Bark Beetle Field Guide For New Mexico Forests

A Photo Guide To Common Beetles

New Mexico
Forest and Watershed
Restoration Institute

New Mexico Highlands University

CREDITS

Contents: adapted from *Common Bark Beetles of New Mexico* by Dr. Steven K. Souder of USDA-Forest Service, Forest Health Protection Region 3. Special thanks to reviewers, Dr. Steven K. Souder, USDA-FS-FHP-R3 & Victor Lucero & George Ducker, New Mexico Forestry Division. Cover Photo: Kathryn Mahan, NMFWRI. Design: Sarah Friedland. Gallery Illustrations: USDA-Forest Service Forest Health Protection Region 3.

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HOW TO USE THIS BOOK

This field guide offers information on how to identify common bark beetles present in New Mexico. The book is organized by tree host species.

Some of the terms used in this book include:

BOLE - main trunk of the tree

ROOT CROWN - junction of the tree's bole and root system, just above the soil level

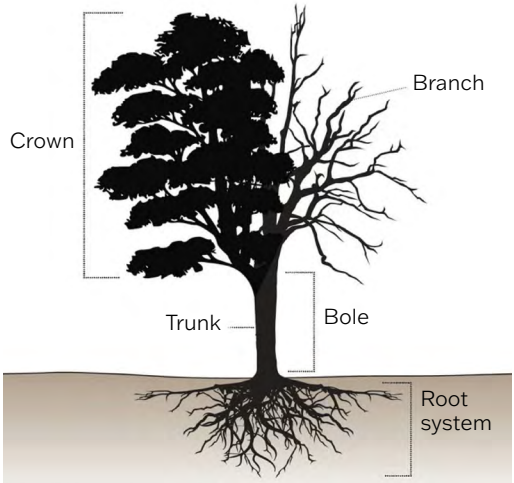
BARK - outermost layer of the tree

PHLOEM - layer of tissue just under the bark, responsible for nutrient transport

CAMBIUM - a layer of tissue just under the phloem, responsible for growth

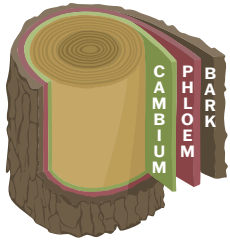
FRASS - droppings/waste of insects, can appear sawdust-like

Parts of a tree



PITCH TUBES - blobs of resin (sap, frass, boring dust) exuded by trees as a defense against beetle attack.

GALLERIES - maze-like tunnels created by beetles as they lay eggs and hatch that are visible under the bark. The illustrations present in this guide depict egg and larval galleries for that beetle species.



If looking for beetles or galleries, you may find it helpful to have a knife or hatchet to cut into the bark, as well as tweezers and a hand lens to better see the details of the beetles. Specimens can be preserved in glass screw-top vials with 70-80% ethyl or isopropyl alcohol.

Top left: Frass. Top right: cross-section of a tree. Above: Pitch tubes. Photo by James McGraw, North Carolina State University, Bugwood.org

For more information, questions or identification of bark beetle, contact:

The United States Department of Agriculture, Forest Service, Forest Health Protection Southwestern Region.
https://www.fs.usda.gov/r03/natural-resources/forest-health

The New Mexico Forestry Division Forest Health Program or local District offices.
https://www.emnrd.nm.gov/sfd/forest-health/

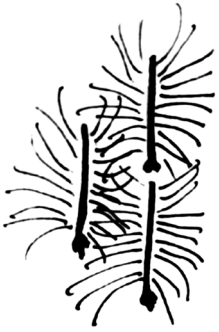
Cedar Bark Beetles

***Phloeosinus* spp.**

HOST Juniper spp.

INITIALLY ATTACKS The main bole and branches

GALLERY PATTERN Egg galleries are parallel to the grain of the wood and larval galleries run up and down from the egg galleries. Galleries score the sapwood and egg galleries possess no frass.



ECOLOGY Cedar bark beetles are not considered aggressive and kill stressed or damaged juniper and cedar trees. There are 24 native species of *Phloeosinus* in the western U.S. that are similar.

