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Montana Forest Insect and Disease Conditions and Program Highlights 2015



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Forest Service Northern Region



Montana Department of Natural Resources and Conservation
Forestry Division

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MONTANA

Forest Insect and Disease Conditions and Program Highlights – 2015

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ABBREVIATIONS

<u>Category</u>	<u>Abbr.</u>	<u>Name</u>
Beetles	DFB	= Douglas-fir beetle
	FE	= Fir engraver
	PE	= Pine engraver
	MPB	= Mountain pine beetle
	RTB	= Red turpentine beetle
	SB	= Spruce beetle
	WBBB	= Western balsam bark beetle
	WPB	= Western pine beetle
Defoliators	DFTM	= Douglas-fir tussock moth
	PB	= Pine butterfly
	WSBW	= Western spruce budworm
Exotic Insects	BWA	= Balsam woolly adelgid
	LCB	= Larch casebearer
Pathogens	LPPDM	= Lodgepole pine dwarf mistletoe
	LPDM	= Limber pine dwarf mistletoe
	DFDM	= Douglas-fir dwarf mistletoe
	WLDM	= Western larch dwarf mistletoe
	WPBR	= White pine blister rust
Hosts	DF	= Douglas-fir
	ES	= Engelmann spruce
	GF	= Grand fir
	HE5NP	= High-elevation 5-Needle Pines (Limber and Whitebark Pines)
	LP	= Limber pine
	LPP	= Lodgepole pine
	PP	= Ponderosa pine
	QA	= Quaking aspen
	SAF	= Subalpine fir
	WBP	= Whitebark pine
	WL	= Western larch
WWP	= Western white pine	
Other	ADS	= Aerial Detection Survey
	BLM	= Bureau of Land Management
	FIA	= Forest Inventory and Analysis
	FHP	= Forest Health Protection
	FS	= Forest Service
	MT	= Montana
	NF	= National Forest
	NP	= National Park
	IR	= Indian Reservation
	RA	= Reporting Area
	RD	= Ranger District
	TPA	= Trees per acre

*For a list of scientific names see Common and Scientific Names, page 52.

HIGHLIGHTS

- Western spruce budworm defoliation was extensive and increased in the number of acres affected from 878,000 acres in 2014 to 1.2 million acres in 2015. Douglas-fir, subalpine fir, and Engelmann spruce were all impacted.
- Mountain pine beetle-caused mortality continued to decline from its 2009 peak of 3.7 million acres to 174,000 acres affected in 2015. Ponderosa, lodgepole, and whitebark pine were killed mainly in Beaverhead, Granite, Missoula, and Ravalli Counties.
- Root disease fungi caused damage and mortality on nearly 3 million acres of NF lands in western Montana.
- In northwestern Montana, larch needle cast declined from a peak of about 50,000 acres in 2011 to about 1,200 acres in 2015.
- Rapid temperature drops on November 11 and 29, 2014 appeared to cause foliar damage to conifers across Montana. Most trees affected appeared to be recovering in 2015, but mortality was noted in a few conifers in native and urban environments.

SUMMARY OF CONDITIONS

Bark Beetles

Mountain pine beetle

Mortality of pine species attributed to MPB was detected across Montana in 2015, although most areas of past activity continue to decline in intensity. In landscapes with few remaining host trees, mortality was often found as scattered trees across a landscape. Some areas of significant mortality were noted, including areas with increased mortality 10-15 years after the initial outbreak began. LPP remains the principal host and accounts for approximately 90% of all tree mortality.

In Montana, overall mortality dropped to about one-third of 2014 acres and two-thirds of 2014 tree numbers. This drop was driven by decreased mortality in LPP, with similar decreases in PP and HE5NP (WBP and LP) but a significant increase in WWP mortality to nearly 5,000 acres. Nearly half of all LPP mortality in Montana (49% of acres) was located in Beaverhead County, with most remaining LPP mortality (44% of acres) detected in Granite, Missoula, and Ravalli Counties. Approximately 59% of all mortality in the HE5NP habitat type also occurred in Beaverhead County with another 21% in nearby Granite County. Approximately 62% of all mortality in PP was found in Ravalli County. These counties constitute significant parts of the Beaverhead, Bitterroot, and Lolo NFs. Nearly all mortality in WWP in Montana occurred in Lincoln County on the Kootenai NF. In areas where susceptible host remains, especially Beaverhead, Granite, Missoula and Ravalli Counties, additional mortality may be expected although suitable stands are becoming scarce. The potential for increased WWP mortality, especially in Lincoln County, needs field assessment.

Douglas-fir beetle

Pockets of DFB-caused mortality in Montana were detected at similar levels in 2015 when compared to 2014. DFB-caused mortality was detected on all land ownership types including federal, state, tribal, and private lands. Tree mortality occurred in spatially isolated pockets scattered throughout the state. DFB activity was often associated with prior WSBW-caused defoliation, and acres of DFB-caused mortality may be under-reported across Montana due to difficulties of detecting DFB activity in trees with extensive WSBW defoliation. Of note, DFB outbreaks continued in locations within the Kootenai NF in the southern portion of Lincoln County; the Rocky Boy's IR in Chouteau County; the Flathead NF in the eastern portion of Flathead County; the Flathead IR in the southeastern portion of Lake County; and on the Helena NF in the eastern portion of Broadwater County.

Much of the DF host type throughout MT has experienced severe WSBW defoliation for the better part of the last decade. This defoliation, if coupled with unusually warm and dry weather or another outbreak catalyst, could promote increased DFB activity in subsequent years.

Other Bark Beetles

Spruce Beetle: SB-caused mortality remained at low levels throughout Montana, causing very low levels of mortality in 2015, similar to what occurred in 2014. Two outbreaks caused substantial mortality from 2010-2013 and then declined sharply to low levels in 2014. These were located on federally managed lands within the Gravelly Mountains, Beaverhead-Deerlodge NF and within the Rock Creek drainage, Custer NF. Ground surveys indicated populations remained at post-epidemic levels in 2015 where beetles only colonized scattered individual trees. SB populations are not expected to erupt again within these locations as the prevalence of susceptible, large-diameter spruce host has been substantially depleted.

Pine engraver: Populations of PE and associated tree mortality continued at low, endemic levels in 2015, with total acres and number of trees killed largely unchanged from 2014. Nearly all mortality was in PP as scattered spots across the state. In Montana, much of the PP mortality attributed to PE was noted in Ravalli County. Areas of high *Ips* species activity noted on the Crow and Northern Cheyenne IRs and Custer NF in 2014 have decreased in 2015. However, ground survey in these locations shows continued significant mortality of up to 20% in areas where slash deposition from thinning treatments occurred. Overall, PE beetle populations have remained fairly static throughout the state. If weather continues to provide near or above normal precipitation patterns and barring large areas of improper slash management, windthrow or storm damage, we expect populations will continue at or near endemic levels.

SAF mortality-complex: SAF mortality is found by ADS at varying levels on an annual basis. We believe that most SAF mortality involves western balsam bark beetle but there are other agents, including root diseases, which are also involved. Because we cannot ground truth all of the SAF mortality we record with ADS to confirm mortality agent, we created the category SAF mortality-complex to cover multiple mortality causing agents. In 2015, SAF mortality-complex was found in approximately 2,100 acres scattered in high-elevation forests throughout the state.

Defoliators

When compared with 2014, the number of acres defoliated by WSBW increased in 2015 by approximately 20% to more than 1 million acres in counties both east and west of the Continental Divide. Defoliation from budworm was recorded in most western counties in Montana. In 2015, defoliation intensity remained high in many areas, especially on several forests east of the Continental Divide, where budworm has been recorded for several years. Counties with significant budworm defoliation include Flathead, Granite, Lewis & Clark, Meagher, Missoula, Park, and Powell. This includes NF lands intermingled with surrounding lands of other ownerships.

No defoliation from DFTM, PB, nor LCB was recorded by ADS in 2015. Ground surveys, however, found small, isolated pockets of defoliation from PB.

Exotic/Invasive Insects

Balsam wooly adelgid: BWA was first detected in Montana in 2010 through ground surveys. Extensive ground surveys were conducted in 2013 throughout the state by Montana Department of Natural Resources and Conservation, and R1 FHP. These surveys found BWA in

Broadwater, Flathead, Gallatin, Granite, Lewis and Clark, Lincoln, Mineral, Missoula, Park, Ravalli, and Sanders Counties. In 2014, ADS first recorded BWA and in 2015 ADS found 358 acres with BWA damage. We expect detections of BWA to increase as aerial observers continue learning the visual signature and as BWA continues to cause more extensive tree damage within the state. Also in 2015, the Idaho-Montana border in Beaverhead County was accessed via trail and surveyed; no infestations were detected

BWA is an exotic pest that causes branch dieback and can cause tree mortality. The most obvious indicator of its presence is the white “wool” covered females on the bark of stems and branches of trees during summer months. Thus far BWA infections have been observed causing branch dieback and overall stress in host trees within Montana. Direct mortality caused by BWA has not been documented thus far in MT; however, we expect BWA infections to make trees highly susceptible to other mortality agents and eventually contribute to tree mortality.

Gypsy Moth: Gypsy moth is an exotic insect that is established in the northeastern United States and causes extensive defoliation in a wide variety of tree species. Gypsy moth is currently not established in Montana and in 2015 gypsy moth traps were set by FS and various partnering agencies throughout the state with no positive detections.

Root Diseases

Root diseases are diseases of the site and do not change drastically from one year to the next. Based on a recent assessment using Forest Inventory and Analysis (FIA) plots, root disease fungi are estimated to cause damage and mortality on nearly 3 million acres of NF lands in western Montana. Root disease hazard, calculated from the FIA root disease data, occurs at some level on over 6.5 million acres in western Montana across all ownerships. Root disease-caused mortality is more common west of the Continental Divide. We currently do not have an assessment of root disease distribution and impact east of the Continental Divide. In general, large areas of root disease can be found east of the Divide, but it tends to occur in more discrete patches, rather than being ubiquitous throughout an area. Also, root diseases can be commonly found in riparian areas east of the Continental Divide, often in ES and SAF. The most impacting root diseases are Armillaria root disease, laminated root rot, Heterobasidion root disease, schweinitzii root and butt rot, and to a lesser extent tomentosus root rot.

Foliage Diseases and Tip Blights

Larch needlecast has declined since it peaked in 2011 and 2012 with nearly 50,000 acres detected by ADS each of those years after only 24 acres were detected in 2010. In 2013, the acreage dropped to about 12,000 acres and rebounded slightly to 16,500 acres in 2014. In 2015, the downward trend continued with only about 1,200 acres detected in Montana.

ADS detected over 3,000 acres of lodgepole pine needlecast in 2015. No acres were detected in 2014. Most acres were mapped in Jefferson County (2,634 acres) southeast of Helena on the northwest slopes of the Elkhorn Mountains, but several polygons were mapped in Powell County (346 acres) and one small polygon was mapped in Lewis and Clark County (26 acres).

Dwarf Mistletoes

Historical assessments of dwarf mistletoe stands in Montana show that about 16% of DF, 33% of LPP, and 30% of WL stands are infected with dwarf mistletoe. More recent assessments using FIA data collected on over 50,000 trees across Montana show that only about 1% of DF, 3.2% of LPP, and 3.9% of WL trees are infected. The clumpy nature and protracted disease-cycle of dwarf mistletoes allow for impacts across an individual stand to range from none to severe. The clumpy nature of dwarf mistletoe is likely the reason for differences between these two measurements; the first is measuring infected stands and the second is measuring infected trees.

White Pine Blister Rust

Western white pine

Mature WWP continues to be lost due to a combination of WPBR and MPB. ADS detected a significant increase of MPB in WWP in Lincoln County, from 2 acres in 2014 to nearly 5,000 acres in 2015. Lack of suitable sites, either man-made or natural, limits natural regeneration and WPBR may kill a high proportion of natural seedlings. Rust-resistant stock is planted operationally on suitable WWP sites on federal, state, industrial, and private forest lands throughout northwestern Montana. In addition to planting rust-resistant stock, pruning of the lower bole is an important tool used in WPBR management.

Whitebark pine

WPBR has been impacting WBP ecosystems for many decades. In addition, recent outbreaks of MPB have caused widespread mortality in many WBP stands already impacted by WPBR. The combination of WPBR, bark beetle outbreaks, and lack of natural regeneration due to fire suppression has raised concerns about the long-term viability of WBP ecosystems.

Standardized methodology is now being used to establish monitoring plots in WBP stands throughout the West. These plots are designed to provide a statistically-based assessment of the incidence of WPBR in the ecosystem and the condition of WBP. Whitebark and Limber Pine Information System, WLIS, is an older database which was developed (<http://www.fs.fed.us/r1-r4/spf/fhp/prog/programs2.html>) to compile and provide results of surveys in both WBP and LP. WLIS has been expanded to include 4 other HE5NP and has been re-named the HE5NP Database (Hi5Db). Its completion and availability is contingent upon funding, but data can still be submitted for inclusion in the final product. Please contact the Missoula FHP office for further information.

Limber pine

LP is found at elevations ranging from 2,700 feet near the community of Terry in far eastern Montana to around 9,000 feet in and around the Beaverhead-Deerlodge NF in southwestern Montana. West of the Continental Divide, LP is largely confined to limited areas adjacent to the Continental Divide, while scattered populations of LP can be found across much of eastern Montana. WPBR is found throughout the distribution of LP, but there are a few areas where LP remains apparently free of the disease, including locations southwest of Ennis and south of Billings.

Damage that might be confused with white pine blister rust

Pine leaf adelgid (*Pineus pinifoliae* Fitch) continues to significantly impact planted WWP in Lincoln County. Damage is similar to that caused by WPBR branch cankers and includes branch flagging; swollen branch ends; red needles much like a needle disease, except multiple years involved; numerous cohorts of red needles remaining attached; and resin droplets on affected branches. Damage is also being noted in natural WWP in various locations, including Glacier National Park.

Quaking Aspen Damage

Damage to QA is mapped occasionally by aerial surveyors when other damage activity is low and QA damage is striking. In most counties, total mapped acres in 2015 were well under 100. However, in two counties over 150 acres were mapped (Madison and Meagher), with over 300 acres mapped in Gallatin County. Nearly all affected acres were on private lands. The cause of the >1,000 total acres of QA damage is unknown and may differ by location. However, old age and conifer encroachment have both been identified as causes in QA damage in Montana.

Abiotic Damage

Variable levels of foliar damage were observed in conifers across Montana. Damage observed in western redcedar and various pine species is likely due, at least in part, to rapid temperature drops on November 11 and 29, 2014 (Figure 1). Western redcedar was especially impacted in areas of northwest Montana. A small proportion of affected conifers were killed, but most showed new growth during 2015.

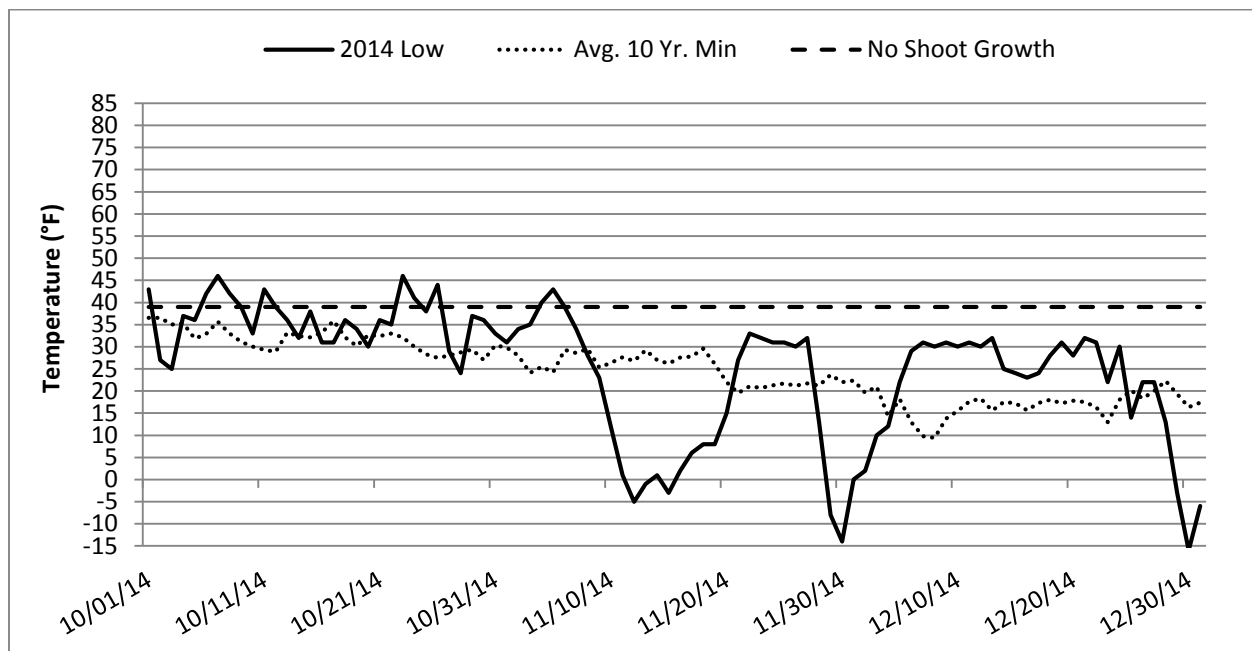


Figure 1. Data from Hungry Horse weather station showing above average nighttime low temperatures in October followed by substantial below average low temperatures in November and December 2014. Dashed black line shows temperature at which western redcedar stops shoot growth and winter hardening accelerates.

