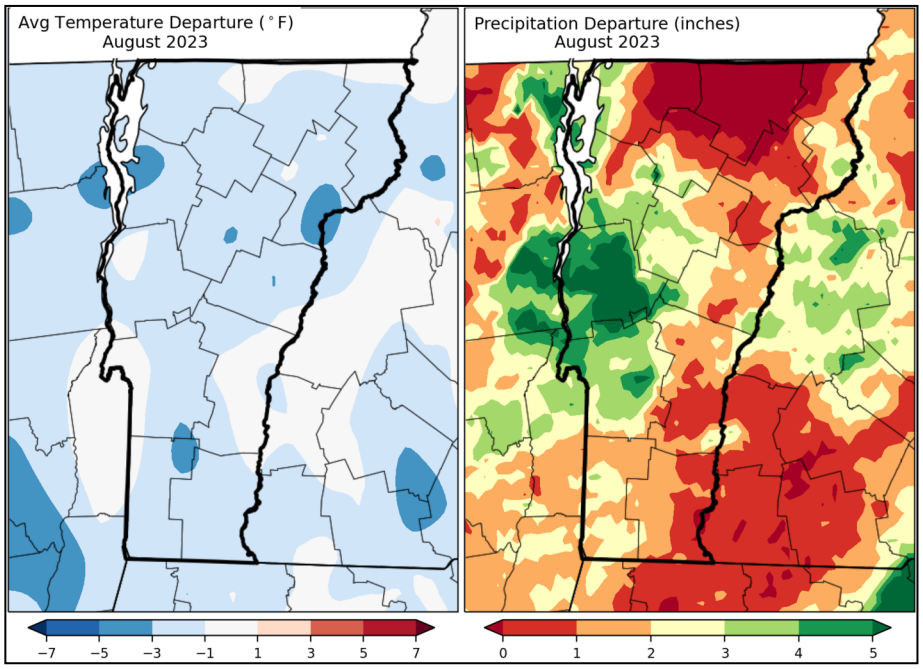
Vermont Forest Health

Insect and Disease Observations — August 2023

Department of Forests, Parks & Recreation
August 2023 vtforest.com

Weather

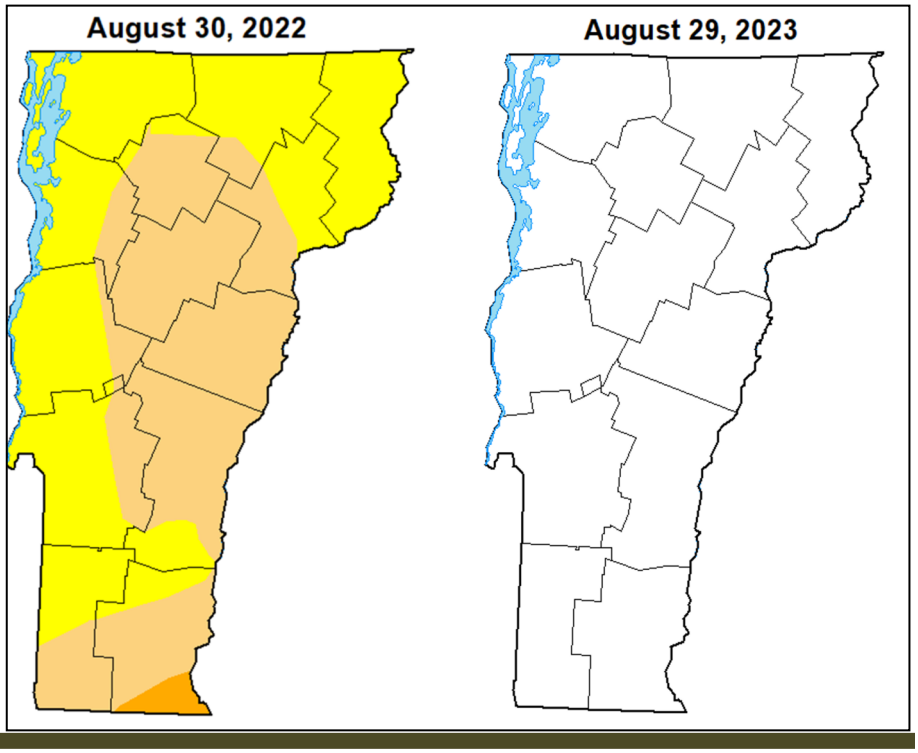
August marks the last full month of the summer. State-wide temperatures averaged 64.0 °F, which was 4.4 degrees cooler than August of last year. Statewide precipitation averaged 6.10 inches, which was 2.59 inches more than August of last year.