Top: Natasha Wright, Braman Termite & Pest Elimination, Bugwood.org
Bottom: William M. Ciesla, Forest Health Management International, Bugwood.org

Engravers
***Ips* spp.**

Top left:Ladd Livingston, Idaho Dept. of Lands, Bugwood.org Top Right and Bottom: Natasha Wright, Braman Termite & Pest Elimination, Bugwood.org

HOSTS Most pines, some in spruce

ATTACKS Found in slash (>3″ diam.), the top of trees, small/large branches, and the main bole.

GALLERY PATTERN Y, H, or I–shaped galleries that score the sapwood and contain no frass in the egg galleries.

PITCH TUBES are thumbnail sized, if present, and may be found with boring dust in adjacent bark crevices.

Below: USDA-FS-FHP-R3

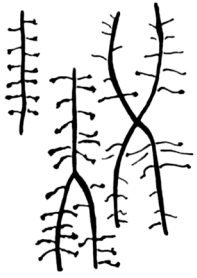
Ips knausi
Ponderosa pine

Ips hunteri
Picea sp.

OTHER IPS SPECIES:

Ips pini Ponderosa pine
Ips avulus Smaller ponderosa pine branches
Ips grandicollis Upper crown of ponderosa pine
Ips calligraphus Larger ponderosa pine branches and main bole
Ips confusus piñon pine

Engravers *continued*



USDA-Forest Service, Forest Health Protection Region 3.

ECOLOGY *Ips* species can have several generations a year. *Ips* beetles have toothlike spines on the posterior ends of their elytra which distinguishes them from *Dendroctonus and Scolytus* species. *Ips* are not considered as aggressive or destructive as some of the *Dendroctonus* bark beetles because they typically target injured or stressed trees. Drought and logging can contribute to increases in *Ips* populations. They do not have to kill the tree to survive, however, generational broods can build up over time in the same tree causing mortality. Proper handling of slash and minimizing mechanical damage from harvest and mastication activities during active beetle flight periods (March-November) can prevent buildup of populations. If necessary, immediate removal of cut wood materials outside of host area is all-important. *Ips* beetles are small (3 to 8 mm in length; depending on species), reddish-brown to black with a prominent cavity at the posterior end. Different species of *Ips* can have three to six pairs of toothlike spines on the elytral declivity.

Larger Mexican Pine Beetle

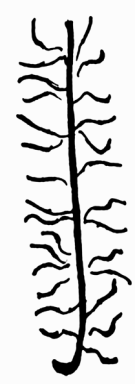
Dendroctonus approximatus

HOSTS Ponderosa pine, Southwestern white pine, Apache pine, Chihuahua pine, and several Mexican pines.

ATTACKS The lower bole and underside of downed trees

GALLERY PATTERN Egg galleries run vertical up the tree bole filled with frass and slightly larger than the beetle width. The galleries are similar to Mountain Pine Beetle galleries. Larval galleries extend off from each side of the egg gallery.

PITCH TUBES may be present from primary attacking beetles and are not generated by LMPB because it is a secondary attacking bark beetle.



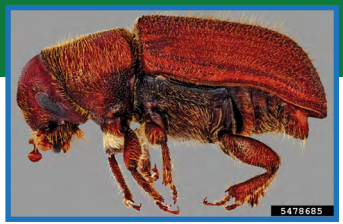
Top: Steven Valley, Oregon Dept. of Agriculture, Bugwood.org
Bottom: USDA-Forest Service, Forest Health Protection Region 3.

Larger Mexican Pine Beetle *continued*

ECOLOGY The larger Mexican pine beetle (LMPB) has one generation a year. Eggs of LMPB are laid in niches away from the cambium and on the bark side of the gallery. Larvae mine and form pupal cells in the bark. Adult beetle flight can occur from June to October. This relatively broad flight period corresponds with lower frequency and spreadout attacks over the course of a year. Adults and larvae overwinter in the same tree. It is a secondary species that attacks near the base of trees already attacked by a primary beetle species such as Southwestern Pine Beetle, Roundheaded Pine Beetle, Mountain Pine Beetle, and *Ips* species. LMPB is also known to attack stressed, injured, or recently down trees. LMPB is relatively uncommon but is typically found in southern New Mexico. The adults are dark brown to black and averages about 6 mm in length.

