

# 2022 Wyoming Forest Health Highlights



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## 2022 Wyoming Forest Health Summary

Forest health surveying and monitoring in Wyoming is a collaborative effort between Wyoming State Forestry Division, federal agencies, conservation districts and local communities. Working together on the ground and through the air ensures early detection and continuous monitoring, ranging from bark beetle and defoliator outbreaks in rural forests to invasive species in parks and urban areas. The Forest Health Highlights summarizes insect, disease, and related forest events for the previous year.



*Figure 1 2022 fire damage in the Laramie Mountains south east of Casper, WY.*

### **In 2022:**

- Over 18,500,000 acres were surveyed via aircraft for forest health threats by Wyoming State Forestry Division and the United States Forest Service.
- 4,993 separate observations of damage were recorded by aerial survey.
- Approximately 98,000 total acres of damage were recorded by all insect, diseases and abiotic agents excluding fire.
- Aerial survey was conducted over Yellowstone for the first time since 2019.

## 2022 Wyoming Forest Health Damage Graph by Agent

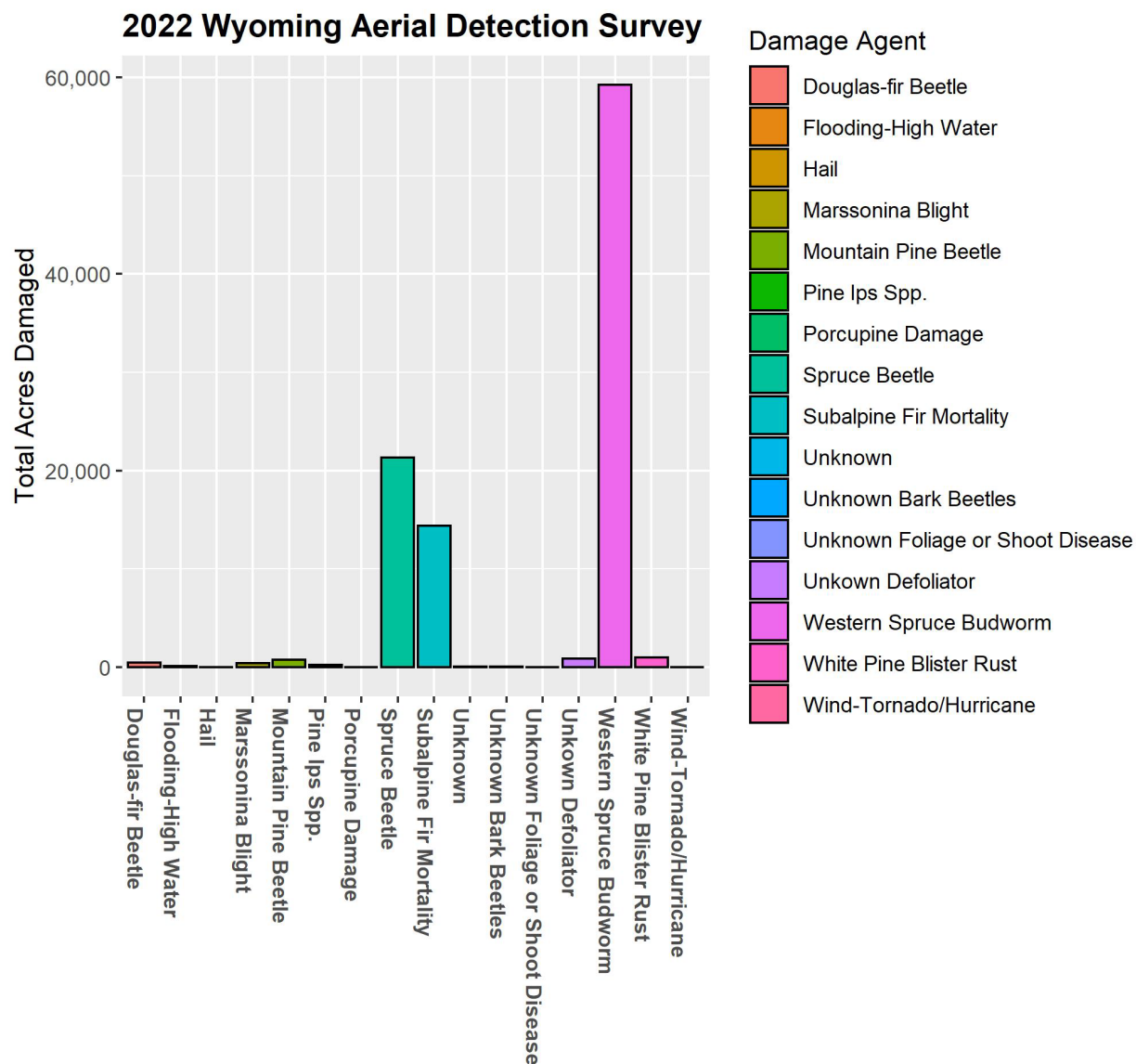


Figure 2 shows the total acres impacted by forest health damage agents across Wyoming collected through the aerial survey program in 2022 excluding fire. Forest health data is collected using aerial survey and ground based methods by the Wyoming State Forestry Division and United States Forest Service. 1.5 acres were recorded by aerial survey as balsam woolly adelgid (BWA) on the western side of the state. Due to BWA not being confirmed in Wyoming, the 1.5 acres were added to Subalpine Fir Mortality. The same was done for the table in Figure 2. Due to discrepancies in the reporting metrics in the aerial survey programs between US Forest Service Regions, western balsam bark beetle has been combined with subalpine fir decline and labeled as subalpine fir mortality. Additionally, pine engraver has been combined with Ips engraver beetles and is shown above as Pine Ips Spp.

## 2022 Acres Damaged and 2021 Comparisons

<b>Damage Agent</b>	<b>2022 Acres Recorded</b>	<b>Change Since 2021</b>
Douglas-fir Beetle	436	-527
Flooding-High Water	104	101
Hail	14	
Marssonina Blight	381	322
Mountain Pine Beetle	746	154
Pine Ips Spp.	236	-261
Porcupine Damage	7	
Spruce Beetle	21,336	-4,857
Subalpine Fir Mortality	14,368	4,442
Unknown	53	43
Unknown Bark Beetles	50	42
Unknown Foliage or Shoot Disease	17	
Unkown Defoliator	841	-452
Western Spruce Budworm	59,252	481
White Pine Blister Rust	975	-289
Wind-Tornado/Hurricane	20	-1,532

Figure 3. The above table displays total acres impacted by damage agent. It also compares the acres damaged by agent to their totals in 2021. Green indicates fewer acres damaged while red indicates more acres damaged. No values present in the Change column, shows damage agents that were present in 2022 but not in 2021. Balsam woolly adelgid acres were combined with Subalpine Fir Mortality acres due to it not being positively confirmed in Wyoming. Due to discrepancies in the reporting metrics in the aerial survey programs between US Forest Service Regions, western balsam bark beetle has been combined with subalpine fir decline and labeled as subalpine fir mortality. Additionally, pine engraver has been combined with Ips engraver beetles and is shown above as Pine Ips Spp.



