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MONTANA FOREST INSECT AND DISEASE CONDITIONS AND PROGRAM HIGHLIGHTS

Montana
Department of
Natural Resources
and Conservation

Forestry Division

Mountain Pine Beetle
Mortality in Whitebark
Pine in Yellowstone NP

Armillaria Mushrooms

MONTANA

Forest Insect and Disease Conditions and Program Highlights - 2004

Report 05-1

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Mountain pine beetle mortality in whitebark pine in Yellowstone NP, courtesy of Ken Gibson, USDA Forest Service.

Armillaria mushrooms, archives, USDA Forest Service.

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INTRODUCTION

This report summarizes the major forest insect and disease conditions in Montana during 2004 and was jointly prepared by the Montana Department of Natural Resources and Conservation, Forestry Division and USDA Forest Service (FS), Forest Health Protection (FHP), State and Private Forestry, Northern Region. Information for the report was derived from ground and aerial surveys within Reporting Areas across parts of Montana. A Reporting Area (RA) includes all federal, state, and private land ownerships within a particular geographic boundary (Figure 1).

SUMMARY OF CONDITIONS

Bark Beetles

Although late fall turned out to be atypically dry, much of the State received above normal amounts of precipitation during calendar year 2004. Most of the State, and especially the eastern portions, have not completely broken out of the 4- to 5-year drought; however, growing conditions for most bark beetle hosts improved markedly throughout Montana. Despite improved conditions, long-term drought affects are not easily overcome. Many bark beetle species are at extremely high levels and will not respond to improved host conditions for a year or so. Those latter two factors combined result in an increase in infested area by most bark beetle species across the State. Unfortunately, less-than-optimal weather conditions late in the season prevented aerial survey of all beetle-infested areas. Approximately 85% of the forested portions of the reporting areas were flown. While some areas appeared to be less impacted for most of Montana, both aerial and ground-collected data showed still-increasing bark beetle infestations for most species.

Mountain pine beetle-infested areas increased in many locations surveyed; however, in some locations, intensity of beetle-caused mortality is declining due to host depletion. Decreases in infested areas recorded on the Lolo National Forest (NF) is a reflection of the amount of area flown—not necessarily an indication that the outbreak overall is waning. In total, considerably more infested acres were recorded in 2004 than in 2003, despite some heavily infested areas having not been flown. Much of that total infested area was recorded in whitebark pine stands, where outbreak extent and intensity increased significantly. In all, it is likely that total infested area throughout the State is actually much higher than recorded.

Douglas-fir beetle-infested acres decreased in parts of northwestern Montana, but increased in southwestern and central Montana. Overall, infested acres increased in 2004 and beetle activity remained high in many areas. Grand fir mortality attributable to fir engraver once again increased to all-time high levels and western balsam bark beetle-killed subalpine fir was mapped on more acres than ever recorded. Now, as we look forward to 2005, we are hopeful of continuing the recovery from the droughty conditions of the past several years. With continued near-normal weather, we are cautiously optimistic we may see bark beetle populations begin to decrease in intensity, if not extent. A relatively warm and dry winter, followed by another unusually dry spring, would likely result in expansion of most bark beetle-infestations through the coming year.

Defoliators

Due to unpredictable and inclement weather conditions during peak survey times for our aerial surveyors this year, actual total acreage with defoliator damage is underestimated. Ground surveys of a majority of areas not flown were moderately to heavily infested with western spruce budworm (WSB) – the most prevalent defoliator in Montana. Acres that were flown and mapped with defoliation is about 187,000 – of which 177,000 was solely western spruce budworm (figure 7). Roughly, four thousand acres in various locations around the state (the largest figure 3000 acres in the Kootenai National Forest) were coded as 'unidentified defoliation'. Poor visibility conditions and seasonal timing of aerial flights made pest identification difficult. On-going Douglas-fir tussock moth monitoring efforts conducted by DNRC, correctly forecasted a population surge. Over 5800 acres were damaged by tussock moth this year in the Flathead Indian Reservation alone. Tree mortality figures caused by tussock moth were not available.

Other defoliators were more localized per forest, with minimal acres of defoliation detected. Pine tussock moth, larch bud moth, and larch sawfly damage were all recorded on a combined total of less than 85 acres across the state. Defoliation totals of pine needle sheath miner and western false hemlock looper made up less than one thousand acres. No gypsy moths were found in monitoring traps in the state of Montana.

Root Diseases

Mortality and growth losses from root disease continue to be high throughout the state. Root disease-caused mortality is more common west of the Continental Divide, causing mortality on over one million acres. Large areas of root disease can be found east of the Divide but they are found in more discrete patches, rather than ubiquitous throughout an area.

Dwarf Mistletoes

Douglas-fir, western larch, and lodgepole pine are the tree species most severely affected by dwarf mistletoes. Fire greatly influences the distribution of dwarf mistletoes across the landscape. In general, any fire event that kills infected trees will reduce the population of dwarf mistletoe, at least in the short term. Large, complete burns will greatly reduce dwarf mistletoe populations across the landscape and may even eliminate small, localized populations. Small, patchy burns will temporarily reduce the amount of mistletoe, but infected residuals provide a ready source of dwarf mistletoe seeds for infection of the new regeneration.

White Pine Blister Rust

White pine blister rust continues to be present throughout the range of five-needle pines in the state. Rust severity is highest in the northwestern part of the state where the disease continues to cause extensive mortality in western white pine. The effects of blister rust on whitebark pine ecosystems took longer to appear than in western white pine forest type, but it is apparently proving to be equally devastating. Blister rust has been implicated in dieback and mortality of limber pine in many locations.

ANNUAL AERIAL SURVEY

The annual aerial detection survey in Montana was conducted from June 28 thru September 17th, 2004. The survey covered approximately 20.8 million acres of mixed ownership forestlands, excluding most wilderness areas (Figure 2). Four FHP sketch mappers, using three different airplanes, conducted the 2004 aerial survey.

Deteriorating weather conditions late in the season prevented aerial surveys on portions of the forested lands that are normally flown. As a result only about 85% of forested lands in 16 Reporting Areas in Montana were flown.

Much of the data summarized in this report is a product of the aerial survey, as well as ground surveys and biological evaluations. Along with the data summaries, aerial survey maps are available from the Missoula FHP Field Office, in both paper and digitized GIS format.

The annual aerial detection survey is an overview survey designed to cover large areas in relatively short periods. Aerially detected signatures include tree mortality, defoliation and windthrow. If forest disturbance activities are low, secondary disturbances such as diseases, needle casts, high-water damage and previous fire damage are sketch mapped. The intent of the survey is to cover each area once a year during which time the observer sketch maps as many disturbances and damage as possible. The survey is conducted using single-engine, high-wing airplanes, flying at speeds of approximately 90 to 130 mph, at an average altitude of approximately 1,000 to 2,000 feet above ground level.

The aerial survey data is estimates made from airplanes and though not as many areas were ground checked, as we would like, enough were checked to lend confidence to the areas for which we only have aerial survey data. Together, aerial and ground surveys provide information relative to bark-beetle-caused mortality, as well as other damage agents pertinent to land managers charged with the responsibility of maintaining forest health.

INSECTS

Abbreviations

The following abbreviations are used throughout the bark beetle section:

Beetles	DFB	=	Douglas-fir beetle, *Dendroctonus pseudotsugae* Hopkins
	ESB	=	Spruce beetle, D. *rufipennis* (Kirby)
	IPS	=	Pine engraver, *Ips pini* (Say)
	MPB	=	Mountain pine beetle, *D. ponderosae* Hopkins
	WPB	=	Western pine beetle, *D. brevicomis* LeConte
	FE	=	Fir engraver, *Scolytus ventralis* LeConte
	WBBB	=	Western balsam bark beetle, *Dryocoetes confuses* Swaine
	RTB	=	Red turpentine beetle, *D. valens* LeConte
Hosts	LPP	=	Lodgepole pine
	PP	=	Ponderosa pine
	WWP	=	Western white pine
	WBP	=	Whitebark pine
	DF	=	Douglas-fir
	GF	=	Grand fir
	SAF	=	Subalpine fir
	ES	=	Engelmann spruce
Other	NF	=	National Forest
	RD	=	Ranger District
	IR	=	Indian Reservation
	BLM	=	Bureau of Land Management

Reporting Area summaries follow. For each, bark beetle effects on their respective hosts are noted. To the extent possible, we have indicated areas affected, an estimate of impacts, and beetle population trends. Though reporting areas are typically designated by names of National Forests, Indian Reservations, or National Parks; there may be within those reporting areas, lands of various ownerships—federal, state and private.

BARK BEETLE CONDITIONS BY REPORTING AREA IN BRIEF

Mountain Pine Beetle (MPB). The infested area mapped in 2004 increased significantly in many parts of the State, despite several of the more heavily infested areas not being flown. In western Montana, most areas also showed an increase in infested areas (tables 4 and 5, and figure 3). One exception was the Lolo NF reporting area; however, some of the most heavily impacted areas—Plains/Thompson Falls and Superior RDs—were not flown. On the Deerlodge and Flathead NFs, where most affected areas were flown, infested area increased once again. Acres on which beetle-caused mortality was recorded—in all species and on all ownerships—increased considerably, to more than 453,300 acres. Just over 306,100 acres had been recorded in 2003. The figure recorded this year is the highest total infested area in the State since 1988. Had all infested acres been mapped, we likely would have exceeded 500,000 acres. On those infested acres, more than 2 million trees were killed in 2003—recorded as faders in 2004. Nearly 90% of those were lodgepole pine. Although beginning to decline in some host stands, beetle populations are still expanding in many areas. As many as 80 new attacks per acre (in lodgepole pine) were found in one area surveyed.

A significant increase in beetle-caused mortality was noted in whitebark pine stands—especially on the Gallatin and Beaverhead NFs and in Yellowstone National Park (NP). While parts of the Beaverhead NF and Yellowstone NP were not flown, we know from ground observations that infestations increased substantially in those areas.

Many susceptible lodgepole, whitebark, and ponderosa pine stands remain in the state. Unless weather patterns change to ones more favorable to their host and less conducive to beetle survival and population expansion, or management activities reduce the availability of susceptible hosts, MPB populations and resultant tree mortality will continue until few susceptible hosts remain.

Douglas-fir Beetle (DFB). In western Montana, DFB-infested stands on the Flathead and Kootenai NFs showed static or declining populations (table 3, figure 4). In many areas, beetle-killed trees were still obvious; but seldom did we find higher numbers of new attacks in 2004 than in 2003. Stands surveyed in and around areas affected by the 2000 fires on parts of the Bitterroot and Helena NFs showed still-high populations and increased new attacks in many areas in 2003. Infestations on the Bitterroot NF, however, showed indications that populations may at last be declining. The infested area recorded on aerial detection surveys declined from more than 34,500 acres in 2003 to slightly less than 31,000 acres in 2004. That is still the most heavily impacted reporting area in the State. Ground surveys and observations showed fewer areas with high amounts of currently infested trees. Surveys conducted on the Deerlodge, Helena and Lolo NFs showed significant increases in infested areas. Some of those were still heavily infested with trees attacked in 2004; however, some of those recorded increases occurred because not all infested areas were surveyed in 2003. On the Gallatin NF, populations remained high in some stands, and a few observations showed unusually late attacks in some areas. Trapping results also indicated later-than-normal flights in a few infested stands elsewhere. It will be of interest to follow these outbreaks. DFB does not typically overwinter as larvae and survival may decline as a result of late egg deposition.

Statewide, the infested area mapped increased to more than 92,500 acres; up from 76,500 acres in 2003. In some stands, particularly on the Lolo, Deerlodge, and

Gallatin NFs, populations appear to be still increasing.

Worthy of note, in some areas of western Montana, small-diameter Douglas-fir have been killed over the past 2-3 years, with damage attributed to DFB. Ground observations have shown that Douglas-fir pole beetles, the flatheaded fir borer, or combinations of both have in fact killed many of those—in the 6-inch to 10-inch diameter classes—. Both those beetles regularly respond to drought-stressed trees. As an aside, many smaller-diameter western larch have also been recently killed by the flatheaded fir borer.

More than 1 million acres of Douglas-fir, older than 100 years, exist in the State. Weather and stand disturbances—fire, defoliation, or wind throw—increase the likelihood of DFB outbreaks in susceptible stands. Preventive management is the key to reducing outbreak potential.

Fir Engraver (FE). Grand fir stands, in which FE-caused mortality was recorded, increased to yet another all-time high in 2004 (table 6, figure 5). Most stands in which grand fir was a significant component, in western Montana, showed high levels of infestation. Total infested area exceeded 34,400 acres in 2004. Last year's previous high infested-acres total of 20,600 acres was increased by more than half this year. Nearly 60,000 grand fir were estimated to have been killed in 2003 (recorded as faders in 2004). We believe these dramatic increases in FE-caused mortality are still drought related despite a better precipitation year in 2004. Unless we return to more normal long-term precipitation patterns, beetle-caused mortality will likely continue.

Western Balsam Bark Beetle (WBBB). The number of acres on which subalpine fir mortality, attributed to WBBB, were recorded increased markedly in 2004. Portions of the Beaverhead NF, where beetle populations have recently been high, were not flown. In the areas surveyed, more than 133,800 acres were infested—compared to 76,000 acres in 2003. An estimated 250,000 subalpine fir were killed (table 6, figure 6). In many areas, populations are still increasing, and will continue so long as susceptible stands and favorable weather provide such favorable conditions.

Others. Pine engraver beetle (IPS) populations, and associated tree mortality increased substantially in ponderosa pine stands in the State, but most of those increases were noted on the Flathead IR. There, the infested area increased from 1,800 acres in 2003, to more than 14,000 acres in 2004. Elsewhere in the Region, populations were static or declined slightly. Still, faders were recorded on just over 16,000 acres this year, compared to slightly more than 5,000 acres in 2003.

Spruce beetle (ESB) populations remained at endemic levels throughout Montana. In no reporting area were more than 100 infested acres recorded. We know the outbreak recorded east of Yellowstone Lake in Yellowstone NP, mapped at more than 8,700 acres in 2003 still exists; however, the Park was not flown in 2004. We are unsure of its current extent.

Western pine beetle (WPB)-caused mortality, still relatively low for our stand conditions, declined to only about 400 acres in 2004. WPB-infested ponderosa pines had been observed on the Flathead IR in 2003, whereas none were recorded in 2004. There likely were some trees still there, but areas were either not flown or misidentified. About 800 infested acres had been recorded in second-growth ponderosa pine stands in 2003. An estimated 1,000 trees have been killed in those stands within the past two years. We anticipate continuing declines if precipitation patterns approach normal conditions (table 6).

The following tables, and area summaries included throughout this report, show estimates of infested areas and amounts of associated mortality; as gathered through annual aerial detection surveys. Some have been augmented by ground surveys; but time, access, and available personnel limit those.

These combined survey methods, then, provide information on extent and intensity of bark beetle infestations.

BARK BEETLE CONDITIONS BY REPORTING AREA

Beaverhead Reporting Area

Dillon RD. The only portion of the District flown in 2004 was the East Pioneer Mountains, northwest of Dillon. There, widely scattered, small groups of MPB-killed LPP were recorded as well as fewer, but numerous groups of DFB-killed DF, WBBB-killed SAF, and MPB-killed WBP. Groups of faded trees were observed from about Rock Creek on the north to Clark Canyon Reservoir on the south. Most beetle-killed WBP was recorded in high-elevation stands both north and south of Bannock. Several other groups were mapped east of Earls Gulch. The portion of the District in the West Pioneers and Beaverhead Mountains was not flown; however, historically the most prevalent bark beetle-caused mortality recorded in those areas has been attributed to WBBB in SAF stands. Because of the prevalence of WBBB activity in other areas, we can only assume it is continuing in susceptible stands not flown as well.

In the Blacktail Mountains and near Axes Canyon, other widely scattered and small groups of DFB-killed DF, LPP and WBP killed by MPB, and WBBB-killed SAF were observed. District-wide, for the area flown, DFB-killed trees were recorded on about 440 acres, MPB-killed LPP on almost 820 acres and WBP on nearly 200, and almost 1,400 SAF were killed by WBBB on 500 acres. We are confident many more acres of bark beetle-killed trees existed on areas not surveyed.

Wise River RD. A small portion of the District, north of Wise River was flown in 2004. There, WBBB remained the single most important agent of mortality in SAF stands on the District; however, numerous small groups of DFB-killed DF were also observed. Most of the rest of the District was not flown. In past years, many groups of faders were recorded in the Pioneer Mountain Range, from the Big Hole River south to Elkhorn Springs. Mortality in those areas likely continued. Also throughout that area, generally in the Wise River drainage at lower elevations, many groups of DFB-killed DF were mapped. In the few areas surveyed, DFB-caused mortality was observed on almost 600 acres; SAF killed by WBBB were recorded on just over 600 acres.

Wisdom RD. The District was not flown in 2004, but as in other parts of the Forest, we are certain WBBB remained the most significant mortality-causing agent. SAF stands throughout the Beaverhead Mountain Range, along the Montana/Idaho border have been infested to greater or lesser extents. Notable concentrations have recently been mapped in the Ruby Creek drainage, west of Wisdom; and in the Beaver Creek and Thompson Creek drainages in the Anaconda Range to the north. In 2003, almost 1,000 beetle-killed SAF were recorded on about 600 acres.

Widely scattered DFB-caused mortality has been of less significance in the past few years, and likely remained present in many stands in 2004. In 2003, mortality attributed to DFB totaled 2,200 trees on 1,300 acres. A DFB trapping project in the vicinity of Steel Creek showed nearly static beetle populations—number of new attacks were virtually the same as previous-year hits.

Madison RD. Most of the Tobacco Root Mountains and SAF stands in the Gravelly Range were not flown in 2004; however, in the past couple of years, SAF mortality attributed to WBBB had reached extremely high levels throughout the District. Some stands were more heavily impacted than others, but it appeared there were few SAF stands on the District not affected to some extent. Relatively small groups—up to 100 trees each—were reported in the Tobacco Root Mountains to the north. To the south, throughout the Gravelly Range, extremely large groups of faders—covering as much as several thousand acres each, and averaging an estimated 3-5 trees per acre—were mapped within the past two years.

In 2004, the largest concentrations of WBBB-killed trees were mapped south and west of Ennis in the Ruby Range, throughout the Snowcrest Range, and in the southern end of the Gravelly Range. Total affected area on the District was estimated at 9,700 acres on which an estimated 10,700 trees were killed.

Large groups of WBP, killed by MPB—much increased over the past couple of years—were recorded in the southern portions of the Gravelly and Snowcrest Ranges.

Elsewhere, there were lesser amounts of DFB-killed DF, and MPB-killed WBP scattered throughout the reporting area. DFB-caused mortality and LPP killed by MPB was especially noticeable in the West Fork Madison River drainage.

To the south, in the Centennial Range, on lands administered mostly by BLM, large amounts of SAF, killed by WBBB, were still present, but decreased from 2003. In that same general area, significant amounts of WBP killed by MPB were recorded. Lesser amounts of LPP have been infested by MPB. Largest groups of SAF faders were noted west of Nemesis Mountain and totaled almost 3,100 trees on 1,400 acres; while most MPB-caused mortality was to the west of there. Total MPB-caused mortality, in both LPP and WBP, exceeded 35,000 trees on 13,400 acres. Small amounts of DFB activity were observed at a few lower-elevation sites.

Total aerial survey estimates for the Beaverhead Reporting Area, on lands of all ownerships, showed nearly 5,000 acres infested by DFB; 43,400 acres infested by MPB (all hosts); and almost 21,200 acres infested by WBBB. Approximately 230,000 trees were killed by bark beetles throughout the area in 2003—and recorded as faders in 2004. In addition, nearly 37,000 acres showed some level of western spruce budworm (WSBW) defoliation. Dependent upon weather over the next few years, many of those trees could be killed by DFB. Again, only about 60% of the reporting area was flown in 2004.

Bitterroot Reporting Area

Stevensville RD. Widely scattered and small groups of DFB-killed DF were mapped in the Bitterroot Mountains, west of Stevensville. In lower-elevation stands, along the eastern slopes of the Bitterroots, small and very scattered groups of PP, killed by MPB and/or WPB were also observed. Several groups of LPP, and WBP at higher elevations, killed by MPB, were mapped in a few drainages, west of Stevensville.

In the Sapphire Mountains, to the east of the Bitterroot Valley, many small groups of beetle-killed trees were generally scattered throughout the reporting area. Most numerous were groups of DFB-killed DF—especially prevalent from Slocum Creek on the north to Skalkaho Creek on the south. There were also a few groups of SAF, killed by WBBB, at some higher elevation sites in the Sapphires. A few small groups of PP, killed by MPB, were mapped throughout the reporting area.

