

2009 Wyoming Forest Health Highlights

The Forest Resources:

Evaluating and measuring the forest resources of Wyoming is a complex effort done by several federal, state, and tribal agencies. It is estimated that Wyoming contains between 10.3 – 11.4 million acres of traditional forestland with coniferous and deciduous trees. Approximately 80% of these forests are managed by federal agencies; the remaining 20% are managed by private land owners of these forests with whom the Wyoming State Forestry Division works closely to provide one-on-one technical assistance.

Combined data from all of these various management sources comprise Gap Data (Fig.1). These data include more of the non-traditional forest lands such as wooded draws, conservation plantings on the plains, riparian forests and linear street forests in community settings. Gap data indicate that more than 12.8 million acres could be considered "forests" or lands with extensive tree vegetation". All of these forestlands play an important role in Wyoming Forest Health and are highly valued by residents and visitors of Wyoming.

Figure 1.

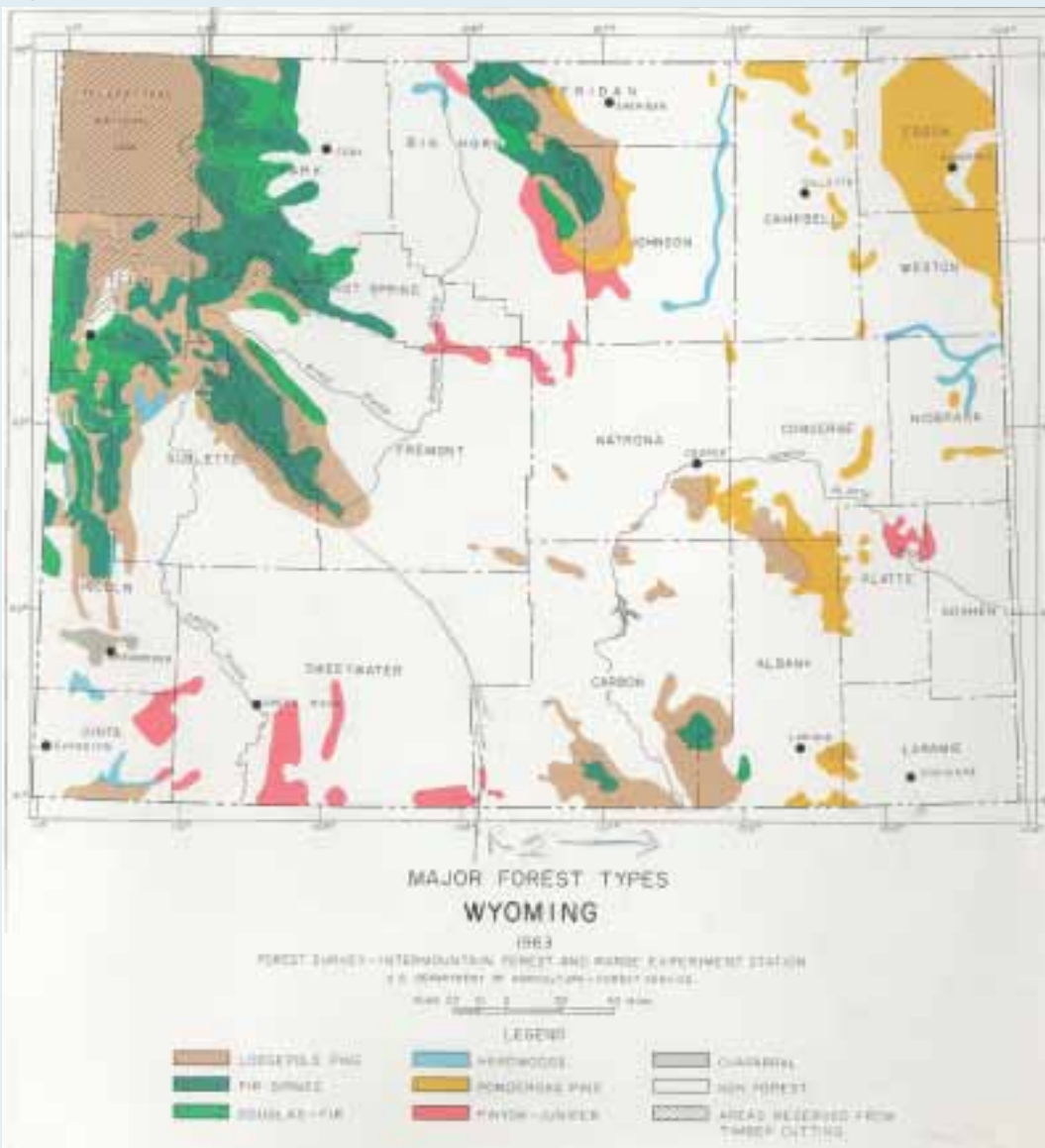


Figure 1 map was created from various data sources in 1963 and shows forest type areas of Wyoming. This was made before GIS and GPS were invented and used for several decades as a Wyoming forest management tool.