Mountain Pine Beetle

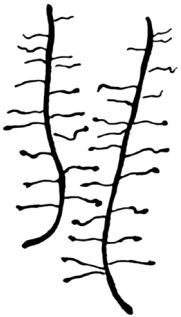
Dendroctonus ponderosae



HOSTS Ponderosa pine >25 cm, Southwestern white pine

ATTACKS The lower bole (> 1 m); in outbreaks may occur from root collar to middle branches to tops

GALLERY PATTERN Egg galleries run vertical along the bole through the inner living bark, engraving both bark and wood. Eggs are laid alternately and larval galleries branch along the sides of the egg galleries at right angles. There is often a short bend at the base of the egg gallery. Pupal chambers are present at the terminal ends of the larval galleries.



PITCH TUBES of successful attacks are numerous, widely scattered, and cream to reddish brown (1.3-2.5 cm in size) in color. Presence of red boring dust (particularly during drought) in bark crevices or at the base of the tree may also be seen.

Top: Steven Valley, Oregon Department of Agriculture, Bugwood.org Bottom: Ladd Livingston, Idaho Department of Lands, Bugwood.org

Mountain Pine Beetle *continued*

ECOLOGY Generally, Mountain pine beetle (MPB) has one generation per year and prefers to attack mature host trees (>12.5 cm DBH; >60 years). Under endemic situations, MPB targets weakened trees. Under epidemic outbreaks, MPB can decimate very large stands of host trees and is considered one of the most destructive bark beetles in the West. MPB decimated pine stands throughout the Rocky Mountain range in the early 2000's. Beetles select larger trees before attacking smaller trees. Adults fly during June-September. Generally, the larvae overwinter in the tree and complete development to adult stage the following spring/summer. In ponderosa pine of the Southwest, MPB is found primarily on the Kaibab Plateau in northern portions of Arizona and infrequent attacks occur in northern New Mexico. It also vectors blue-stain fungus (*Ceratocystis* & *Europhium* spp.) predisposing it to tree death. Larvae are small white grubs with tan head capsules. Adult MPB are stout, brown-black, cylindrical beetles (~4 to 7.5 mm in length).

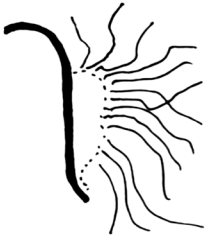
Red Turpentine Beetle

Dendroctonus valens

HOSTS Ponderosa; but can attack most pine species

ATTACKS The lower portion on the bole around the root collar.

GALLERY PATTERN Mated beetles excavate a wide egg gallery between the bark and wood filled with frass. The female lays eggs along the side of the gallery. The larval galleries are generated by group feeding unique to RTB and produces a large irregular gallery; larvae feed aggregately before fanning outward.



Top: Pest and Diseases Image Library , Bugwood.org Bottom: Laura Merrill, USDA Forest Service, Bugwood.org

PITCH TUBES are large (~5 cm) reddish globules near the root crown, however, may be absent in weakened trees. Red-brown boring dust and pinkish resin crystals may be seen at the base or in bark crevices.

Red Turpentine Beetle *continued*

ECOLOGY Red turpentine beetle (RTB) generally has one generation a year but may produce a second or third in warmer areas. Adult flight is high early in the year through midsummer. RTB overwinters under bark as adults or larvae. This species does not always kill trees they attack and not considered a serious pest. However, attacks can occur on stressed or dying trees, particularly, following fire or logging events. It is also found in freshly cut slash and logs as well as tree stumps. Unfortunately, RTB may promote additional attacks by other more aggressive bark beetles leading to tree mortality. It is also known to transfer blue-stain fungus on its body surface. Because RTB does not cause frequent tree mortality or outbreaks alone, management actions are not typically initiated. Adult RTB are the largest bark beetles in North America (~6 mm to 12 mm in length) with a distinctively reddish-brown coloration. Larvae are white with brown head capsules and hind areas.