District totals, down from those mapped in 2003 showed only about 725 acres of DFB-infested DF; approximately 40 acres infested by MPB—most in WBP stands; and more than 320 acres affected by WBBB. Reported bark beetle activity declined on most ownerships.

Darby RD. A few very small groups of PP, killed by MPB and WPB, were observed in low-elevation stands on the east slopes of the Bitterroot Mountains. Beetle-killed groups of both LPP and WBP, killed by MPB, were prevalent south of Lake Como. Also in that area, and particularly in the Lost Horse Creek drainage, fire, DFB, or both have affected many DF. In the Sapphire Mountains, especially south of Skalkaho Creek, many groups of 5 to 120 DF each, killed by DFB were mapped. District-wide, DFB-infested acres increased somewhat in 2004.

In summary, almost 7,400 acres exhibited some level of DFB-caused mortality (compared to 5,760 in 2002); and 495 acres of MPB-killed trees—most of which were recorded in PP stands. Other bark beetle-caused damage was observed, but was of less importance.

Sula RD. Many groups of DF, killed by DFB and varying in size from a few to a few hundred trees each, were noted throughout several tributaries of East Fork Bitterroot River, from Sula east to the Forest boundary. Some of the larger groups were recorded near Jennings Camp Creek and Shirley Mountain and south from there to Lost Trail Pass. East of the Bitterroot River, stands in the Rye Creek drainage and near Deer Mountain contained some of the largest groups of faders. Total area infested by DFB increased to slightly more than 12,000 acres. Just over 10,200 acres had been recorded in 2003. Approximately 26, 200 DF were killed on those infested acres.

Also, on the District several groups of PP killed by MPB and totaling 390 acres, were recorded. At higher elevations, SAF stands generally contained small groups of WBBB-killed trees, totaling about 100 acres.

West Fork RD. Very high amounts of DFB-killed DF, some still exhibiting fire effects, were mapped throughout the reporting area. Largest groups were noted in the upper portions of West Fork Bitterroot River drainage. There, virtually every tributary of the West Fork, which contained DF stands, had showed groups of beetle-killed trees. Numerous large groups were also observed west of Nez Perce Pass, in the Frank Church-River of No Return Wilderness. However, they seem to have been generally fewer than in 2003. District totals showed nearly 11,500 acres still infested. In addition, a few hundred acres were observed on which MPB had killed LPP or PP, and about 375 acres showed comparatively small amounts of WBBB-killed SAF.

Throughout the Bitterroot NF, in areas affected by fires of 2000, some damaged trees remain and may still be attracting DFB. In addition, a significant increase in beetle-infested stands not affected by fire, has been observed. Ground surveys conducted in the past two years indicated many fire-damaged trees were infested in 2001, but many non-damaged trees had been attacked in 2002 and 2003. Surveys conducted in fire-affected and adjacent stands in 2004, showed generally declining numbers of new attacks, although numerous new attacks per acre were observed in some areas. In some areas, host depletion suggests beetle populations are beginning to decline.

Bitterroot Reporting Area totals for 2004 showed 31,000 acres infested by DFB—compared to 2003 figures that showed more than 34,500 acres. Almost 62,000 DF were killed last year alone. Slightly less than 30 acres of LPP, and about 1,000 acres of PP stands, contained MPB-caused mortality. Much of the latter was recorded on the Sula State Forest. Just over 1,100 acres of SAF stands were infested by WBBB. Mortality attributed to other bark beetles was less noticeable.

Custer Reporting Area

Beartooth RD. Large groups of WBBB-killed SAF were recorded in the Pryor Mountains near Tony Island Spring, west of there to Bent Spring, and south to Mystery Cave. Smaller groups were recorded throughout the reporting area.

Elsewhere, in the Pryor Mountains, MPB-caused mortality was noted in PP stands at several widely scattered locations, with the heaviest concentrations being observed south and east of Tony Island Spring. Significant amounts of MPB-caused mortality in LP stands were mapped generally west of Red Pryor Mountain. Infested stands were also noted on lands administered by BLM in that area.

South of Red Lodge, from Mount Maurice, south and east to the Forest boundary, several large groups of WBP, killed by MPB, were mapped. WBP mortality in the vicinity of Red Lodge totaled 2,200 trees on 1,700 acres. In the upper reaches of tributaries of West Fork Rock Creek, large groups of WBBB-killed SAF were observed. More than 4,400 acres were infested to some extent, District-wide. An estimated 9,200 SAF were killed.

Sioux RD. The Sioux RD was not flown in 2004. In 2003, MPB- and IPS-infested PP stands were observed in Chalk Buttes, Ekalaka Hills, and the Long Pines. Additional beetle-caused mortality was observed in the East and West Short Pine Hills, North and South Cave Hills, and Slim Buttes. These populations, first recorded in 2001, were still increasing in 2003. A total of 2,600 acres, averaging mortality of about one tree per acre, was recorded in 2003.

Ashland RD. Many small and widely scattered groups of PP, killed by combinations of MPB and IPS were recorded in many of the tributaries of Otter Creek, Beaver Creek, and the Tongue River, east of Ashland. While beetle-killed groups were not large (generally 10 trees or less), mortality was very generally scattered over most PP stands from about East Fork or Otter Creek on the north to the Forest boundary on the south. Much bark beetle activity appeared to be associated with stand damage directly attributable to the Stag Fire of 2000 and continuing droughty conditions. Throughout the District, beetles killed about 2,800 PP on a combined 2,600 acres. Only 617 infested acres were reported in 2003.

Custer Reporting Area-wide, reported bark beetle-caused mortality totaled 265 DF on 74 acres; 380 limber pine on 300 acres; 8,200 PP on 5,030 acres and 2,280 WBP on 1,760 acres, killed by MPB; an estimated 1,500 PP killed by IPS on 930 acres; and 10,750 WBBB-killed SAF on 4,900 acres. Most of those were increases over 2003.

Deerlodge Reporting Area

Butte RD. Very large groups of LPP, killed by MPB, were once again mapped to the north, south, east, and west of Butte in 2004. The largest groups, with the most intense amounts of beetle-caused mortality, once found to the southeast of Butte in the Basin Creek and Thompson Park areas, have now moved farther to the west and south along the Continental Divide and west towards Interstate 15. Throughout the infested area, fader groups extended to several thousand acres each, and ranged from an estimated 0.5 to 40 beetle-killed trees per acre. Ground surveys conducted there showed the infestation in that area is still quite active although decreasing in some areas due to host depletion. In the Lime Kiln area, new attacks averaged 47 per acre, with another 13 per acre killed in 2003. In Basin Creek, new attacks averaged 16 per acre, but 44 per acre were killed in 2003 and 65 per acre in the couple of years before that. Similar data for Thompson Park showed 10 new attacks, 72 previous-year attacks, and 3 older dead per acre.

To the east, along East Ridge, the very noticeable outbreak continued, as did ones near Delmoe Lake, north of Homestake Pass. To the north of Butte, from Harrison Gulch on the east to Telegraph Gulch on the west, outbreaks continued to build. In all areas surveyed in 2004, MPB-infested areas increased over 2003 levels.

To the west and southwest, north of Fleecer Mountain, and along east-facing slopes of Fleecer Ridge to just south of Anaconda, increasing amounts of MPB-killed LPP were mapped. District-wide, an estimated 814,500 LPP were killed on approximately 54,900 acres in the last year. Those estimates represent significant increases over the more than 140,800 LPP killed on nearly 18,500 acres, recorded in 2003.

DFB-killed DF was noted in slightly increasing amounts throughout the DF type on the District. District-wide, DFB-caused mortality totaled 800 trees on 330 acres. Increasing amounts of WSBW-caused defoliation, coupled with continued dry conditions could increase DFB outbreaks within the next year or two.

Jefferson RD. MPB-infested LPP stands on the District increased markedly in 2004. Infested stands were mapped east of Delmoe Lake, extending east of Whitetail Reservoir into the upper portions of Whitetail Creek, further east into the Bull Mountains, and southward along the Silver Bow/Jefferson County line. Infested stands were also observed in the Tobacco Root Mountains. Infestations on the District were not as extensive as those on Butte RD, but increased significantly in 2004. Infested area on the District recorded as 6,700 acres in 2003, increased to almost 40,000 acres in 2004. More than 205,000 LPP were killed.

South of Boulder, minor amounts of DFB-killed DF were noted; however, most beetle-caused mortality there was also MPB-killed LPP, found in tributaries of Boulder and Little Boulder Rivers. In the northern portion of the Tobacco Root Mountains, several groups of SAF killed by WBBB and totaling about 1,500 acres, were mapped in tributaries of South Boulder River and Curly Creek drainages. In that same general area, but north of Windy Pass, MPB-killed LPP was mapped at higher elevations and northward on lower sites. MPB had killed small and scattered groups of PP.

North of Boulder, on lands administered by both BLM and FS, MPB had killed numerous groups of PP and a few groups of LPP. Beetle populations there are also increasing.

Deer Lodge RD. MPB-caused mortality in LPP stands increased considerably east of Deer Lodge, in the Baggs Creek and Cottonwood Creek drainages. There, several large groups were recorded. Small and widely scattered groups of MPB-killed LPP were observed in many other LPP stands throughout the reporting area. Those appeared to be increasing. Outbreaks on the District totaled about 3,600 acres in 2004. Only 1,200 acres had been recorded in 2003. An estimated 14,000 LPP were killed.

Smaller groups of MPB-killed LPP and DFB-killed DF were also noted in Lost Creek and Racetrack Creek drainages, west of Deer Lodge. Elsewhere in the reporting area, many small and scattered groups of DFB-killed DF were found north and east of Deer Lodge Mountain. District-wide, nearly 850 DF were killed on 300 acres—about the same level as observed in 2003.

Pintler RD. Fewer groups of LPP killed by MPB were mapped in Boulder Creek and Smart Creek drainages, north of Philipsburg, than had been observed in 2003. However, still increasing MPB populations were found in many mature LPP stands on the District, and were especially noticeable in the Upper Willow Creek drainage. Other groups were mapped within the Stony Creek and Rock Creek drainages. District totals declined from 2003 levels when 1,650 acres of MPB-caused mortality were observed. In 2004, only about 125 acres of MPB-infested LPP stands were noted. MPB activity was also found in about 20 acres of PP and another 35 acres of WBP. About 600 trees were killed by MPB in 2003.

In upper Stony Creek drainage, northward into Harvey Creek drainage and very generally throughout the Rock Creek drainage from Maxville south to the District boundary, many groups of DFB-killed DF were observed. Some of those groups exceeded several hundred trees. Although widely scattered, the infested area decreased in 2004 to slightly more than 4,800 acres on which about 16,000 DF were killed. Nearly 5,100 acres had been infested in 2003. In several high-elevation SAF stands, notably upper Stony Creek, and higher tributaries of Rock Creek, WBBB-caused mortality was noticeable, although somewhat less than recorded in 2003. Mortality in those stands totaled slightly more than 3,500 trees on 2,300 acres. In 2003, 4,225 acres showed some level of WBBB-killed SAF. In a few lower-elevation PP stands, north towards the Clark Fork River, MPB had killed several groups of trees.

For the Deerlodge Reporting Area, MPB-infested stands were found on more than 108,000 acres. Only 31,000 MPB-infested acres had been reported in 2003. Most infested LPP stands were on FS-administered lands. DFB infested another 8,200 acres and WBBB about 4,000 acres.

Flathead Reporting Area

Swan Lake RD. Still high, although declining amounts of GF, killed by FE, were once again mapped throughout mixed-conifer stands on the District in 2004. While FE was the direct cause of this ongoing mortality, beetles were still taking advantage of drought-affected trees even though moisture conditions were much improved in 2004. Some of the previously heavily infested areas—such as the vicinity of Echo Lake—were not flown in 2004. However, numerous small groups of beetle-killed trees, as well as several large ones were mapped throughout the Swan Valley and west into the Island Unit. Throughout surveyed portions of the reporting area, wherever GF was found, FE-killed trees were observed as well. A total of 2,300 beetle-killed trees were noted on close to 2,000 acres.

Southward through the Swan Valley, most stands that contained GF were affected to a greater or lesser extent by FE activity. DF stands in that same general area were also impacted by DFB, to a lesser but still significant extent. Infested groups were typically not large, but were generally scattered throughout the DF type. The largest concentrations of DFB-killed trees were mapped in North and South Forks of Swamp Creek, Cilly Creek, and Goat Creek drainages, south of Swan Lake. Throughout the District, DFB killed 5,600 trees on about 1,100 acres.

Significant amounts of MPB-killed LPP were also widely scattered throughout LPP stands, on both the east and west sides of Swan Valley. Largest fader groups were found west of Metcalf Lake, southeast of Cedar Lake, near Elk Creek Point, and south of Holland Lake. There were also important amounts of WBP mortality, attributed to MPB, in some locations—the most notable being a large fader group mapped north of Rainbow Lake. Many high-elevation SAF stands in that area also contained trees killed by WBBB—generally scattered throughout the type. A particularly large group was seen near the headwaters of North Fork Porcupine Creek.

On the Island Unit, west of Flathead Lake, MPB-killed LPP and FE-infested GF increased in 2004. Several large groups of beetle-killed LPP, south of Blacktail Mountain, contained several hundred trees each. In that same area, several large groups of GF were killed by FE. The largest, containing an estimated 1,000 trees, was mapped west of Lake Mary Ronan. Many small groups of LPP, killed by MPB, and DF killed by DFB, were recorded throughout the eastern part of the Unit. Lower elevation PP stands, especially in the western portion of the Unit were impacted by MPB as well. A very large group of WBBB-killed SAF, covering more than 2,030 acres, was mapped above Redmond and Briggs Creeks in the extreme western part of the area.

District-wide, almost 2,000 acres showed some level of FE-caused mortality on both FS and private land. That was down from about 4,650 acres last year; however, not all of the District was flown in 2004. An additional 1,100 acres were impacted by DFB, and MPB killed various numbers of its host on almost 11,000 acres on lands of all ownerships.

Spotted Bear RD. Only a small portion of the northeastern part of the District was flown in 2004. It is safe to assume, however, MPB-caused mortality continued to expand in LPP stands along the South Fork Flathead River, south and east of Spotted Bear. In 2003, one polygon between Addition Creek and Jungle Creek, of about 2500 acres, contained an estimated 50,000 beetle-killed trees in 2002 and decreased only slightly in 2003. Other groups in the reporting area totaled thousands of dead trees each. Most LPP stands along tributaries of the South Fork, south of the Ranger Station, have been affected to some extent. Ground-collected data in that area showed an average of nearly 35 trees per acre killed in 2002. That was a general increase over the level of 2001. In total, almost 11,000 acres showed some level of MPB infestations in 2003. In the portion flown this year, more than 15,000 trees on just over 8,000 acres were reported.

Other areas of increasing MPB activity were previously mapped along Spotted Bear River—especially in the vicinity of Big Bill Mountain. In DF stands in the Spotted Bear River drainage, DFB-killed trees were common, but in mostly small and widely scattered groups in 2003. They had decreased somewhat from levels recorded in 2002. In 2003, DFB activity was especially noticeable in the vicinity of Beacon Mountain and Crossover Mountain. Elsewhere in the District, MPB- and DFB-caused mortality was scattered. Several groups of WBBB-killed SAF were noted in high-elevation sites throughout the District. Observed DFB-affected stands on the District totaled less than 200 acres in 2004, compared to 350 acres in 2003.

Hungry Horse/Glacier View RD. Only that portion of the District along the Middle Fork Flathead River was surveyed in 2004. In 2003, MPB and DFB activity had decreased slightly throughout the District in the portion flown. MPB-caused mortality has been common in both LPP and WWP stands on both sides of Hungry Horse Reservoir, from Hungry Horse and Martin City, south to the District boundary. Building populations of MPB mapped in the upper portions of Middle Fork Flathead River, especially along and near Patrol Ridge, continued to expand. Smaller groups of MPB-killed trees, as well as numerous groups of FE-killed GF were mapped along the Middle Fork from Nimrod, north nearly to West Glacier. For the part of the District flown, MPB killed a reported 35,000 LPP, and about 400 WBP on a combined 15,400 acres. That was a tremendous increase over the 250 acres recorded in 2003.

DFB-caused mortality was observed in lesser amounts on the Coram Experimental Forest, but areas south of there were not flown. Numerous groups of DFB-killed trees had been observed in other sites south and east of Hungry Horse and Martin City, and along the Reservoir, south to Dudley Creek in 2003. Nearly 1,000 acres had been affected last year. Only about 150 acres were recorded in 2004. At higher elevations, considerable amounts of WBBB-caused mortality had been recorded in SAF stands—of particular note near Three Eagles Lakes and along Pioneer Ridge. In those areas, more than 970 acres were infested. In the portion of the District flown this year, almost 5,000 SAF, killed by WBBB, were recorded on just less than 2,900 acres. Most were mapped east of Square Mountain.

On Glacier View RD, in high-elevation SAF stands throughout the reporting area, groups of WBBB-killed trees increased substantially—especially in the Whale Creek, Hay Creek, and Coal Creek drainages. Numerous groups, of several hundred acres in size, contained 1-4 beetle-killed trees per acre. More than 4,700 acres were infested. To the south, in most tributaries of North Fork Flathead River, DFB-, MPB-, and FE-caused mortality was widely scattered. In some areas on the Stillwater SF and stands north of Columbia Falls, very large groups of FE-killed GF were recorded. Larger groups of MPB-infested LPP were also mapped along Dead Horse Ridge and Winona Ridge. District-wide, MPB has infested more than 1,200 acres and DFB almost 600 more.

Tally Lake RD. Many large groups of FE-killed GF and WBBB-killed SAF were observed on Stillwater SF, north of Whitefish Lake, within this reporting area. Throughout mixed conifer stands on the District itself, many groups of beetle-killed trees, of several species, were observed. Around Tally Lake, numerous groups of DFB-killed DF and GF killed by FE were once again recorded. Some groups contained thousands of trees each. In that same general area, MPB populations were found in LPP stands, but at a somewhat decreased level. From there, south to Highway 2 west of Kalispell, and especially around Ashley Lake, DFB-killed DF, GF killed by FE, and a few SAF that had been killed by WBBB were common.

Throughout the Logan Creek drainage, many lower-elevation DF stands have been seriously impacted by DFB, while upper-elevation ones showed significant amounts of WBBB-caused mortality. Now, in that general area, MPB-killed LPP has become more noticeable. Mortality attributed to WBBB was mapped in large groups near Sheppard Mountain, Elk Mountain, Bowen Lake and in upper portions of Alder and Robertson Creek drainages. FE-caused mortality was also noted in many stands dominated by GF. In general, bark beetle-caused mortality recorded during aerial surveys (trees killed by beetles in 2003) increased once again throughout the reporting area.

On District and adjacent lands, nearly 2,900 acres (compared to 1,300 acres in 2003) showed some level of DFB-caused mortality; about 900 acres (200 acres in 2003) showed MPB-killed trees; more than 6,200 acres (only 1,900 acres last year) of FE-related activity; and more than 7,700 acres (4,400 acres in 2003) of WBBB-infested SAF.

Throughout the Flathead Reporting Area, for the areas flown and on lands of all ownerships, more than 39,200 acres have been infested by MPB (compared to 24,500 acres in 2003); 20,600 acres by FE (16,100 acres in 2003); 5,700 acres by DFB (5,600 acres last year); and 18,700 acres by WBBB (13,800 acres reported in 2003). Forest-wide, slightly less than 164,000 bark beetle-killed trees were recorded in 2004.

Gallatin Reporting Area

Big Timber RD. DFB-caused mortality in the lower Boulder River drainage, south of Big Timber remained at about the same level in 2004 as had been recorded in 2003. Beetle-killed groups from Contact Creek on the north to Elk Creek on the south, generally ranged in size from about 5 to 50 trees each. There were, however, larger groups recorded throughout the drainage. Some of the largest were noted near Shorty Creek, Raspberry Creek, Snowslide Creek and Hicks Park Campground. A few small and widely scattered groups of DFB-killed trees were also noted in the West Boulder River drainage. On private and FS lands, approximately 1,850 acres were reported as infested—more than twice the 850 acres recorded in 2002.

In several high-elevation sites in the Boulder River drainage, a few groups of WBBB-killed SAF were mapped. One group, above Copper Creek, contained an estimated 100 beetle-killed trees. At other sites, particularly Copper Creek, South Fork Sheep Creek, near Boulder Pass and Independence Peak, several large groups of MPB-killed WBP were recorded.

In Big Timber Creek drainage, on the eastern slopes of the Crazy Mountains, a few small groups of DFB-killed trees were noted. Stand conditions there suggest those populations could continue to build within the next few years.

