USDA Forest Service
U.S. DEPARTMENT OF AGRICULTURE

Rocky Mountain Region Forest Health | Region 2–RO–25-01 | May 2025

Forest Insect and Disease Conditions in the Rocky Mountain Region, 2024

Disclaimers for Aerial survey data, GIS and Maps

Due to the nature of aerial surveys, these data will only provide rough estimates of the location, intensity and resulting trend information for agents detectable from the air. Many of the most destructive diseases are not represented in the data because these agents are not detectable from aerial surveys. The maps and data presented should only be used as a partial indicator of insect and disease activity and should be validated on the ground for actual location and causal agent. The insect and disease data are available digitally from the U.S. Department of Agriculture, Forest Service, Region Two Forest Health Protection group. The cooperators reserve the right to correct, update, modify, or replace GIS products. Using these data for purposes other than those for which they were intended may yield inaccurate or misleading results.

The information shown is based on data compiled as of 05-08-2025.

Cover photo: Aerial view of roundheaded pine beetle complex activity spreading on the Uncompahgre National Forest. Photo by Justin Backsen, USDA-FS.

Contents

Conditions in Brief

2024 Weather Summary for the Rocky Mountain Region

In 2024, the USDA Forest Service Rocky Mountain Region experienced considerably less precipitation than average in Wyoming and the western sections of South Dakota and Nebraska. In contrast, southern and central Colorado received more precipitation than average (Figure 1).

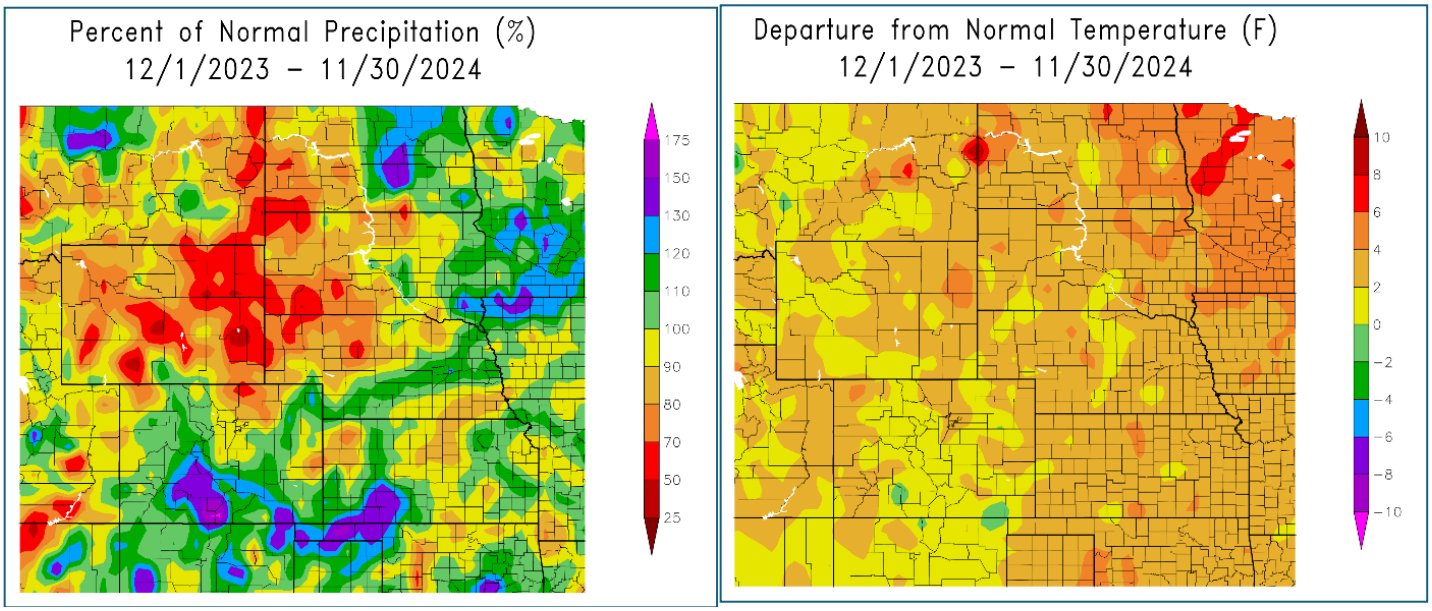


Figure 1. Percent of normal precipitation (left) and departure from normal temperature (right) for Region 2. Source: High Plains Regional Climate Center.

At the time that our annual aerial detection surveys began the last week of June, much of Colorado was drought- free, while most of Wyoming and the western sections of South Dakota and Nebraska were just in abnormally dry to moderate drought conditions. By the end of our surveys, while a large part of Colorado remained drought-free, all of Wyoming, South Dakota, and Nebraska were experiencing conditions ranging in severity from “Abnormally Dry” to “Exceptional Drought” (Figure 2).

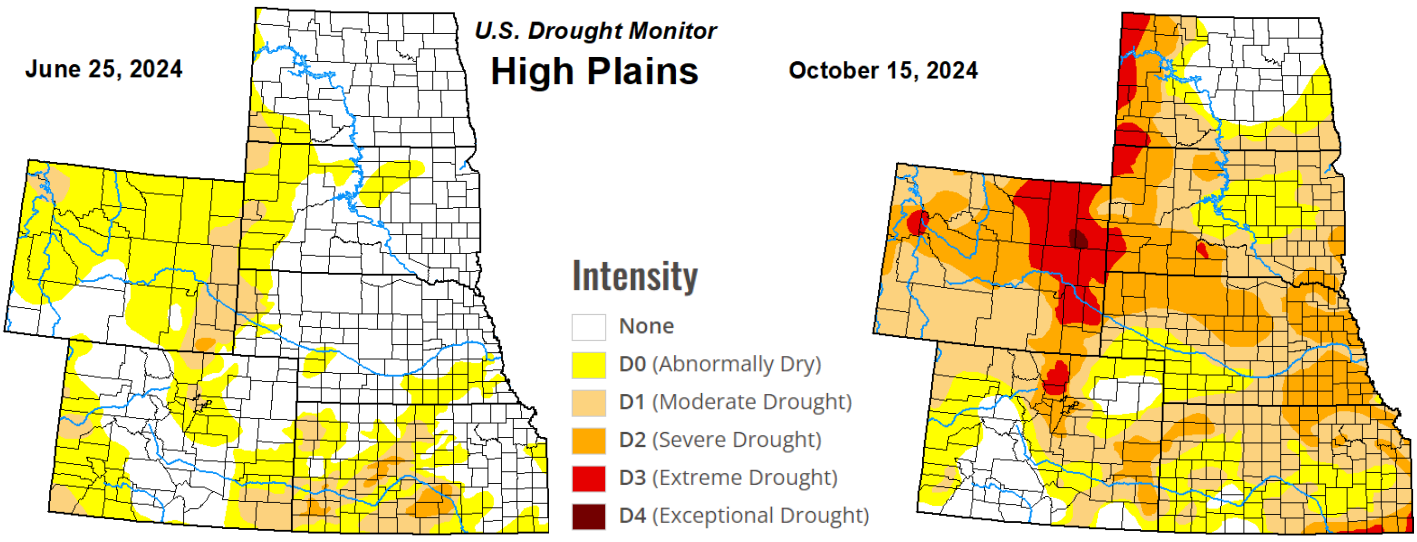


Figure 2. Drought intensity on June 25th (left) and drought intensity on October 15th (right) for the Rocky Mountain Region. Source: The U.S. Drought Monitor.

While the snowpack was normal for Colorado and southern/western Wyoming, it was well below normal for northeastern Wyoming, South Dakota, and Nebraska on April 1st (Figure 3).

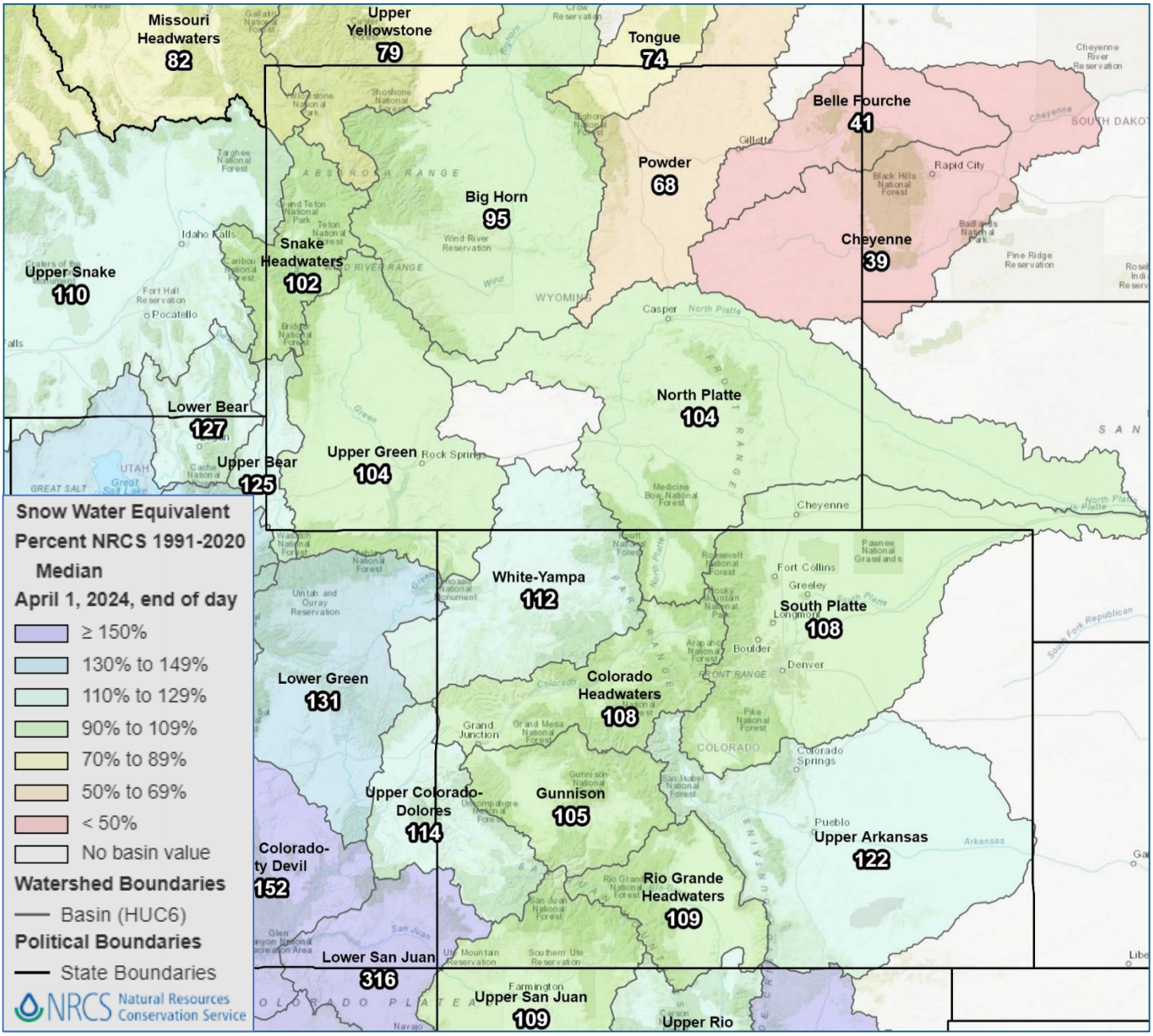


Figure 3. Percent of normal snowpack on April 1st 2024. Source: National Water and Climate Center.

On average, the region experienced above normal precipitation and lower than normal temperatures during winter and spring, contributing to a delayed fire season. This was followed by a summer and fall with below normal precipitation and above normal temperatures which led to fires that broke records for size in Wyoming. Smoke from wildfires also caused many of our aerial survey detection flights to be postponed, thus our flight season was extended for over a month longer than usual.

Aerial Survey Summary

Each year during the summer and early fall, Forest Service Rocky Mountain Region State, Private and Tribal Forestry group, Forest Health Protection and its state partners conduct aerial detection surveys to map forest insect and disease activity in the region. Aerial surveys provide an annual snapshot of forest health conditions over large areas more efficiently and economically than other methods. For this reason, aerial surveys are the primary method of collecting data on the health of treed areas affected by insects and diseases. To conduct the survey, observers in small aircraft record areas of activity using a digital aerial sketch mapping system that incorporates a tablet computer, geographic information systems, and global positioning system technology. Aircraft used for these flights in Region 2 are typically small high-wing planes such as the Quest Kodiak 100 and Cessna T206. Aircraft fly in either a grid pattern over relatively flat terrain or by following the contours of the terrain in mountainous or deeply dissected landscapes. Forest Service partners with state cooperating agencies in conducting the annual survey. In 2024, 45.8 million acres were aerially surveyed in Region 2 (Figure 4). The Insect and Disease Survey geospatial data are available for download at https://www.fs.usda.gov/science-technology/data-tools-products/fhp-mapping-reporting/detection-surveys.

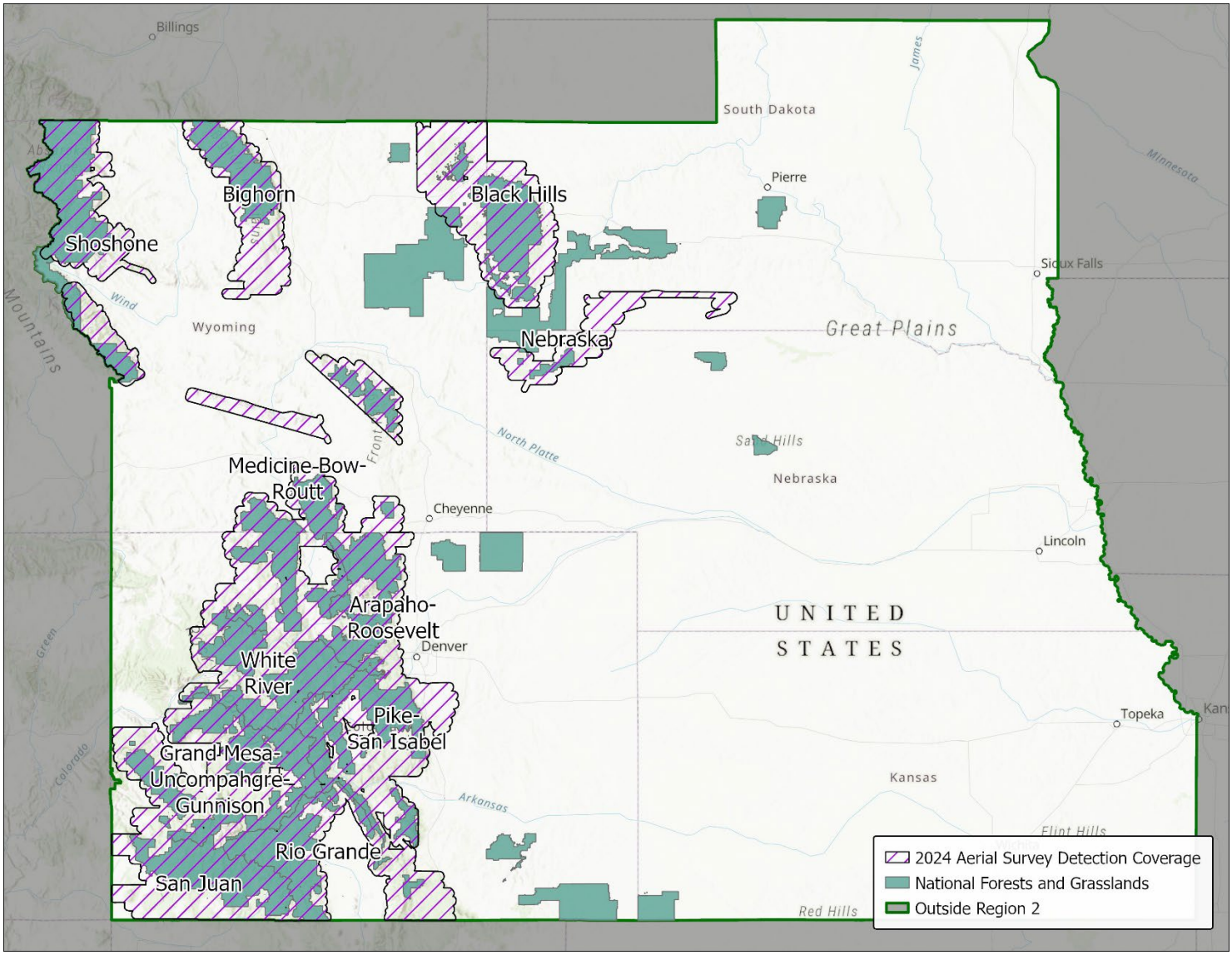


Figure 4. Flown areas from the 2024 aerial detection survey. USDA Forest Service map by Nathan Edberg.

Bark Beetle Summary

New tree mortality in the Rocky Mountain Region was primarily caused by four major bark beetles: western balsam bark beetle, Douglas-fir beetle, spruce beetle, and mountain pine beetle. Recent years of increased western spruce budworm defoliation in Douglas-fir stands may be the source for an observed increase in Douglas-fir beetle activity. In 2024, bark beetle trends varied: Douglas-fir beetle and mountain pine beetle activity increased, spruce beetle activity declined, and western balsam bark beetle activity remained stable.

To verify and expand on aerial survey data, Forest Health Protection specialists conducted ground surveys in newly affected mountain pine beetle areas along Colorado's Front Range and in the northern Black Hills of South Dakota and Wyoming.

Table 1. Comparison of acres of bark beetle[1] activity observed by state from aerial detection surveys between 2023 and 2024 in Region 2.

State	Spruce Beetle	Spruce Beetle	Mountain Pine Beetle	Mountain Pine Beetle	Douglas-fir Beetle	Douglas-fir Beetle	Western Balsam Bark Beetle	Western Balsam Bark Beetle
Year	**2023**	**2024**	**2023**	**2024**	**2023**	**2024**	**2023**	**2024**
Colorado	19,000	11,000	3,100	5,300	17,000	21,000	27,000	27,000
Kansas	0	0	0	0	0	0	0	0
Nebraska	0	0	0	0	0	0	0	0
South Dakota	0	0	330	340	0	0	0	0
Wyoming[2]	2,800	360	550	630	350	130	4,100	3,400
Region 2 Total[3]	**22,000**	**11,000**	**4,000**	**6,300**	**18,000**	**21,000**	**31,000**	**30,000**

[1]Only major bark beetle and mortality agents are shown. Agents detected with lesser activity may not be represented in the table.
[2]Includes only the Region 2 portion of Wyoming.
[3]Sum of individual values may differ from totals due to rounding and multiple agents occurring in the same location.

