Forest Management: Knowing your forest

Querencia in Action: Landowner Guide





Ponderosa pine forest. *Photo by Carolina May*



Dry mixed-conifer forest. *Photo by Taryn Schlosser*

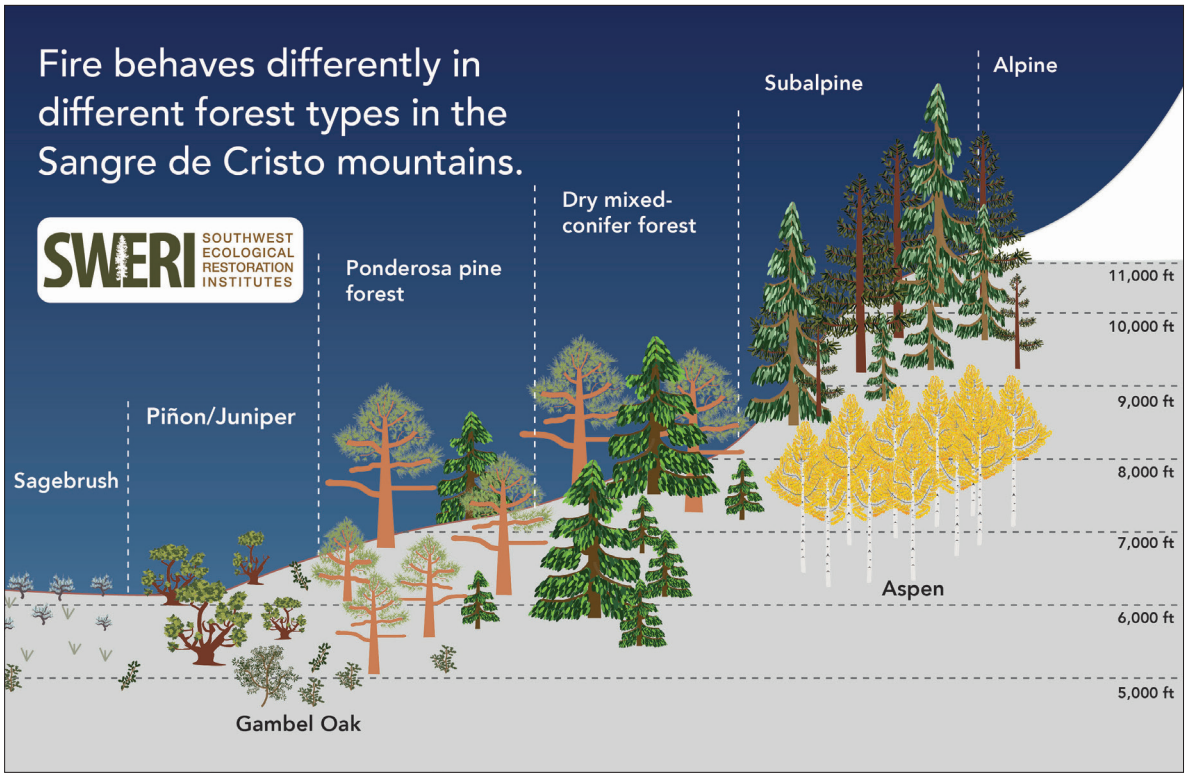
Why get to know your forests?

New Mexico's many different forest types can be found along an elevation gradient. Each forest type has a unique community of tree species, legacies of use and histories. What you already know about your land, combined with continued observation, can help you make informed decisions about its future care. This guide focuses on the two most common montane forests in New Mexico (ponderosa pine and dry mixed-conifer), identifies tree health indicators to look for, and provides resources to help you decide what may improve your forest health for the long term.

Getting Started: Looking at the forest

Healthy forests don't all look the same. Ponderosa pine forests generally consist of open forested areas dominated by ponderosa pine, with trees randomly dispersed or in small groups. Other species do occur, but do not dominate the stand. Dry mixed-conifer forests are denser and dominated by a mix of trees that need full sun and those that can grow in shade. Sites are usually warmer and drier.

