



South Dakota 2014 Forest Health Highlights

South Dakota's Forest



Coniferous forests make up more than three-fourths of the state's forest. These forests are situated primarily in the Black Hills, extending north into Harding County and east to Todd County. The dominant species is ponderosa pine. These forests contribute to the state's economy through a vibrant forest products industry, tourism, and agriculture, and provide valuable wildlife habitat. Two-thirds of the coniferous forests in the state are on federal land. The most serious threats to these forests are mountain pine beetles and fires.

Bottomland forests make up only 3 percent of the forested land in the state. These forests consist primarily of cottonwood, willow, green ash, and elm. The forests provide tremendous value in improving water quality and flood control. Approximately 70 percent of bottomland forests in South Dakota are privately owned. The biggest threat to riparian forests is the lack of regeneration of cottonwood trees. Other problems include banded elm bark beetles, Dutch elm disease, and poplar cankers.



Upland hardwood forests of oak, ash, aspen and elm, comprise approximately 20 percent of South Dakota forest land and are scattered primarily in the northeast and southeast corners of the state though aspen, birch, ash, ironwood, and bur oak occur in the Black Hills. The greatest threats to these forests are declining regeneration, disease, invasive species, and land-use changes. The most valuable asset of hardwood forests are the recreational opportunities they provide. About two-thirds of the upland hardwood forests are privately owned; the rest are mostly on federal lands.

Urban or community forests occupy approximately 103,000 acres in the state. There are a large number of species present within community forests with ash being the most common followed by elm, crabapples, and maple. Community forests provide energy conservation, improved water quality, and aesthetic appeal, among other values. Common threats include diseases, development, and weather events. There are two Tree Campus USA universities and 34 Tree City USA communities in South Dakota.



Windbreak forests cover about 200,000 acres across the state. Although not typically thought of as forest land, they serve many valuable functions. Windbreaks protect roads, fields, livestock, and structures from wind and snow, and help prevent soil erosion. They provide habitat for pheasants and other birds. Windbreaks face the same threats as other forests types. The most common species found in shelterbelts is green ash. With the looming threat of emerald ash borer, efforts are being taken to expand the diversity of plantings. There is no ownership data for windbreaks, although most are considered to be privately owned.

South Dakota Forest Insect and Disease Highlights

Bark Beetles

Mountain pine beetle

Dendroctonus ponderosae

The Black Hills of South Dakota has been experiencing various levels of mountain pine beetle (MPB) epidemics since 1996, when an epidemic began in the Beaver Park area of the Black Hills National Forest. Since 2010 the epidemic has expanded to affect about 414,000 acres of federal, state, and private forest lands, and over 16 million trees have been killed. Forest Service land surrounding the western and northern border of Custer State Park has been experiencing an MPB epidemic since 2002, particularly within the Black Elk Wilderness Area. The wilderness area borders Custer State Park and has experienced near 100 percent pine mortality in the areas affected. Custer State Park has seen lower pine mortality due to the implementation of management tactics such as thinning stands to reduce susceptibility and sanitation measures. While the epidemic has been held in check in much of Custer State Park, there have been a number of spot infestations that occurred in the western portion of the Park with an estimated 21,000 trees being infested during the past flight (2014).

