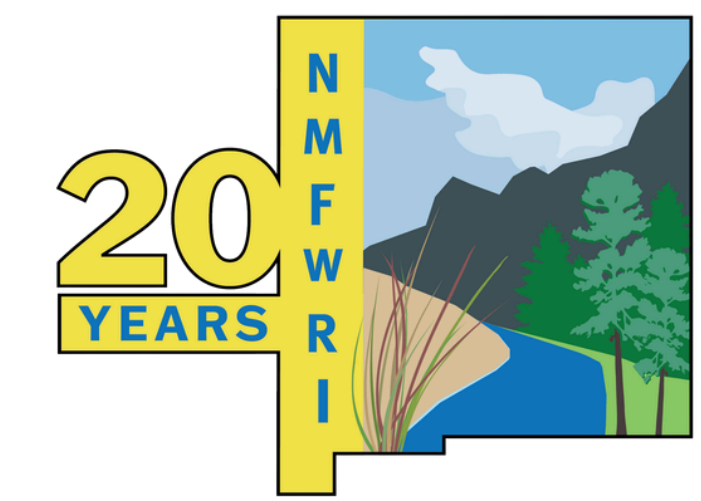




# Forest Health and Recovery on Long-term Monitoring Sites

## 3 years after the Hermit Peak Calf Canyon Wildfire



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### Context

- In 2022, the Hermit's Peak/Calf Canyon (HPCC) fire burned 341,471 acres across four counties in northern New Mexico, including nearly 500 of the more than 2,500 plots in the New Mexico Forest and Watershed Restoration Institute Ecological Monitoring Program's long-term network (est. 2007). Post-fire work provides opportunities for in-depth comparison of untreated sites and treated sites and improved understanding of treatment effectiveness and longevity to inform adaptive management.
- Project objectives:
  - present results from 305 pre- and post-fire plots
  - including treated and untreated sites; public and private lands; ponderosa pine, mixed conifer forest types of various burn severities (see Figs 2-9).
  - evaluate trends around forest health and recovery (see Figs 10-17).

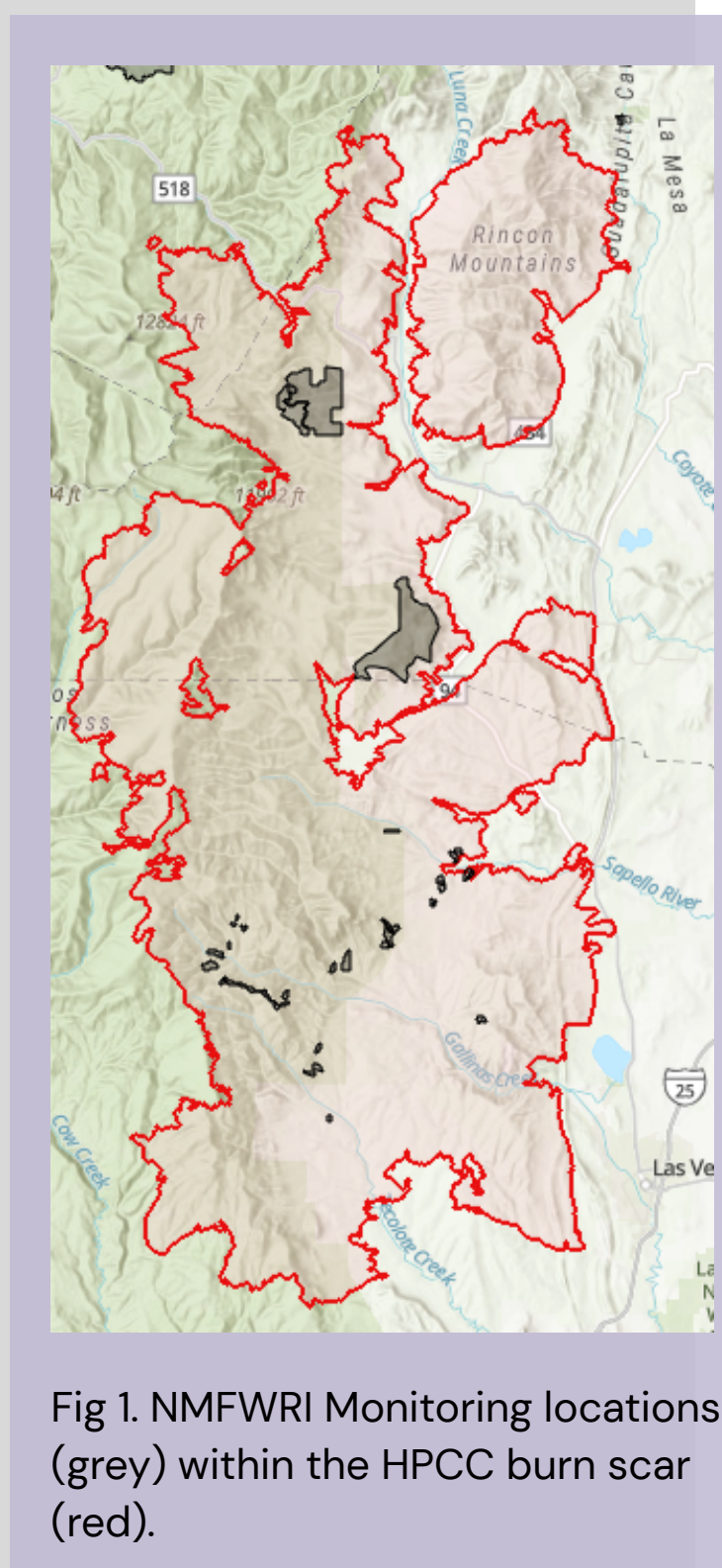
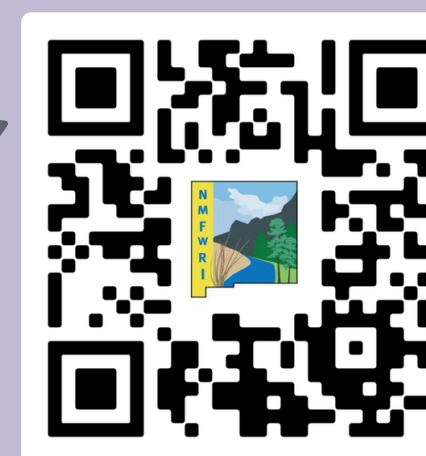


Fig 1. NMFWR Monitoring locations (grey) within the HPCC burn scar (red).