Very little windthrow damage was detected by ADS in 2015, but a cluster of polygons totaling almost 100 acres was detected in the southwest portion of Meagher County in the Crazy Mountains.

ANNUAL AERIAL DETECTION SURVEY

Aerial detection surveys are an overview assessment designed to locate and document forest change events, as seen from the air. It is a form of data collection that allows the observer to survey large tracts of forested land in a relatively short period of time. Single engine, high-wing aircraft flying at speeds of approximately 90 to 130 mph at an average altitude of 1,500 feet above ground level are used to fly either contour or grid patterns within a Reporting Area. The damage extents, or polygons, of the aeri ally detected signatures of recently killed or defoliated trees are marked on a digital sketch mapping system. These polygons are given a code for the agent that likely caused the damage, which is inferred from the size and species of trees affected as well as the color and pattern of the damage. The agent code is followed by the total number of trees affected, TPA affected, or an intensity of the damage (L for light and H for heavy). Areas burned by wildfire are not surveyed until the third year following a fire, as it can be difficult to distinguish mortality caused by fire from that caused by insect or disease activity. The actual amount of mortality from tree diseases, dwarf mistletoes, and WPBR are greatly underestimated with ADS because symptoms from these agents can be difficult and, in some instances, impossible to identify from the air.

The annual ADS in Montana was conducted from June 29 to September 30, 2015. The survey encompassed approximately 29.6 million acres of mixed ownership forested lands, excluding most designated wilderness areas (Figure 2). Four FHP observers, using three contract aircraft, conducted the 2015 ADS and identified approximately 1.4 million acres of forest damage within Montana.

The data summarized in this report are a product of the annual ADS, as well as ground surveys and biological evaluations. The digital data files, data summaries, and ADS damage maps are available from the Missoula FHP Field Office, in both paper and digital GIS format. Data may also be downloaded from [our FS webpage](#).

INSECT AND DISEASE CONDITIONS BY COUNTY

County Results

For each county, damage by ownership is noted and, to the extent possible, we have indicated areas affected and estimated extent of damage. Counties that are not included had no reported information. Forestland data in the following tables are from the annualized surveys performed by USDA Forest Service, FIA (<http://www.fia.fs.fed.us>). In some of our tables acres of damage are reported for some ownership where there is no forestland reported by FIA. Because of the limited forestland within ownerships of some counties, the density of FIA plots may not have been sufficient at the county level to identify forested acres (i.e. forestland exists but was missed in the FIA sample resulting in an estimate of zero acres). This discrepancy is within their standard of error. Acres flown include areas of non-forest covered during the survey.

Beaverhead County

Forestland, Mortality, and Defoliation by Ownership (2,285,999 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	1,094,662	117,673	46,521	31,220	1,290,078
DFB	102	28	17	17	164
SB	123	30	2	8	163
MPB-LPP	68,020	2,016	2,749	666	73,451
MPB-PP	14	2	0	2	18
MPB-HE5NP	8,543	62	137	12	8,755
SAF Mortality-Complex	52	8	0	6	66
WSBW	7,573	2,622	1,292	1,056	12,543
QA Damage	4	14	36	0	55

Much of the same areas of Beaverhead County were flown in 2014 and 2015, and most forested acres within the county were observed from the air. Bark beetle-caused mortality from DFB and MPB both decreased when compared to 2014. In 2015, impacted acres and number of trees killed by MPB in both LPP and HE5NP dropped to less than half of 2014 estimates. Nevertheless, approximately half of Montana's MPB activity in both LPP and HE5NP occurred in Beaverhead County making it one of the last areas where significant mortality is still occurring. DFB activity (less than 200 acres) is scattered across the county wherever large DF is found. Whether this DFB activity is focused in the drier DF habitat type or not has yet to be explored.

Scattered mortality from SB doubled in 2015, with spots found throughout the county and concentrations in the Pioneer Range. Despite the increase, total affected acres was still low at approximately 160 acres. SAF mortality-complex was below 100 acres and WSBW-caused defoliation has dropped 2.5 fold to approximately 12,500 acres.

BWA surveys were conducted via trail along the Idaho-Montana border including Moose Creek, Big Swamp Creek, Big Lake Creek, and Miner Creek drainages. No BWA were detected.

Aspen damage was observed via ADS in 6 polygons ranging from 2 to 35 acres in the southeast part of the county totaling 55 acres. This is about one-third of the acres detected in this general area in 2014. DFB, WSBW, and schweinitzii root and butt rot are expected to continue causing tree mortality within the dry Douglas-fir type such as around the Bender Center at Birch Creek if no changes are made to stand conditions.

WPBR is common in WBP and LP. LPDM is present in this county.

Big Horn County

Forestland, Mortality, and Defoliation Acres by Ownership (703,743 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	0	6,545	405,070	22,418	434,034
DFB	0	6	0	0	6
MPB-LPP	0	6	0	0	6
MPB-PP	0	4	0	0	4
MPB-HE5NP	0	6	0	0	6
PE	0	76	40	0	116
SAF Mortality-Complex	0	2	0	0	2
WSBW	0	2,776	0	0	2,776
QA Damage	0	129	299	0	428

Areas flown by ADS in Bighorn County in 2015 were similar to those flown in 2015. The only notable tree mortality was due to PE. In this case, ground surveys indicated recent *Ips* species-complex activity noted in prior years has returned to endemic levels in 2014 and 2015. Localized areas did have elevated *Ips* species activity on the Northern Cheyenne IR in management areas harvested in winter.

WPBR is present in LP in this county. LPPDM is known to significantly impact LPP in areas of the Pryor Mountains. LPDM is also present in this county.

Blaine County

Forestland, Mortality, and Defoliation Acres by Ownership (64,886 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	0	75,012	57,319	4,589	136,920
DFB	0	8	0	0	8
MPB-LPP	0	12	2	0	14
MPB-PP	0	16	0	0	16
PE	0	10	0	0	10
SAF Mortality-Complex	0	2	0	0	2

Areas of the Little Big Horn Mountains around Hayes (Fort Belknap IR) surveyed in 2015 indicate decreasing insect activity, with DFB, MPB, PE, and SAF each found with under 20 acres of detected mortality. It should be noted that Fort Belknap IR has had an active program for removal of dying, infested trees. These removals likely occurred prior to aerial survey resulting in a lower estimate of actual insect-caused tree mortality. Approximately 180 trees were reported removed by crews in 2015, with previous year's removals around 400 trees.

A site visit to the Fort Belknap IR in 2015 found unique and extensive damage in a PP stand southwest of the Powwow Grounds. A yet-to-be-identified agent (or agents) is causing twisted stems, yellowing crowns, canker-like symptoms on boles, and small pockets of mortality in 5 to 10 inch dbh PP.

Western gall rust and comandra blister rust are common in PP on the Fort Belknap IR causing stem deformities, branch mortality, top kill, and occasional whole tree mortality. Armillaria root

disease is found on the Fort Belknap IR, in the Mission Canyon area, with large pockets developing in DF and QA. LPPDM is also present in the county.

Broadwater County

Forestland, Mortality, and Defoliation Acres by Ownership (469,538 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	163,148	29,996	94,683	0	287,829
DFB	521	0	117	2	641
MPB-LPP	10	0	2	0	12
MPB-PP	2	0	4	0	6
MPB-HE5NP	2	0	0	0	2
SAF Mortality-Complex	6	0	0	0	6
WSBW	19,785	734	298	0	20,817
Lophodermella concolor	272	0	57	0	329

Most of the forested area in the county was flown in 2015. WSBW was by far the insect causing the most tree damage. Number of acres defoliated by WSBW almost doubled when compared to 2014, with most of the defoliation seen along the northern border of the county. Levels of DFB-caused tree mortality remained similar to 2014, with most of the mortality seen along the eastern border of the county, and MPB remained low and scattered mostly in the eastern part of the county.

ADS identified a cluster of polygons of lodgepole pine needlecast totaling over 2,600 acres, with one 328-acre polygon in Broadwater County and eight separate polygons totaling over 2,300 acres in neighboring Jefferson County. These polygons are concentrated southeast of Helena on the northwest slopes of the Elkhorn Mountains.

WPBR has been found in LP in this county. Armillaria root disease is present in the county, and schweinitzii root and butt rot is quite common, especially causing significant decay in butt logs of larger, older DF. LPPDM is also present in the county.

Carbon County

Forestland, Mortality, and Defoliation Acres by Ownership (374,095 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	170,321	90,347	45,058	6,188	311,915
DFB	10	0	0	0	10
SB	29	0	2	0	31
MPB-LPP	74	0	0	0	74
MPB-HE5NP	25	0	1	0	26
SAF Mortality-Complex	6	0	0	0	6
WSBW	701	79	150	0	930
QA Damage	0	0	2	0	2

Aerial surveys primarily occurred within an area of the Beartooth Mountains in the western portion of the county near Red Lodge, MT and in the Pryor Mountains in the eastern portion of the county. In these areas, MPB activity continued within LPP and WBP. Ground surveys indicated pockets of MPB-caused mortality decreased substantially throughout the Rock Creek drainage but continued at higher elevations in the Picket Pin area. The SB outbreak that occurred within the Rock Creek drainage in recent years has subsided in the area. Small,

scattered pockets of WSBW were detected in the southern Pryor Mountains on the Crow IR in the eastern portion of the county.

QA damage was observed via ADS in a two-acre polygon about 7.5 miles northwest of Red Lodge.

Spruce broom rust and tomentosus root rot in ES are prevalent in various campgrounds in this county. A field visit to the Beartooth Ranger District of the Gallatin NF documented tomentosus root rot causing declining crowns in ES all along the Limestone Road throughout the spruce dominated forests along Picket Pin Creek.

WPBR is common in WBP and LP, and LPPDM and LPDM are present in this county.

Carter County

Forestland, Mortality, and Defoliation Acres by Ownership (408,629 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	65,752	0	37,515	0	103,268
PE	41	2	18	6	68

Forested lands within the Custer NF southwest of Ekalaka, MT, were surveyed by ADS. The only damaging agent found was PE causing PP mortality on 68 acres,

Cascade County

Forestland, Mortality, and Defoliation Acres by Ownership (539,052 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	182,991	26,385	99,045	14,143	322,566
DFB	81	2	20	12	115
SB	11	0	1	0	12
FE	2	0	0	0	2
MPB-LPP	6	2	6	0	14
MPB-PP	4	4	33	7	49
MPB-HE5NP	1	0	0	0	1
PE	2	0	2	0	4
SAF Mortality-Complex	10	0	0	0	10
WSBW	3,865	3,090	16,672	2,823	26,450
QA Damage	0	0	34	0	34

In 2015, most of the forested portion of Cascade County was covered by ADS. WSBW caused large areas of defoliation in the southern part of the county bordering Judith Basin, Lewis and Clark, and Meagher Counties, and WSBW increased more than four-fold in the number of acres defoliated in 2015 when compared to 2014. Number of acres recorded with DFB-caused mortality remained low in 2015; however, the intensity or TPA increase in some areas. MPB-caused tree mortality significantly decreased for all host species across the county. SB, FE, PE, and SAF-mortality complex were also recorded at very low levels.

Aspen damage was observed via ADS on one 34 acre polygon about 24 miles south of Great Falls. This is less than the 43 acres detected in other areas of southern and eastern portions of the county in 2014.

WPBR is common in LP in this county. Armillaria root disease is present in the southeastern portion of the county, and schweinitzii root and butt rot is quite common, causing significant decay in butt logs of larger, older DF. Tomentosus root rot is known to occur in several areas and Elytroderma needle disease in LPP has been noted in Aspen Campground.

Chouteau County

Forestland, Mortality, and Defoliation Acres by Ownership (263,551 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	16,135	10,267	33,959	1,466	61,828
DFB	24	68	49	2	143
SB	0	0	2	0	2
MPB-LPP	6	0	6	0	12
MPB-PP	0	2	0	0	2
WSBW	420	1	140	3	564

Similar areas of the Bear Paw and Highwood Mountains were flown in 2014 and 2015. Nevertheless, total bark beetle activity has decreased in the county. DFB-caused mortality was found at low levels in 2015, down to under 150 total acres. Less than half of 2014 MPB activity was noted in 2015, down to under 20 acres. Detection of bark beetle-killed trees on Rocky Boys IR is likely lower due to removal of dead and dying trees by tribal crews. Only WSBW-caused defoliation was up, with over 500 acres affected.

Armillaria root disease continues to be an agent of concern in various locations on the Rocky Boy's IR. Also, butt rot and breakage caused by *Ganoderma applanatum* has been observed in QA on the Rocky Boy's IR. White trunk rot caused by *Phellinus tremulae* is also common in older aspen stems as evidenced by the presence of conks.

Deer Lodge County

Forestland, Mortality, and Defoliation Acres by Ownership (376,394 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	202,931	6,255	34,088	40,999	284,275
DFB	6	2	18	18	44
SB	2	0	0	0	2
MPB-LPP	247	2	347	35	631
MPB-PP	2	0	0	0	2
MPB-HE5NP	143	0	250	8	401
SAF Mortality-Complex	4	0	0	0	4
WSBW	1,501	0	349	535	2,385

Aerial survey of Deer Lodge County shows one of the largest drops in bark beetle activity in 2015 of any county in Montana. Although slightly less area was surveyed in 2015 compared to 2014, the un-surveyed area encompassed the non-forested I-90 corridor. Over all host types, MPB dropped from nearly 21,000 acres in 2014 to just over 1,000 acres in 2015, while DFB dropped from over 1,000 acres to under 50 acres. The only increased insect activity noted was WSBW defoliation which grew from approximately 30 acres to over 2,300 acres.

WPBR has been found in LP in this county. Schweinitzii root and butt rot is common in DF, causing decay in butt logs but not acting as an aggressive root pathogen. LPPDM and LPDM are also present in the county.

Fergus County

Forestland, Mortality, and Defoliation Acres by Ownership (1,004,223 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	87,603	185,151	248,799	12,419	533,972
DFB	30	20	199	2	251
SB	2	2	0	0	4
MPB-LPP	0	5	7	0	12
MPB-PP	20	15	112	11	157
PE	0	2	24	0	26
SAF Mortality-Complex	0	0	2	0	2
WSBW	10,769	278	3,123	0	14,170
QA Damage	0	0	18	0	18

WSBW was the most important tree-damaging insect in Fergus County in 2015. Number of acres defoliated and defoliation intensity remained similar to 2014, with most of the damage from WSBW found in the southern part of the county. MPB activity significantly decreased compared to 2014, and was found at low and scattered levels in forested areas in the central and southern part of the county. SB, PE, and SAF-mortality complex were all recorded but at very low levels.

Aspen damage was observed by ADS on 2 acres 17 miles south southeast and 16 acres 17 miles southeast of Lewistown. This is less than half the 40 acres detected across 6 polygons in 2014 about 10 miles west of these polygons and north of the Big Snowy Mountains.

Armillaria root disease occurs in the Moccasin Mountains north of Lewistown and near Crystal Lake, and LPPDM is also present in this county.