Table 2. Bark beetle[1] activity by National Forest (NF) in acres from aerial detection surveys in 2024.

National Forest[2]	Spruce Beetle	Mountain Pine Beetle	Douglas-fir Beetle	Western Balsam Bark Beetle	Roundheaded Bark Beetle complex in Ponderosa Pine
Arapaho and Roosevelt NF	140	210	80	2,000	0
Bighorn NF	70	80	3	90	0
Black Hills NF	0	400	0	0	0
Grand Mesa, Uncompahgre and Gunnison NF	3,700	300	2,300	5,400	2,400
Medicine Bow and Routt NF	300	1	9	5,100	0
Nebraska NF	0	0	0	0	0
Pike and San Isabel NF	3,000	440	2,600	630	0
Rio Grande NF	8	4	5,300	220	0
San Juan NF	2,600	2	2,300	1,100	3,900
Shoshone NF	110	0	90	190	0
White River NF	340	0	770	6,800	0

[1]Only major bark beetle and mortality agents are shown. Agents detected with lesser activity may not be represented in the table.
[2]Values based on proclamation boundaries, thus any inholdings within the Forest boundary are included.

Defoliation and Abiotic Injury Summary

Defoliation can be caused by insects or diseases whereas abiotic injury is caused by the non-living parts of an ecosystem such as weather, light, and water. Due to lighting conditions and smoke, the causal agents of tree defoliation can be difficult to distinguish when conducting aerial surveys. Aspen defoliation is typically captured through aerial mapping and the specific casual agent is determined through field visits when possible. In 2024, there were significant increases in acres of aspen defoliation mapped on both the Medicine Bow-Routt National Forest and the White River National Forest. These areas include high visitor use zones in Eagle and Routt Counties, CO, specifically during the fall for leaf color change viewing which is negatively impacted by the defoliation.

In conifer species, tree stress caused by multiple years of defoliation can directly lead to tree mortality or predispose trees to bark beetle attack. In 2024 increasing damage of western spruce budworm (WSBW) was seen on the Medicine Bow-Routt National Forest. Damage from WSBW remained severe on the Pike National Forest along with severe damage from Douglas-fir beetle. Douglas-fir beetle activity in WSBW impacted stands is typical due to host tree stress caused by the defoliation events.

Specific abiotic events such as tornadoes and avalanches can cause local catastrophic damage by uprooting and snapping trees. Areas of windthrown trees, the uprooting of a tree caused by wind, may warrant ground monitoring for bark beetle activity depending on the species, the size of the impacted trees, and the adjacent stands. Bark beetle species that are drawn to trees in windthrow events are spruce beetle, Douglas-fir beetle, and western balsam bark beetle This is because trees downed by wind events can provide suitable host material for bark beetles to reproduce, in some cases allowing populations to grow sufficiently that adjacent healthy trees can be successfully attacked and killed. Notable tornado activity occurred north of Sundance, Wyoming.

Table 3. Major defoliators, diseases and abiotic[1] activity by state in acres from aerial detection surveys in 2024.

State	Aspen Defoliation and Discoloration[2]	Western Spruce Budworm	Windthrow
Colorado	9,300	217,000	0
Nebraska	0	0	0
Kansas	0	0	0
South Dakota	0	0	0
Wyoming[3]	2,800	17,000	430
Region 2 Total[4]	**12,000**	**234,000**	**430**

[1]Only major defoliators, diseases and abiotic agents are shown. Agents detected with lesser activity may not be represented.
[2]Aspen defoliation and discoloration include damage primarily by Marssonina leaf spot, western tent caterpillar and large aspen tortrix.
[3]Includes only the Region 2 portion of Wyoming.
[4]Sum of individual values may differ from totals due to rounding and multiple agents occurring in the same location.

Table 4. Major defoliators, diseases and abiotic[1] activity by National Forest (NF) in acres from aerial detection surveys in 2024[2].

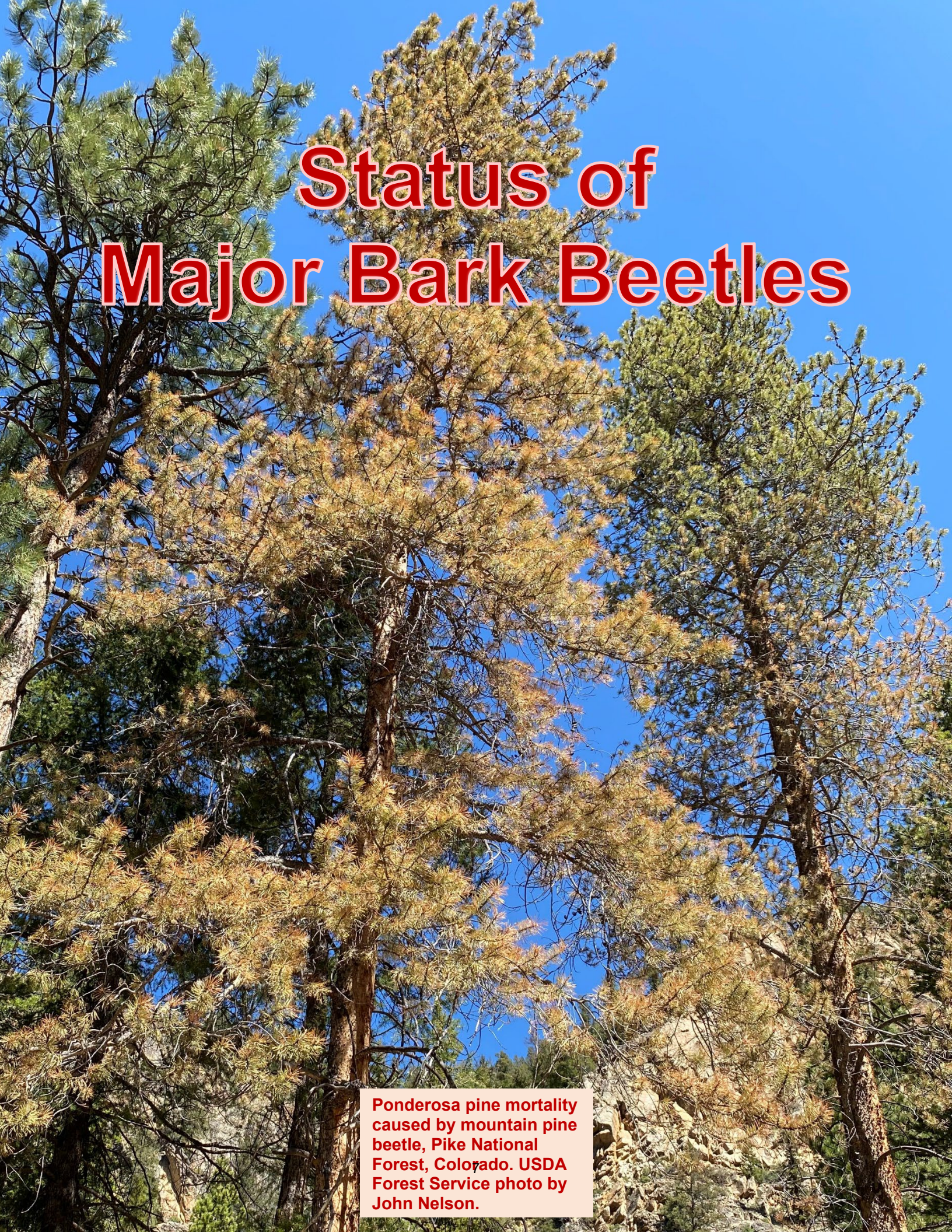
National Forest[3]	Aspen Defoliation and Discoloration[4]	Western Spruce Budworm	Windthrow
Arapaho and Roosevelt NF	30	50	0
Bighorn NF	0	3,100	0
Black Hills NF	0	0	350
Grand Mesa, Uncompahgre and Gunnison NF	750	68,000	0
Medicine Bow and Routt NF	4,100	36,000	0
Nebraska NF	0	0	0
Pike and San Isabel NF	110	30,000	0
Rio Grande NF	930	14,000	0
San Juan NF	570	16,000	0
Shoshone NF	0	6,800	0
White River NF	1,200	9.000	0

[1]Only major defoliators, diseases and abiotic agents are shown. Agents detected with lesser activity may not be represented in the table.
[2]Sum of individual values may differ from totals due to rounding and multiple agents occurring in the same location.
[3]Values based on proclamation boundaries, thus any inholdings within the Forest boundary are included.
[4]Aspen defoliation and discoloration include damage primarily by Marssonina leaf spot, western tent caterpillar and large aspen tortrix.

Disease Summary

Tree diseases can cause damage and mortality quickly, sometimes over days or weeks when environmental conditions are conducive. More often impacts progress over months to several years. Tree diseases such as dwarf mistletoes, root diseases, rusts, and cankers can persist in trees for years. Symptoms of tree diseases are variable, depending on tree species, type of disease, and portion of the tree impacted, and they are often difficult to detect and quantify by aerial surveys. Crown damage and discoloration can key aerial surveyors into locations and even trees with disease, but ground surveys are usually required to determine causal agents and disease severity. Recent disease outbreaks and persistent diseases are covered in the chapter Status of Major Diseases.

Status of Major Bark Beetles



Ponderosa pine mortality caused by mountain pine beetle, Pike National Forest, Colorado. USDA Forest Service photo by John Nelson.

Status of Major Bark Beetles

Spruce Beetle

Dendroctonus rufipennis

Hosts: Engelmann and blue spruce, attacks lodgepole pine but does not reproduce.

Spruce beetles, like many of the most destructive bark beetles, find the most suitable hosts in stands of dense, mature and stressed trees. In the last twenty years in many areas in Region 2 where these conditions existed, spruce beetle outbreaks have moved through vast acreages and killed a majority of large diameter Engelmann spruce trees. Ongoing outbreaks of spruce beetle continue to expand where suitable hosts are present in Region 2, particularly in and adjacent to the San Juan, Gunnison, Shoshone, Arapaho/Roosevelt and Medicine Bow National Forests (Figures 5, 6, and 7). However, there was a significant overall reduction in spruce beetle acres mapped by aerial surveys in Colorado and Wyoming in the last few years. In many locations this reduction is the result of spruce beetle outbreaks having moved through areas with abundant suitable host tree availability into areas with fewer host trees, thus activity has subsided due to host depletion. In many areas where beetles have been active in recent years, few mature spruce trees remain living. In areas where spruce beetle has killed most larger diameter spruce trees, smaller diameter spruce, as well as other non-host species such as subalpine fir and quaking aspen, have survived the outbreaks and continue to occupy these stands.

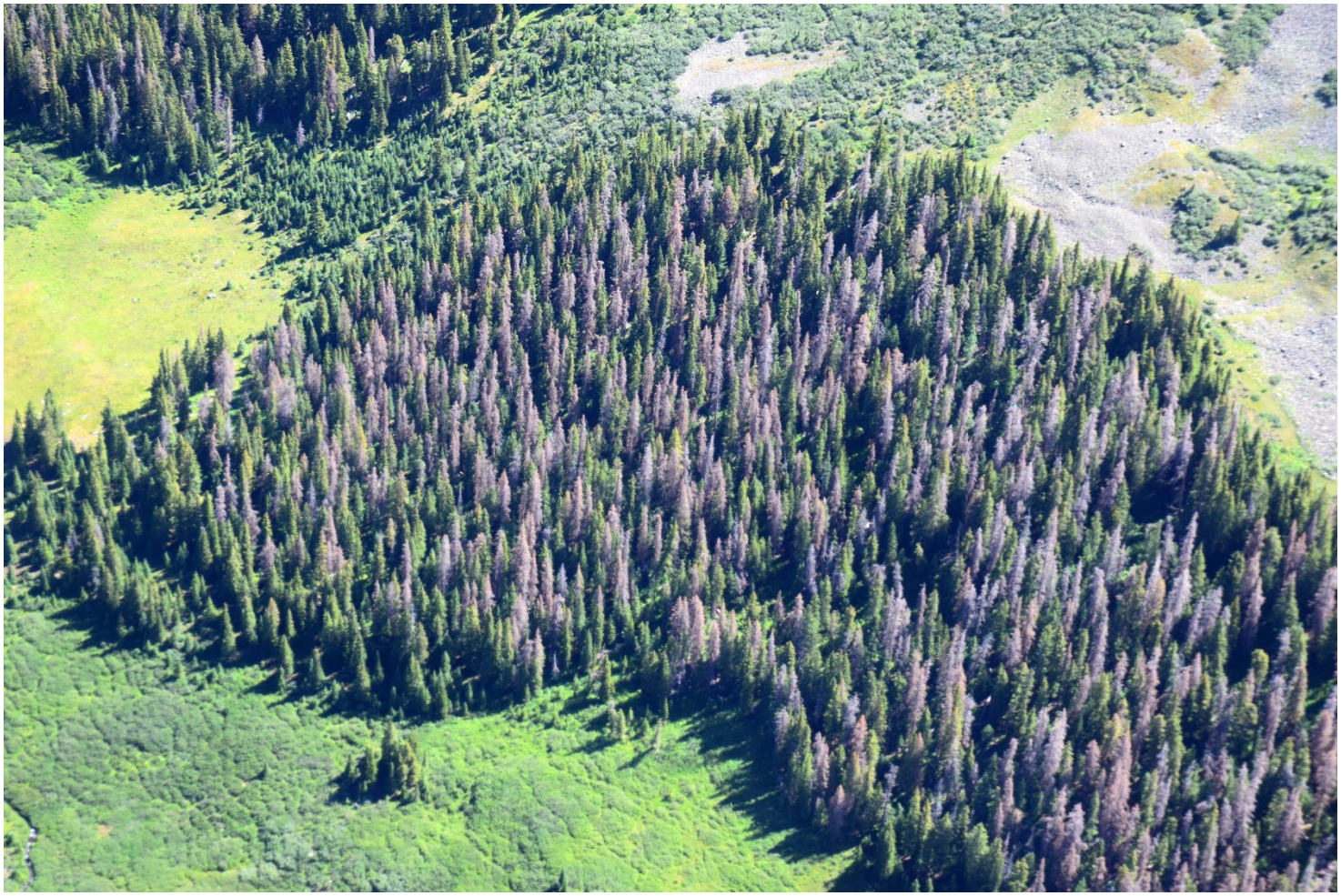


Figure 5. Fading and standing dead Engelmann spruce trees following spruce beetle attack on the Uncompahgre National Forest. USDA Forest Service photo by Justin Backsen.

In Colorado, 11,000 acres of spruce beetle activity were observed, down from 19,000 acres in 2023. Spruce beetle activity continues in the San Juan mountains, especially on the north side of Lizard Head Pass and south of Silverton (Figure 5). They also continue to infest areas in the central Sawatch Range and areas west and south of Rocky Mountain National Park.

Aerial surveys mapped spruce beetle-caused mortality on only 360 acres in the Region 2 portion of Wyoming. This number is almost certainly low due to the aerial surveys being precluded over the Togwotee and Union Pass areas due to fire activities. These areas have had spruce beetle damage occurring for years (Figure 6). Though not detected by aerial surveys, we suspect that spruce beetle activity continues in the southern Shoshone National Forest, particularly west of Dubois in the Union Pass area.

The Crater Ridge fire on the Bighorn National Forest burned in the summer of 2021. In 2023 there was light and scattered spruce beetle activity in the fire area. Fire damaged trees have weakened defenses and, much like windthrown trees, can provide host material for spruce beetle populations to increase and spillover into nearby undamaged stands. Since spruce beetle has a two-year lifecycle, we expected that if this type of spillover does occur in this instance, we would have begun to observe it in 2024 (Figure 7). The low numbers of acres mapped in this area suggest that we may not see an expansion of spruce beetle on the northern Bighorn National Forest. However, one year's observations are not conclusive so we will continue to closely monitor this area. There also continues to be light spruce beetle activity with scattered single trees and small groups of mortality on the Dayton Gulch area on the Medicine Wheel and Tongue Ranger Districts.

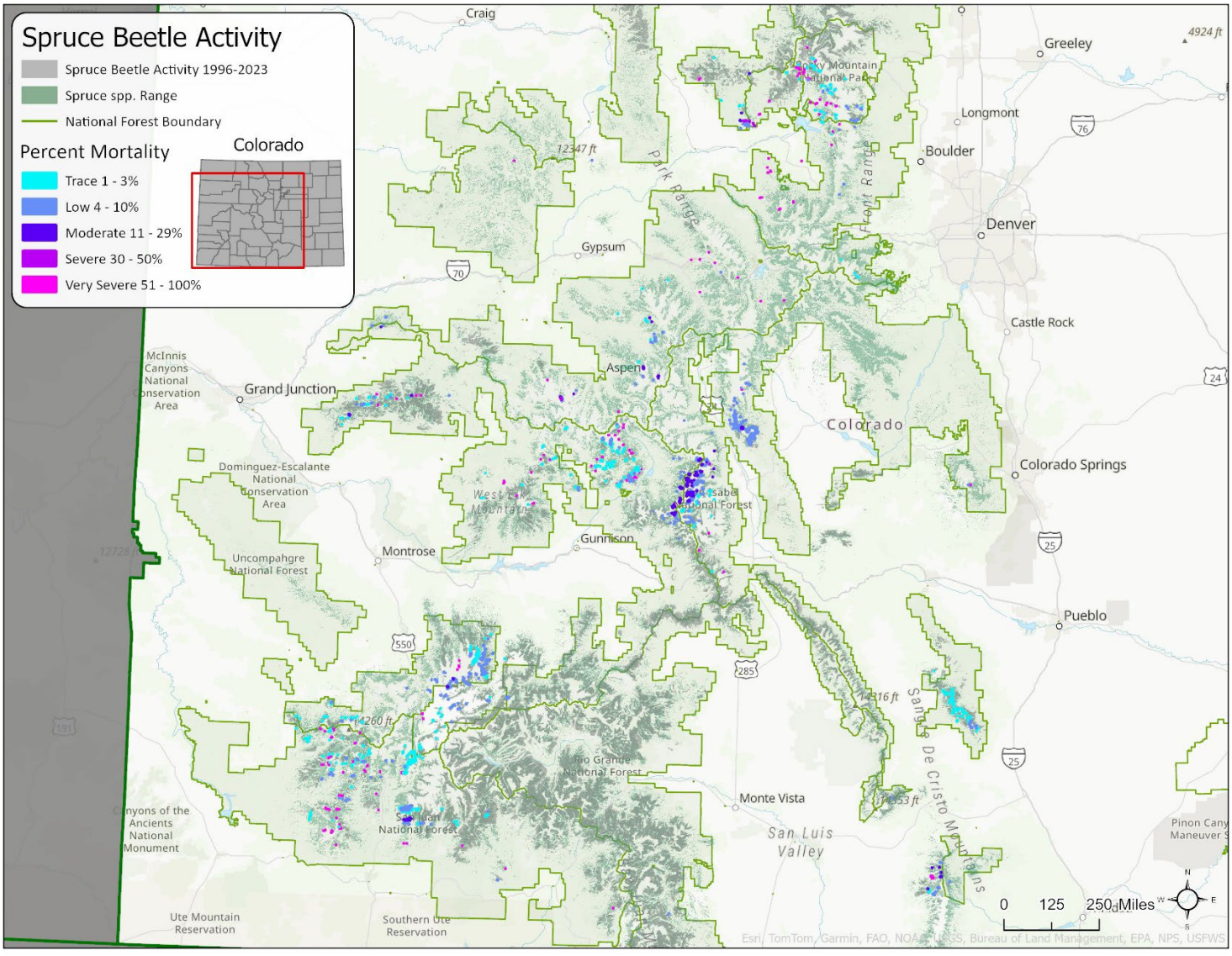


Figure 6. Spruce beetle-affected areas in Colorado vary in intensity as observed by the 2024 aerial detection survey. Spruce cover type is shown in green and previously mapped damage is in grey. USDA Forest Service map by Nathan Edberg.