### Methods

- Plot data were collected according to a modified Common Stand Exam protocol, which can be examined in detail using the QR code.
- Measurements were typically taken on May-Sept on monumented, fixed-radius, 1/10<sup>th</sup> acre plots with 1/100<sup>th</sup> acre subplots, established under a stratified random sampling design. Measurements include:
  - overstory tree composition, diameter, height, and condition
  - seedling, sapling and shrub species, size, density & condition
  - ground and aerial cover
  - fuel loading
  - photo documentation
- Data was collected by professionally managed crews and processed through multiple Quality Control & Quality Assurance steps.
- For this report, we shared results from 4145 acres (18 projects; 305 sample plots) monitored both pre and post-fire. We selected sample events measured pre-fire as close to 2022 as possible (ranging from 2008-2020), and compared these data to the results from post-fire sampling (2022-2024).
  - Ponderosa Pine:** 25 plots were treated with thinned only (Thinned), 120 were treated with thinning & prescribed fire (Thinned & Burned), and 18 were untreated (Untreated)
  - Mixed Conifer:** 52 plots were treated with thinned only (Thinned), 60 were treated with thinning & prescribed fire (Thinned & Burned), and 30 were untreated (Untreated)
- Values represent averages of plot-level means, then averaged across projects for each treatment history and monitoring status



Learn more about our monitoring protocols

### Results: Pre & Post-Fire Photo Series



Fig 4. Ponderosa, Thinned (32.09). Fig 5. Ponderosa, Thinned & Burned (28.10). Fig 6. Ponderosa, Untreated (T2RB). Fig 7. Mixed conifer, Thinned (31.10). Fig 8. Mixed conifer, Thinned & Burned (03.01). Fig 9. Mixed conifer, Untreated (12.16). Photopoint monitoring captures the diversity of pre- and post-fire conditions and impacts in a format accessible to managers and the public regardless of scientific background.



### Results: Overstory Tree Survival

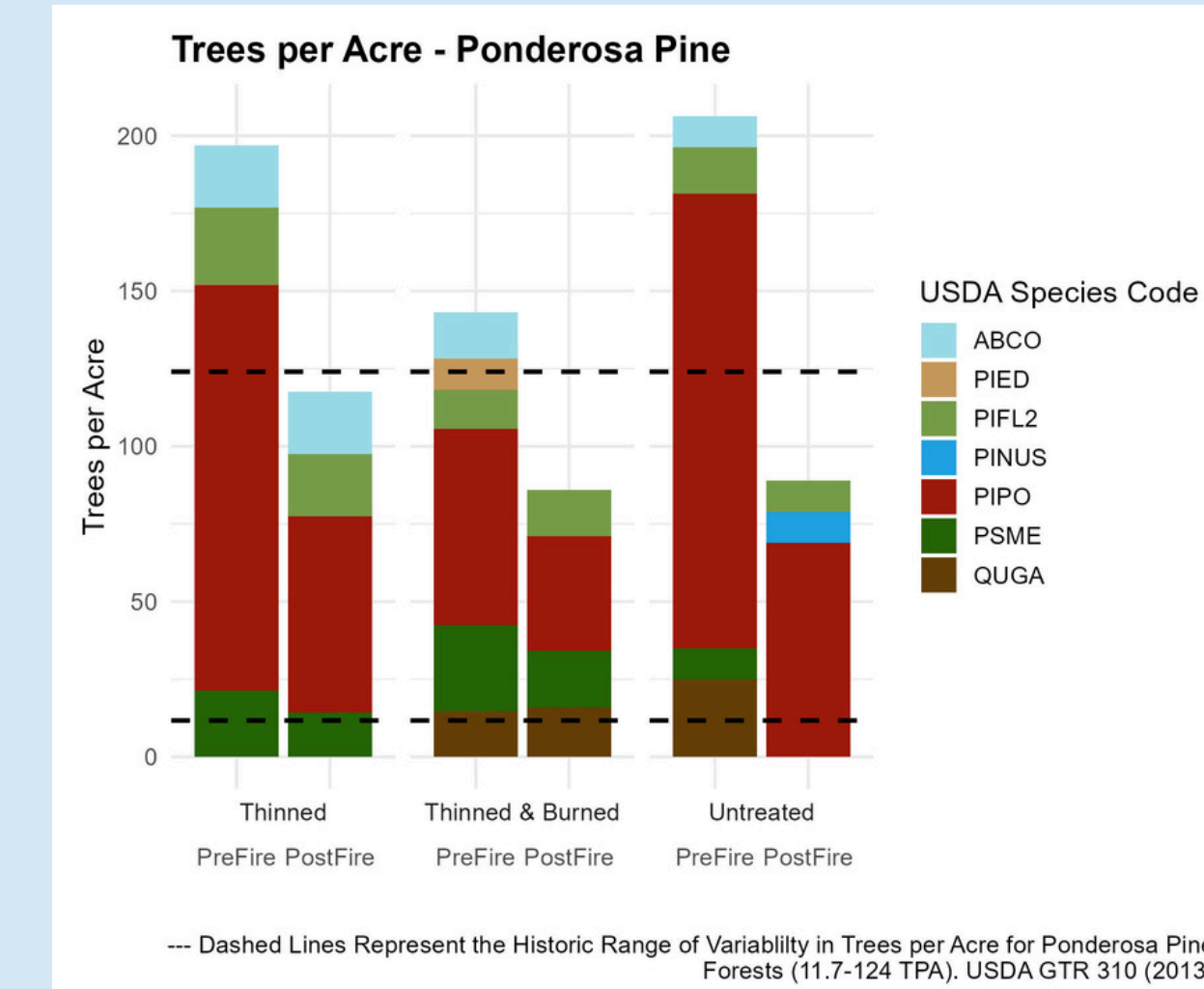


Fig 10. Trees per acre in Ponderosa pine forests pre- and post-fire (5" DBH and up only).