A healthy ponderosa pine forest may look different from a healthy dry mixed-conifer forest, but both include a mix of trees of varying ages and conditions, shrubs, grasses, wildflowers,



The Rocky Mountains, which includes the Sangre de Cristo's, create incredible variations in topography, soils, and moisture gradients, and this variability strongly influences the enormous diversity of understory and forest vegetation that grows in different places. Fire is a necessary component of all these vegetation types and is an important force in shaping the forests we see today. Fire provides crucial ecosystem services to these forests, such as nutrient cycling, clearing out dead or diseased trees or accumulated fuel, and creating opportunities for new trees to grow. *Illustration by Southwest Ecological Restoration Institutes.*

and young seedlings. Their structure is diverse and can include areas with different tree species, ages, and densities, which form a mosaic across the landscape. The effects of disturbance (fire, insects, wind, etc.) are variable across the mosaic. Because forests are complex, management decisions are normally made at the stand level instead of only considering individual trees.

When looking at your stand, it's important to think about context. Consider these questions:

- What tree and plant species do you notice? Are there similarities in types and size?
- Is there natural regeneration? Are there seedlings?
- If your land burned, are there patches with different fire severity?
- Are snags (standing dead trees) scattered throughout the stand or clustered in specific areas?
- Do trees have obvious signs of damage (browning needles, cracks, holes, etc.)?



A stand of aspens. *Photo by Taryn Schlosser*

What is a stand?

A forest stand is a group of trees that are similar enough in species composition and arrangement of ages and conditions that they can be managed as a unit. Stands can be as small as a 1/4 acre and as large as an area where trees remain similar enough to be managed as a single unit.

What trees do you have?

Forest Type	Dominant Species	Species that May Also Occur
Ponderosa Pine	Ponderosa pine	Douglas-fir, oaks, aspen, white fir, Rocky Mountain juniper, one-seed juniper, piñon, blue spruce
Dry Mixed-Conifer	Mix of Douglas-fir, ponderosa pine, limber pine	White fir, aspen, blue spruce, Rocky Mountain juniper

BLUE SPRUCE

Latin Name: *Picea pungens*

Habitat: Drainage, moist canyons. Foothills, mixed-conifer, and subalpine forests in mountainous regions throughout New Mexico. From 7,500 to 10,500 ft.

ID: Up to 160 ft in height. Whorled branches, slightly to strongly drooping. Bark is gray, brown, and more furrowed/ridged than scaly. Needles are sharp and rigid to the touch and typically 4-sided. Cones are yellowish.





Photos by Claire Gentry

DOUGLAS-FIR

Latin Name: *Pseudotsuga menziesii*

Habitat: Foothills, mixed-coniferous forests. Common throughout New Mexico. From 6,500 ft all the way to treeline.

ID: Up to 200 ft in height. Bark is dark brown, deeply furrowed. Crown shape conical to rounded. Needles flat, tapering to a very short stem. Needles form an angle at the point of attachment to the twig that is shaped like a hockey stick.





Photos by Carolina May

LIMBER PINE

Latin Name: *Pinus flexilis*

Habitat: Mixed-conifer forests to subalpine. Mountainous areas in northern New Mexico. From 7,500 to 12,000 ft.

ID: 26-85 ft in height. Spreading to ascending branches. Brownish-gray bark forms scaly plates with maturity. 5 needles per bunch.

Near right photo by Carmen Melendez, far right by Taryn Schlosser




OAKS

Latin Name: *Quercus* spp.

Habitat: Grow in association with ponderosa pine forests and dry mixed-conifer. Hills, canyons, and mountain slopes. Common throughout New Mexico.

ID: Appearance varies both within a species and between them. Generally, oaks can grow up to 60 feet in height but are more often shrubby. The leaves are often lobed. Acorns are various sizes. Oaks resprout after disturbance.

Near right photo by Carolina May, far right by Taryn Schlosser




ONE-SEED JUNIPER

Latin Name: *Juniperus monosperma*

Habitat: Dry, rocky slopes. Grows in association with piñon pine and ponderosa pine. Very widespread throughout New Mexico. From 4,000 to 8,000 ft.

ID: 7-23 ft in height. Typically, with a rounded crown and multiple stems. Bark is grayish-brown, can be shreddy in appearance. Leaves usually bright green, scale-like. Berries dark blue/purple with a whitish cast that can be rubbed off. Usually 1 seed per berry.

Photos by Carolina May




PIÑON PINE, TWO-NEEDLE PIÑON

Latin Name: *Pinus edulis*

Habitat: Dry slopes, mesas, grows in association with juniper, oaks, and ponderosa pine. Common throughout New Mexico. From 4,500 to 9,000 ft.

ID: 15-60 ft in height. Yellowish-brown bark, irregularly fissured, and resinous. Usually 2 needles per bunch, occasionally 1 or 3.

