

- Southern Pine Beetle

Southern Pine Beetle

Kills New Jersey Pine Trees

The **southern pine beetle** (SPB), one of the most destructive forest insects in the southeastern United States, quickly devastates pine dominated forests during outbreaks. This native bark beetle, which is smaller than a grain of rice, feeds on the living tissue under the tree's bark and introduces blue stain fungi. As pine dominant forests cover an estimated 440,000 acres in southern New Jersey, this beetle poses a considerable threat to our state's forest resource. Since its re-entry into the state in 2001, SPB impacted approximately 26,600 total acres, and more than half that total occurred in 2010 alone.

Since 2001, SPB populations in New Jersey have been on the rise, destroying 1000 new acres of pine forests each year on average, but infestations remained largely confined to the southern sections of the state. Then, in 2008, SPB crossed the Egg Harbor River for the first time and entered the pine forests of Atlantic County, and continues to move north and west.

In 2010, New Jersey experienced the warmest growing season on record (average temperature 68.3°F) and below average precipitation. These conditions quickly advanced SPB's range and damage levels. SPB entered the heart of the New Jersey Pinelands – designated as the nation's first National Reserve by Congress in 1978, and a Biosphere Reserve in 1983 by the United Nations Educational, Scientific and Cultural Organization. According to USDA Forest Service estimates, 80% of the pine forest could be impacted by SPB within the next 10 years if no action is taken.

“As pine dominant forests cover an estimated 440,000 acres in southern New Jersey, this beetle poses a considerable threat to our state's forest resource.”

Actual Size:
1/8" →



SPB Predators

Trees that have already dropped their needles and have no fine branches, probably no longer have SPB, but may be home to beneficial SPB predators, such as checkered beetles and woodpeckers. If a dead tree does not pose a threat to people or property, leave the tree to encourage these predators.



Checkered beetle preys on SPB



Wildfire risk

Forests devastated by SPB become fire-prone from many standing dead trees as well as accumulated leaf litter. Also, the decreased canopy cover causes the forest floor and vegetation to dry out quickly, increasing wildfire risk. With these fuel types, wildfires in SPB affected areas burn hotter and become more labor intensive for firefighters to control.

SPB Signs & Symptoms



Aerial of SPB-infested stand



Pitch tubes



S-shaped galleries & blue stain fungi

SPB attacks all pine species including pitch, shortleaf, loblolly, and Virginia, preferring trees weakened from drought, stress, or injury. The tree crown displays the first outward sign of infestation when it rapidly turns from a healthy green to yellow, red, and finally, brown. A closer inspection may reveal pitch tubes on the trunk and S-shaped galleries under the bark. The beetle also transmits blue stain fungi, which stops water from circulating in the tree.



Prevent SPB Outbreaks

You can reduce the risk of SPB outbreaks by actively managing your forest. Trees under stress become susceptible to SPB while healthy, strong trees resist beetle attacks. Thin forests so trees are spaced 20 feet apart or greater. This thinning not only promotes healthy growth and form of the trees, but the increased space also interrupts pheromone communication between the beetles. To protect a high-value individual tree for up to two years, an Approved Forester may recommend a spray or injection treatment. Treatments are only effective if applied prior to an SPB attack.

Control SPB

To control populations and minimize the spread, foresters must detect and suppress infestations while the beetles still actively infest the tree. If untreated, beetles move quickly to adjacent forests. The best control option is to cut infested trees and sell to a sawmill. This disrupts populations from expanding and destroys all life stages. If the infested trees cannot be sold, remove the bark, buck the logs or chip the wood to kill the beetles in the trees. Contact a NJ Certified Tree Expert or Approved Forester for professional assistance with SPB identification, tree removal, and chipping.

Suppression options

Before cutting trees, contact your local or county shade tree commission for an explanation of local and state ordinances and permit requirements. After suppression, keep all infested wood chips or logs away from uninfested pines to avoid spreading the beetle.

