US Forest Service
Rocky Mountain Region
State and Private Forestry/Tribal Relations

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Service Trip Report GSC-23-06 March 2023

Year Three Update on the Mountain Pine Beetle Population in the Wilder-Gunnison Highlands Outbreak and Treatment Area, Gunnison Ranger District, GMUG National Forest

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Summary

In the third year of the Wilder-Gunnison Highlands treatment project, mountain pine beetle (MPB) activity continued to expand. Over 200 acres were treated for fuels reductions and sanitation in 2022. After treatment, there were 840 acres of infested lodgepole pine (LPP) documented in the Wilder-Gunnison Highlands project area by aerial detection survey, which is 40 acres more than the previous year (2021). The outbreak has expanded noticeably in 2022 to the northeast into the Fossil Ridge Recreation Management Area (RMA) (Figure 1); this includes almost half of the total infested acreage (410 acres). High populations of MPB were also found by trapping on the southern end of the treatment area, in Lost Canyon, though there was little obvious mortality in the area in 2022.

Figure 1. Recently dead lodgepole pine in the Fossil Ridge Recreation Management Area, 2022.

Introduction

The MPB outbreak near Taylor Canyon, CO was first discovered in 2019 and sanitation efforts began quickly in 2020 (Lockner et al. 2021). In 2022, the third consecutive year of forest management and sanitation was completed. Mountain pine beetle continues to spread within the Wilder-Gunnison Highlands treatment area and to the east/northeast. Over 200 acres were treated in 2022 (Figure 2). After treatment, there were 840 acres of infested LPP documented in the area by aerial survey, which is 40 acres more than 2021. The Forest Health Protection staff at the Gunnison Service Center (GSC) has been closely monitoring this outbreak since 2019 with

transects, plots, trapping, and aerial survey. Here we will discuss the results of monitoring the outbreak distribution and flights of the MPB for 2022.

Aerial and ground surveys

The outbreak has expanded noticeably in 2022 to the east/northeast into the Fossil Ridge RMA to include almost half of the total infested acreage as mapped by aerial survey (410 acres, Figures 1 and 2). Ground surveys and transects in the RMA identified multiple years of MPB attacks with substantially more green hits (current/recent beetle attacks) in 2022 than previous years. The bulk of the outbreak continues to be in the northern Gunnison Highlands subdivision and just east on Forest Service (FS) land. At the southern end of the Gunnison Highlands subdivision, beetles also continue to expand east from FS land into the RMA; this area has remained untreated due to its designation and harvest limitations. Most of the FS land, Wilder, and the NW side of Gunnison Highlands has been treated and no new outbreaks are being mapped by aerial survey on that side of the treatment area.