Average temperature and precipitation departure from normal. Maps and data: Northeast Regional Climate Center.

Drought Update

With rain continuing across the state, Vermont remained drought-free in August. By the end of the month, the U.S. Drought Monitor listed 100% of the state as having no drought conditions. At this time last year, 1.30% of the state was listed in severe drought, 44.95% of the state was listed in moderate drought and 55.05% was listed as abnormally dry.



Drought Comparison between August 2022 and 2023. Map and data: U.S. Drought Monitor.

Flood Impacts on Tree Health

This summer, Vermont has experienced torrential rains and devastating flooding. In addition to community impacts, flood conditions can stress trees from their roots to their crown, causing lasting damage or mortality. There are multiple symptoms and damages you can look for, along with steps you can take to promote tree recovery.

Chlorosis from flood stress. Photo Credit: Andrew J. Boone, South Carolina Forestry Commission, Bugwood.

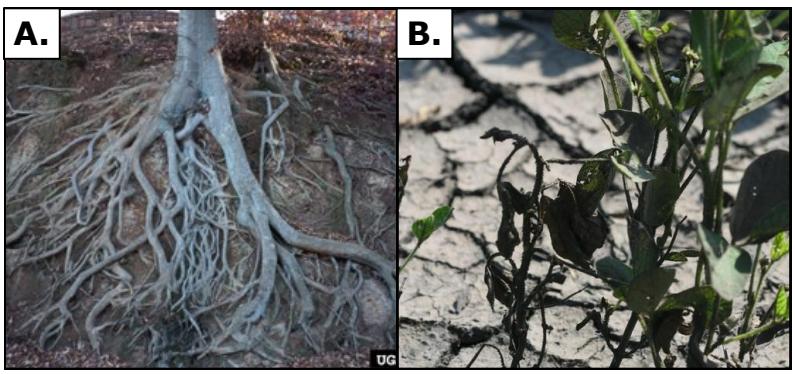
Extended periods of heavy rain and floods cause vast changes in the soil, which can be detrimental to sensitive trees. Waterlogged soils create conditions for molds and fungi to colonize tree roots and soil oxygen is quickly reduced or depleted. Tree roots require oxygen to survive—one to two weeks of flooding during the growing season can severely stress or kill sensitive species, while others can survive for months. Organic matter decomposition slows and changes in anaerobic soils, creating substances that are toxic to trees. Industrial or agricultural pollutants may also be introduced.

Flood-related damages may be visible above the soil surface as well. The bole (trunk) can be wounded by debris, creating openings for pathogens, fungi, and insect pests. Woody debris around the base can attract certain woodboring insects, while sediment deposited over tree roots can further reduce oxygen supply. Conversely, flooding can erode soil, exposing roots and increasing potential for wind blowdown.

Foliage submerged in water for more than a few days will die. Sediment residue on foliage inhibits photosynthesis and gas exchange and can kill impacted branches as well. Flood-stressed trees may exhibit chlorosis (yellowing) of the leaves, premature fall color, and leaf drop. In future years, affected trees may have reduced growth, dieback, and large seed crops. Stressed trees are more attractive to insect pests and fungal pathogens such as Armillaria root rot (*Armillaria* spp.), which can colonize and eventually kill infected trees.

While flooding can have detrimental effects on tree health, it is possible to promote impacted tree recovery. Remove debris and/or sediment at the base of trees to reduce insect and fungal habitat, speed drying, and facilitate soil oxygen recovery. Water and/ or fertilize stressed trees for the next few years, as needed. You can consult with an arborist about pruning impacted branches or restoring soil at the base of the tree. Monitor wounded or stressed trees in the years following a flood event for indicators of continued decline, such as dead branches, thin/ discolored foliage, and fungi.