Flathead County

Forestland, Mortality, and Defoliation Acres by Ownership (2,219,167 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	1,742,530	499,966	418,304	131,155	2,791,955
DFB	1,256	10	151	25	1,442
SB	78	2	2	10	92
FE	35	0	8	0	43
Larch Needle Diseases	0	0	0	116	116
MPB-LPP	750	2	28	59	839
MPB-PP	14	0	9	3	26
MPB-WWP	4	0	0	0	4
PE	0	0	2	0	2
SAF Mortality-Complex	171	2	4	8	185
WSBW	92,965	18,943	5,953	14,843	132,704

Most of the county was flown in 2015 with the exception of wilderness areas. The insect causing the most damage in the county again was WSBW. Acres with defoliation from WSBW decreased three-fold but is still considered high and scattered throughout the county. WSBW is still very active in the Whitefish, Flathead, and Swan Mountains. No defoliation from DFTM was

recorded via ground or ADS surveys in 2015. DFB activity remained elevated and at similar levels as in 2014. DFB-caused mortality may continue over the next few years due to the extent of DF experiencing damage in wildfires in 2015. Fire in combination with high levels of WSBW defoliation can also increase the risk of DFB outbreaks.

MPB activity significantly decreased in LPP and PP, both in acres affected and intensity. MPB activity remained low in WWP and HE5NP in 2015. MPB can be found more commonly in the southern part of the county in the Swan Valley.

SB increased in 2015 but is still at relatively low levels, while FE and PE activity remained very low. SAF mortality decreased in 2015 and is at low levels.

Low levels of larch needle cast were detected via ADS in one 116 acre polygon about two miles east northeast of Duck Lake on a south facing slope. This continues the trend of reduced larch needlecast that peaked in 2011. There was no larch needlecast detected in 2010, followed by 18,619 acres (2011), 8,986 acres (2012), 3,849 (2013), 1,193 (2014), and finally 116 acres detected in 2015.

Elevated levels of Rhabdocline needle cast in DF and lodgepole pine needlecast in LPP were observed at the Bigfork Tree Improvement Area in 2015. DFB and root disease are causing tree mortality in several stands in the Lost Beetle Project Area. Also, rapid drops in temperature on November 11th and 29th, 2014 were likely responsible for the extensive damage to western redcedar seen in the Tally Lake Ranger District and other portions of northwestern Montana.

A site visit to the Fortine Ranger District of the Kootenai NF documented almost 20 acres of blowdown on the ridge between Harvey Creek and Sunday Creek Drainages. Several bark beetle species were found making use of the recent DF and ES blowdown and several decay agents were involved in the breakage.

A site visit to the Native Plant Nursery in Glacier Park documented a number of minor agents affecting their plants, but the most noteworthy was leaf rust on rough fescue, likely caused by *Puccinia brachypodii* var. *poae-nemoralis*. A site visit to Logging Creek and Quartz Creek Campgrounds in Glacier National Park documented the presence of Armillaria root disease in DF in Logging Creek Campground, and the presence of red belt fungus causing significant decay in previously topped dead DF trees. High water from past spring runoffs was found impacting trees along the creek in Quartz Creek Campground, and pine leaf adelgid was noted in natural WWP saplings near these campgrounds.

WPBR is common in both WWP and WBP in this county. Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are Heterobasidion root disease in firs, Armillaria root disease, and schweinitzii root and butt rot. The tree species most affected by all root diseases are DF and true firs. Heterobasidion root disease is known to occur in PP in this county. DFDM, LPPDM, and WLDM are present and common in this county.

Gallatin County

Forestland, Mortality, and Defoliation Acres by Ownership (1,242,626 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	595,679	54,847	216,286	19,496	886,307
DFB	62	4	178	8	253
SB	52	6	14	0	72
MPB-LPP	18	2	8	0	28
MPB-PP	4	0	2	0	6
MPB-HE5NP	60	4	0	0	64
PE	4	0	0	0	4
SAF Mortality-Complex	68	0	11	1	79
WSBW	16,298	0	6,478	581	23,357
QA Damage	4	0	321	0	325

Aerial surveys detected WSBW as the most active pest agent within Gallatin County in 2015. WSBW-caused defoliation continued at higher infestation levels than observed in 2014 throughout the Gallatin Canyon and Bridger Mountains. MPB activity remained at low levels throughout the county in LPP. In WBP, MPB activity had been high in recent years as this host acted as a refugium for populations that have declined sharply in LPP since 2010. However, MPB in WBP declined sharply in 2015 and returned to endemic levels in many high-elevation stands.

Similar acres of DFB activity were detected in 2015 as in 2014. Ground surveys indicated DFB typically occurred in small, isolated pockets within the Portal Creek drainage and in adjacent drainages between there and the Big Sky ski resort. Similarly, DFB activity occurred in scattered pockets just northeast of the Bridger Mountains in the Elkhorn Ridge area. DFB-caused mortality is often hard to detect in trees defoliated by WSBW; thus, the aerial surveyed acres and trees reported for DFB in this county are likely underestimated.

Aspen damage was observed via ADS on 11 polygons ranging from 9 to 77 acres in the northeast corner of the county totaling 325 acres. This is a substantial increase from the 39 acres detected in 6 polygons widely scattered across this area of the county in 2014.

Significant levels of schweinitzii root and butt rot and decay caused by tomentosus root rot in DF and ES occur in campgrounds and other portions of the Gallatin NF. Black stain root disease has been identified from DF but is considered of minor importance.

LPPDM is a management concern in various areas, especially on flat land with obsidian sandy soils. LPDM is also present in the county.

WPBR is common in WBP and LP in this county.

Glacier County

Forestland, Mortality, and Defoliation Acres by Ownership (370,348 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	33,208	203,177	160,795	0	397,181
DFB	4	382	40	0	426
SB	0	183	0	0	183
MPB-LPP	0	4	0	0	4
SAF Mortality-Complex	0	26	2	0	28
WSBW	5	18,835	498	0	19,338
QA Damage	2	0	18	51	72

Aerial surveys were limited to the western portion of Glacier County in 2015. In this area, WSBW activity continued at similar levels as were detected in 2014. DFB activity continued at low levels within widely scattered groups in this portion of the county.

Aspen damage was observed via ADS on 11 polygons ranging from 2 to 39 acres in the western half of the county totaling 72 acres. This is substantially less than the nearly 1,600 acres detected in 2014.

WPBR is common in WBP and LP. Genetically superior WBP trees above the Going-to-the-Sun Highway near Siyeh Bend appear to still be relatively free from WPBR.

Armillaria root disease is known to be a significant pathogen in DF in the western portion of the county on the Blackfoot IR and the Lewis and Clark NF, and LPPDM and WLDM are present in this county.

Golden Valley County

Forestland, Mortality, and Defoliation Acres by Ownership (85,852 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	17,111	5,704	58,463	0	81,278
DFB	18	8	20	0	46
SB	0	0	2	0	2
MPB-PP	10	2	20	4	36
MPB-HE5NP	4	0	0	0	4
SAF Mortality-Complex	2	0	0	0	2
WSBW	4,571	1,196	1,125	126	7,018

Aerial surveys were limited to the northern portion of Golden Valley County in 2015. In this area, WSBW activity continued at similar levels as detected in 2014. Similarly, DFB activity continued at low levels in scattered pockets of defoliated trees in the area surveyed.

Granite County

Forestland, Mortality, and Defoliation Acres by Ownership (1,047,318 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	599,706	25,970	164,547	25,903	816,128
DFB	106	16	75	6	203
MPB-LPP	20,867	18	315	22	21,222
MPB-PP	6	2	8	0	16
MPB-HE5NP	3,102	0	46	0	3,148
SAF Mortality-Complex	16	0	0	0	16
WPB	6	0	0	0	6
WSBW	56,665	2,523	7,389	1,188	67,765

In both 2014 and 2015 nearly the entire county was surveyed. Although WSBW defoliation nearly doubled in 2015 to approximately 68,000 acres, all other insect activity decreased to one-quarter or less of 2014 levels. Under 25,000 acres of MPB-caused tree mortality were detected in 2015. Although greatly decreased this was nearly 14% of all MPB-caused mortality in the state (14% of LPP and 21% of HE5NP).

Common root diseases found in this county include Heterobasidion root disease in firs, Armillaria root disease, schweinitzii root and butt rot, and tomentosus root rot. DF and true firs are most affected by the first three root diseases and ES, SAF, and DF are most affected by tomentosus root rot. Heterobasidion root disease is known to occur in PP.

Elytroderma needle disease is a significant agent in PP in localized areas.

LPPDM and WLDM are present in this county. A site visit to BLM lands west of Phillipsburg and adjacent to private land in-holdings documented moderate levels of LPPDM. Dwarf mistletoe bole infections were common at 5 feet or below. Additionally, western gall rust branch and bole infections were common throughout the area.

Hill County

Forestland, Mortality, and Defoliation Acres by Ownership (71,123 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	0	0	32,124	1,530	33,654
DFB	0	18	10	2	30
SB	0	2	0	0	2
MPB-LPP	0	39	6	0	45
MPB-PP	0	2	0	0	2
SAF Mortality-Complex	0	2	0	0	2
WSBW	0	22	44	20	86

Within Hill County only a small portion of the Bear Paw Range within the Rocky Boys IR was surveyed in both 2014 and 2015. Bark beetle activity is low with scattered mortality from MPB and DFB under 50 acres each. However, removal of dead and dying trees by tribal crews likely decreased the level of mortality detected on the Rocky Boys IR. Defoliation from WSBW was the only increased activity noted, although the scattered defoliation is still under 100 acres total.

Armillaria root disease continues to be an agent of concern in various locations on the Rocky Boy's IR. Schweinitzii root and butt rot and armillaria root disease can be found in stands near

Bailey Mountain and in the general area of West Fork of Beaver Creek in the southern portion of Rocky Boy's IR. Red ray rot is very common in PP on private lands bordering the reservation. LPPDM is common in many stands, and Elytroderma needle blight is impacting LPP in the West Fork Beaver Creek drainage.

Jefferson County

Forestland, Mortality, and Defoliation Acres by ownership (820,289 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	417,415	64,848	147,324	12,542	642,130
DFB	20	5	7	2	34
SB	0	2	0	0	2
MPB-LPP	14	0	0	0	14
MPB-PP	4	1	5	0	10
MPB-HE5NP	6	0	0	0	69
PE	1	0	6	0	4
SAF Mortality-Complex	14	0	0	0	14
WSBW	5,910	500	2,531	11	8,952
Lophodermella concolor	1,816	0	489	0	2,305

All bark beetle activity in Jefferson County decreased in 2015 from 2014 survey levels despite similar areas having been flown. Acres of mortality for DFB, SB, MPB (all hosts), PE, and SAF-complex were each under 50 acres. Only WSBW-caused defoliation affected a large area—nearly 9,000 acres—which is an eight fold increase over 2014 levels.

ADS identified a cluster of polygons of lodgepole pine needlecast totaling over 2,600 acres, with eight separate polygons totaling over 2,300 acres in Jefferson County and one 328 acre polygon in neighboring Broadwater County. These polygons are concentrated southeast of Helena on the northwest slopes of the Elkhorn Mountains.

WPBR has been found on LP in this county.

Judith Basin County

Forestland, Mortality, and Defoliation Acres by Ownership (548,824 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	274,980	0	21,438	5,875	302,294
DFB	36	1	1	0	38
SB	18	0	0	0	18
MPB-LPP	16	0	0	0	16
MPB-PP	6	6	4	0	16
MPB-HE5NP	135	0	0	0	135
SAF Mortality-Complex	40	0	0	0	40
WSBW	22,367	618	1,258	481	24,724

The insect causing the most damage was WSBW in 2015. Number of acres defoliated by WSBW slightly increased to about 24,000 acres. Most of the WSBW defoliation was low intensity (less than 50% defoliation) and scattered throughout the southwestern part of the county. Small forested areas in the southern part of the county had high intensity defoliation (greater than 50% defoliation). Number of acres affected and number of TPA killed by MPB

significantly decreased in all species of pines, especially in HE5NP. DFB, SB, and SAF mortality was found at low and scattered levels in the county.

WPBR is common in LP. Armillaria root disease is significant in localized areas. Tomentosus root rot is known to be significant in some campgrounds. LPPDM is present in this county.

Lake County

Forestland, Mortality, and Defoliation Acres by Ownership (769,850 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	166,538	0	335,272	47,334	549,145
DFB	316	1,633	97	104	2,149
SB	0	8	2	2	12
FE	9	0	5	0	14
Larch Needle Diseases	139	0	0	0	139
MPB-LPP	4	101	2	4	111
MPB-PP	10	16	10	4	40
MPB-HE5NP	0	2	0	0	2
PE	0	0	0	2	2
SAF Mortality-Complex	127	30	8	4	170
WSBW	23,008	11,946	5,478	5,635	46,067

Similar areas were aerially surveyed in Lake County in 2015 as in 2014. WSBW continued to be the most active agent causing widespread defoliation primarily in DF host throughout the county. Area of defoliation remained constant in 2015 relative to the prior year. Scattered pockets of DFB activity occurred throughout the county with notable mortality occurring near Mission Reservoir just east of Saint Ignatius, MT.

Low levels of larch needlecast were observed in a 62 acre polygon about 1.5 mile north northeast of Woods Bay and a 77 acre polygon about 1 mile northeast of Woods Bay via ADS. No larch needlecast was detected in 2014 after an increase to over 2,500 acres in 2013. WLDM, Armillaria root disease, and decays are causing growth loss and mortality in the Bug Creek Integrated Resource Management Project Area.

WPBR is common in both WWP and WBP in Lake County. Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are Heterobasidion root disease in firs, Armillaria root disease, and schweinitzii root and butt rot. The tree species most affected are DF and true firs. Heterobasidion root disease is known to occur in PP. Elytroderma needle blight is a significant agent in PP in localized areas in this county, as noted by the ADS. DFDM, LPPDM, and WLDM are present in this county.

A sudden drop in temperatures in November likely resulted in needle damage to western red cedar and western white pine on the Swan State Forest

Lewis and Clark County

Forestland, Mortality, and Defoliation Acres by ownership (1,431,958 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	959,230	66,398	333,128	29,327	1,388,084
DFB	193	15	64	19	291
Lophodermella concolor	26	0	0	0	26
MPB-LPP	57	0	2	0	59
MPB-PP	6	18	62	8	95
MPW-HE5NP	14	0	0	0	14
PE	0	0	6	0	6
SAF Mortality-Complex	12	0	4	0	16
WPB	0	0	2	0	2
WSBW	116,003	6,785	57,668	12,879	193,335
QA Damage	0	0	54	37	92

In 2015, the insect causing the most damage in Lewis and Clark County was WSBW and was especially evident near the town of Lincoln, and in the Sawtooth and the Lewis and Clark Mountain Ranges. Number of acres defoliated by WSBW remained elevated and almost doubled over 2014 to just under 200,000 acres. Defoliation intensity also remained very high with most areas of defoliation rated as high, or greater than 50% defoliation. DFB activity slightly decreased in acres affected and TPA killed. Number of acres affected by MPB was very low and decreased in both LPP and PP. PE, WPB, and SAF mortality were at low and scattered levels in the county.

ADS detected one 26-acre polygon of lodgepole pine needlecast in this county. This polygon is located just a few miles southwest of Helena in Grizzly Gulch.

Aspen damage was observed via ADS in 3 polygons ranging from 16 to 38 acres spread across the northern half of the county totaling 92 acres. LPPDM is causing growth loss and mortality in areas of the Tenmile Project Area.

Armillaria root disease is present in the southeastern portion of the county, and schweinitzii root and butt rot is quite common, causing significant decay in butt logs of larger, older DF. WPBR is common in WBP and LP. LPPDM is common in the county.

Liberty County

WPBR occurs in LP and WBP on East Butte of the Sweetgrass Hills. LPPDM is present in this county.

Lincoln County

Forestland, Mortality, and Defoliation Acres by Ownership (2,298,210 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	1,726,004	0	387,436	55,835	2,169,276
BWA	46	0	0	0	46
DFB	2,205	0	510	216	2,931
SB	18	0	6	4	28
FE	4	0	2	0	6
MPB-LPP	448	0	165	116	729
MPB-PP	8	0	8	0	16
MPB-WWP	4,673	0	143	0	4,816
SAF Mortality-Complex	194	0	0	0	194
WSBW	43,773	0	1,703	2,631	48,107

Most insect activity including DFB, SB, FE, BWA, and SAF mortality-complex has decreased in Lincoln County. DFB activity, however, remained at around 3,000 acres. This is over 20% of all DFB activity detected in the state. Polygons of DFB activity are most apparent south of Libby along the Cabinet Mountains but are scattered across the County. Although MPB has decreased in LPP and PP hosts, the 2015 survey detected a significant increase in WWP mortality from 2 acres to nearly 5,000 acres. Most of this increase of MPB-caused mortality in WWP occurred in the Purcell Mountains north of Libby, west of Lake Koocanusa. Total WSBW-caused defoliation increased only slightly but shifted location, dropping in intensity east of the Libby Dam and increasing in activity in the Purcell Mountains. All lands outside of the Cabinet Mountain Wilderness were surveyed in this County in both 2014 and 2015.