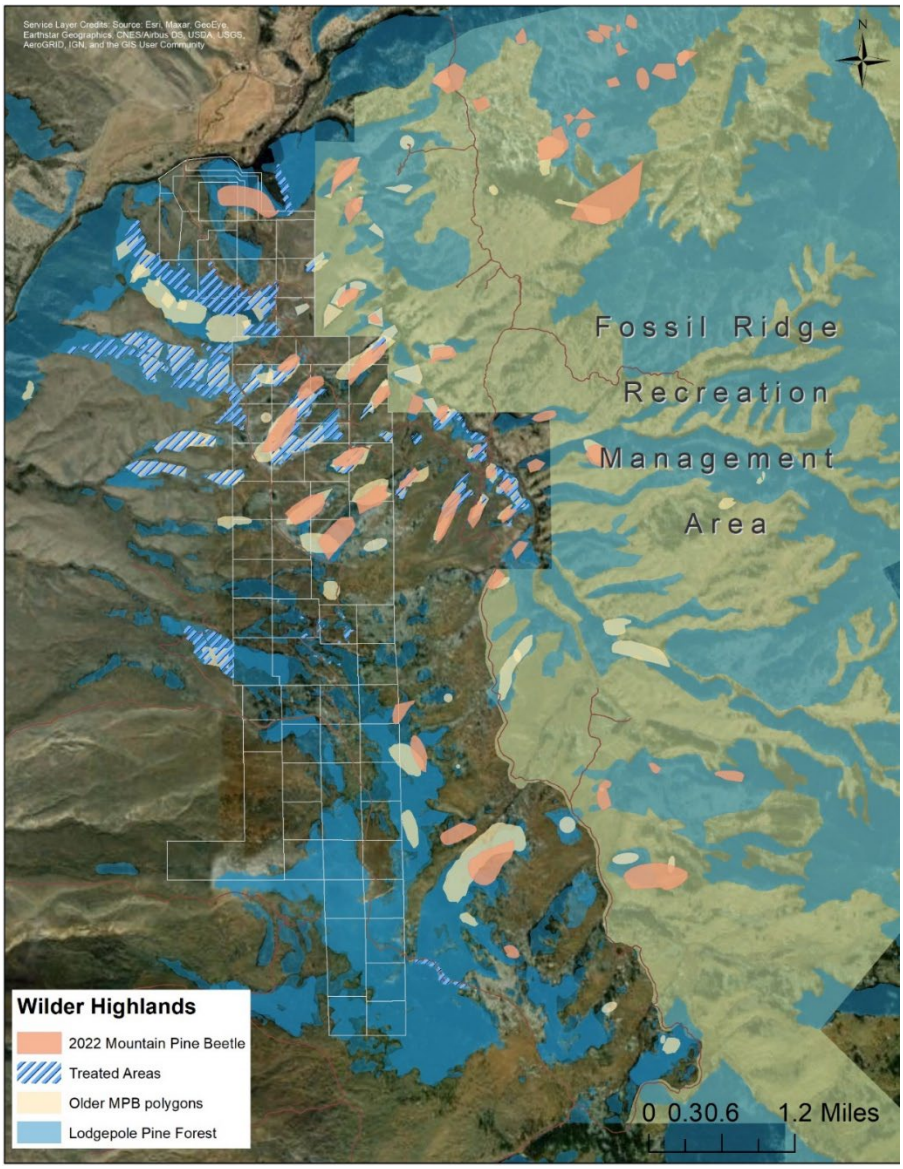


Figure 1. Mountain pine beetle mapped by aerial survey around the Wilder-Gunnison Highlands project in 2022 in peach color (2020 and 2021 polygons in cream color). Treatment areas in blue with white thatch marks.

Treatments

Treatments in 2022, completed by our partners, included both fuels reductions and sanitation of infested trees. In Wilder, both sanitation and thinning were completed, removing most suitable host material as well as other tree species to open the area and reduce fuels. On both private and FS land, helicopter logging currently infested trees (sanitation) in steep areas was used and left smaller hand piles created by hand crews. Larger slash piles at landings were machine piled. Most of these slash piles, created in 2022, were burned winter 2022/2023 by the Gunnison Ranger District East Zone Fire and Fuels crew; piles that were not burned will be burned this winter 2023/2024.

Figure 3. Slash piles created after sanitation harvest of MPB attacked trees.

Trapping

Lindgren funnel traps baited with MPB lures were deployed in June and picked up weekly until early September. A total of 21 traps were dispersed throughout the Wilder-Gunnison Highlands project area for the third consecutive year (please see Marchetti et al. 2022 for methodology). Trap placement varied, but most were placed in aspen stands and/or older dead pockets adjacent to heavily infested LPP stands. Some traps were placed near three newly created large machine slash piles. Two traps were placed around each large slash pile in the Wilder subdivision. Traps were also placed in aspen stands adjacent to heavily infested LPP stands and in dead and infested pockets in LPP stands in the Gunnison-Highlands subdivisions and on FS lands. Traps adjacent to slash piles collected 40-200 MPB total for the season (Figure 3). The traps placed in aspen stands adjacent to heavily infested LPP stands varied in their catches from 5-330 MPB for the season. The four traps placed on the edge of small pockets of LPP stands pulled the most beetles from 180, 420, and 530 for the season. The high trap catches in the southern end of the project area may indicate the spread of beetles and the need for additional suppression in that area.