Additional resources on impacted-tree recovery: *How to manage flood damage to trees* from University of Minnesota Extension; *Understanding the Effects of Flooding on Trees* from Iowa State University Extension and Outreach.



A. Roots exposed by flooding. Photo credit: Randy Cyr, Greentree, Bugwood. B. Foliage damage from flooding. Photo Credit: Daren Mueller, Iowa State University, Bugwood.

Invasive Pest Update—Elm Zigzag Sawfly

Elm zigzag sawfly (*Aproceros leucopoda*) has been confirmed in Vermont for the first time. Larval samples suspected to be elm zigzag sawfly (EZS) were collected from Franklin county and sent to USDA-APHIS PPQ for identification in May 2023. Following confirmation, EZS has since been found in Chittenden and Grand Isle counties. EZS is native to China and Japan, and was first reported in North America in Quebec in 2020.

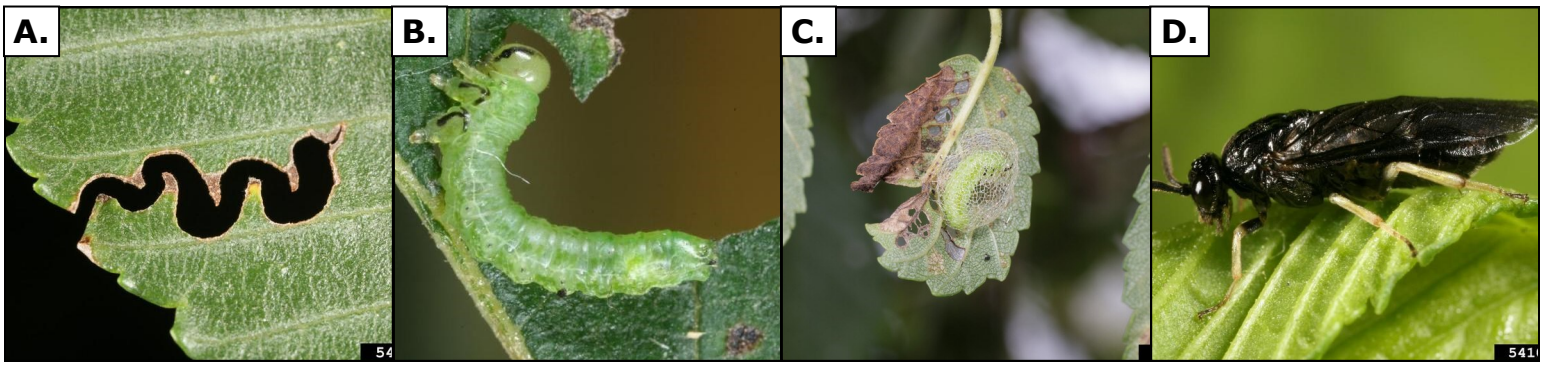
EZS feeding pattern and larvae. Photo Credit: Eric R. Day, Virginia Polytechnic Institute and State University, Bugwood.

Female EZS develop rapidly and reproduce parthenogenetically (asexually), allowing for four to six generations per year. Eggs are laid on elm (*Ulmus* spp.) leaves. Larvae are whitish-gray upon hatching, becoming bright green with dark markings as they mature. As their name implies, larvae feed in a distinctive zigzag pattern between the leaf veins. Older larvae feed more widely, often eliminating the characteristic zigzag pattern. During the growing season, EZS pupate in loose cocoons on the underside of leaves. Adults are shiny, black flies that reach 7–8 mm in length.

EZS are active between May and October. Although the insects are small, outbreaks can fully defoliate elm trees. Significant dieback and/ or tree mortality can occur when a tree experiences annual, heavy defoliation by EZS. Additionally, there are some indications that heavy infestations of EZS may outcompete and cause population declines of native elm specialists.

Given that EZS is a newly introduced pest species, there is still a lot to learn about its impacts and effective management options. Small populations can be removed by hand; heavy infestations require pesticide treatment for removal, which is best done in the spring as soon as larvae are present. However, pesticide applications are not specific to EZS larvae and likely have significant negative impacts on the native invertebrates inhabiting treated elms. EZS is considered a mild pest in its native range—more research is needed to understand natural population controls and if any existing predators or parasitoids may be effective forms of biological control in other regions.