District-wide, about 1,720 acres contain some level of DFB-caused mortality. MPB has killed about 1,600 trees—mostly WBP—on almost 640 acres and WBBB killed nearly 1,900 SAF on slightly more than 900 acres. Most of those figures indicate a reduction in infested area from 2003 levels. Much of the wilderness part of the District was not flown.

Livingston RD. Although outbreaks were found at little more than endemic levels, scattered, small groups of DFB-killed DF were once again mapped in the Mill Creek drainage south of Livingston. Those populations have had much less impact in that drainage because of active stand management conducted there over the last ten years. Similar small groups were also recorded in North Fork Sixmile Creek. DFB infestations on the District covered less than 700 acres.

On the western side of the Yellowstone Valley, in high-elevation stands throughout the east-facing slopes of the Gallatin Mountain Range, significant increases in amounts of beetle-killed SAF and WBP were noted. Numerous groups covered several hundred acres each. More than 7,700 acres of MPB-infested WBP and nearly 7,800 acres of WBBB-killed SAF were recorded in that area.

In the northern portion of the District, within the Crazy Mountains, small and widely scattered groups of DFB-infested DF and SAF impacted by WBBB were noted. The most significant tree killer in the area, however, was a combination of MPB and white pine blister rust in WBP stands. Blister rust-affected stands were reported on more than 3,100 acres. It is likely that many of those stands also harbored populations of MPB.

Gardiner RD. A few groups of DFB-killed DF, most containing from 10 to 60 trees each, were mapped in the Bear Creek drainage, northeast of Gardiner. In that same area, high-elevation stands of SAF and WBP had been infested by WBBB and MPB, respectively. Some of those groups exceeded a few hundred acres each.

Small outbreaks of DFB were also noted above Cedar Creek and near Dome Mountain, east of the Yellowstone River, north of Gardiner. Other groups were mapped in the Mulherin Creek drainage. White pine blister rust was reported as the damaging agent in WBP stands at several locations on the District; however, MPB and secondary bark beetles may also be affecting those trees. Several large groups of faded WBP were observed near Sheep Mountain. That mortality was attributed to MPB. Notable increases in SAF and WBP mortality was observed in the upper stretches of Tom Miner and Rock Creek.

Throughout the District, about 250 acres of DFB-infested stands were noted, down from the 644 reported last year. Approximately 2,500 acres of SAF were found to contain noticeable amounts of WBBB-caused mortality, and on another 4,300 acres MPB killed close to 7,000 WBP. More than 1,200 acres were reported as affected by blister rust. Quite likely, many of those also contained MPB-caused mortality.

Bozeman RD. Most of the District was flown in 2004, so we have a better representation of bark beetle activity. In the Bridger Mountain Range, north of Bozeman, widely scattered and mostly small groups of beetle-killed SAF and DF were recorded. Highest concentrations of faded trees were noted in the upper Stone Creek drainage. Other groups were more scattered. Throughout DF stands in the Bridger Mountains, WSBW-caused defoliation in DF stands increased once again in 2004 (totaling more than 51,000 acres). While DFB-caused mortality was recorded on only 430 acres in 2004, significant and prolonged defoliation, coupled with continuing drought, could lead to increasing DFB activity throughout the Bridger Range.

Elsewhere, the most prevalent bark beetle conditions observed on the District were very large and generally scattered groups of WBBB-killed SAF and MPB-killed WBP throughout the Madison and Gallatin Mountain ranges. There, thousands of acres of each were recorded. In total, MPB infested nearly 11,000 acres of WBP stands (and blister rust another 2,600 acres) and WBBB killed almost 19,000 SAF on 14,200 acres

Hebgen Lake RD. DFB-killed DF were still quite noticeable, although at reduced levels both north and south of Hebgen Lake. While DFB populations seemed to be in a generally declining mode, late-season attacks observed in some areas bear watching over the next year. Fader groups were generally small and widely scattered; however, one above Watkins Creek was estimated at 200 trees and another, near Trapper Creek, at 150 trees. Total infested area covered about 900 acres.

North of Hebgen Lake, a few small groups of DFB-killed DF were recorded in the Beaver Creek drainage. However, the most significant bark beetle activity in that area was found to be MPB in WBP stands. North from Lightning Lake, nearly to Lone Mountain, fader groups were large and found in most WBP stands. Other MPB-killed WBP were recorded east of Beaver Creek, near Tepee Basin and Upper Tepee Basin. District-wide, an estimated 28,400 WBP were killed on approximately 24,500 acres. Even those estimates may be conservative. Data collected on ten variable-radius plots near Lightning Lake showed, for the area surveyed, more than 160 trees per acre have been killed in the last 2-3 years.

SAF stands throughout the Madison Range were once again heavily infested by WBBB in 2004. Very large groups were mapped within the Wapiti Creek, Eldridge Creek and Buck Creek drainages, and northward towards Flattop Mountain. Elsewhere, though widely scattered throughout the SAF type, groups were generally smaller. Throughout the infested area, nearly 23,000 acres of SAF stands were observed with some degree of beetle-caused mortality.

For the entire portion of the Gallatin Reporting Area flown, nearly 4,520 acres of DFB-infested DF stands were observed, compared to 5,650 in 2003. Another 420 acres of MPB-infested LPP (a virtually static condition), almost 49,000 acres of MPB-killed WBP (an increase of 40,000 acres over last year) and about 48,100 acres on which WBBB-killed SAF was found were mapped. Only 15,000 acres of WBBB-caused mortality had been recorded in 2003 (however, not all the infested area was flown last year).

Helena Reporting Area

Townsend RD. Extensive stands of WBP and LP, reportedly affected by blister rust, have been observed in the Big Belt Mountains, east of Canyon Ferry Lake, within the past few years. Ground surveys have now confirmed that much of that mortality has been caused by MPB. Likely, secondary bark beetles have also infested many of those trees. Aerial surveys in 2004 showed large groups of faded WBP in the vicinity of Mount Edith and south from there to Deep Creek. Other large groups of MPB-killed WBP were mapped from Mount Edith north towards Boulder Mountain.

Elsewhere on the District, DFB-caused mortality increased markedly in most DF type from Deep Creek south to Sixteenmile Creek. Throughout the remainder of the District, very many but generally small groups of beetle-killed trees were noted in various forest types: WBBB-killed SAF and MPB-killed LPP and PP were prevalent, though not found in very large groups anywhere. DFB-infested DF—some still associated with past fires—was also quite commonly recorded in small groups. District-wide, DFB-infested trees were observed on almost 6,800 acres; MPB-killed LPP on 1,835 acres, and beetle-impacted PP on 730 acres. MPB was attributed with killing 16,000 WBP on 6,760 acres, although many of those trees were also infested with blister rust. WBBB-caused mortality was recorded on about 810 acres.

Helena RD. Significant and increasing amounts of MPB-killed PP were mapped south and east of Helena. The most numerous and largest groups were recorded in the Crow Creek drainage, west of Eagle Creek Ranger Station, and in the McClellan Creek drainage near Strawberry Butte; south and east of Helena. Other notable groups were noted in the Sixmile Creek drainage, west of Helena. Lightly scattered, small groups of MPB-killed LPP and DF killed by DFB were noted to the northwest of Helena, towards Mullan Pass.

Numerous, mostly small 5- to 20-tree groups of PP, killed by MPB, were observed northeast of Helena, in the northern portion of the Big Belt Mountains. They were most numerous in the Gates of the Mountains Wilderness, near Hogback Mountain, northward towards Mount Rowe, and near the boundary between Helena and Lewis & Clark NFs. Smaller, more widely scattered groups of PP, killed by MPB, were noted throughout PP type. Throughout the District, beetle-killed PP were noted on 2,370 acres. Recorded were also small and scattered groups of MPB-killed LPP and WBP. MPB-infested LPP totaled 1,900 acres and WBP about 750 acres. Several groups of DF, killed by DFB, some as large as 50 trees, were observed in large-diameter, older DF. Some were still found in the vicinity of stands affected by wildfires in 2000. Total DFB-infested area was about 2,200 acres. WBBB killed SAF on another 1,240 acres.

Lincoln RD. Only about half of the District was flown in 2004. Where surveys were conducted, DFB-caused mortality in DF stands was noted, but at a decreased level from past years. DFB-killed trees were observed in the Nevada-Ogden area, southwest of Lincoln and eastward, in the vicinity of Wolf Creek. Though not flown, DFB activity likely remained in the Arastra Creek drainage, northwest of Lincoln. It was still active there in 2003. Elsewhere, groups were likely small and widely scattered throughout the District. Total infested acreage, for the area flown, was less than 20 acres.

MPB-caused mortality in some low-elevation PP stands in the Wolf Creek drainage was also observed. Most were small groups, well scattered throughout the type; however, they were more concentrated near Denton Mountain, Sugarloaf Mountain, and in nearby drainages. WBBB-killed SAF and LPP, killed by MPB, were probably still found in the upper Arastra Creek drainage, and east from there, towards Copper Creek. Those populations and resultant mortality appeared to be increasing in 2003. MPB activity for the area flown was recorded on about 450 acres and WBBB-infested trees were noted on but 200 acres; however, again, much of the District was not surveyed.

Throughout the Helena Reporting Area, and especially northwest of Helena, WSBW populations are increasing significantly. Defoliation, coupled with prolonged drought, could result in increased amounts of DFB activity within the next few years. Area-wide survey estimates for bark beetle-caused mortality for areas flown totaled: DFB 10,800 acres; MPB 19,400 acres (almost half in WBP stands); and WBBB about 3,200 acres. DFB and MPB activity increased significantly in 2004.

Kootenai Reporting Area

Rexford RD. Numerous but small groups of DFB-killed DF were found in a widely scattered pattern in mixed-conifer stands on both the east and west sides of Lake Koocanusa. Notable concentrations to the west were found in the Big Creek and Young Creek drainages and in the extreme upper reaches of the Yaak drainage. To the east, most were found in the Pinkham Creek drainage, especially near Virginia Hill. Total affected area was about 1,340 acres; down from 1,650 acres recorded in 2003. About 3,500 DF were killed in 2003.

Also noticeable were groups of SAF, killed by WBBB, near Elsworth Mountain, Sutton Mountain and Boulder Mountain. SAF mortality totaled about 1,050 trees on nearly 1,275 acres. In 2003, 650 acres had been recorded. Other beetle-caused mortality was more widely scattered, and small groups.

Fortine RD. DFB-caused mortality, in DF stands, decreased somewhat over that reported in 2003. The most severely affected stands were located in Williams Creek, Graves Creek, and Deep Creek drainages. A few large groups were observed in the Galton Range, south of the Canada/US border where outbreaks have continued for several years. Several small groups were widely scattered south of Dickey Lake, with one large group noted in Magnesia Creek drainage and two others south of Stewart Creek. Many other, but typically smaller groups, were mapped throughout host type. DFB-caused mortality totaled nearly 3,900 trees on 2,300 acres of FS and private land. About 2,500 acres had been found in 2003.

SAF mortality, caused by WBBB, was also prevalent at many locations on the District, and increased somewhat from 2003 levels. Some of the larger groups on the District were mapped near Stahl Peak and northeast of Krag Peak. Total for the District was slightly more than 1,720; up from 1,100 acres in 2003.

Three Rivers RD. DFB continued to be the most significant mortality-causing agent throughout DF stands on the District. Most DF and other mixed-conifer stands were generally infested by DFB from Bull Lake, northward to Callahan Creek, south of the Kootenai River. North of the River, small groups of DFB-killed trees were widely scattered in the southern portion of the Yaak River drainage and especially in tributaries of O'Brien Creek. It appeared many DF stands were affected to a greater or lesser extent, although total infested area was less than in 2003. Total affected area in 2004 was about 1,270 acres. It had been 2,500 acres last year. In that area north of the Kootenai River, from China Creek west to O'Brien Creek, about 570 acres showed some level of FE-caused mortality.

In the northern part of the Yaak drainage, combinations of MPB and blister rust continued to seriously affect WWP stands.

Large-diameter and older trees are more impacted by MPB, whereas blister rust has affected stands of all ages. MPB-killed WWP was especially noticeable from Meadow Creek on the south to Pete Creek on the north, where about 500 trees were killed on 310 acres. A few groups of MPB-killed LPP and WBP were noted throughout the Yaak drainage. Some of the most severely impacted areas were WBP stands near Newton and Tepee Mountains. Those outbreaks totaled about 5,300 dead trees on almost 1,500 acres. DFB-caused mortality was very widely scattered throughout the upper Yaak as was WBBB-killed SAF at higher elevations. DFB-killed groups were generally small, whereas several groups of dead SAF covered more than a few hundred acres each.

District wide, about 4,350 DF were killed on 1,270 acres; 1,900 SAF on 2,360 acres; and 920 GF on 570 acres.

Libby RD. Continued effects of long-lasting dry conditions resulted in widespread and significant amounts of DFB-, MPB-, and FE-caused mortality being mapped in mixed-conifer stands throughout the District. Beetle-killed groups, with a significant increase in FE-infested stands, were noticeable south of Libby in Libby Creek, Swamp Creek, and Fisher River drainages. While groups of beetle-killed trees were well distributed throughout their respective forest types, DFB-caused mortality was more prevalent from Cow Creek north to the Kootenai River, then west to the District boundary. Stands on both north and south sides of the Kootenai River have been affected. Stands in the Purcell Mountains north of Libby were still infested to a minor degree. In those same general areas, significant amounts of GF, killed by FE, were recorded in 2004. Those groups were particularly large and prevalent in Quartz Creek and Bobtail Creek drainages west of Libby; and near Big Hoodoo Mountain, Horse Mountain, Tepee Lake, and other tributaries of Fisher River, south of Libby.

Several additional groups of DF, killed by DFB, were mapped in the Fivemile Creek, Tenmile Creek, and Warland Creek drainages, east of Lake Koocanusa. Significant numbers of DFB-killed trees were also observed throughout the Wolf Creek drainage. DFB infested stands on the District increased to about 3,300 acres in 2004—up from 1,600 acres last year.

While MPB-infested LPP stands had been declining in recent years, it was unusual to not record any on the District in 2004. It is conceivable some occurred on the District, but were not detected. Previously, about 900 acres had been reported—most south of Libby in the Fisher River drainage. In the Wolf Creek and Little Wolf Creek drainages, several small groups of IPS-killed PP were mapped. Some of that mortality may have been caused by MPB. MPB, along with blister rust, was attributed with killing WWP in the Purcell Mountains north of Libby.

Beetle-infested stands on the District totaled: DFB, 3,300 stands—7,000 dead DF; FE, 7,800 acres—7,000 beetle-killed GF; MPB (all hosts, but mostly WWP), 2,000 acres—1,900 trees; and minor amounts of IPS-, WBBB- and WPB-caused mortality

Cabinet RD. Numerous, but relatively small groups of MPB-killed LPP and WWP, and DFB-killed DF, were once again mapped at various locations throughout the Vermillion River drainage. MPB-caused damage was more prevalent in the lower portion of the drainage, while DFB was more common in the upper. Several larger groups of LPP, killed by MPB, were found near Wafer Hill and in the Miller Creek drainage; DFB-caused mortality was more common, but very widely scattered from Vermillion River, west to Bull River.

In some mixed-species stands, MPB-killed WWP has increased from previous levels. A significant increase in amount of WWP, infested by white pine blister rust, was noted in 2004. Many of those affected stands—a majority found west of Noxon Reservoir—were more than likely also impacted by MPB. In total, MPB killed host trees on about 1,400 acres, about half LPP and half WWP. Blister rust damage was recorded on another 7,500 acres.

DFB-infested DF stands were still common south of the Clark Fork River, from Little Beaver Creek, northwestward to Elk Creek, but at declining levels. Most beetle-killed groups are now small and very widely scattered. District-wide about 1,300 acres were infested. Widely scattered small groups of MPB-killed LPP, PP, and WWP; plus noticeable amounts of SAF, killed by WBBB, and FE-killed GF also were found at several locations in that portion of the District south of the Clark Fork.

Total mortality attributed to bark beetles in the Kootenai Reporting Area in 2004 was: 21,000 DF killed by DFB on 9,100 acres (11,000 acres in 2003); 8,500 GF killed by FE on 9,120 acres (3,000 acres in 2003); 10,400 trees killed by MPB on 1,530 acres (6,200 acres in 2003); and 5,860 SAF killed by WBBB on 5,720 acres (2,600 acres in 2003). Minor amounts of mortality attributed to IPS and WPB was recorded in 2004.

Lewis & Clark Reporting Area

Rocky Mountain RD. The District was not flown in 2004 nor has it been for the past several years. We have no current record of bark beetle activity on the District.

Judith RD. Small and widely scattered groups of beetle-killed trees were mapped in the Highwood Mountains in 2004. Most were DFB-killed DF; however, isolated groups of LPP and PP, killed by MPB, were also noted. Several groups of MPB-killed LPP were mapped in North Fork and Middle Fork Little Belt Creek drainages. No other significant concentrations were recorded, rather a generally light infestation throughout the reporting area, often associated with noticeable root disease centers.

In the Judith RD portion of the Big Snowy Mountains, MPB-killed PP was found in a widely scattered pattern of small groups. Highest concentrations of fader groups were mapped in North Fork and South Fork of Flatwillow Creek, Rock Creek, and East Buffalo Creek. Some of the larger groups were noted in the vicinity of Lyons Butte.

On lands administered by BLM north of Lewistown, in the Judith, North Moccasin, and South Moccasin Mountains, many small groups of faders, killed by MPB, were mapped throughout susceptible PP stands. There appeared to be a general decrease in infested stands on lands of all ownerships in that area in 2004.

In the Little Belt Mountains, numerous but very widely spread groups of beetle-killed trees were recorded throughout the reporting area. While bark beetle-killed groups were prevalent in host stands, the most notable mortality was observed in WBP stands where both MPB and blister rust were found killing trees. Very large groups were mapped near Yogo Peak, Kings Hill, and Hoover Mountain. Other mortality was attributed to MPB in LPP and PP stands, DFB and WBBB.

District-wide, DFB was found on 350 acres; MPB on almost 3,500 acres—on all hosts, but most was PP; WBBB on nearly 2,000 acres; and blister rust on another 4,750 acres. Most of that latter was probably also infested by MPB.

Musselshell RD. Very widely scattered and small groups of MPB-killed PP were mapped throughout the Big and Little Snowy Mountains. Largest groups were recorded near Horsethief Canyon and Red Hill; and in the Willow Creek drainage, near Ashbridge Spring. Elsewhere, groups were very widely distributed. Much was on non-FS land. Noticeable pockets of root disease were recorded near Green Pole Canyon. Bark beetle activity, especially DFB, is a likely associate in those stands. WBP has been heavily impacted by both blister rust and MPB, and MPB has infested several large groups of LPP, north of Lake Sutherlin.

In the Crazy Mountains, numerous large groups of WBP, killed by MPB and blister rust; and SAF, killed by WBBB, were mapped in high-elevation stands. Some of the largest groups were recorded near Mount Elmo, Target Rock, and Loco Mountain.

Throughout the District, about 2,100 PP were killed by MPB on about 2,700 acres. DFB killed 2,700 trees on 1,080 acres. MPB and blister rust affected WBP and LP on more than 6,400 acres, and MPB alone on 1,000 acres of LPP. WBBB killed 2,200 trees on 2,200 acres.

Kings Hill RD. Numerous large groups of MPB-infested PP were mapped throughout the Little Belt Mountains, and at generally higher levels than recorded in 2003. The largest groups were noted near Indian Gulch, Lion Gulch, and Double Gulch above Tenderfoot Creek; and in the Pilgrim Creek and Tillinghast Creek drainages, west and south of Monarch. While other groups were not as large, there was a noticeable increase in the extent of beetle-infested stands throughout the reporting area, up to nearly 6,500 acres in 2004—an increase of nearly 1,000 acres since last year.

DFB-killed DF was also found widely scattered throughout the Little Belt Mountains. Several groups were concentrated throughout the Tenderfoot Creek drainage. In an area near Wild Rock Ridge, there were noticeable groups of MPB-killed LPP. WBP has also been infested by MPB and impacted by blister rust at several locations in the Little Belt Mountains. Likewise, WBBB-killed SAF was noted in higher elevations throughout the area.

Totals for the District were about 4,900 SAF killed on more than 5,500 acres; 17,600 PP and 4,000 LPP killed by MPB on 6,400 acres and 3,500 acres, respectively; MPB and blister rust have affected WBP on more than 8,600 acres, and DFB killed 1,650 trees on 815 acres.

Area-wide mortality attributed to bark beetles in the Lewis & Clark Reporting Area totaled almost 5,500 DF on 2,472 acres (1,300 acres in 2003); 41,000 pines on 29,100 acres (21,300 acres in 2003); and 12,400 SAF on 9,725 acres (6,700 acres in 2003). All those figures are up significantly from 2003.

