

2009 South Dakota Forest Health Highlights

The Forest Resources:

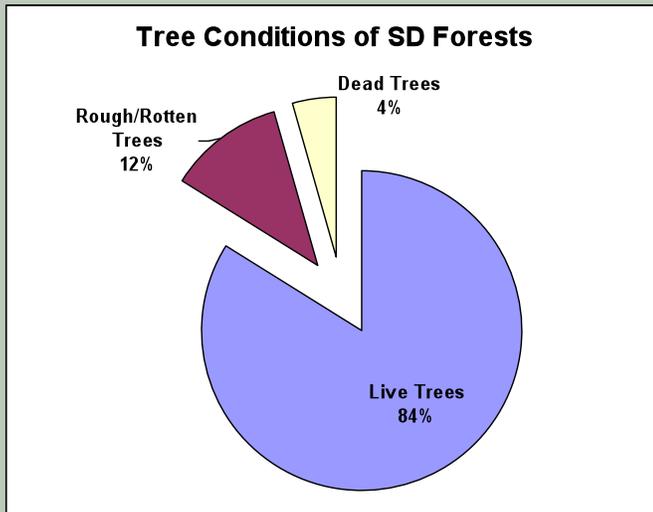
Excerpts taken from FIA report:

Ronald J. Piva, W. Keith Moser, Douglas D. Haugan, Gregory J. Josten, Gary J. Brand, Brett J. Butler, Susan J. Crocker, Mark H. Hansen, Dacia M. Meneguzzo, Charles H. Perry, Christopher W. Woodall. South Dakota's Forests 2005, Resource Bulletin NRS 35. USDA Forest Service, Northern Research Station.

South Dakota has roughly 1.7 million acres of forest land, slightly more than 3 percent of the total land area. The Black Hills region in western South Dakota contains almost 80 percent of the of the State's forest land. The forest types vary from the conifer forests in the west to hardwood forests in the east. The Great Plains divides these two forest types, but this vast grassland also contains a broken latticework of wooded draws, bottomland forests, windbreaks, and community forests.

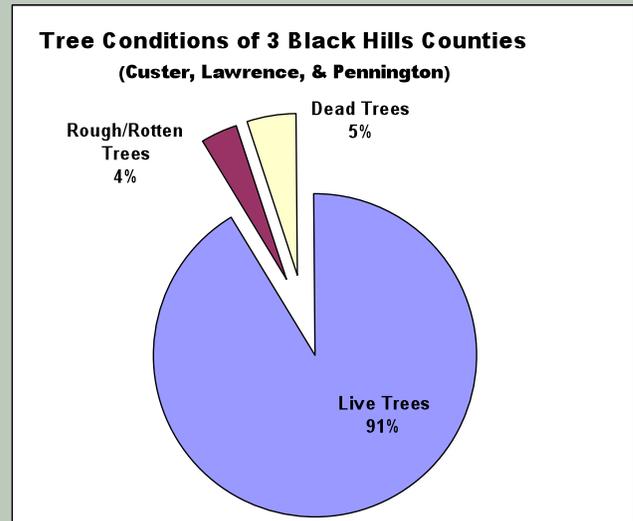
Management is critical to the health of South Dakota's forests. Removing infested trees and reducing stand density are the most effective means of reducing pine tree mortality resulting from a mountain pine beetle epidemic in the Black Hills. Chipping and prescribed fire can reduce fuel hazards, decreasing the chances of catastrophic fire. Prompt removal of infected American elm is the best way to slow the spread of Dutch elm disease. The emerald ash borer threatens our native ash trees, one of the most abundant tree species in the State. Introduced to this country from Asia, the borer has killed millions of ash trees in the Upper Midwest. There is no known natural defense to stop this invader. Foresters are diligently working to keep Emerald Ash Borer and other damaging exotic, invasive agents out of South Dakota.

Figure 1. Tree Condition Charts from FIA data



- All trees on Forestland in South Dakota – both Live and Dead
- Rough and Rotten (R/R) trees have severe defects, pitch flow, decay, and decline.
- More R/R trees on Chart 1 sampled from all the live trees in SD – indicates trees in windbreaks and riparian areas in decline.

Figure 2. Survey from 3 Black Hills Counties which contain 65% of the Forestland in SD



Note - More Dead trees were found in the counties of the Black Hills (Fig. 2) in comparison to all trees surveyed (Fig. 1) in South Dakota. This is due to the increased bark beetle activity in the forests of the Black Hills.