No larch needlecast was detected via ADS in 2015. Larch needlecast levels have fluctuated over the last six years. Acres detected in each year were: 0 (2010), 6,480 (2011), 13,074 (2012), 2,047 (2013), 14,828 (2014), and 0 (2015).

Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are Heterobasidion root disease in firs, Armillaria root disease, laminated root disease, and schweinitzii root and butt rot. The tree species most affected are DF and true firs. Heterobasidion root disease is known to occur in PP.

An intensive root disease analysis within the Flower Creek drainage south of Libby found 43% of the acres within this drainage have moderate to high root disease hazard.

A site visit to a DF test plantation on the Three Rivers Ranger District of the Kootenai NF documented Armillaria root disease having a significant impact on the stand. Terra matting used at the time of planting was also impacting the trees.

A site visit to an older PP plantation in O'Brien Creek on the Three Rivers Ranger District of the Kootenai NF documented Armillaria root disease significantly impacting these pine trees. Pine leaf adelgid was also noted impacting WWP within this same stand, as well as having significant impact in a WWP test plantation in Cody Creek.

A site visit to Therriault Lakes Campgrounds on the Fortine/Rexford Ranger Districts of the Kootenai NF documented the presence of a white pocket decay—very likely tomentosus root

rot—in stumps and is likely responsible for decline in some of the large ES. Spruce broom rust was also found causing decline and topkill in ES within and around the campgrounds.

A site visit to the Sunday Creek area on the Fortine/Rexford Ranger Districts of the Kootenai NF documented tomentosus root rot in ES, Heterobasidion root disease in SAF, and Armillaria root disease in DF and true firs. Spruce broom rust was common in the ES and LPPDM was common in the LPP.

Atropellis cankers are present in many LPP east of Lake Koocanusa, reducing vigor of individual trees and contributing to stem failure.

WPBR is common in both WWP and WBP. DFDM, LPPDM, and WLDM are present in this county.

Madison County

Forestland, Mortality, and Defoliation Acres by Ownership (1,492,617 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	590,125	109,996	195,254	12,368	907,743
DFB	181	37	38	2	258
SB	261	16	6	2	285
MPB-LPP	663	51	2	0	716
MPB-PP	6	2	2	0	10
MPB-HE5NP	265	12	25	4	306
SAF Mortality-Complex	82	2	12	2	98
WSBW	31,649	1,474	7,085	871	41,079
QA Damage	65	0	122	0	187

Much of the insect activity detected in 2014 in Madison County remained present in similarly scattered spots in 2015, affecting mostly the Tobacco Root, Gravelly, and Madison Ranges. The Ruby Range had less activity. Both DFB and SB continue impacting 250 to 300 acres each as scattered mortality across the landscape. However, spots of tree mortality are thickest in the Gravelly Range where chronic mortality attributed to SB has been occurring; it is likely *Ips* species are also associated with this mortality. MPB activity dropped to around 1,000 acres, with the largest drop in the HE5NP host type. The only significant increase in insect activity was for WSBW. Nearly twice the number of acres were affected in 2015 as compared to 2014, with the largest new areas at the north and south end of the Tobacco Root Mountains and the southeast portion of the Gravelly Range near Reynolds Pass.

Aspen damage was observed by ADS in 19 polygons ranging from two to 57 acres spread across the southern half of the county totaling 187 acres. This is slightly more than the 143 acres detected in 2014.

WPBR is common in WBP and LP. LPDM is present in this county. Schweinitzii root and butt rot is locally damaging to old DF stands.

Meagher County

Forestland, Mortality, and Defoliation Acres by Ownership (1,207,500 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	444,068	6,153	201,231	12,196	663,647
DFB	519	0	264	20	803
SB	20	0	0	0	20
FE	4	0	0	0	4
MPB-LPP	124	0	0	0	124
MPB-PP	14	0	16	2	32
MPB-HE5NP	107	0	2	2	111
PE	2	0	2	0	4
SAF Mortality-Complex	36	0	2	2	40
WSBW	30,390	563	23,029	982	54,964
Windthrow	91	0	0	0	91
QA Damage	0	40	118	0	158

WSBW was the most significant damaging agent in 2015 and was especially evident in the Big Belt, Castle, and Crazy Mountain Ranges. Number of acres defoliated by WSBW increased by approximately two and a half-fold over 2014. Defoliation intensity ranged from low to high across the county. Number of acres affected by DFB and TPA killed doubled in 2015 and occasionally was found near WSBW polygons. PE, FE, SB, and SAF mortality-complex were at low and scattered levels in the county.

ADS detected over 90 acres of blowdown clustered in 4 polygons. These polygons are located in the very southeast corner of the county in the Crazy Mountains. Aspen damage was observed via ADS in four polygons ranging from 21 to 65 acres spread across the southern third of the county for a total of 158 acres. This is slightly less than the 231 acres detected in 2014. In the Upper Sheep Creek Project Area, stem decay and butt rots are causing damage in older stands and LPPDM is causing reduced growth and mortality in some stands dominated by LPP.

Tomentosus root rot and schweinitzii root and butt rot are damaging older ES and DF in localized areas.

WPBR is common in WBP and LP. LPPDM is present and damaging LPP in this county, as are comandra blister rust and Atropellis canker.

Mineral County

Forestland, Mortality, and Defoliation Acres by Ownership (783,049 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	652,242	0	36,693	36,773	725,708
BWA	200	0	0	0	200
DFB	161	0	9	4	174
SB	16	0	0	0	16
FE	2	0	0	0	2
Larch Needle Diseases	838	0	0	0	838
MPB-LPP	5,889	0	91	2	5,982
MPB-PP	256	0	6	4	267
MPB-WWP	2	0	0	0	2
MPB-HE5NP	16	0	0	0	16
SAF Mortality-Complex	91	0	2	0	93
WSBW	8,860	0	157	0	9,018

Similar areas were surveyed in Mineral County in 2015 as were in 2014. MPB activity in LPP continued with a slight increase in area impacted in 2015 relative to the prior year. This activity was located in large and small pockets scattered throughout the southern portion of the county near the Idaho border. WSBW activity increased nine-fold from minimal amounts that were detected in 2014. This activity was scattered throughout the county and primarily impacted DF host. DFB activity increased to cause widely scattered pockets of mortality within the northern portion of the county.

Light levels of larch needlecast were observed via ADS in seven polygons ranging in size from 33 to 223 acres in central and northwest portions of the county. Larch needlecast acres peaked in 2011/2012, with the following acres detected over last six years: 0 (2010), 11,676 (2011), 12,459 (2012), 990 (2013), 0 (2014), and 838 (2015).

WPBR is common in WWP and WBP. The more common root diseases known to occur in this county are *Heterobasidion* root disease in firs, *Armillaria* root disease, laminated root disease, and *schweinitzii* root and butt rot. The species most affected are DF and true firs. *Tomentosus* root rot has been found impacting WL trees heavily infected with WLDM. *Heterobasidion* root disease is known to occur in PP. DFDM, LPPDM, and WLDM are also present in this county.

A site visit to a stand in the East Fork of Johnson Creek on the Superior Ranger District of the Lolo NF documented a yet-to-be-identified white pocket root and butt rot impacting suppressed WL understory, leading to decline and fall down.

An intensive root disease analysis within the Jam Cracker Analysis Area on the Superior Ranger District of the Lolo NF found 47% of the acres (across all ownerships) have moderate or high root disease hazard. *Armillaria* root disease is the main root disease agent, but *Heterobasidion* root disease and *schweinitzii* root and butt rot are also contributing to butt decay, decline, and tree mortality. *Heterobasidion irregulare* (*Heterobasidion* root disease in pine) was cultured from the roots of a symptomatic PP within this analysis area.

A site visit to a stand a few miles north of St. Regis on the Superior Ranger District of the Lolo NF documented *Armillaria* root disease, *schweinitzii* root and butt rot, and DFB impacting DF.

A late fall visit to an analysis area in the Ward Creek drainage (Redd Bull Analysis Area) northwest of St. Regis on the Superior Ranger District of the Lolo NF documented root disease in WL. Positive identification is pending, but it appears to be tomentosus root rot. Moderate to severe levels of WLDM are also found throughout this same area.

Missoula County

Forestland, Mortality, and Defoliation Acres by Ownership (1,541,360 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	696,593	19,101	532,409	165,466	1,413,569
DFB	133	783	71	12	999
SB	6	2	6	0	14
Larch Needle Diseases	103	0	0	0	103
MPB-LPP	18,100	3	1,759	6	19,868
MPB-PP	118	6	137	44	305
PE	2	0	0	6	8
SAF Mortality-Complex	36	40	12	2	90
WPB	0	2	10	8	20
WSBW	74,265	21,393	78,437	12,496	186,592

Similar areas were surveyed in Missoula County in 2015 as in 2014. WSBW activity continued to cause widespread levels of defoliation primarily in DF, as impacted area more than doubled in 2015 relative to the prior year. High levels of defoliation occurred throughout the Seeley Lake area and ground surveys indicated severe defoliation in DF, SAF, and ES occurred throughout the Lake Alva Campground area. MPB activity continued to cause LPP mortality at similar rates as in 2014, primarily in the southeastern portion of the county within the Lolo Creek area and surrounding drainages. Ground surveys indicated mortality in LPP continued within some high-value sites in this area such as Lee Creek Campground. DFB activity decreased two-fold within the county and was widely scattered causing mortality in isolated locations, often in trees with prior WSBW defoliation.

Black pine leaf scale (*Nuculaspis californica* Coleman) was detected causing substantial crown decline on approximately 100 acres in the Houle Creek Drainage near Frenchtown.

Light levels of larch needlecast were observed by ADS in a 103 acre polygon about 13 miles northwest of the Ninemile Ranger Station. Larch needlecast acreage has fluctuated over the last 6 years with a peak in 2011: 0 (2010), 2,789 (2011), 1,168 (2012), 1,630 (2013), 0 (2014), and 103 (2015).

Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are Heterobasidion root disease in firs, Armillaria root disease, laminated root disease, and schweinitzii root and butt rot. The tree species most affected are DF and true firs. Heterobasidion root disease is known to occur in PP.

WPBR is common in both WWP and WBP. Elytroderma needle blight is a significant agent in PP in localized areas in this county. Comandra blister rust is common in PP in this county. DFDM, LPPDM, and WLDM are present in this county.

A site visit to Lee Creek Campground east of Lolo Pass on the Missoula Ranger District of the Lolo NF documented LPPDM infecting LPP crowns, as well as causing significant bole

infections. Western gall rust hip cankers and moderate to severe levels of mechanical damage caused by recreationists were also frequently noted in LPP.

A sudden drop in temperatures in November likely resulted in needle damage to WWP on private property near Condon.

Musselshell County

Forestland, Mortality, and Defoliation Acres by Ownership (18,554 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	0	21,598	285,918	9,780	317,296

Aerial surveys were limited to a small area in the northwestern portion of Musselshell County where no damage was observed in 2015.

Park County

Forestland, Mortality, and Defoliation Acres by Ownership (972,670 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	733,380	71,190	201,291	23,628	1,029,489
DFB	217	6	150	0	373
SB	69	4	8	0	81
MPB-LPP	207	4	8	0	219
MPB-HE5NP	129	8	28	2	166
SAF Mortality-Complex	33	7	16	0	56
WSBW	17,651	2,535	33,922	391	54,499
QA Damage	0	0	87	0	87

Similar areas were aerially surveyed in 2015 as in 2014 within Park County. WSBW activity was widespread and continued primarily within DF host in the county at similar levels as were detected in 2014. DFB activity was often detected in defoliated areas within the county. DFB activity occurred in small pockets, notably in the Pool and Pine Creek drainages near Paradise Valley and the southern portion of the Crazy Mountains.

MPB activity has declined to very low levels in recent years and was only active within isolated locations of WBP and, to a lesser extent, LPP host. Ground surveys indicated MPB activity in drainages adjacent to Paradise Valley had minimal levels of MPB activity.

Aspen damage was observed via ADS in a 30-acre and a 57-acre polygon. Both polygons are in the east-central part of the county. This is an increase from the 15 acres detected in three polygons spread across the northern half of the county in 2014.

WPBR is common in WBP and LP stands. Tomentosus root rot and schweinitzii root and butt rot are known to be significant in some campgrounds, and LPPDM is present in the county.

Phillips County

Forestland, Mortality, and Defoliation Acres by Ownership (112,457 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	0	95,372	28,795	3,031	127,199
DFB	0	8	0	0	8
MPB-LPP	0	10	0	0	10
MPB-PP	0	22	0	0	22
PE	0	26	0	0	26
WSBW	0	62	0	0	62

Areas of the Little Big Horn Mountains around Hayes (Fort Belknap IR) and Zortman (BLM) were flown in both 2014 and 2015. Survey results indicate continued low levels of scattered mortality with most of the bark beetle activity found in PP attributed to MPB and PE. No one bark beetle (DFB, MPB-all hosts, or PE) was found affecting more than 35 acres. However, it should be noted that Fort Belknap IR has had a very active program of removing dying, infested trees. These removals likely occurred prior to aerial survey resulting in a lower estimate of actual insect-caused tree mortality. Approximately 180 trees were reported removed by crews in 2015, with previous year's removals around 400 trees. Defoliation due to WSBW was not noted in 2014 and constituted only a little over 60 acres in 2015.

Western gall rust and comandra blister rust are common in PP on the Fort Belknap IR causing stem deformities, branch mortality, top kill, and occasional whole tree mortality. Armillaria root disease can be found on the Fort Belknap IR, in the Mission Canyon area, with large pockets developing in DF and QA. LPPDM is present in the county.

Pondera County

Forestland, Mortality, and Defoliation Acres by Ownership (122,560 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	120,894	0	17,276	0	138,171
DFB	10	0	0	2	12
MPB-LPP	4	0	0	0	4
SAF Mortality-Complex	364	0	0	0	364
WSBW	3,385	12	0	0	3,398

The insect causing the most damage was WSBW. Defoliation from WSBW significantly increased in 2015 and was detected across most of the county. DFB and MPB in LPP remained at low levels. SAF mortality increased by almost 2-fold in acres affected and intensity.

WPBR is common in WBP and LP in this county.

Powder River County

Forestland, Mortality, and Defoliation Acres by Ownership (499,074 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	268,854	66,509	151,142	10,598	497,104
PE	90	0	14	0	104
Windthrow	4	0	2	0	6

Forested areas in the Custer NF within this county were surveyed by ADS in 2015, and found PE causing PP mortality in some areas. Ground surveys indicated recent *lps* spp. complex activity noted in prior years returned to endemic levels in 2014 and 2015.

Powell County

Forestland, Mortality, and Defoliation Acres by Ownership (1,066,582 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	648,270	78,593	223,970	45,006	995,840
DFB	59	28	66	7	160
SB	0	12	2	0	14
Lophodermella concolor	137	0	209	0	346
MPB-LPP	61	45	12	7	125
MPB-PP	0	16	82	4	102
MPB-HE5NP	121	0	0	0	121
PE	0	0	6	0	6
SAF Mortality-Complex	30	4	2	2	38
WSBW	79,457	4,481	29,009	11,488	124,436
Frost Injury	0	8	2	0	10

WSBW defoliation was found throughout most of the county in 2015 and increased by almost two-fold over 2014 to nearly 125,000 acres. Significant defoliation from WSBW was recorded in the Boulder, Lewis and Clark, Nevada, and Swan Mountain Ranges. Low and scattered levels of defoliation were also recorded in the Garnet Range, but may be an underestimate because this range was flown early in the season before damage from WSBW may have been evident. DFB activity decreased in number of acres affected; intensity increased in the Swan. Some of the DFB activity was in or near areas that have been defoliated by WSBW over several years.

MPB activity significantly decreased in LPP, PP, and HE5NP forests in number of acres affected and TPA. Most of the activity was recorded in the Garnet range and along the Continental Divide. SB and PE remained at low levels in 2015. Low levels of SAF mortality-complex were also recorded in 2015.