In the meantime, it is important to continue monitoring EZS across Vermont and try to stop the spread into new areas. If you believe you have found EZS, report it on vtinvasives.org. To learn more about EZS, visit the EZS factsheet on Vermont Invasives.



A. EZS feeding pattern. B. EZS larvae. Note the black T-shaped marking about the second and third leg. Photo Credit: A. B. & D.: Gyorgy Csoka, Hungary Forest Research Institute, Bugwood. C: Tom Macy, Ohio DNR Division of Forestry, Bugwood.

Supplemental Sightings

Magnolia scale (*Neolecanium cornuparvum*) was reported in Windsor County. This native, sapsucking scale insect feeds on young magnolia (*Magnolia spp*.) branches. In August, females give live birth to crawlers—mobile nymphs—which are more susceptible to pesticide treatments than later stages. Infestations can cause reduced growth and dieback; heavy infestations may cause mortality.

Magnolia scale. Photo credit: John .A. Davidson, Univ. Md, College Pk, Bugwood.org.

Maple anthracnose (*Aureobasidium apocryptum, Discula campestris and Colletotrichum gleosporoides)* continues to be reported throughout the state. Although this foliar disease is more prevalent after wet springs, it can also appear following periods of heavy rain. This pathogen causes leaf necrosis, deformation, and premature leaf drop. Although not aesthetically pleasing, this pathogen does not contribute to severe dieback or defoliation.

Maple anthracnose. Photo credit: FPR Staff.

Definite tussock moth (*Orgyia definita*) was reported in Lamoille County. Larvae are active from early spring throughout the summer and feed on a number of different hardwood species. Defoliation from feeding does not negatively impact tree vigor. Adult flight period is from mid-summer through October. Males fly to flightless females, who produce egg masses on their cocoons.

Definite Tussock Moth caterpillar. Photo credit: Jeffrey Sokal.

Broad-necked Root Borer (*Prionus laticollis*) was reported in Caledonia County. This species can be found in deciduous forests of eastern North America. Adults feed on foliage and occasionally fruits, while larvae feed on roots, hollowing and girdling them. Since the larval stage can last three years, extensive damage can occur. Infested trees risk outright mortality or blowdown due to weakened roots.

P. laticollis. Photo credit: Jon Yuschock, Bugwood.

An individual harlequin bug (*Murgantia histrionica*) was intercepted in a grocery store in Washington County. Native to Mexico and Central America, nymph and adult harlequin bugs use piercing, sucking mouthparts to feed on the sap of plants in the Brassicaceae family (i.e. broccoli, cauliflower), occasionally attacking other fruit tree and vegetable crops. This species is rarely seen north of Pennsylvania due to its cold intolerance and has not previously been encountered in Vermont. While it is unlikely that this individual could have established in Vermont if it was not intercepted, it is always important to document and report unfamiliar organisms or sightings of known invasives in other regions. This enables preventative measures to be taken, if needed.

Jessica Louque, Smithers Viscient, Bugwood.

Balsam fir needle rust (*Uredinopsis* spp., *Milesina* spp.) was observed on a balsam fir (*Abies balsamea*) in Essex County. Both *Uredinopsis* and *Milesina* rusts infect previous and current-year needles, causing yellowing, necrosis, and premature drop. Between July and August, white, tube-like fruiting bodies (aecia) grow from the bottom of infected needles, opening to release spores. Spores then infect an alternate host, such as bracken fern (*Pteridium aquilinum*), to complete their life cycle.

Balsam fir needle rust. Photo credit: FPR Staff.

Rosy maple moth (*Dryocampa rubicunda*) larvae were reported in Caledonia County. These larvae preferentially feed on maples (*Acer* spp.), but will utilize other hardwood species as well. Like other species in its family (Saturniidae), adults lack mouthparts and cannot feed. While occasional population booms can result in extensive defoliation, this species is not a known agent of tree decline or mortality.

