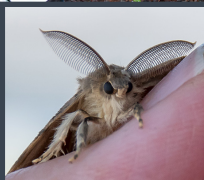


Protecting Washington from Invasive Pests



DON'T CROSS THE LINE
**No Homegrown Fruit
Beyond This Point**
Entering Apple Maggot
Pest-Free Area



Washington
State Department of
Agriculture

Pest Program
Entomology Branch

Washington’s environment faces a constant threat – the accidental introduction of invasive pests that could ruin ecological systems, parks, gardens, farms, and even our economy. But through early detection and a quick response, we can protect our natural resources from destructive invasive pests for years to come.

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More about invasive insects

What are invasive insects?

Invasive insects are non-native insects that cause ecological or economic harm in a new environment. For example, the Japanese beetle is considered invasive because it is not from Washington and it damages hundreds of plants. However, although the honeybee isn't native, it is not considered invasive because it does not cause widespread harm and even provides benefits to humans.

Why is WSDA concerned about invasive insects?

Invasive insects threaten our environment as a whole in addition to agriculture. For example, gypsy moth caterpillar feeding can devastate entire forests. Apple maggot could infest and devastate the Washington apple industry. The Washington Invasive Insect Council estimates that if just 23 invasive insects became established in Washington, the costs to the state would exceed \$1.3 billion annually.

How do invasive insects get to Washington?

People are the primary movers of invasive insects. Pests can hitch rides on container ships, wood pallets, stone, logs, nursery stock and other items that people bring from other states or countries to sell locally. People who relocate or visit Washington from infested areas can also carry invasive insects on their vehicles, furnishings, or other items they bring with them.

How does WSDA stop invasive insects from establishing here?

Early detection. WSDA in cooperation with the U.S. Department of Agriculture (USDA) conducts annual statewide trapping to detect introductions of invasive insects. WSDA trappers place about 35,000 traps throughout the state each year. The traps detect pests as soon as they are introduced in the state and provide vital information for state entomologists.

Rapid response. When trapping and other monitoring (such as finding egg masses) indicates that an invasive insect may be establishing, WSDA takes action. This may include increased trapping, taking steps to eradicate a pest, or establishing quarantines to prevent the spread of a pest.

Benefits of controlling invasive species

Everyone in Washington as well as tourists, other states, and even international customers benefit from the work the WSDA's Pest Program conducts to protect our state from invasive insects.

- **Residents** – Insects like gypsy moth and the Japanese beetle are a nuisance that can destroy yards, gardens, and parks.
- **Recreation** – Protecting our local, state, and national parks from invasive insects keeps them beautiful and usable for recreation.
- **Farmers** – Protecting crops from invasive species reduces pesticide costs and keeps markets open for Washington-grown products.
- **Environment** – Insect pests can defoliate and kill trees – sometimes entire forests. Controlling invasive pests protects not only the plants but all the wildlife that depends on them.
- **Economy** – Controlling invasive species protects valuable timber and agricultural products as well as the thousands of jobs that depend on these industries.
- **National and international customers** – Washington products are well-known throughout the world. Controlling invasive species means people around the world can continue to enjoy high-quality, Washington-grown products.
- **Other states** – Washington can be a gateway for some invasive species into the U.S. By controlling those pests here, Washington is playing a significant role in protecting other states.

You can help protect our environment

While WSDA entomologists are actively searching for and trapping potential invasive insect pests, you can help us by keeping your eyes open for any unusual insects or signs of insect damage that you do not recognize. The more eyes searching for invasive species, the more likely we are to detect an invasive species before it becomes established in Washington or contain the spread of the pest.

What if you find a strange looking insect?

If you find an unusual insect, if possible, capture the insect in a secure container and take a photo of it.

Send photos of the insect to PestProgram@agr.wa.gov for identification. You can also report suspected invasive species through the Washington Invasive Species Council's WA Invasives app.

Maintain the specimen in the container until you are contacted with further instructions.

If unable to capture the specimen, a quality image is still helpful.

- Get as close as you can to the insect while still obtaining a clear image.
- Hold the camera steady both before and after taking the picture to reduce blurry images.
- Take multiple shots – getting clear images of insects can be tricky!

Without a photograph or specimen, entomologists cannot confirm an insect's identity.

Priority pests of concern

Apple Maggot (*Rhagoletis pomonella*)

Potential damage/risk

- Tunnels through fruit such as apples, crabapples, cherry, pears, plums, and apricots. The damage turns the fruit brown and mushy.
- If found in commercial fruit, it could devastate the Washington apple industry – Washington's top crop.