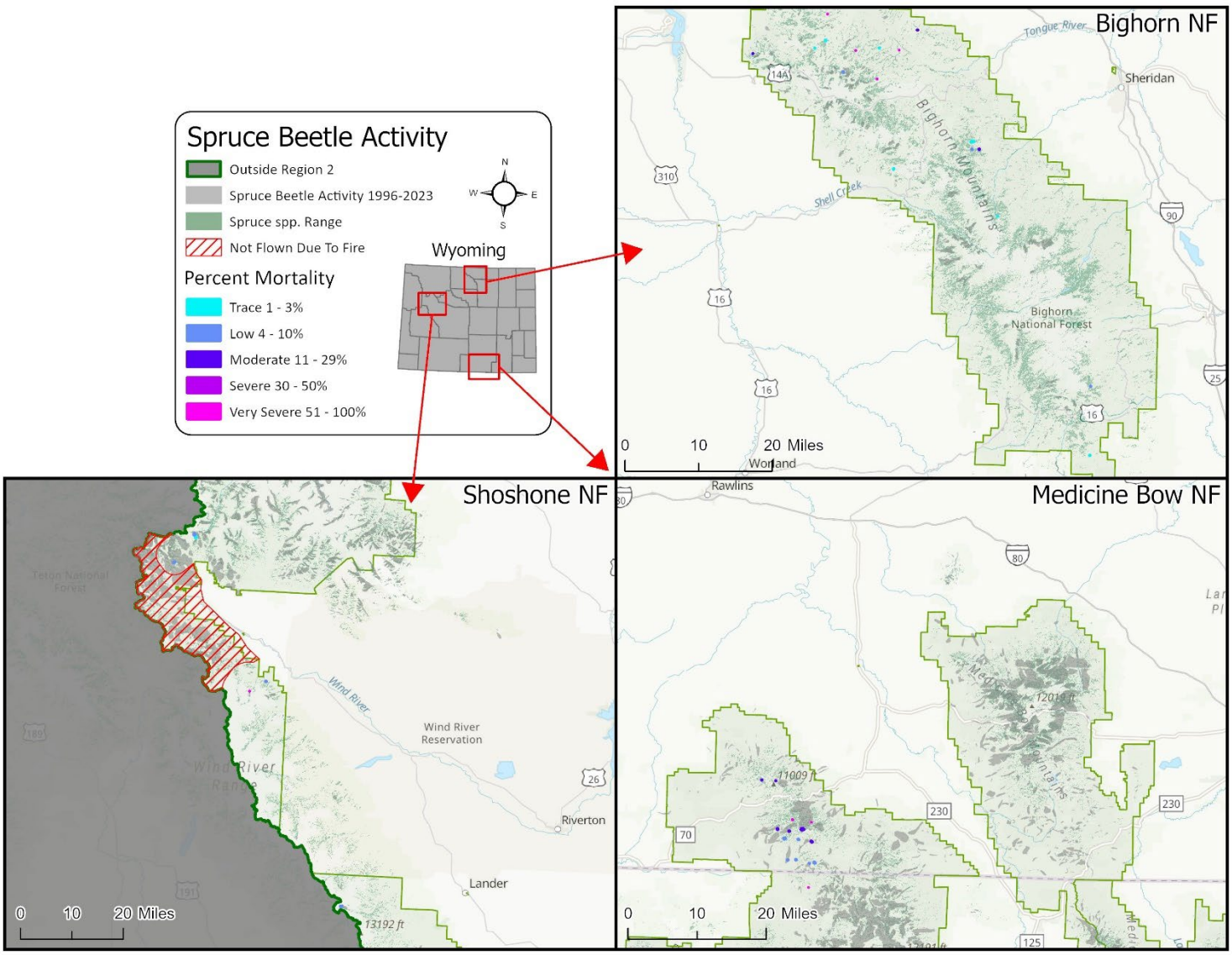


Figure 7. Spruce beetle-affected areas in Wyoming vary in intensity as observed from the 2024 aerial detection survey. Spruce cover type is shown in green and previously mapped damage areas are in grey. USDA Forest Service map by Nathan Edberg.

Mountain Pine Beetle

Dendroctonus ponderosae

Hosts: ponderosa, lodgepole, limber, whitebark and bristlecone pine

Mountain pine beetle (MPB) populations have remained at endemic levels since the last outbreaks which occurred in the region from approximately 2001-2014. However, recent monitoring efforts including aerial detection and ground surveys indicate increasing mountain pine beetle population trends in Region 2, particularly on the Arapaho-Roosevelt, Pike-San Isabel, Gunnison, Grand Mesa, and San Juan National Forests in Colorado, the Black Hills National Forest in South Dakota, and the Bighorn National Forest in Wyoming.

Ground and aerial surveys indicate MPB populations have risen to epidemic-levels on the Pike and Arapaho-Roosevelt National Forests, with smaller outbreaks in ponderosa and limber pine across the front range forests (Figure 8). Both survey methods show increasing tree mortality and expanding affected areas, driven by high tree density and older age-classes. Noticeable increases in MPB activity along Front Range mountain communities such as Idaho Springs, Colorado and Black Hawk, Colorado were evident along and near the I-70 corridor (Figures 9 and 10). This corridor had severe MPB activity in lodgepole pine during the early 2000s epidemic and has high visibility to the public with associated recreation impacts.

In early 2024, sanitation and chemical treatments were implemented at recreation sites across the Pike National Forest on the South Platte, Pikes Peak, and South Park Ranger Districts, in response to increasing MPB populations. Fall resurveys confirmed the treatments were successful in limiting MPB activity. The increasing trend of mountain pine beetle populations is expected to continue, likely leading to expanding affected areas and greater tree mortality in the coming years.

Mortality due to mountain pine beetle attacks continues to expand on the Gunnison National Forest. Affected acres detected by aerial survey have increased from 1,100 acres in 2023 to 2,100 acres in 2024 in Gunnison County alone, with lodgepole and limber pine as the primary hosts. Mountain pine beetle activity also continues to expand in the West Elk Mountains, predominantly in the Ohio Creek drainage and areas surrounding Crested Butte, Colorado (Figure 11). The ongoing mountain pine beetle outbreak that originated in and around the Wilder-Gunnison Highlands developments continues to expand into the Fossil Ridge wilderness and Taylor Canyon (Figure 12).

Figure 8. Mountain pine beetle activity in ponderosa pines along Beaver Brook on the Arapaho-Roosevelt National Forest, Colorado. USDA Forest Service photo by Isaac Dell.

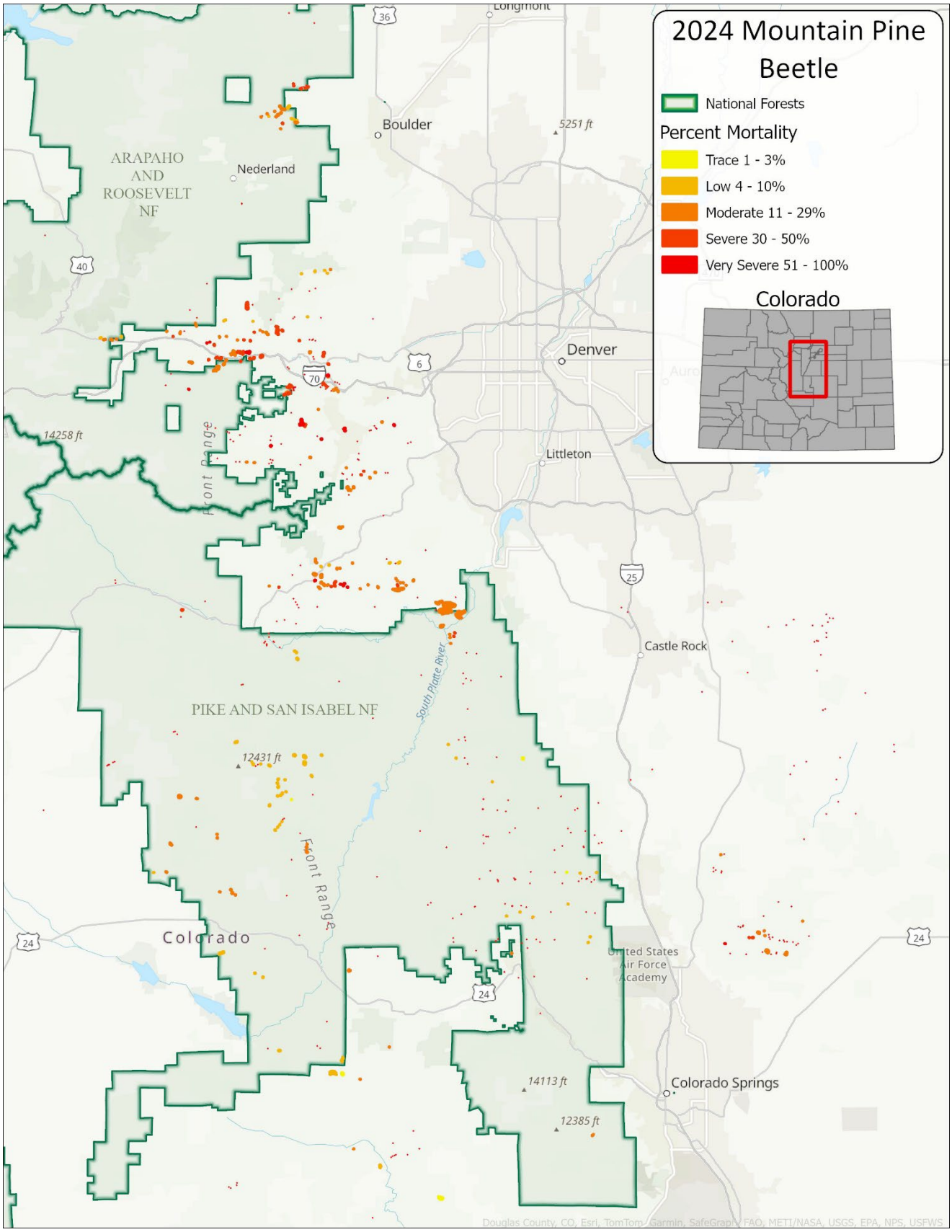


Figure 9. Mountain pine beetle activity in ponderosa pines as observed by the 2024 aerial survey in the front range foothills of Colorado. USDA Forest Service map by Nathan Edberg.

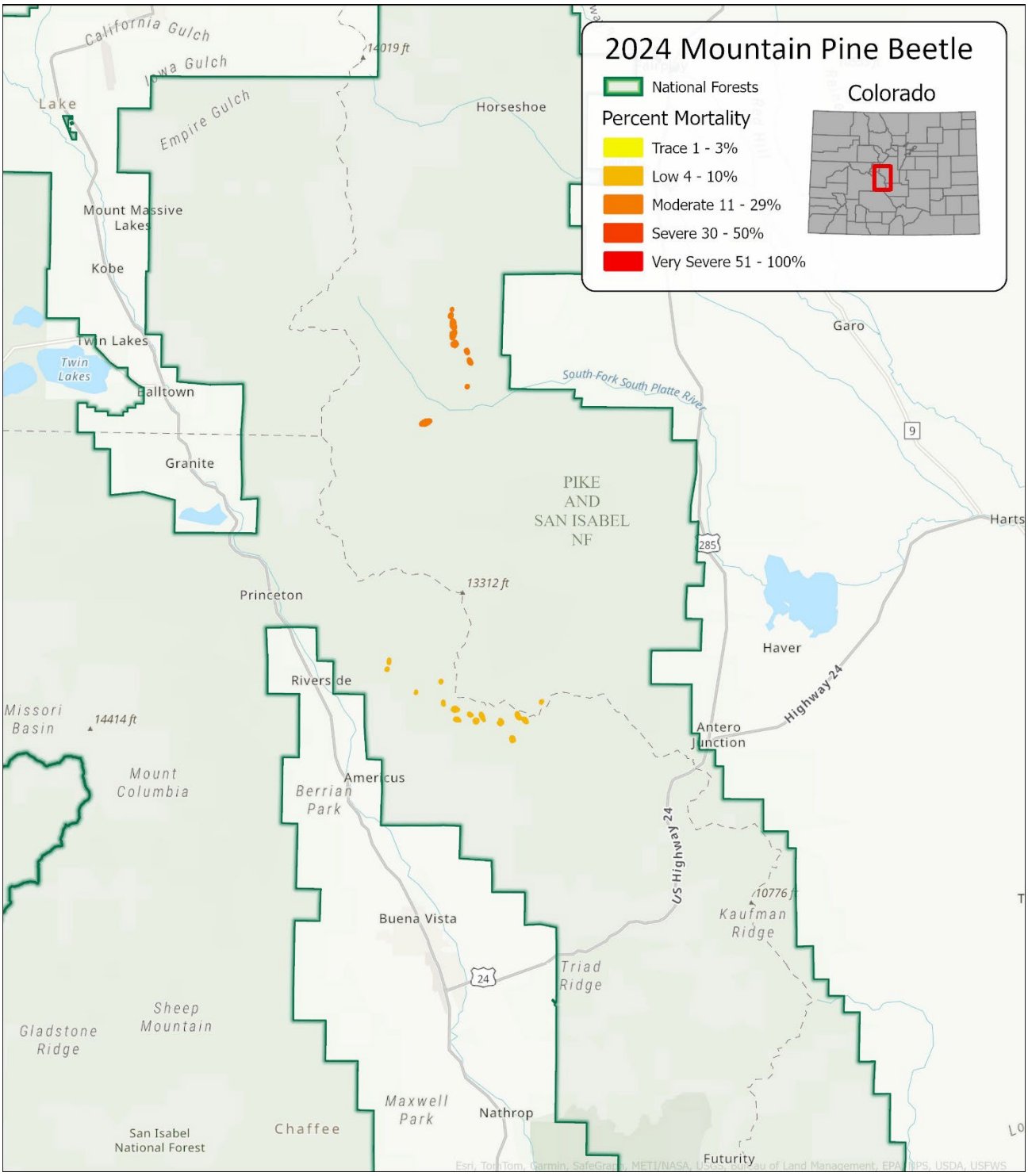


Figure 10. Mountain pine beetle primarily attacking ponderosa, limber and bristlecone pines on the northern San Isabel National Forest as observed by the 2024 aerial survey. USDA Forest Service map by Nathan Edberg.

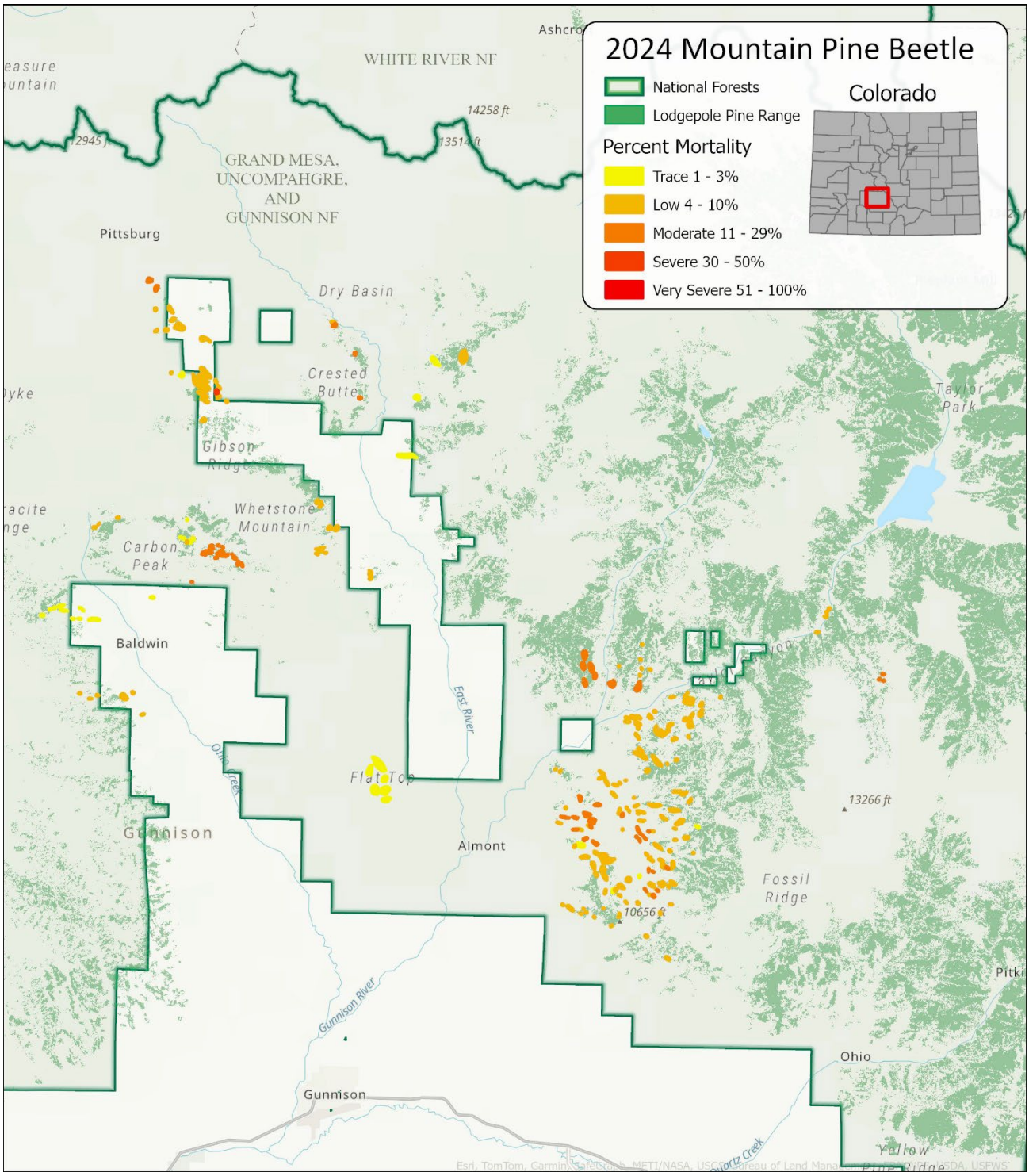


Figure 11. Mountain pine beetle activity in and around the Wilder-Gunnison Highland outbreak area in the lower Taylor basin, in the West Elk Mountains around Crested Butte, Colorado and along Ohio Creek as observed from the 2024 aerial detection survey and nearby susceptible lodgepole pine forests. USDA Forest Service map by Nathan Edberg.