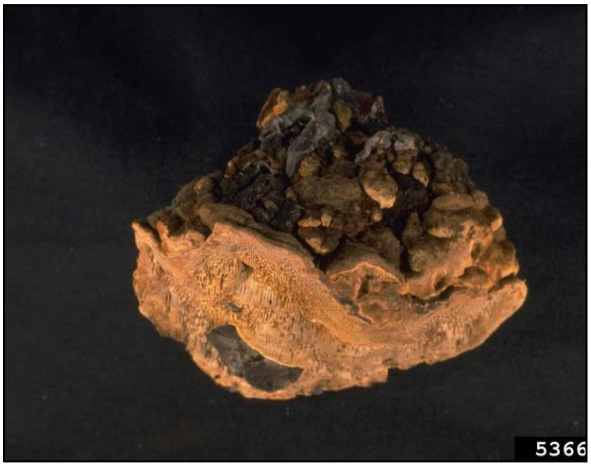
Rosy maple moth larvae. Photo Credit: Steven Katovich, Bugwood.

Elm leaf beetle (*Xanthogaleruca luteola*) damage was reported on elm (*Ulmus* spp.) individuals and stands in Essex County and Caledonia County. Both larvae and adults feed on elm leaves—larvae skeletonize leaves and adults create circular holes. Adults and larvae are active throughout the growing season. Native to Europe, this species has few natural controls.

Elm leaf beetle damage. Photo credit: FPR Staff.

Pine-pine gall rust (*Peridermium harknessii*) is a fungus that causes spherical growths (galls) on the branches or boles of pine trees (*Pinus* spp.). Each spring, the fungus produces orange spores that are wind dispersed. Unlike many rusts, it does not require an alternate host. Pine-pine galls do not always adversely affect a tree. However, galls on the main bole can have a serious effect on growth and survival—when a gall dies or is killed by an invading fungus, nutrient and water flow past the gall is terminated.

Pine-pine gall rust. Photo credit: FRP staff.



Red ring decay (*Porodaedalea pini*, formerly *Phellinus pini*) was reported in Caledonia County. This fungus typically affects older conifer stands. It colonizes trees through a broken branch or knot, then moves into the heartwood. While red ring decay does not directly kill the host tree, it can cause extensive heartwood decay, making the host tree susceptible to breakage. Fruiting bodies are usually indicative of extensive decay.

P. pini fruiting body. Photo credit: William Jacobi, Colorado State University, Bugwood.

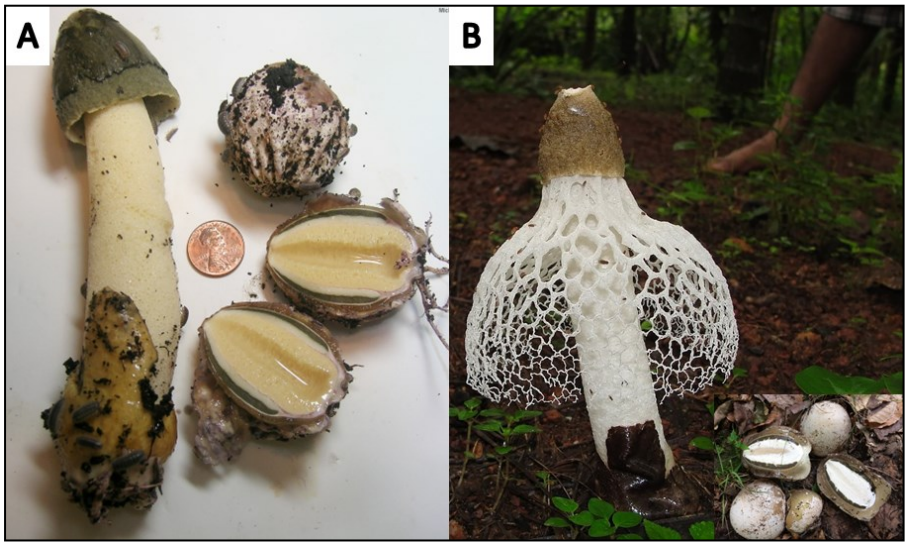
A red-shouldered pine borer (*Stictoleptura canadensis*) was reported in Windsor County. This species is in the longhorn beetle family (*Cerambycidae*). Larvae likely live for several years, feeding on the dead and decaying wood of pine trees (*Pinus* spp.) and other conifers. Adults feed primarily on flower nectar. Little is known about the life history of this insect.

Red-shouldered pine borer. Photo credit: FPR staff.