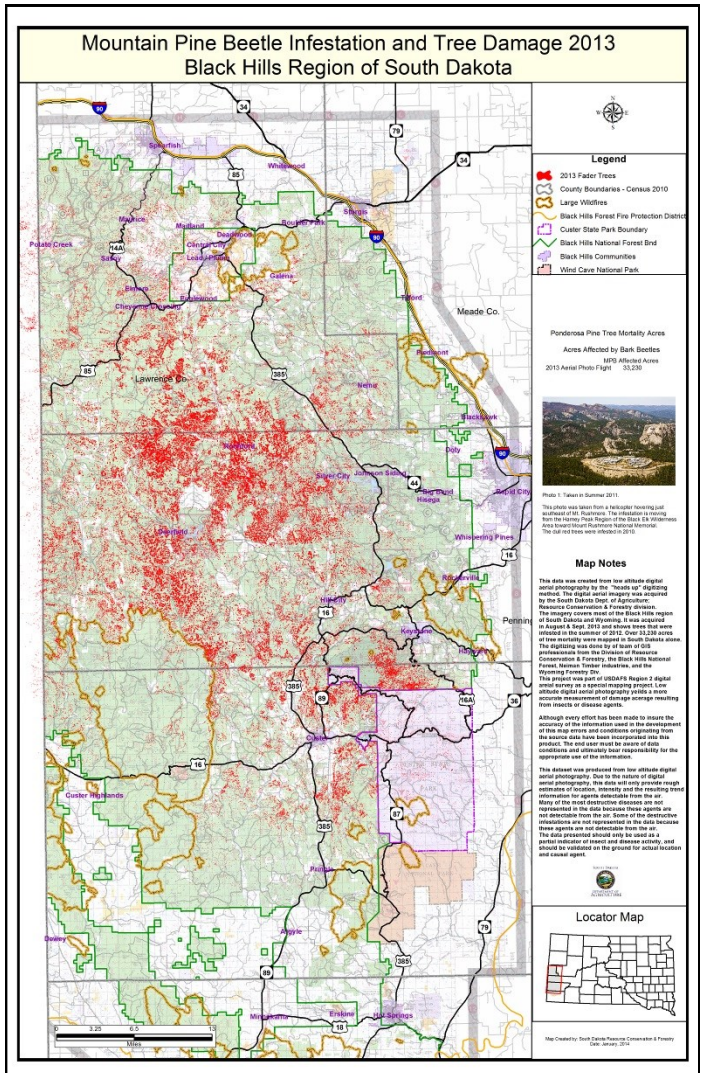
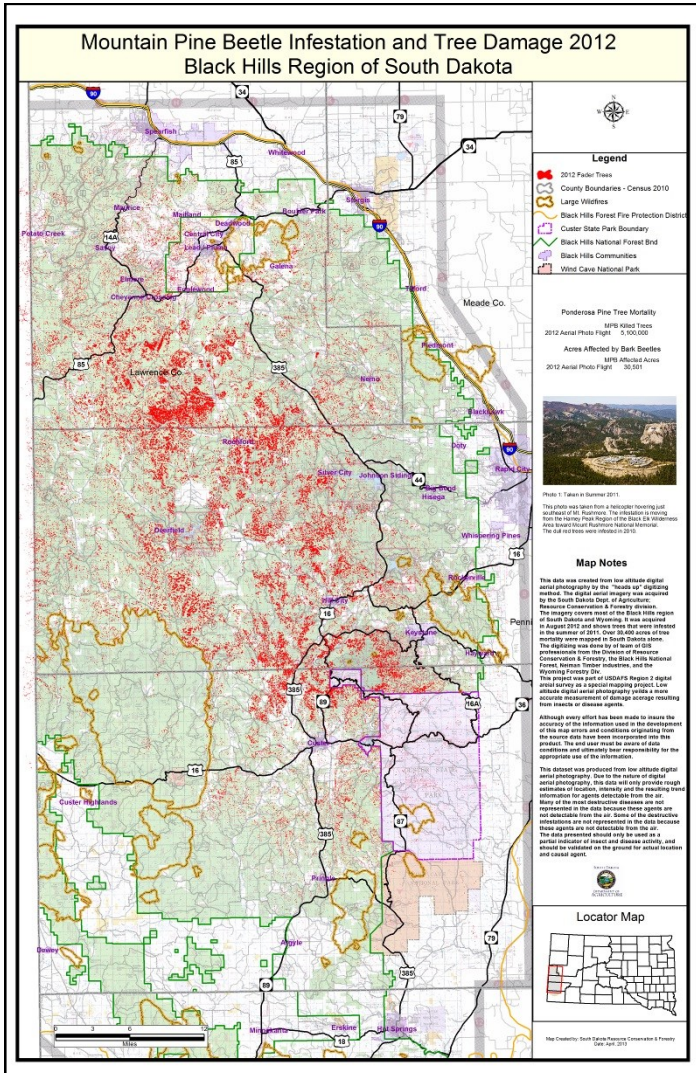
This is a reduction from the previous two years when 31,000 trees were infested following the 2013 flight and 36,000 following the 2012 flight. More than 120,000 infested trees were identified and treated in Custer State Park