Cottonwood,
Wyoming State Tree



Forest Health Issues (Insect, Disease, and Decline concerns in Wyoming)

Mountain pine beetle (MPB) – (*Dendroctonus ponderosae*)

In Wyoming, MPB infests lodgepole, ponderosa and two different 5-needle pine species called limber and whitebark. Generally, limber pines grow at lower elevations from 4000 – 10,000 ft. on relatively harsh sites. Whitebark pines occur at higher elevations from 7000 – 11,000 ft. Both of these species produce pine nuts that are a critical food source to several wildlife species.

MPB is causing extensive pine mortality in several sites around Wyoming forests (Fig.2). These MPB outbreaks vary in extent and severity by location; many outbreaks are at epidemic levels and occur in both mixed conifer and pure pine forests.

Results from 2009 aerial detection surveys on the Bridger-Teton National Forests indicated that MPB continued to cause high levels of tree mortality on the Kemmerer, Big Piney, Grey's River, Jackson and Buffalo Ranger Districts. Increasing levels of mountain pine beetle-caused tree mortality were detected in both lodgepole and whitebark pines in the southern portion of the Pinedale Ranger District and lower Grey's River. Many whitebark forests including those in the Wyoming Range and upper Spread Creek and Blackrock Creek on the Buffalo Ranger District have experienced the loss of almost 100% of susceptible trees. Similar levels of mountain pine beetle-caused tree mortality were mapped on Bureau of Land Management, State, and private lands adjacent to National Forests and National Parks. Mountain pine beetles have also resulted in the loss of 90% susceptible lodgepole pine on the Mountain View and Evanston Ranger Districts, Uinta-Wasatch-Cache National Forest, on the north slope of Uinta Mountains in southwestern Wyoming.

Lodgepole pine forests in Northern Wyoming contained a few small pockets of isolated tree mortality in Big Horn and

Johnson Counties. Given the many outbreaks of MPB across Wyoming and the extensive lodgepole pine stands in the Big Horn Mountains, it was interesting to observe only small pockets of pine mortality. MPB also continues to cause high levels of limber pine mortality in northern Natrona County as well as in Ten Sleep Canyon. The Middle Fork of the Powder River has large areas of limber pine mortality, which is usually a combination of white pine blister rust disease and MPB damages.

MPB populations were rapidly increasing in the mountain ranges in the southern portions of Wyoming. A spectacular, landscape-level epidemic of mountain pine beetle continues to be evident across the lodgepole pine forests of the Medicine Bow National Forest. MPB attacks in lodgepole pine there have increased from 233,000 acres in 2007 to over 343,000 acres in 2009. If the current rate of intensification and spread continues, most of the mature, large diameter lodgepole pine trees in southern Wyoming will be killed within 3-5 years.

Whitebark and Limber pine stands have seen dramatic increases in MPB activity in the 2008 and 2009 surveys in the Wind River and Absaroka Ranges. MPB epidemics in whitebark pine sites began in 2006 and expanded in these mountain ranges. Mortality on some sites has reached almost 100 % of whitebark pine depletion. Similar limber pine depletion has also happened in the Big Horn Mountains due to MPB activity.

Ponderosa pines have been impacted less by MPB. There are small isolated pockets of MPB activity in ponderosa pines in Johnson County on the east side of the Big Horn Mountains. These small groups of ponderosa pine mortality are west of Ranchester, WY on Highway 14 and south of Clear Creek in the Big Horn Mountains. Small pockets of dead ponderosa pines also occur in the Black Hills National Forest on the Eastern edge of Wyoming in Crook and Weston Counties.