## Map of 2022 Forest Health Damage

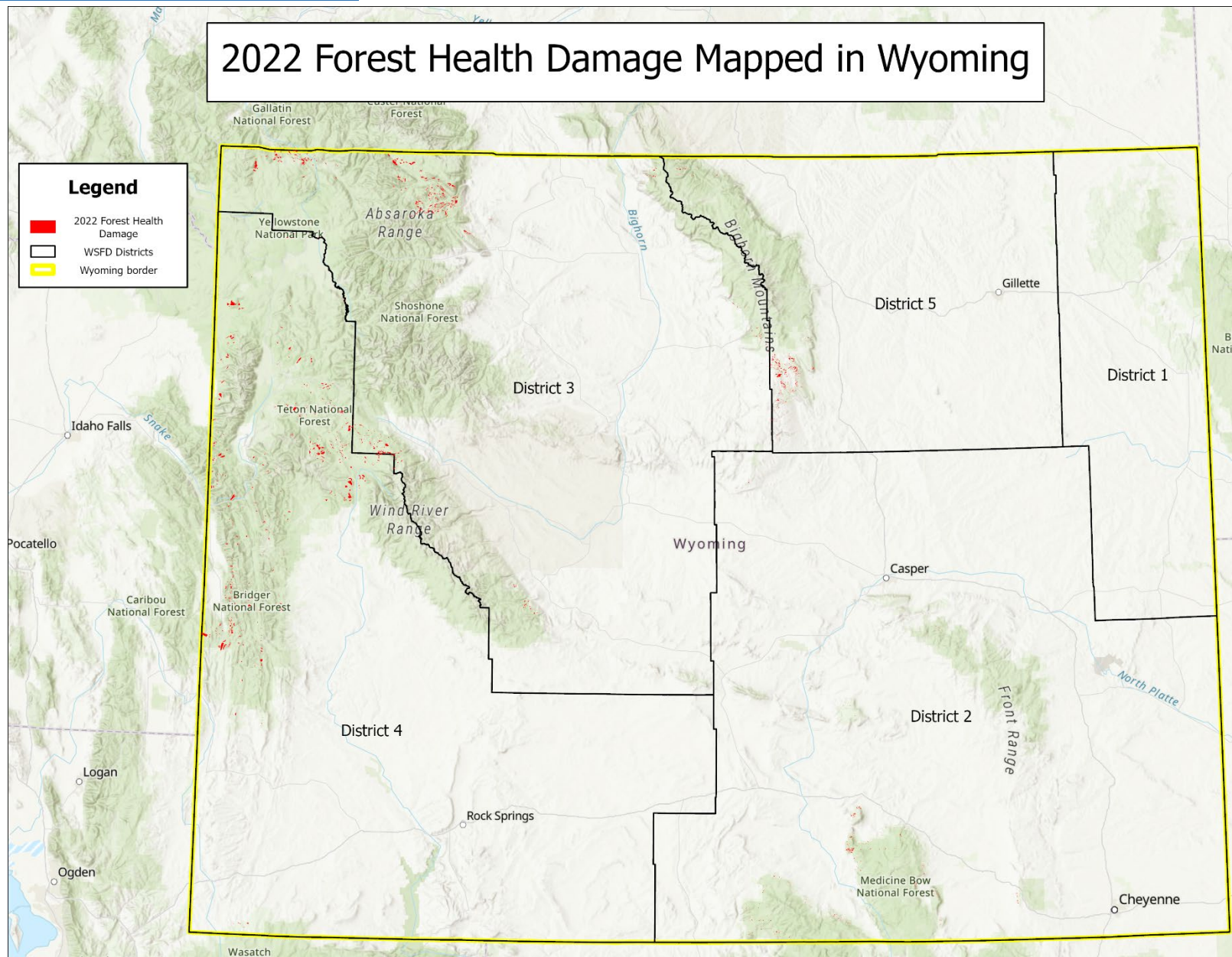


Figure 4. The map above shows the extent and scale of forest health damage recorded in 2022 across Wyoming. At this scale some damage is not visible.