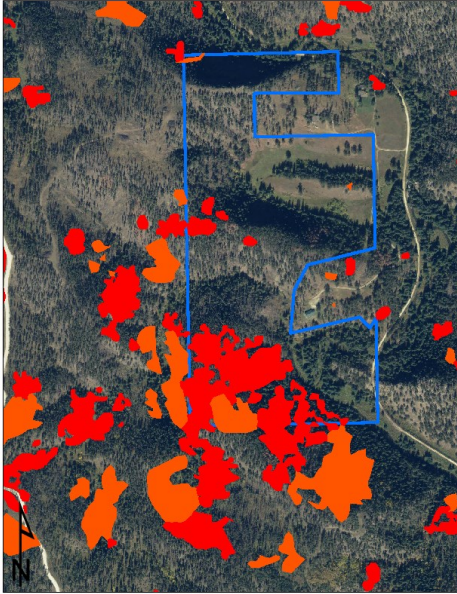
Cutting and chunking in Custer State Park

SDDA RCF file photo

following the 2011 flight. The infested trees have either been harvested or the boles were cut into short sections (2 feet) and left in place, a solar treatment commonly referred to as "cutting and chunking."



Two years of MPB infestation on federal and private lands.



Aerial photography analysis shows how wide spread the infestation is in the Black Hills.

The epidemic continues to also affect private lands throughout the Black Hills. Ground surveys on less than 15 percent of private land acres in the Black Hills revealed over 34,000 acres of private lands contained some level of infestation in 2014.

There is a relic stand of limber pine in Custer State Park. An anti-aggregation pheromone, verbenone, has been used as part of the management of this relic stand of trees. The efforts have been very successful with the loss of about 3 percent of the trees infested by mountain pine beetle, despite high losses of ponderosa pine in the immediate vicinity. This past flight (2014) saw 14 trees infested by



Limber pine in Custer State Park.

SDDA RCF file photo

mountain pine beetle, however larvae have only been found in a few of these trees.

Banded elm bark beetle

Scolytus schevyrewi

This exotic bark beetle was accidentally introduced from Asia sometime during the 1990s, but was not detected in this country until 2003 in Colorado and Utah. It was detected in Pennington County, South Dakota in 2004 and since has been found in much of the state. The most common host is Siberian elm but it can also be found colonizing American elm and Japanese elm. More recently it is being found in the hybrid elms 'Regal' and 'Triumph' that have become popular trees in the state.

Cedar bark beetles

Phloeosinus

These bark beetles are secondary insects that hasten the decline of junipers that are already stressed. The predisposing stress for this outbreak was the drought that occurred earlier in this decade. The combination of the drought and colonization by this insect has resulted in the loss of juniper (cedar) windbreaks in the south central part of the state. This past spring and summer there were numerous reports of declining windbreaks of eastern redcedars. There were few reports of the insect in windbreaks of Rocky Mountain juniper.

Red turpentine beetle

Dendroctonus valens

Populations of red turpentine beetle have appeared to increase recently. The number of infested trees may not be increasing as much as being reported however, as infested trees are probably being identified more often due to the intensive inspections for mountain pine beetle. We are also seeing an increase in turpentine beetles in stands that were chipped in the early spring.