Figure 12. Mountain pine beetle activity in lodgepole pine in the lower Taylor basin. USDA Forest Service photo by John Nelson.

In Wyoming, there was a small increase in mountain pine beetle activity in the ponderosa pine along the eastern edge of the Bighorn Mountains (Figure 13). Much of it was occurring on state, private and Bureau of Land Management (BLM) lands with some activity also observed on the Bighorn National Forest. There also appears to be a small uptick in mountain pine beetle activity in some of the limber pine stands on the Bighorn National Forest.

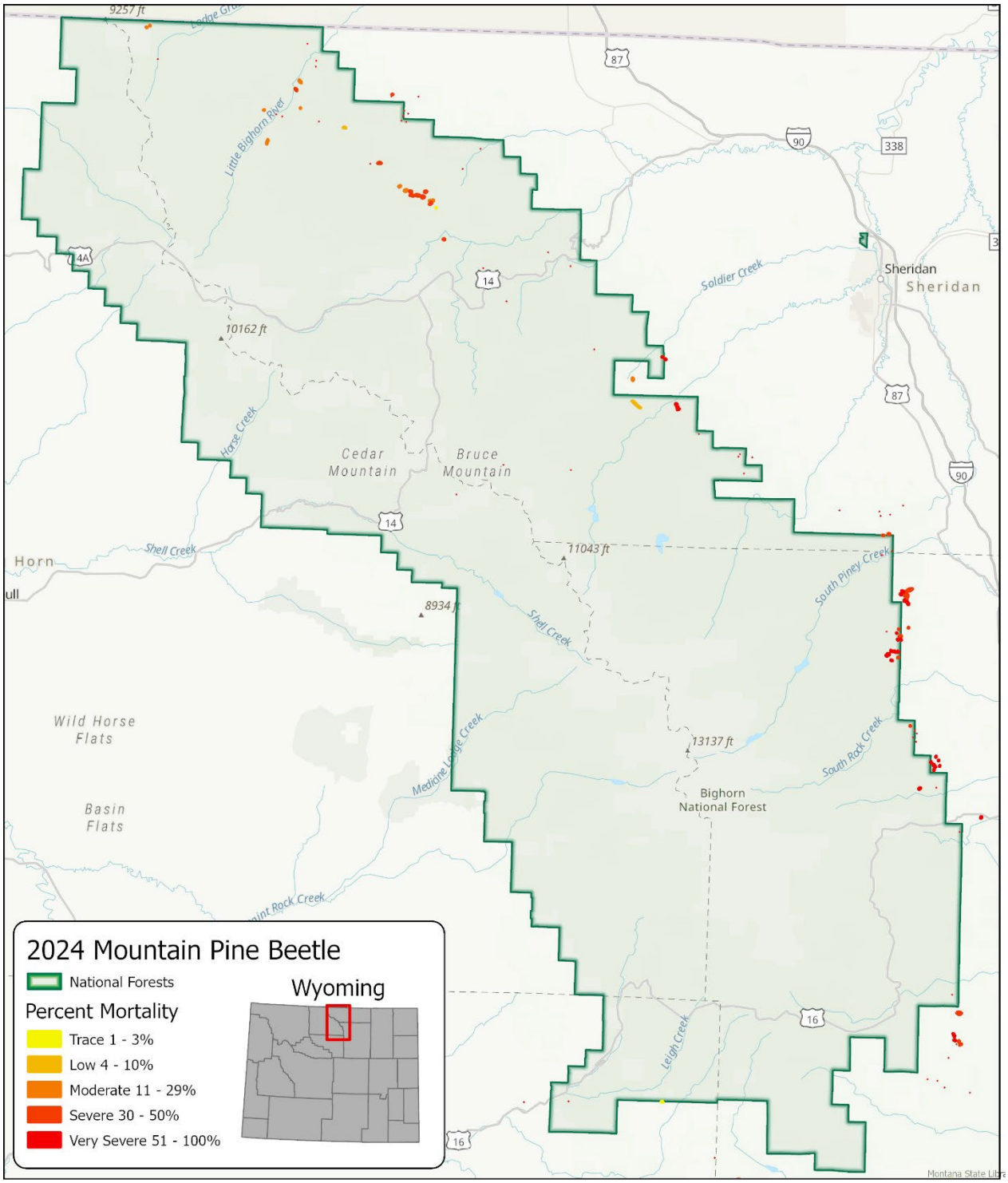


Figure 13. Mountain pine beetle primarily attacking ponderosa and limber pines on and adjacent to the Bighorn National Forest as observed by the 2024 aerial survey. USDA Forest Service map by Nathan Edberg.

Since the last epidemic in the Black Hills of South Dakota and Wyoming ended nine years ago, mountain pine beetle has been at very low (endemic) levels. Starting in 2022, an increasing trend in new mountain pine beetle killed trees has been observed. This activity is still light and scattered (Figure 14), but the presence of small groups of infested trees indicate activity is increasing. Activity is generally confined to larger trees in high density stands on steep rocky slopes that are inaccessible so have not been thinned. In other parts of the Black Hills National Forest, mountain pine beetle activity is very low, consisting of single trees attacked by mountain pine beetle with additional mortality being caused by pine engraver (*Ips*) beetles.

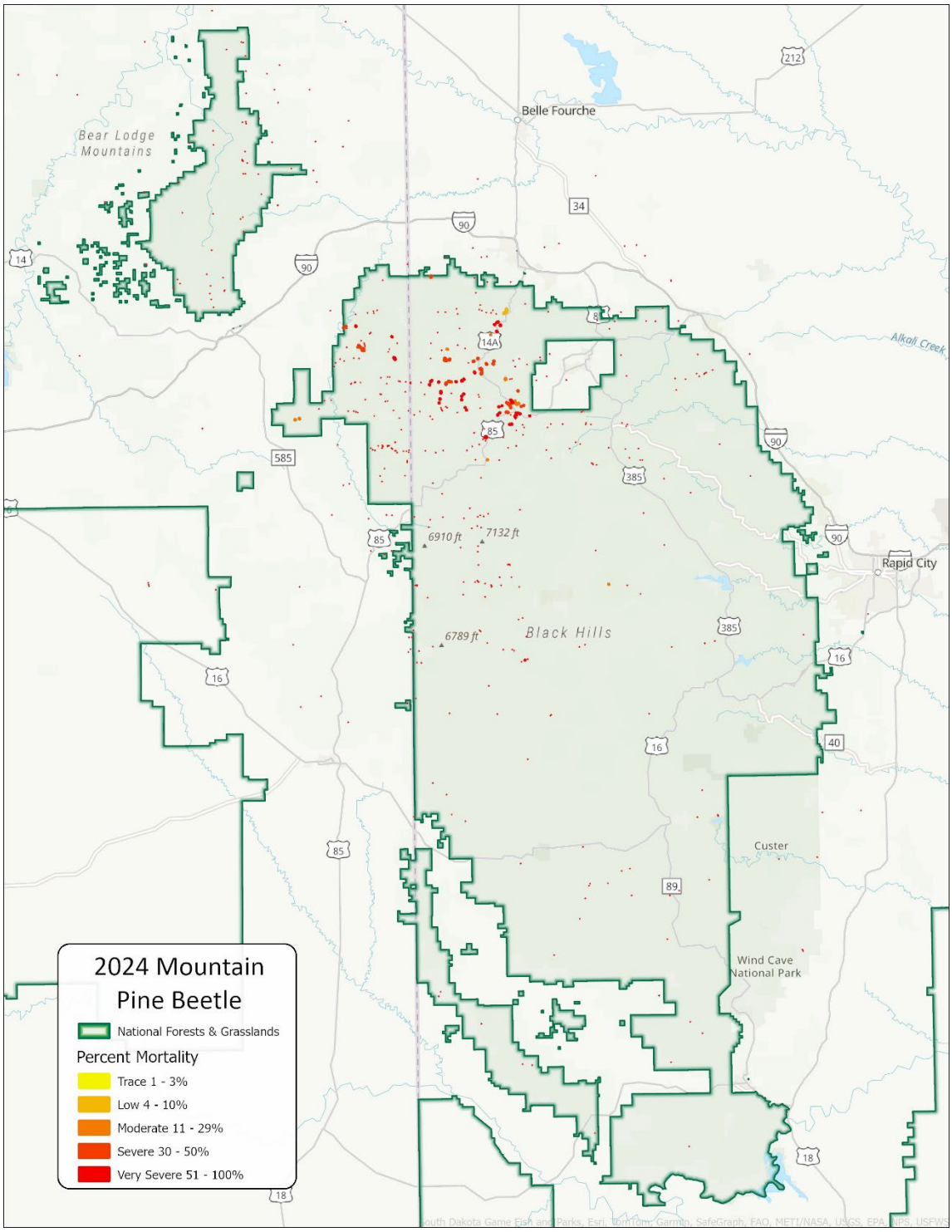


Figure 14. Mountain pine beetle on the Black Hills National Forest as observed by the 2024 aerial survey. USDA Forest Service map by Nathan Edberg.

Roundheaded Pine Beetle Complex in Ponderosa Pine

Roundheaded pine beetle, *Dendroctonus adjunctus*
Southwestern pine beetle, *Dendroctonus barberi*
Mountain pine beetle, *Dendroctonus ponderosae*
Pine engraver or *Ips* bark beetles, *Ips* spp.

Host: ponderosa pine

The “roundheaded pine beetle complex” refers to an assemblage of bark beetle species that jointly attack and cause mortality in ponderosa pine. The primary species included in this complex are roundheaded pine beetle, southwestern pine beetle (previously identified as western pine beetle), mountain pine beetle, and pine engraver beetles. An outbreak of this complex is ongoing in portions of southwestern Colorado (Figure 15). The area of affected ponderosa pine continues to expand on the Dolores Ranger District of the San Juan National Forest (3,900 acres of activity) and within the Uncompahgre National Forest (2,400 acres of activity). The fact that roundheaded pine beetle has remained in outbreak for over a decade is unusual, as typical outbreaks in the southwest tend to be short in duration, lasting little over three years. Expansion from the Glade is continuing both north and eastward into ponderosa pine stands in federal, state, and private forests (Figure 16).

Figure 15. Aerial view of roundheaded pine beetle complex activity spreading on the Uncompahgre National Forest. USDA Forest Service photo by Justin Backsen.

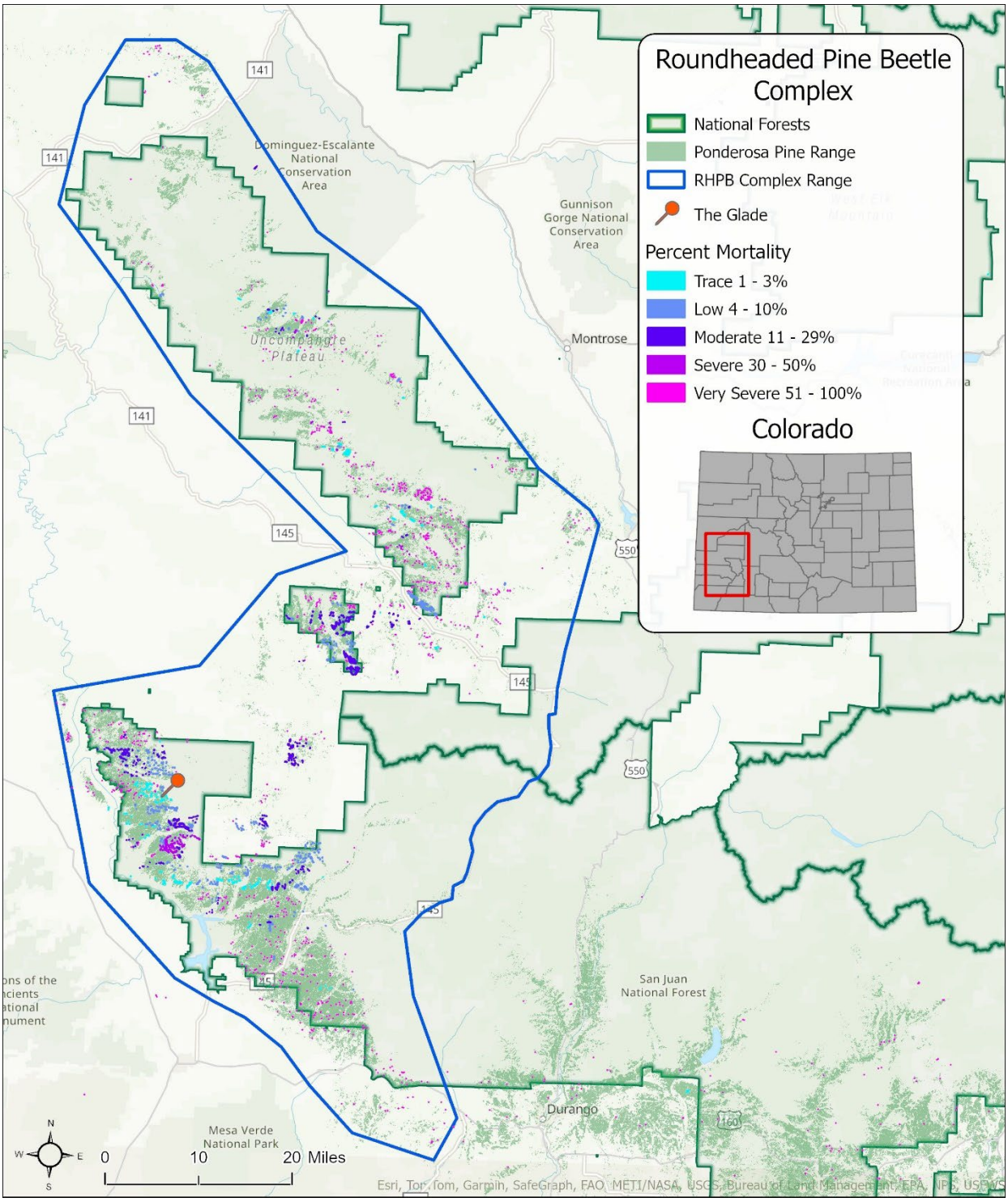


Figure 16. Roundheaded pine beetle complex activity as observed by the 2024 aerial survey. The blue boundary line delineates our current understanding of the extent of bark beetle-caused ponderosa pine mortality associated with this complex of beetles. USDA Forest Service map by Nathan Edberg.

Forest Health Protection has contributed funding to support removal or “sanitation” of infested trees and thinning efforts in the timber management area on San Juan and Uncompahgre National Forest lands shown in Figure 17. The roundheaded pine beetle complex has continued to spread northward, with increasing activity in the Norwood Ranger District of the Uncompahgre National Forest as well as in areas of dense ponderosa pine on the Uncompahgre Plateau. Trapping surveys conducted in 2023 and 2024 indicate that roundheaded pine beetle and southwestern pine beetle are the primary bark beetle species present in both the San Juan and Uncompahgre National Forests, although the proportion of beetle species varies between locations.

Figure 17. Thinning and sanitation of ponderosa pine stands is ongoing in areas affected by roundheaded pine beetle complex on the Uncompahgre National Forest, these efforts were financially supported by Forest Health Protection. USDA Forest Service photo by Matthew Ethington.

Douglas-fir Beetle

Dendroctonus pseudotsugae

Host: Douglas-fir

Douglas-fir beetle activity is scattered and widespread in Wyoming and Colorado (Figure 18). Douglas-fir beetles preferentially attack large, old trees in dense, stressed stands (Figure 19 and 20). In recent years, drought conditions and years of heavy western spruce budworm defoliation has caused tree stress resulting in increased Douglas-fir beetle activity. Aerial surveys recorded Douglas-fir beetle activity on 21,000 acres in Colorado alone, with an additional 130 acres in Wyoming.

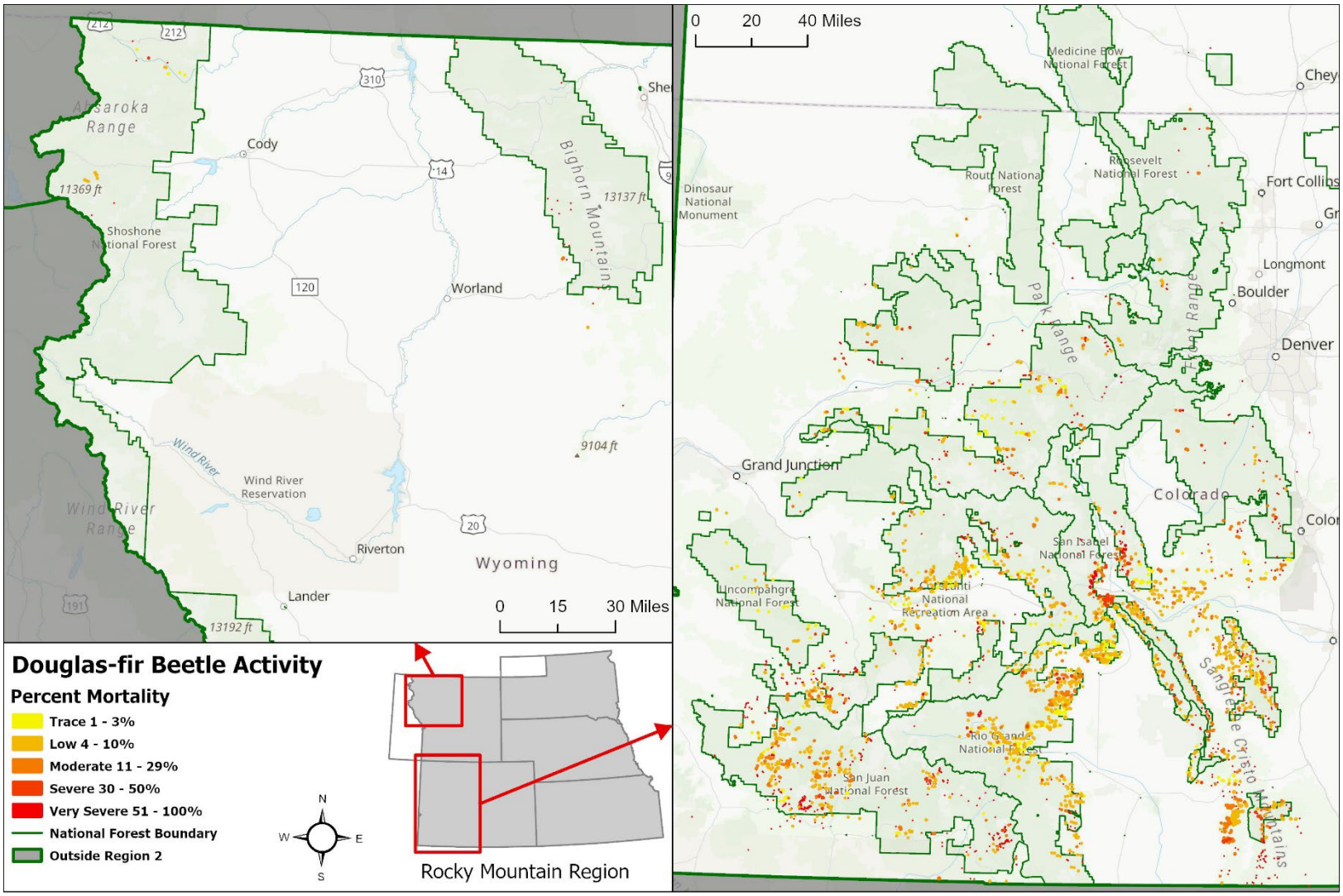


Figure 18. Douglas-fir beetle-caused tree mortality as observed from the 2024 aerial detection survey in Wyoming and Colorado is often associated with stress caused by previous years' drought and western spruce budworm defoliation. USDA Forest Service map by Nathan Edberg.