## Map of 2022 Forest Health Damage by Agent

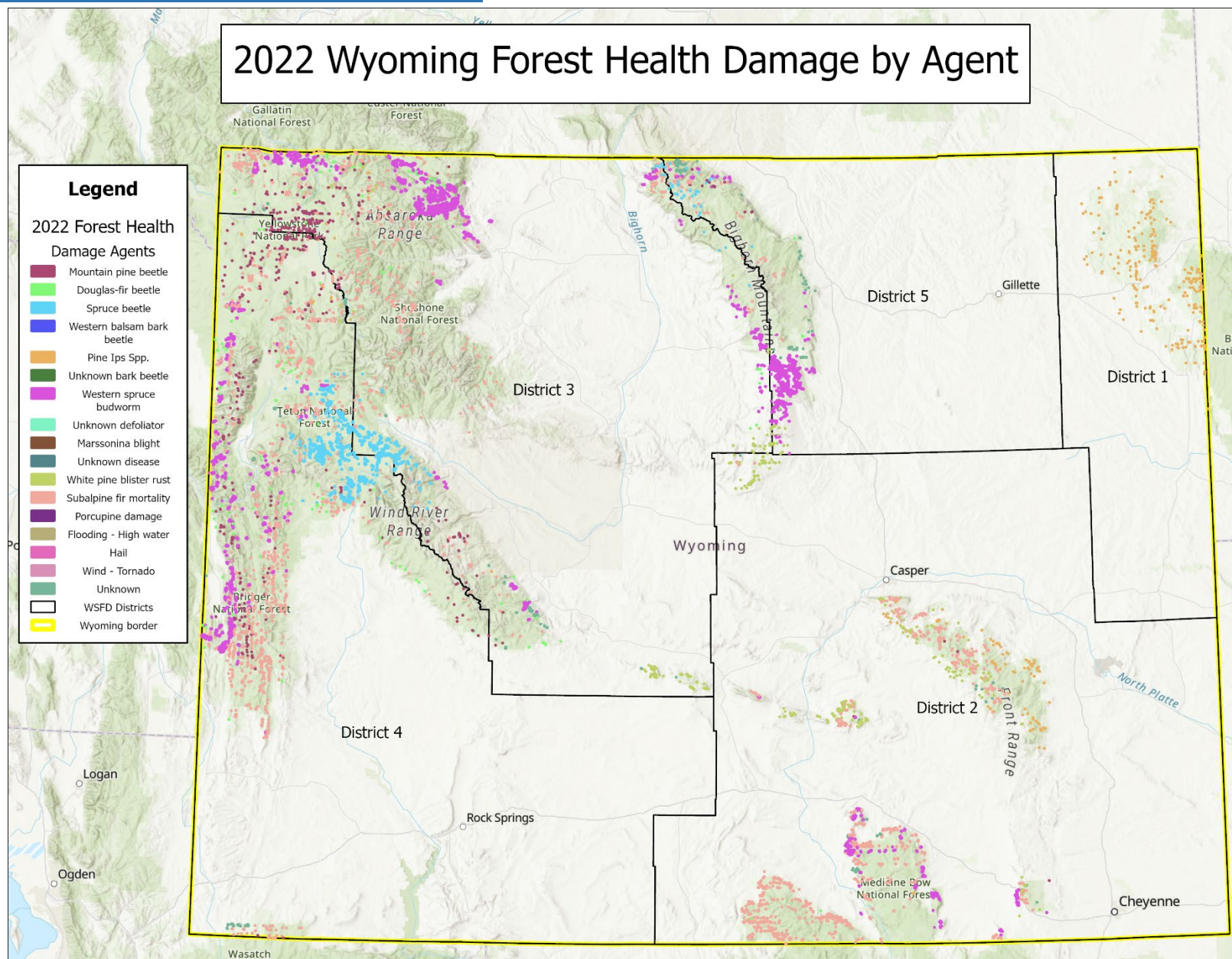


Figure 5. The map above shows the location of all mapped forest health damage agents in 2022 across Wyoming. The colored points have all been increased in size by a factor of three to increase their visibility at a statewide scale.



## Map of 2022 Forest Health Damage by Forest Type

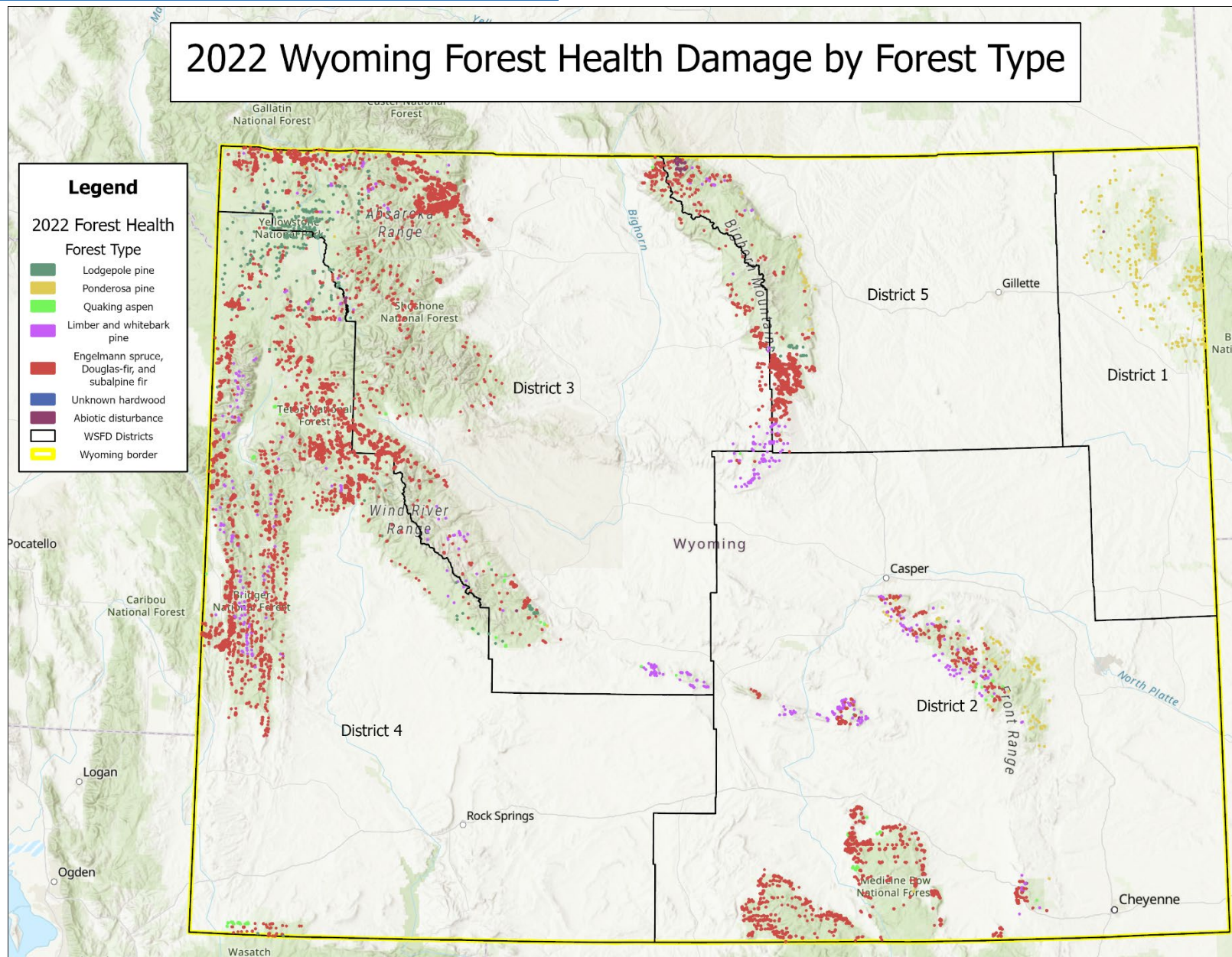


Figure 6. The map above indicates the forest type that was damaged in 2022. The colored points have all been increased in size by a factor of three to increase their visibility at a statewide scale.