State tree - Black Hills Spruce



Special Forest Health Issues and Components of Change

Mountain Pine Beetle Epidemics:

Mountain Pine Beetle (MPB) (*Dendroctonus ponderosae*) causes the most direct tree mortality than any other damage agent in South Dakota.

MPB has caused extensive ponderosa pine mortality throughout the Black Hills during the past six years.

2004 – 2007: Surveys detected large and expanding MPB infestations in the Beaver Park and Deerfield areas in South Dakota. Pine mortality was widespread in the Northern Hills and Central Hills, and a number of concentrated beetle pockets had fused into large outbreaks.

Multi-stand, landscape-level episodes of ponderosa pine tree mortality caused by MPB made entire slopes of trees fade from green to red in unison.



Figure 1. A female MPB laying eggs inside tree cambium.



Figure 2. Landscape level MPB infestation in the Black Hills of South Dakota. Note the coalescing pockets of dead trees.

MPB outbreaks occurred in the Black Hills in 2004 near Harney Peak and the Black Elk Wilderness areas; and in 2006 more outbreaks occurred surrounding the Deerfield Reservoir. These outbreaks continued 4 more years (with some sites having large epidemic populations of MPB) and are still producing widespread and intense tree mortality. Efforts continue to treat these areas and limit beetle spread; in 2006, over 200,000 infested trees were removed to help reduce beetle populations.

Other MPB outbreaks started around Harney Peak, Black Elk Wilderness, and Mount Rushmore National Monument.

2008 – 2009: The Black Hills of South Dakota still had a large and growing mountain pine beetle situation. These were treated aggressively in the central Black Hills, and some new areas of tree mortality occurred. Custer State Park and around the Black Elk Wilderness area received a variety of treatments: thinning, and non-commercial sanitation. Some of this has been unsuccessful because of the large population of beetles present and attacking from the wilderness area.



Figure 3. Fading pine dying from MPB infestation.

Aerial Overview Detection Surveys :

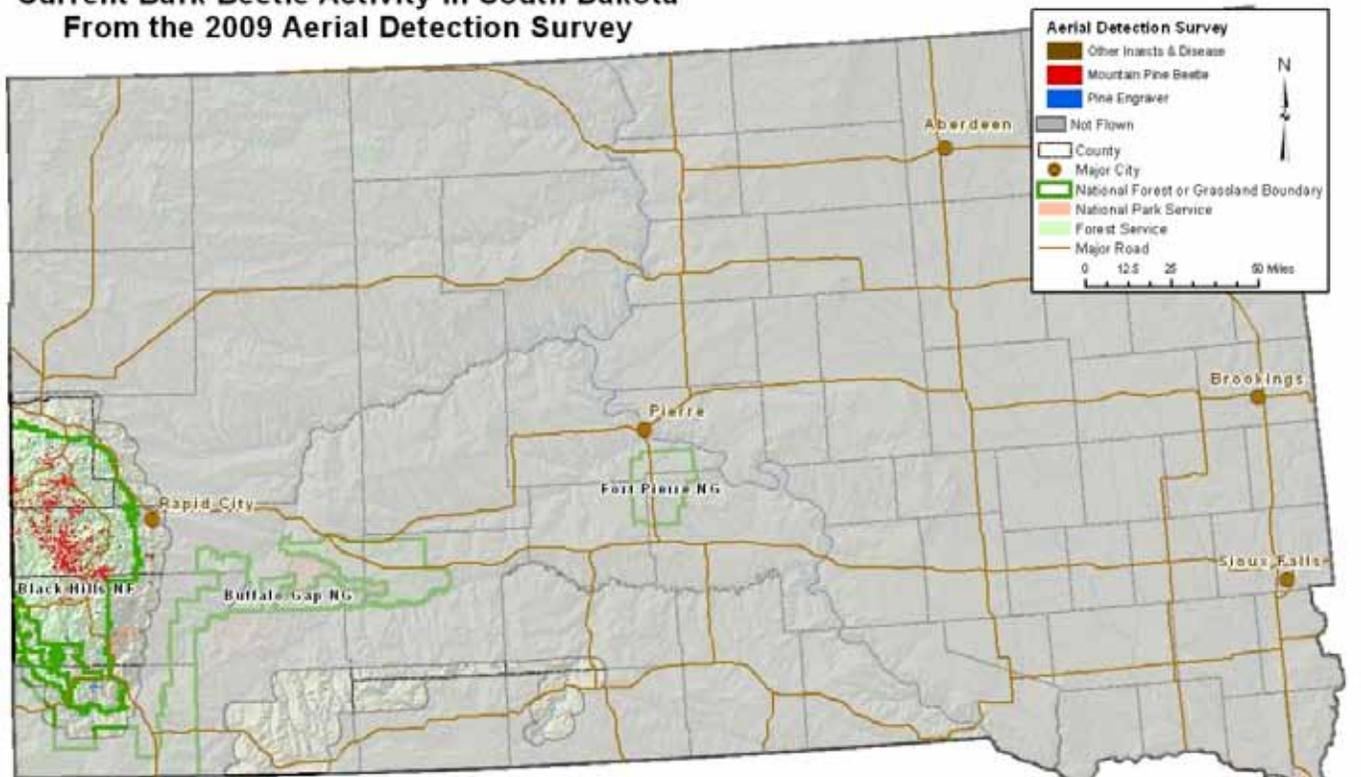
The 2009 aerial forest health overview detection surveys were done by forest technician Al Dymerski and entomologist Bill Schaupp of the USDA Forest Service – Rocky Mountain Region (R2). This type of Detection Monitoring has been performed annually for South Dakota’s Black Hills forests since 1957.