In the average weekly trap collections for the past three years, the peak of the MPB population varies from early July to early August. This variability is within the normal flight period of MPB in

Colorado. This year's peak beetle flight occurred in mid-July. Each population rises rapidly together, which increases the success of MPB as they mass attack trees and attract mates easily with mating and aggregation pheromones

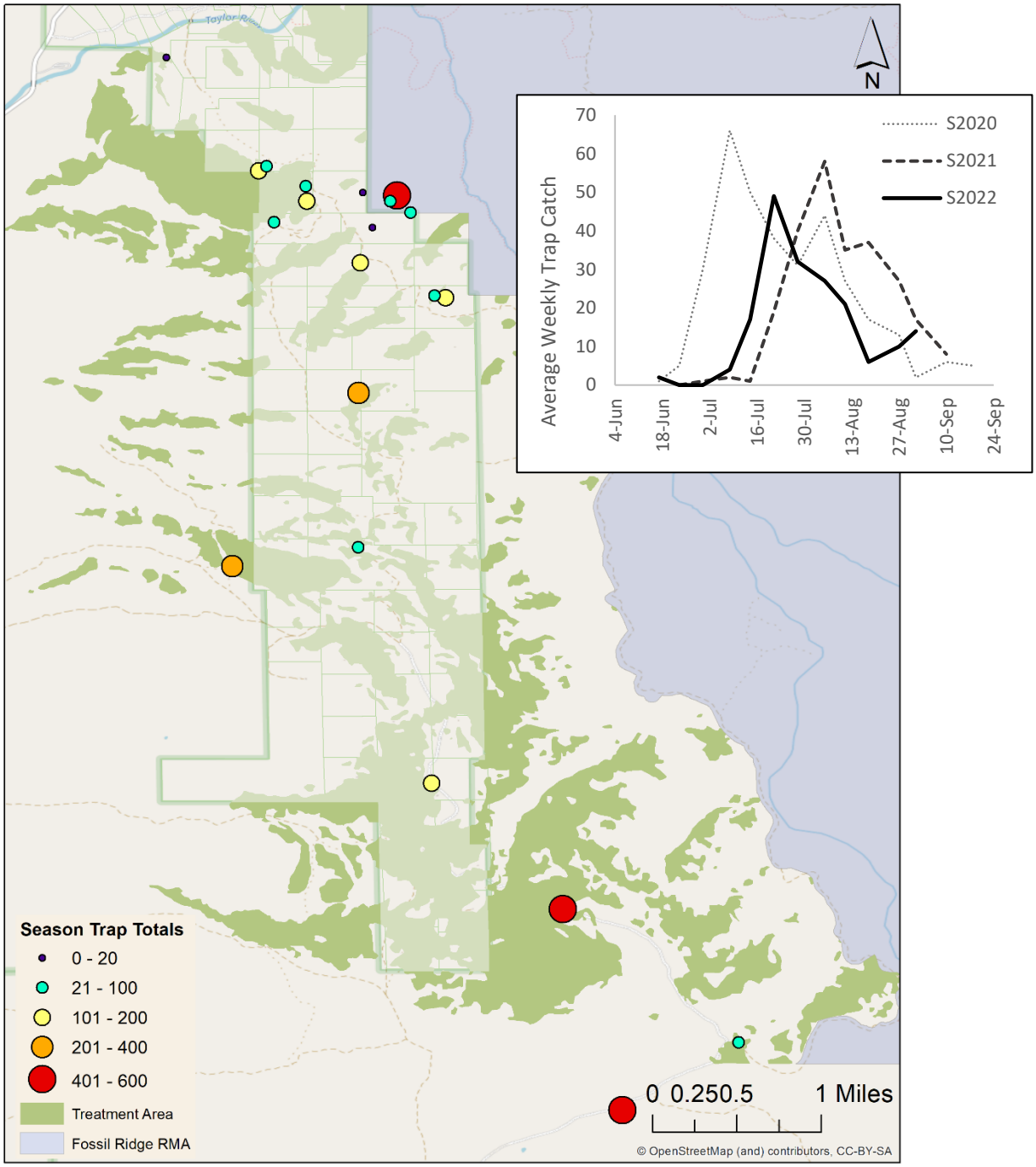


Figure 3 Map: Seasonal trap totals for baited Lindgren traps deployed in the Wilder-Gunnison Highlands Treatment Area. Inset: Weekly Trap Averages from MPB lured Lindgren Funnel traps in 2020, 2021, and 2022.