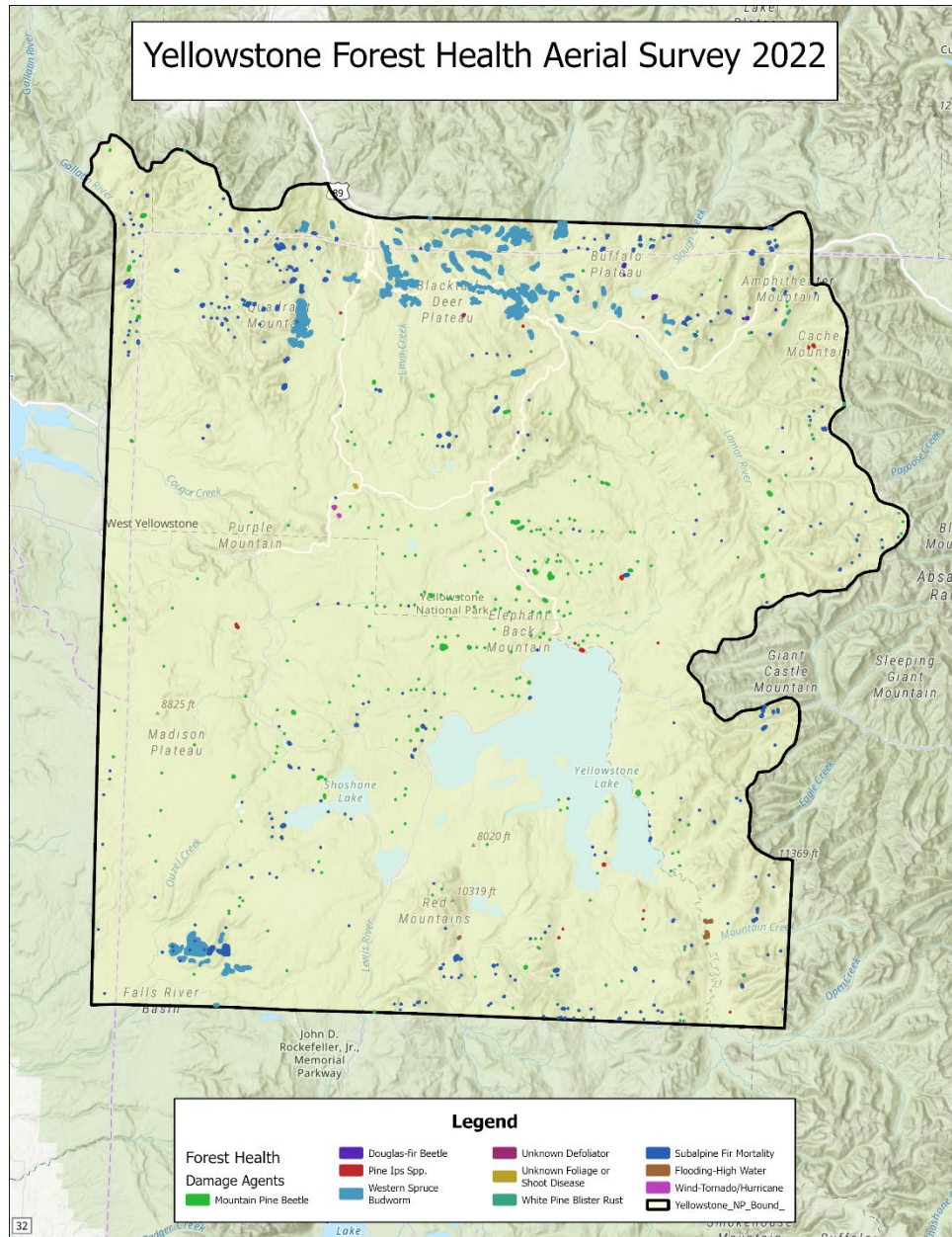


## 2022 Acres Damaged by Forest Type Table

<b>Forest Type</b>	<b>2022 Acres Recorded</b>	<b>Change Since 2021</b>
Abiotic tree disturbance	586	-1,123
Engelmann spruce, Douglas-fir and subalpine fir	95,342	-467
Limber and whitebark pine	1,151	-408
Lodgepole pine	998	675
Ponderosa pine	221	-3,042
Quaking aspen	920	126
Unknown hardwood	17	

Figure 7. The table above displays the acres damage by forest type in Wyoming 2022. Forest type damage statistics are calculated using 2022 Aerial Detection Survey data.

# Yellowstone Forest Health 2022



Damage Agent	Acres Recorded
Mountain Pine Beetle	634
Douglas-fir Beetle	85
Ips Engraver Beetles	66
Western Spruce Budworm	10,967
Unkown Defoliator	8
Unknown Foliage or Shoot Disease	17
White Pine Blister Rust	42
Subalpine Fir Decline	1,598
Flooding-High Water	96
Wind-Tornado/Hurricane	20

Figure 8. The map and table above show location and acres impacted for forest health damage agents observed in 2022 throughout Yellowstone National Park. Aerial survey flights aren't done every year for Yellowstone. The last aerial survey was done in 2019.



## Western Spruce Budworm

*Choristoneura freemani*

Western spruce budworm (WSBW) continues to be Wyoming’s most damaging forest pest by acreage. 2022 saw a slight increase in acres impacted compared to 2021. The Southern Bighorns continue to see significant defoliation with mortality of small to medium sized trees. In addition to the Southern Bighorns, the Bridger Teton National Forest and the Shoshone National Forest continue to experience reoccurring defoliation. WSBW acreage is often underreported on aerial surveys due to detection difficulty. WSBW outbreaks can be long lasting. Severe repeated defoliation leads to mortality or increased susceptibility to other damage agents. WSBW primarily impacts Douglas-fir, subalpine fir and spruce trees in Wyoming.