Figure 19. Douglas-fir beetle caused tree mortality on the Gunnison National Forest, Colorado. USDA Forest Service photo by Brad Lalande.

Figure 20. Douglas-fir beetle caused tree mortality on the San Isabel National Forest, Colorado. USDA Forest Service photo by Isaac Dell.

In southwestern Colorado, there was a significant increase in Douglas-fir mortality due to the combination of defoliation by western spruce budworm and attack by Douglas-fir beetle. For example, in Gunnison County aerial surveys documented 2,000 acres in 2024, and in Saguache County, there was an increase from 2,900 acres in 2023 to 4,500 acres in 2024. Aerial observations on the Grand Mesa, Uncompahgre and Gunnison National Forests indicate that trees located in drainages at lower elevations are most affected. The San Isabel National Forest also experienced substantial Douglas-fir beetle-caused mortality both in the Wet and Sangre De Cristo Mountains.

Fir Engraver

Scolytus ventralis

Host: white fir

Fir engraver has been causing mortality and top kill of large mature white fir trees in southern Colorado for many years. In 2024, aerial surveys detected 3,900 impacted acres, slightly down from 4,100 acres in 2023 (Figures 21, 22 and 23). Fir engraver-caused mortality was mapped on and around the GMUG, San Juan, and Rio Grande National Forests. This outbreak has been compounded by Heterobasidion root disease which is also being treated after harvesting white fir. Forest management activities have been favoring more resilient tree species through planting pines and protecting existing Douglas-fir trees from Douglas-fir beetle by deploying the anti-aggregation pheromone methylcyclohexenone in high-value stands.

Figure 21. Fir engraver beetle mortality in white fir, Uncompahgre National Forest, Colorado. USDA Forest Service photo by Justin Backsen.

Figure 22. Fir engraver beetle mortality in white fir, Amphitheater campground, Uncompahgre National Forest, Colorado. USDA Forest Service photo by John Nelson.

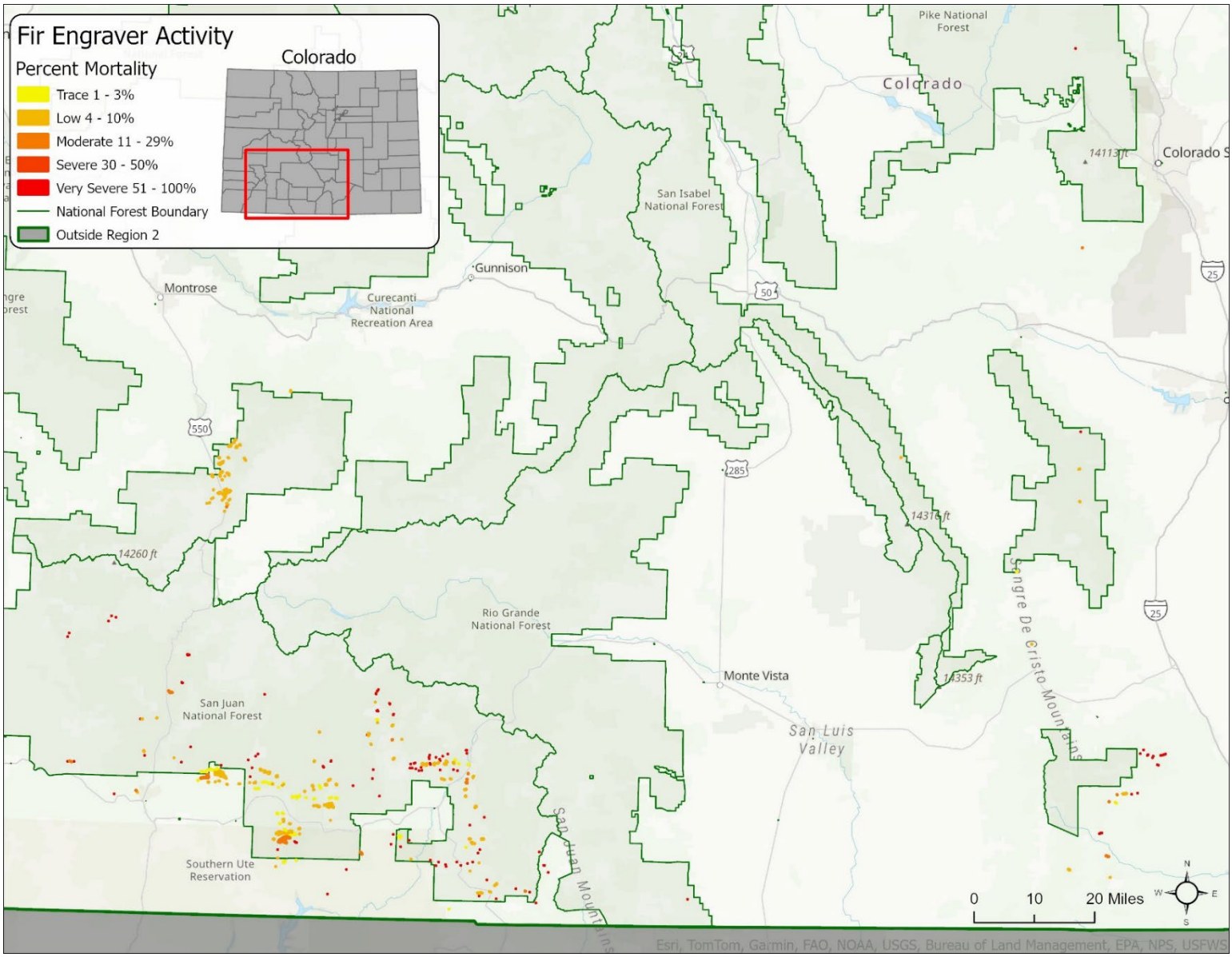


Figure 23. Fir engraver-caused mortality of white fir in and around the San Juan and Rio Grande National Forests as observed by the 2024 aerial surveys. USDA Forest Service map by Nathan Edberg.

Western Balsam Bark Beetle

Dryocoetes confusus

Host: subalpine fir

Western balsam bark beetle (WBBB) causes chronic, low-level mortality in the subalpine fir trees typically found at elevations throughout the Rocky Mountain region. This beetle's activity tends to increase during periods of drought-caused tree stress and can cause alarming levels of mortality when conditions are favorable for the beetle. In Colorado, aerial surveys mapped 27,000 acres of pockets of mortality caused by western balsam bark beetle in subalpine fir in 2024 (Figure 24). In Southwest Colorado, mortality continued to be observed on the Grand Mesa, Uncompahgre, Gunnison (combined total of 5,400 acres) and San Juan National Forests (1,100 acres) (Figure 25).

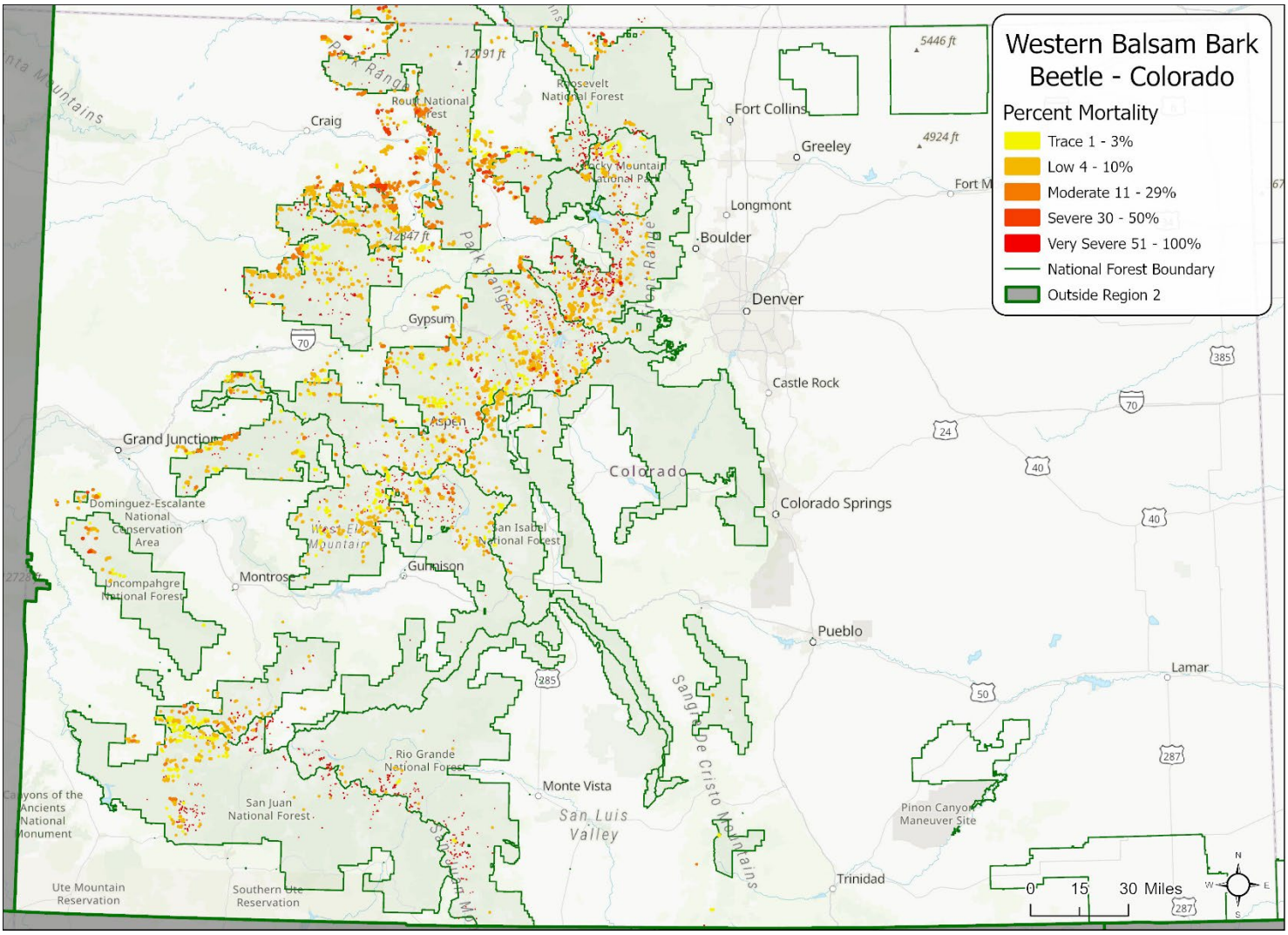


Figure 24. Trace to low-intensity western balsam bark beetle activity in subalpine fir in Colorado as observed from the 2024 aerial detection surveys. USDA Forest Service map by Nathan Edberg.

Figure 25. Western balsam bark beetle activity in subalpine fir on the Gunnison National Forest, Colorado. USDA Forest Service photo by Isaac Dell.

In Wyoming, aerial surveys indicated that subalpine fir mortality caused by western balsam bark beetle was light and scattered in the Absaroka, Wind River, Bighorn and Snowy Ranges (Figure 26). Ground surveys suggest a potential increase in western balsam bark beetle activity in the northern Bighorn Mountains.

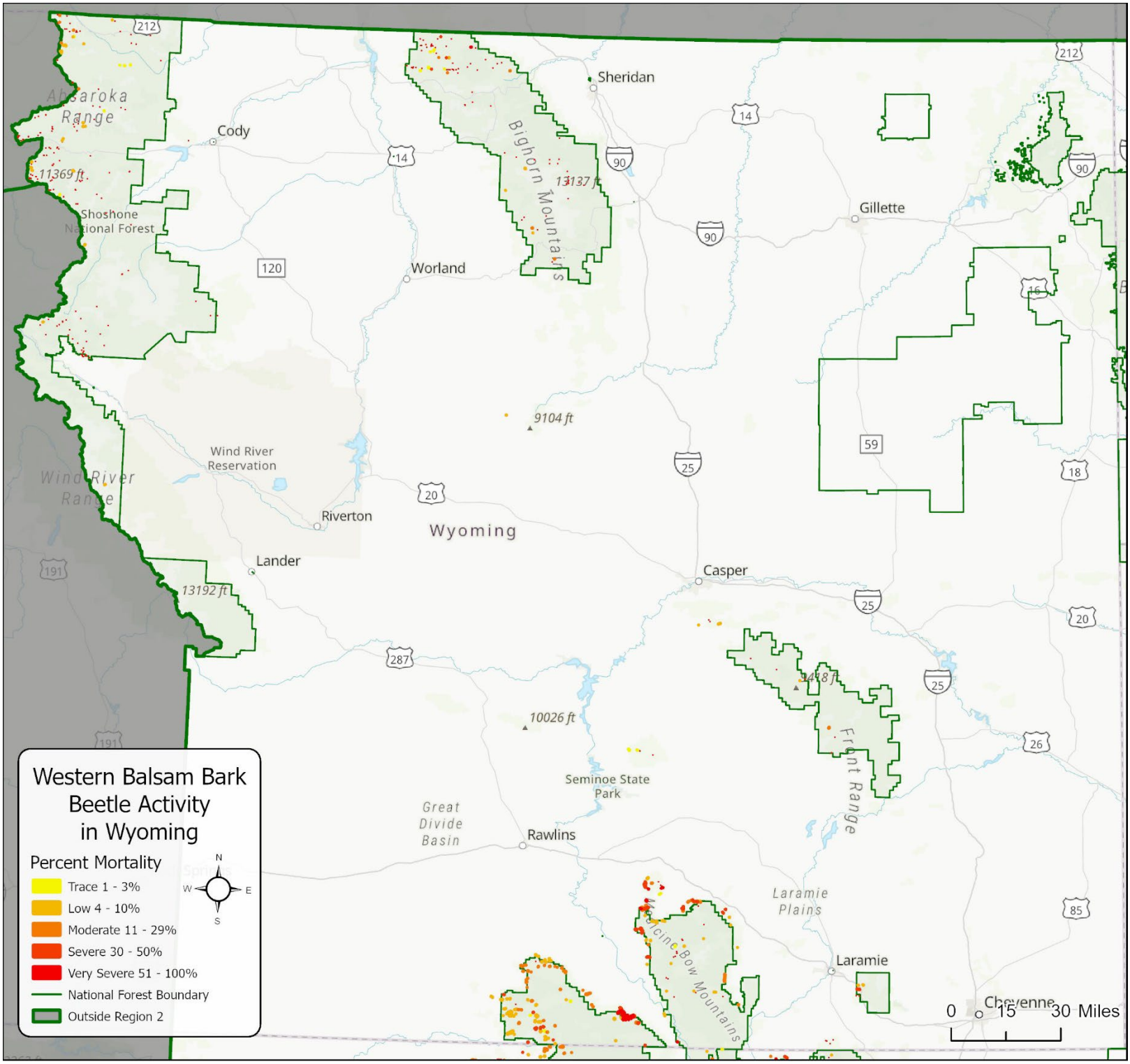
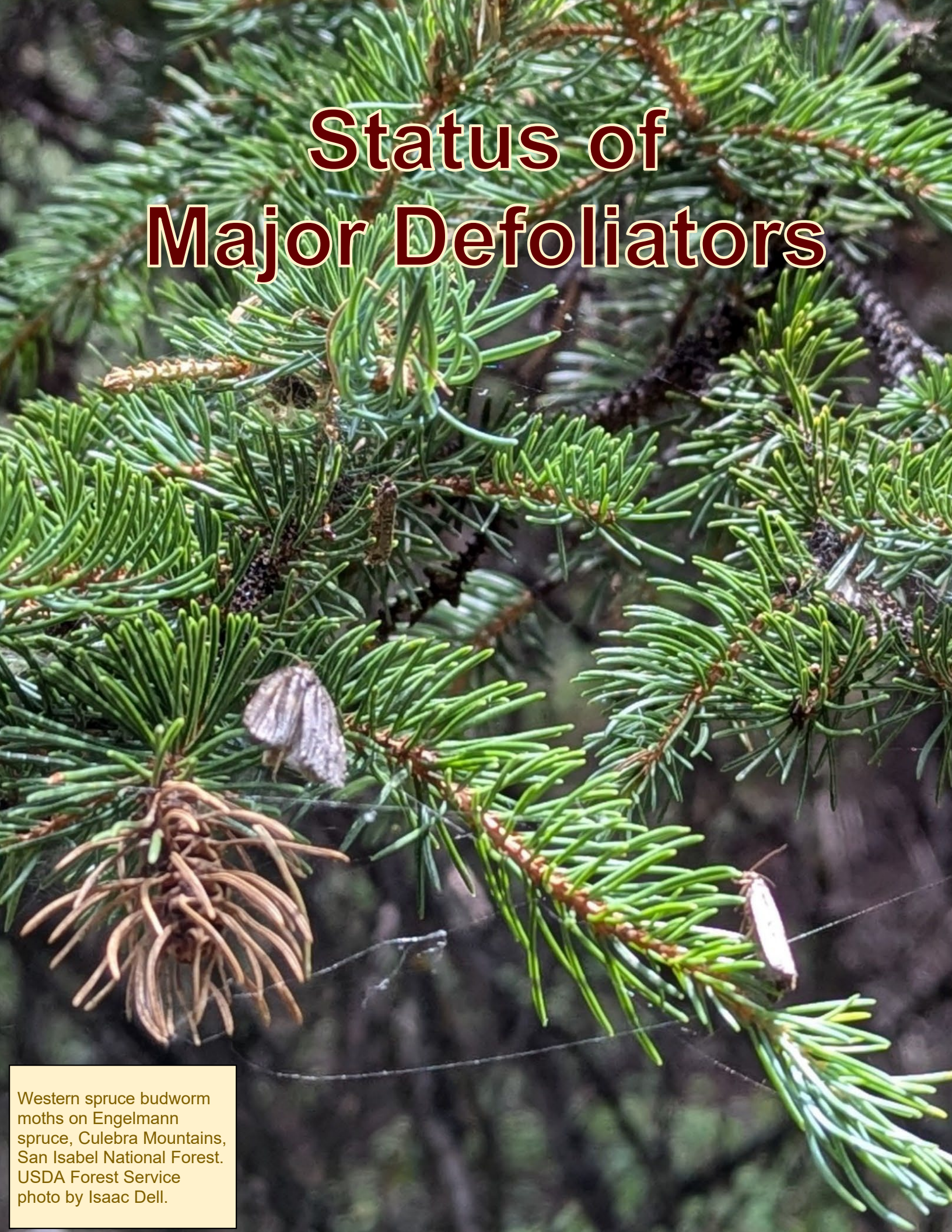


Figure 26. Trace to low-intensity western balsam bark beetle activity in subalpine fir in Wyoming as observed from the 2024 aerial detection surveys. USDA Forest Service map by Nathan Edberg.