Transects

Twenty-three transects in the Wilder-Gunnison Highlands project area and the RMA were completed fall of 2022. Transects are a half mile walking survey covering four acres while counting

green hits and red hits (see Marchetti 2022 for methodology details). These ratios of green vs red hits indicate where beetles are concentrated and populations are increasing or decreasing. In 2021, there were shrinking populations overall, however in 2022 this trend has been reversed and there was a large expansion of green hits similar to levels observed in 2019 (figure 5). In 2022, green hits averaged about five trees per acre, compared to three red hits per acre, indicating a growing population. However, the red hits were slightly artificially suppressed as several transects were within treated areas where infested trees were removed by helicopter logging, thus the trees that would have been red and counted by fall were removed earlier that spring. The larger populations were widely distributed - first in the historic center of the outbreak, but also within the RMA. The southern section of Gunnison Highlands is primarily mixed conifer forests and continues to have minimal populations, though the populations adjacent to Lost Canyon Road, which are dominantly LPP stands, are slowly growing.

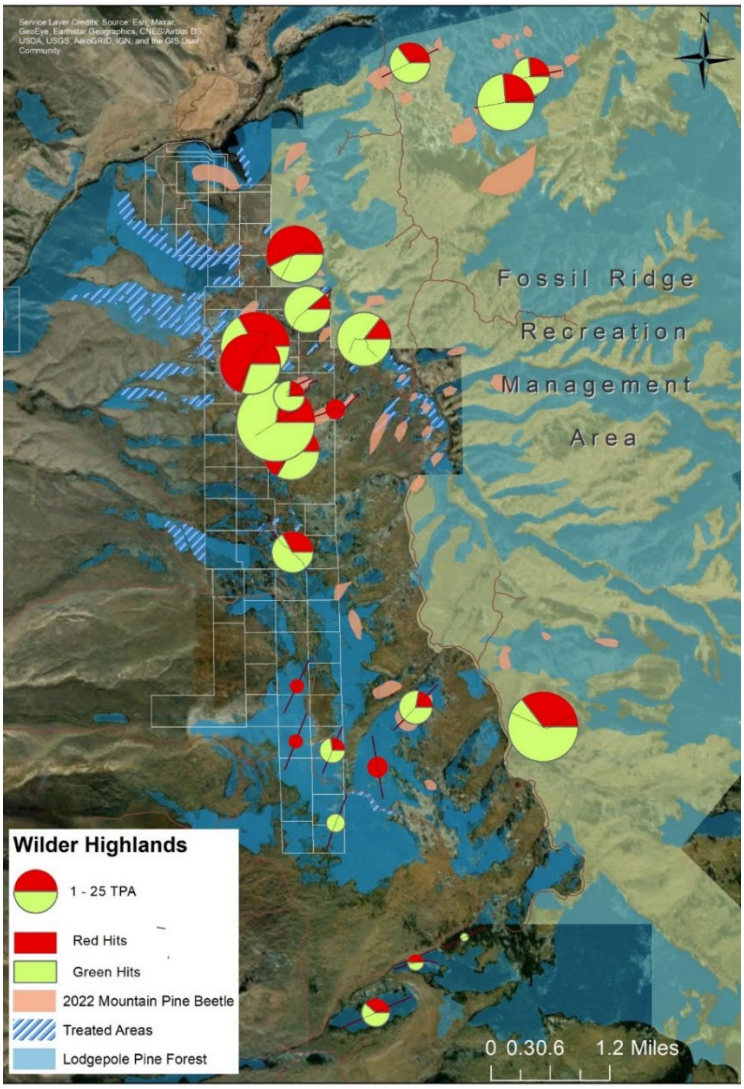
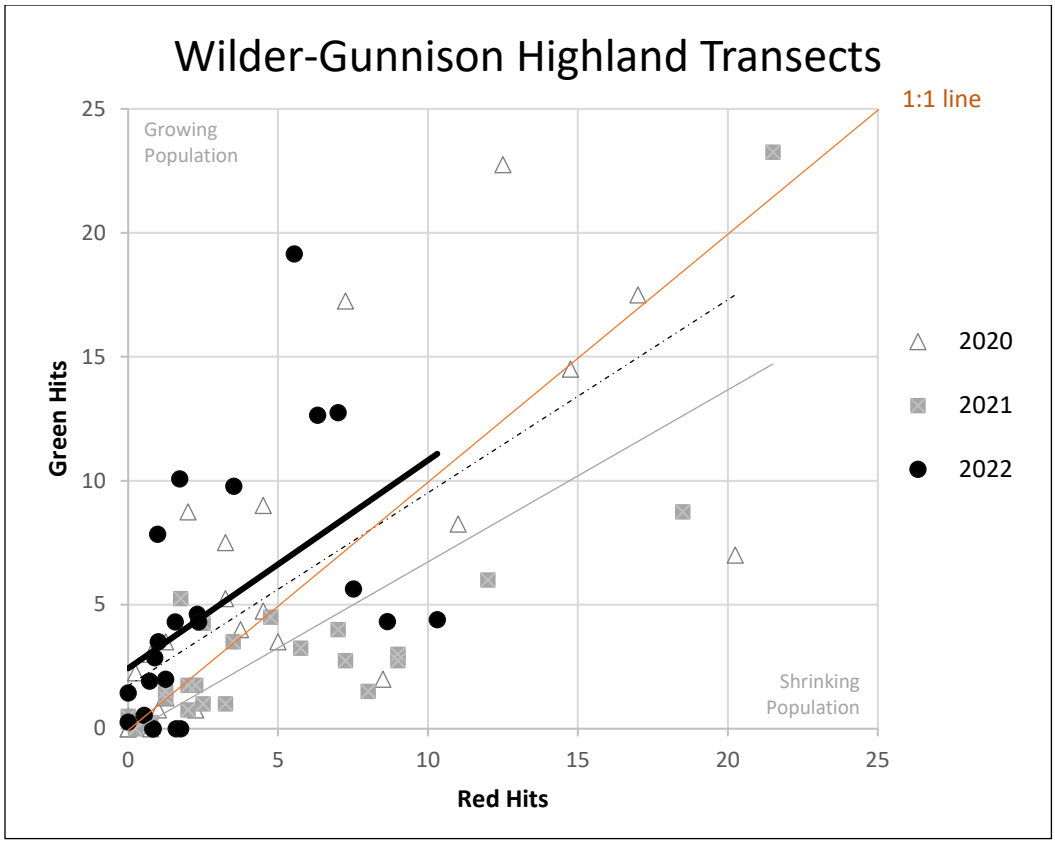