Summary of 2009 aerial survey

- There was significant new mortality caused by MPB, in locations of current epidemics. Most of the epidemic areas showed an intensification of MPB.
- The total acreage affected by MPB remained at about the same level in 2009 as was mapped by aerial surveys in the previous two years.
- “Acres affected” does not indicate the intensity of mortality due to MPB infestation. Some areas may have only 1 tree per acre killed by MPB. Other sites can range to more than 100 trees per acre.

- Over the course of the current MPB epidemic episode, widespread management activities have occurred on National Forest and other federal lands. Treatment of State and private forest areas continue with sanitation and preventions efforts against MPB. All of this work has reduced the acres affected and intensity levels of MPB as mapped by aerial survey.
- The epidemic continues to expand in a number of locations throughout the Black Hills.

Current Bark Beetle Activity in South Dakota From the 2009 Aerial Detection Survey



Due to the nature of aerial surveys, the data on this map will only provide rough estimates of location, intensity and the resulting trend information for agents detectable from the air. Many of the most destructive diseases are not represented on this map because these agents are not detectable from aerial surveys. The data presented on this map should only be used as a partial indicator of insect and disease activity, and should be validated on the ground for actual location and causal agent. Shaded areas show locations where tree mortality or defoliation were apparent from the air. Intensity of damage is variable and not all trees in shaded areas are dead or defoliated.

Other Forest Health Damages of Concern:

Armillaria Root Disease (*Armillaria spp.*) on aspen, Colorado blue and white spruces, ponderosa pine, and oak

Armillaria is the most common root disease in the region and occurs on many different tree species in the state. Often this disease contributes to beetle-caused tree mortality. Armillaria root disease was seen on oaks along floodplains and in grazed areas in South Dakota. The combination of stresses between flooding in the 1990's and drought in more recent years promoted its growth in these areas.

Banded Elm Bark Beetle (*Scolytus schevyrewi*) on American and Siberian elms

Banded elm bark beetle was first discovered in the region in 2003 and is found nearly everywhere that elms are found in the state. In 2006, the beetle was associated with declining Siberian elms in western communities in South Dakota. These trees are often a dominant tree species and are stressed due to the long-term drought. The insect also appears in dying American elms within many of the riparian stands in the western and central areas of South Dakota. The population appears high, based upon the number of emergence holes found on these trees, and the expanding elm mortality may be due to the possibility of the banded elm bark beetle serving as a vector for Dutch elm disease.

Diplodia Blight (*Sphaeropsis sapinea* or *Diplodia pinea*) on Ponderosa, Austrian, and Scotch pines

Diplodia Blight seemed to increase in importance in the Great Plains and was one of the most important diseases affecting pines in this area. There were few reports of this disease during the 1900's. This shoot blight pathogen may be considered a non-native, invasive, forest pathogen in South Dakota. In 2006, stress from drought allowed the disease to cause greater damage in planted areas and native forest. Ips beetle-caused pine mortality was associated with Sphaeropsis blight in beetle-killed trees.

Dutch Elm Disease (*Ophiostoma ulmi*) on American elm

In 2004, the incidence of Dutch elm disease dramatically increased in communities that still have American elms as a dominant street tree. Communities have a difficult task in removing the high number of infested trees in a timely manner and this may be the cause for increases in the disease. American elm mortality was higher than what was experienced during the 1990's. Trees that escaped the first wave of Dutch Elm Disease are about 5-6" in diameter (age about 20 years). However, this disease is still a major threat to remaining American elms; some larger trees were succumbing to the disease. The disease also continues to be a problem in riparian areas of the state.