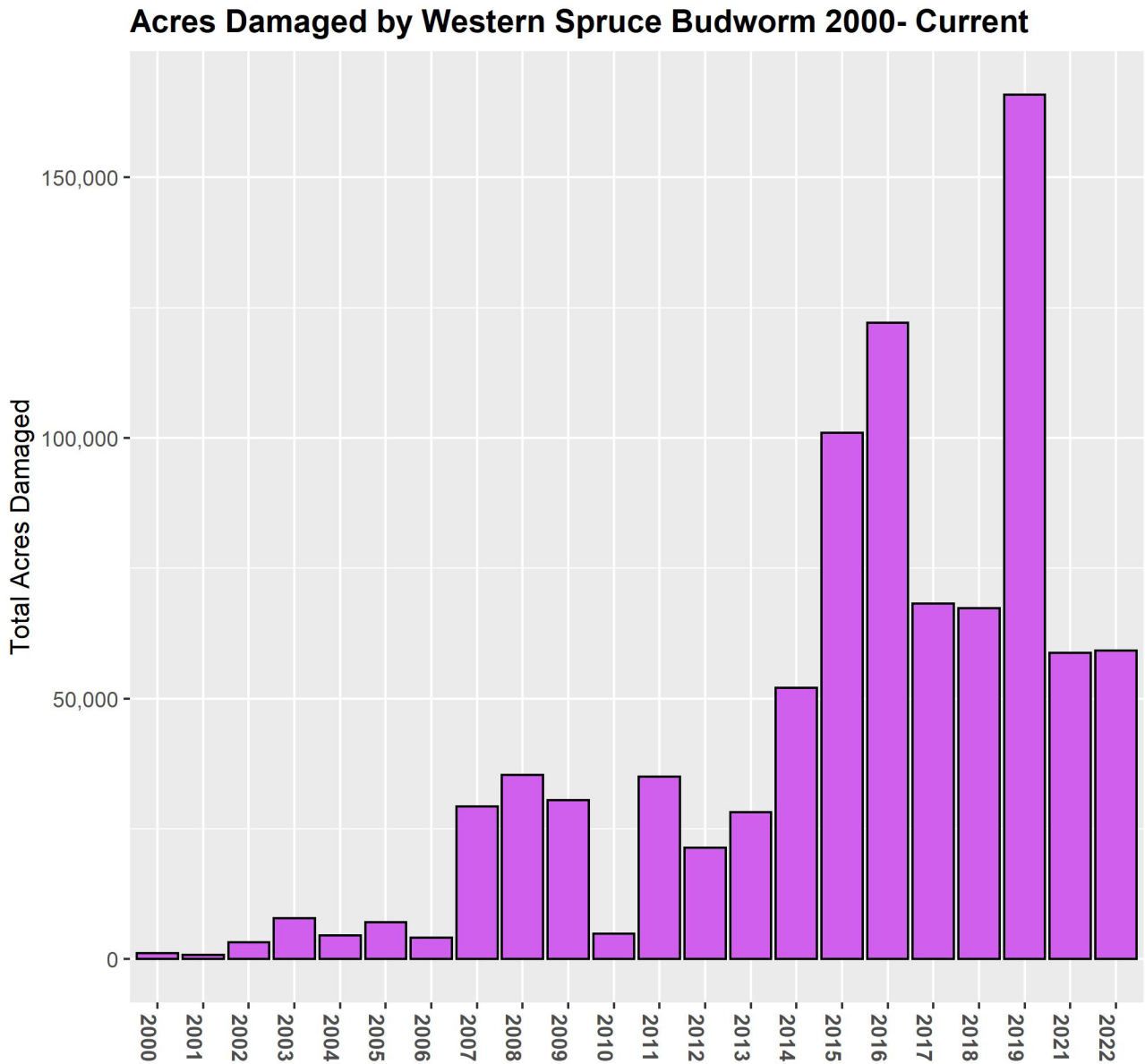


Figure 9. The graph above shows total acres by year of recorded damage by western spruce budworm. Survey coverage was reduced in 2020 and isn't shown for comparison purposes to other years.

## Spruce Beetle

### *Dendroctonus rufipennis*

Spruce beetle damage continues to be ongoing with similar levels of mortality being observed since 2016. Previous pockets of mortality around the central portion of the Shoshone National Forest and central/eastern portion of the Teton National Forest are slowly expanding and being filled in. Over the past couple of years, aerial surveys have seen individual trees and small areas of spruce beetle activity on the Bighorn National Forest with more concentrated activity closer to the state line. Mortality in the Bighorns from spruce beetle hasn't become widespread, but the USFS and WSFD are continuing to monitor the situation

### Acres Damaged by Spruce Beetle 2000- Current

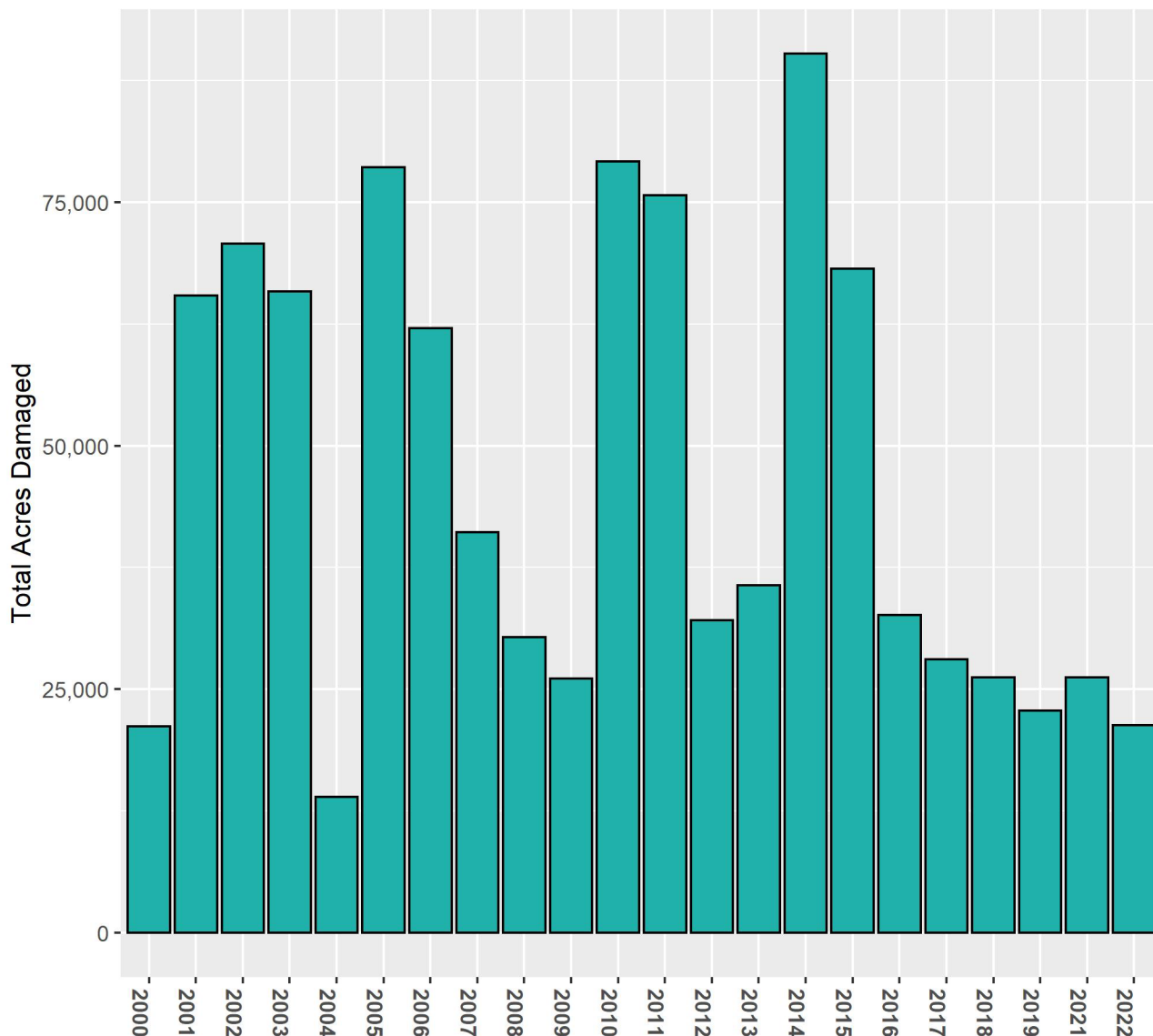


Figure 10. The graph above shows total acres by year of recorded damage by spruce beetle. Survey coverage was reduced in 2020 and isn't shown for comparison purposes to other years.