ADS detected almost 350 acres of lodgepole pine needlecast in Powell County. These acres are in 3 separate polygons: 179 acre polygon on the west side of MacDonald Pass; 135 acre polygon east of Deerlodge and just north of Electric Peak; and a 32-acre polygon just east of Garrison in Spotted Dog Creek.

Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are *Heterobasidion* root disease in firs, *Armillaria* root disease, and *schweinitzii* root and butt rot. The tree species most affected are DF and true firs. *Tomentosus* root rot has been found in over-mature ES.

WPBR is common in WBP and LP. LPPDM is present in this county.

Ravalli County

Forestland, Mortality, and Defoliation Acres by Ownership (1,204,610 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	1,058,671	0	105,391	35,329	1,199,391
DFB	334	0	56	10	400
SB	10	0	0	0	10
FE	4	0	0	0	4
MPB-LPP	24,575	0	351	81	25,007
MPB-PP	1,722	2	264	159	2,147
MPB-HE5NP	957	0	0	0	957
PE	926	0	134	118	1,178
SAF Mortality-Complex	322	0	2	0	324
WPB	14	0	2	0	16
WSBW	30,987	0	2,221	523	33,731

MPB was the prevalent insect found throughout the county again. Number of acres affected by MPB significantly decreased for all species of pines, but intensity (TPA killed) significantly increased for all pine species affected. Approximately 62% of all PP and 17% of all LPP mortality from MPB in 2015 across the region occurred in Ravalli County. MPB activity was mapped in both the Sapphire and Bitterroot Mountains. If the current trend continues, MPB activity is expected to continue to decline over the next few years.

Number of acres defoliated by WSBW increased by approximately 5-fold between 2014 and 2015. Most of the WSBW activity was in the northern part of the county in the Sapphire Mountains. Scattered and lower levels of WSBW defoliation were also found in the southern part of the county.

DFB activity increased two-fold in acres affected and intensity. WPB and PE remained at low and scattered levels throughout the county. In 2015, ADS recorded about 10 acres affected by SB; about 100 acres were affected in 2014 and none were recorded in 2013. Number of acres where SAF mortality-complex was recorded increased by about 2-fold to over 300 acres.

Armillaria root disease, DFDM, and bark beetles are killing trees in the Proposed Westside Collaborative Management Project Area.

Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are Heterobasidion root disease in firs, Armillaria root disease, laminated root disease, and schweinitzii root and butt rot. The tree species most affected are DF and true firs. Heterobasidion root disease is known to occur in PP in the foothills of both the Bitterroot and Sapphire Mountains. Tomentosus root rot is occasionally observed in ES.

WPBR is common in WBP. Notable levels of comandra blister rust cause top kill in PP in the foothills of the Bitterroot Mountains.

Elytroderma needle blight is a significant agent in PP in localized areas in this county; high levels continue to exist in the area around Lake Como. DFDM, LPPDM, and WLDM are present in this county, with DFDM being quite common in the lower elevations of the Sapphire and Bitterroot Mountains.

A sudden drop in temperatures in November likely resulted in needle damage to ponderosa pine, particularly along the Eastside Highway.

Rosebud County

Forestland, Mortality, and Defoliation Acres by ownership (409,464 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	70,048	31,053	275,084	37,449	414,635
PE	24	257	1	0	282

Forested area in the southern portion of the county within the Custer NF and Northern Cheyenne IR was surveyed in 2015. The only mortality identified by ADS was PP caused by PE, which effected relatively low numbers of acres. Ground surveys indicated recent *Ips* species-complex activity noted in prior years returned to endemic levels in 2014 and 2015.

Sanders County

Forestland, Mortality, and Defoliation Acres by Ownership (1,745,753 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	915,910	5,777	467,166	62,035	1,450,887
BWA	112	0	0	0	112
DFB	1,527	179	67	40	1,813
SB	18	0	4	0	22
FE	4	6	0	0	10
MPB-LPP	1,104	10	373	129	1,617
MPB-PP	28	4	6	4	42
MPB-WWP	79	0	2	0	81
MPB-HE5NP	2	10	0	0	12
PE	0	4	0	0	4
SAF Mortality-Complex	50	29	10	6	95
WPB	0	6	0	0	6
WSBW	2,457	4,007	216	275	6,955

Similar areas were aerially surveyed in 2015 as in 2014 within Sanders County. WSBW remained active in the county with notable pockets just west of Hot Springs, MT and in the southeastern portion of the county. MPB activity in LPP continued at a declining rate, with four times less area impacted in 2015 relative to 2014. Similarly, DFB activity continued at low levels with the amount of area impacted reduced in 2015 compared to the prior year. Small pockets of DFB activity were specifically located during ground surveys in the Trout Creek drainage and in the Finley Flats areas.

Over last six years, larch needlecast peaked in 2012, then steadily declined to no ADS detections of the disease in 2015. Acreage affected each year by larch needlecast in Sanders County was: 24 (2010), 4,375 (2011), 11,511 (2012), 1,299 (2013), 255 (2014), and 0 (2015).

Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are Heterobasidion root disease in firs, Armillaria root disease, laminated root disease, and schweinitzii root and butt rot. The tree species most affected are DF and true firs. Heterobasidion root disease is known to occur in PP, while tomentosus root rot is known to occur in localized areas in the county, affecting DF and ES. WPBR is common in both WWP and WBP. DFDM, LPPDM, and WLDM are present and common in this county.

Rhabdocline needle cast continues to be a problem in the Plains Tree Improvement Area, but with continued fungicide treatment the severity has lessened.

A late spring site visit to the Cabinet Ranger District of the Kootenai NF documented pine leaf adelgid in WWP. Low levels of larch needle blight were noted near the Cabinet Ranger Station west of Trout Creek during the same visit.

Western gall rust and abiotic damage were found causing notable damage in Scots pine on private property northwest of Trout Creek.

A site visit to the Dry Creek area on the Cabinet Ranger District of the Lolo NF documented Armillaria root disease having a significant impact in a legacy PP plantation, indicating it may have originated from off-site stock. Pine leaf adelgid was found at light levels in WWP in this same plantation. A nearby stand was also be impacted by Armillaria root disease, and evidence of tomentosus root rot was also found. Alder flea beetle was found heavily defoliating the alder in this same stand.

Mortality of DF leave trees were noted in multiple stands on the Cabinet Ranger District of the Lolo NF. Causal agents were a combination of root disease, low levels of scorching from prescribed fires, and DFB.

Silver Bow County

Forestland, Mortality, and Defoliation Acres by Ownership (219,251 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	141,487	25,719	74,189	11,669	253,065
DFB	2	0	4	0	6
SB	2	0	0	0	2
MPB-LPP	14	0	2	4	20
MPB-HE5NP	30	0	2	6	38
SAF Mortality-Complex	6	0	0	0	6
WSBW	2,097	0	898	214	3,209

Where most of Silver Bow County was surveyed in 2014, significantly less was surveyed in 2015, with forested areas north and west of Butte surveyed, but most of the Highland Mountains south of Butte not surveyed. Thus, some of the decrease in bark beetle-caused tree mortality could be due to this decrease in area. However, based on polygons in the commonly-surveyed portion, and trends across the state, it is apparent actual mortality has decreased. Scattered spots of DFB, SB, and MPB remain present along the Continental Divide west of I-15. Even with less area surveyed, the state-wide trend for increased WSBW-caused defoliation is present, particularly in areas south of Fairmont Hot Springs.

WPBR is common in WBP and LP. LPPDM occurs in the county.

Stillwater County

Forestland, Mortality, and Defoliation Acres by Ownership (180,751 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	110,519	5,336	129,950	5,336	251,141
SAF Mortality-Complex	2	0	0	0	2
WSBW	1,181	0	201	0	1,382

Area surveyed was limited to the southwestern portion of Stillwater County during 2015 ADS. Limited WSBW activity was detected in DF in this area and was found at levels similar to those observed in 2014.

Sweet Grass County

Forestland, Mortality, and Defoliation Acres by Ownership (255,109 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	236,529	9,860	153,640	3,684	403,712
DFB	17	0	2	0	19
MPB-LPP	0	0	2	0	2
MPB-HE5NP	450	0	0	0	450
SAF Mortality-Complex	76	0	0	0	76
WSBW	11,171	224	8,012	292	19,699
QA Damage	0	0	17	0	17

Similar areas were aerially surveyed in the northwestern and southern portions of Sweet Grass County in 2014 and 2015; however, less area was surveyed in the central portion of the county in 2015. Acres with detected MPB activity decreased in 2015 relative to 2014. MPB caused mortality in WBP and lesser amounts of LPP within the southern portion of the county, especially in the East Boulder Canyon area. WSBW populations increased and caused greater DF defoliation within the northwestern portion of the county in the Crazy Mountains relative to levels observed in 2014.

Aspen damage was detected via ADS in one 17-acre polygon 12 miles west northwest of Big Timber and south of Cort Creek.

WPBR has been found in WBP and LP in this county. Tomentosus root rot, schweinitzii root and butt rot, and stem decays affect over-mature conifers in this county.

Teton County

Forestland, Mortality, and Defoliation Acres by Ownership (209,657 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	189,474	23,750	18,928	7,618	239,771
DFB	40	2	0	0	42
MPB-LPP	8	0	0	0	8
MPB-HE5NP	37	0	0	0	37
SAF Mortality-Complex	59	0	0	0	59
WSBW	3,678	172	329	0	4,179
QA Damage	0	0	15	0	15

WSBW caused the most insect damage in Teton County in 2015. Number of acres with WSBW defoliation increased by 20-fold in 2015 as compared to 2014. DFB and MPB remained at low and scattered levels.

QA damage was detected via ADS in one 16-acre polygon about 20 miles west of Choteau and about one mile east southeast of Crab Butte. This is only about one-tenth the acreage of QA damage detected in the northwest corner of the county in 2014.

WPBR is common in WBP and LP in this county. Armillaria root disease kills conifers and QA, and tomentosus root rot and schweinitzii root and butt rot are causing damage in over-mature conifers in parts of this county.

Toole County

WPBR occurs in WBP and LP in this county. Specifically, it occurs in LP of the West Butte in the Sweetgrass Hills.

Wheatland County

Forestland, Mortality, and Defoliation Acres by Ownership (196,665 ac flown)

Damage Agent	National Forest	Other Federal	Private	State	Total
Forestland	49,411	0	27,794	6,176	83,381
DFB	2	0	4	0	6
MPB-LPP	2	0	0	0	2
MPB-PP	26	0	5	0	28
MPB-HE5NP	8	0	0	0	8
WSBW	10,554	82	2,042	73	12,751

Damage from all insects was in forested stands in the northwest portion of the county. The insect causing the most damage was WSBW. Number of acres with WSBW defoliation significantly increased in 2015; some areas had high levels of defoliation. MPB activity decreased in most pine species and is considered to be at endemic levels. DFB also decreased and is at endemic levels.

WPBR occurs in LP in this county.

Table 1. Forest Mortality, Defoliation, and Other Damage on Montana National Forests, National Parks, and Tribal Lands, 2015

<u>Administrative Unit/Damage Agent</u>	Acres	Trees
<u>BEAVERHEAD NF</u>		
DILLON RD	Acres	Trees
Douglas-fir Beetle	46	47
Spruce beetle	24	33
Mountain Pine Beetle (PP)	8	52
Mountain Pine Beetle (LPP)	21,225	284,127
Subalpine Fir Mortality	34	74
MPB (HE5NP)	1,524	9,045
Western Spruce Budworm	2,455	0
QA Damage	2	0
MADISON RD	Acres	Trees
Douglas-fir Beetle	131	171
Spruce beetle	153	174
Mountain Pine Beetle (LPP)	107	120
Subalpine Fir Mortality	28	55
MPB (HE5NP)	24	26
Western Spruce Budworm	14,275	0
QA Damage	32	0
SHERIDAN RD	Acres	Trees
Douglas-fir Beetle	46	57
Spruce beetle	171	228
Mountain Pine Beetle (PP)	6	3
Mountain Pine Beetle (LPP)	16	47
Subalpine Fir Mortality	32	58
MPB (HE5NP)	239	268
Western Spruce Budworm	11,333	0
QA Damage	35	0
WISDOM RD	Acres	Trees
Douglas-fir Beetle	8	9
Spruce beetle	18	37
Mountain Pine Beetle (PP)	2	3
Mountain Pine Beetle (LPP)	45,849	589,848
Subalpine Fir Mortality	6	6
MPB (HE5NP)	6,274	48,018
WISE RIVER RD	Acres	Trees
Douglas-fir Beetle	46	64
Spruce beetle	12	24
Mountain Pine Beetle (PP)	6	5
Mountain Pine Beetle (LPP)	1,021	9,262
Subalpine Fir Mortality	12	15

<u>Administrative Unit/Damage Agent</u>	Acres	Trees
WISE RIVER RD	Acres	Trees
MPB (HE5NP)	759	6,960
Western Spruce Budworm	800	0
<u>BITTERROOT NF</u>		
DARBY RD	Acres	Trees
Douglas-fir Beetle	91	260
Spruce beetle	8	13
Pine Engraver Beetle	123	200
Mountain Pine Beetle (PP)	613	8,621
Mountain Pine Beetle (LPP)	4,540	20,321
Western Pine Beetle	6	3
Subalpine Fir Mortality	28	91
MPB (HE5NP)	190	88
Western Spruce Budworm	7,444	0
STEVENSVILLE RD	Acres	Trees
Douglas-fir Beetle	37	95
Spruce beetle	2	10
Pine Engraver Beetle	109	65
Mountain Pine Beetle (PP)	234	250
Mountain Pine Beetle (LPP)	8,417	70,427
Fir Engraver Beetle	4	20
Subalpine Fir Mortality	26	91
MPB (HE5NP)	36	148
Western Spruce Budworm	10,521	0
SULA RD	Acres	Trees
Douglas-fir Beetle	32	56
Pine Engraver Beetle	691	10,489
Mountain Pine Beetle (PP)	803	8,316
Mountain Pine Beetle (LPP)	10,509	84,197
Western Pine Beetle	6	4
Subalpine Fir Mortality	46	80
MPB (HE5NP)	652	4,048
Western Spruce Budworm	7,426	0
WEST FORK RD	Acres	Trees
Douglas-fir Beetle	175	792
Pine Engraver Beetle	2	5
Mountain Pine Beetle (PP)	64	119
Mountain Pine Beetle (LPP)	1,653	6,579
Subalpine Fir Mortality	224	920
MPB (HE5NP)	79	150
WEST FORK RD	Acres	Trees
Western Spruce Budworm	5,668	0

<u>Administrative Unit/Damage Agent</u>	Acres	Trees
<u>CUSTER NF</u>		
ASHLAND RD	Acres	Trees
Pine Engraver Beetle (PP)	114	106
Windthrow	4	6
BEARTOOTH RD		
Douglas-fir Beetle	10	32
Spruce beetle	29	21
Mountain Pine Beetle (LPP)	74	25
Subalpine Fir Mortality	14	45
MPB (HE5NP)	30	42
Western Spruce Budworm	2,039	0
SIOUX RD	Acres	Trees
Pine Engraver Beetle (PP)	57	90
QA Damage	11	0
<u>DEERLODGE NF</u>		
BUTTE RD	Acres	Trees
Douglas-fir Beetle	2	2
Mountain Pine Beetle (LPP)	12	50
Subalpine Fir Mortality	4	23
MPB (HE5NP)	24	95
Western Spruce Budworm	2,348	0
DEER LODGE RD	Acres	Trees
Douglas-fir Beetle	48	39
Mountain Pine Beetle (LPP)	266	954
Subalpine Fir Mortality	10	33
MPB (HE5NP)	985	2,468
Western Spruce Budworm	3,587	0
JEFFERSON RD	Acres	Trees
Douglas-fir Beetle	22	19
Mountain Pine Beetle (PP)	2	2
Mountain Pine Beetle (LPP)	12	130
Subalpine Fir Mortality	12	23
MPB (HE5NP)	4	4
Western Spruce Budworm	12,808	0
PHILIPSBURG RD	Acres	Trees
Douglas-fir Beetle	56	189
Mountain Pine Beetle (PP)	2	3
Mountain Pine Beetle (LPP)	17,392	105,804
Subalpine Fir Mortality	10	30
MPB (HE5NP)	1,744	8,585
Western Spruce Budworm	19,328	0
<u>FLATHEAD NF</u>		