Photos by Taryn Schlosser




PONDEROSA PINE

Latin Name: *Pinus ponderosa*

Habitat: Mid to high elevation forests. Common throughout New Mexico in mountainous regions. From 5,000 to 9,000 ft.

ID: 20-100 ft in height, can be taller. Bark puzzle piece shaped. Bark is grayish-black or brown when young and turns more golden-brown as they get older. Usually 3 needles per bunch.

Photos by Taryn Schlosser




QUAKING ASPEN, ASPEN

Latin Name: *Populus tremuloides*

Habitat: Mountainous slopes and valleys throughout New Mexico. From 6,500 to 10,500 ft.

ID: 16-100 ft in height. Bark is white, smooth, and powdery to the touch. Bark around base becomes grayish-black and furrowed with maturity. Leaves green, turn yellow-gold in the fall.





Near right photo by Alex Withnall, far right by Taryn Schlosser

ROCKY MOUNTAIN JUNIPER

Latin Name: *Juniperus monosperma*

Habitat: Mixed-conifer forests, dry slopes. Common throughout New Mexico. Found at higher elevations than Juniperus monosperma (one-seed juniper). From 5,700 to 9,000 ft.

ID: 10-35 ft in height. Most commonly with a single trunk. Has a "lacy" or "droopy" appearance. Bark is reddish-brown or grayish-brown, shreddy. Leaves usually blue-green, scale-like. Berries dark blue/purple with a whitish cast that can be rubbed off. Usually 2 seeds per berry.





Near right photo by Carolina May, far right by Grace McCartha

WHITE FIR

Latin Name: *Abies concolor*

Habitat: Mixed-conifer forests, common throughout mountainous regions of New Mexico. From 7,000 to 9,000 ft.

ID: 30-100 ft tall or more. Bluish-green in coloration. Symmetrical conical shape. Branches perpendicular to trunk. Bark is whitish-gray and smooth on young trees, dark gray and furrowed with maturity. Cones stick up on branches instead of hang down.





Near right photo by Carolina May, far right by Alex Withnall

Tree identification resources:

Trees and Shrubs of New Mexico by Jack Carter

Tree Guide by the Pajarito Environmental Education Center: https://peecnature.org/learn/nature-guides/tree-guide/

Southern Rocky Mountain Ponderosa Pine Forest & Woodland by NatureServe Explorer: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.1225588/Pinus_ponderosa_Southern_Rocky_Mountain_Forest_Woodland_Group

Southern Rocky Mountain Dry Mixed Conifer Forest & Woodland by NatureServe Explorer:https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.836537/Pseudotsuga_menziesii_-_Pinus_ponderosa_Southern_Rocky_Mountain_Dry_Forest_Woodland_Group

How healthy is this tree?

When looking at an individual tree, remember that context matters. Are there more healthy trees than stressed or dead trees? Do other trees in the stand exhibit the same signs of stress? Are they clustered near each other or dispersed in the stand? Some stressed and dead trees in a stand are natural, but widespread stress or mortality may indicate an underlying issue that requires attention (*see more in Forest Management: Making decisions about the future of your forest*).

Healthy trees:

- Green needles/leaves
- New buds
- Full crowns
- Springy branches
- Stable trunks
- Produce cones, seeds, flowers, pollen

Stressed trees:

- Tips of needles/leaves yellowing and/or all the needles/leaves on a branch yellowing
- Broken limbs
- Thinning crown

- Increased resin on bark
- Witches' brooms

Dead trees:

- No live foliage
- Bark sloughing
- Brittle branches

Causes of tree stress:

Trees respond differently to stress. Some trees that look badly damaged can recover, while others steadily decline over several years. A tree that is already struggling is more susceptible to other stressors. Disturbances are a natural and necessary part of healthy forests. The presence of insects, fungi, and mistletoe does not mean that a tree should be removed.