Roundheaded Pine Beetle

Dendroctonus adjunctus

HOSTS Ponderosa pine. Limber pine, Chihuahua pine, and several Mexican pines are recorded hosts.

ATTACKS The main and lower bole

GALLERY PATTERN Egg galleries packed with frass run vertical up the tree bole, but gently sway side to side. Larval galleries extend from each side of the egg gallery. Larvae initially mine in the inner bark until the third instar and then bore into the outer bark to complete development.

PITCH TUBES may be numerous. In addition, reddish-brown boring dust maybe present in bark crevices at entrance holes. In heavily attacked trees, pitch tubes are often missing or very small.

Top: Steven Valley, Oregon Department of Agriculture, Bugwood.org Bottom: USDA Forest Service , USDA Forest Service, Bugwood.org

Roundheaded Pine Beetle *continued*

ECOLOGY Roundheaded pine beetle (RPB) completes a single generation in a year. Unlike typical bark beetle flight in early spring, RPB adults fly late in the year during October to November. Females initiate the attack producing an aggregation pheromone drawing male beetles to the tree. Beetles mine holes through the bark and excavate a mating chamber in the phloem tissue. Female beetles then excavate their galleries and lay eggs individually in niches on alternate sides. Galleries of multiple mating pairs may intersect and be confused for SWPB galleries. In the Southwest, it is destructive in stands of overstocked, pole-sized ponderosa pines and periodic outbreaks have occurred in southern New Mexico killing hundreds of young trees. Outbreaks are irregular and ephemeral. It is also not uncommon to find RPB in the same tree with SWPB. The adult is cylindrical and slender and dark brown in color (~5 mm in length).

Southern Pine Beetle

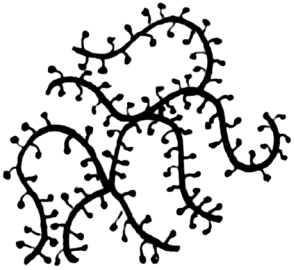
Dendroctonus fronttalis

HOSTS Ponderosa, Chihuahua, and Apache pine.

ATTACKS The main and lower bole

GALLERY PATTERN Egg galleries of SPB are made in the cambium that cross repeatedly and have a serpentine pattern as with Southwestern pine beetle, however, larval galleries and pupal cells are seen on the underside of the inner bark (unlike Southwestern pine beetle).

PITCH TUBES may be numerous and reddish-brown boring dust maybe present.



Top: Erich G. Vallery, USDA Forest Service - SRS-4552, Bugwood.org
Bottom: Ronald F. Billings, Texas A&M Forest Service, Bugwood.org

Southern Pine Beetle *continued*

ECOLOGY Southern pine beetle (SPB) can have several generations a year. It is common in the Southeastern U.S. through Mexico, and south to Central America. In Arizona and New Mexico, SPB is not a serious pest, however, it can attack Ponderosa, Chihuahua, and Apache pine. As a result of its uncommon nature, information on the biology in the Southwestern U.S. is limited. The female beetle initiates an attack on a tree by boring through the bark and broadcasting a pheromone for males to join. Typically, SPB attack in mass overcoming the trees defenses. All stages of the beetle are associated with the inner bark or phloem tissue. A blue-stain fungus, *Ceratocystis minor*, is often vectored by SPB to the host tree increasing chance or tree mortality. Adult SPB are dark reddish-brown (~3 mm in length) and can be differentiated from Southwestern pine beetle by the presence and spacing of long setae on the elytral declivity.