<u>Administrative Unit/Damage Agent</u>	Acres	Trees
GLACIER VIEW RD	Acres	Trees
Douglas-fir Beetle	29	58
Spruce beetle	67	82
Mountain Pine Beetle (LPP)	2	5
Subalpine Fir Mortality	96	162
Western Spruce Budworm	34,846	0
HUNGRY HORSE RD	Acres	Trees
Douglas-fir Beetle	277	858
Spruce beetle	2	3
Mountain Pine Beetle (WWP)	4	2
Mountain Pine Beetle (PP)	4	4
Mountain Pine Beetle (LPP)	8	20
Fir Engraver Beetle	12	48
Subalpine Fir Mortality	38	92
Western Spruce Budworm	20,469	0
SPOTTED BEAR RD	Acres	Trees
Douglas-fir Beetle	14	32
Mountain Pine Beetle (PP)	2	2
Mountain Pine Beetle (LPP)	525	1,708
Fir Engraver Beetle	12	40
Subalpine Fir Mortality	19	53
Western Spruce Budworm	19,889	0
SWAN LAKE RD	Acres	Trees
Douglas-fir Beetle	924	1,396
Spruce beetle	1	3
Mountain Pine Beetle (PP)	14	22
Mountain Pine Beetle (LPP)	12	60
Fir Engraver Beetle	9	38
Subalpine Fir Mortality	133	379
Western Spruce Budworm	32,874	0
Larch Needle Cast	139	0
TALLY LAKE RD	Acres	Trees
Douglas-fir Beetle	383	1,015
Spruce beetle	6	4
Mountain Pine Beetle (PP)	4	4
Mountain Pine Beetle (LPP)	200	4,459
Fir Engraver Beetle	10	33
Subalpine Fir Mortality	16	29
Western Spruce Budworm	17,779	0
<u>GALLATIN NF</u>		
BIG TIMBER RD	Acres	Trees
Douglas-fir Beetle	24	47

<u>Administrative Unit/Damage Agent</u>	Acres	Trees
Subalpine Fir Mortality	74	183
MPB (HE5NP)	456	704
Western Spruce Budworm	11,603	0
BOZEMAN RD	Acres	Trees
Douglas-fir Beetle	50	97
Spruce beetle	12	20
Mountain Pine Beetle (PP)	4	2
Mountain Pine Beetle (LPP)	552	5,424
Subalpine Fir Mortality	43	125
MPB (HE5NP)	42	131
Western Spruce Budworm	17,349	0
QA Damage	4	0
GARDINER RD	Acres	Trees
Douglas-fir Beetle	14	17
Spruce beetle	71	50
Mountain Pine Beetle (LPP)	205	1,384
Subalpine Fir Mortality	20	70
MPB (HE5NP)	92	175
Western Spruce Budworm	5,141	0
HEBGEN LAKE RD	Acres	Trees
Douglas-fir Beetle	14	17
Spruce beetle	44	95
Mountain Pine Beetle (LPP)	4	15
Subalpine Fir Mortality	32	80
Pine Engraver Beetle	4	10
MPB (HE5NP)	6	11
Western Spruce Budworm	597	0
LIVINGSTON RD	Acres	Trees
Douglas-fir Beetle	211	211
Spruce Beetle	4	3
Mountain Pine Beetle (LPP)	4	60
Subalpine Fir Mortality	26	68
MPB (HE5NP)	46	108
Western Spruce Budworm	10,724	0
Windthrow	24	0
<u>HELENA NF</u>		
HELENA RD	Acres	Trees
Douglas-fir Beetle	46	114
Pine Engraver Beetle (PP)	1	1
Mountain Pine Beetle (PP)	9	9
Mountain Pine Beetle (LPP)	39	39
Subalpine Fir Mortality	18	40

<u>Administrative Unit/Damage Agent</u>	Acres	Trees
MPB (HE5NP)	14	13
Western Spruce Budworm	45,665	0
Lophodermella concolor	1,984	0
LINCOLN RD	Acres	Trees
Douglas-fir Beetle	67	379
Mountain Pine Beetle (LPP)	20	49
Subalpine Fir Mortality	8	18
MPB (HE5NP)	4	20
Western Spruce Budworm	74,882	0
TOWNSEND RD	Acres	Trees
Douglas-fir Beetle	569	1,083
Mountain Pine Beetle (PP)	2	2
Mountain Pine Beetle (LPP)	16	71
Subalpine Fir Mortality	16	35
MPB (HE5NP)	4	6
Western Spruce Budworm	27,495	0
Lophodermella concolor	268	0
<u>KOOTENAI NF</u>		
CABINET RD	Acres	Trees
Douglas-fir Beetle	760	2,901
Spruce beetle	16	19
Mountain Pine Beetle (WWP)	78	32
Mountain Pine Beetle (PP)	10	18
Mountain Pine Beetle (LPP)	734	6,477
Fir Engraver Beetle	4	3
Subalpine Fir Mortality	16	25
MPB (HE5NP)	2	1
FISHER RIVER RD	Acres	Trees
Douglas-fir Beetle	1,399	25,819
Spruce beetle	6	3
Mountain Pine Beetle (WWP)	29	58
Mountain Pine Beetle (PP)	4	5
Mountain Pine Beetle (LPP)	334	4,891
Subalpine Fir Mortality	4	11
Western Spruce Budworm	3,389	0
FORTINE RD	Acres	Trees
Douglas-fir Beetle	33	138
Spruce Beetle	2	1
Mountain Pine Beetle (WWP)	2	1
Subalpine Fir Mortality	18	40
Western Spruce Budworm	7,766	0
LIBBY RD	Acres	Trees

<u>Administrative Unit/Damage Agent</u>	Acres	Trees
Douglas-fir Beetle	642	2,148
Spruce Beetle	2	1
Mountain Pine Beetle (WWP)	548	415
Mountain Pine Beetle (PP)	2	1
Mountain Pine Beetle (LPP)	84	110
Fir Engraver Beetle	2	1
Western Spruce Budworm	4,042	0
REXFORD RD	Acres	Trees
Douglas-fir Beetle	62	131
Spruce beetle	2	2
Mountain Pine Beetle (WWP)	2,257	674
Subalpine Fir Mortality	12	60
Western Spruce Budworm	13,832	0
THREE RIVERS RD	Acres	Trees
Douglas-fir Beetle	301	858
Spruce beetle	8	6
Mountain Pine Beetle (WWP)	1,838	609
Mountain Pine Beetle (PP)	2	1
Fir Engraver Beetle	2	1
Subalpine Fir Mortality	62	74
Western Spruce Budworm	13,985	0
<u>LEWIS and CLARK NF</u>		
JUDITH RD	Acres	Trees
Douglas-fir Beetle	79	176
Spruce beetle	22	44
Mountain Pine Beetle (PP)	8	4
Mountain Pine Beetle (LPP)	20	39
Fir Engraver Beetle	2	3
Subalpine Fir Mortality	40	88
MPB (HE5NP)	105	229
Western Spruce Budworm	26,761	0
KINGS HILL RD	Acres	Trees
Douglas-fir Beetle	356	1,307
Spruce beetle	29	35
Mountain Pine Beetle (PP)	16	41
Mountain Pine Beetle (LPP)	96	41
Fir Engraver Beetle	2	5
Subalpine Fir Mortality	22	31
MPB (HE5NP)	45	64
Western Spruce Budworm	4,848	0
MUSSELSHELL RD	Acres	Trees
Douglas-fir Beetle	211	1,918

<u>Administrative Unit/Damage Agent</u>	Acres	Trees
Pine Engraver Beetle	2	1
Mountain Pine Beetle (PP)	56	39
Mountain Pine Beetle (LPP)	31	45
Fir Engraver Beetle	2	5
Subalpine Fir Mortality	14	32
MPB (HE5NP)	103	121
Western Spruce Budworm	44,024	0
Windthrow	67	0
ROCKY RD	Acres	Trees
Douglas-fir Beetle	154	172
Mountain Pine Beetle (LPP)	18	70
Subalpine Fir Mortality	427	1,480
MPB (HE5NP)	41	94
Western Spruce Budworm	29,229	0
QA Damage	2	0
<u>LOLO NF</u>		
MISSOULA RD	Acres	Trees
Douglas-fir Beetle	71	356
Pine Engraver Beetle (PP)	2	5
Mountain Pine Beetle (PP)	94	132
Mountain Pine Beetle (LPP)	19,410	95,955
Western Pine Beetle	6	3
Subalpine Fir Mortality	10	35
MPB (HE5NP)	616	5,940
Western Spruce Budworm	64,760	0
NINEMILE RD	Acres	Trees
Douglas-fir Beetle	51	85
Spruce beetle	8	10
Mountain Pine Beetle (PP)	238	245
Mountain Pine Beetle (LPP)	7,234	59,909
Subalpine Fir Mortality	26	52
MPB (HE5NP)	8	26
Western Spruce Budworm	4,472	0
Larch Needle Diseases	103	0
Douglas-fir Beetle	207	392
Spruce Beetle	2	1
PLAINS RD	Acres	Trees
Mountain Pine Beetle (PP)	8	5
Mountain Pine Beetle (LPP)	287	542
Subalpine Fir Mortality	16	64
Western Spruce Budworm	803	0
SEELEY LAKE RD	Acres	Trees

<u>Administrative Unit/Damage Agent</u>	Acres	Trees
Douglas-fir Beetle	9	46
Spruce Beetle	2	1
Mountain Pine Beetle (LPP)	6	8
Subalpine Fir Mortality	30	203
Western Spruce Budworm	83,945	0
SUPERIOR RD	Acres	Trees
Douglas-fir Beetle	130	239
Spruce beetle	12	10
Mountain Pine Beetle (WWP)	2	1
Mountain Pine Beetle (PP)	36	53
Mountain Pine Beetle (LPP)	139	448
Fir Engraver Beetle	2	5
Subalpine Fir Mortality	75	248
MPB (HE5NP)	8	23
Balsam Woolly Adelgid	199	0
Western Spruce Budworm	5,066	0
Larch Needle Diseases	838	0
THOMPSON FALLS RD	Acres	Trees
Douglas-fir Beetle	347	1,435
Mountain Pine Beetle (PP)	8	13
Mountain Pine Beetle (LPP)	91	110
Subalpine Fir Mortality	14	38
Balsam Woolly Adelgid	112	0
Western Spruce Budworm	1,654	0
<u>BLACKFEET IR</u>	Acres	Trees
Douglas-fir Beetle	91	119
Spruce Beetle	14	21
Mountain Pine Beetle (LPP)	4	15
Subalpine Fir Mortality	10	14
Western Spruce Budworm	6,408	0
QA Damage	51	0
<u>CROW IR</u>	Acres	Trees
Douglas-fir Beetle	6	35
Mountain Pine Beetle (PP)	4	2
Mountain Pine Beetle (LPP)	6	21
Pine Engraver Beetle (PP)	36	27
Subalpine Fir Mortality	2	25
MPB (HE5NP)	6	15
QA Damage	127	0
<u>FLATHEAD IR</u>	Acres	Trees
Douglas-fir Beetle	2,454	13,304
Spruce beetle	9	9

<u>Administrative Unit/Damage Agent</u>	Acres	Trees
Pine Engraver Beetle (PP)	4	2
Mountain Pine Beetle (PP)	20	29
Mountain Pine Beetle (LPP)	111	545
MPB (HE5NP)	12	42
Fir Engraver Beetle	6	15
Subalpine Fir Mortality	99	407
Western Pine Beetle	6	3
Western Spruce Budworm	36,871	0
<u>FORT BELKNAP IR</u>	Acres	Trees
Douglas-fir Beetle	16	12
Mountain Pine Beetle (PP)	38	89
Mountain Pine Beetle (LPP)	22	61
Pine Engraver Beetle (PP)	36	197
Subalpine Fir Mortality	2	1
Western Spruce Budworm	62	0
<u>NORTHERN CHEYENNE IR</u>	Acres	Trees
Pine Engraver Beetle (PP)	295	230
QA Damage	2	0
<u>ROCKY BOY'S IR</u>	Acres	Trees
Douglas-fir Beetle	80	171
Spruce Beetle	2	1
Mountain Pine Beetle (PP)	4	3
Mountain Pine Beetle (LPP)	39	260
Subalpine Fir Mortality	2	1
Western Spruce Budworm	22	0
<u>GLACIER NP</u>	Acres	Trees
Douglas-fir Beetle	300	110
Spruce beetle	171	148
Mountain Pine Beetle (LPP)	2	10
Subalpine Fir Mortality	18	44
Western Spruce Budworm	31,356	0
<u>YELLOWSTONE NP</u>	Acres	Trees
Douglas-fir Beetle	44	67
Spruce beetle	86	120
Mountain Pine Beetle (LPP)	297	599
MPB (HE5NP)	56	103
Subalpine Fir Mortality	156	416
Western Spruce Budworm	2,830	0
Flood Damage	10	35

Table 2. Host Type Infested by Bark Beetles on all Ownerships Statewide, 2015 (Acres)*

Insect ¹	USFS	Other Fed	Private	State	Total
DFB	8,194	3,131	2,416	558	14,299
SB	736	269	59	26	1,090
FE	64	6	16	0	86
PE	1,088	378	252	132	1,850
MPB-LPP	141,287	2,333	6,244	1,133	150,997
MPB-PP	2,282	137	795	260	3,474
MPB-HE5NP	14,157	100	495	34	14,786
MPB-WWP	4,759	0	145	0	4,904
MPB-ALL	162,485	2,570	7,679	1,427	174,161
SAF	1,911	154	89	33	2,187
WPB	20	8	14	8	50

¹Includes areas surveyed in Yellowstone NP within WY

¹DFB = Douglas-fir beetle; SB = spruce beetle; FE = fir engraver beetle; PE = pine engraver beetle; MPB LPP = mountain pine beetle in lodgepole pine; MPB PP = mountain pine beetle in ponderosa pine; MPB HE5NP = mountain pine beetle in high elevation 5-Needle pines (WBP & LP); MPB WWP = mountain pine beetle in western white pine; MPB All = mountain pine beetle in all pines; SAF = Subalpine fir mortality complex; WPB = western pine beetle

Table 3. Bark Beetle Infestations Statewide (total acres impacted and estimated trees killed) 2013-2015

Insects*	2013 Acres	2013 Trees	2014 Acres	2014 Trees	2015 Acres	2015 Trees
DFB	15,901	39,034	20,466	54,071	14,299	95,436
SB	571	437	1,166	1,478	1,090	1,312
FE	382	1,018	1,052	3,795	85	242
MPB	526,458	2,570,042	598,836	4,306,984	174,161	2,596,389
PE	618	1,178	2,024	5,674	1,851	13,020
SAF	6,973	19,383	4,235	9,229	2,188	6,276
WPB	36	18	22	20	50	30
Total	550,939	2,631,110	627,801	4,381,251	193,724	2,712,705

*DFB = Douglas-fir beetle; SB = Spruce beetle; FE = fir engraver beetle; PE = pine engraver beetle; MPB = mountain pine beetle; SAF = subalpine fir mortality complex; WPB = western pine beetle.