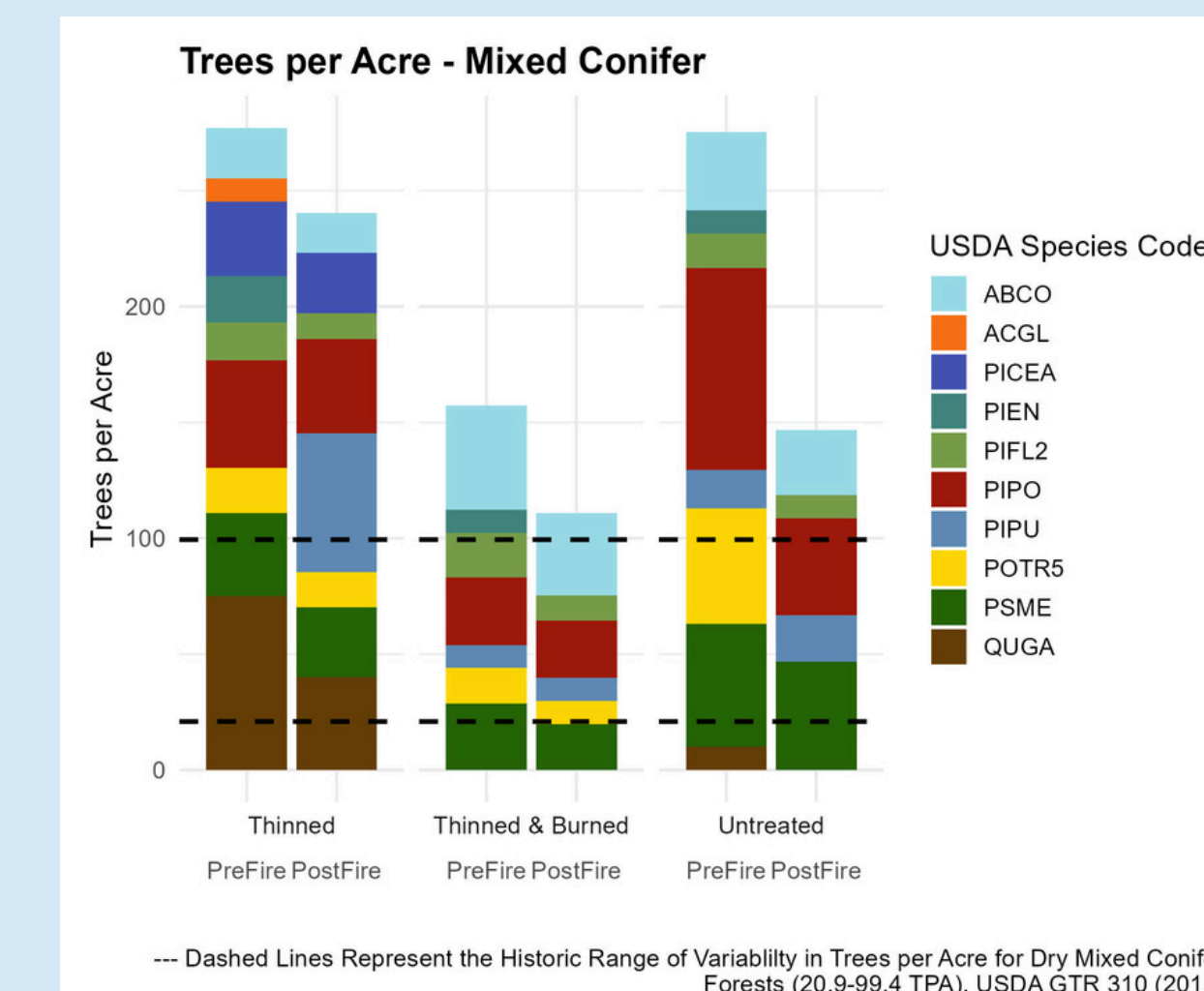


Fig 11. Trees per acre in mixed conifer forests pre- and post-fire (5" DBH and up only).

- Dashed lines on each figure show the Historic Range of Variability (HRV) as proposed in the 2013 GTR-310, and on average, projects did not fall within this range pre-fire. These forests were overstocked before the HPCC fire.
- Post-fire, all ponderosa projects fell within the HRV on average; mixed conifer projects did not.
- Note: Generally NMFWR measures at a 1" breakpoint diameter for determining a tree, however, one of the untreated mixed conifer sites used a 5" breakpoint diameter. Therefore, figures here represent only trees >5" in diameter at 4.5 ft (DBH) and >4.5' in height.