Status of Major Defoliators



Western spruce budworm moths on Engelmann spruce, Culebra Mountains, San Isabel National Forest. USDA Forest Service photo by Isaac Dell.

Status of Major Defoliators

Western Spruce Budworm

Choristoneura occidentalis

Hosts: true firs, Douglas-fir and spruce

The western spruce budworm (WSB) remains a serious defoliator in Douglas-fir and mixed conifer forests throughout the region. There continues to be high levels of WSB activity in high elevation spruce-fir forests. Aerial surveys detected 217,000 acres of western spruce budworm activity in Colorado which is approximately 15,000 acres more than was detected in 2023 (Figure 27). WSBW was detected on 17,000 acres in Wyoming (Figure 28).

The Grand Mesa-Uncompahgre-Gunnison (GMUG), San Juan and White River National Forests were most affected. Delta, Garfield, Mesa and Pitkin Counties experienced continued heightened activity in WSB activity. Ground observations on the Routt, Pike, Roosevelt, San Juan, GMUG, and San Isabel National Forests recorded persistent heavy budworm damage and tree death in spruce-fir stands (Figures 29 and 30).

In Wyoming, western spruce budworm defoliation continues to occur across Douglas-fir stands on the Shoshone and Bighorn National Forests and to a lesser degree on the Medicine Bow National Forest. In many of these areas, multiple years of heavy defoliation of Douglas-fir have resulted in unhealthy, stressed trees and tree mortality.

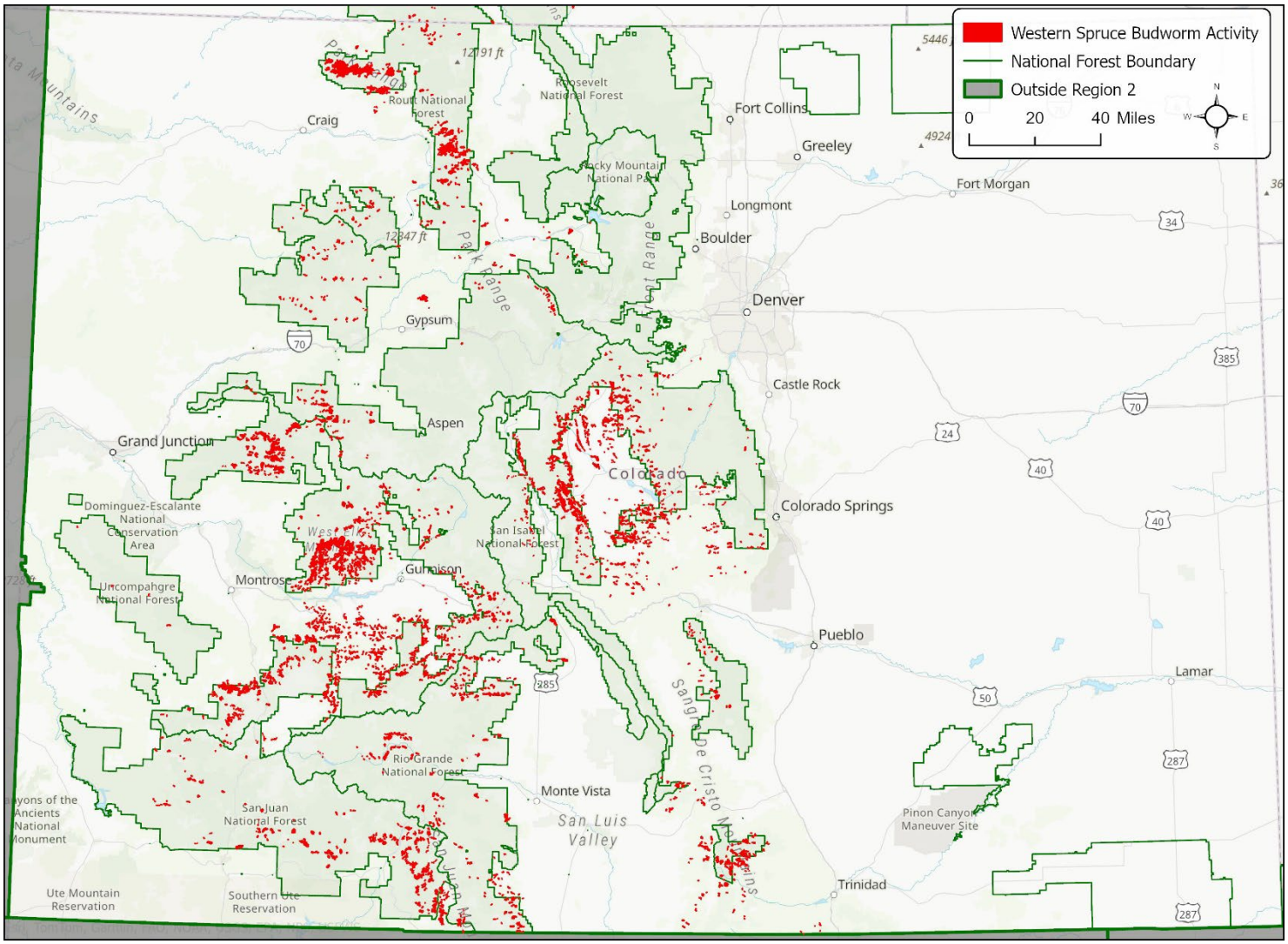


Figure 27. Western spruce budworm activity in Colorado as observed from the 2024 aerial detection survey. USDA Forest Service map by Nathan Edberg.

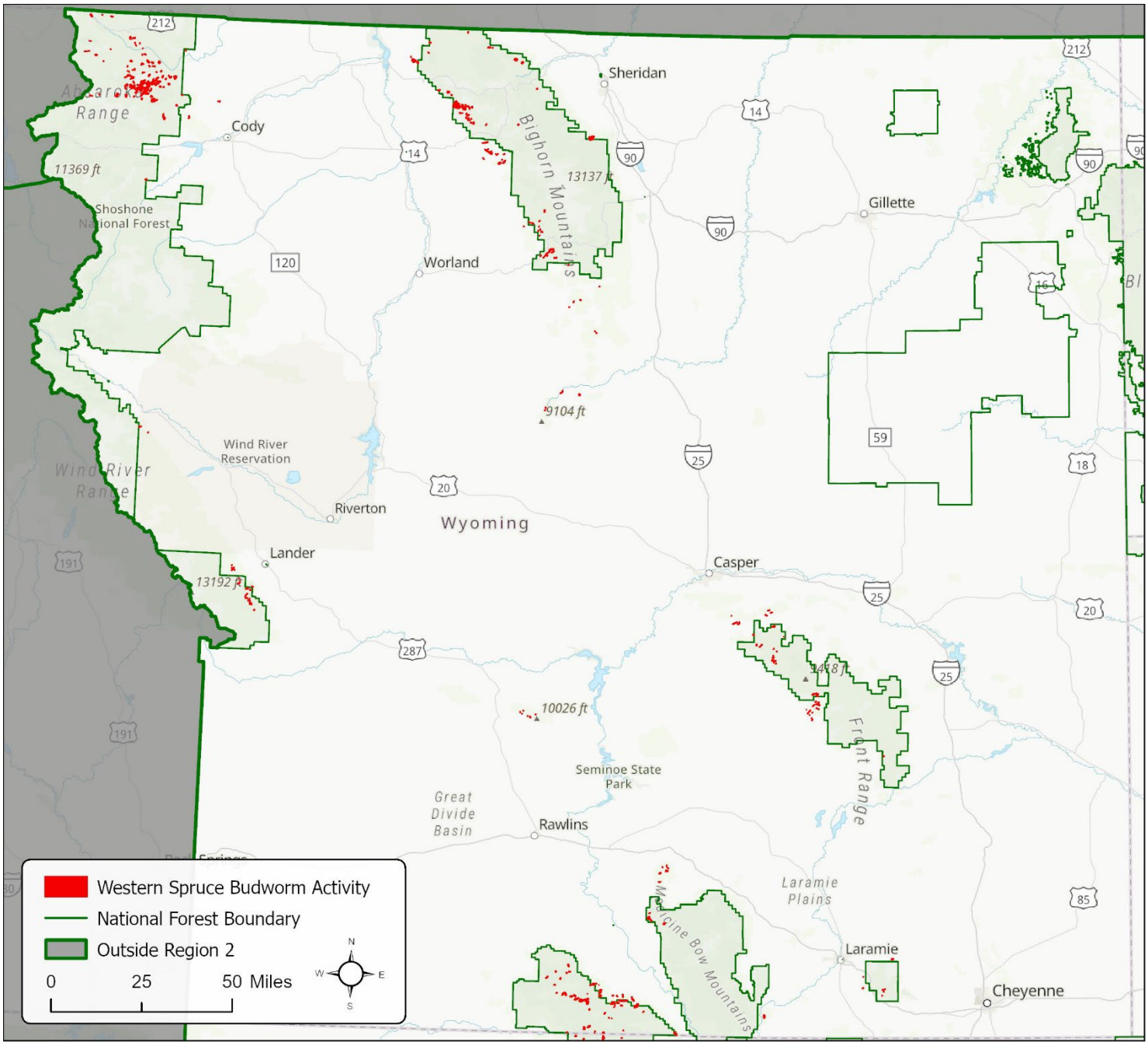


Figure 28. Western spruce budworm activity in Wyoming as observed from the 2024 aerial detection survey. USDA Forest Service map by Nathan Edberg.

As of 2023 and continuing into 2024, defoliation of Douglas-fir stands in the northern Shoshone National Forest has declined significantly from its peak a few years ago. Many of these areas, however, are being impacted by Douglas-fir beetle as beetles take advantage of weakened trees. The most active defoliation on the northern Shoshone National Forest is now occurring in Engelmann spruce and subalpine fir stands at the northern end, with remnant areas of light defoliation on Douglas-fir occuring along Sunlight Road (Figure 31). In the southern Shoshone National Forest, defoliation of Douglas-fir continues at lower levels (Figure 32).

Figure 29. Engelmann spruce and subalpine fir trees defoliated by western spruce budworm in the Culebra Mountains, San Isabel National Forest. USDA Forest Service photos by Isaac Dell.

Figure 30. Western spruce budworm moths (left) and feeding damage with empty budworm pupal cases (right) observed on Engelmann spruce in the Culebra Mountains, San Isabel National Forest. USDA Forest Service photos by Isaac Dell.

Douglas-fir Tussock Moth

Orgyia pseudotsugata

Hosts: Douglas-fir, true firs and spruce

Douglas-fir tussock moth (DFTM) is a native defoliator in the western United States and Canada that impacts Douglas-fir, true firs, and spruce in the Rocky Mountain Region. DFTM can be one of the most damaging western defoliators. Host damage is caused as larvae feed on the current year's foliage causing it to shrivel and turn brown. As larvae mature, they consume older, whole needles. Defoliation occurs first at the tops of trees and outer branches and then, as the season progresses, on lower crowns and inner branches of the host tree. DFTM can completely defoliate trees in one season. Defoliation can result in top and branch kill, reduced vigor, growth loss and increased susceptibility to attack by other insects and diseases, particularly Douglas-fir beetle, that can move in and kill stressed trees within 3-5 years post-outbreak of DFTM. Photographic documentation of life history can be seen in Figure 31.

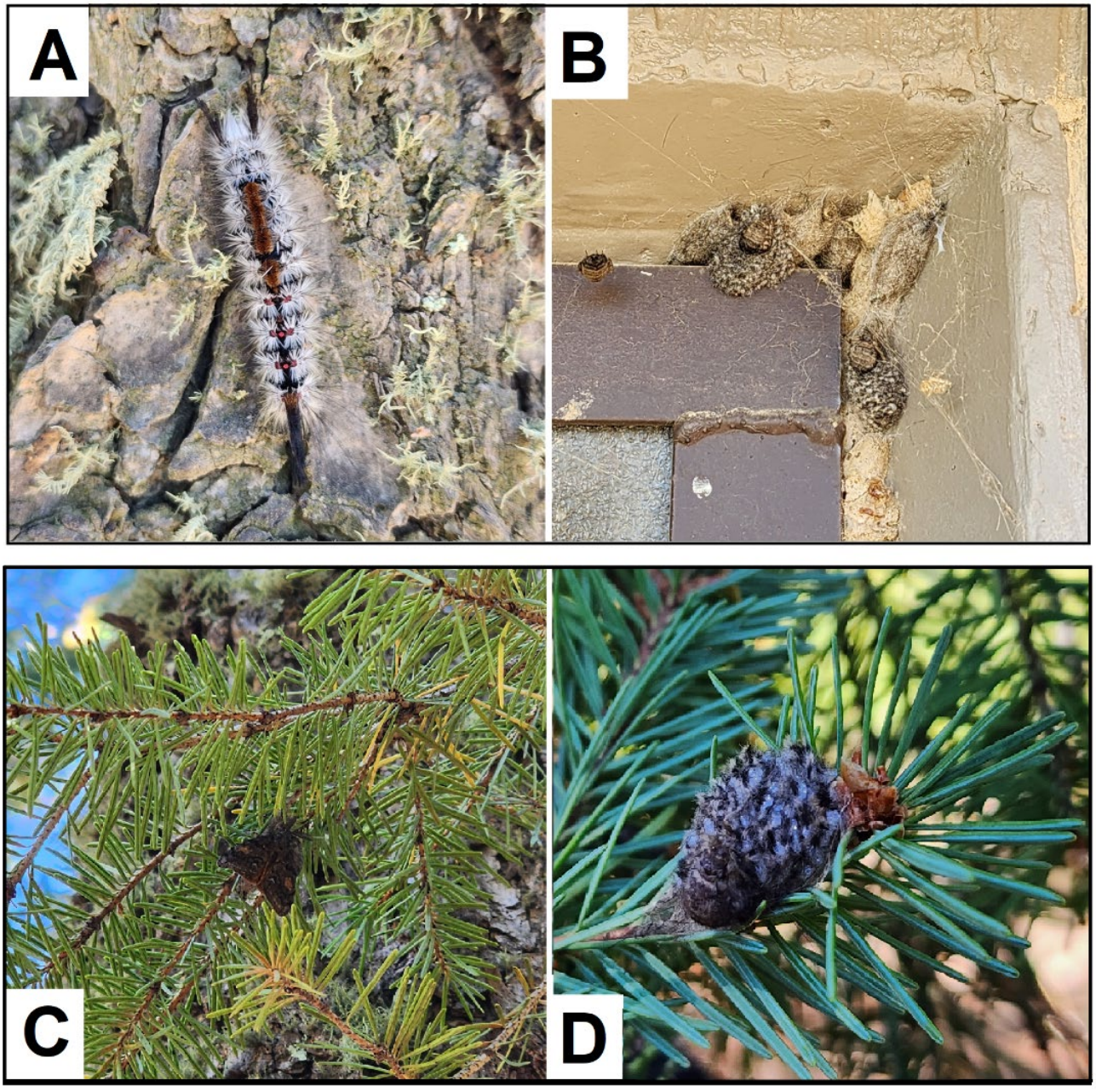


Figure 31. A. DFTM larva. **B.** Cocoons and egg masses with wingless female moths present on a building (pit toilet). **C.** Adult male moth. **D.** Fresh egg mass laid on top of cocoon by female. USDA Forest Service photos by Marianne Davenport.

DFTM outbreaks occur cyclically, typically every seven to fourteen years (ten to twelve years in Colorado), and lasts two to four years before natural population regulators like predators, parasitoids, and the nuclear polyhedrosis virus (NPV) cause a collapse. Historical outbreaks in the Rocky Mountain Region date back to the late 1930s, with large-scale infestations occurring in 1993-1996, 2004-2008, and 2014-2016. The 2014-2016 outbreak alone defoliated 24,000 acres. The 2023 DFTM egg mass and cocoon survey predicted an outbreak by 2025. Pheromone trapping results showed a significant increase in mean trap catches from 2.33 moths per trap in 2023 to 13.99 moths per trap in 2024, with some sites exceeding 40 moths per trap, signaling a rising population. However, 2024 spring larval survey on the Pike National Forest (Figure 32) indicating suboutbreak levels, NPV-infected larvae observed in late summer, and low counts during egg mass surveys during the fall of 2024 indicate a likely population collapse due to widespread NPV infection, which has historically shortened outbreaks. Five sites had no new egg masses, and no sites had more than four viable egg masses. A small sample size of larvae confirmed that 100% of the DFTM larvae tested was positive for NPV, strongly indicating that the outbreak may be collapsing before reaching peak defoliation.

No control activities are recommended for 2025. Public outreach in affected recreation areas should continue to warn visitors of potential allergic reactions (“tussockosis”) from caterpillar hairs, which can cause itching, rashes, and respiratory issues. Defoliated trees should be monitored for recovery or bark beetle activity, particularly Douglas-fir beetle. If defoliation increases unexpectedly, aerial insecticide applications may be considered for high-value areas. Long-term forest health strategies should be implemented to increase species diversity and tree vigor, improving resilience against future outbreaks.