Disturbance

Fire Signs & Symptoms:

- Scorched needles
- Charred bole
- Catface/fire scar

Drought & High Temperature-Signs & Symptoms:

- Yellowing or browning needles
- Premature needle drop
- Thinning canopy



Foliage discoloration due to needlecast). *Forest Health Protection, Forest Service, USDA, Alaska Region* (https://www.flickr.com/photos/194703066@N07/51812376577/in/album-72177720296192422/, licensed by PMD https://creativecommons.org/publicdomain/mark/1.0/)



Green needles and producing cones are signs of a healthy tree. *Photo by Carolina May*



Fire impacts on trees. *Photo by Meredith Prentice*



Example of witches' broom. *Photo by Alex Withnall*







Above: Grouse in a ponderosa. *Photo by Taryn Schlosser* Above right: Animal damage. *Photo by Carolina May* Right: Downed logs form habitat. *Photo by Kathryn Mahan*

Wildlife and Forests

Trees with cavities, broken tops, witches' brooms, and mistletoe are valuable to wildlife. They provide habitat and shelter for birds, deer, elk, bears, porcupines, squirrel, and many more. Snags, downed logs, and stressed trees also create micro-habitats for the bugs, plants, and prey that larger animals rely on.

Signs of wildlife use:

- Holes from woodpeckers
- Nests
- Bark-stripped patches, especially when they look chewed or gnawed on
- Browsed branches
- Claw marks
- Broken twigs and branches
- Tracks



Damage caused by woodpecker, note the deep irregular patterns of holes. *Photo by Carmen Melendez*



Conk fungus.
Photo by Taryn Schlosser



Insects and frass. *Photo by Taryn Schlosser*



Insect damage on tree. *Photo by Carolina May*

Insects Signs & Symptoms:

- Galleries
- Pitch tubes
- Frass
- Cocoons
- Webs
- Chewed on needles
- Abnormal growths on stems or leaves
- Galls
- Woodpecker holes

Fungi, Pathogens, & Diseases Signs & Symptoms:

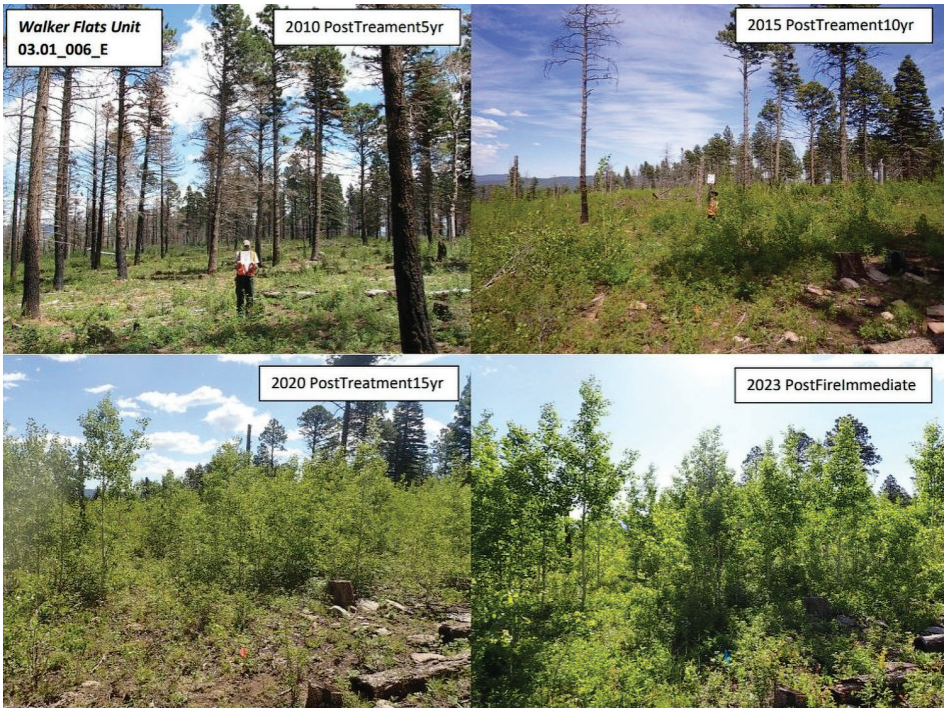
- Fungal conks/cankers
- Mushrooms
- Witches' brooms (more yellow than those caused by mistletoe)
- Discolored needles

The speed and trajectory of recovery after disturbance varies between individuals, but there are some commonalities. *For more information on forest recovery, please see Recovery of Burned Forests.*

Reminder: You don't have to know exactly what's happening to make useful observations. Focus on