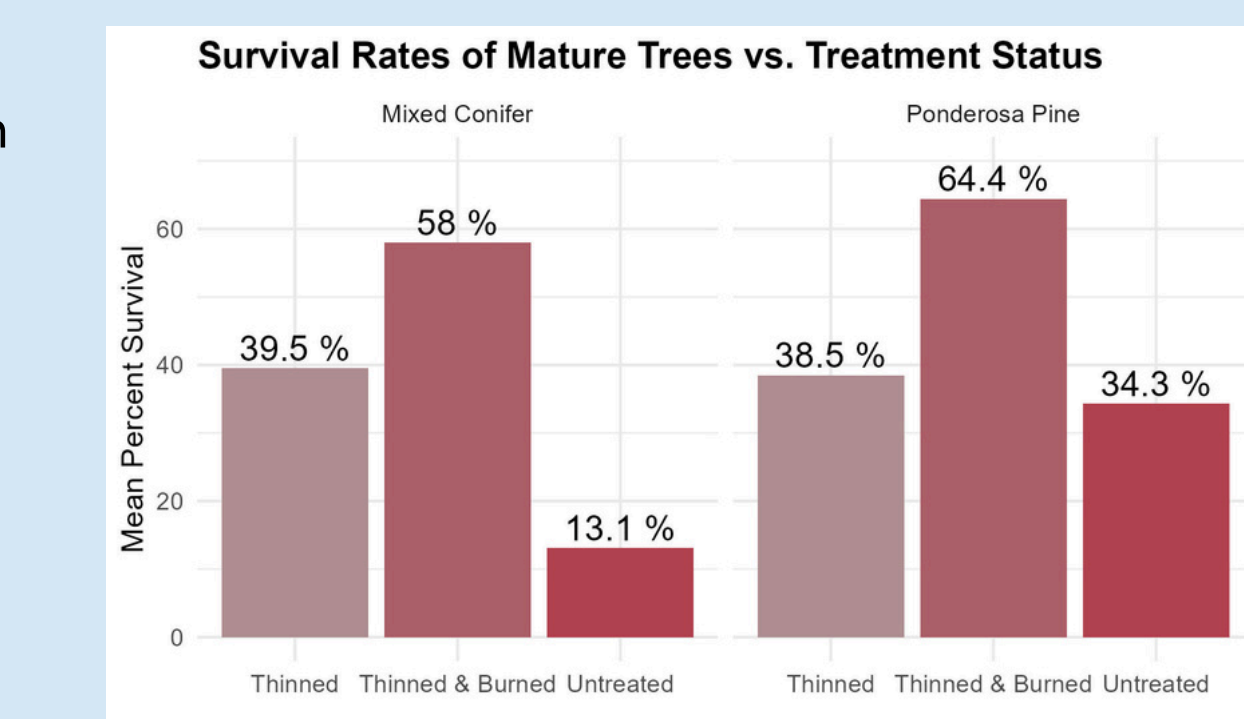


Fig 12. Post-fire survival rates of overstory trees by treatment history.

### Results: Post-fire regeneration

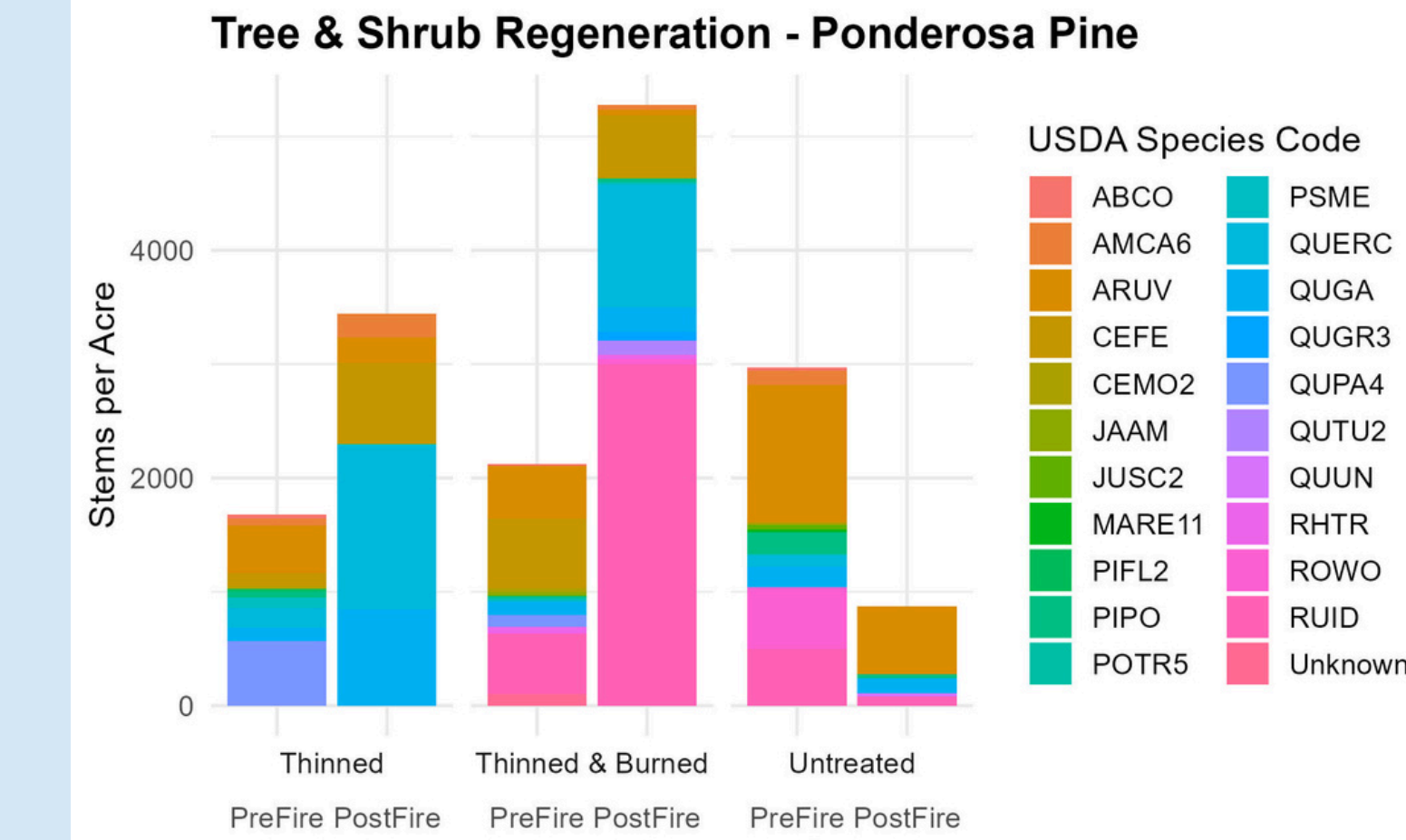


Fig 13. Stems per acre by species in Ponderosa pine forests, pre-and post-fire.