Lolo Reporting Area

Missoula RD. Widespread fires in 2003 prevented aerial surveys of the Missoula RD last year. So, comparisons of bark beetle conditions are ones with those reported in 2002. Generally, to the west, MPB infestations increased in both PP and LPP stands throughout the reporting area. While not infested to the extent other stands on the Forest have been, LPP stands throughout the western portion of the District were generally found to contain smaller and more widely scattered groups of MPB-killed trees. Some DF stands, particularly in the Lolo Creek drainage, still showed small and widely scattered DFB-caused mortality, although at a decreased level. Few groups were larger than about 30 trees, but they were generally scattered throughout DF types. In that same area, at higher elevations, WBBB-killed SAF was more noticeable. The Rattlesnake Creek drainage was not flown in 2004; however, in the lower portions of the drainage, WPB-killed PP and some DFB activity are known to exist.

DF stands in Rock Creek drainage, while still quite generally infested by DFB, decreased in extent and intensity in 2004. Fader groups, though numerous, were smaller and more widely scattered than in past years. Groups of faders, few containing as many as 100 trees, were mapped from about Williams Gulch on the south to the confluence of Rock Creek and Clark Fork River on the north. Beetle-killed trees were also noted along the south side of the Clark Fork, both east and west of Rock Creek. Lesser amounts of MPB-killed LPP and PP were mapped this year, but are found at some locations in the Rock Creek drainage. At a few high-elevation locations, WBBB-infested SAF was observed.

West of Rock Creek, and south of Missoula, bark beetle-killed trees of several species were noted in a widely scattered pattern. MPB had killed both LPP and PP, WPB and IPS were attributed with having killed some PP, and DFB-affected DF were mapped in a few locations. Stands in the upper Miller Creek and Little Park Creek drainages were more heavily impacted. In stands along Lolo Creek, MPB- and DFB-killed trees were found in widely scattered and small groups south of Lolo Creek; but north of there, in the Grave Creek Range—west of Blue Mountain—MPB had killed much larger groups of LPP. Some of them covered several hundred acres.

District totals in 2004 included 11,200 acres of MPB-killed trees (mostly LPP) and another 4,700 acres of DFB-infested stands. Other species of beetles were found at much less significant levels.

Ninemile RD. Ninemile RD was also not flown in 2003, so there were marked changes over those mapped in 2002. For the most part, MPB activity increased significantly, the affected area more than doubling in the last two years. While LPP stands in the immediate vicinity of Siegel Pass showed decreasing amounts of MPB-caused mortality, much of the remaining LPP stands on the District were more heavily impacted. Throughout the Ninemile drainage, along both the Reservation and Ninemile Divides, beetle-killed groups were mapped in large numbers—and most groups were individually quite expansive. Very large groups of beetle-killed trees were mapped along Reservation Divide from Three Lakes Peak southeastward along the Divide to Squaw Peak. Likewise, very large groups were observed along Ninemile Divide, from Hopkins Mine southeast to nearly to Ellis Mountain. Large groups of dead LPP were also recorded in the Mill Creek and O'Keefe Creek drainages, to the east.

Elsewhere, large amounts of MPB-killed LPP and PP were recorded throughout the Fish Creek and Petty Creek drainages. Largest groups there were found from Cougar Creek south to Straight Creek. It appeared that most LPP stands, with any significant component of susceptible-size trees, anywhere on the District, were being affected by MPB. Total infested LPP stands on the District in 2004 covered nearly 54,300 acres on lands of all ownerships. Another 1,500 acres of PP exhibited some level of MPB-caused mortality. DFB-killed DF was found on only 600 acres.

Plains/Thompson Falls RD. Unfortunately, inclement weather resulted in only a very small portion of the District being flown in 2004. A small part of the District, north of Siegel Pass was surveyed. There, north of Siegel Mountain and west of Paradise, several large groups of MPB-killed LPP were mapped. Elsewhere, we know that significant increases in the amount of MPB-killed LPP were found in many stands throughout this reporting area and the adjacent Superior RD. Although aerial survey information was not available, a few ground surveys in selected stands on the District showed populations are still increasing in many areas. In McGinnis Creek and Corona Divide, north of Plains, data showed an average 46 new attacks and 60 previous-year attacks; and 17 new attacks and 56 previous-year attacks in those areas, respectively. In a few stands, there has been a decrease in beetle intensity, due to host depletion. But beetle populations continued to move into previously un-infested stands last year.

In 2003, the largest polygons along the divide between the two Districts were recorded near Brooks Mountain, Knox Pass, and Mount Bushnell. Those areas were still heavily infested, but there had been a slight decrease in outbreak intensity. Southeast of Thompson Falls in LPP stands within Cherry Creek drainage, very large groups of MPB-killed LPP were mapped near Eddy Mountain and Sacajawea Peak. Those infested stands, too, have experienced decreasing intensity because many susceptible trees have been killed. More generally, LPP stands throughout the Coeur d'Alene Mountains from the confluence of the Flathead and Clark Fork Rivers, westward to the Montana/Idaho border were affected to some extent. Ground-collected data for a few stands in that area showed as many as 136 beetle-killed LPP per acre, within the past few years. Sixty-six of those were killed in 2004.

North of the Clark Fork River, within Thompson River drainage, LPP stands were also heavily impacted by MPB. The largest groups in that area were recorded near Cube Iron Mountain, Big Hole Peak, in the West Fork Fishtrap Creek drainage, and along Corona Divide.

Still other LPP stands west of Siegel Pass towards Keystone Peak and north to Siegel Mountain, exhibited large groups of beetle-killed trees. More than 100,000 beetle-killed LPP have been recorded in that area alone.

Near Marmot Peak, and in other parts of upper Fish Trap Creek, stands of WWP have been seriously affected by a combination of blister rust and MPB. Infestations there have intensified. Elsewhere, MPB populations have killed significant amounts of LPP and PP in Thompson Creek and Little Thompson Creek drainages.

Widely scattered, in mostly small groups—but still important total amounts, DFB-caused mortality was observed throughout DF stands on the District. In noticeable, but considerably lesser amounts, MPB has killed WBP in some stands, and WBBB has contributed to the death of SAF.

Totals for the District and adjacent State and private lands in 2003 showed MPB-killed trees on almost 50,400 acres; about 600 acres infested by DFB; 900 acres with WBBB-caused mortality; and about 50 acres infested by WPB. Had we obtained data for 2004, those figures likely would have increased.

Seeley Lake RD. MPB-caused mortality was prevalent in a few small groups of LPP south and west of Seeley Lake, particularly in the Placid Creek and Finley Creek drainages. To the east and north of Seeley Lake, in the vicinity of Richmond Peak and near Florence Lake, larger groups of LPP had been killed by MPB. WBP, damaged by blister rust, but also heavily impacted by MPB, was noted in several large groups near Morrell Mountain, above Lodgepole Creek, near East Spread Mountain, and close to Conger Point. To the west, other groups were seen near Mount Henry. Those infestations intensified in 2004. Total MPB affected stands for the District was about 2,000 acres of LPP, where MPB was the sole mortality agent, and another 8,900 acres of WBP with mortality attributed to both MPB and blister rust.

Elsewhere on the District, DFB-killed trees were less widespread in 2004. Stands in the Cottonwood Creek, Spread Creek and Dunham Creek drainages were particularly heavily infested. Throughout the DF type on the District, DFB-caused mortality increased in some areas while it decreased in others. About 1,060 acres, total, were reported in 2004. WBBB-caused mortality was observed on about 400 acres in a few high-elevation SAF stands. Minor amounts of MPB-killed PP were also noted on the District, but a few 40- to 50-tree groups were seen near Woodward.

Superior RD. Most of the District was not flown in 2004. Only a small portion, above Trout Creek, was surveyed. There, large groups of MPB-killed LPP were mapped from near Chimney Rock, southwestward to Prospect Creek. In 2003, large groups of LPP, killed by MPB, were mapped in Sunrise Creek and Quartz Creek drainages, southeast of Superior. Elsewhere, very large groups of MPB-killed LPP—some totaling hundreds of thousands of trees—were mapped near Van Ness Point, Mount Baldy, and Blacktail Mountain southeast of St. Regis; near Moon Peak and Up Up Mountain, west of St. Regis; and very generally scattered throughout the Twelvemile Creek drainage. The largest polygons in that general area were recorded near Brooks Mountain, Knox Pass, and Mount Bushnell—on the divide between Superior and Plains/Thompson Falls RDs. Very large groups were also mapped near Greenwood Hill and Camels Hump Lookout. District-wide more than 47,200 acres were infested in 2003. We believe most of those outbreaks continued to expand in 2004, but in some of the areas that have been infested for several years, there likely was a decrease in intensity.

Significant amounts of MPB-caused mortality were recorded in PP stands east of Superior, from Eddy Creek northwest to Sloway Gulch. Acres with noticeable amounts of PP mortality declined somewhat in 2003, but still totaled about 400 acres. At least some of that mortality is thought to be drought related. Ground surveys showed still-increasing populations in many areas. In some, host depletion has resulted in population declines; however, in a few areas surveyed, 2003 attacks averaged more than 120 per acre.

Throughout the Lolo Reporting Area—the most heavily impacted in the State (of which only about 35% was flown)—MPB-killed LPP was reported as totaling 771,300 trees on 84,000 acres; 5,800 PP killed on 3,000 acres; and less than 100 WBP on 300 acres (however, another 9,800 acres were reported as affected by blister rust). Although much less significant, DFB reportedly killed about 22,000 DF on 8,100 acres; WPB killed 80 PP on 70 acres; and WBBB accounted for 37,000 dead SAF on 3,300 acres. Because not all of the Reporting Area was flown, we are confident all those estimates are low.

Garnet Reporting Area (BLM)

For the most part, many small and widely scattered groups of bark beetle-killed trees were mapped throughout the Reporting Area; however, several large groups of MPB-killed LPP were noted near Lost Horse Mountain. Smaller, but still significant-sized groups were recorded near Bonner Mountain, in Donovan Creek, Cramer Creek, and Tenmile Creek drainages. Along the Blackfoot corridor, to the east, MPB- and WPB-killed PP were common. Further to the east, in Chimney Creek drainage, MPB-infested LPP stands were once again noticeable.

DFB-killed DF were very widely scattered throughout the Area, but more prevalent and in larger groups north and east of Beartown and in the upper Hoover Creek drainage. In a few higher-elevation SAF stands, WBBB damage was apparent.

In total, about 7,200 DF were killed on 2,600 acres; MPB killed approximately 9,800 LPP and 570 PP on a combined 5,500 acres; 50 WPB-killed PP were recorded on 75 acres; and 1,040 dead SAF on 280 acres were attributed to WBBB. All figures represented increases over those reported in 2003.

INDIAN RESERVATIONS

Blackfeet IR.

The western portion of the Blackfeet IR was flown along with Glacier National Park in 2004. There, a few small groups of DFB-killed DF and MPB/IPS-killed LPP were mapped near Lower Saint Mary Lake. The most significant bark beetle-caused damage, however, was several large groups of SAF, killed by WBBB, recorded near Cut Bank Ridge and in upper tributaries of North Fork Cut Bank Creek. On the part of the Reservation flown, an estimated 4,000 SAF were killed on about 2,600 acres.

Crow IR.

Widely scattered, but mostly small groups of MPB-caused mortality, were recorded in PP stands in drainages on the eastern slopes of the Wolf Mountains, east of Lodge Grass. Heaviest concentrations were mapped in Corral Creek and Indian Creek drainages, with smaller groups mapped south to the Reservation boundary. To the north, MPB-killed PP were noted in Thompson Creek and Little Thompson Creek drainages.

Widely scattered, generally small groups of PP, killed by MPB, were found in lower-elevation stands throughout the Pryor Mountains. Larger groups of LP killed by MPB were mapped in the West Pryor Mountains. The largest concentrations of beetle-killed trees were observed in SAF stands east of Pryor Creek drainage. Populations of WBBB and resultant mortality have increased within the last few years. Throughout the Reservation, 1,350 PP were killed by MPB on 1,200 acres; 380 LP were killed by MPB on 260 acres; and 540 SAF were killed by WBBB on 340 acres.

Flathead IR

Once again, only the southern and central portions of the Reservation (about 50% of the forested area) were flown in 2004. However, much of the MPB activity on the Reservation is taking place within the area surveyed. Significant increases in the amount of LPP, killed by MPB, were noted there in 2004—despite many areas that have known infestations not being flown. Most of the larger groups of MPB-infested stands were mapped throughout the southern portion of the Reservation, from about Upper Jocko Lake on the east to Burgess Creek on the west. The largest groups of beetle-killed trees were recorded along the Reservation/Lolo NF divide, near Blackrock Peak, and in the upper tributaries of Jocko River—especially Liberty Creek in the extreme southeastern corner of the Reservation. Most recorded mortality was attributed to MPB, in LPP stands; however, notable groups of PP were also affected—some being killed by MPB, others by IPS, still others by WPB. Large groups of faders previously observed in Magpie Creek and lower Revais Creek drainages have declined in intensity, but have been replaced by larger groups in upper Revais Creek, South Fork Jocko River, and Jocko River drainages. In 2002, beetle-caused mortality was reported to the east in Dry Creek and Pistol Creek drainages, and near McDonald Lake. While we cannot be certain due to lack of data, beetle activity was likely still present in those areas.

The remainder of the Reservation was not flown in 2004; however, bark beetles were probably still active in the following areas—reported in 2002. In the northeast, MPB-caused mortality increased markedly from Hellroaring Creek, north to the Reservation boundary. Elsewhere, MPB activity in both LPP and PP stands was very generally scattered throughout the respective host types. Larger groups of LPP faders were noted south of Rainbow Lake, and significant amounts of PP mortality were observed in the Revais Creek drainage and near Saddle Mountain.

In the interior of the Reservation, important amounts of MPB- and IPS-caused mortality were found in PP stands near Sonyok Mountain and the Bison Range in the south, northward into the Salish Mountains, west of Loon Lake, and east of there in the vicinity of Jette Lake. In 2002, beetle activity was reported on Wild Horse Island and near Black Lake. That activity likely continued.

Scattered throughout mixed conifer stands were noticeable amounts of mortality attributed to DFB, FE, and WPB. Some SAF stands in the upper Jocko River drainage experienced mortality caused by WBBB. In portions of the Reservation, severe defoliation attributed to Douglas-fir tussock moth was recorded. Depending upon weather in the next year or so, some of those defoliated DF could be killed by DFB.

Total beetle-infested areas on the portion of the Reservation flown included 2,800 DF killed on 1,700 acres; 2,900 PP killed by MPB on 3,300 acres; and about 27,000 PP killed by IPS on approximately 14,000 acres. WBBB-caused mortality accounted for 2,500 dead SAF on 2,600 acres and FE killed almost 800 GF on 300 acres. The most significant damage recorded, however, was the 144,000 LPP killed by MPB on nearly 53,000 acres. That was nearly a two-fold increase over the 28,300 acres recorded in 2003; but to reiterate, much of the Reservation was not flown in either 2003 or 2004. Those estimates do not reflect damage that likely occurred in portions of the Reservation not flown.

Fort Belknap IR

Conditions were little changed from those observed in the last couple of years. Very widely scattered and generally small groups of MPB-killed PP and LPP were mapped across the Reservation. Groups ranged in size from 1-150 trees, with concentrations noted near Thornhill Butte, Eagle Child Mountain, and near Mission Peak. Most of the latter were small groups of LPP. The largest of those contained an estimated 25 trees. About 530 PP were killed on slightly fewer than 160 acres. Another 125 LPP were killed on about 40 acres. Both of those figures represent nearly static conditions.

Northern Cheyenne IR

Very widely scattered and small groups of PP, killed by IPS and MPB, were noted throughout the forested areas of the Reservation. Heaviest concentrations of MPB-killed trees were mapped in Tie Creek and East Fork Muddy Creek drainages, south and east of Lame Deer. Others were mapped south of Busby; but there were noticeable groups of IPS-killed trees throughout beetle-infested areas.

Reservation-wide, about 800 PP on 445 acres were recorded as having been killed by IPS. Another 1,250 PP on 664 acres were killed by

MPB. The Reservation was not flown in 2003, but those figures represent decreases in infested areas from those recorded in 2002.

Rocky Boys IR

A few widely scattered, mostly small groups of PP, killed by MPB, were mapped throughout the forested area of the Reservation flown in 2004. Largest groups were observed in the Eagle Creek drainage and near Flying A Butte; however, they were much less significant than groups of beetle-killed LPP recorded in other susceptible stands. In 2004, small groups of mostly well-scattered beetle-killed LPP were recorded in the central portion of the Reservation. Larger groups, one of 200 trees, were mapped near Black Mountain, in the East Fork of Beaver Creek, and near Lost Canyon. In recent years, fewer MPB-killed LPP have been recorded, perhaps in response to direct control measures implemented in some stands. Active management efforts have been largely successful in reducing beetle-caused mortality. A few small groups of DFB-killed DF were mapped near Centennial Mountain and east of Salt Coulee.

Slightly more than 600 beetle-killed LPP were mapped on about 200 acres—a marked decrease from the 1,100 acres reported in 2003. Another 260 PP were killed on 90 acres, but there may have been more beetle activity in PP stands than reflected in this year’s estimates. DFB killed about 400 trees on 160 acres—a slight increase over data recorded last year.

NATIONAL PARKS

Glacier NP

The Park was not flown in 2003 due to several fires that burned in the Park for much of the summer, so data collected in 2004 is comparable to that obtained in 2002. Within the past 2-3 years, wildfires have affected thousands of acres of forested stands, in the western, central, and southern portions of the Park. Associated with some of those were increasing amounts of DFB-caused mortality—observed in many widely scattered locations, but near many burned stands, particularly near Kintla, Bowman, Quartz, and Logging Lakes. In response to drought-induced damage, FE populations have built in GF stands at several locations in the Park. The largest of those was located in the Pinchot Creek drainage. And MPB-killed LPP was noted in small and very scattered groups throughout LPP type.

Most significant amounts of beetle-caused mortality in the Park were large groups of SAF killed by WBBB. Largest of those was mapped near Logging Mountain; however, several other large groups were observed in high-elevation stands.

Park totals for 2004, included 5,100 DF killed by DFB on 3,300 acres; 4,800 GF killed by FE on 4,050 acres; 720 of various MPB hosts were killed on 850 acres; and WBBB killed 18,300 SAF on just over 8,200 acres. All outbreaks increased over previously recorded figures.

Yellowstone NP

Because of inclement weather in August, the Park was not flown in 2004. In 2003, for the portion of the Park surveyed, large groups of WBBB-caused mortality were mapped in SAF stands throughout the Gallatin Range, in the northwest portion of the Park. Largest groups were noted near Little Quadrant Mountain, Quadrant Mountain, Electric Peak, and Antler Peak. In that same general area, several large groups of WBP, killed by MPB, were also recorded. In the north central part of Park, from the Gardiner River east to Coyote Creek, numerous but small groups of DFB-killed DF were observed. Elsewhere in the northern portion of the Park, numerous small groups of WBP and LPP, killed by MPB, were widely scattered. A few larger groups of MPB-killed WBP were noted near Mount Washburn, Frederick Peak, Mount Hornaday, and Amethyst Mountain. Very expansive and intense MPB outbreaks in WBP had been reported south and east of Mount Washburn in 2003. In 2004, ground observations detected another very large outbreak in the vicinity of Avalanche Peak. Ground-collected data in that area showed an average 95 WBP per acre killed within the past 2-3 years.

A significant outbreak of ESB was believed to have continued in Columbine, Beaverdam, and Rocky Creek drainages, east of Yellowstone Lake. That outbreak expanded markedly from 2002 to 2003. In the southeastern portion of the Park, large groups of WBP, killed by MPB; and SAF, killed by WBBB had been observed. The largest groups of the former were on the Two Ocean Plateau. Those conditions worsened in 2003 and likely continued in 2004.

Throughout the rest of the Park, widely scattered and mostly small groups of SAF, LPP and WBP faders were mapped in 2003. More significant amounts of SAF mortality, attributed to WBBB, were noted along Big Game Ridge and in the upper Snake River drainage, east of the Park's south entrance.

Beetle-killed totals for the Park, in 2003, included 3,300 DF—attributed to DFB on 1,130 acres; 18,060 ES on 8,750 acres killed by ESB; 1,010 LPP on 700 acres killed by MPB; 27,900 WBP killed by MPB on 15,100 acres; and finally, 10,500 SAF were killed by WBBB on 6,390 acres. The biggest increases were noted in ESB and MPB activity. Once again, we are confident the MPB outbreaks in WBP expanded considerably.