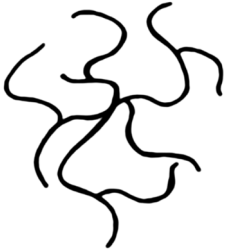
Southwestern Pine Beetle

Dendroctonus barberi

HOSTS Ponderosa pine (large down to pole size), will also attack Coulter pine

ATTACKS Midway up the bole then spreads up and down

GALLERY PATTERN Adults form serpentine galleries that crisscross and branch on the sapwood; galleries contain frass; larval galleries are short and are more visible on the bark underside where they feed and development.



Top: Erich G. Vallery, USDA Forest Service - SRS-4552, Bugwood.org Bottom: William M. Ciesla, Forest Health Management International, Bugwood.org

PITCH TUBES are reddish-brown (6-12 mm) globules formed at SWPB entry points along bole. Reddish-orange boring dust may be present at base of the tree in pitch tube absence.

Southwestern Pine Beetle *continued*

ECOLOGY Southwestern pine beetle (SWPB) can complete up to four generations a year in the Southwest. Flight periods are from late spring through late summer in which emerging adults attack new trees. Infestations increase during periods of drought or when trees are affected by root disease, soil compaction, fire, and mechanical damage. Fading foliage is the first indication of successful attack. Infected trees may exhibit bark flaking; woodpeckers expose the smooth orange inner bark foraging for larvae developing in the outer bark. Larvae are white grubs with brown head capsules; pupae are soft and white resembling adults. Adults (~35mm in length) can be brown to black with rounded posterior. SWPB is one of the more aggressive bark beetles in the Southwest.

Douglas-fir Beetle

Dendroctonus psuedostugae

HOSTS Douglas-fir only; prefers older larger trees (>30 cm dbh)

ATTACKS The mid - or lower bole where >12" DBH then spreads along the bole

GALLERY PATTERN Is slightly etched on the sapwood and mostly contained in the inner bark. Egg galleries begin with a simple J-hook then run vertical. Egg galleries are packed with frass. The larval galleries alternate along the egg gallery and extend perpendicular. Pupal cells occur at the ends of the larval mines

PITCH TUBES are often not present; fine orange-brown boring dust may be visible in bark crevices and at base of the tree. Pitch streamers (midbole) may indicate attack.

Top: Steven Valley, Oregon Department of Agriculture, Bugwood.org Bottom: William M. Ciesla, Forest Health Management International, Bugwood.org

Douglas-fir Beetle *continued*

ECOLOGY Douglas-fir beetle (DFB) completes one generation a year, however, DFB has overlapping cohorts. Most of the mortality caused by DFB is generated by the spring/early summer flights of overwintering adults. The second and smaller late summer flights consists of adult beetles that spent the previous winter as larvae. In addition, adults that emerged in spring may produce a brood in one tree and re-emerge and generate a second brood in another tree. DFB commonly attacks trees injured by fire, heavy defoliation, root disease, soil compaction, and populations can buildup in areas of windthrown trees. Periods of drought also facilitate outbreaks. Adults (~6mm in length) are black with reddish elytra and possess clubbed antennae and rounded posterior. DFB can be managed with and antiaggregation pheromone (MCH) to prevent tree mortality. It is a major tree killer in the Southwest.

Douglas-Fir pole & Engraver Beetle

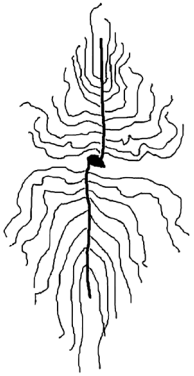
Pseudohylesinus nebulosus* and *Scolytus monticolae

The Douglas-fir pole beetle adults are dull brown, slender, and about 3 mm in length with a round posterior.

HOSTS Douglas-fir is principal host

ATTACKS "Pole" size trees as well as top-kill and branch tips in larger trees. Trees >30 cm in diameter have been attacked under drought conditions.

GALLERY PATTERN A central nuptial notch with larval galleries that tend to turn upward and downward depending on if they are above or below the notch.



USDA-Forest Service, Forest Health Protection Region 3.