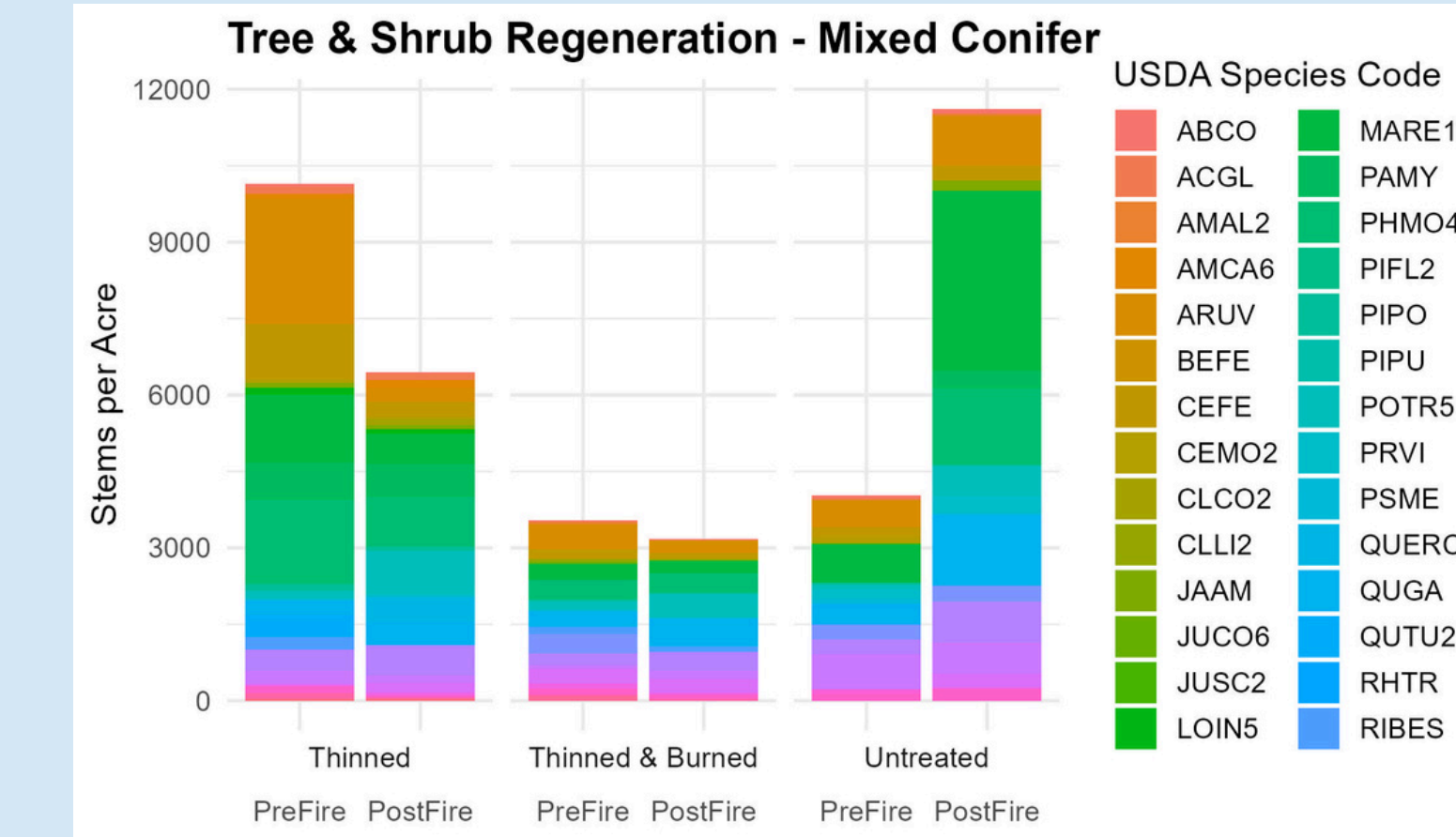


Fig 14. Stems per acre by species in mixed conifer forests, pre-and post-fire.

- These figures show seedlings, saplings and shrubs recorded in the 1/100<sup>th</sup> acre microplots. These are woody species under 4.5' tall and/or under 1" at DBH.
- Thinned and thinned+burned sites in ponderosa pine saw an influx of regeneration post-fire, but untreated sites, which burned at higher severities, did not.
- While regeneration was present with all Mixed-Conifer site types, untreated Mixed Conifer experienced the highest rates of regeneration, driven by shrub and aspen response.

Table 1. PLANTS codes and common names (for Figs 10-14).

Code	Common Name	Code	Common Name
ABCO	white fir	POTR5	quaking aspen
ACGL	Rocky Mountain maple	PRVI	chokecherry
AMAL2	Saskatoon serviceberry	PSME	Douglas-fir
AMCA6	leadplant	QUERC	oak
ARUV	kinickinnick	QUGA	Gambel oak
BEFE	Colorado barberry	QUGR3	gray oak
CEFE	Fendler's buckbrush	QUPA4	hybrid oak
CEMO2	mountain mahogany	QUTU2	scrub oak
CLC02	rock clematis	QUUN	wavyleaf oak
CLL12	Western white clematis	RHTR	skunkbush sumac
JAAM	fivepetal cliffbush	RIBES	currant
JUC06	common juniper	RICE	wax currant
JUSC2	Rocky Mountain juniper	RIIN2	whitestem gooseberry
LOIN5	twiberry honeysuckle	ROWO	woods' rose
MARE11	creeping barberry	RUID	raspberry
PAPY	Oregon boxleaf	RUPA	thimbleberry
PHM04	mountain ninebark	SABE2	Bebb willow
PICEA	spruce	SHCA	russet buffaloberry
PIED	piñon	SODU2	Arizona mountain ash
PIEN	Engelmann spruce	SYRO	roundleaf snowberry
PIFL2	timber pine	ULPU	Siberian elm
PINUS	pine	Unknown	unknown
PIPO	ponderosa pine	VAMY2	whortleberry
PIPU	blue spruce	YUBA	banana yucca