DEFOLIATORS

Western Spruce Budworm

Western spruce budworm (WSB) continues to be the primary defoliating agent in the state. This native defoliator can be found ubiquitously across the state wherever host species occur, preferably Douglas-fir trees. WSB is usually the most prevalent defoliator detected, in distribution and acres affected, in most reporting areas. In Montana, over 177,000 acres were mapped with WSB defoliation, one and one-half the amount recorded for 2003 (~124,000 acres) and over three times as much recorded for 2002 (~53,000). As mentioned in the introduction, the actual acreage with budworm defoliation is probably much higher due to some sections not being flown – especially in the Beaverhead-Deerlodge and Helena reporting areas that are historic chronic infestation sites.

The most heavily impacted reporting areas mapped with WSB defoliation were Beaverhead (36,800 acres), Gallatin (73,000 acres), Deerlodge (29,432 acres), and Helena (31,173 acres). Again, those sections not flown are historic 'hot spots' for WSB when populations are high. In the Gallatin National Forest and surrounding areas, WSB defoliated roughly 73,000 acres – a considerable increase from 56,000 acres in the same forest since last year and currently the highest concentrations in the state. When defoliation is severe enough to be detected by aerial surveyors, ground conditions are typically much worse. Moderate to heavy defoliation was observed in the overstory, with heavy to complete defoliation on understory hosts. Budworm populations in the Gallatin have been proliferating and expanding since 2001. However, there were some reports that heavy defoliated areas in 2003 had significant population declines in 2004 and even some tree recovery. Yellowstone National Park was not flown this year and therefore, was not included in total infested WSB acres. Severe defoliation by budworm and mortality due to DFB were detected in surrounding forested areas around the park (the Gallatin NF in Montana and the Targhee NF in Idaho). Land managers of the Park speculate that about 3000 acres were damaged solely by budworm. Most other areas in Montana retain small WSB populations considered at endemic levels. Monitoring plots and trapping efforts for WSB surprisingly showed moth counts to have declined since last year. Despite significantly high defoliation occurring in particular areas of Montana, overall budworm populations are still considered moderate. Monitoring will continue in 2005.

Research has shown WSB population levels to be highly correlated with weather conditions. While stand conditions are also important to sustaining budworm populations, weather conditions play a major role in population growth by determining larval survival during the bitter winter months. Massive die-offs typically occur due to freezing, but recent drought conditions have prevented normal mortality levels to occur. Therefore, if current weather patterns remain warm and drier than normal allowing more larvae survive to adult stage, land managers can expect budworm defoliation to become more widespread and severe. Predictions by national weather services show southwestern Montana to remain in extreme drought conditions in the upcoming years. However, unlike bark beetle survival that largely depends on host conditions, quick alterations in weather patterns can strongly influence budworm population levels by directly affecting larvae during vulnerable life stages or reducing forage material.

Douglas-fir Tussock Moth

Pheromone-baited sticky traps have been used in western Montana since 1979 to monitor populations of Douglas-fir tussock moths and are placed at 33 permanent plots. In 2004, traps were recovered from 29 plots.

The highest average numbers of male moths were caught from plots located in Big Arm (29.6), Jette Lake (34.8), Pistol Creek (38.0), and Rocky Point (15.2). Populations at Big Arm have significantly increased while populations at Jette Lake, Pistol Creek, and Rocky Point remain high from previous years.

In addition to defoliation observed near plots with numerous moth catches, heavy defoliation occurred on the National Bison Range, in Camas Prairie, and along the western shore of Flathead Lake.

An egg-mass survey for tussock moth was conducted in a few heavily defoliated areas north of Polson in August of 2004. After conducting the surveys, it was concluded the tussock moth population in the Flathead Indian Reservation is quite likely declining rapidly. In general, the population through out the Region appears to be declining.

Table 1. Douglas-fir tussock moth trap catches western Montana 1996-2004

Average number of male moths per trap

Plot	Location	1996	1997	1998	1999	2000	2001	2002	2003	2004
Albert Creek	14N, 21W, S16	0.0	0.0	0.0	0.4	1.2	3.2	2.6	0.0	0.0
Arlee	16N, 20W, S1	0.0	0.0	0.0	1.6	0.8	4.6	7.0	0.0	0.0
Big Arm	24N, 21W, S36	0.2	0.0	0.0	0.0	0.8	13.0	30.0	5.0	29.6
Big Fork	27N, 19W, S36	0.0	0.0	0.0	0.0	2.2	0.4	0.0	0.0	0.0
Blue Mountain	13N, 20W, S34	0.0	0.0	0.6	1.2	0.4	10.8	18.0	0.0	0.0
Butler Creek	16N, 23W, S24	0.2	0.0	0.0	0.4	2.8	8.4	9.6	0.0	0.2
Clear Creek	19N, 24W, S26	0.0	0.0	0.0	0.4	*	0.6	1.2	0.0	2.0
Corral Creek	15N, 22W, S36	0.0	0.4	0.0	0.6	0.8	1.0	2.4	0.0	0.8
Ferndale	27N, 19W, S32	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.0	0.6
Fish Creek	14N, 24W, S6	0.0	0.0	0.0	0.0	1.0	0.4	0.0	0.0	0.0
Foys Lake	28N, 22W, S36	0.0	0.0	0.0	0.0	0.0	3.4	0.6	0.2	1.0
Frenchtown F	14N, 21W, S10	0.0	0.0	0.0	0.4	0.4	0.8	0.4	0.0	0.4
Frenchtown J	14N, 21W, S22	0.0	0.0	0.0	0.2	1.6	2.4	6.8	0.2	0.0
Frenchtown T	14N, 21W, S23	0.0	0.0	0.4	0.0	1.4	4.8	12.8	0.0	0.4
Jette Lake	23N, 21W, S2	0.8	0.0	0.4	2.0	6.0	50.0	72.6	15.6	34.8
Kerr Dam	22N, 21W, S13	0.0	0.0	0.2	0.4	8.6	22.8	27.4	0.0	8.2
Lake Mary Ronan	25N, 22W, S23	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	1.0
Lakeside	26N, 20W, S6	0.0	0.0	0.2	0.0	2.2	0.6	0.0	0.0	0.0
Lolo Creek	11N, 20W, S6	0.0	0.2	0.0	0.0	1.0	2.6	0.2	0.0	0.0
Pattee Canyon	12N, 19W, S12	0.0	0.0	0.2	0.0	1.2	8.6	20.6	6.6	0.2
Petty Creek	14N, 22W, S19	0.0	0.2	0.0	0.8	9.8	7.6	4.6	0.0	0.0
Pistol Creek	18N, 20W, S35	0.4	0.4	1.2	63.6	13.8	55.8	62.2	11.4	38.0
Polson-Big Creek	22N, 19W, S21	0.0	0.0	0.0	0.6	0.2	3.4	5.2	0.2	1.4
Polson-Hell Roaring	22N, 19W, S33	0.0	0.0	0.0	0.0	2.0	0.8	0.4	0.0	2.0
Polson-Lost Lake	22N, 19W, S17	0.0	0.0	0.2	0.2	3.4	4.6	3.4	0.0	0.4
Revais Creek	17N, 22W, S4	0.0	0.0	0.0	0.8	1.6	1.6	2.2	0.0	1.0
Rocky Point	23N, 20W, S4	0.0	0.2	0.0	0.6	1.4	21.6	30.0	0.6	15.2
St. Mary Lake	18N, 19W, S35	0.0	0.2	0.0	0.0	1.0	4.4	0.8	0.0	0.2
Skidoo Bay	23N, 19W, S2	0.0	0.0	0.0	0.0	0.2	0.6	6.0	0.2	0.2
Smith Camp	25N, 20W, S8	0.0	0.0	0.0	0.0	0.4	0.4	0.2	0.4	3.2
Somers # 1	27N, 21W, S27	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.2	1.2
Somers # 2	27N, 20W, S26	0.0	0.0	0.0	0.0	1.4	1.6	1.0	0.0	0.8
Worden Creek	12N, 20W, S21	0.0	0.0	0.0	0.0	0.2	0.0	1.2	0.0	0.0

Gypsy Moth

Cooperative detection monitoring for the European gypsy moth in Montana in conjunction with Animal and Plant Health Inspection Services (APHIS), Montana Department of Agriculture, and Montana Department of Natural Resources and Conservation (DNRC) has continued. No moths were caught in detection traps. Monitoring will continue in 2005.

As an aside a single Asian Gypsy moth was caught in a detection trap in northern Idaho. This is the first time an Asian Gypsy moth has been captured this far inland. Delimitation monitoring will be included with next year's normal trapping regime in Idaho. They will also be treating a square mile around the trap site with insecticides.

Other Defoliators

An unidentified defoliator damaged nearly 4100 acres in various forested areas across the state. Ground surveys were unable to be implemented at most sites to determine causal agents. Two separate ground surveys in the Kootenai NF discovered declining cedars affected by drought at one location, and a combination of larch pathogens at another. Western false hemlock looper populations were only detected in the Flathead National Forest and appear to be decreasing with only 418 acres infested, down from 700 in 2003. Although 240 acres is quite a large area for pine needle-sheath miner damage, this defoliator typically remains at very low levels.

DISEASES

Root Diseases

Root diseases are the most significant disease agents of mortality and growth loss in Montana, mostly west of the Continental Divide. Because root diseases are diseases of the site, we see very little changes occurring from one year to the next. The most significant root diseases in Montana are Armillaria root disease, laminated root disease, annosum root disease, and brown cubical root and butt decay. The most susceptible tree species in Montana is Douglas-fir, with grand fir and subalpine fir taking a close second. The most tolerant species are western larch, pines and western red cedar, with the remaining species falling somewhere along the gradient between susceptible and tolerant. Although root diseases cause significant amounts of mortality and growth loss, they are also a major agent influencing both structure and species composition across landscapes. Root diseases have greatly influenced succession of vegetation in our forests. This is especially evident in the absence of natural fire cycles. On sites where there is a mixed species component with root disease tolerant serals, root diseases tend to prolong the seral stage on those sites. Root diseases slowly thin out the more root disease-susceptible species (Douglas-fir and true firs), and favor the root disease-tolerant serals.

On grand fir/subalpine fir climax habitats, with a Douglas-fir forest type, low levels of root disease will actually push the stand towards climax faster than in the absence of root disease. This is due to the greater susceptibility of Douglas-fir to root diseases. Although grand fir and subalpine fir are susceptible to root diseases, they are measurably more tolerant than Douglas-fir. Root disease on western red cedar/western hemlock climax sites will also push stands towards climax by weeding out the more root disease susceptible seral species on these sites (Douglas-fir and grand fir).

On sites with a root disease susceptible forest type and climax habitat, very high levels of root disease will maintain early stand development. Root disease patches experience wave after wave of mortality as trees become large enough for their root systems to contact the inoculum on the site. Trees are unable to grow to a very large size before being killed by root disease.

Mortality from Douglas-fir bark beetle (DFB) continues to be high in various spots in Montana, which has raised some issues regarding management for DFB in root diseased areas. Douglas-firs infected with root disease often harbor endemic levels of DFB which likely aids in the rise of the DFB populations during an outbreak.

Annosum root disease of PP is less evident than the above root diseases, but very important in local areas. It has been found causing mortality in ponderosa pine plantations in various locations on the Darby RD, Bitterroot National Forest, private lands west of Kalispell, and continues to be a significant agent on the Flathead IR.

White Pine Blister Rust

White pine blister rust is an introduced pathogen of western white pine that has been present in western North America since the 1920's. Blister rust spread quickly throughout the natural range of western white pine in the northwest United States with devastating impact. By the mid-1960’s initial control efforts, such as Ribes removal and chemical control, had been abandoned. Harvest of white pine was accelerated because managers thought that little would survive.

A tree-breeding program, in place since the early 1950’s, has utilized low levels of naturally occurring rust-resistance in western white pine to produce rust-resistant planting stock. This stock has been used operationally for approximately the last 15 years, and is the basis for restoration of western white pine. Rust-resistant white pine is utilized, among many places, on the Kootenai, Lolo, and Flathead NF, and the Stillwater and Swan State Forests in western Montana. Initial predictions for performance of the rust-resistant white pine were that 65% or more of the trees would remain canker-free. However, monitoring studies in operational plantations in Idaho are showing that infection levels of the rust-resistant stock are highly variable by site, ranging from zero to 95%+. The relation of current infection level to future mortality in rust-resistant white pine is not known; continued monitoring of operational plantations will be required in order to answer this and other key management questions.

In order to address this and other issues involving the performance and management of rust-resistant white pine, a three-day conference of geneticists, pathologists, silviculturists, and ecologists was held in October 2002, in Coeur d'Alene, ID. As a follow-up to that conference, two-day workshops were then offered in order to update forest managers on the latest information regarding performance and management of rust-resistant western white pine in the Inland Empire. Approximately 55 foresters from private industry and federal and state agencies attended the two workshops that were offered in 2003. Two additional workshops were offered in 2004 with more than 50 participants. A one-day workshop titled "Pruning for White Pine Blister Rust" is also offered each summer through University of Idaho Forestry Extension. Small woodland owners mostly attended this workshop.

In addition to western white pine, blister rust infects other species of five-needle pines such as whitebark and limber pine. The effects of blister rust on whitebark pine ecosystems took longer to appear than in the western white pine forest type, but apparently have the ability to be equally devastating. The combined effects of blister rust and mountain pine beetle have caused extensive areas of whitebark pine mortality, raising concerns about the long-term viability of whitebark ecosystems and the resultant effects on whitebark-dependent species such as grizzly bear and Clark's nutcracker. There is currently an effort underway to compile the various surveys on the status of whitebark pine and blister rust that have been done in the western United States. Beta release of an interactive database will occur this spring with over 1400 plots in the system.

A training workshop, sponsored by the Whitebark Pine Ecosystem Foundation, took place in June of 2004 with 108 attendees. The purpose of this workshop was to help provide consistency in monitoring whitebark pine throughout its range to determine changes in blister rust, bark beetles, and other factors over time. The monitoring will allow for prioritization of whitebark pine communities for restoration and provide an assessment of rust impact or changes in forest succession as whitebark pine is replaced with other species.

Dwarf Mistletoes

Dwarf mistletoes are parasitic plants that extract water and nutrients from living conifer trees. The dwarf mistletoes are native components of western coniferous forests, having co-evolved with their hosts for millions of years. The different dwarf mistletoes are generally host specific. In Montana, lodgepole pine and larch dwarf mistletoes occur throughout the range of their respective hosts, while Douglas-fir dwarf mistletoe occurs only in the range of its host west of the Continental Divide.

Because dwarf mistletoes are obligate parasites, ecological forces that have patterned the development of the host tree species have also played roles in influencing the distribution of dwarf mistletoes across the landscape. Fire is one of those influential ecological forces. In general, any fire event that kills host trees will reduce the population of dwarf mistletoes, at least in the short term. The larger and more continuous the fire disturbance, the greater the reduction in dwarf mistletoe populations at the landscape level.

Large, complete burns will greatly reduce dwarf mistletoe populations across the landscape and may even eliminate small, localized populations. Small, "patchy" burns will temporarily reduce portions of dwarf mistletoe populations, but infected residuals provide a ready source of dwarf mistletoe seeds for the infection of the newly developing regeneration.

Human influences, including fire suppression and logging, have also had effects on dwarf mistletoe population dynamics. Partial cutting, which created multi-storied stands, and fire suppression may have served to increase the severity of dwarf mistletoes relative to the "pre-settlement" condition. Conversely, dwarf mistletoes may have been reduced in certain age classes, habitat types, elevation zones or topographic positions that have been intensively managed. Fire suppression and cutting practices that have encouraged shifts in species compositions could have either increased or decreased the disease severity depending on what species of trees and dwarf mistletoes occurred on any given site.

The parasitic activity of dwarf mistletoes causes reduced tree diameter and height growth, decreased cone and seed production, direct tree mortality, or predisposition to other pathogens and insects. Western larch and Douglas-fir dwarf mistletoes have been estimated to cause average growth losses of 20 ft^3/acre/year in areas where they occur in Montana. Lodgepole pine dwarf mistletoe has been estimated to cause an average growth loss of 9 ft^3/acre/year in eastern Montana and 12 $ft.^3$/acre/year in western Montana. On the other hand, witches' brooms and tree mortality may result in greater structural diversity and increased animal habitat. Dwarf mistletoe flowers, shoots, and fruit are food for insects, birds, and mammals. Witches' brooms may be used for hiding, thermal cover, and nesting sites by birds and mammals. In the long term, heavily infested stands of the host trees can begin to decline, resulting in a successional shift toward other tree species.

In 2004, dwarf mistletoe suppression activities were supported with Forest Health Protection suppression funds on 1,254 National Forest acres in Montana. Tree girdling was completed on 1,184 acres of the Kootenai National Forest and 70 acres of the Lolo NF.

Heartwood Stem Decays

The main function of heartwood in live trees is to give individual trees vertical stability. The decay of heartwood weakens this vertical stability, making trees more susceptible to stem breakage. Stem breakage can lead to mortality and subsequent formation of small-scale canopy gaps. The main successional functions of heartwood stem decays are to move stands from a mature closed canopy to a more open canopy and to perpetuate an open canopy.

Stem decays are important in the creation of wildlife habitat in living trees. Although primary cavity nesters are capable of excavating in sound wood, they selectively excavate in trees and snags with heartwood decay. Most primary cavity nesters do not reuse their holes from one year to the next. Their previous year's holes are then used by a multitude of secondary cavity nesters, which are very dependent on already-created holes for successful reproduction. Thus, cavity-nesting habitat (i.e., heartwood decay) is necessary for the successful reproduction of a number of animal species.

Heartwood decay fungi are also necessary for the formation of hollow trees, which are also important habitat for a number of animal species. Hollow trees are created when decay fungi invade the heartwood of a living tree. The decay may progress to the point that the cylinder of decayed heartwood eventually detaches from and slumps down, leaving a hollow chamber. The only way to obtain a hollow dead tree or log is to start with a living tree hollowed out by decay.

Foliage Diseases

Most fungi causing foliage diseases are confined to the needles and leaves, a few attack buds, and some invade young twigs. Foliage diseases are generally more severe in the lower canopy on seedlings, saplings, and small poles than on larger trees. Most of the fungi affect either foliage of the current season or older foliage, but rarely both; it is unusual for all the foliage in either category to be involved. The fungi vary in pathogenicity from year to year according to climatic conditions; heavy infection over a period of years is exceptional. Some trees in a stand are severely infected, but others escape with little or no infection, apparently because of individual resistance. Foliage diseases rarely cause mortality, but they do cause a reduction in growth.

Larch needle disease was identified on nearly 3,000 acres in Montana, with approximately 1,700 acres of western larch in the Kootenai and Flathead reporting areas affected during the aerial detection survey of 2004. This is much lower than the more than 33,000 acres identified in 2003. Larch needle blight and larch needle cast were confirmed during several site visits to the Kootenai NF in 2004. Affected trees had reflushed by late summer, but needles on spur shoots were shortened and chlorotic. Epidemics of larch needle diseases (larch needle blight and/or larch needle cast) have been reported in the Northern Region about every ten years since 1913. Two years of complete infection can kill spur shoots. Several years of heavy damage (>70%) may lead to tree mortality, but this is uncommon. Growth loss is probably the greatest effect of this disease.

Elytroderma needle blight

Elytroderma needle blight is the most damaging foliage disease on ponderosa pine in Montana. The fungus infects and kills needles, but also invades twigs and causes localized brooms. Spores of the fungus mature in late summer and fall and are dispersed when the needles are wet.

The fungus can live from year to year in invaded bark, so the disease can be perpetuated without conditions favorable for either spore production or infection of new needles.

Localized areas of heavy infection from Elytroderma needle blight were again seen across western Montana in 2004. Elytroderma has been heavy in several locations in Montana for a number of years: Jette Lake area north of Polson, Bitterroot Valley south of Missoula, and the Belt Creek Canyon east of Great Falls.

Sphaeropsis (Diplodia) shoot blight and canker

Sphaeropsis shoot blight and canker (also known as Diplodia shoot blight) is caused by the fungus *Sphaeropsis sapinea* (Fr:Fr) Dyko & Sutton in Sutton. The disease is seen mainly on ponderosa pine in Montana, but other species can be affected. Damage occurs on current year's growth in the spring as evidenced by needle stunting, discoloration, and shoot dieback. Needles turn a straw-like color, then red as the shoot dies and dries out. Resin droplets often exude from the base of infected needles. Cones are infected by the fungus and act as a source of inoculum each spring as spores are spread to new growth by rain-splash. Severity of infections on ponderosa pine varies. In the most susceptible trees, nearly all current-year shoots can be infected, and chronic infections can result in non-vigorous crowns and occasional top-kill. In less susceptible trees only scattered shoots are affected, while some ponderosa pine appear to be resistant and without visible infections. Patterns of infection within a tree's crown vary as well; there may be numerous dead shoots on one side of a tree and few if any on the other. Observations suggest that ponderosa pine along river bottoms and major drainages may have heavier levels of infection, perhaps due to airflow patterns or other environmental conditions.