Flat headed wood borers (*Agrylus spp.*) on bur oak, birch, and Eastern redcedar

In 2006, Two-lined chestnut borer (*A. bilineatus*) was associated with dying bur oaks located in native stands in western South

Dakota. These infestations appear to be concentrated along the White River, though they occur in oak stands in the northwest part of the state.

Bronze birch borer (*A. anxius*) infested trees in the central areas of South Dakota, even in communities that had experienced very little birch tree dieback. This increase in activity and tree decline may be related to the high summer temperatures that extremely stress birches.

Hackberry borer (*A. celti*) has also been found infesting hackberries throughout the central South Dakota and this increased activity is probably related to the lack of host vitality due to the drought and high summer temperatures.

Gypsy Moth (*Lymantria dispar*) on hardwood trees

Annual detection trapping for gypsy moth is conducted each year in the state. Traps were placed among potential hosts at popular developed recreation sites.

In 2006, there were 4 moths collected in traps on the eastern edge of South Dakota and another 4 moths in a trap in the Black Hills area. In 2007, 8 moths were trapped around Custer City.

During 2008, gypsy moth adults were collected from traps in eight different Black Hills campgrounds and one additional moth was collected from a trap in the southeastern part of South Dakota.

Pine Tip Moth (*Rhyacionia spp.*, *Dioryctria spp.*) on Austrian, ponderosa, and Scotch pines, and Colorado blue spruce

Zimmerman pine moth infestations were increasing during 2004. Austrian and ponderosa pines were most affected in windbreaks in the southeastern part of the state. In addition there have been a number of blue spruces that have become infested with *Dioryctria* spp.

Pine wilt/Pinewood Nematode (*Bursaphelenchus xylophilus*) on Austrian, ponderosa, and Scotch pines

Pine wilt caused significant Scotch pine mortality in southwestern and central South Dakota. Windbreak and ornamental trees were being killed at an alarming rate. Austrian pines, though few in number within this region, were also being killed. These species are no longer recommended due to the prevalence of the disease. Despite the presences of the nematode in southwestern South Dakota for decades, this disease was not a serious problem until recently. This may be due to the long-term drought stressing the trees and the warmer winters perhaps increasing nematode survival. The nematode associated with pine wilt has not been found north of I-90 in South Dakota.

Other Forest Health Damages of Concern (cont.):

Weather damages on all tree species:

Drought Effects -

Most of South Dakota experienced severe drought conditions from 2004 – 2008. All tree species become more vulnerable to secondary stressors such as bark beetles and diseases. The drought was responsible for decline and mortality of planted spruces on the western short-grass prairie where the precipitation has been inadequate to support them. Reduced growth and poor color was visible in many tree species, especially conifers. Windbreak trees were particularly stressed by drought conditions in SD.

Flooding -

In Spring of 2009, flooding was a problem in western and northern South Dakota. The flood waters have receded but many trees and shrubs standing in water or in saturated soils.

Cottonwoods and willows, particularly young trees, tolerate flooding better and longer than most trees but even these trees were adversely affected. However, most evergreens and fruit trees have a very low tolerance to flooding and may seriously decline over time. The deciduous trees will survive brief periods of flooding, but may suffer dieback or death as a consequence of its roots declining due to the lack of available oxygen.

Web-spinning sawflies (*Neurotoma fasciata*) on cherry and plum trees

The feeding by this sawfly resulted in the defoliation of plums and cherries throughout the southcentral areas of South Dakota. The sawfly had left most plum thickets completely defoliated by early summer, resulting in a poor fruit crop in 2006.

White Pine Blister Rust Disease (*Cronartium ribicola*) on limber pine

The disease continued to intensify in limber pine sites in western South Dakota. In the Black Hills of South Dakota, limber pine is now limited to only a couple of hundred trees. The two primary stressors of this relic stand are white pine blister rust and intense competition with other trees. Ponderosa pines and Black Hills spruces are encroaching within this widely dispersed stand on the relatively intolerant limber pine. While noted for its ability to survive on dry sites, the persisting regional drought may also be a contributing factor in the decline and mortality of limber pine.

Ice Effects -

An ice storm across eastern South Dakota in January 2006 was responsible for damaging thousands of trees. A buildup of ice resulted in branch breakage in silver maples, green ash, and a number of other deciduous species. Damage is still visible in 2009.

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



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