Previous outbreaks followed a pattern where severe defoliation peaked in the second year and was often detected in aerial surveys. While 2023 survey data initially suggested an impending DFTM outbreak, 2024 monitoring indicates a likely population collapse due to NPV. DFTM defoliation was mapped on two areas of the Pike National Forest and on private land west of Boulder. Although some defoliation may still occur, severe impacts expected for 2025 are now unlikely. Monitoring should continue, but active management is not recommended at this time. For more information and management recommendations, see LSC-25-05.

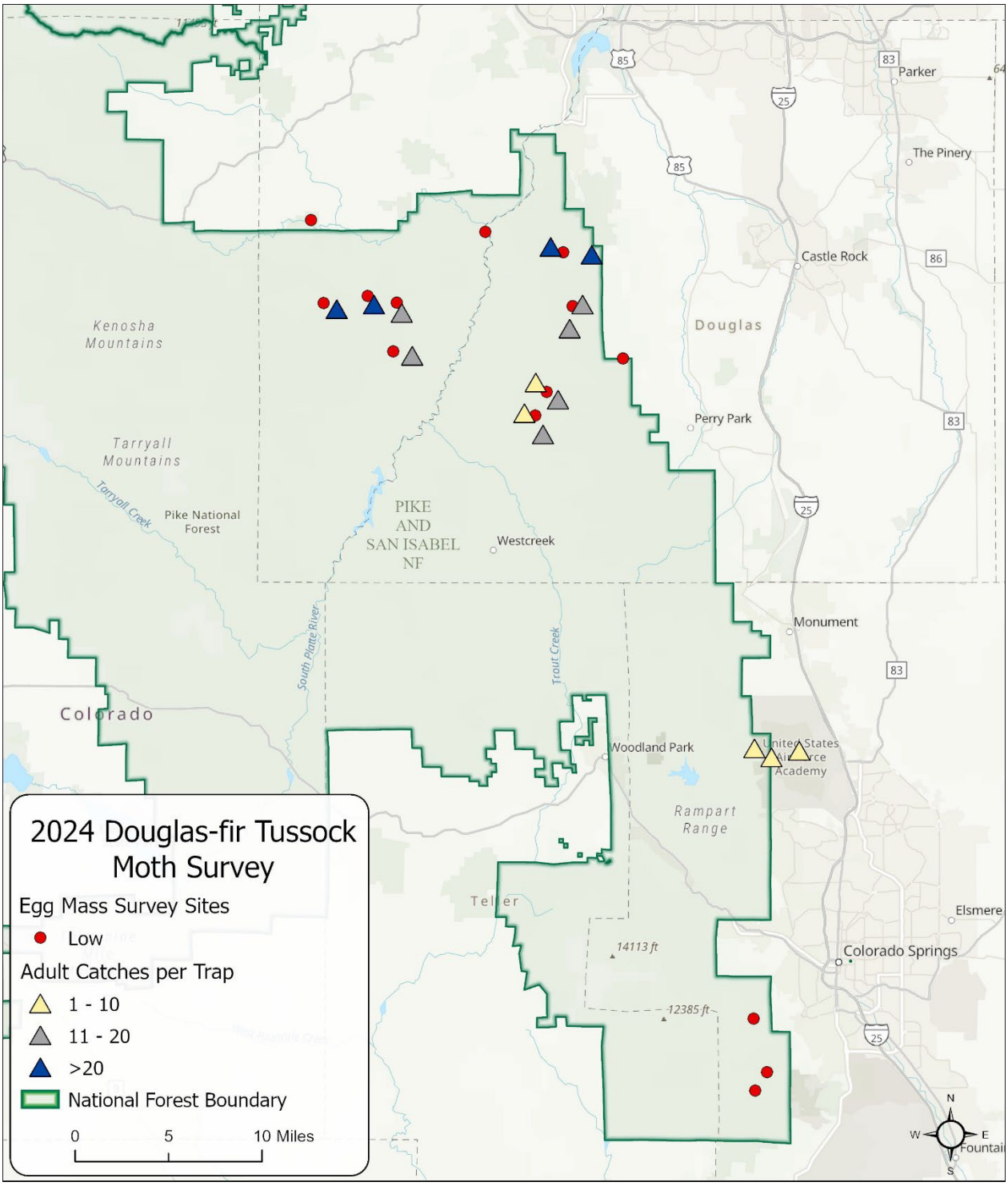


Figure 32. DFTM egg mass sampling sites with rating results for the 2024 egg mass survey and trap catches. Red dots show low numbers of egg masses detected during ground survey. Triangles indicate trap locations. USDA Forest Service map by Nathan Edberg.

Aspen Defoliating Insects

Western tent caterpillar *Malacosoma californicum*

Forest tent caterpillar *Malacosoma disstria*

Large aspen tortrix *Choristoneura conflictana*

Aspen twoleaf tier moth *Enargia decolor*

Aspen blotch miner *Phyllonorycter tremuloidiella (apparella)*

There are several known defoliators of aspen and other hardwoods in Region 2. Forest and western tent caterpillar as well as large aspen tortrix prefer aspen, but are commonly found on cherry, service berry, and other understory plants. Repeated defoliation can cause reductions in growth, top kill, and mortality. Most outbreaks in the Interior West are short lived, only lasting 2-5 years, and provide an important food source for birds and predatory insects. Natural controls such as parasite wasps and flies as well as diseases reduce the survivorship of the caterpillars. Aspen blotch miner and twoleaf tier moths have been causing more widespread defoliation than has been observed in the past and we are still finding new species affecting aspen.

There were significant new outbreaks of aspen defoliators mapped in northern Colorado and southern Wyoming. The Routt National Forest went from 170 acres to 4,100 acres and the White River went from 310 acres to 1,200 acres. (Figure 33). An unknown caterpillar was causing most defoliation on Hardscrabble Mountain in the White River National Forest (Figure 34). Additional collections will help us identify the agent. Aspen blotch miner, aspen leafminer, marssonina leaf blight, and aspen leaf rust were also found contributing to the defoliation at the site. Populations of tortrix and tent caterpillars defoliating quaking aspen were noted on the Rio Grande and San Juan National Forests, but defoliation acreages have been in decline for the past three years.

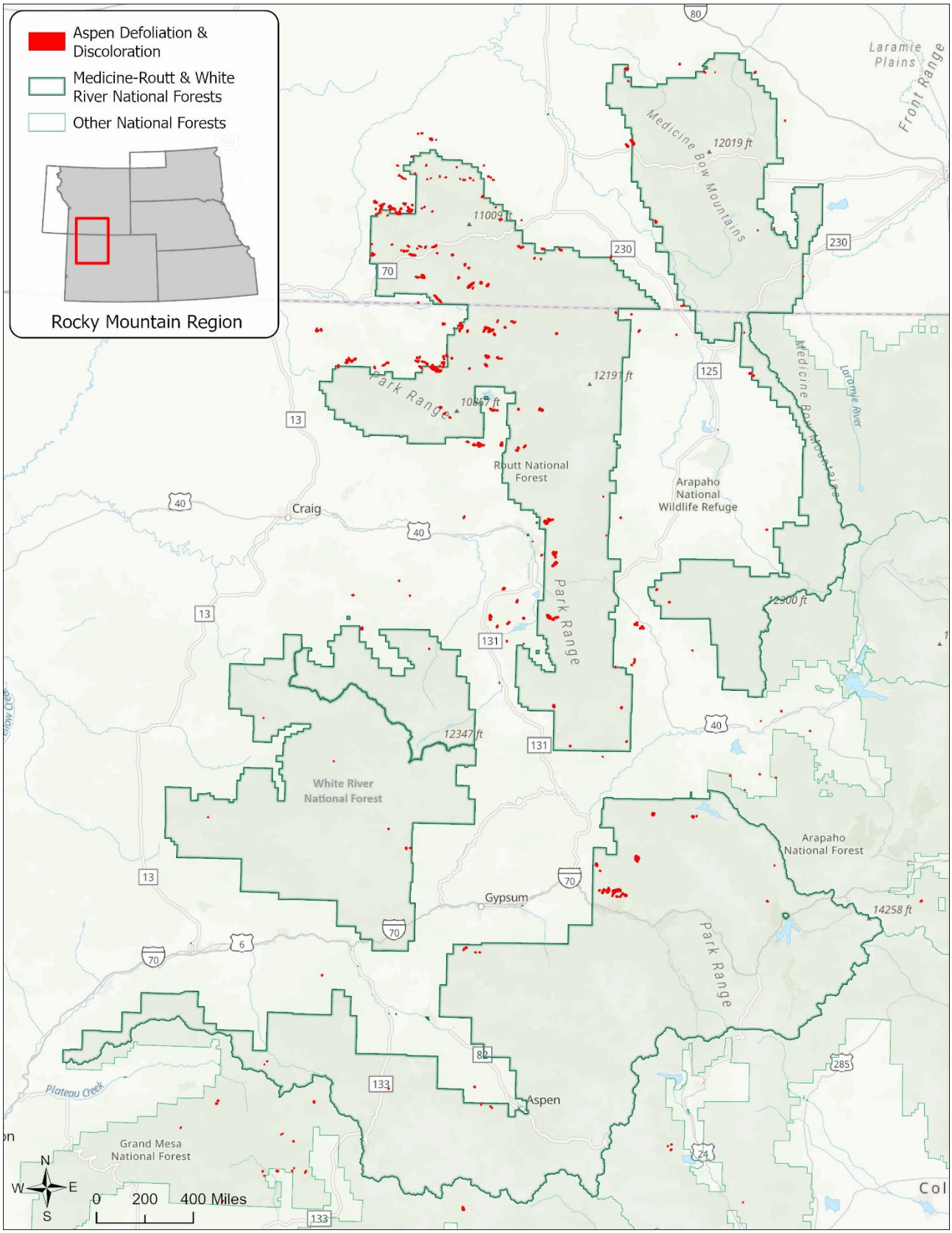


Figure 33. Aspen defoliation and discoloration on the Medicine Bow-Routt and White River National Forests as observed from the 2024 aerial detection survey. USDA Forest Service map by Nathan Edberg.

Figure 34. Unknown caterpillar defoliating quaking aspen on the Routte National Forest (top three). Aspen foliage defoliation/damage was attributed to numerous biotic agents: lepidopterous caterpillars (left), marssonina leaf blight (left center), aspen leaf rust (right center), and aspen leaf miner (right). USDA Forest Service photos by John Nelson.

Pine Looper

Phaeoura mexicanaria
Host: ponderosa pine

Following severe defoliation of about 4,000 acres of ponderosa pine in the Hell Canyon Ranger District in 2022, a second generation of pine looper emerged in 2023 and caused additional defoliation before the population collapsed. No significant defoliation was detected in 2024.

Status of Major Diseases

White pine blister rust on limber pine
USDA Forest Service photo by Brad LaLande.

Status of Major Diseases

Dwarf Mistletoes

Arceuthobium spp.

Hosts: pines and Douglas-fir

Dwarf mistletoes are parasitic plants that obtain their food and nutrients from their hosts (Figure 35). They spread by means of sticky seeds that are forcibly discharged during the summer and fall. Dwarf mistletoes are among the most common and damaging forest pathogens in the west, causing extensive growth loss, deformities (including brooms and cankers) and mortality. Five different species occur in Region 2, each with a specific set of hosts (Table 5). Large wildfires over the past decade have reduced disease levels in some areas of northern Colorado and southern Wyoming. Silvicultural treatments have also reduced damage from dwarf mistletoes on the Bighorn, GMUG, Medicine Bow-Routt and Shoshone National Forests. Continued management to reduce dwarf mistletoe impacts is highly encouraged. A dwarf mistletoe management guide is available for the region: Dwarf Mistletoes: Ecology and Management in the Rocky Mountain Region.

Table 5. Dwarf mistletoes and their hosts in the Rocky Mountain Region.

***Arceuthobium* species**	**Main Hosts**
A. americanum	Lodgepole pine, occasionally ponderosa, whitebark, lim pines
A. cyanocarpum	Limber, whitebark, Rocky Mountain bristlecone pines
A. divaricatum	Piñon pine
A. douglasii	Douglas-fir
A. vaginatum subsp. *cryptopodum*	Ponderosa pine, occasionally Rocky Mountain bristlecone pines, lodgepole pines

Figure 35. Mature female berries (left) and male flowers (right) of lodgepole pine dwarf mistletoe. USDA Forest Service photos by Jim Blodgett.

Root Diseases

Armillaria Root Disease

Primarily *Armillaria solidipes* (*A. ostoyae*), *A sinapina,* and *A. gallica*

Hosts: all tree species in the Rocky Mountain Region are susceptible

Tomentosus Root Rot

Onnia tomentosa and *O. leporina*

Hosts: Engelmann and white spruce, subalpine fir, and lodgepole pine

White Mottled Rot
Ganoderma applanatum

Hosts: aspen and other hardwood species

Heterobasidion Root Disease
Heterobasidion irregulare (*H. annosum s.s.*)

Hosts: ponderosa pine and eastern red cedar (central Nebraska)

H. occidentale (*H. parviporum*)

Hosts: white fir and occasionally subalpine fir, Engelmann and blue spruce within the distribution of white fir (Colorado)

Coniophora Root and Butt Rot
Coniophora puteana

Hosts: spruce-fir (Engelmann spruce and subalpine fir; Colorado and Wyoming)

Schweinitzii Root and Butt Rot
Phaeolus schweinitzii

Hosts: Douglas-fir and other conifers (Colorado and Northern Wyoming)

Root diseases are caused by fungal pathogens that break down roots and lower stems of trees. These diseases are persistent and cause localized, long-term damage in all tree species, to varying degrees, in Region 2. Damage results in reduced timber volume, and increased predisposition to bark beetles, windthrow, and hazardous conditions. The most common root disease associated with tree failures in all forest types is Armillaria root disease (Figure 36), followed by Tomentosus root disease, Heterobasidon root disease, white mottled rot (Figure 36), Coniophora root disease, and Schweinitzii root and butt rot (Figure 36). In an aspen survey in northern Wyoming and South Dakota, *Armillaria* spp. and Ganoderma root disease were commonly observed causing damage. Outside of pockets of windthrow, most signs and symptoms of root disease are nonspecific, not diagnostic, and may not appear. Therefore, identifying root disease can be difficult. In Region 2, root diseases typically do not cause widespread damage in forested settings, but they are often associated with tree failures in developed recreation sites.

Figure 36. Mushrooms of an *Armillaria* species forming clusters at the base of a dead tree (left). Fruiting body from Schweinitzii root and butt rot (middle). Light brown upper surface of *Ganoderma applanatum* fruiting body on an aspen (right). USDA Forest Service photos by Brad Lalande, Jim Blodgett, and Kelly Burns, respectively.

Stem Decays

Red Ring Rot
Porodaedalea pini

Hosts: most conifers in the region are susceptible

White Trunk Rot
Phellinus tremulae

Hosts: aspen

Indian Paint Fungus
Echinodontium tinctorium

Hosts: true fir and Douglas-fir

Red Ray Rot
Dichomitus squalens

Hosts: ponderosa pine

Red Belt Fungus
Fomitopsis schrenkii (*F. pinicola*)

Hosts: most conifers in the region are susceptible

Stem decay fungi are vital for wood decomposition and other ecosystem services. However, decay fungi weaken the structural integrity of their host trees, which reduces merchantable timber volume and increases hazard potential. In intensively managed stands and recreation areas, trees are particularly vulnerable to infection, because tree wounding is common and wounds provide infection courts for decay organisms to gain entry. Thin barked species, such as aspen and subalpine fir, are more vulnerable to stem decay than species with thicker bark. The most prevalent stem decays in Region 2 are red ring rot (Figure 37), white trunk rot (Figure 37), Indian paint fungus, red ray rot (Black Hills National Forest), and red belt fungus (Figure 37), which occurs in dead trees or dead parts of living trees. Mature, large diameter trees are more susceptible to stem decays as they have more infection courts, more heartwood, decreased ability to heal, and longer potential to harbor fungi. Stem decays are especially a concern in developed recreation sites where continued monitoring is warranted to assess the extent of damage. Reducing wounding is the best way to prevent infection by stem decay fungi.

Figure 37. Fruiting bodies (conks) associated with *Porodaedalea pini* (left), *Phellinus tremulae* (middle), and *Fomitopsis schrenkii* (right). USDA Forest Service photos by Brad Lalande (left/middle) and Jim Blodgett (right).

Rusts and Cankers

Comandra Blister Rust
Cronartium comandrae

Hosts: lodgepole and ponderosa pine

Alternate hosts: bastard toadflax and northern comandra

Comandra blister rust is a problem in northern Colorado and Wyoming mostly on lodgepole pine. The occurrence and incidence of the disease are strongly correlated with the presence of its alternate hosts. Increases in the

number of new branch cankers were observed in 2023 and 2024 on the Bighorn and Shoshone National Forests. This might result in more stem cankers in the near future. The disease causes reductions in lumber quality, and branch and top death, which can lead to reduced growth and cone production. Whole tree mortality occurs, particularly in smaller trees, when cankers girdle trees (Figure 38).

Figure 38. Lodgepole pine with a thinning/yellowing crown caused by comandra blister rust (left), a close-up (see orange circle in left photo) of the same tree showing perennial concentric canker ridges (middle), and a dead lodgepole pine recently killed by the rust (right). USDA Forest Service photos by Jim Blodgett.

White Pine Blister Rust
Cronartium ribicola

Hosts: limber, whitebark, and Rocky Mountain bristlecone pine

Alternate hosts: currants and gooseberries (*Ribes* spp.), and species of *Pedicularis* and *Castilleja*

White pine blister rust (WPBR) is an exotic, invasive fungal disease. Recent favorable weather conditions have resulted in increased disease incidence in South Dakota and Wyoming and have allowed the disease to spread into new areas of Colorado. Orange blisters, branch flagging, and branch, stem, and tree mortality (Figure 39) are becoming more common in the Region. In 2024, the disease was confirmed for the first time on the San Juan National Forest (La Plata and Archuleta Counties, Colorado) on limber pines over 90 miles west of the nearest outbreak area in the Sangre de Cristo Range.

Conservation and restoration strategies have been implemented due to this damaging disease. Some of the strategies include: 1) limber pine is listed as a “species of management concern” in Rocky Mountain National Park, 2) a “sensitive species” by the Bureau of Land Management in Wyoming, 3) a “species of local concern” in the Black Hills National Forest, and 4) whitebark pine is listed as threatened under the Endangered Species Act mainly due to WPBR. The Black Hills National Forest and Rocky Mountain National Park have active limber pine conservation programs that include monitoring, pruning-out WPBR cankers, and seed collecting for preservation and planting. Forest Health Protection is partnering with Colorado State University, Rocky Mountain Research Station, National Park Service, and the USDA Forest Service to develop, promote, and implement improved monitoring techniques and proactive management strategies. Protecting, conserving, and restoring these important species is one of Forest Health Protection’s main concerns.