What to do with leftover wood chips and wood from SPB suppression:

- mulch under non-pine trees
- ask your local Department of Public Works about their tree recycling program
- use solid pieces of debarked wood as firewood
- compost wood chips, bark, and debarked wood

For woodland owners

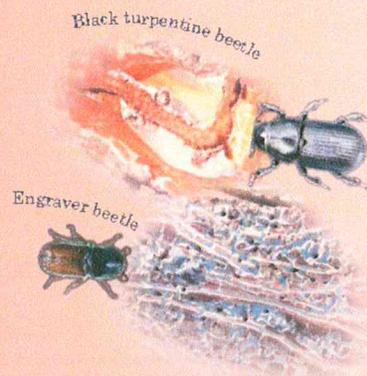
- Cut actively infested pines plus a 50-100 foot buffer of adjacent uninfested pines
- Fell trees toward infestation center
- Cut and chip infested trees on site

For homeowners

- Cut and chip infested trees on site
- Debark and cut infested trees into pieces and enclose completely under a tarp

Look-alike bark beetles

Unlike the S-shape of SPB galleries, the black turpentine beetle creates large straight galleries near the base of the tree where larvae feed in groups. Engraver beetle galleries are I, Y, or H shaped, running up and down the tree vertically. These beetles are not as destructive as SPB, and generally attack weakened trees already infested with SPB.



Financial Assistance

Woodland owners enrolled in the programs below may be eligible for cost-share opportunities to implement suppression and pre-suppression activities to reduce SPB outbreak severity and spread.

Farm Land Assessment Program (FLA)

as it pertains to Woodland Assessment, requires woodland owners to develop and implement a state-approved forest management plan to qualify for reduced property taxation. Woodland owners must fulfill special requirements concerning property used exclusively and actively devoted for the production and sale of forest products, excluding Christmas and nursery trees. Eligible landowners must have at least five acres dedicated to active agriculture or woodland devotion.

Forest Stewardship Program (FSP)

is administered through the NJ State Forest Stewardship Coordinating Committee with representatives from federal, state, and private natural resource agencies and organizations. FSP offers technical and financial assistance to private woodland owners to develop a Forest Stewardship Plan to manage for wood products as well as wildlife, forest health, forest restoration, invasive species control, and water quality. Non-industrial private woodland owners who own 5 acres or more are eligible to participate. The land must have existing tree cover or other woody vegetation, or land suitable for growing such vegetation.

Environmental Quality Incentive Program (EQIP)

is administered by the Natural Resources Conservation Service (NRCS), for woodland owners who have a Forest Stewardship Plan. EQIP offers technical and financial assistance to implement conservation practices on eligible forest lands.

www.southernpinebeetle.nj.gov

Natural Resources Conservation Service Office
www.njnrsc.usda.gov/contact

NJ State Approved Foresters
www.state.nj.us/dep/parksandforests/forest/act.pdf

NJ Certified Tree Experts
www.state.nj.us/dep/parksandforests/forest/community/cte.htm



RUTGERS

New Jersey Agricultural Experiment Station

State Forestry Services

Forest Health Office in Trenton	609-292-2531
Southern Region Office in Mays Landing	609-625-1124
Central Region Office in New Lisbon	609-726-1621
Northern Region Office in Andover	973-786-5035



- Community Forestry
- Forest Nursery
- Forestry Education
- State Lands
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- Forest Fire
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- Forest Health

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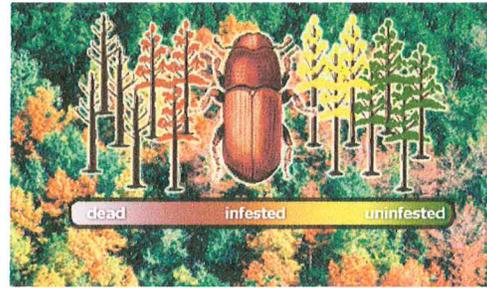
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Identification

The adult beetle is approximately 1/8 inch long, brownish black with the posterior end rounded.

An infested tree's needles will turn from green to yellow or brown as quickly as two weeks following initial attack.

Foresters spot the brown infested stands during aerial surveys and with GPS technology, check them on the ground. The foresters look for the telltale signs of a SPB infestation: pitch tubes, exit holes, and galleries.



More information
barkbeetles.org
 Southern pine beetle - FIDL 49



Report a beetle sighting
 Southern Regional office (609) 625-1124
 Trenton office (609) 292-2531

or contact your local consulting forester
 or a certified tree expert

Pitch Tubes



Small yellowish-white pitch tubes found on the lower portion of a tree - approximately 15 feet from ground - indicates an infestation. Pitch tubes range from a nickel to a quarter in size. If you gently squeeze the tubes and they are soft, it can indicate that the SPB has recently infested the area. However, if the tubes are hardened, the SPB infestation may have occurred within the past year and the insects may or may not be present. Some pitch tubes may actually contain the insect that created them.

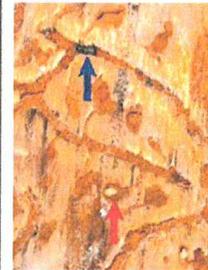
Exit Holes



Another indication that the SPB has attacked a tree is the exit holes on the bark. These are approximately half the size of BB pellets and are usually clustered together. Exit holes indicate that the SPBs have matured and left the tree.