Resources

- The other guides in this series, "Forest Management: Making decisions about the future of your forest" and "Recovery of Burned Forests"
- Other QIA guides: https://nmfwri.org/stewardship/wildfire-resiliency/
- New Mexico Forestry Division – technical assistance: https://www.emnrd.nm.gov/sfd/technical-assistance-to-landowners-and-communities/
- Bark Beetle Field Guide for New Mexico Forests – A Photo Guide to Common Beetles: https://nmfwri.org/wp-content/uploads/2026/04/Bark-Beetle-Field-Guide-for-New-Mexico-Forests-A-Photo-Guide-to-Common-Beetles.pdf
- Forest Pest and Disease Guide from USFS: https://www.fs.usda.gov/sites/nfs/files/r03/publication/ID%20of%20AZ%20and%20NM%202025%20compressed.pdf
- New Mexico Restoration Principles: https://www.fs.usda.gov/sites/nfs/files/r03/santafe/publication/swjm-cfl-rp-nm-forest-restoration-principles.pdf



A series of photopoints tells the story of a forest over time. These photos document the same stand across 13 years, including five, 10, and 15 years after thinning and immediately after the 2022 Hermits Peak–Calf Canyon Fire. Because the photos were taken from the same location and angle, they provide a visual record of how the forest changed before and after a major disturbance. *Photos by NMFWRI Monitoring Crew.*

changes over time and patterns across the landscape. One simple, low-cost way to do this is with a photopoint, which is a photograph taken from a consistent location and angle and repeated over time. You can use a camera or a phone. Photopoints can help you document changes in a stand, including tree growth and mortality, changes in vegetation, and the effects of fire, insects, drought, and other disturbances. They can also help you notice changes that are easy to miss from one visit to the next and provide a record of your forest. For the most useful comparisons, take photos from the same location, in the same direction, and at a similar height and angle. Note the date and location so you can return to the same spot in the future.

Identifying hazards trees

A hazard tree is a tree that has a structural defect that makes it likely to tip over or cleave off large sections. Some common signs include :

- Less than 50% live foliage
- Bole injuries or large broken branches
- Lightning scars below the top fork
- Significant root damage
- Conks/fungal fruiting bodies (indicate rot)
- Over 50% of their roots exposed
- Lean over 30%
- Evident flood damage
- Newly increased wind pressure (e.g. surrounding nearby trees are dead)
- Burned trees, or trees deteriorating after a wildfire

Strong or gusty winds, rainy weather, and steep slopes increase the risk these trees pose. It's important to maintain situational awareness when working around trees that have these signs.



Hazard tree. *Photo by Kathryn Mahan*

What next?

Once you've gotten to know your forest better, the next step is management!

This guide was produced by New Mexico Forest & Watershed Restoration Institute (NMFWRI) in partnership with the Wildfire Resiliency Training Center, with funding from the USDA Natural Resource Conservation Service (NRCS), USDA NextGen, the Economic Development Administration (EDA) Disaster Recovery Grant Program and the Cooperative and International Programs of the U.S. Forest Service, Department of Agriculture, under the Southwest Forest Health and Wildfire Prevention Act. In accordance with Federal law and U.S. Department of Agriculture policy, NMFWRI, NMHU, WRTC and Luna Community College are prohibited from discriminating on the basis of race, color, national origin, sex (including gender identity and sexual orientation), religious creed, disability, age, political beliefs, and prohibits reprisal or retaliation for prior civil rights activity. NMHU and LCC are equal opportunity employers.

Sources: Mahan, K.R., Melendez C., May, C., Prentice, M., Yannayon, E. 2026. Field Manual for Monitoring Upland Forests, Second Edition. A publication of the New Mexico Forest and Watershed Restoration Institute. Available at: www.nmfwri.org

Reynolds, R. T., Sánchez Meador, A. J., Youtz, J. A., Nicolet, T., Matonis, M. S., Jackson, P. L., DeLorenzo, D. G., & Graves, A. 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). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. https://doi.org/10.2737/RMRS-GTR-310

Tom DeGomez, Arizona Cooperative Extension. (2011). Recovering from Wildfire: A Guide for Arizona's Landowners.

Contributors: Content Development: Taryn Schlosser, Shantini Ramakrishnan, Kathryn Mahan, Crystal Medina Editors: Edward Martinez, Crystal Medina, Vincent Vispo, Kathryn Mahan, Jax Gaglianese-Woody Design: Sarah Friedland Cover Photo: Taryn Schlosser

New Mexico Forest and Watershed Restoration Institute
New Mexico Highlands University

Wildfire Resiliency Training Center
Luna Community College

FIRE NM
Fire Informed Restoration Education for New Mexico