## Subalpine Fir Mortality

Subalpine fir mortality in Wyoming can be caused by many different damage agents either independently or in combination. Many of these damage agents are difficult to detect through aerial survey alone. Examples of damage agents include western balsam bark beetle, armillaria root disease, and drought. Additionally, discrepancies exist between identification based on US Forest Service Region. All subalpine fir mortality damage agents have been combined for reporting purposes. Further information on damage agents impacting subalpine fir can be found later in the report.

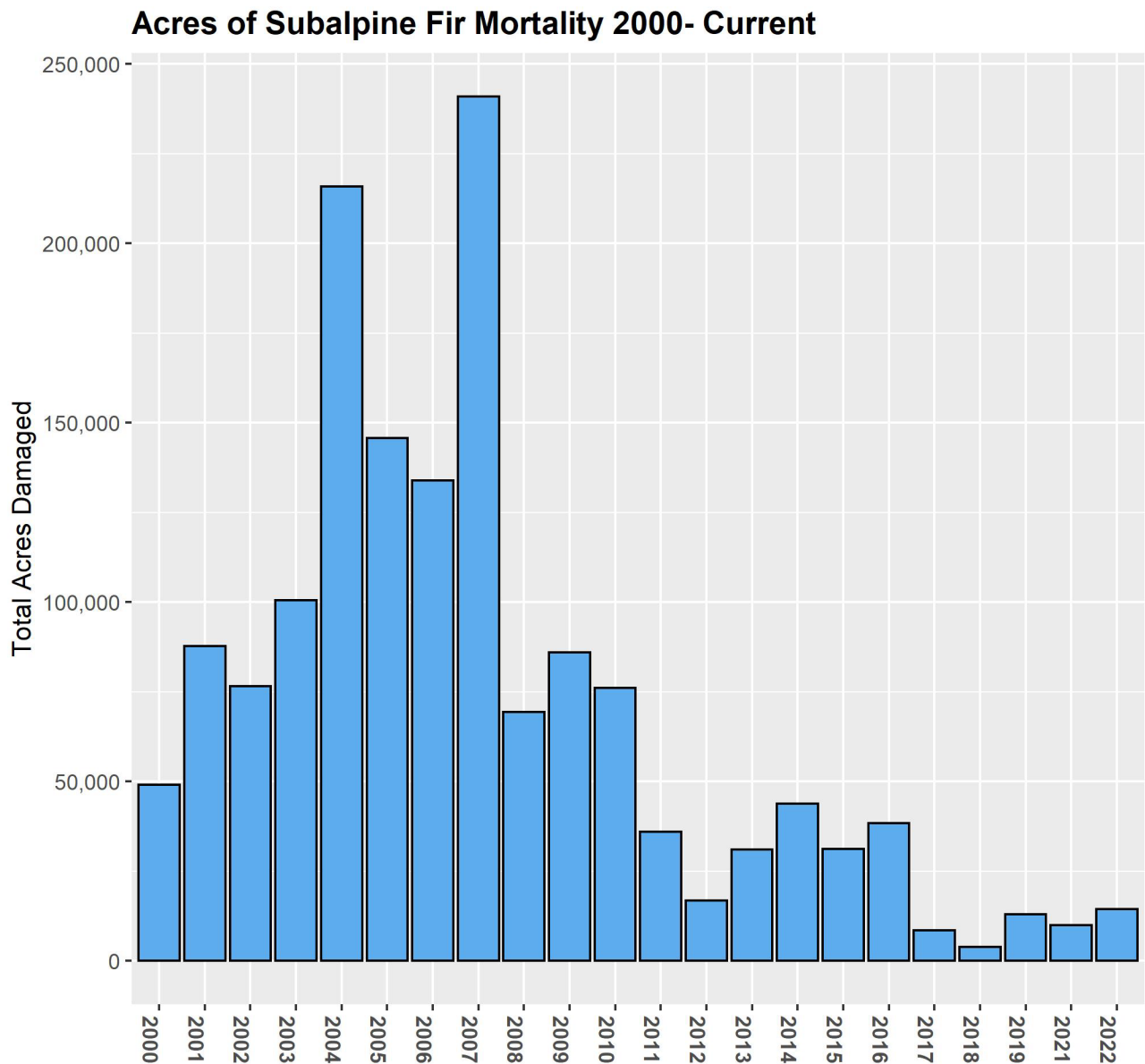


Figure 7. The graph above shows total acres by year of subalpine fir mortality. Survey coverage was reduced in 2020 and isn't shown for comparison purposes to other years.

## Pine Ips Spp.

Pine engraver, *Ips pini*, and other *Ips* species are the main bark beetles causing tree mortality and top kill currently in pine species throughout Wyoming. The Black Hills region continues to see high levels of *Ips* activity as the mountain pine beetle epidemic has subsided. *Ips* species can have multiple generations during a season, which allows them to quickly respond to favorable environmental conditions. Shorter winters followed by longer hotter drier summers stress trees and increase the likelihood of *Ips* caused tree mortality. Pine *Ips* spp. in Wyoming impact ponderosa, lodgepole, limber, and whitebark pine.