Zonate leaf spot (*Cristulariella* spp.; *Grovesinia* spp.) has been observed on ash (*Fraxinus* spp.) and boxelder (*Acer negundo*) across the state. Zonate leaf spot causes concentric rings on the leaves of a number of different hardwood, shrub, and herbaceous plant species. Wet springs and summers contribute to higher amounts of zonate leaf spot. Premature leaf drop may occur. Recurring infections may reduce vigor, but this pathogen does not typically cause significant decline or mortality.

Zonate leaf spot. Photo credit: FPR staff.

Foraging For Fungi



A: Ravenel's stinkhorn. Photo and information credit: Michael Kuo, MushrromExpert. **B:** Skirted stinkhorn. Photo and information credit: Ultimate Mushroom.

Ravenel's stinkhorn *(Phallus ravenelil*) is a late summer saprotroph that can be found growing in gardens, lawns and in the woods. The immature fruiting body, or egg-form, is whitish to pink, egg-shaped, 3-6cm high by 2-4cm wide, and typically hidden below ground. This is the only edible stage of this mushroom. When mature, the broadly conical cap is 3-5cm high, creamy to grey brown in color, and perforated at its apex. The cap is covered in a foul-smelling brown slime, which attracts flies to disperse its spores. The pale yellow stem is 10-17cm long and 2-3.5cm thick, tapering as it approaches the cap. This mushroom can be confused with the skirted stinkhorn (*Phallus duplicatus*), another mushroom only edible in its egg form. This saprotrophic mushroom grows in the same environments as Ravenel's stinkhorn. The underground egg form is whitish to purplish in color and 3-8cm high by 2-4cm wide. When mature, this mushroom is similar in size and color to Ravenel's stinkhorn, but develops an indusium (net) from the bottom of the cap that extends halfway down the stem and flares outwards.

Devil's tooth (*Hydnellum peckii*) is an illusive mycorrhizal fungi that can be found in association with pine trees. This tooth fungus is variable in size—above ground height ranges from 3-10cm. Its cap has white to pale-pink margins, a deep pink center, and is slightly funnel shaped, extruding red liquid droplets. It measures 3-8 cm wide when mature and is rounded and often multilobed. The underside of the cap is light pink with 1-5 mm long spines covering its entire surface, giving off a brown spore print. The velvety, cylindrical stem is pinkish in color, 0.5-6cm high and 0.5-2cm wide. The majority of the stem is underground. Under the microscope, the hyphae have clamp connections. This mushroom can be confused with the mealy tooth (*Hydnellum ferrugineum*) mushroom, however mealy tooth lack clamp connections. Neither of these fungi are commonly foraged edibles due to their pungent and bitter taste. However, they are used for dyes.

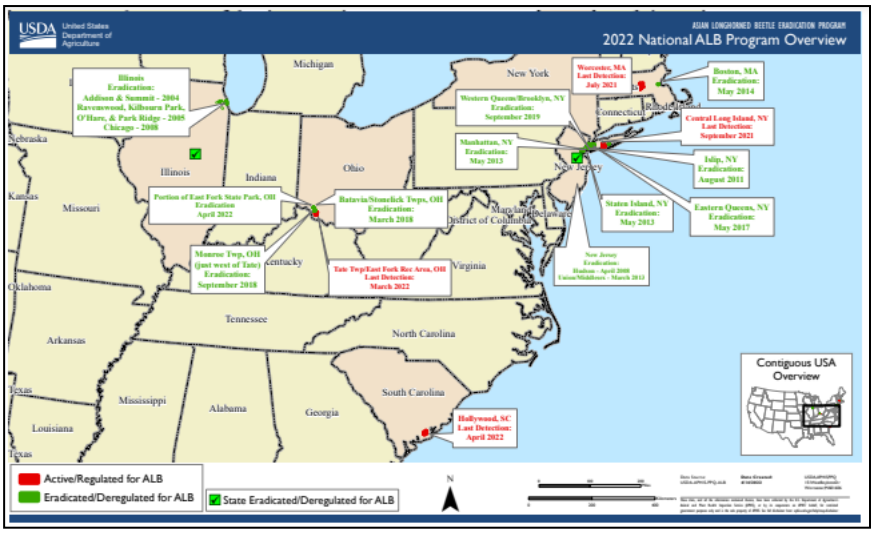
Hydnellum sp. Photo and information credit: Stevie Smith, First Nature.