### Results: Burn Severity

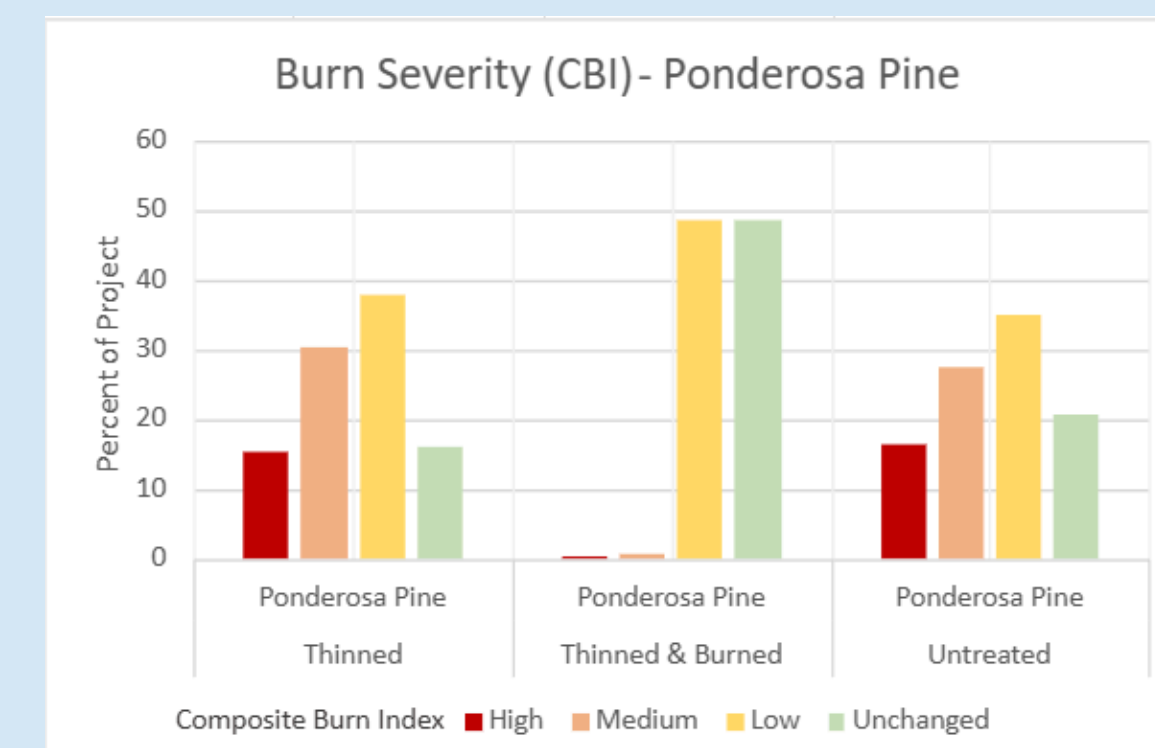


Fig 2. Composite Burn Index by treatment history in ponderosa pine.

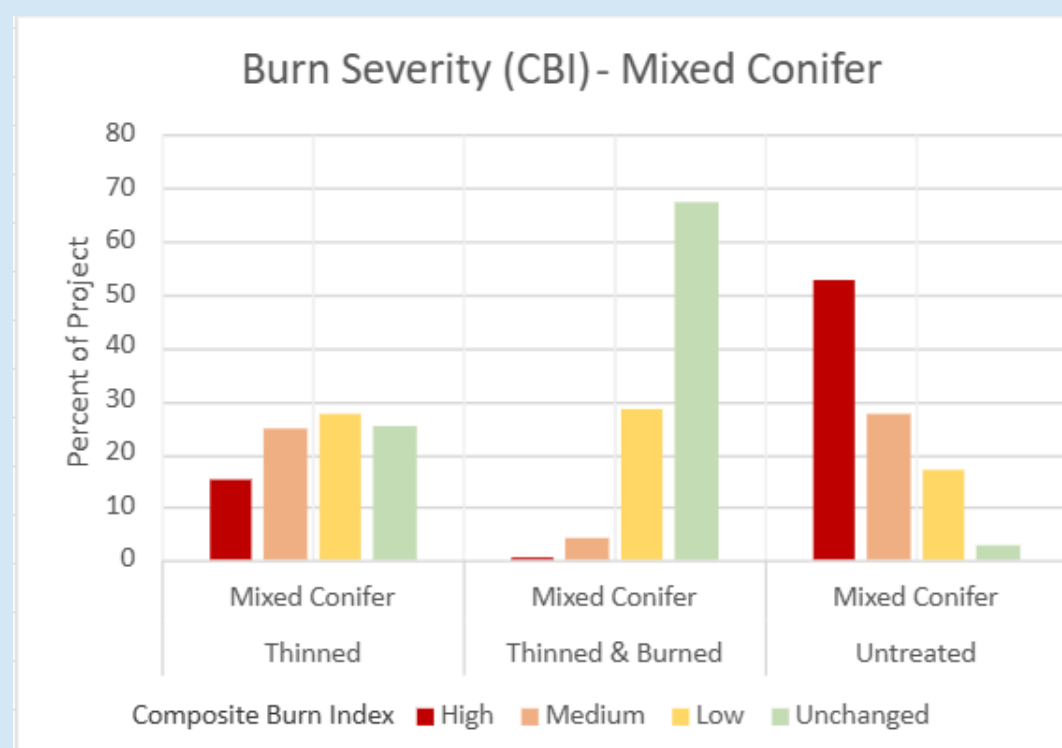


Fig 3. Composite Burn Index by treatment history in mixed conifer.

Thinned & burned projects in both forest types had the lowest acreages per project acreage of high-severity, while untreated projects in both forest types had the highest percentages of high-severity fire.