Table 4. Douglas-fir Beetle-Caused Mortality on all Ownerships Statewide, 2013-2015

Reporting Area	2013 Acres	2013 Trees	2014 Acres	2014 Trees	2015 Acres	2015 Trees
Beaverhead	257*	252*	1,702	7,309	436	567
Bitterroot	1,497	7,012	252	359	404	1,366
Custer	1,660*	4,986*	382	531	10	32
Deerlodge	305*	406*	872	3,451	275*	525*
Flathead	1,513	3,111	1,831	6,592	1,841	4,554
Gallatin	3,233*	10,954*	859	929	665	929
Garnets	62	69	112	151	103	123
Helena	695*	1,227*	1,232	1,729	1,006	2,249
Kootenai	3,171*	6,366*	5,503	16,816	4,089	58,103
Lewis and Clark	887	1,257	1,077	1,508	1,302	9,020
Lolo	1,398*	1,983*	3,136	2,218	1,025	3,365
Blackfeet IR	39	38	32	84	131	220
Crow IR	16	9	24	17	6	35
Flathead IR	545	581	2,382	8,093	2,553	13,821
Fort Belknap IR	106	503	52	92	16	12
No. Cheyenne IR	0	0	0	0	0	0
Rocky Boy's IR	6	5	267	238	127	399
Glacier NP	509*	275*	728	3,909	300*	110*
Yellowstone NP ¹	12*	10*	26	36	44	67
Total	15,901	39,034	20,469	54,062	14,333	95,497

★= Not Surveyed; * = Partially Surveyed; ¹Yellowstone NP includes MT, ID, and WY acres

Table 5. Mountain Pine Beetle-Caused Mortality on State and Private Lands, Statewide, 2013-2015 (Acres)

Reporting Area	2013 LPP	2013 PP	2013 HE5NP	2013 WWP	2014 LPP	2014 PP	2014 HE5NP	2014 WWP	2015 LPP	2015 PP	2015 HE5NP	2015 WWP
Beaverhead	9,792*	7*	407*	0*	12,332	31	223	0	3,448	4	188	0
Bitterroot	2,320	3,175	0	0	984	4,907	0	0	437	443	0	0
Custer	109*	230*	94*	0*	742	17	10	0	0	0	0	0
Deerlodge	10,124*	126*	1,124*	0*	8,018	61	2,144	0	663*	12*	300*	0*
Flathead	228	75	9	5	504	118	0	0	10	20	0	0
Gallatin	1,326*	16*	511*	0*	220	67	1,688	0	20	1	36	0
Garnets	66	253	0	0	21	181	0	0	37	175	0	0
Helena	580*	1,318*	4*	0*	178	308	4	0	10	126	0	0
Kootenai	427*	23*	2*	144*	746	67	0	2	420	12	0	145
Lewis and Clark	1,026	14,999	137	0	89	3,852	254	0	13	171	4	0
Lolo	194*	816*	4*	2*	2,854	463	0	0	2,308	84	0	0
Blackfeet IR	14	0	0	0	0	0	0	0	0	0	0	0
Crow IR	472	49	294	0	18	16	8	2	0	0	6	0
Flathead IR	243	872	0	0	870	540	0	0	0	6	0	0
Fort Belknap IR	6	548	0	0	34	96	0	0	2	0	0	0
No. Cheyenne IR	0	108	0	0	0	0	0	0	0	0	0	0
Rocky Boy's IR	2,759	36	0	0	324	6	0	0	8	0	0	0
Glacier NP	2*	0*	0*	0*	19	0	0	0	0*	0*	0*	0*
Yellowstone NP ¹	1,549*	0*	56*	0*	0	0	0	0	0	0	0	0
Total	31,237	22,651	2,642	151	27,953	10,730	4,331	4	7,376	1,054	529	145

LPP = lodgepole pine; PP = ponderosa pine; HE5NP = high elevation 5-needle pines (WBP & LP); WWP = western white pine
 ★ = Not Surveyed; * = Partially Surveyed; ¹Yellowstone NP includes MT, ID, and WY acres

Table 6. Mountain Pine Beetle-Caused Mortality on all Federal Ownerships, Statewide, 2013-2015 (Acres)

Reporting Area	2013 LPP	2013 PP	2013 HE5NP	2013 WWP	2014 LPP	2014 PP	2014 HE5NP	2014 WWP	2015 LPP	2015 PP	2015 HE5NP	2015 WWP
Beaverhead	157,217*	21*	8,101*	0*	250,589	45	21,703	0	70,355	26	8,895	0
Bitterroot	120,693	15,523	4,423	0	80,687	17,890	2,076	0	25,142	1,726	957	0
Custer	953*	365*	1,340*	0*	777	28	2,968	0	74	0	30	0
Deerlodge	97,647*	59*	5,385*	2*	102,837	68	12,899	0	17,688*	6*	2,756*	0*
Flathead	710	599	93	345	997	46	4	0	747	24	0	4
Gallatin	4,046*	0*	5,672*	0*	2,018	35	7,071	0	764	5	642	0
Garnet	74	9	0	0	45	9	0	0	60	20	0	0
Helena	1,885*	424*	151*	0*	135	110	26	0	77	33	22	0
Kootenai	3,995*	181*	1,094*	114*	5,062	285	4	2	1,151	18	2	4,752
Lewis and Clark	12,971	15,408	4,842	0	2,050	3,609	481	0	171	98	294	0
Lolo	4,463*	1,450*	108*	2*	37,720	857	82	0	27,168	396	632	3
Blackfeet IR	0	0	0	0	0	0	0	0	4	0	0	0
Crow IR	0	0	0	0	0	0	0	0	6	4	6	0
Flathead IR	1	2	0	0	2	12	0	0	111	20	12	0
Fort Belknap IR	45	382	0	0	2	40	0	0	22	38	0	0
No. Cheyenne IR	0	0	0	0	0	0	0	0	0	0	0	0
Rocky Boy's IR	46	0	0	0	4	0	0	0	39	4	0	0
Glacier NP	323*	6*	0*	0*	2,474	2	0	0	2*	0*	0*	0*
Yellowstone NP ¹	1,549*	0*	56*	0*	404	0	220	0	297	0	56	0
Total	406,618	34,429	31,265	463	485,803	23,036	47,534	2	143,878	2,418	14,304	4,759

LPP = lodgepole pine; PP = ponderosa pine; HE5NP = high elevation 5-needle pines (WBP & LP); WWP = western white pine

★ = Not Surveyed; * = Partially Surveyed; ¹Yellowstone NP includes MT, ID, and WY acres

Table 7. Additional Bark Beetle-Caused Mortality on all Ownerships, Statewide, 2013-2015 (Acres)

Reporting Area	2013 SB	2014 SB	2015 SB	2013 FE	2014 FE	2015 FE	2013 PE	2014 PE	2015 PE	2013 SAF	2014 SAF	2015 SAF	2013 WPB	2014 WPB	2015 WPB
Beaverhead	98*	248	436	0*	0	0	0*	0	0	194*	251	132	0*	0	0
Bitterroot	0	100	10	0	0	4	4	6	1,178	120	150	326	12	4	16
Custer	21*	32	31	0*	0	0	0*	266	196	1,170*	235	14	0*	0	0
Deerlodge	34*	132	0*	2*	0	0*	0*	30	0*	88*	102	36*	2*	2	0*
Flathead	128	2	95	189	767	57	243	6	4	1,687	463	326	0	0	0
Gallatin	6*	187	161	0*	0	0	0*	2	4	957*	216	232	0*	0	0
Garnets	4	0	20	0	0	0	0	0	0	18	12	10	6	0	0
Helena	4*	66	0	0*	0	0	48*	6	12	66*	108	52	0*	8	2
Kootenai	91*	6	43	0*	233	10	0*	2	0	207*	898	112	10*	0	0
Lewis and Clark	44	138	56	0	0	6	153	31	32	690	316	506	0	2	0
Lolo	102*	142	28	18*	36	2	6*	632	2	546*	624	194	6*	4	26
Blackfeet IR	8	4	14	0	0	0	0	0	0	18	20	12	0	0	0
Crow IR	2	2	0	168	0	0	0	471	74	4	4	2	0	0	0
Flathead IR	8	2	11	6	10	6	0	121	4	94	124	105	0	0	6
Fort Belknap IR	0	0	0	0	0	0	0	0	37	0	0	2	0	0	0
No. Cheyenne IR	0	0	0	0	0	0	0	452	300	0	0	0	0	2	0
Rocky Boy's IR	0	0	4	0	0	0	0	0	0	0	0	2	0	0	0
Glacier NP	0*	102	171*	0*	0	0*	0*	0	0*	1,111*	649	18*	0*	0	0*
Yellowstone NP ¹	0*	4	86	0*	0	0	0*	0	0	2*	212	157	0*	0	0
Total	571	1,167	1,166	382	1,046	85	618	2,025	1,843	6,973	4,384	2,238	36	22	50

★= Not Surveyed; * = Partially Surveyed; ¹Yellowstone NP includes MT, ID, and WY acres

Table 8. Western Spruce Budworm Defoliation by Reporting Area on all Ownerships, Statewide, 2013-2015 (Acres)

<i>Reporting Area</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>
Beaverhead	19,720*	53,401	42,312
Bitterroot	4,521	7,382	34,739
Custer	4,945	1,059	2,471
Deerlodge	434*	15,327	49,657*
Flathead	201,008	320,468	165,264
Gallatin	78,285*	35,268	96,604
Garnets	21,684	59,470	4,460
Helena	85,261*	116,120	276,220
Kootenai	42,921*	39,796	44,673
Lewis and Clark	31,339	71,603	131,246
Lolo	64,817*	82,636	279,311
Blackfeet IR	6,794	3,407	6,931
Crow IR	0	1,347	2,776
Flathead IR	868	17	39,183
Fort Belknap IR	1,471	0	62
No. Cheyenne IR	0	0	0
Rocky Boy's IR	1,973	207	161
Glacier NP	29,251	68,728	31,362*
Yellowstone NP ¹	2,269	1,825	2,830
Total	597,561	878,061	1,210,262

★ = Not Surveyed; * = Partially Surveyed; ¹Yellowstone NP includes MT, ID, and WY acres

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COMMON AND SCIENTIFIC NAMES

Common Name	Pathogens	Primary Hosts
Annosus root disease (S-Type)	<i>Heterobasidion occidentale</i> Orosina & Garbelotto	DF, GF, SAF
Annosus root disease (P-Type)	<i>Heterobasidion irregulare</i> Garbelotto & Orosina	PP
Armillaria root disease	<i>Armillaria ostoyae</i> (Romagn.) Herink	DF, GF, SAF, saplings of all conifers
Aspen heart rot	<i>Phellinus tremulae</i> (Bond.) Bond. & Borisov.	QA
Aspen shoot blight	<i>Venturia macularis</i> (Fr.) E. Muller & Arx	QA
Atropellis canker	<i>Atropellis piniphila</i> (Weir) Lohman & Cash	LPP
Black canker	<i>Ceratocystis fimbriata</i> Ellis & Halst.	QA
Black stain root disease	<i>Ophiostoma wageneri</i> (Goheen & F.W. Cobb) Harrington	DF, PP
Comandra rust	<i>Cronartium comandrae</i> Pk.	LPP, PP
Diplodia shoot blight	<i>Diplodia pinea</i> (Desmaz.) J. Kickx fil.	PP
Dothistroma needle blight	<i>Mycosphaerella pini</i> Rost. In Munk	PP, LPP, LP
Dutch Elm Disease	<i>Ophiostoma ulmi</i> (Buisman) Nannf.	Elms
Dwarf mistletoes	<i>Arceuthobium</i> spp.	DF, LP, LPP, WL
Elytroderma needle disease	<i>Elytroderma deformans</i> (Weir) Darker	PP
Ganoderma	<i>Ganoderma applanatum</i> (Pers.) Pat.	QA
Indian paint fungus	<i>Echinodontium tinctorium</i> (Ell. & Ev.) Ell. & Ev.	GF, WH
Laminated root rot	<i>Phellinus weirii</i> (Murrill) R.L. Gilbertson.	DF, GF, SAF, WH
Larch needle blight	<i>Hypodermella laricis</i> Tub.	WL
Larch needle cast	<i>Meria laricis</i> Vuill.	WL
Marsonnina leaf spot	<i>Marsonnina populi</i> (Lib.) Magn.	QA
Red ray rot	<i>Dichomitus squalens</i> (P. Karst.) D.A. Reid	PP
Red ring rot	<i>Phellinus pini</i> (Thore :Fr.) A.Ames	DF, ES, PP, WL
Rhabdocline needle blight	<i>Rhabdocline pseudotsugae</i> Syd.	DF
Schweinitzii root and butt rot	<i>Phaeolus schweinitzii</i> (Fr. :Fr.) Pat.	Mainly DF, all conifers
Spruce broom rust	<i>Chrysomyxa arctostaphyli</i> Diet.	ES
Tomentosus root disease	<i>Onnia tomentosa</i> (Fr.) P. Karst.	ES, DF, LPP, SAF, WL
Western gall rust	<i>Endocronartium harknessii</i> (J.P. Moore) Y. Hiratsuka	PP, LPP
White pine blister rust	<i>Cronartium ribicola</i> J.C. Fisch.	LP, WBP, WWP

Common Name	Insects	Primary Hosts
Balsam woolly adelgid	<i>Adelges piceae</i> Ratzeburg	GF, SAF
Douglas-fir beetle	<i>Dendroctonus pseudotsugae</i> Hopkins	DF
Douglas-fir tussock moth	<i>Orygia pseudotsugata</i> (McDunnough)	DF, ES, TF
Fall webworm	<i>Hyphantria cunea</i> (Drury)	CC
Fir engraver beetle	<i>Scolytis ventralis</i> LeConte	GF, SAF
Larch casebearer	<i>Coleophora laricella</i> (Hubner)	WL
Mountain pine beetle	<i>Dendroctonus ponderosae</i> Hopkins	All pines
Pine butterfly	<i>Neophasia menapia</i> (Felder & Felder)	PP
Pine engraver beetle	<i>Ips pini</i> (Say)	LPP, PP
Spruce beetle	<i>Dendroctonus rufipennis</i> Swaine	ES
Western balsam bark beetle	<i>Dryocoetes confuses</i> Swaine	SAF
Western pine beetle	<i>Dendroctonus brevicomis</i> LeConte	PP
Western spruce budworm	<i>Choristoneura freemani</i> Razowski	DF, GF, SAF, ES, WL

CC = chokecherry; DF = Douglas-fir; ES = Engelmann spruce; GF = grand fir; LP = limber pine; LPP = lodgepole pine; PP = ponderosa pine; QA = quaking aspen; SAF = subalpine fir; TF = true firs; WWP = western white pine; WH = western hemlock; WL = western larch; WBP = whitebark pine

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Figures

Figure 1. Reporting Area Boundaries and National Forest Lands in Montana

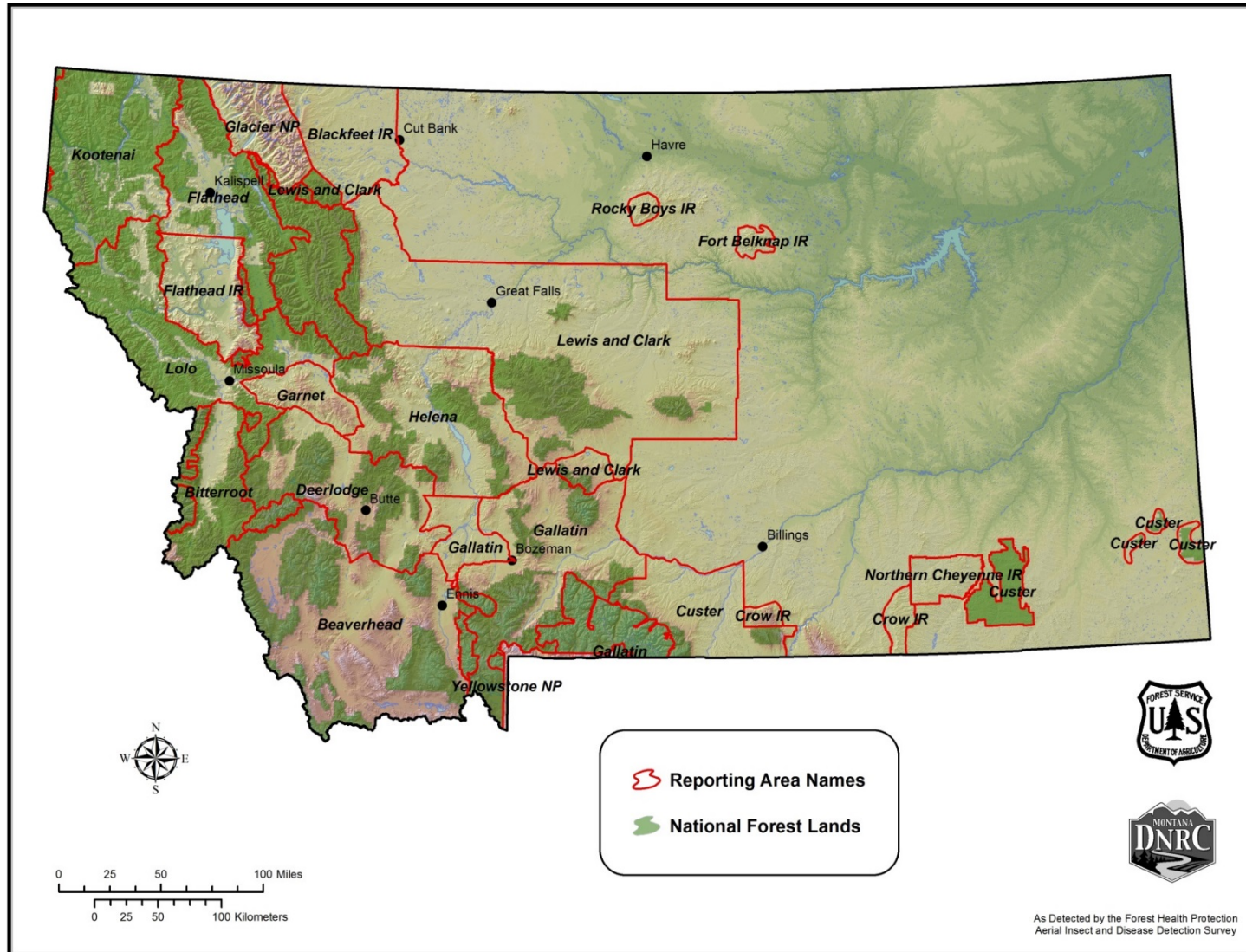


Figure 2. Areas Surveyed in 2015 by Forest Health Protection Aerial Detection Survey in Montana