The State of Vermont accepts no liability or responsibility for the consumption and/or misidentification of any mushrooms mentioned in this publication.

Pests in the Spotlight: Asian longhorned beetle

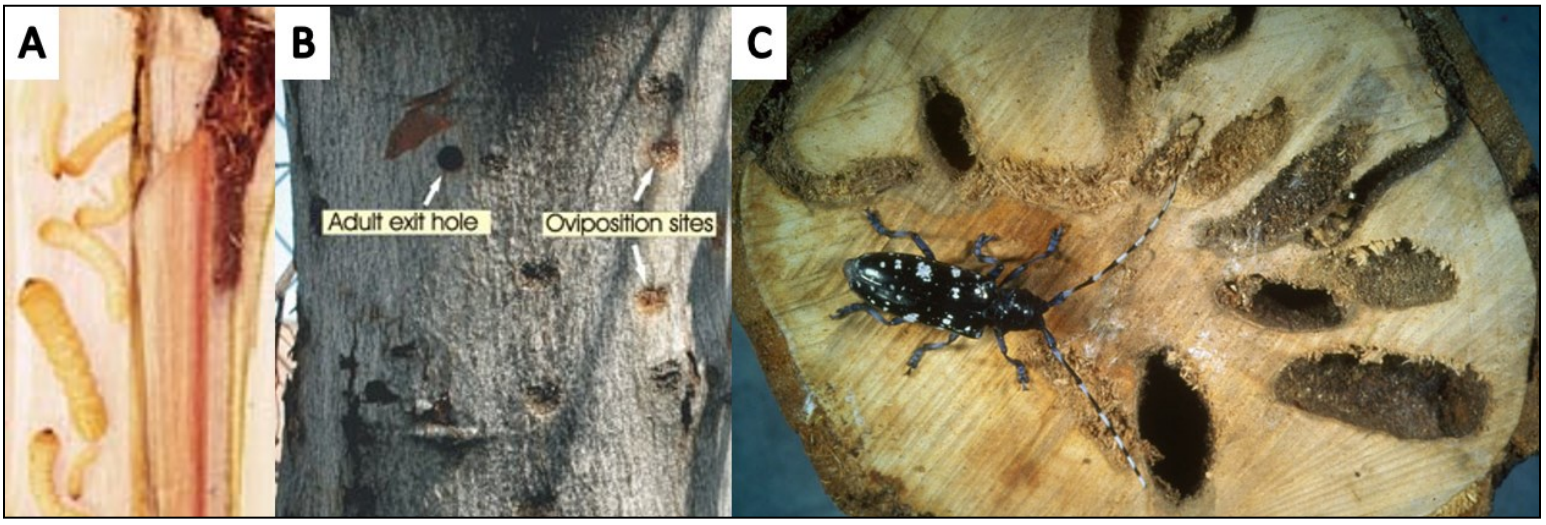
Asian longhorned beetle (ALB, *Anoplophora glabripennis*), an invasive, wood-boring beetle that was first detected in the United States in 1996, **has not yet been detected in Vermont.** This insect feeds on hardwood species including, but not limited to, maple (*Acer* spp.), ash (*Fraxinus* spp.), birch (*Betula* spp.), elm (*Ulmus* spp.), and poplar (*Populus* spp.) trees, making it an insect of high concern to our northern hardwood forests.

ALB has been reported in New York (1996), Illinois (1998), New Jersey (2002), Massachusetts (2008), Ohio (2011), and South Carolina (2020).



2022 National ALB Program Overview Map. Map and Data: U.S. Department of Agriculture's Animal and Plant Health Inspection Service.

ALB eggs are laid in oviposition (egg laying sites) on the host tree's bole and branches. When larvae emerge, they burrow into and then consume the heartwood of infested trees. Larvae form pupation chambers within the tree during development. Newly emerged adults tunnel out of the tree to reproduce, leaving dime-sized exit holes (3/8-3/4 inches) behind. This burrowing causes girdling and dieback which can lead to mortality of infested trees. Adult ALB are 1-1.5 inches long and approximately 0.5 inches wide, glossy black, with white spots. Their black-and-white striped antennae are 1.3-1.5 times longer than their body. Adults can only fly short distances on their own but travel much farther through infested shipping materials and transported firewood. For more information on ALB, or to report a sighting, visit VTinvasives.