Current Bark Beetle Activity in Wyoming From the 2009 Aerial Detection Survey

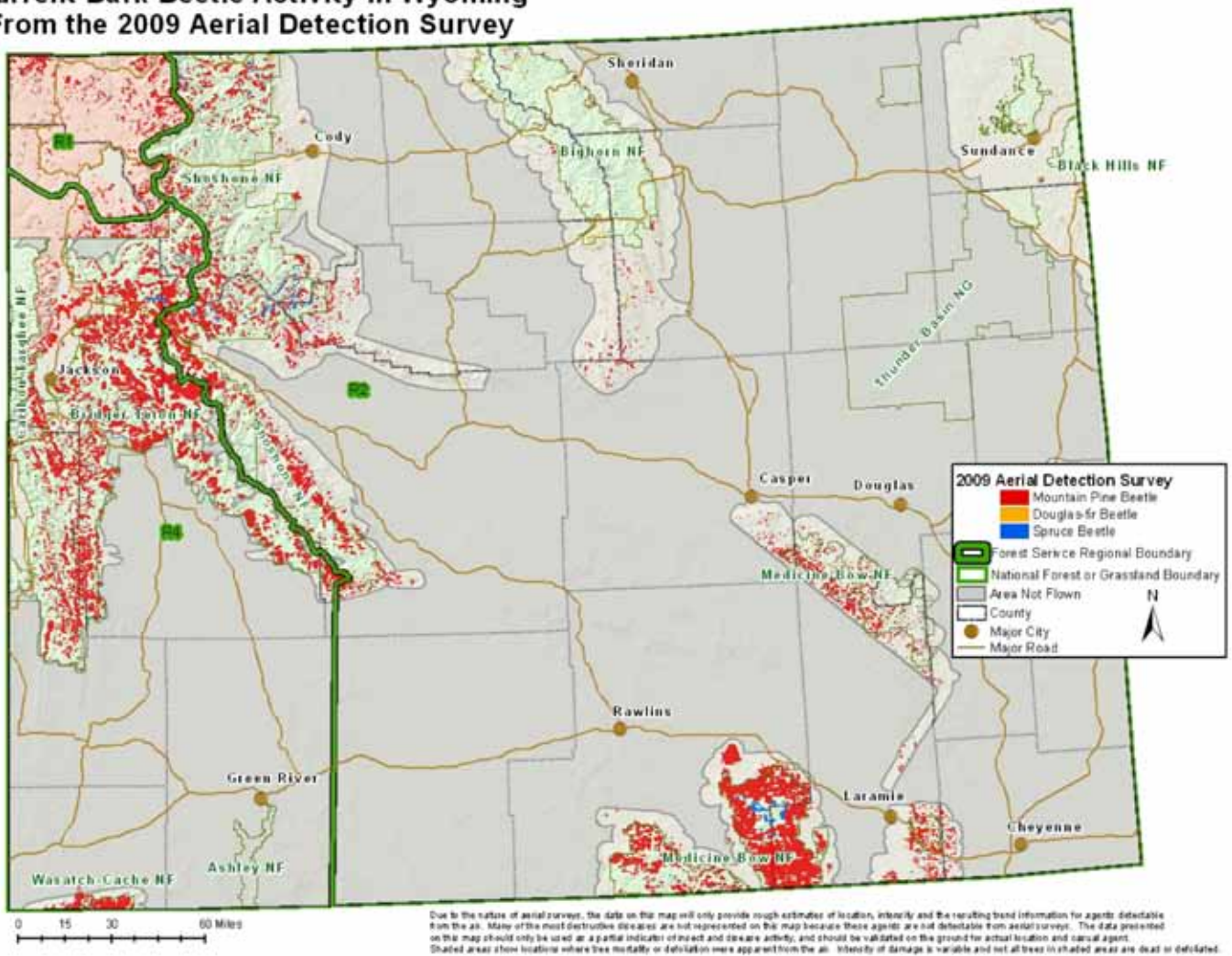


Figure 2. Aerial Detection Survey Map and attached tables of estimated acres with tree mortality. During the 2009 Aerial Surveys, surveyors found the following number of acres of dead or damaged trees from these insects: MPB (mountain pine beetle), SB (spruce beetle), DFB (Douglas-fir beetle), SAF Decline (subalpine fir decline and western balsam bark beetle), and WSBW (Western spruce budworm).

2009 ADS	Acres with Tree Mortality			
MPB – all hosts	1,205,000	}	Lodgepole Pine	932,000
SB	26,000		Ponderosa Pine	22,000
DFB	3,900		5-Needle Pines	32,000
WSBW	16,600			
SAF Decline	116,000			



Dead ponderosa pines near Sheridan, WY on the Bighorn National Forest. These were all killed by Mountain pine Beetle. Note the recent dead (brown) and the older dead (gray) trees.