Figure 39. Limber pine with white pine blister rust aecial blisters (left), red branch-flagging (an early symptom, middle), and a limber pine recently killed by the rust (right). USDA Forest Service photos by Jim Blodgett.

Broom Rusts of Spruce and Fir

Chrysomyxa arctostaphyli

Hosts: Colorado blue, Engelmann, and white spruce

Alternate hosts: bearberry or kinnikinnick, manzanitas are occasional alternate hosts

Melampsorella caryophyllacearum

Hosts: subalpine and white fir

Alternate hosts: chickweeds

Broom rusts occur wherever the distributions of hosts and alternate hosts overlap. Thus, these fungal diseases are common throughout the Region. Damage includes growth loss, top-kill, and tree mortality. The diseases are called broom rusts because they frequently cause abnormal stem branching that results in “broom” formation. These diseases were frequently found sporulating in 2022, 2023, and 2024 in Colorado, South Dakota, and Wyoming (Figure 40).

Figure 40. An Engelmann spruce killed by spruce broom rust and a close-up of spruce broom rust sporulating (left and upper-middle), and a close-up of fir broom rust sporulating and a subalpine fir with a large broom (lower-middle and right) USDA Forest Service photos by Jim Blodgett.

Western Gall Rust
Peridermium harknessii

Hosts: lodgepole and ponderosa pine

Western gall rust is a disease that causes branch and stem galls and stem cankers in hard pines. It is common throughout the Rocky Mountain Region, occurring on all forests. Western gall rust spreads from pine to pine with no alternate host. Cankers kill bark, which allows stem decay fungi to enter their hosts. Stem galls frequently result in significant wood distortion, reducing both stem strength and merchantable volume. The associated stem decay and wood distortion often results in stem breakage (Figure 41), a major concern in developed recreation sites.

Figure 41. Western gall rust stem canker deforming a lodgepole pine (left), stem breakage at a western gall rust canker (middle), and western gall rust sporulating on lodgepole pine (right). USDA Forest Service photos by Jim Blodgett.

Diplodia Shoot Blight and Canker Disease
Diplodia sapinea

Hosts: pines and other conifers

This fungal disease is most damaging in Kansas, Nebraska, and South Dakota, but was recently confirmed in Colorado and Wyoming. It causes shoot blight, cankers, crown wilt, collar rot, and root disease on trees of all ages. A few heavily impacted areas were observed in South Dakota in 2024 (Figure 42), associated with trees wounded by hail. Only heavily impacted areas can be identified during aerial surveys. Aerial detection surveys identified 210 acres of Diplodia/hail damage in Nebraska and 3,100 acres in South Dakota in 2024.

Figure 42. Several symptomatic branches in ponderosa pine trees with Diplodia shoot blight and canker disease (left), a closer view showing both live and dead branch tips (middle), and *Diplodia sapinea* fruiting on a cone bract (right). USDA Forest Service photos by Jim Blodgett.

Conifer Needle Diseases

Bifusella Needle Casts
Bifusella spp.

Hosts: pine species

Lophodermella Needle Casts
Lophodermella spp., primarily *L. concolor* and *L. montivaga*

Hosts: pine species

Dothistroma Needle Blight
Dothistroma spp.

Hosts: pine species

A variety of foliage diseases (needle casts and needle blights) occur in conifers throughout the Rocky Mountain Region. Outbreaks occur sporadically because spread and infection are highly dependent on favorable weather conditions, typically above average moisture in the spring and/or summer. Conifer foliage diseases can significantly affect growth since conifers depend on several years of foliage and cannot refoliate like hardwoods. No major outbreaks of conifer foliage diseases were detected by ground or aerial surveys in 2024. Widespread, but minor, damage attributed to Bifusella needle casts has been commonly observed in limber pine throughout Region 2 over the past decade (Figure 43). Lophodermella needlecasts were observed at low levels in lodgepole pine in southwest Colorado on the Gunnison National Forest. Dothistroma needle blight was observed sporadically in Nebraska, South Dakota, and Wyoming (Figure 43). Infections in the lower crowns and in regeneration were commonly observed in lodgepole pine on the Bighorn National Forest in 2024. Occasionally, outbreaks can appear dramatic, but damage is often minor, and trees typically recover.

Figure 43. Lodgepole pine with symptoms of Dothistroma needle blight and older needles prematurely shed (left), close-up of lodgepole pine needles with early fruiting bodies of *Dothistroma* spp. (middle), and Bifusella needle cast on limber pine (right). USDA Forest Service photos by Jim Blodgett (left, middle) and Kelly Burns (right).

Common Aspen Diseases

Sooty bark canker
Encoelia pruinosa

Cytospora canker
Valsa sordida

Aspen trunk rot
Phellinus tremulae

In 2024, only 34 acres of aspen discoloration (mostly caused by Marssonina leaf blight and other foliar diseases) were reported by aerial surveys in Colorado. This number is much lower than typically reported in the Region. Common mortality agents observed in mature aspen trees (Figure 44) included sooty bark canker, Cytospora canker, aspen trunk rot, Ganoderma root disease (*G. applanatum*), and some Armillaria species (mostly *A. sinapina* and *A. gallica*). However, over fifty different damage agents have been identified in aspen in the Region. In treated areas and in many stands with overstory aspen mortality, abundant regeneration was observed. Common aspen regeneration problems in the Region include competition from other hardwoods and conifer regeneration, healthy aspen overstories (shading reduces regeneration), aspen canker diseases, and ungulate browsing. Stand thinning, coppice cutting, and fires have resulted in increased aspen regeneratiion in many areas of the Region.

Figure 44. Sooty bark canker (left), Cytospora canker (mid-left), aspen trunk rot conk (mid-right), and Ganoderma root disease conk (right) on aspen. USDA Forest Service photos by Jim Blodgett.

Other Entomology and Pathology Activities

Forest Health Protection Trainings

Region 2 Forest Health Protection staff provides annual training opportunities to resource managers and field-going personnel on Forest Insect and Disease Identification (FID) and Hazard Tree Management (HTM). In 2024, Forest Health Protection staff returned to in-person training sessions for all FID courses. FID courses were conducted on the Arapaho-Roosevelt/Rocky Mountain National Park, Black Hills, Pike-San Isabel, and San Juan National Forests. An expanded Forest Insects and Diseases and Bark Beetle Workshop was conducted on the Dolores Ranger District – San Juan National Forest, including private landowners and non-governmental organizations, to discuss the effects of a bark beetle complex and management strategies. Hazard Tree Management trainings were available as a virtual or in-person course options; both with in-person field components. The options of courses allowed a variety of students to attend including individuals from USDA Forest Service, Colorado State Forest Service, City of Durango, Rocky Mountain National Park, ExplorUS, and other contractors. Virtual training videos are available for Forest Insects and Diseases and Hazard Tree Management, with relevant field sessions, if needed. For more information regarding regional trainings please visit our Region 2 Training Website.

Hazard Tree Management Program

The technical report, Hazard Tree Evaluation Using Survey123, was updated in December 2023 (Figure 45). The associated Survey123 form was also updated. Among other improvements the form now has an individual tree report template and two summary report templates for all trees selected. The ability to enter host genus and species was added if it was not in the original species list and a management/mitigation field was added. The technical report Tree Failure Evaluation Using Survey123 was updated in January 2024. The associated Survey123 form was also updated. Among other improvements, this form now has a single-tree report template and the ability to enter host genus and species. Region 2 also has a Survey123 version of the International Tree Failure Database (ITFD). Data from this version is compatible with the previous online ITFD and with the Region 2 Tree Failure Evaluation Survey123 form. However, Region 2 has not updated the ITFD guide since it is not currently being used in the Region. See Forest Health Protection Trainings for trainings regarding hazard tree management. More information is available on the Region 2 Forest Health Protection Hazard Tree Management Website.

Figure 45. Hazard tree and tree failure evaluations includes looking for various defects and indicators such as (from left to right): dead trees, conks, ant activity (indicates internal decay), and internal decay with cracks. USDA Forest Service photos by Jim Blodgett.

Forest Health Protection Programs and Information for Managing Invasive Species

The most notable invasive forest pest of our native trees in the region is the Eurasian disease white pine blister rust, which is expanding its range in five-needle pines.

Many more invasive tree insect and disease pests affect non-native trees in our urban and planted landscapes. Some are devastating urban tree pests such as emerald ash borer, walnut twig beetle and Dutch elm disease. On our National Forest System lands, invasive plants are a serious threat to our rangelands and native plant communities.

Invasive Plant Grants to States

Forest Health Protection provides limited grant funding to state agencies for assistance with the local management of invasive plants on state and private forest lands to reduce the spread of priority weeds on all forest lands. Forest Health Protection does not fund invasive plant treatments on National Forest System lands. By maintaining some flexibility in the program, states can put these dollars where they can make a project or program successful. Even small grants to the local weed management boards can make a big difference. Each state handles the funds differently to support treatments and leverage state and county funding for weed programs. Our state agency partners for the invasive plants program are the Colorado Department of Agriculture, Wyoming Department of Agriculture, South Dakota Department of Agriculture-Resources, Conservation and Forestry Division, Nebraska Forest Service and Kansas Forest Service.

Mountain Pine Beetle Management Success Story

The Pike-Wide Spray Project is a major success in protecting high-value ponderosa pines across the Pike National Forest from mountain pine beetle infestation. Over the course of two years, a collaboration between Forest Health Protection specialists and Pike National Forest staff resulted in the removal of infested material and the treatment of 1,389 trees across multiple campgrounds and trailheads. The combined efforts of forest entomologists, pathologists, District staff, and dedicated volunteers ensured that all sprayed trees remained healthy in fall 2024 surveys, an indication of the effectiveness of proactive forest management and cross-discipline coordination.

Executing this project required thoughtful planning and extensive fieldwork, from surveying and marking trees to ensuring precise application of insecticide. Forest Health Protection staff worked closely with District teams to design and implement the project, providing ongoing assessments and securing funding. The South Platte, Pikes Peak, and South Park Ranger Districts played vital roles, with staff members overseeing site preparation, sanitation efforts, and contract execution. Volunteers, including Team Rubicon and the Knights of Columbus, contributed significantly by assisting with tree removal and firewood distribution. Despite logistical challenges such as inclement weather and contract hurdles, the team adapted to ensure timely treatment before the beetle flight window (Figure 46).

This project not only protected trees but also strengthened relationships, demonstrating the power of early intervention and coordinated action in mitigating insect outbreaks. With all treated trees remaining beetle-free through 2024, the Pike-Wide Spray Project showcases how strategic collaboration can safeguard recreation sites and sustain forest health for years to come.

Figure 46. Left: USDA Forest Service crew with cut and split mountain pine beetle-infested logs. Middle: Volunteer workday at Buffalo Campground, Pike National Forest. Right: Contractor spraying insecticide on a healthy ponderosa pine.

Special Forest Health Protection Projects

Evaluation Monitoring (EM)

Assessing the drivers of ponderosa pine dieback and mortality in western forests. EM-IW-2023. Kelly Burns, Jane Stewart and Seth Davis.

Special Technology Development Program (STDP)

Development of field-based diagnostic tools to identify Armillaria species. STDP-Region 2-2023-02. Brad Lalande, Jane Stewart, Mee-Sook Kim, Ned Klopfenstein and Jim Blodgett.

Developing tools for early detection and monitoring of high elevation pine rusts. STDP-Region 2-2022-01. Kelly Burns, Jane Stewart and Ashley Miller.

Biocontrol of Invasive Forest Pests (BCIFP)

Enhancing Canada thistle biocontrol: development of accurate and cost-effective tools to identify Canada thistle rust in plant tissue and soil. BCIFP-Region 2-20-01. Andrew Norton.

Host plant and environmental determinants of Canada thistle rust infection. BCIFP Region 2-2024-01. Andrew Norton

Publications

2024 Biological Evaluations and Service Trips

Gunnison Service Center

GSC-24-01, Assessment of High Point Trail, Black Canyon of the Gunnison National Park, and Ponderosa Campground, Curecanti National Recreation Area – Lalande, Lockner, Ethington, Marchetti, Rawinski

GSC-24-02, Lodgepole Pine Dieback and Discoloration, San Juan National Forest, Pagosa Springs RD – Lalande, Lockner, Ethington

GSC-24-03, Jones-Bald Mountains Vegetation Management Site Visit, San Isabel NF, Salida RD. Lalande, Lockner, Ethington, Marchetti, Rawinski

GSC-24-04, Trapping Pine Engraver at Horsefly Timber Management site, Southern Uncompahgre Plateau, Ouray RD Area – Lockner, Marchetti

GSC-24-05, Year Four Update on the Mountain Pine Beetle Population in the Wilder-Gunnison Highlands Outbreak and Treatment Area, Gunnison Ranger District, GMUG National Forest. – Lockner, Marchetti

GSC-24-06, Potentially Deploying Verbenone to Protect Ponderosa Pine from Mountain Pine Beetle, Beaver Creek Campground, Divide Ranger District, Rio Grande National Forest – Lockner, Marchetti, Lalande, Ethington

GSC-24-08*, Bark Beetle Complex and Dwarf Mistletoe at 'Iron Beetle Toe' Timber Sale, Ouray Ranger District, Uncompahgre National Forest –Lockner, Lalande, Marchetti, Nelson

GSC-24-09, Beetle-driven Mortality in Limber and other Pines in Central Colorado – Marchetti, Ethington, Rawinski

GSC-24-11*, 2023 Bark Beetle Trapping in Ponderosa Pine, San Juan and Uncompahgre National Forests – Ethington, Nelson, Marchetti

GSC-24-12, Roundheaded Pine Beetle Outbreak: Dolores Ranger District, San Juan National Forest 2013 – Lockner, Marchetti, Nelson, Lalande, Rawinski

*Report numbers GSC24-07 and GSC24-10 were not used

Lakewood Service Center

LSC-24-06, Current Mountain Pine Beetle Activity Along the Front Range of the Southern Rocky Mountains – Davenport
LSC-24-07, Abbreviated Mountain Pine Beetle Management Recommendations for the Pike National Forest – Davenport
LSC-24-08, Site Assessment of the United States Air Force Academy – Davenport
LSC-24-09, Forest Health Assessment of Pikes Peak Ranger District – Stokes, Davenport
LSC-24-10, Forest Health Assessment of Rocky Mountain National Park – Davenport, Burns
LSC-24-11, Evaluation of Limber Pine Conservation Efforts in Rocky Mountain National Park and Recommendations for FY25-27 – Burns
LSC-24-12, Forest Health Assessment of Peak to Peak Highway Area, Boulder Ranger District – Stokes
LSC-25-01, Western Spruce Budworm Activity on Pole Mountain, Wyoming – Davenport
LSC-25-02, Forest Health Assessment of Kelly Dahl Campground, Boulder Ranger District – Davenport, Burns
LSC-25-03, Forest Health Assessment of United States Air Force Academy and Farish Recreation Area – Davenport, Burns
LSC-25-04, Assessment of Mountain Pine Beetle Activity in Recreation Areas on the Peak to Peak Highway – Davenport, Burns
LSC-25-05, Douglas-fir Tussock Moth Population Status and Potential for a Front Range Outbreak – Kruse, Davenport
LSC-25-06, Abbreviated Mountain Pine Beetle Management Recommendations for the Arapaho-Roosevelt National Forest – Davenport
LSC-25-07, Douglas-fir Tussock Moth Population Status 2024: Executive Summary Report – Kruse, Davenport
LSC-25-08, Pike – San Isabel National Forests 2024 Highlights of Tree Mortality and Damage – Davenport
LSC-25-09, Arapaho – Roosevelt National Forests 2024 Highlights of Tree Mortality and Damage – Davenport
LSC-25-10, Medicine Bow – Routt National Forests 2024 Highlights of Tree Mortality and Damage – Davenport
LSC-25-11, White River National Forest 2024 Highlights of Tree Mortality and Damage – Davenport
LSC-25-12, Update on Current Mountain Pine Beetle Activity Along the Front Range of the Southern Rocky Mountains – Davenport
LSC-25-13, Mountain Pine Beetle in Ponderosa Pine along the Front Range: Executive Summary Report – Davenport

Rapid City Service Center

RCSC-25-01, Hail and Diplodia, Mystic Ranger District (2024 Update) – Blodgett, Allen
RCSC-25-02, Western Spruce Budworm Activity in the Ten Sleep Canyon and Battlepark areas on the Bighorn National Forest – Allen, Schotzko, Wilson
RCSC-25-03, Western spruce budworm activity in the Sinks Canyon and Geyser Creek Trail Areas on the Shoshone National Forest – Allen, Schotzko, Wilson
RCSC-25-04, Leafy Spurge and Common Mullein Biocontrol at Devil's Tower National Monument – Allen, Schotzko, Wilson
RCSC-25-04, Black Elk Limber Pine – Blodgett
RCSC-25-06, Mountain Pine Beetle Activity in the Black Hills NF – Allen, Schotzko, Wilson
RCSC-25-07, Mountain Pine Beetle Activity on the Bighorn NF – Allen, Schotzko, Wilson
RCSC-25-08, Ips activity on the Bessey and McKelvie Units of the Nebraska NF – Allen, Schotzko, Wilson

Other Reports and Peer-Reviewed Publications

Blodgett, J. T., Burns, K. S., and Lalande, B. 2023. *Hazard Tree Evaluation Using Survey123.* USDA For. Serv., Rocky Mountain Region, State, Private, and Tribal Forestry, Tech. Rpt. Region 2-74 Version 2.

Blodgett, J. T., Burns, K. S., and Lalande, B. 2024. *Tree Failures Evaluation Using Survey123.* USDA For. Serv., Rocky Mountain Region, State, Private, and Tribal Forestry, Tech. Rpt. Region 2-75 Version 2.

McKee, M., Dobbs, J., Tisserat, N., Blodgett, J. T., Burns, K. S., Stewart, J. E. 2024. First Report of Diplodia Shoot Blight and Canker Disease Caused by *Diplodia sapinea* on Ponderosa Pine in Colorado, USA. *Plant Dis.* https://doi.org/10.1094/PDIS-07-24-1369-PDN

Raymond, H., Sitz, R.A., Pearse, I.S., Ibarra Caballero, J.R., Lalande, B.M., Stewart, J.E. 2024. Defining the Pathobiomes Associated with Drippy Blight in Colorado and Drippy Nut in California. PhytoFrontier. 2024 Oct 23. https://doi.org/10.1094/PHYTOFR-03-24-0029-R

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