managing-land/sc/data-dashboard
- Climate Change Resource Center: https://www.fs.usda.gov/ccrc/
- Greening Fire Team: https://www.fs.usda.gov/managing-land/fire/sustainable-ops
- Socioeconomic Vulnerability to Ecological Changes in the Southwest An All Lands Assessment (SEVA): https://www.fs.usda.gov/Internet/FSE DOCUMENTS/fseprd969262.pdf