Western gall rust and Sphaeropsis shoot blight

Casually attributing shoot dieback on ponderosa pine to Sphaeropsis shoot blight may lead to an incomplete or incorrect diagnosis. Informal surveys show that western gall rust infections are commonly present towards the ends of branches with shoot dieback, although there is no reason that western gall rust and Sphaeropsis shoot blight cannot be present on the same branch. In fact, even small amounts of water stress increase damage caused by *Sphaeropsis sapinea*, and western gall rust infections may be causing stress in portions of the branch distal to even small rust galls. Combined damage from Sphaeropsis shoot blight and western gall rust continues to cause noticeable dieback of ponderosa pine shoots. Low levels of damage can currently be seen throughout western Montana. Moderate to severe damage occurs in certain locations.

COMPLEXES AND DECLINES

Subalpine Fir Mortality

Subalpine fir mortality across western Montana remained high in 2004. Much of the mortality occurred from varying combinations of root diseases, bark beetles, and possibly other factors. The most significant factor, however, is thought to be mortality directly or indirectly caused by WBBB. In Montana, nearly 250,000 trees were killed by WBBB on over 130,000 acres in 2004. The pathogenic fungus carried by western balsam bark beetle, *Ophiostoma dryocoetidis*, appears to cause mortality even when the beetles only lightly attack trees.

Aspen Decline and Mortality

Current aspen numbers in Montana are estimated at only one-third of historical numbers. In 2004, mortality was reported on 101 acres in the Fort Belknap IR and Kootenai reporting areas. Aspen mortality is probably underestimated during aerial detection surveys due to the lack of visible signatures associated with mortality in trees that die after an extended period of decline. Aspen does not compete well in low-light environments and requires canopy-opening disturbances, such as fire, to regenerate. Without regeneration, stands of this short-lived tree species are expected to become decadent and deteriorate. Reductions of Montana aspen forests are believed to be largely due to fire suppression activities over the past 100 years; however, this supposition needs further investigation.

ABIOTIC

Herbicide

Mature ponderosa pines have shown substantial needle discoloration and loss in campgrounds where herbicides containing picloram have been applied to control certain noxious weeds. Additional symptoms included curling of small branches and needles, swollen terminal growth, and tree mortality. Trees and broadleaved shrubs with growth regulator-like injury symptoms were in or adjacent to areas where the herbicide had been applied. Tissue analysis has not been done to show presence of picloram or other herbicide ingredients in the affected trees, but it should be noted that some herbicide formulations containing picloram claim control of pine, Douglas-fir and spruce.

Drought

Montana has been experiencing a drought during four of the past five years. Foliage discoloration, reduced growth, top dieback, branch dieback, and overall decline were seen on various tree species across the state.

Hazard Tree Management in Recreation Sites

FHP continues to provide technical assistance to land managers in hazard tree management in recreational areas. A form is available to help managers evaluate trees and properly document on-going hazard tree management programs. FHP provides training in using the form and other aspects of hazard tree management.

An international database has been developed to identify the most common factors associated with tree failures. FHP will be facilitating the use of this database in Montana by federal recreation managers. If this database is adequately supported and successful in the information gained, educational materials will be developed to help resource managers in decision-making related to hazard trees.

Anyone requesting training or other assistance with hazard tree management should contact Marcus Jackson (406-329-3282) or Blakey Lockman (406-329-3189).

SPECIAL PROJECTS

1. Changes in Fire-Killed Western Larch

Information on the deterioration of fire-killed western larch is limited. This ten-year study, with multiple size classes, will provide more information about losses in lumber and fuelwood values than previous studies. Wildlife biologists have shown interest in learning more about how changes in fire-killed larch relate to wildlife use. Others may find this study useful in projecting woody fuel loads on burned larch sites.

The study includes four size classes (8” to 11.9” dbh, 12” to 15.9” dbh, 16” to 19.9” dbh, and 20+” dbh) spread over five locations within the boundaries of the 2001 Moose Fire, Flathead NF. Ten trees in each size class will be randomly selected and dissected 1, 2, 3, 5, 7, and 10 years after the fire. Checks, woodborers, wood stain, decay and other factors will be measured after the trees are cut down. Some trees will be left uncut for each size class as “longevity snags” to continue monitoring for conk development and snag longevity.

Third year data were collected in September 2004. Data are currently being analyzed. Sapwood decay appears to have increased substantially between two and three years after the fire. A report of second and third year findings is forthcoming. For additional information, contact Marcus Jackson, Missoula Field Office.

2. Blister Rust Infection Levels in White Pine Plantations of Improved Stock (f2)

We have been surveying infection levels in F2 plantations since the mid-1990, and have discovered infection levels are highly variable. Over 60 plantations have been surveyed and infection levels vary from 0.0% to 95.8%. Nursery inoculation tests in 1976 indicated that the maximum infection levels should never be greater than 33%, so additional evaluations have been conducted to try to explain the variation observed.

An FHP sponsored University of Idaho study found that infection levels increased with stand elevation and slope and decreased with latitude. The big question is whether the infection levels will increase over time and result in high mortality levels. Fourteen plantations have had follow-up evaluations; 9 plantations were evaluated after five years and 5 plantations were evaluated after 10 years. Infection levels in 5 plantations did not increase much, but infection levels increased dramatically in the other nine. Mortality levels were much lower, but reflected similar changes, and were 30-43% in 3 plantations.

Pruning in natural stands with moderate to high levels of infection greatly improves survival, and additional studies are underway to determine pruning impacts in F2 stands. (For additional information, contact John Schwandt, Coeur d'Alene Field Office).

3. Blister Rust Canker Growth in F2 Stock

In 2000 and 2001, we individually tagged about 100 blister rust cankers to monitor canker growth rates on F2 stock. After 3-4 years, canker growth rates on branches vary from about 1 inch to 2.5 inches per year. This is slightly less than the 2-3 inches reported for cankers in unimproved stock, but additional analyses are needed to better define differences. (For additional information, contact John Schwandt, Coeur d'Alene Field Office).

4. Girdling Rates of Blister Rust Cankers in F2 Stock

A new study to look at bole cankers on F2 stock was initiated in 2004 with FHP funding support for a graduate student from Oregon State University. Bole cankers on F2 stock often appear to be growing slower and have irregular shapes compared to cankers on unimproved stock. This study will take cross-sections through cankers to examine cambial death over time in an attempt to define canker-girdling rates, which will help predict mortality rates of F2 stock. (For additional information, contact John Schwandt, Coeur d'Alene Field Office).

5. Elytroderma Needle Disease Thinning and Pruning Project

The Bitterroot National Forest was awarded money for precommercial thinning in ponderosa pine through FHP Suppression/Prevention/ Restoration funding. FHP worked with the Forest to set up plots to monitor the effects of two thinning regimes with and without pruning on the infection levels of Elytroderma needle disease. The project is in the Elk Bed area of the Darby RD. Elytroderma has been moderately severe for a number of years in this area, causing needle loss, brooming, and bole twisting in infected trees. Twelve stands were selected for this project. Each stand half was randomly assigned one of four treatments: thinning to 12x12 spacing, thinning to an 18x18 spacing, thinning to 12x12 spacing and pruned, and control (no treatment). A pretreatment survey of Elytroderma was completed, and trees were tagged, measured and rated for Elytroderma after treatments were completed. Fifty trees were tagged within each treatment for a total of 1200-tagged trees. Annual monitoring will begin in 2006 and is planned to continue for 10 years. Establishment data will be analyzed and a report will be forthcoming. For additional information, contact Blakey Lockman (406) 329-3189 blockman@fs.fed.us.

6. Ponderosa Pine Decline on the Flathead Indian Reservation

Plots were established on the Flathead Indian Reservation in 1993 to monitor the apparent decline and mortality of large old growth ponderosa pine. An establishment and 5-year remeasurement report came out in 2001 (FHP Report 01-3). These plots were remeasured again in 2004. Data will be analyzed and a report will be forthcoming. For additional information contact Blakey Lockman (406) 329-3189 blockman@fs.fed.us

7. Assessing the Effectiveness of Management Activities on DFB Populations

A multi-year study, begun in 2002, will help determine effectiveness of management activities on DFB populations, and particularly ones existing in areas recently affected by fire. Beetle-infested stands on the Bitterroot, Helena, and Beaverhead NFs; as well as BLM-administered land near Boulder, were assessed for beetle presence and status prior to implementation of management efforts. Those efforts included salvage of infested and threatened trees, use of trap trees or baited funnel traps, and the use of the DFB anti-aggregant, MCH. Management activities were implemented in 2002, 2003, and 2004. Data were collected following implementation of management and subsequent beetle flights in each year.

Although not all proposed and scheduled activities have been carried out, in areas where salvage logging was conducted, and in most areas where funnel traps were used, beetle-caused mortality was markedly reduced in all 3 years. In areas where MCH was used to protect threatened trees or stands, treatments were deemed successful. In almost none of the treated areas was new beetle-caused mortality observed.

DFB populations are beginning to decline in many treated areas. In a few, pheromone-baited funnel traps and MCH may once again be used in 2005 to reduce anticipated DFB-caused mortality. In other areas DFB populations are sufficiently low that additional treatments are not warranted. Following evaluations this fall (2004), overall effects of three post-fire year treatments will be reported. For additional information, contact Nancy Sturdevant, Missoula Field Office (MFO).

8. Testing the Effectiveness of Pheromone-Baited Funnel Traps in Reducing DFB-Caused Mortality in Nearby Stands of Susceptible DF

This is a cooperative project with Rob Progar (PNW, Corvallis, OR) determining the effectiveness of funnel traps in reducing DFB activity. The objective is to determine if we can suppress DFB populations and/or reduce beetle-caused mortality with funnel traps. We used triplets of baited traps—three sets of three traps placed 200 meters apart in a "triangular" pattern on two RDs—Wisdom and Philipsburg (Beaverhead-Deerlodge NF). After beetle flight, we surveyed the interior of the "triangle" to see if DF mortality was reduced by trap catches. Millions of beetles were trapped; but we found quite a bit of tree mortality as well. Data to determine treatment effectiveness is being analyzed. For additional information, contact Nancy Sturdevant, MFO.

9. Can Pheromone Trap Catches Reduce DFB-Caused Mortality

This is a cooperative project with Kimberly Wallin (OSU, Corvallis, OR) in trying to determine how much DFB-caused mortality occurs around pheromone-baited funnel traps—and if trap placement affects mortality in adjacent DF stands. Ten pairs of traps, in 2 DFB population densities (moderate and high) placed in DF stands in southwestern Montana (Sula and Stevensville RDs, Bitterroot NF). Trap catches are being analyzed. This project will run through 2005. For additional information, contact Ken Gibson, MFO.

10. Comparison of Two New MCH Products—An Observation

In an area on Sula RD (Bitterroot NF) where large-diameter, older DF dominated stand conditions, and which was heavily infested by DFB, we conducted a side-by-side comparison of two MCH products, available for the first time in 2004. We compared them to the "standard" MCH bubble capsule, registered by Phero Tech, Inc.; and which has been used extensively, operationally, for several years.

In each of three 5-acre stands, we placed 30 MCH bubble capsules per acre—the registered and recommended rate. Randomly assigned to the adjacent blocks were one of three treatments: Standard Phero Tech bubble capsules, bubble capsules manufactured by Biota Control, and ones manufactured by Hercon Environmental. All bubble capsules were of similar construction and contained equal amounts of liquid MCH.

Bubble capsules were installed in stands in late-April. An adjacent, un-treated stand of similar conditions served as a "control." Treatment effectiveness was evaluated in late-September. DFB populations declined in that general area in 2004. In the untreated stand, we found but 4 new, DFB-killed trees. But we found no new attacks in any of the treated areas. While the "observation" was not established to be a replicated study, we were hopeful of demonstrating the effectiveness of MCH products new to the market. We believe they were effective. Neither has yet been registered for operational use, but that may be forthcoming. For additional information, contact Ken Gibson, MFO.

11. DFB Traps--Philipsburg RD

Pheromone-baited funnel traps were used in an area surrounding East Fork Reservoir in an attempt to reduce DFB-caused mortality. The outbreak around the reservoir, and extending into the Anaconda-Pintler Wilderness, began several years ago. Hundreds of thousands of beetles were trapped, resulting in numbers of beetle-killed DF being approximately the same in 2004 and 2003. We expect, without the trapping effort additional hundreds or thousands of DF in the treated area would have been killed. While many large-diameter DF are dead, numerous green trees remain. In much of the area beetle activity appears to be static. South of the Reservoir, DFB populations may still be increasing; but in the area surrounding it, we anticipate declining populations due in large part to host depletion. For additional information, contact Nancy Sturdevant, MFO.

12. Testing Efficacy of Verbenone Pouch in Reducing MPB-Caused Mortality in PP

A project was conducted in PP stands on the Plains/Thompson Falls RD to help determine the efficacy of the standard, 5-gram verbenone pouch compared to a new "slow-release" pouch in protecting trees from MPB attack. In a randomly assigned treatment (by block) test, we treated three 1-acre plots in each of 6 blocks. Treatments consisted of 0, 20 standard (Phero Tech), or 40 new (slow-release, Biota) pouches per acre. Pouches were stapled to individual trees in a grid pattern (approximately ½-chain apart at 40/acre; about ¾-chain apart at 20/acre). A baited funnel trap was hung at the center of each plot. Stands were treated in late June and evaluated in late September. The standard pouches were replaced at the end of July. Treatment results were not as we had hoped because of beetle populations too low to make valid comparisons between treatments. For additional information, contact Ken Gibson, MFO.

13. West-Wide Evaluation of Bifenthrin as a Protectant Against Bark Beetle Attacks

Second-year Results

As part of a multi-Region study, we conducted a preventive spray treatment in MPB-susceptible LPP stands on Jefferson RD. We selected 210 live LPP, at least 8 inches d.b.h., in early June 2003. Selected trees were randomly assigned to one of six groups, each of which would receive a different "treatment." Six treatments were: 0.03% bifenthrin (Biflex), 0.06% Biflex, 0.12% Biflex, 2% carbaryl, 2003 control (no spray) and 2004 control (no spray, reserved for second year of study).

Trees were treated in mid-June. Mixtures were water-based sprays, applied with hydraulic sprayers. Tree boles were treated to a point of runoff, to a height of about 25 feet. Following treatment, standard MPB tree bait was attached to each tree (except trees reserved for 2004). Treatment effects were evaluated in late-September 2003. First-year results showed weaker concentrations of Biflex provided poor protection from MPB attack; highest concentration (0.12%) was moderately successful. Carbaryl provided excellent protection. Results are shown in table below.

	Control '03	0.03% Biflex	0.06% Biflex	0.12% Biflex	2% Carbaryl	Biflex '04	Carbaryl '04	Control '04
Attacked	**31**	**29**	**22**	**6**	**1**	**24**	**3**	**25**
Not Attacked	**2**	**6**	**10**	**25**	**34**	**9**	**30**	**9**
% Alive	**6**	**17**	**31**	**81**	**97**	**17**	**91**	**16**

In June 2004, the 25 trees remaining alive in the Biflex (0.12%) group, the 34 in the Carbaryl group, and the 35 2004 controls were baited with MPB tree baits. Second-year protection was evaluated in September. For additional information, contact Ken Gibson, MFO.

14. Testing Efficacy of Onyx, Sevin, and Permethrin +C in Protecting Individual LPP from MPB Attack

In mid-June, 150 LPP were selected as part of an evaluation of another potential replacement for Sevin (carbaryl) insecticide in protecting individual LPP from MPB attack. The insecticide under evaluation was Permethrin +C, a synthetic pyrethroid. In addition, we again evaluated the registered rate (0.06%) of Onyx (bifenthrin); and we applied 2% carbaryl as the "standard." Control trees were selected for both 2004 and 2005 (second-year protection). This project was under the direction of Chris Fettig, Research Entomologist, PSW, Davis, CA.

Trees were selected on the Jefferson RD, Beaverhead-Deerlodge NF, east of Butte. Groups of thirty trees each, comprised five treatments: 0.06% Onyx, 0.2% Permethrin +C, 2% carbaryl, check ('04), and check ('05). Trees were treated June 15-17 and evaluated in mid-September, following beetle flight. Results are shown in table below.

	Control	Onyx	Perm. +C	Carbaryl
Attacked	**30**	**1**	**2**	**0**
Not Attacked	**0**	**29**	**28**	**30**
% Mortality	**100**	**3.4**	**6.7**	**0**

Trees will be re-baited in 2005. For additional information, contact Ken Gibson, MFO.

15. Testing Efficacy of Verbenone Pouch in Reducing MPB-Caused Mortality in LPP
An individual-tree test was conducted in LPP stands near Corona Divide, Plains/Thompson Falls RD; testing efficacy of standard (Phero Tech) 5-gram verbenone pouch and a "new" (slow-release, Biota) pouch in reducing MPB-caused mortality in high-value trees. Trees were selected and treated in late June. Test was comprised of three treatments: 2 standard pouches per tree, 2 "new" pouches per tree, and none (controls). Fifty trees were selected for each treatment. All 50 trees were baited with standard MPB tree baits. Standard pouches were replaced in late-July; project results being determined in September. Treatments, not statistically different from each other, successfully protected trees from beetle attack, when compared to untreated controls. Following table illustrates those results:

Treatment	Not attacked[1]	Strip attack[2]	Mass attack[3]	% Attacked
Control	**0**	**5**	**45**	**100**
Standard	**24**	**11**	**15**	**30**
New	**24**	**12**	**14**	**29**

[1] No or unsuccessful (pitch outs) attacks
[2] "Strip attacks" were partial attacks and were not killed
[3] Only "mass attacks"—trees actually killed—contributed to "% attacked"

For additional information, contact Sandy Kegley, Coeur d'Alene Field Office (CFO).

COMMON AND SCIENTIFIC NAMES

Pathogens

Annosum root disease	*Heterobasidion annosum* (Fr.:Fr.) Bref.	Primary hosts: DF, GF, PP, SAF
Armillaria root disease	*Armillaria ostoyae* (Romagn.) Herink	DF, GF, SAF, sapling pines
Black stain root disease	*Leptographium wageneri* (Kendrick) M.J. Wingfield	DF, PP
Brown cubical butt rot	*Phaeolus schweinitzii* (Fr.:Fr.) Pat.	DF
Dothistroma needle cast	*Dothistroma septospora* (Doroguine) Morelet	LP, PP, WWP, LPP, WBP
Dwarf mistletoes	*Arceuthobium* spp.	LPP, LP, DF, WL
Brown Stringy rot	*Echinodontium tinctorium* (Ell. & Ev.) Ell. & Ev.	GF, WH
Elytroderma needle cast	*Elytroderma deformans* (Weir) Darker	PP
Fusarium root rot	*Fusarium oxysporum* Schlechtend.:Fr.	DF (Nursery)
Grey mold	*Botrytis cinerea* Pers. ex Fr.	WL (Nursery)
Laminated root rot	*Phellinus weirii* (Murrill) R.L. Gilbertson.	DF, GF, WH, SAF
Sirococcus tip blight	*Sirococcus conigenus* (DC.) P. Cannon & Minter	WWP (Nursery)
Sphaeropsis shoot blight	*Sphaeropsis sapinea* (Fr.:Fr.) Dyko & Sutton in Sutton	PP
Western gall rust	*Endocronartium harknessii* (J.P. Moore) Y. Hiratsuka	LPP, PP
White pine blister rust	*Cronartium ribicola* J.C. Fisch.	WWP, WBP, LP

Insects

Douglas-fir beetle	*Dendroctonus pseudotusugae* Hopkins	DF
Douglas-fir tussock moth	*Orygia pseudotsugata (*McDunnough*)*	DF, TF, ES
Gypsy moth	*Lymantria dispar (*Linaeus*)*	Most hardwoods
Mountain pine beetle	*Dendroctonus ponderosa* Hopkins	All pines
Pine engraver beetle	*Ips pini* (Say)	PP, LPP
Spruce beetle	*Dendroctonus rufipennis* Swaine	ES
Western balsam bark beetle	*Dryocoetes confuses* Swaine	SAF
Western spruce budworm	*Choristoneura occidentalis* Freeman	DF, TF, ES, WI
Western pine beetle	*Dendroctonus brevicomis* LeConte	PP
Fir engraver beetle	*Scolytis ventralis* LeConte	GF, SAF
Hemlock looper	*Lambdina fiscellaria lugubrosa* (Hulst)	DF
False hemlock looper	*Nepytia canosaria* (Walker)	DF

DF = Douglas-fir; GF = Grand fir; TF = True fir; SAF = Subalpine fir; PP = Ponderosa pine; LP = Limber pine: LPP = Lodgepole pine; WWP = Western white pine; ES = Engelmann spruce; WH = Western hemlock; WL = Western larch; WBP = Whitebark pine

PUBLICATIONS 2004

Bulaon, B. 2004. Bark beetle activity in ponderosa pine in Grant Creek neighborhood, Missoula, Montana. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-09.June 8, 2004. 8p.