### Results: Snags per Acre

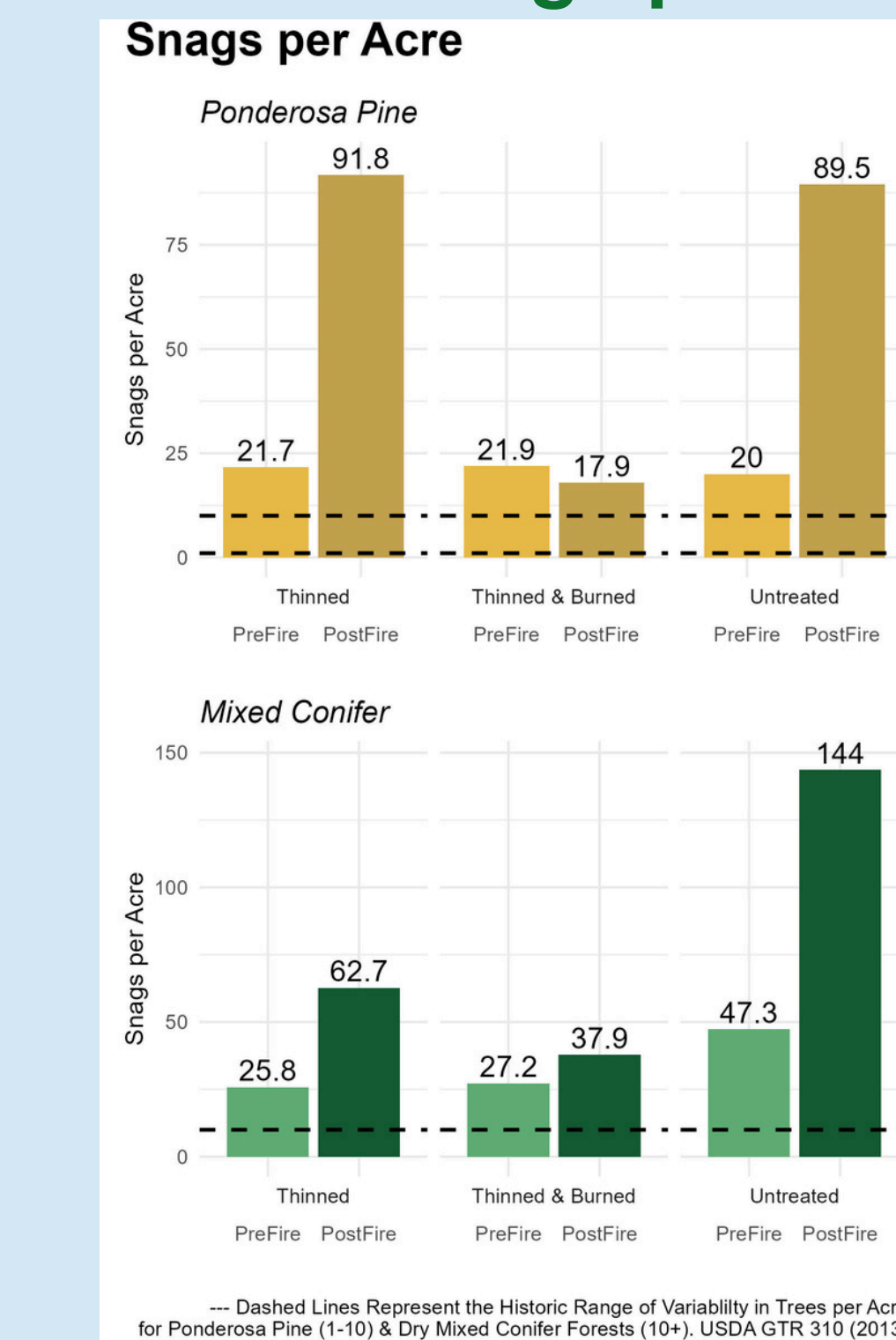


Fig 15. Snags in ponderosa and mixed conifer forests, pre- and post-fire, by treatment history.

- Snags (standing dead trees over 5" DBH) increased in all but one treatment history group. Post-fire efforts to monitor snag decay classes will provide future opportunity for additional analyses on snag recruitment and snag decay.

### Results: Surface Fuels

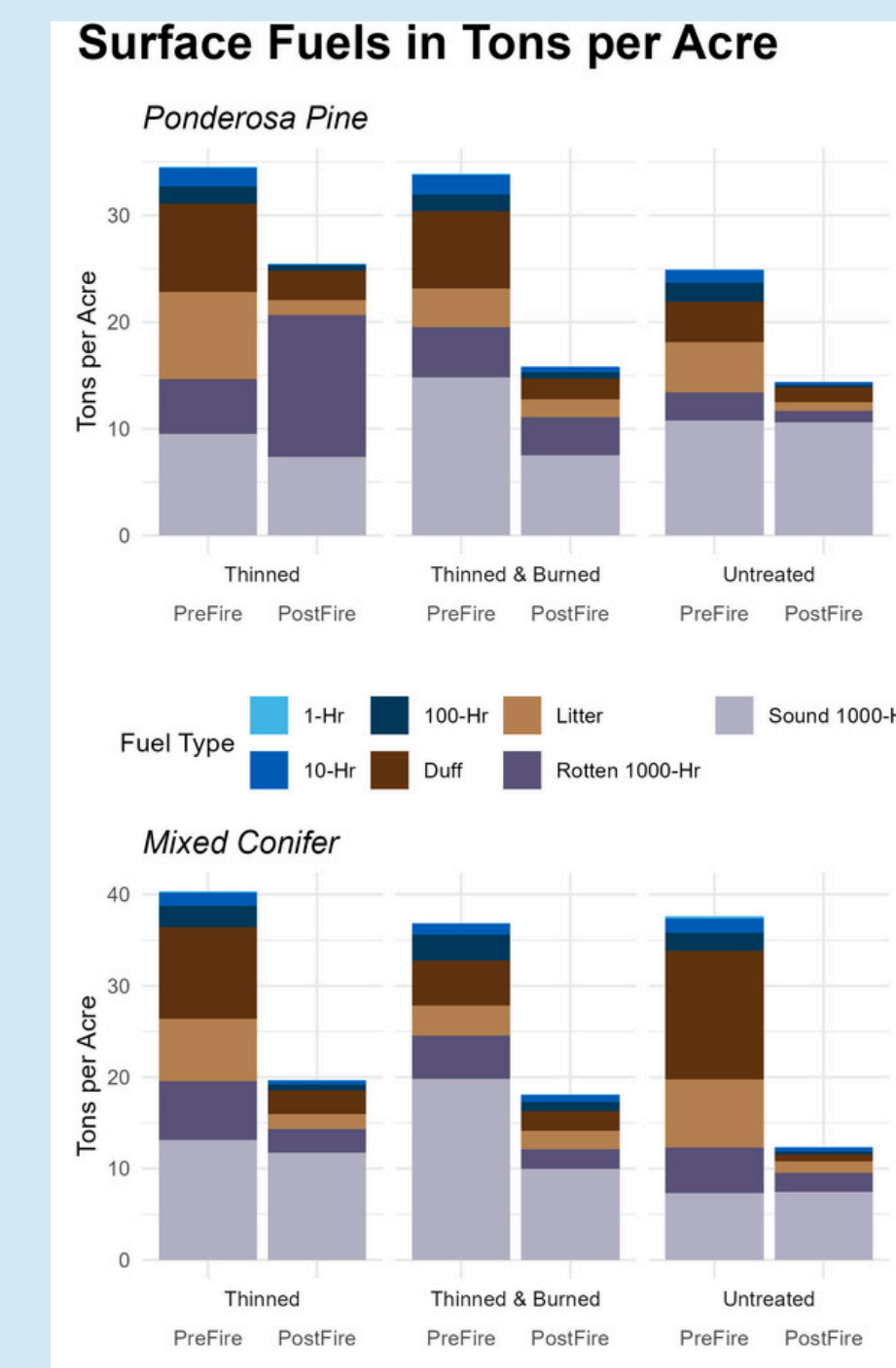


Fig 16. Surface fuels in ponderosa and mixed conifer forests, pre- and post-fire, by treatment history.

- Surface fuel loads decreased across all treatment histories in both forest types post-fire. Untreated projects having the lowest post-fire fuel loads is likely related to higher burn severities on those projects. We anticipate increased fuel loads in Untreated sites as logs are recruited from snags (see Fig 15).