Douglas-Fir pole & Engraver Beetle *continued*

ECOLOGY Depending on the location and temperature, Douglas-fir pole beetles and engraver beetles can have one or two generations per year. They prefer to attack stressed trees after fire, defoliation, windthrow, and root rot. Adult beetles usually emerge, take flight, and attack in the spring or early summer. Monogamous pairs create a longitudinal egg gallery constructed in the cambium layer, often with two branches—one up and one down the trunk—originating from the central entrance tunnel. Douglas-fir pole beetle adults overwinter in niches cut into the bark while *S. monticolae* overwinter as larvae under the bark. The Douglas-fir pole beetle adults (~3 mm in length) are dull brown, slender, and have a round posterior.

The engraver beetle (*S. monticolae*) is smaller < 3 mm and has the "sawed-off" posterior.

Fir Engraver

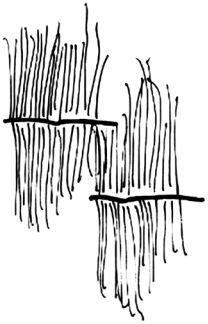
Scolytus ventralis

HOST White fir

ATTACKS The main bole and branches

GALLERY PATTERN Egg galleries are perpendicular to the grain of the wood and score the inner wood and possess little to no frass. Females lay eggs on both sides and larval galleries run up and down from the egg galleries. Larval gallery widths increase as they move away from the egg gallery and are filled with frass. Galleries score the sapwood.

PITCH TUBES are not commonly seen; entrance holes occur in bark crevices with reddish-brown boring dust.



Top: Donald Owen, California Department of Forestry and Fire Protection, Bugwood.org Bottom: USDA Forest Service - Forest Health Protection Intermountain Region - Ogden, UT , USDA Forest Service, Bugwood.org

Fir Engraver *continued*

ECOLOGY There is one-two (partial) generations a year in the southwest and adult attacks can occur from late May through early September. This species can cause top-kill only or kill the entire tree. They characteristically attack trees that are weakened from drought, prolonged defoliation from other insects, dwarf mistletoe, root diseases, or from mechanical wounding. Outbreaks can occur after extended periods of low precipitation and warmer winters. In addition, successful attacks on a fir may lead to further infestation because attractants are emitted by the first beetles that bore into the tree. The abdomen of this insect appears to be "sawed" off distinguishing it from other bark beetle genera. Fir engravers transport fungus (*Trichosporum symbioticum*) that is important to development of their brood. Fir engravers overwinter as larvae, pupate and emerge in late spring/ early summer. Adults are shiny, dark-brown to black beetles (~4 mm in length). Larvae are white and with an amber-colored head capsule.

Western Balsam Bark Beetle

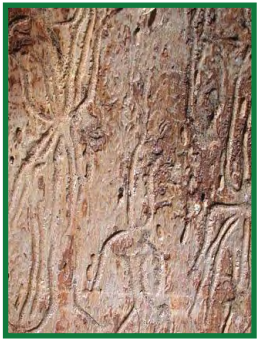
Dryocoetes confusus

HOSTS Cork bark fir, and rarely Engelmann spruce

INITIALLY ATTACKS The lower to mid bole (> 2 m from base of tree)

GALLERY PATTERN Star-like egg galleries that radiate from a center nuptial chamber. Egg galleries lightly score the wood surface.

PITCH TUBES are not present; short pitch streamers may run down the bole of the tree and boring dust may be present in bark crevices near entry.



Top Left: USDA-Forest Service, Forest Health Protection Region 3. Top right: Javier E. Mercado, Bark Beetle Genera of the U.S., USDA APHIS PPQ, Bugwood.org Bottom: USDA-Forest Service, Forest Health Protection Region 3.