Bulaon, B.M. 2004. Bark beetle potential in the Custer National Forest. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-23. August 3, 2004. 8p.

Bulaon, B.; Gibson, K. 2004. Drought effects and chemical damage on trees in Kalispell. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-06. April 20, 2004. 4p.

Bulaon, B.; Gibson, K. 2004. Douglas-fir tussock moth egg-mass survey results, Flathead Indian Reservation. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-43. 2p.

Bulaon, B.M.; Sturdevant, N. 2004. Pre-release surveys for *Mecinus janthinus* on dalmation toadflax in Blaine County, Montana. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-18. July 15, 2004. 5p.

Gibson, K. 2004. Bark beetle concerns, Libby Ranger District. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-07. May 3,2004. 8p.

Gibson, K. 2004. Western larch mortality in western Montana. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-11. May 26, 2004. 3p.

Gibson, K. 2004. Douglas-fir beetle activity on state land in Upper Rock Creek drainage. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-15. June 3, 2004. 7p.

Gibson, K. 2004. Bark beetle-caused mortality on Hebgen Lake Ranger Station compound. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-16. June 14, 2004. 3p.

Gibson, K. 2004. Bark beetles in the Cow Creek analysis area, Libby Ranger District, Kootenai National Forest. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-20. August 3, 2004. 7p.

Gibson, K. 2004. Suppression review-Tally Lake and Swan Lake Ranger Districts, Flathead National Forest. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-21. August 3, 2004. 4p.

Gibson, K. 2004. Bark beetle conditions in Big Arm, West Shore, and Lone Pine State Parks, Montana. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-22. August 3, 2004. 9p.

Gibson, K. 2004. Mountain pine beetle in the McGinnis Creek drainage, Plains[Thompson Falls Ranger District. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-32. 4p.

Gibson, K. 2004. Douglas-fir beetle presence and potential in Big Timber Canyon. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-34. 8p.

Gibson, K. 2004. Marking guidelines for Douglas-fir beetle-infested Douglas-fir, Antelope salvage sale, Bureau of Land Management, Missoula Field Office. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-37. 5p.

Gibson, K. 2004. Douglas-fir tussock moth-Flathead Indian Reservation. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-30. September 8, 2004.4p.

Gibson, K. 2004. Suppression reviews/bark beetle conditions on a portion of the Gallatin National Forest. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-28. August 30, 2004. 4p.

Gibson, K.; Bulaon, B. 2004. Marking guidelines for bark beetle-infested ponderosa pine, Sula Ranger District, Bitterroot National Forest. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-05. March 24, 2004. 4p.

Gibson, K.; Jackson, M. 2004. Trego analysis area review, Fortine Ranger District and selected suppression reviews, Rexford Ranger District. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-31. September 21, 2004. 2p.

Gibson, K.; Kegley, S. 2004. Testing the efficacy of verbenone in reducing mountain pine beetle attacks in second-growth ponderosa pine. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-7. 8p.

Gibson, K.; Weber, A. 2004. Sheldon Flats thinning and engraver beetle trapping, Libby Ranger District, 1997-1998. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-3. 6p.

Hagle, S.K.; Parker, J.; Harris, G. 2004. Weitas Creek Campground, Clearwater National Forest. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-15. 12p.

Hagle, S.K.; Perry, K.; Wiles, R. 2004. Jerry Johnson Campground hazard tree evaluation, September 2003. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-2. 14p.

Hagle, S.K.; Perry, K.; Wiles, R. 2004. Corps of Discovery Campground hazard tree evaluation, December 2003. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-4. 12p.

Jackson, M. 2004. Changes in Fire-killed western larch on the Glacier View Ranger District (Flathead National Forest), Montana: Establishment and year one report. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-16. 13p.

Jackson, M. 2004. Insect and disease assistance for Pine Grove Campground, Emerald Lake Campground, and Picket Pin Mountain. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-33. 4p.

Jackson, M.; Bulaon, B.M. 2004. Bark beetles and disease concerns in Lewis and Clark National Forest campgrounds. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-24. 16p.

Jackson, M.; Sturdevant, N. 2004. Insect and disease evaluation on the Roaring Lion and Four C Ranches in the Bitterroot Valley. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-08. May 3, 2004. 13p.

Jackson, M.B.; Sturdevant, N.J. 2004 Sacajawea Memorial Camp insect and disease evaluation, Beaverhead-Deerlodge National Forest. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-29. August 23, 2004. 5p.

James, R.L. 2004. Nevada Division of Forestry Washoe Nursery. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-42. December 8, 2004. 10p.

James, R.L.; Knudsen, G.R.; Morra, M.J. 2004. Preplant soil treatment effects on production of Douglas-fir seedlings at the USDA Forest Service Nursery, Coeur d'Alene, Idaho. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-10. 14p.

James, R.L.; Knudsen, G.R.; Morra, M.J. 2004. Preplant soil treatment effects on production of Douglas-fir seedlings at the USDA Forest Service Nursery, Coeur d'Alene, Idaho. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-12. 10p.

James, R.L.; Knudsen, G.R.; Morra, M.J. 2004. Preplant soil treatment effects on production of seedlings at the USDA Forest Service Lucky Peak Nursery, Boise, Idaho. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-13. 12p.

James, R.L.; Zeidler, S. 2004. Preplant soil treatment effects on production of bare root bitterbrush seedlings Lone Peak Conservation Nursery, Draper, Utah. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-14. 14p.

Kegley, S. 2004. Western pine beetle after the Hope 44 fire, Sandpoint Ranger District. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-01. January 16, 2004. 6p.

Kegley, S. 2004. North Fork and Spruce Tree Campgrounds, St. Joe Ranger District, Idaho Panhandle National Forests. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-35. September 20, 2004. 3p.

Kegley, S.; Beckman, D.; Wulff, D. 2004. 2003 North Idaho Douglas-fir tussock moth trapping system report. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-6. 7p.

Kegley, S.; Gibson, K. 2004. Protecting whitebark pine trees from mountain pine beetle attack using verbenone. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-8. 4p.

Kegley, S.; Schwandt, J.; Gibson, K. 2004. Forest health assessment of whitebark pine in selected stands in the Selkirk Mountains of northern Idaho 2001. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-5. 8p.

Lockman, B. 2004. Evaluating insects and diseases in a western white pine test plantation and ponderosa pine proposed seed production areas, Three Rivers Ranger District, Kootenai NF. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-39. 3p.

Lockman, B. 2004. Evaluating insects and diseases in a CEEM certification stand, Sula Ranger District, Bitterroot NF. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-40. 4p.

Lockman, B.; Bulaon, B. 2004. Insects and diseases in the Blazing Saddles timber sale. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-12. June 25, 2004. 5p.

Lockman, B.; Gibson, K. 2004. Disease and insect considerations in the Mayo Gulch fuels reduction area, Superior Ranger District, Lolo National Forest. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-19. August 23, 2004. 5p.

Meyer, L., compiler. 2004. Montana Forest Insect and Disease Conditions and Program Highlights-2003. Missoula, MT: USDA Forest Service, State and Private Forestry and Montana Department of Natural Resources and Conservation, Forestry Division. Report 04-1. 53p.

Pederson, L.; Schwandt, J. 2004. Spruce tree plantation insect and disease assessment, Priest Lake Ranger District, Kaniksu National Forest. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-46. December 6, 2004. 4p.

Randall, C. 2004. An evaluation of bark beetle conditions and treatments on Lookout Pass Ski and Recreation Area, 2003. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-04. February 4, 2004. 18p.

Randall, C. 2004. 2004 Spring application of verbenone on Lookout Pass Ski and Recreation Area. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-13. June 10, 2004. 4p.

Randall, C. 2004. Tansy ragwort collection day, Palouse Ranger District, Clearwater National Forest. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-17. June 8, 2004. 3p.

Schwandt, J.; Kegley, S. 2004. Mountain pine beetle, blister rust, and their interaction on whitebark pine at Trout Lake and Fisher Peak in Northern Idaho from 2001-2003. Missoula, MT: USDA Forest Service, State and Private Forestry. Report 04-9. 6p.

Schwandt, J.; Naffin, K. 2004. Blister Rust Evaluation of Phase 2 Trees at Grouse Creek Seed Orchard. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-44. December 6, 2004. 7p.

Sturdevant, N. 2004. Initial assessment of insect and disease conditions at the Sacajawea Memorial Park. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-02. February 4, 2004. 5p.

Sturdevant, N. 2004. Evaluation of mountain pine beetle activity in the Elkhorn landscape analysis. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-10. May 20, 2004. 6p.

Sturdevant, N.J. 2004. Evaluating Douglas-fir restoration treatments on Douglas-fir beetle activity on the Wisdom and Townsend Ranger Districts. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-25. October 20, 2004. 4p.

Sturdevant, N.J. 2004. Evaluation of insect activity on Clancy Forest Treatment Timber Sale, Great Divide Ski Area, and North Elkhorn’s Project, BLM-Butte Field Office. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-26. 6p.

Sturdevant, N.J. 2004. Evaluation of potential biological control insectary sites in the Snow Talon fire. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-27. August 5, 2004. 2p.

Sturdevant, N. 2004. Evaluating red turpentine and wood borer activity following hazardous fuels reduction treatments. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-45. December 7, 2004. 3p.

Sturdevant, N.; Bulaon, B.; Jackson, M.; Gibson, K. 2004. Bark beetle and disease conditions, Rocky Boys Indian Reservation. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-14. June 16, 2004. 5p.

Sturdevant, N.; Jackson, M. 2004. Grasshopper fuels reduction project: insect and disease considerations. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-03. February 13, 2004. 7p.

Sturdevant, N.; Jackson, M. 2004. Insect and Disease Conditions at Several Campgrounds on the Hebgen Lake Ranger District. Missoula, MT: USDA Forest Service, State and Private Forestry, File 3420. FHP Trip Report 04-38. December 20, 2004. 11p

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Table 2. Acres of host type infested by bark beetles, 1999-2004

	1999	2000[1]	2001	2002[3]	2003[3,4]	2004[5]
DFB[2]	38,259	34,401	82,273	60,203	76,035	92,395
ESB	830	213	637	6,232	9,539	311
IPS	214	11	17	498	4,784	16,283
WPB	1,324	368	670	739	834	369
FE	134	159	1,047	8,929	20,647	34,352
WBBB	43,472	28,010	27,622	112,024	76,035	133,780
MPB	77,347	40,758	111,626	261,348	305,911	453,292
Total	161,580	103,920	223,892	450,134	493,785	730,782

[1]Not all areas were flown in 2000 due to fires.

[2]DFB=Douglas-fir beetle; ESB= Spruce beetle; IPS=Pine engraver; WPB=Western pine beetle; FE=Fir engraver; WBBB=Western balsam bark beetle; MPB=Mountain pine beetle

[3]Includes Yellowstone NP acres in MT, ID and WY.

[4]Not all areas were flown in 2003 due to fires.

[5]Not all areas were flown in 2004 due to in climate weather.

Table 3. Douglas-fir beetle-infested acres and new dead trees in Montana, all ownerships, from 2001 through 2004

	2001		2002		2003		2004	
Reporting Area	**Acres**	**Trees**	**Acres**	**Trees**	**Acres**	**Trees**	**Acres**	**Trees**
Beaverhead	★	★	3,463	6,073	6,403*	13,840*	4,677*	10,784*
Bitterroot	11,414	21,649	11,755	24,676	34,442	31,989	30,990	61,534
Custer	14	50	0*	0*	27*	45*	64*	234*
Deerlodge	217	530	2,405	3,563	6,610	13,249	8,213*	26,078*
Flathead	14,909	22,813	7,164	16,924	5,580	8,552	5,754*	17,447*
Gallatin	2,231	3,214	2,374	4,293	5,649*	7,450*	4,515	12,669
Helena	1,521	2,262	1,204	2,103	1,817	3,560	10,810*	19,241*
Kootenai	32,051	61,132	17,589	24,411	10,924	14,134	9,108	21,054
Lewis & Clark	377	761	457*	576*	1,293	1,585	2,472*	5,473*
Lolo	9,660	28,296	9,659	21,484	1,143*	2,627*	8,084*	22,034*
Garnets	415	1,166	111	541	917*	1,637*	2,622	7,228
Flathead IR	1,427	2,960	1,691	2,598	14*	44*	1,718*	2,826*
Crow IR	4	18	0	0	0	0	0	0
Glacier NP	★	★	15*	49*	★	★	3,280*	5,123*
Yellowstone NP	★	★	2,315	3,523	1,135*	3,296*	★	★
Other	433	2,139	0	0	28	42	21	40
TOTAL	82,274	155,820	60,202	118,441	75,982	102,050	92,328	211,765

★ = Not surveyed Yellowstone includes acres in MT, ID and WY * = Partially surveyed

Table 4. Acres of mountain-pine-beetle-caused mortality on State and private lands in Montana from 2001 through 2004

	2001				2002				2003				2004			
Reporting Area	LPP	PP	WBP	WWP	LPP	PP	WBP	WWP	LPP	PP	WBP	WWP	LPP	PP	WBP	WWP
Beaverhead	★	★	★	★	1,149	135	1,131	0	171*	95*	2,265*	0*	931*	24*	1,178*	0*
Bitterroot	837	0	0	0	45	519	0	0	0	532	0	0	10	372	0	0
Custer	0	108	0	0	2*	8*	0*	0*	0*	20*	0*	0*	23*	387*	34*	0*
Deerlodge	347	0	0	0	4,380	563	32	0	4,951	659	89	0	17,053*	55*	385*	0*
Flathead	362	80	13	41	2,062	185	39	76	3,735	1,266	236	12	3,891*	651*	801*	10*
Gallatin	15	2	0	0	19	0	0	0	336*	27*	561*	0*	148	12	6,971	0
Helena	28	1,526	0	0	103	2,394	0	0	1,465	1,522	0	0	1,509*	3,646*	1,163*	0*
Kootenai	28	58	0	79	2,315	81	0	74	860	79	0	71	106	14	0	245
Lewis & Clark	47	2,238	2	0	6*	592*	0*	0*	651*	4,202*	309*	0*	1,108*	3,822*	143*	0*
Lolo	4,170	459	8	0	7,333	1,131	44	27	5,305*	1,124*	478*	0*	8,542*	862*	0*	0*
Garnets	22	204	0	0	134	296	0	0	196*	377*	2*	0*	3,029	174	0	0
Crow IR	68	390	0	0	0	557	0	0	0	231	0	0	301	0	2	0
Fort Belknap IR	0	138	0	0	0	82	0	0	0	27	0	0	2	34	0	0
No. Cheyenne IR	0	4	0	0	0	16	0	0	★	★	★	★	0	10	0	0
Rocky Boys IR	0	24	0	0	0	399	0	0	465	51	0	0	60	68	0	0
Flathead IR	481	466	0	0	915	839	0	0	2,023*	923*	0*	0*	3,283*	275*	0*	0*
Other	0	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	6,405	5,725	23	120	18,416	7,797	1,246	177	20,158	11,135	3,940	83	39,996	10,406	10,677	255

[1]LPP = Lodgepole pine; PP = ponderosa pine; WBP = whitebark pine; WWP = western white pine

★= Not surveyed * = Partially surveyed

Table 5. Acres of mountain-pine-beetle-caused mortality on all Federal ownership in Montana, from 2001 through 2004

	2001				2002				2003				2004			
Reporting Area	LPP	PP	WBP	WWP	LPP	PP	WBP	WWP	LPP	PP	WBP	WWP	LPP	PP	WBP	WWP
Beaverhead	★	★	★	★	11,150	2,736	29,132	0	287*	1,933*	36,626*	0*	12,017*	109*	28,800*	0*
Bitterroot	146	555	2	0	1,028	836	6	0	74	524	78	0	17	592	68	21
Custer	0	1,158	0	0	36*	1,017*	0*	0*	0*	554*	533*	0*	61*	4,645*	1,728*	0*
Deerlodge	976	2	2	0	21,212	246	388	36	24,976	1,207	336	0	89,655*	20*	936*	0*
Flathead	13,052	92	767	130	17,986	435	429	412	17,583	66	1,574	73	32,197*	16*	1,615*	8*
Gallatin	12*	0*	0*	0*	128	0	0	0	138*	8,452*	0*	0*	266	5	40,873	0
Helena	88	590	0	0	271	1,499	0	0	6,231	2,639	345	0	3,492*	2,894*	6,658*	41*
Kootenai	978	95	4	727	2,965	603	2	898	4,000	187	0	903	665	101	1,524	2,769
Lewis & Clark	509	4,126	0	0	10*	1,483*	0*	0*	605*	7,603*	4,389*	19*	4,437*	10,253*	8,289*	0*
Lolo	64,745	1,371	210	41	100,475	3,068	718	149	88,755*	4,155*	2,332*	6*	75,338*	2,092*	287*	0*
Blackfeet IR	★	★	★	★	★	★	★	★	★	★	★	★	16	0	4	0
Crow IR	116	748	0	0	35	776	21	0	0	523	0	0	33	899	9	0
Fort Belknap IR	0	0	0	0	8	428	0	0	53	100	0	0	39	122	0	0
Flathead IR	5,354	1,873	0	0	16,025	2,887	6	0	26,237*	3,522*	0*	0*	49,485*	3,016*	222*	0*
No. Cheyenne IR	0	290	0	0	0	703	0	0	★	★	★	★	0	654	0	0
Rocky Boys IR	2	22	0	0	0	465	0	0	0	0	0	0	96	20	0	0
Garnets	502	2	0	0	26	232	0	0	162*	81*	2*	0*	2,276	23	2	0
Glacier NP	★	★	★	★	91*	0*	0*	0*	★	★	★	★	536*	0*	79*	0*
Yellowstone NP	★	★	★	★	606	20	11,814	0	693*	0*	15,086*	0*	★	★	★	★
Total	86,480	10,924	976	898	172,050	17,434	42,516	1,495	169,794	31,546	61,301	1,001	270,626	25,461	91,094	2,839

[1]LPP = Lodgepole pine; PP = ponderosa pine; WBP = whitebark pine; WWP = western white pine ★ = Not surveyed * = Partially surveyed

Yellowstone includes MT, ID and WY acres

Table 6. Bark-beetle-infested acres (other than mountain pine beetle and Douglas-fir beetle) in Montana, all ownerships, 2001-2004

	Engelmann Spruce Beetle				Pine Engraver Beetle				Western Pine Beetle				Fir Engraver Beetle				Western Balsam Bark Beetle			
Reporting Area	2001	2002	2003	2004	2001	2002	2003	2004	2001	2002	2003	2004	2001	2002	2003	2004	2001	2002	2003	2004
Beaverhead	★	42	8*	0*	★	14	0*	0*	★	0	14*	0*	★	10	0*	0*	★	67,669	14,437*	21,175
Bitterroot	27	4	10	0	0	0	0	85	63	95	55	21	34	6	34	40	814	515	873	1,101
Custer	0	0*	2*	0*	0	0*	2,841*	929*	0	0*	0*	0*	0	0*	0*	0*	630	972*	3,269*	4,901
Deerlodge	0	22	8	14*	0	2	28	0*	2	0	58	8*	0	32	41	0*	4	2,187	4,632	3,929
Flathead	71	93	8	73*	0	0	25	36*	61	57	0	10*	605	8,126	16,109	20,592*	6,800	5,377	13,814	18,680
Gallatin	287	0	728*	13	0	0	0*	0	2	0	0*	0	0	0	0*	0	9,700	14,896	14,723*	48,091
Helena	2	2	29	0*	0	0	22	0*	79	0	32	2*	0	0	6	0*	1,328	93	6,348	3,281
Kootenai	170	10	0	0	0	0	0	252	156	164	97	173	207	132	3,008	9,112	2,440	5,120	2,628	5,696
Lewis & Clark	8	0*	0*	95*	2	0*	2*	151*	0	0*	0*	12*	16	0*	0*	22*	3,940	164*	6,690*	9,725
Lolo	30	8	4*	0*	13	3	0*	141*	205	275	534*	69*	95	295	1,444*	39*	1,677	728	1,280*	3,285
Garnets	0	0	2*	2	0	0	0*	31	38	69	30*	75	0	0	6*	0	43	10	236*	283
Flathead IR	42	0	0*	14*	2	4	1,791*	14,165*	26	79	13*	0*	90	302	0*	287*	204	113	10*	2,578
No. Cheyenne IR	0	0	★	0	0	441	★	445	0	0	★	0	0	0	★	0	0	0	★	0
Fort Belknap IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rocky Boys IR	0	0	0	0	0	0	0	42	0	0	0	0	0	0	0	0	0	0	0	0
Crow IR	0	0	0	0	0	0	68	0	0	0	0	0	0	0	0	0	20	60	101	339
Blackfeet IR	★	★	★	2	★	★	★	6	★	★	★	0	★	★	★	2	★	★	★	2,572
Glacier NP	★	0*	★	96*	★	0*	★	2*	★	0*	★	0*	★	0*	★	4,218*	★	0*	★	8,208
Yellowstone NP	★	6,049	8,748*	★	★	32	0*	★	★	0	0*	★	★	21	0*	★	★	14,120	6,394*	0
Total	637	6,230	9,547	309	17	496	4,777	16,285	671	739	833	370	1,047	8,924	20,648	34,312	27,600	112,024	75,435	133,781