Another sign of an attack is reddish dust created during the boring of the tree. This dust can be found within the bark scales and on leaves at the base of infested trees.

Galleries



If bark is removed from an infected tree, signature S-shaped egg galleries can be seen on the trunk surface and in the inner bark. S-shaped galleries distinguish SPB damage from other bark beetles.

Larval mines are generally perpendicular to the egg gallery (red arrow) located in the cambium-phloem or cambium-phloem-middle bark and are packed with fine boring dust. Various galleries will contain adults (blue arrow) as well.

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Life Cycle

The beetles can over-winter in any life stage: egg, larval, pupal, or adult, and produce three to seven generations a year. In New Jersey, the northern-most range of southern pine beetle, beetles usually overwinter in the pupal stage and produce around two generations per year.

A pair of beetles bore galleries into the tree's inner bark for the female to deposit eggs. The eggs hatch into larvae, which feed on the tree's bark. The larvae then become non-feeding pupae, and finally adult beetles. The adults exit the host tree and fly, sometimes several miles, to a new tree.

The "S" shape of the galleries distinguishes this beetle from others. Galleries are created by the larval stage of the insect as it devours the tree's critical inner bark. These galleries girdle the tree while the beetles transmit blue-stain fungi. The fungi stop water from circulating within the tree. The girdling and fungus may kill the tree within two months after the initial attack.



More information

- barkbeetles.org
- [Southern pine beetle - FIDL 49](#)



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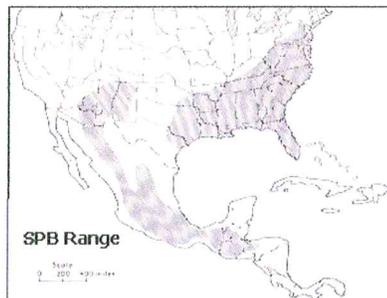
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Impact

History

Research has indicated that an SPB outbreak occurred in southern NJ in 1939. There has not been another known outbreak in the Garden State until fall of 2001.

It is theorized that the late 1990's drought, interstate commerce and above average temperatures occurring in the Mid-Atlantic region have contributed to the SPB migrating northward to New Jersey. The forest environment under stress increased the susceptibility to SPB attack. After establishing a presence in the Garden State, the beetles, attracted to pheromones of other beetles and the scent of trees in stress, fly to infest new trees.



Preferred Hosts

The SPB's naturally ranges from Pennsylvania to Florida. The SPB attacks all species of pines, but prefers pitch, shortleaf, pond, and loblolly, which all occur in southern NJ. Initial SPB damage appears as yellow progressing to red and eventually brown within 1 to 2 months. Infested pine trees die within 3-4 months of initial attack.

Fire Danger

Needles falling off the branches land on understory vegetation creating a fuel ladder effect, which facilitates wildfires reaching the tree crowns. Trees that may still have dry dead needles on the branches could quickly erupt and wildfire could grow to conflagration proportions.

More information

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Assessment

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To assess outbreaks foresters:

- Deploy traps in strategic locations in the south Jersey area to detect the SPB
- Use Digital-Aerial Sketchmapping (D-ASM) in conjunction with traditional aerial photographic interpretation to map existing damage and help to predict potential spread or decline.
- Investigate areas on foot based on the aerial surveys, as well as information provided by NJ Approved Consulting Foresters and the public

SPB Traps

The NJ Forest Service monitors SPB population and distribution by setting up specialized traps in strategic locations. These traps are designed to resemble the bole of a tree. These traps are placed in forested areas where pine is not present or represents a small component of the forest type. This method reduces the chance of spreading the SPB to areas not previously invested.

The SPB is drawn to the traps by placing a wick (white rope) into a jar filled with a turpentine attractant. A pheromone (frontalin) strip is also placed on the trap. SPB senses the turpentine and pheromone as they are dispersed by wind and follows them back to the source. The SPB then lands on the trap (above) and eventually falls down the center and into a solution that preserves them for identification. Other beetles are also trapped such as the checkered beetle which is a natural predator to the SPB.

Foresters collect, identify, and count the beetles in the traps. The SPB population can be extreme, high, moderate, static or declining. Suppression activities would therefore have to be prescribed accordingly. By collecting and recording the number of SPB and checkered beetle, a ratio of the two can be calculated and plotted. This ratio enables the NJ Forest Service to determine how to proceed with suppression. If more checkered beetles than SPB are found it could indicate biological control could be effective and no direct suppression activities are necessary. If the foresters find more SPB than checkered beetles it could mean direct suppression activities are needed.