Western Balsam Bark Beetle *continued*

ECOLOGY Western balsam bark beetle (WBBB) may have a 1 to 2 year life cycle, unfortunately, the biology is still relatively unknown in the southwest region. This species is associated with higher elevation fir species but infrequently attack spruce. The WBBB is moderately aggressive and can kill older or weakened trees from root disease, drought, windthrow, and mechanical injuries. Under endemic populations, relatively low-level mortality is scattered throughout a stand. However, outbreaks can occur when stands contain a large proportion of preferred hosts. Killed trees may retain red needles for several years after death. Males initiate attacks, excavate a nuptial chamber, and then begin emitting pheromones to attract females. The male will mate with multiple females, each creating a egg gallery from the nuptial chamber. Adult WBBB are dark brown (~3-4 mm in length) and covered with erect, red-brown hairs and have an abruptly rounded posterior end. Another identifying feature is the “crew cut” appearance of patches of hairs on the front of beetle heads. Larvae are white legless grubs with brown heads.

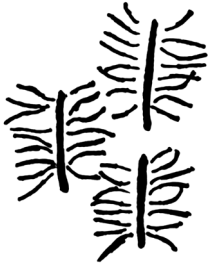
Spruce Beetle

Dendroctonus rufipennis

HOSTS Engelmann spruce, sometimes blue spruce

ATTACKS The mid- or lower bole where >30 cm DBH then spreads along the bole

GALLERY PATTERN Short vertical egg galleries are packed with frass and boring dust except at the terminal end. Egg galleries are created in the phloem tissue. Eggs are laid on both sides of the vertical gallery and larvae create galleries that radiate from each side of the egg gallery.



PITCH TUBES may be present at entry sites. Reddish-orange boring dust around the entrance hole, bark crevices, and at the base of the tree indicate a successful attack. Resin streamers and woodpecker activity may also indicate attacks.

Top: M. O'Donnell and A. Cline, Wood Boring Beetle Families, USDA APHIS PPQ, Bugwood.org Bottom: William M. Ciesla, Forest Health Management International, Bugwood.org

Spruce Beetle *continued*

ECOLOGY Spruce beetle (SB) can complete its life cycle in one or two years, depending on temperature and tree slope orientation. Most populations complete one generation a year in New Mexico. Adults emerge from trees from May through July. Spruce beetles are typically associated on windthrown, cut or fallen, and damaged or injured trees of spruce forests. Under favorable conditions, populations may overflow from downed trees and begin to attack standing mature living trees. Stands with canopy densities of 65% spruce >40 cm DBH pose a high risk of SB attack. In areas where extensive SB tree mortality occurs, changes to the fuel load (fire risk) and stand composition/habitat may have adverse affects to wildlife and watersheds. Adult beetles are dark brown to black with reddish-brown wing covers (~6mm in length). Since 2011, major tree mortality has occurred from SB in spruce/fir forests of northern New Mexico. Spruce beetle may be managed by silvicultural, mechanical, chemical, and aggregation and antiaggregation pheromones.

"A beetle will chase after an opening of light, while a cockroach will scatter at a crack of it. How are we different from insects? Nobody is purely good or purely evil. Most of us are in-between. There are moths that explore the day and butterflies that play at night. Polarity is an integral part of nature — human or not human."

—Suzy Kassem,
Rise Up and Salute the Sun:
The Writings of Suzy Kassem

"In a purely technical sense, each species of higher organism-beetle, moss, and so forth, is richer in information than a Caravaggio painting, Mozart symphony, or any other great work of art."

—E. O. Wilson

"I hear hundreds of years of life. I hear wind and rain and fire and beetles. I hear the seasons changing and birds and squirrels. I hear the life of the trees this wood came from."

—Garth Stein

"One day, on tearing off some old bark, I saw two rare beetles, and seized one in each hand. Then I saw a third and new kind, which I could not bear to lose, so I popped the one which I held in my right hand into my mouth. Alas! it ejected some intensely acrid fluid, which burnt my tongue so that I was forced to spit the beetle out, which was lost, as was the third one."

—Charles Darwin

This guide was produced in 2026 and may be updated as resources allow. Photo Kathryn Mahan, NMFWRI

Photos by Kathryn Mahan, NMFWRI

NMFWRI

FIRE NM
Fire Informed Restoration Education for New Mexico

FOREST SERVICE
US
DEPARTMENT AGRICULTURE

NEW MEXICO
FORESTRY DIVISION

Wildfire Resiliency Training Center
Luna Community College