★ = Not surveyed   * = Partially surveyed   Yellowstone includes both MT, ID and WY acres

Figure 1. Reporting area boundaries in Montana

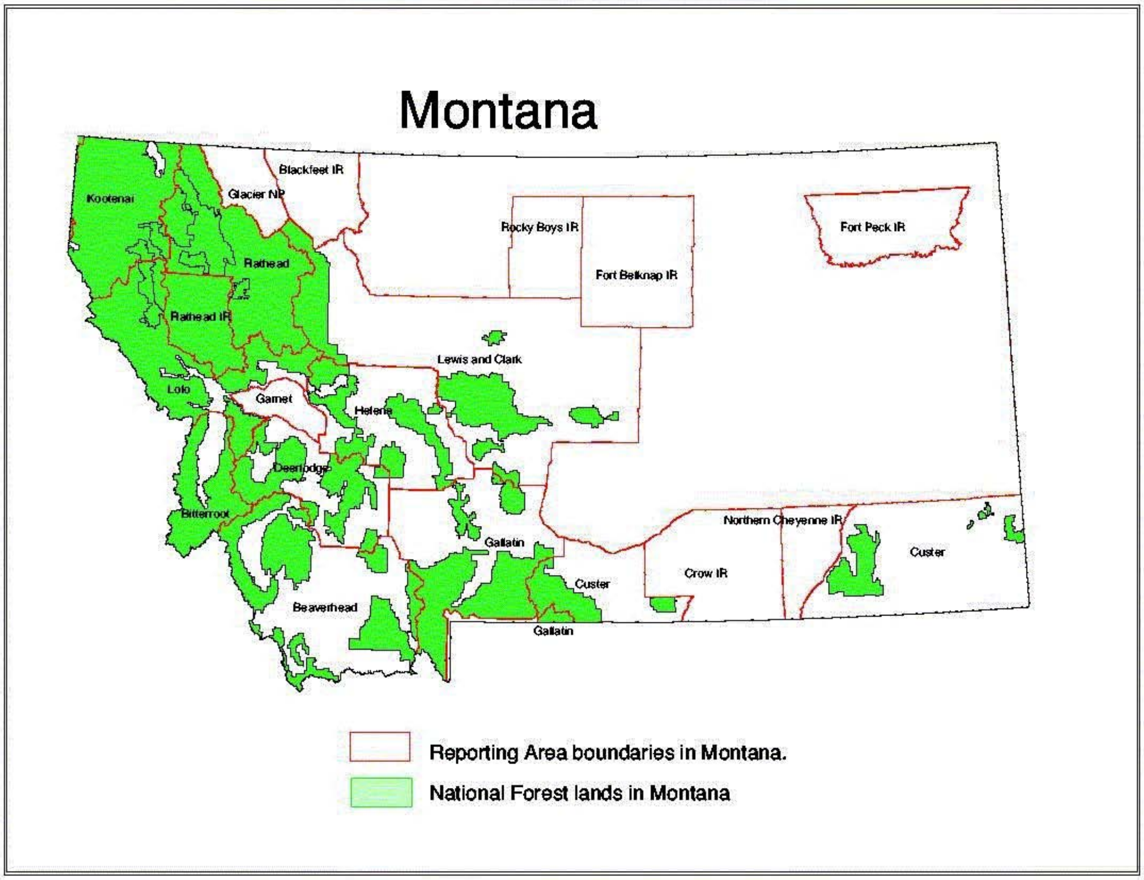

Figure 2. Area Surveyed During the Forest Health Protection Aerial Detection Survey in Montana 2004

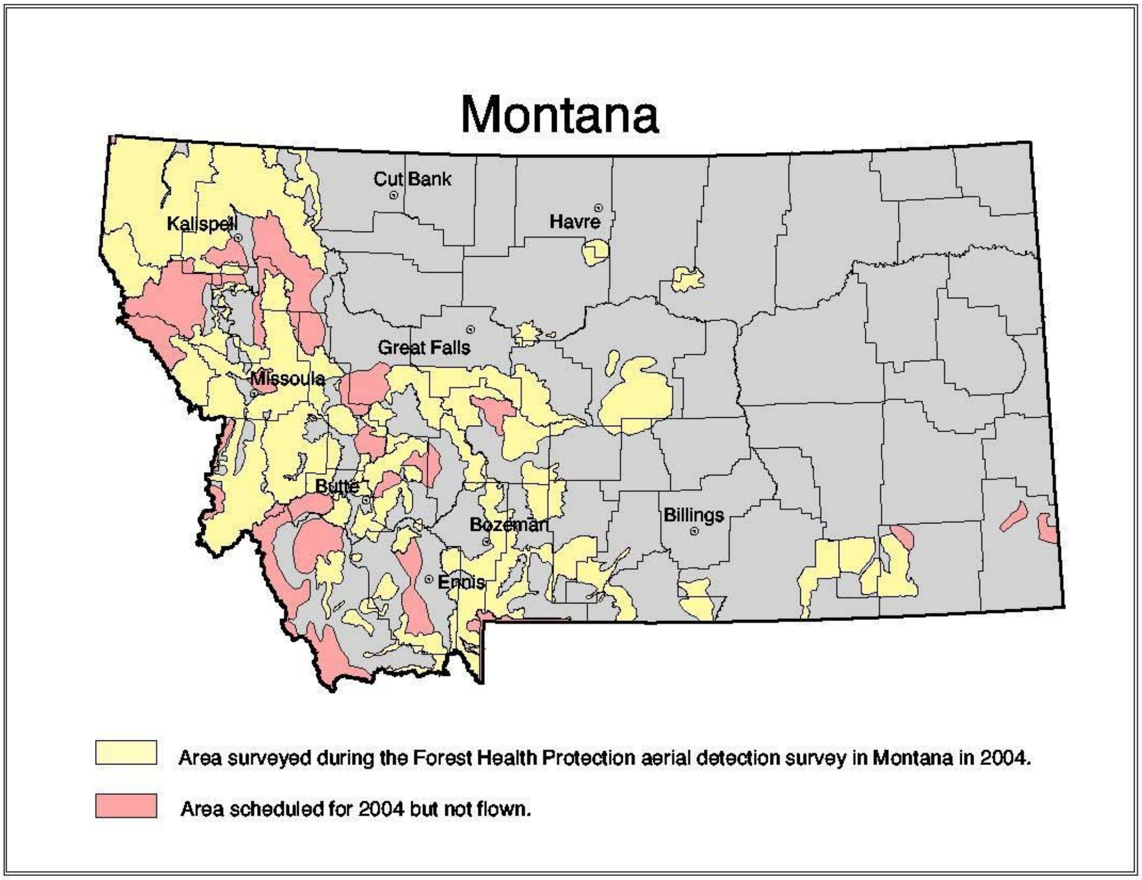

Figure 3. Mountain Pine Beetle Infestations in Montana, 2004

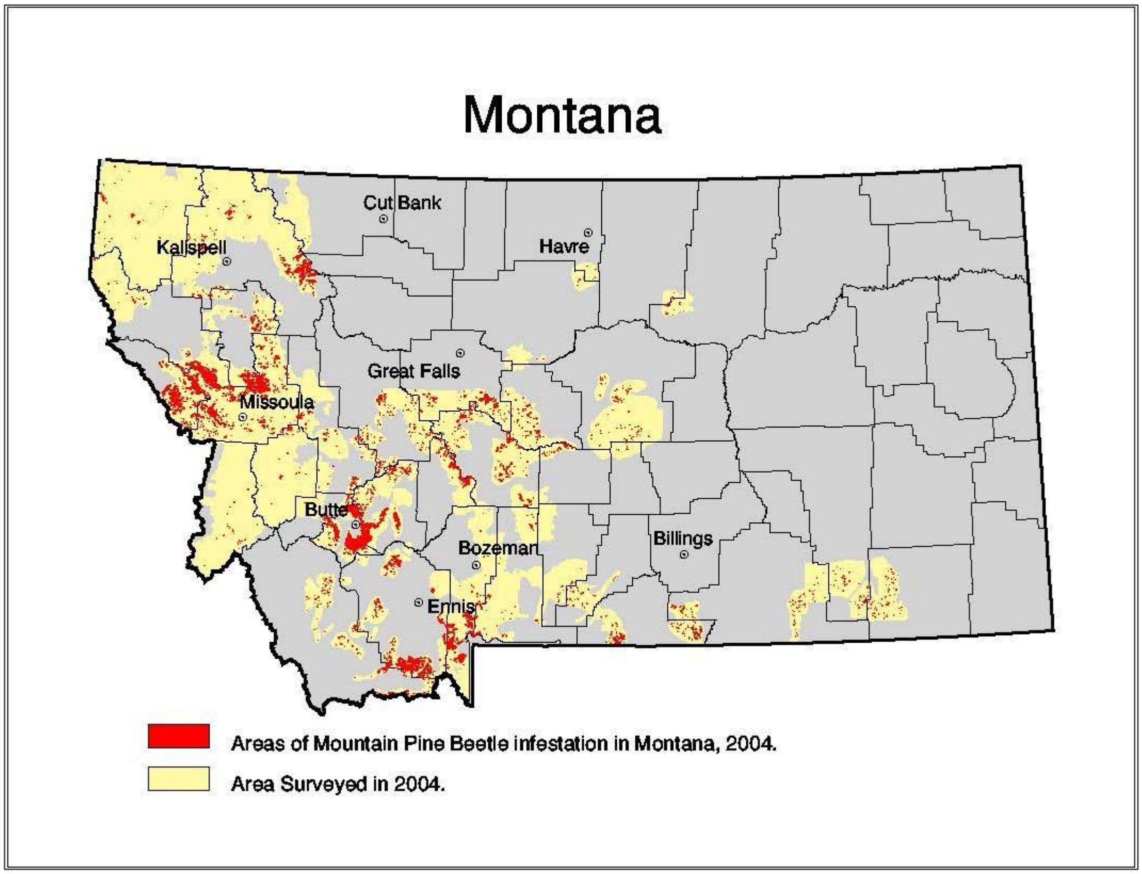

Figure 4. Douglas-fir Beetle Infestations in Montana, 2004

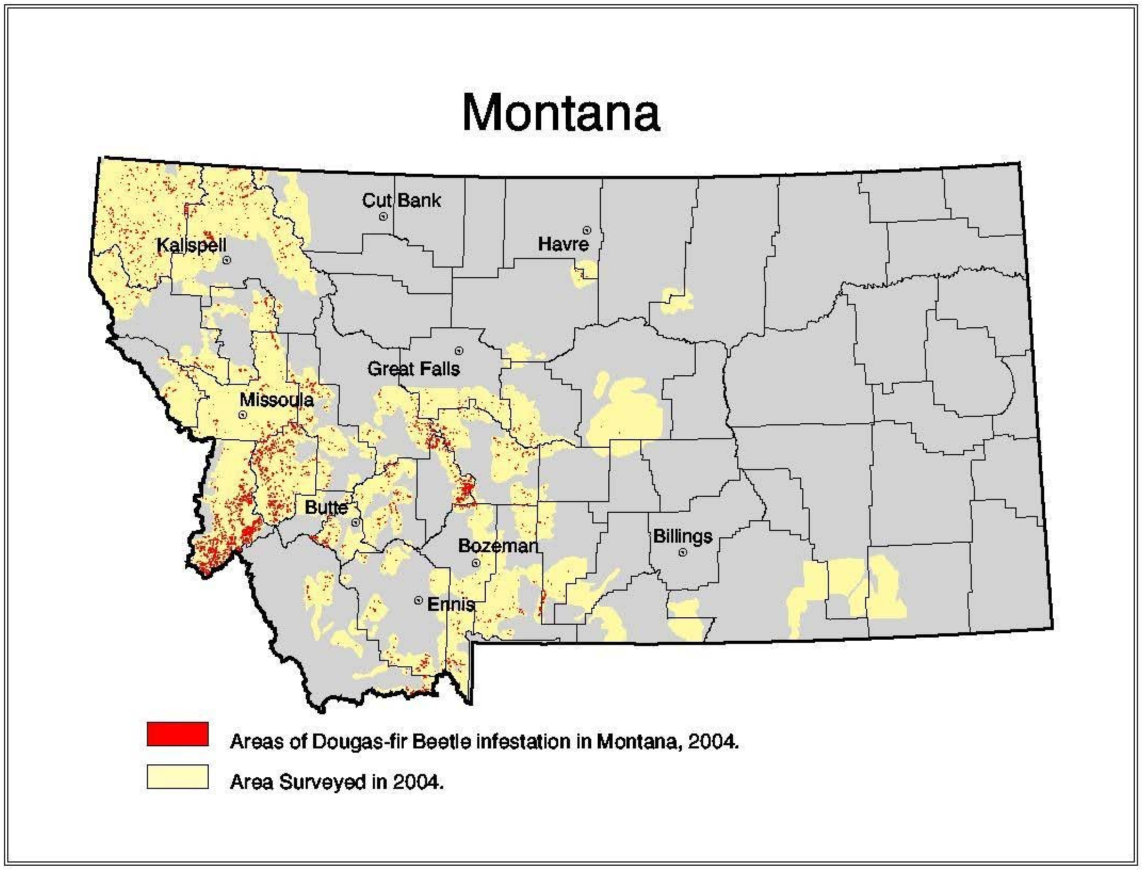

Figure 5. Fir Engraver Infestations in Montana, 2004

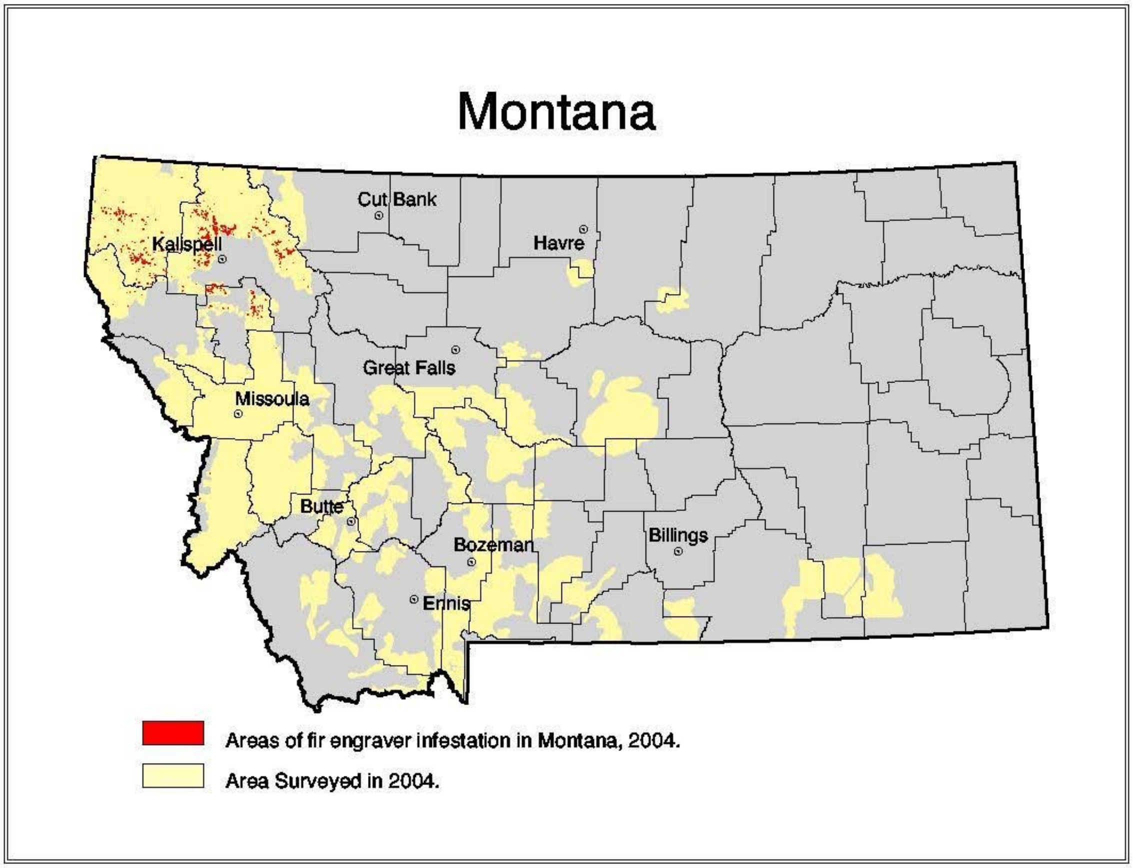

Figure 6. Western Balsam Bark Beetle Infestations in Montana, 2004

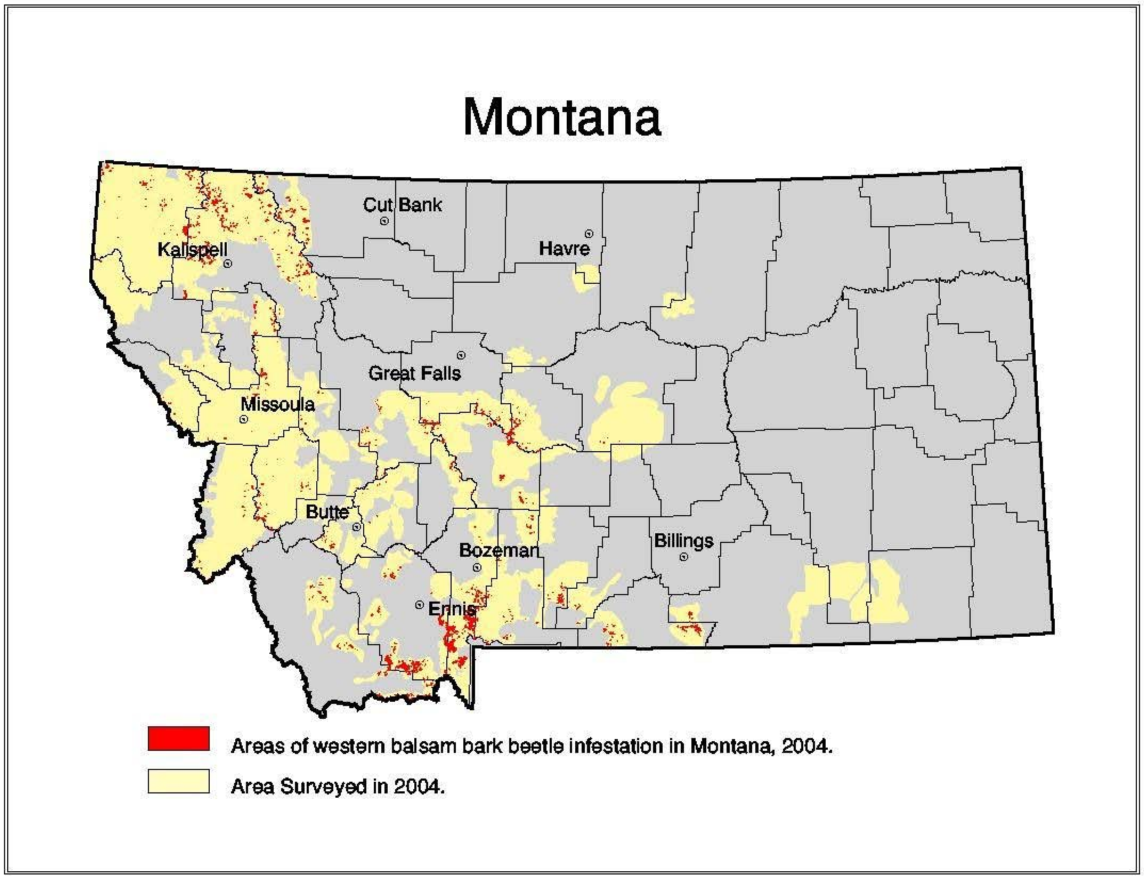

Figure 7. Western Spruce Budworm Infestations in Montana, 2004