### Results: Mistletoe

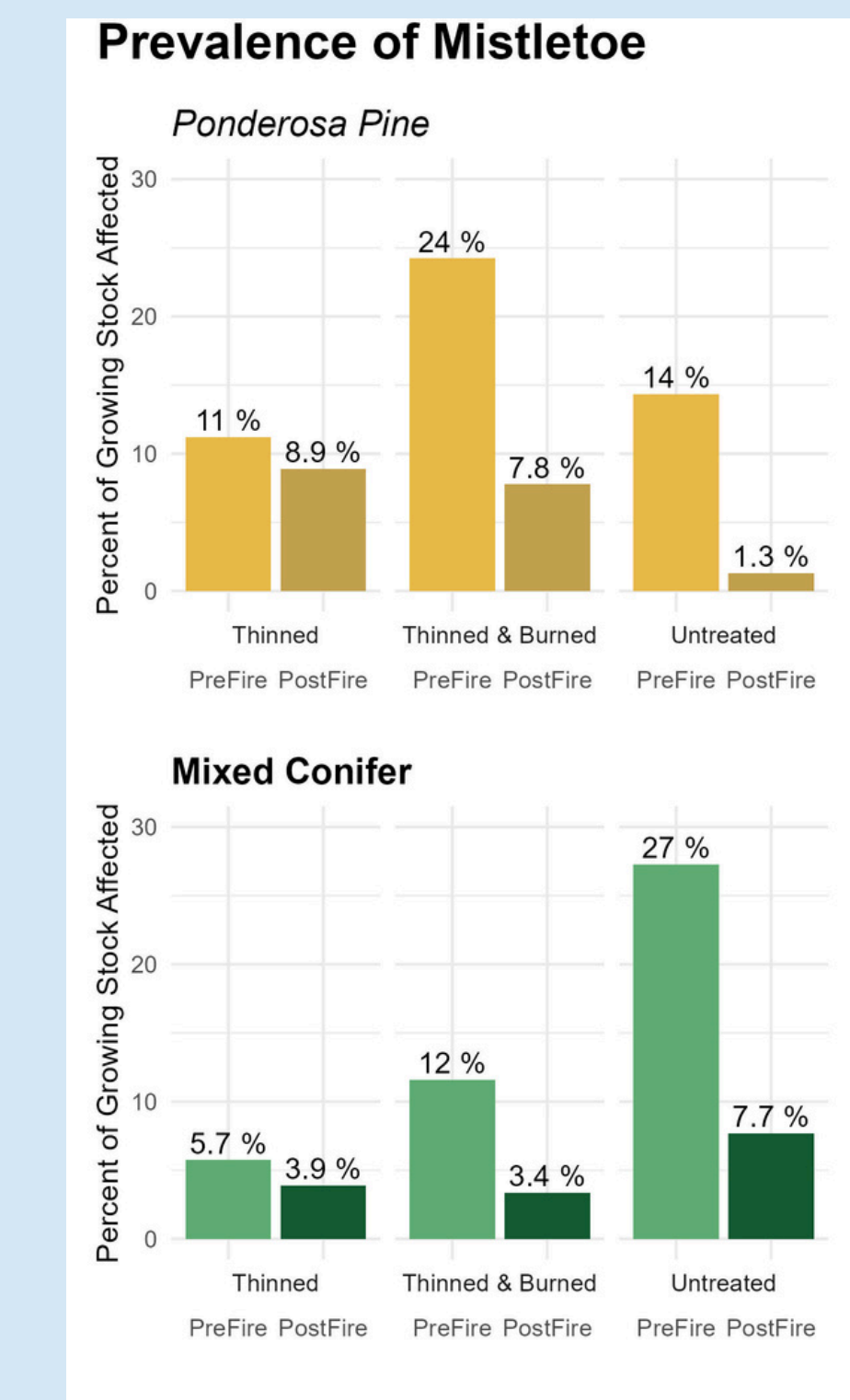


Fig 17. Mistletoe rates in ponderosa and mixed conifer forests, pre- and post-fire, by treatment history.

- Observable mistletoe infestations decreased across all treatment histories in both forest types post-fire, a combination of overstory mortality and smoke impacts.

### Discussion

The network of long-term plots in place pre-fire offers many opportunities to continue learning about wildfire impacts, recovery, treatment effectiveness, treatment expiration and support managers in using this information in adaptive management. These preliminary results support our understanding that there are differences worth exploring further among projects with different treatment histories.

- Some of NMFWR's other current efforts to learn from HPCC include:
  - conducting statistical analyses to further examine these results, along with the data from other wildfires to identify key variables influencing impacts and recovery
  - collecting additional post-fire data (on-the-ground and with remote sensing) to learn more about bark beetle spread, snag recruitment, understory plant communities, and more
  - working with SWERI and other partners to share lessons learned and best practices in post-fire monitoring and research
  - outreach with partners and the public, particularly those impacted by the HPCC wildfire, to share results and observations of forest health and recovery, and promote adaptive management at all levels of decision-making

### Acknowledgements

We would like to thank our partners, including USDA Forest Service, New Mexico State Land Office, and The Biophilia Foundation, for supporting us in accessing these sites. We would also like to thank NMFWR staff, past and present, especially those on the Monitoring crew, who have contributed to this data collection, data entry, quality control, and analysis. The NMFWR is funded through federal and state appropriations, this study was partially funded through both of these sources.

### References

- Reynolds, Richard T.; Sánchez Meador, Andrew J.; Youtz, James A.; Nicolet, Tessa; Matonis, Megan S.; Jackson, Patrick L.; DeLorenzo, Donald G.; Graves, Andrew D. 2013. Restoring composition and structure in Southwestern frequent-fire forests: A science-based framework for improving ecosystem resiliency. Gen. Tech. Rep. RMRS-GTR-310. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 76 p.
- Composite Burn Index (CBI) for HPCC in 2022 (post-fire). Data from USGS, RAVG database.



Learn more about our work monitoring HPCC

The NMFWR Ecological Monitoring Program aims to advance ecological restoration by expanding access to all parts of the adaptive management process, reducing barriers to its adoption, and supporting our partners in building lasting capacity.

Poster presented at the Society for Ecological Restoration Southwest Chapter Conference in Las Cruces, Nov 13-15, 2025.