A: ALB Larvae. Photo credit: Kenneth R. Law, USDA APHIS PPQ, Bugwood. B: Adult exit holes (left) and Oviposition sites (right). Photo credit: Dudley Conservation Commission. C: Adult ALB on a cross section showing internal damage. Photo credit: E. Richard Hoebeke, Cornell University, Bugwood.

Invasive Plant Phenology

In the second full week of each month, volunteers around the state observe and report invasive plant phenophases. Their observations ae compiled here, creating both a timely resource for best management options and a historic record of plant behavior. We aspire to include observations from every Vermont county in this project, and more observers are always welcome. If you would like to be involved in this effort, please contact pauline.swislocki@vermont.gov or check our volunteer page for other opportunities to get involved. For more information about the phenology of invasive plants in Vermont, check out Bud Buds, a podcast from the Invasive Plant Program.

Addison – common buckthorn: leaves, fruit/ unripe fruit; common reed: leaves, flowers/ flower buds; multiflora rose: leaves; purple loosestrife: leaves, open flowers.

Bennington – garlic mustard: leaves, recent fruit or seed drop; shrub honeysuckle: leaves, recent fruit or seed drop.

Caledonia – wild parsnip: leaves, flowers/ flower buds, open flowers; round leaf bittersweet: leaves; burning bush: leaves; common barberry: leaves; common buckthorn: leaves, fruit/ unripe fruit; glossy buckthorn: leaves, fruit/ unripe fruit, ripe fruit; shrub honeysuckle: leaves; Japanese barberry: leaves.

Chittenden – burning bush: leaves, colored leaves; common barberry: leaves, fruit/ unripe fruit, ripe fruit, colored leaves; common buckthorn: leaves, fruit/ unripe fruit, ripe fruit; common reed: evidence of prior infestation, leaves, flowers/ flower buds, open flowers, pollen release; garlic mustard: initial growth, leaves, fruit/ unripe fruit, ripe fruit; glossy buckthorn: leaves, fruit/ unripe fruit, ripe fruit; goutweed: leaves, flowers/ flower buds, open flowers, fruit/ unripe fruit, ripe fruit; Japanese barberry: leaves; knotweed: evidence of prior infestation, leaves, flowers/ flower buds, open flowers; multiflora rose: leaves; purple loosestrife: leaves, flowers/ flower buds, open flowers; round leaf bittersweet: leaves, fruit/ unripe fruit; shrub honeysuckle: leaves, fruit/ unripe fruit, ripe fruit; wild parsnip: leaves, flowers/ flower buds, open flowers, fruit/ unripe fruit, ripe fruit, recent fruit or seed drop.

Franklin – burning bush: leaves, fruit/ unripe fruit; common buckthorn: leaves, fruit/ unripe fruit.

Grand Isle – common buckthorn: leaves, fruit/ unripe fruit, ripe fruit; purple loosestrife: leaves, flowers/ flower buds, open flowers; shrub honeysuckle: leaves, fruit/unripe fruit, ripe fruit, recent fruit or seed drop.

Washington – burning bush: leaves, colored leaves; goutweed: leaves; knotweed: leaves, flowers/ flower buds; purple loosestrife: leaves, flowers/ flower buds, open flowers; shrub honeysuckle: leaves, fruit/ unripe fruit, ripe fruit; wild chervil: leaves.

FORESTS, PARKS & RECREATION VERMONT AGENCY OF NATURAL RESOURCES

For more information, contact the Forest Biology Laboratory at 802-565-1585 or:

Windsor & Windham Counties	Springfield (802) 289-0613
Bennington & Rutland Counties	Rutland (802) 786-0060
Addison, Chittenden, Franklin & Grand Isle Counties	Essex Junction (802) 879-6565
Lamoille, Orange & Washington Counties	Barre (802) 476-0170
Caledonia, Orleans & Essex Counties	St. Johnsbury (802) 751-0110

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