Figure 4. Map of transect results. Pies are scaled by the density of the beetle hit trees in the transects, with size of the circles indicating the population of beetles. The amount of each color indicates the proportion of beetle hit trees that were in 2022 (yellow = green hits) and trees hit in 2021 (red = fading red trees).



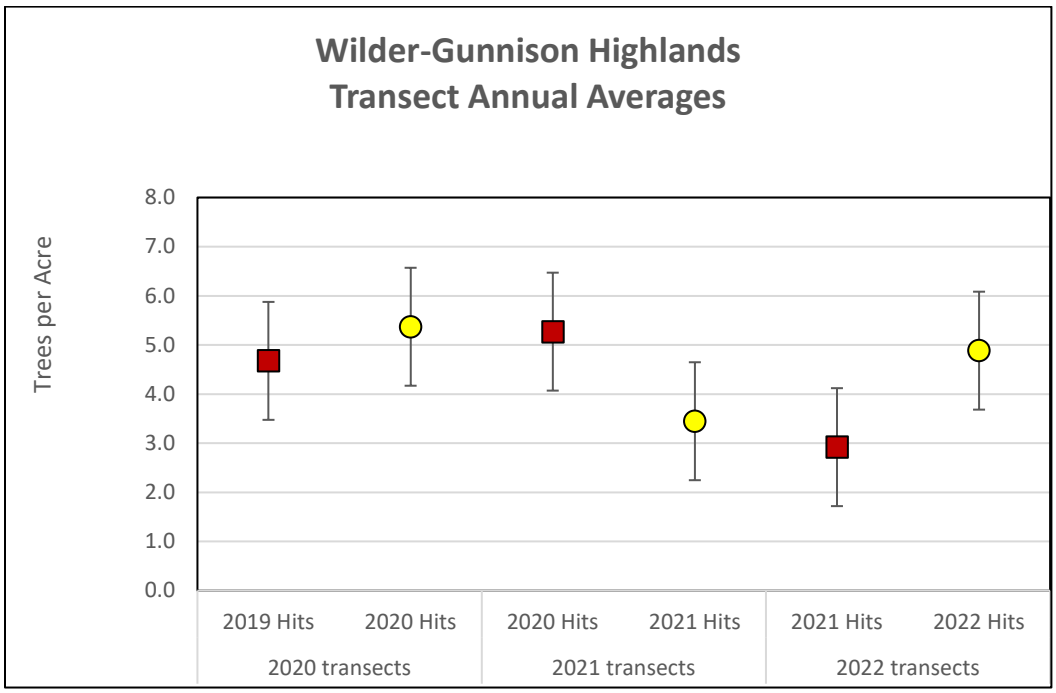


Figure 5. Plots of transect data from Wilder-Gunnison Highlands area. Top: scatterplot comparison of red hits to green hits, with growing populations being above the 1:1 line and shrinking populations being below the red line. Bottom: Same data as top, grouped by transect date, then by year of infestation (red hits being the earlier year in each transect).

Conclusion and recommendations

The mountain pine beetle outbreak in the Wilder-Gunnison Highlands has expanded to the Fossil Ridge RMA, east of the original outbreak found in 2019. This expansion is not surprising but is concerning due to the nearly 300,000 acres of lodgepole pine forest that could be affected. Taylor Park and surrounding areas are most at risk due to the proximity to the outbreak. Mountain pine beetle has also been expanding in the Gunnison Valley, specifically up Ohio creek road near Carbon Peak, Mill Creek, and around the Crested Butte area near Oh Be Joyful campground (Figure 6).