Red turpentine beetle pitch tubes.

SDDA RCF file photo

Pine engraver beetles

Ips pini and *I. calligraphus*

Pine engraver beetle populations that had been very low during the past several years increased dramatically beginning in 2012 and are resulting in ponderosa pine mortality in the Black Hills, primarily in the southern counties of Fall River and Custer. The population has also increased in the Pine Ridge country of Shannon County. Pine engraver beetles are typically found in dying trees, as well as slash piles, but the populations are expanding and are now becoming a significant cause of tree mortality. The population had increased in the early 2000s due to an increase in susceptible host material as a result of wildfires and weather events, such as hail and snow-breakage that resulted in a tremendous buildup of dead, weakened and damaged tree material. The population is increasing again perhaps due to the number of trees killed by the mountain pine beetle and the aftermath of the 2011-2012 drought. Another factor is the increase in the use of chipping slash following thinning operations. We have seen an increase in pine mortality in stands where the fresh slash has been chipped in early spring. The October 2013 blizzard resulted in many pines with broken canopies and these became infested with *Ips* this past growing season.



Storm damage infested with *Ips*.

SDDA RCF file photo

Borers

Ash and privet borer

Tylonotus bimaculatus

This insect was reported in declining green ash trees in several southeastern South Dakota counties this past summer. It was also found in one privet hedge in Sioux Falls, SD. Ash and privet borer has been previ-



Ash and privet borer.

Photo courtesy of Dr. John

ously recorded in South Dakota though it is a relatively rare insect. The borer is typically found in mature or drought-stricken windbreak ash trees. The larvae pack their galleries with frass and these can appear similar to those created by the emerald ash borer. The insect is not a serious problem in South Dakota but is a close "look-a-like" to the emerald ash borer.

Ash/lilac borer

Podosesia syringae

This is a common borer of stressed ash trees and there has been an increase in reports of this insect following the recent drought. Ash/lilac borer infestations rarely results in significant mortality, however there are belts of young Manchurian ash that have been attacked and killed by this insect. Manchurian ash is not considered as drought tolerant as green ash. It is being considered as a better ash to plant due to its tolerance to emerald ash borer infestations but its susceptibility to our native borer, and poor adaptation to dry climates, may limit its future use.



Ash/lilac borer.

Photo courtesy of Dr. John Ball

Flatheaded appletree borer

Chrysobothris femorata

This borer is being reported in the southeastern part of the state. Flatheaded apple tree borers are attracted to dying, young trees. While they attack a number of tree species, including apple, they are being more commonly reported infesting maples particularly red and silver maples and their hybrid, the freeman maples.



Flatheaded appletree borer galleries.

Photo courtesy of Dr. John Ball

Other Notable Insects

Ash seed weevils

Lignyodes bischoffi

The larvae were reported dropping to sidewalks and driveways beneath ash trees throughout eastern South Dakota this fall. The seed weevil spends its larval stage feeding inside of ash seeds during late summer. The larvae emerge and fall from the hanging seed. Once the larva is on the ground it overwinters either in the soil or the litter layer. The insect is not a threat to the tree but can infest more than 70% of the seed crop during certain years. This may become a problem for seed collections being made of the native ash populations to preserve this genetic resource.



Ash seed weevil damage.

Photo courtesy of Dr. John Ball

Chokecherry midge

Contarinia virginianiae

This insect is an occasional problem in chokecherry fruit. The bright orange larvae were found feeding on the inside of the swollen fruit in southwestern South Dakota. The larvae release a toxin as they feed which causes the seed to abort and the hollow fruit enlarges and becomes distorted. The loss of the cherries this summer was most noted on the Pine Ridge Reservation where the fruit is harvested.