Spruce beetle (SB) - (*Dendroctonus rufipennis*)

In Wyoming, spruce beetle caused tree mortality to Englemann spruce occurs throughout the spruce forest type on the northern half of the Shoshone NF. Almost all spruce from 4" diameter and larger were killed in the Carter Mountain area. Now SB is causing similar widespread mortality in spruce stands in Sunlight Basin. It appears that much of the spruce type on the northern end of the Shoshone NF will be affected before this major landscape level event subsides. Anywhere spruce is found along the North Fork corridor, most of the larger trees have been killed and many of the smaller ones attacked also.

Low levels of spruce mortality due to spruce beetle were detected in the Bighorn Mountains due to declines in SB populations in Johnson County during 2008 and 2009. Similar trends existed in Natrona County (30 to 5 acres of SB caused mortality) and Washakie County (480 to 6 acres of spruce mortality) in 2008 to 2009.

In southern Wyoming on the Medicine Bow National Forest, SB populations were at epidemic levels along the main drainages of North Platte Creek and Savage Run Creek. Spruce mortality due to spruce beetle is also common within lodgepole pine stands destroyed by MPB in Carbon County. Spruce beetle is also rampant in some stands of the Snowy Range and Sierra Madre Ranges

Douglas-fir Beetle (DFB) – (*Dendroctonus pseudotsugae*)

Douglas-fir beetle caused little tree mortality in 2009 (Fig.2). Most Douglas-fir tree mortality was detected in Curtis Creek located east of the town of Jackson, WY however, the level of new mortality in this area decreased from 2008. The general decline in Douglas-fir beetle caused tree mortality in recent years may be attributed to loss of suitable host trees from epidemics in the 1990's. DFB killed about 75% of the Douglas-fir forest types on the Shoshone NF. In 2009, Douglas-fir mortality by DFB decreased due to previous host tree depletion

in affected stands in the Absaroka, Wind River, and Big Horn Mountain Ranges. However in the southern Bighorn Mountains, there were high levels of current DFB caused tree mortality.

Subalpine Fir Decline (SAF Decline) and Western balsam bark beetle – (*Dryocoetes confusus*)

The rate of Subalpine fir mortality resulting from a complex of insect and disease agents also decreased significantly throughout western subalpine forests in 2009 (Fig.2). Most of the subalpine fir mortality was mapped in Wyoming on the Bridger-Teton National Forest. This is the sixth consecutive year of high mortality in the subalpine fir of that area. There were large pockets of subalpine fir mortality observed in Johnson County in central Wyoming, too.

Western Spruce Budworm (WSBW) (*Choristoneura occidentalis*)

On the Shoshone NF, defoliation caused by western spruce budworm was detected in Douglas-fir stands near Hunter Peak in the Clarks Fork area. Ground observations west of Hunter Peak detected WSBW defoliation also occurring in multi-storied subalpine fir stands.

Non-native, invasive Insects

Detection monitoring continues throughout Wyoming each year to look for establishment of non-native, invasive insects such as Emerald Ash Borer (*Agrilus planipennis*) and Gypsy Moth (*Lymantria dispar*). There were no adult gypsy moths or emerald ash borers found in early trapping efforts in Wyoming during 2009.

Diseases and Declines in Wyoming:

Aspen Decline

Aspen decline and dieback were mapped throughout Wyoming during recent surveys. In 2006, permanent Evaluation Monitoring plots were installed to determine the cause of aspen decline. Aerial survey and monitoring of these permanent plots continues for monitoring of aspen decline.

Localized instances of aspen decline were recorded in the Wind River Range and the Big Horn Mountains, but the total acreage affected in northern Wyoming was small. Drought, wood boring insects, aspen bark beetles, defoliation, and aspen diseases all contribute to the dieback and decline in aspen forests.

Dwarf Mistletoes (*Arceuthobium* spp.)

The parasitic dwarf mistletoe plants are found in several conifer species throughout Wyoming. *Arceuthobium cyanocarpum* infects Limber and Whitebark pines throughout Wyoming and *A. americanum* occurs in lodgepole pines. *A. vaginatum* is found in ponderosa pines in western and central Wyoming, while *A. douglasii* occurs in Douglas-firs only in western Wyoming. These plant parasites remain the most widespread and frequently observed diseases throughout Wyoming.