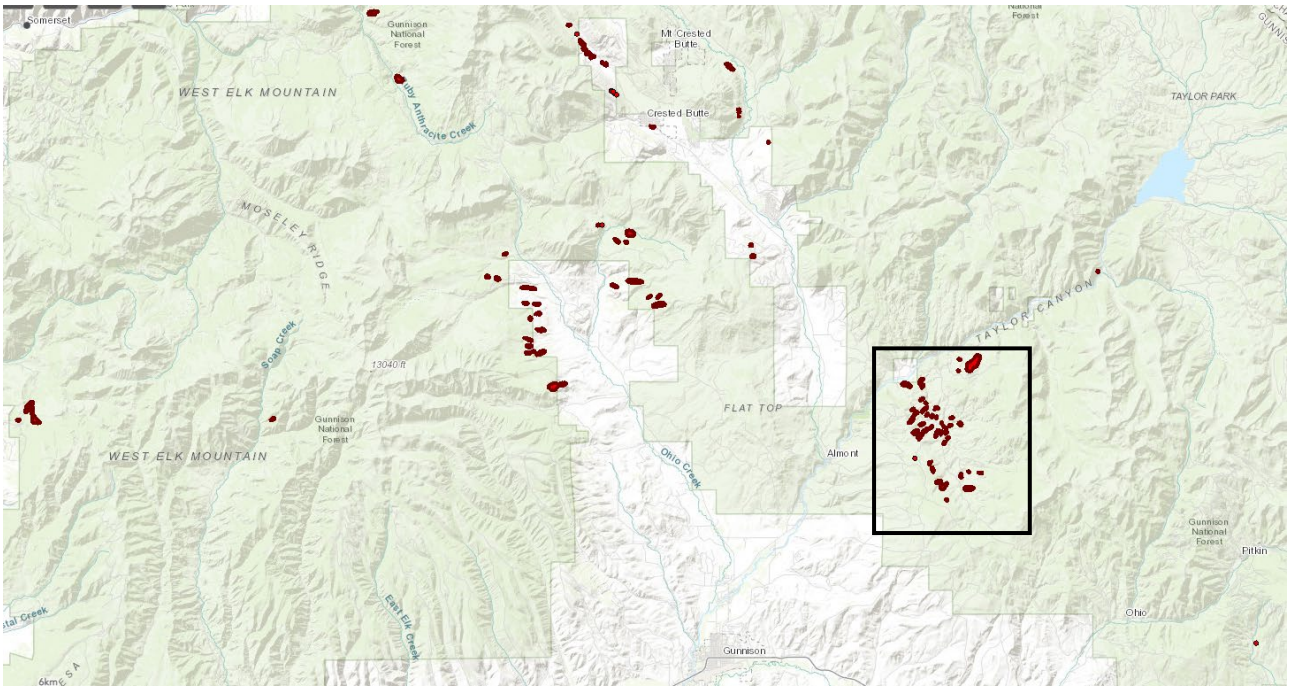


Figure 6. Map of the Gunnison Valley and surrounding areas with active MPB mapped in July of 2022 by aerial survey (red polygons). Wilder is inside the black box on the right.

The drought conditions over the past few years have been very favorable to increasing and expanding the mountain pine beetle population. A trees best defense against bark beetles is producing resin to flush out, or pitch out, the attacking beetle. Access to ground water influences how much resin can be produced under the bark in the phloem as a natural defense. Although there was a normal monsoon season in 2022, one season is insufficient to restore ground water levels after extended drought conditions. With the combination of sanitation and increased precipitation, the hope is to see a reduction of infestation in LPP.

There are a variety of methods available for treating stands affected by or at risk of being attacked by MPB. In stands that currently have infested trees, sanitation and treatment of the infested trees can slow the growth of the beetle population locally. Treatment of infested logs can be in the form of removal from the site, mastication, peeling off the bark, or burning of the logs on site while the beetle larvae are still developing in them. Currently infested trees should be identified in late summer (after peak beetle flight) and sanitation treatments carried out before the next flight in the early summer (before July). Sanitation efforts often require returning to the same stand for three to five years consecutively as infested trees are frequently missed.

Larger scale silvicultural treatments, including thinning or clearcutting, can be used in both infested and un-infested stands. Forest management, such as maintaining a diversity of age

classes, diversity of species, and reducing basal area, is the best way to minimize extensive losses to the beetle over long periods of time. When applied over a larger landscape, these types of treatments provide a long-term reduction in hazard to beetle infestation.

The Wilder-Gunnison Highlands outbreak and project area has been a large success due to the quick action from all parties involved. Unfortunately, we cannot predict the weather, or where the beetles will move to next. The GSC feels strongly that all efforts made thus far have suppressed the outbreak and removed many thousands of beetles from the forest and have thinned the suitable hosts available considerably. Now that the outbreak is growing in the Fossil Ridge RMA, and other areas of Gunnison, the future of this outbreak is unknown. Forest sanitation in 2023 should be completed, if desired, before the beetle flight in early July and finished after flight in the fall. The northern end of Lost Canyon Road should be monitored and could benefit from thinning and future sanitation efforts. Northeast of the outbreak around Taylor Park, ongoing timber sales and harvests should benefit remaining trees and make them more resilient to potential bark beetle attacks by reducing stand density and retaining younger trees.

Acknowledgements

Gunnison Service Center Forest Health Protection appreciates the rapid response to the Wilder-Gunnison Highlands project from our partners: Colorado State Forest Service, National Forest Foundation, the USDA Forest Service, West Region Wildfire Council, and the private communities of Wilder on the Taylor and Gunnison Highlands. Special thanks to the Gunnison Ranger District timber staff and CSFS timber staff for implementing the forest management plans, and the Gunnison East Zone Fire and Fuels crew for pile burning. Also, we acknowledge Brad Lalande, Alyssum Cohen, Erin Miller, Dana Lambert, and Dylan Eimer for helping with transects.

Please reach out to our Service Center if you have any questions or additional needs.

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