More information
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Control

Southern Pine Beetle can be controlled with chemical treatment, cutting and removing, and directional cutting and leaving. The methods depends on the severity of infestation, damage, and timber markets.

Buffer

The buffer method of control removes trees that have been killed, recently attacked (yellow and red) and green trees as a buffer. In some cases depending on potential checkered beetle populations not all trees killed will be salvaged unless the potential for wildfire is high.



Buffer

Cut-and-leave

Cut and Leave (Directional Felling) is very effective in disrupting SPB pheromone production and attack behavior.



Cut-and-Leave

Pheromones are produced by SPB to control the behavior of other SPB to mate, mass attack or disperse.



Checkedred beetle

A major predator to the SPB is the checkered beetle *Thanasimus dubius Fabricius*. The checkered beetle eats pine beetles, as shown here, which can help control SPB at all densities.

Temperature

Temperatures around zero degrees (F) for several days have also shown to have an effect on beetle mortality for all life cycle stages. Temperatures around 20 degrees (F) for several consecutive days have been effective in killing the egg and larval stages.

Woodpeckers

Woodpeckers also help to control SPB and indicate there may be a problem in a given stand of trees. Woodpeckers strip away the bark to prey on SPB and create piles of bark at the base of trees. Woodpeckers are predacious on all life stages of the SPB but prefer the pupae and adult because they are easier to find and excavate. While the trees targeted for SPB foraging will die, the number of SPBs remaining to infest other trees is reduced.



Other methods

Other control measures include the pile and burning of small diameter infested trees and chemical spraying. At this time it appears that in the most known infested areas the trees maybe not be suitable for burning due to their large size. Chemical spraying at this time is not recommended due to the large area in need of treatment and labor intensive efforts needed to make it effective.

Southern pine beetle: wreaking havoc in the Pinelands

The quick-moving southern pine beetle endangers our pine forests across the southern part of New Jersey. While a beetle that measures smaller than a grain of rice may seem unassuming, this destructive pest killed 21,000 acres (33 square miles) of New Jersey trees over the past two years.

After beetles attack, the tree dies within a month. The dead tree quickly becomes a hazard; limbs may fall and injure a person or damage a home. Dead trees also increase wildfire probability and severity.

If not controlled, the beetle spreads to surrounding pines. Popcorn-like sap on the bark, called pitch tubes, is often the most noticeable external symptom of a tree infested with the beetle. An infested tree's crown will turn from a healthy green to yellow, red, and finally, brown. Under the bark you will find S-shaped galleries from the beetle larvae and dark stains from fungus. Often you will not see the actual beetles on an affected tree.

Everyone can do their part: look out for beetle-infested trees and report them to State Forestry Services. To deter beetles, landowners should thin their forest, which keeps trees healthy and resilient. Landowners with five acres or more of property affected by the beetle may be eligible for grants or cost-share opportunities through State Forestry Services.

State Forestry Services continues to implement southern pine beetle management practices. With the cooperation and vigilance of New Jersey residents on the look out for the beetle, infestations may be controlled more quickly before the beetle spreads.

Working together, we can save New Jersey's pinelands from this destructive beetle. Visit www.southernpinebeetle.nj.gov for more on this beetle, grant opportunities, or to report a sighting.

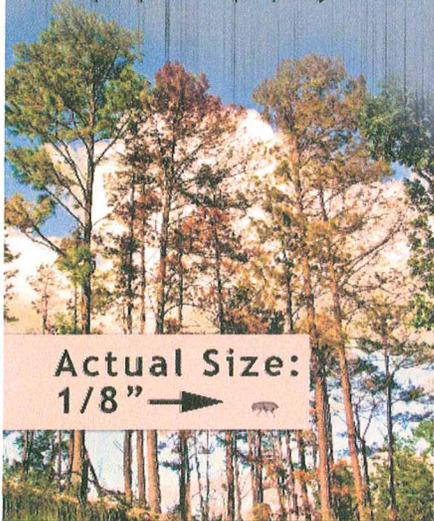
Southern Pine Beetle



kills New Jersey
pines, which impacts
your family's safety.

Beetle Dangers that affect you:

- pest spreads quickly to neighboring pines
- increased wildfire risk
- dying limbs fall, harming people and property



Actual Size:
1/8" →

southernpinebeetle.nj.gov

What you can do to combat SPB

- ✓ Report sightings
- ✓ Spread the word
- ✓ Check for beetle signs



Dying pine trees



Exit holes



S-shaped galleries under bark



Popcorn-like Pitch tubes