Currently, dwarf mistletoe incidence information is updated using data gathered by Forest Inventory and Analysis (FIA) crews and in special Forest Health surveys. These Forest Health surveys indicated an increase in dwarf mistletoe incidence on the Big Horn and Shoshone National Forests when compared to similar surveys conducted in the 1950s and 1970s.

Root Diseases:

Annosus Root Disease - (*Heterobasidion annosum*) – This fungal root disease can be found infecting host tree species in Western Wyoming. As a disease causing agent, the full

ecological effects of this organism have never been evaluated over long temporal and spatial scales. However, by killing planted or naturally regenerated seedlings and saplings, *H. annosum* can cause significant forest vegetation losses. This organism is also a saprophyte, and has a vital role in recycling dead trees, stumps, and roots.

Armillaria Root Disease – (*Armillaria ostoyae*, *A. mellea*) - *Armillaria* is another fungal root disease found throughout Wyoming. The fungus functions primarily as a weak pathogen or saprophyte in most locations, causing little direct tree mortality.

Rust Diseases

Comandra Blister Rust – (*Cronartium comandrae*) – This fungal pathogen is one of the most common and damaging agents affecting much of the lodgepole pines in Wyoming. See photos below of infected trees and comandra plants.

White Pine Blister Rust Disease (*Cronartium ribicola*)

White pine blister rust is found on whitebark and limber pines in Wyoming and appears to be spreading and intensifying throughout the state. The disease is causing considerable ecological impacts in some areas of Wyoming as it threatens white pine species ecosystems in some of our most treasured public and private lands, including the wildland-urban interface, Wilderness Areas, and National Parks.

White pine blister rust was discovered at low infection levels in several new locations in south-central Wyoming including the Snowy Mountains and the Sierra Madre Mountains. In the Sierra Madre Mountains, the disease was only observed on several trees on private land along US Highway 80 just east of the Medicine Bow National Forest boundary.

Limber pine mortality is widespread throughout the Bighorn Mountains and Crooks, Green, Ferris, and Shirley Mountain Ranges. Virtually all of the northern Shirley Mountains have declining limber pine due to infection by white pine blister rust.

Comandra Blister Rust Disease, a common and damaging disease on lodgepole pines in Wyoming.

A. Fungal spores are produced on comandra plants and infect nearby lodgepole pines. B. Sporulating blisters are produced on the trees. C. Infection causes cankers to girdle the pines. D. The tree tops die leaving many stunted and spike-topped trees in the forests.



White Pine Blister Rust Survey of the Greater Yellowstone Area (GYA):

In 2004, a multi-agency effort began to monitor the condition of whitebark pine and the incidence of white pine blister rust in the Greater Yellowstone ecosystem (GYE), including Yellowstone and Grand Teton National Parks and Shoshone National Forest in Wyoming. This statistically based survey has been done annually through 2009 and includes 176 permanent plots randomly placed in mature whitebark pine stands across the GYE. Brief summary tables of the White Pine Blister Rust Survey of the Greater Yellowstone Area (GYA) are below.

Brief summary tables of White Pine Blister Rust Survey of the Greater Yellowstone Area (GYA)

Disease Incidence of whitebark pines in survey plots of GYA

Survey Years	Number of Plots	WPBR Incidence
2004-2007	176	20%
2008	Re-survey of 44 plots	25%
2009-2011	Resurvey of remaining plots	Expected to change

Resurvey of plots for whitebark pine mortality and cause in the GYA

Survey Years	White Pine Mortality
2008-2009	5.7% whitebark pines dies
2008-2009	41% of these dead pines were killed by MPB
2008-2009	31% of dead pines were killed by fire

For further information on Forest Health in Wyoming, especially during the "missing years" of Forest Health Highlight reports please refer to the contacts and websites listed below.



Wyoming State Forestry Division
1100 West 22nd St.
Cheyenne, WY 82001
307-777-7586

<http://slf-web.state.wy.us/forestry/health2.aspx>



US Forest Service - Rocky Mountain Region
Region 2 (central/eastern WY)
740 Simms St.
Golden, CO 80401
303-275-5155

<http://www.fs.fed.us/r2/fhm/>

US Forest Service - Rocky Mountain Region
Regions 1 & 4 (western WY)
4746 S. 1900 E.
Ogden, UT 84403
801-476-9720

<http://www.fs.fed.us/r1-r4>