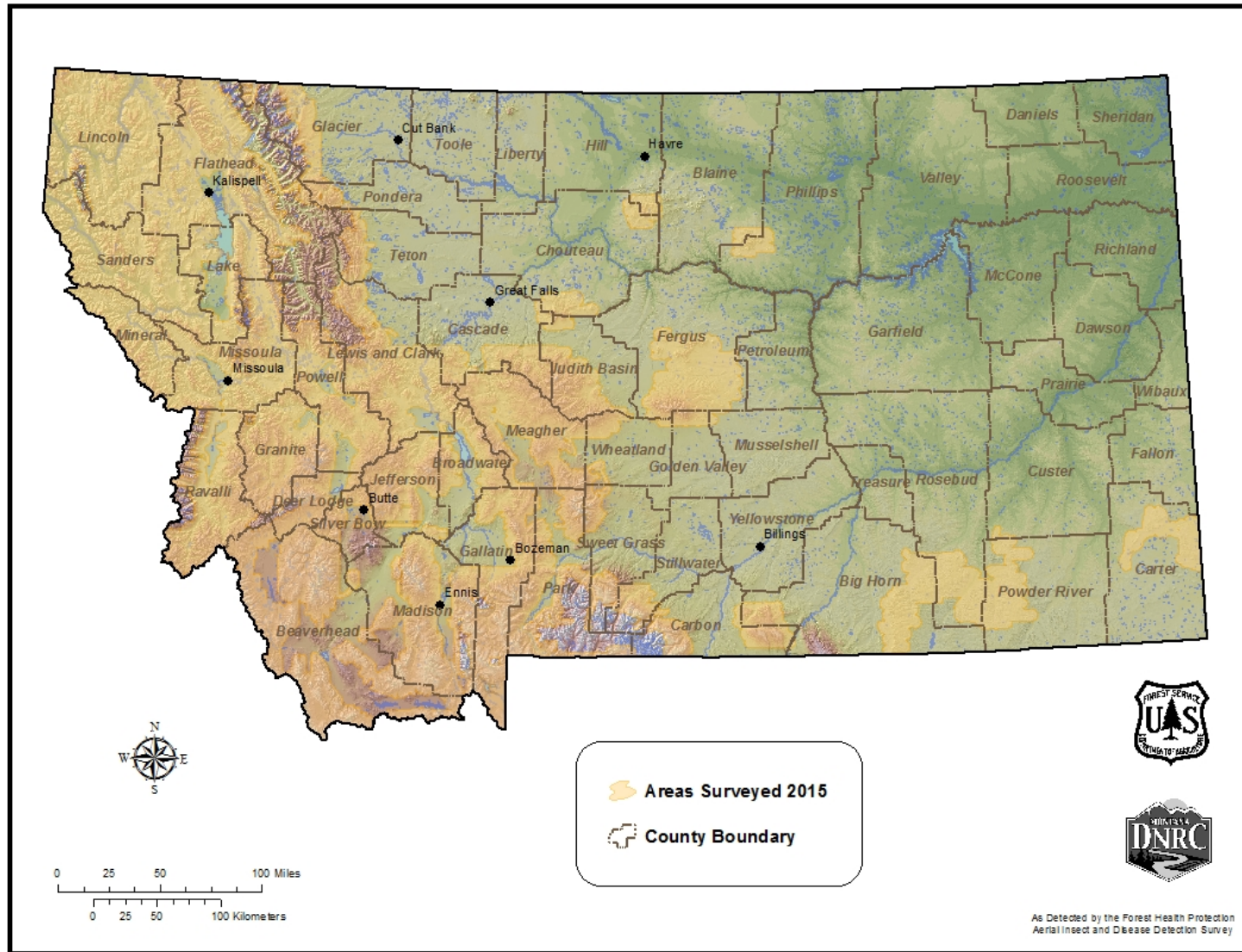


Figure 3. 2015 Mountain Pine Beetle Infestations in Montana

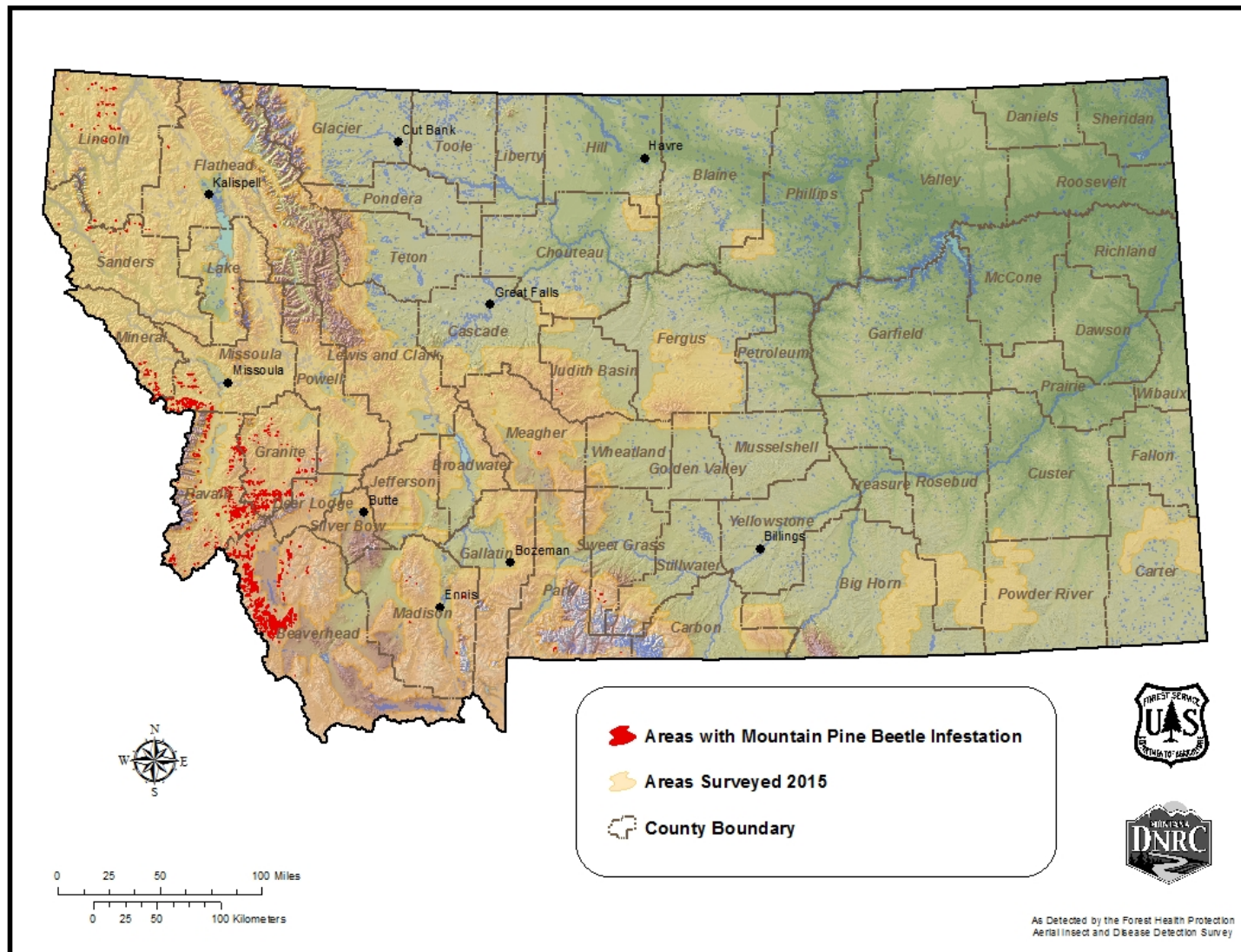


Figure 4. 2015 Douglas-fir Beetle Infestations in Montana

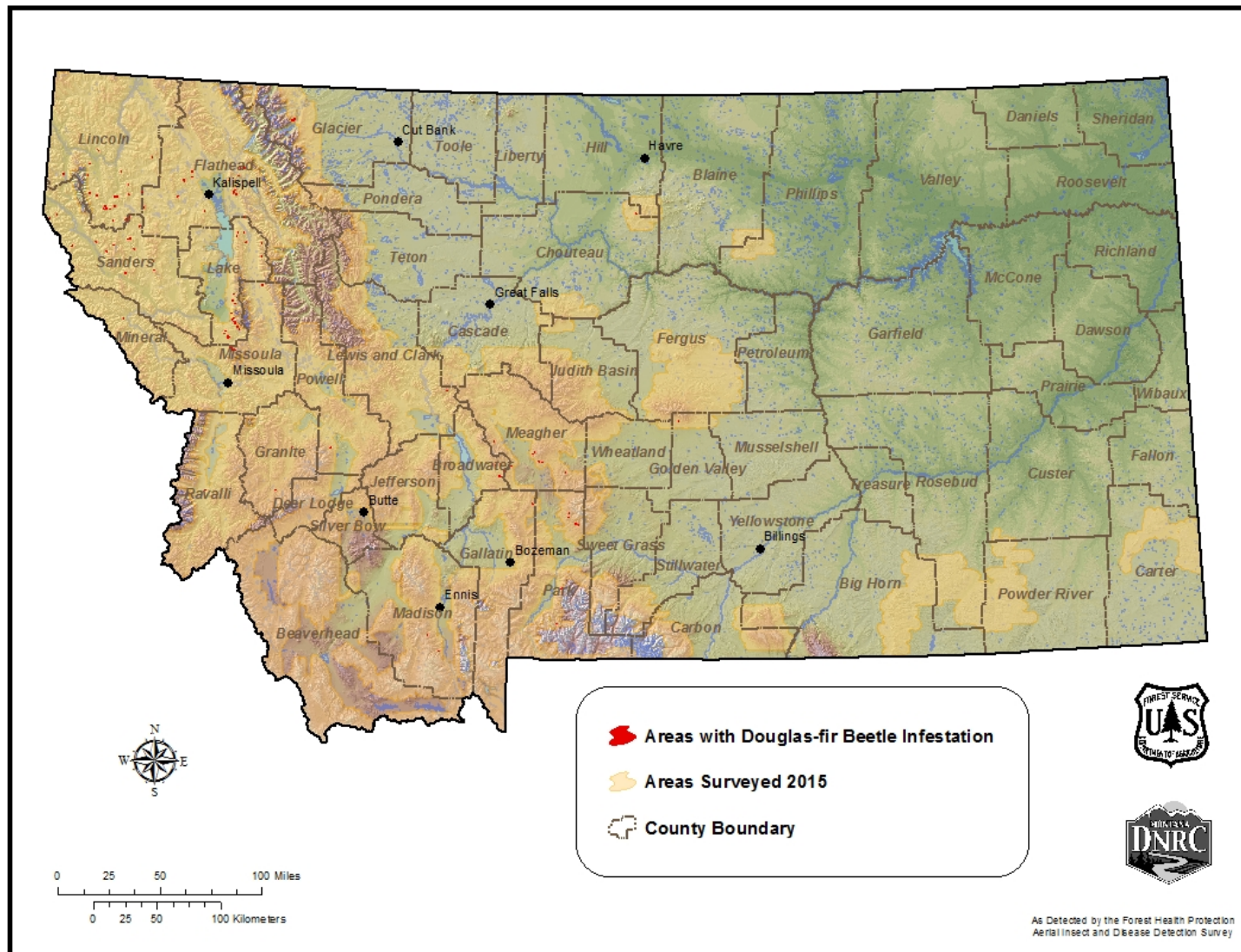


Figure 5. 2015 Western Spruce Budworm Infestations in Montana

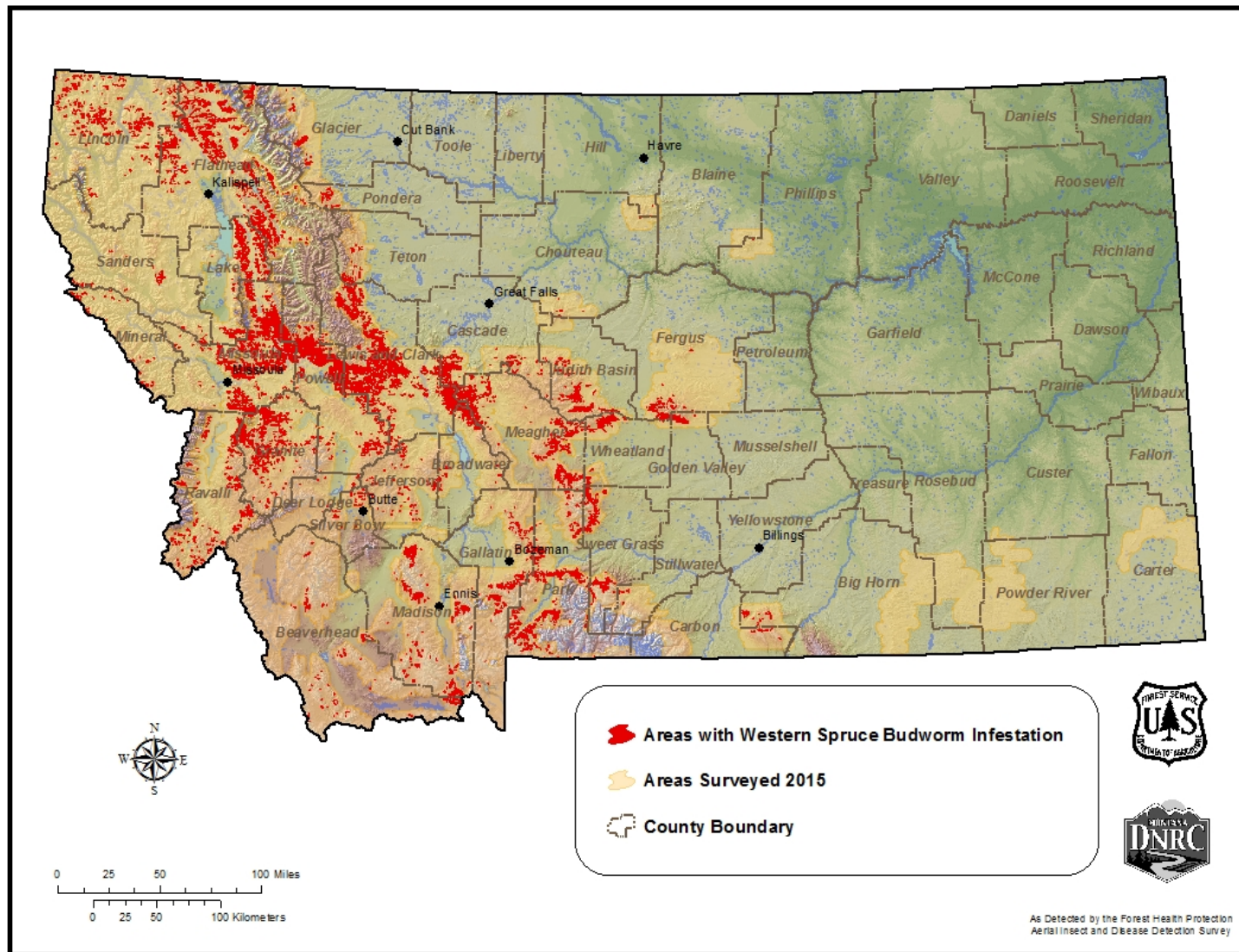


Figure 6. Balsam Woolly Adelgid Detection from Ground Surveys in Montana, 2010-2013 Ground Survey