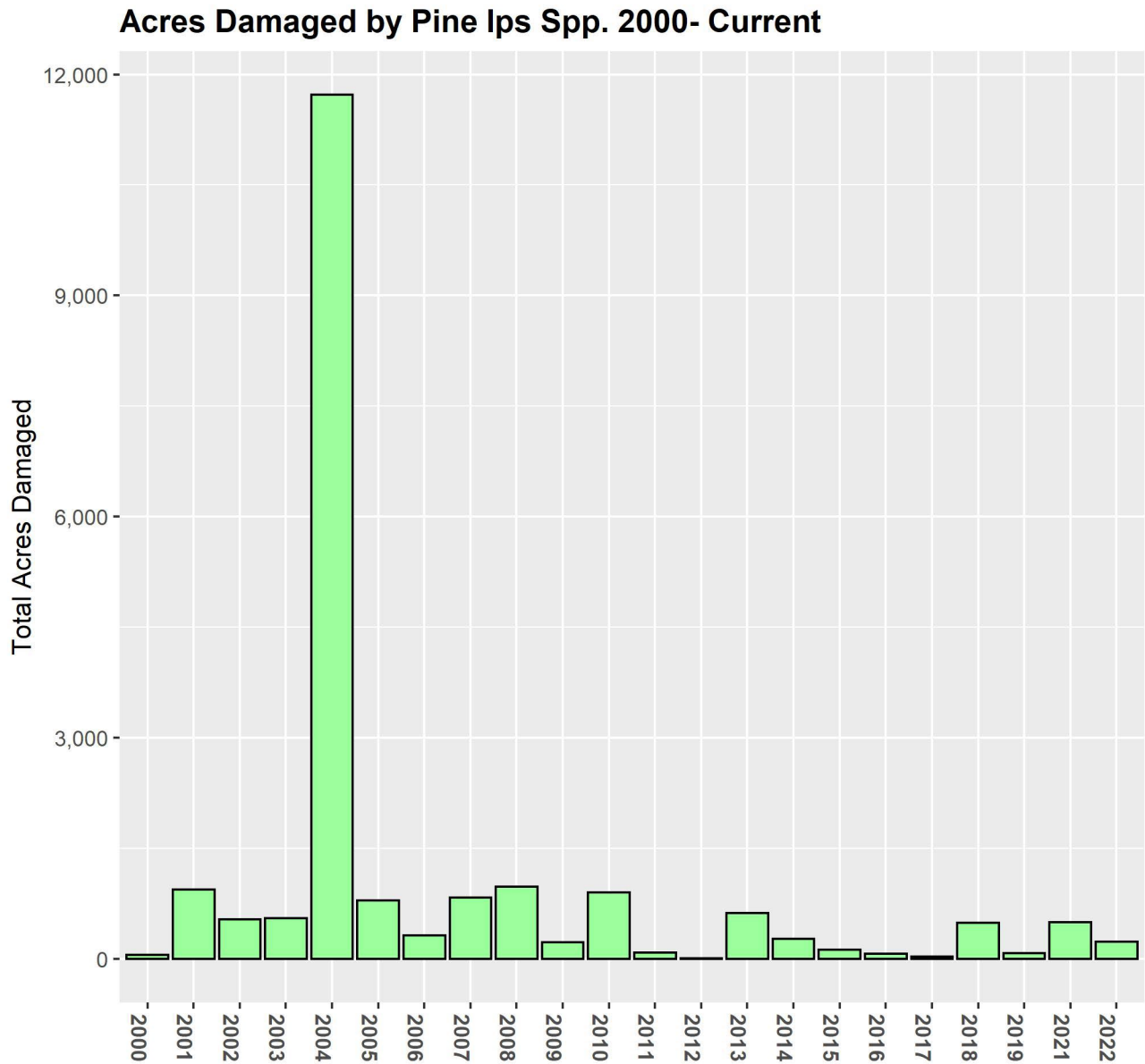


Figure 8. The graph above shows total acres by year of recorded damage by pine *Ips* spp. Survey coverage was reduced in 2020 and isn't shown for comparison purposes to other years. Prior year data mapped in ponderosa pine labeled *Ips* Engraver Beetles has been included in the above graph. Pine Engraver is the predominant *Ips* species found attacking ponderosa pine.



## Other Bark Beetles

### Mountain Pine Beetle

*Dendroctonus ponderosae*

Mountain pine beetle (MPB) continues to remain at low populations. Low numbers of mapped mortality are normal with only weakened or highly stressed trees generally being killed. Many recorded MPB killed trees were limber and high elevation white bark pine, severely weakened by white pine blister rust.

### Western Balsam Bark Beetle

*Dryocoetes confusus*

Western Balsam Bark Beetle (WBBB) mortality is found throughout the state impacting individual and small clusters of trees in subalpine fir forests. In Figure 5, all damage marked as subalpine fir mortality in Districts 1, 2, 3, and 5 were originally labeled as WBBB. However, due to WBBB mortality commonly being marked as individual trees and not continuous large areas, the number of acres impacted for these areas is relatively low. WBBB is not considered a major forest pest and doesn't cause widespread mortality compared to mountain pine beetle, spruce beetle or Douglas-fir beetle.



Figure 13. Western balsam bark beetle killed trees seen on Casper Mountain.

### Twig Beetles

*Pityophthorus spp., Pityogenes spp.*

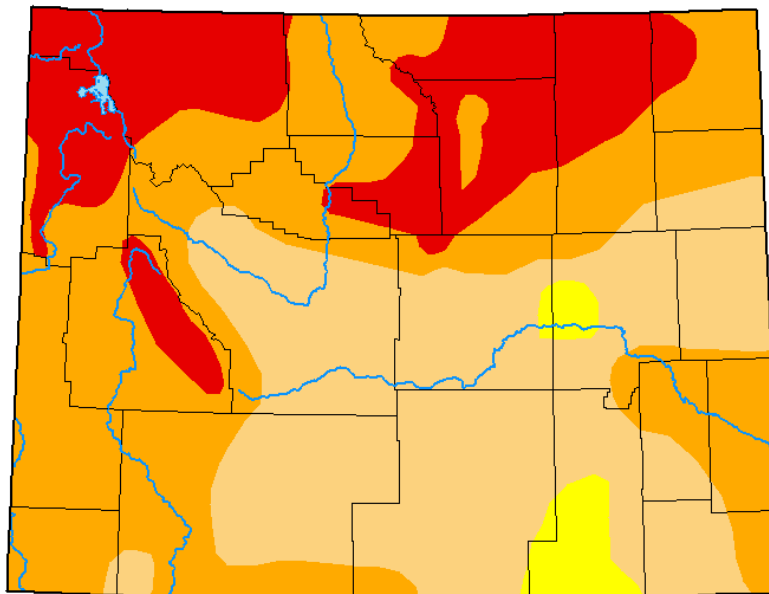
Twig beetles refers to multiple different species of small bark beetles that affect the branches of trees. In Wyoming, issues with twig beetles are found in the SE corner of the state effecting ponderosa pine. Areas include Curt Gowdy State Park, around Guernsey and south of the Laramie Mountains. Impacts from drought/twig beetles have been observed since 2018, but 2021 is the first year it was recorded as part of the aerial survey. Observed twig beetle damage was greatly reduced in 2022 compared to the previous year. No observations were recorded by aerial survey flights in 2022. Twig beetle damage can vary from year to year and is often correlated with drought. Drought conditions were less severe compared to 2021.