Exotic Invasive

Emerald ash borer

Agrilus planipennis

Emerald ash borer has not been detected in South Dakota but detection trapping in parks and campgrounds continues throughout the state. The only *Agrilus* caught in the traps to-date are the bronze birch borer (*A. anxius*) and two-lined chestnut borer (*A. bilineatus*). Three Pest Detector workshops were held during the summer and more than 65 people, mostly Master Gardeners, were trained in

the detection of this pest as well as thousand cankers disease. Master Gardeners reported, and we followed up on, 9 reports of possible emerald ash borer infestations. All reports from trees were identified as the banded ash borer (*Neoclytus caprea*) or the redheaded ash borer (*N. acuminatus*) and the only insects submitted as possible emerald ash borers were the golden buprestid (*Buprestis aurulenta*) and a *Cypriacis*.



Emerald ash borer galleries.

SDDA RCF file photo

Disease Conditions

Bur oak blight

Tubakia iowensis sp nov

Bur oaks in some of the draws in Minnehaha County were identified as infested by bur oak blight (BOB). This disease has been previously reported in many of the South Dakota counties bordering Minnesota and Iowa. The appearance of the disease this year may be due to the wet weather that occurred during oak shoot expansion in May. The disease is also one of the most commonly misidentified diseases in the state with people confusing the symptoms of BOB with that of oak anthracnose.



Bur oak blight symptoms.

Photo courtesy of Dr. John Ball

Dutch elm disease

Ophiostoma novi-ulmi

Reports of the disease were widespread in eastern South Dakota during 2013 with many communities suffering high losses and this loss was repeated in 2014. Many communities with significant elm populations had a backlog of removals that extended until mid-November. American elm still is one of the most common community trees in the state, comprising more than 8% of the street tree population. This increase in losses due to Dutch elm disease is a particular concern as some communities in the near future may have to deal with this threat and emerald ash borer, a combination that will quickly deplete resources for city forestry departments.



Elm tree with fading leaves from Dutch elm disease.

Photo courtesy of Dr. John Ball

Diplodia tip blight

Diplodia pinea (*Sphaeropsis pinea*)



Diplodia damage.

Photo courtesy of Dr. John Ball

The disease was commonly reported throughout the state on Austrian and ponderosa pines in shelterbelts and community plantings. While the disease has been reported in these species for many years, the increase in reports may be related to the number of mature pines, more than 80 years old, that are already in decline from drought.

Elytroderma needle cast

Elytroderma deformans

This needle cast is becoming more commonly reported on ponderosa pines in Black Hills. The infected trees have compact witches' brooms in the crown which makes infected trees highly noticeable. This disease is usually not a tree killer, but the loss of foliage can weaken the tree.

Pine wilt nematode

Bursaphelenchus xylophilus

Rapidly declining Austrian and Scotch pine in the southern region of the state (south of I-90) have been found with this disease for more than a decade. Reports of the disease increased in 2013 and 2014 with most of the affected trees occurring in the southeastern counties that border Nebraska. Mature Austrian pines were the species most impacted by this disease but many mature Scotch pines have also been killed by this disease.



Shelterbelt tree killed by pine wilt.

Photo courtesy of Dr. John Ball

White pine blister rust

Cronartium ribicola

This disease was discovered in the relic stands of limber pine in Custer State Park in the early 2000s. A survey revealed only a few new infections in 2014. Pruning has been performed in past years in an effort to slow the spread of the disease. Pruning infested tissue has generally been necessary for only a few small branches, less than 0.5 cm, on an infected limber pine.

Forest Health Conditions with Other Damaging Agents

Winter desiccation injury

Winter desiccation injury was seen in some pole-size ponderosa pine stands in the northern Black Hills this past winter. The trees had reddish brown foliage throughout their canopies except on the branches that just emerged from the snow.

Many birches, catalpas, cherries, and maples showed extensive dieback after the winter. The cause of the decline of these trees may be related to the long, cold winter that followed a dry autumn.



Winter desiccation on spruce

Photo courtesy of Dr. John Ball

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