# Drought

Drought is an important abiotic factor impacting the resistance and resilience of trees to forest health damage agents. When trees lack adequate moisture, they are unable to produce defensive compounds or withstand reductions in vigor by insects and disease. Many forest health pest outbreaks are tied to drought stress in forests. Less severe drought was observed in 2022 across Wyoming compared to 2021.

## U.S. Drought Monitor Wyoming

**March 29, 2022**  
(Released Thursday, Mar. 31, 2022)  
Valid 8 a.m. EDT



June 28, 2022

September 27, 2022

December 27, 2022

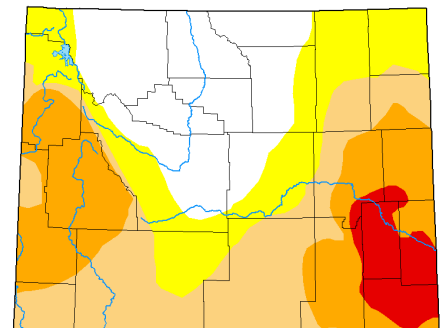
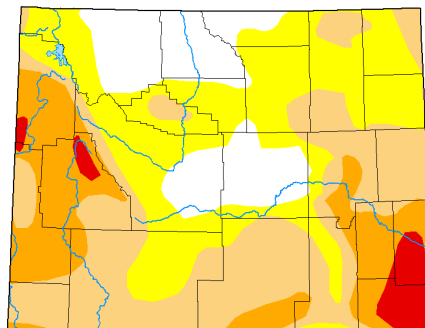
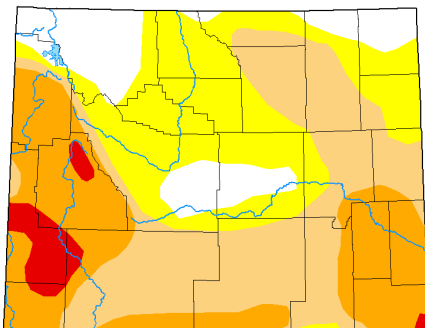


Figure 11. Drought maps for Wyoming at approximate quarter intervals throughout the 2022 year. Each map provides an estimated amount of drought for that day. Level of drought stress fluctuates throughout the year by area.



## Invasive Species

### Emerald Ash Borer

*Agrilus planipennis*

Wyoming State Forestry continues to coordinate and carry out trapping for emerald ash borer (EAB) throughout the state. In 2021, 60 traps were placed across Wyoming. No EAB was found. Traps are placed in high risk communities and areas. Areas are considered high risk if they have any of the following: urban ash trees, along major transportation routes, or in high use tourist areas. EAB has not been positively detected in Wyoming.



Figure 16. Emerald ash borer trap hung in a campground in Buffalo, WY.

### Thousand Cankers Disease

The first confirmation of Thousand Cankers Disease (TCD) in Wyoming was found in 2021. Two trees were identified as having TCD. Both are black walnuts (*Juglans nigra*) located in Cheyenne at separate sites. TCD is considered an “insect-disease complex” consisting of three factors: 1) walnut twig beetle (*Pityophthorus juglandis*), a native beetle that feeds on the inner bark, 2) fungal spores, (*Geosmithia morbida*), carried on wings of the beetle and deposited around galleries, and 3) subsequent canker formation around galleries. TCD originated in the western United States and is not native to Wyoming. No new confirmations of TCD were found in Wyoming in 2022.

### Balsam Woolly Adelgid

*Adelges piceae*

Surveys were done for the invasive insect balsam woolly adelgid in western Wyoming and no specimens were confirmed. Many areas of subalpine fir appear to be declining without definitive cause. Balsam woolly adelgid primarily affects subalpine fir, grand fir and white fir. It is currently found in areas of Utah, Idaho and Montana along the western border of the state.

### Spongy Moth

*Lymantria dispar*

As part of the national USDA spongy moth program, WSFD installed, monitored and evaluated 67 detection traps across 5 counties in 2022. In 2021, 3 positive identifications were made, two in Park County and one in Crook County. In 2022, delimiting traps were done at positive location sites to determine infestation status and extent. No moths were caught in delimiting traps, indicating no populations were established.



Figure 17. Spongy moth detection trap hung in Cheyenne, WY.

## Other Forest Health Damage Agents Recorded in 2022

### Root Rots

Root rots are long lasting destructive pathogens found in forested settings. They may contribute to insect outbreaks by providing influxes of suitable breeding material or make sites hazardous to falling trees. At areas heavily affected by root rot, it is common to find more than one species causing damage. Root rot pathogens persist in the soil and are spread by root to root contact of trees.

- Armillaria Root Disease (*Armillaria spp.*)  
Affects Douglas-fir, true firs, pines, aspen, and spruce. Part of the damage agent complex resulting in subalpine fir mortality.
- Heterobasidion Root Disease S-type (*Heterobasidion occidentale*)  
Found in western Wyoming affecting spruce, Douglas-fir and true fir species.
- Tomentosus Root Rot/False Velvet Top Fungus (*Onnia tomentosa*)  
Primarily found in spruce forests throughout western Wyoming.

### Foliage Diseases

- Marssonina Blight (*Drepanopeziza spp.*)  
Common leaf disease in aspen resulting in premature defoliation. Found throughout Wyoming.
- Rhabdocline Needle Cast (*Rhabdocline spp.*)  
Causes drop of older needles in Douglas-fir. Rarely results in mortality. Recorded in Lincoln County in 2022.

### Other Forest Pathogens

- Dwarf Mistletoe (*Arceuthobium spp.*)  
Most common conifer foliar pathogen within the western part of Wyoming and throughout the intermountain west. Primarily affects pine species and Douglas-fir. Native parasitic plant causing branch die back, top kill and occasionally mortality.
- Cytospora Canker of Fir (*Cytospora abietis.*)  
Contributes to subalpine fir mortality. Commonly associated with stressed trees. Other cytospora species can be found throughout Wyoming affecting spruce and aspen species.
- White Pine Blister Rust (*Cronartium ribicola*)  
Nonnative invasive pathogen resulting in mortality in limber and high elevation white bark pine stands throughout Wyoming.

[For More Information Contact](#)

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