Identification highlights

- Adults – unique banding pattern on wings, can only be identified with microscopic examination.
- Larvae – legless white maggot

Most likely to be found

- Adults – Spring/summer
- Larvae (maggots) – Summer/fall (in fruit)

Quick facts

- Apple maggot flies don't fly well. People unintentionally speed their spread when they take infested homegrown or foraged fruit into a pest-free area.
- About half of Washington is quarantined for apple maggot, mostly in Western Washington.
- If you live in an apple maggot quarantine area, you cannot take homegrown fruit or green waste into the pest-free area.
- Learn more about apple maggot at agr.wa.gov/applemaggot

Images

Adult

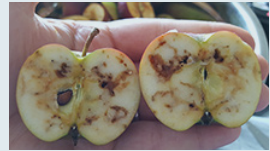


Joseph Berger, Bugwood.org

Larva



Infested apple



Sticky trap



Whitney Cranshaw, Colorado State University, Bugwood.org

Asian Longhorned Beetle (*Anoplophora glabripennis*)

Potential damage/risk

- Larvae bore deep into trees. This can destroy the tree's vascular system and eventually kill the tree.
- Tourism, nursery, and lumber industries as well as urban forests would be severely impacted. Quarantines would be a multi-million dollar blow to Washington's economy.

Identification highlights

- Large black beetle with white (sometimes yellow) spots. Distinctive long striped antenna are usually considerably longer than the beetle's body.
- Perfectly round exit holes in hardwood trees and large amounts of sawdust at the base of trees.

Most likely to be found

- Adults found May-October, most common in August

Quick facts

- Moving firewood, pallets, and nursery stock can spread Asian longhorned beetle. They can be transported as larvae long distances before emerging as adults.

Images

Adult



Joe Boggs, Ohio State University, Bugwood.org

Adult



Gillian Allard, FAO of United Nations, Bugwood.org

Exit hole



Dennis Haugen, USDA Forest Service, Bugwood.org

Damaged tree



Dennis Haugen, USDA Forest Service, Bugwood.org

Citrus Longhorned Beetle (*Anoplophora chinensis*)

Potential damage/risk

- Attacks and kills more than 100 species of plants including several species in the citrus family as well as apple, willow, poplar, maple, alder, elm and birch.

Identification highlights

- Large black beetle with 10-12 white spots on each wing cover. Long antennae have alternating black and white (sometimes blue) bands.
- Round or oval shaped exit holes on bark, large amounts of sawdust at the base of hardwood trees.

Most likely to be found

- Adults found May-October, most common in August

Quick facts

- This beetle is introduced in wood packing material and live plant material.
- Native to China, Korea, and Japan, this pest has been found and successfully eradicated in Georgia, Wisconsin, and Washington.

Images

Adult



Steven Valley, Oregon Department of Agriculture, Bugwood.org

Adult



Art Wagner, USDA-APHIS, Bugwood.org

Exit hole on bonsai in Lacey, WA



Exit hole on tree



National Plant Protection Org., the Netherlands, Bugwood.org

Emerald Ash Borer (*Agrilus planipennis*)

Potential damage/risk

- Kills stressed and healthy trees and is so aggressive that trees may die in only two or three years. Has killed millions of ash trees in areas where it is established.

Identification highlights

- Small insect with a narrow body and green metallic wing covers.

Most likely to be found

- Adults from May-September, peak flight in mid-June

Quick facts

- Emerald ash borer was discovered in 2002 in Detroit. Within five years, most infested trees had died.
- Moving firewood can rapidly increase the spread of this pest.

Images

Adult



Howard Russell, Michigan State University, Bugwood.org

Larva in wood



David Cappaert, Bugwood.org

Larval damage under bark



Michigan Department of Agriculture, Bugwood.org

50 traps annually



Kelly Oten, North Carolina Forest Service, Bugwood.org

European Cherry Fruit Fly (*Rhagoletis cerasi*)

Potential damage/risk

- Larva (maggots) infest cherries and feed on the tissue between the fruit skin and the pit, causing soft, brown spots in the fruit.
- European cherry fruit fly is the most serious pests of cherries in Europe.

Identification highlights

- Adults – unique banding pattern on wings, can only be identified with microscopic examination.
- Larvae – legless white maggot

Most likely to be found

- Summer

Quick facts

- Washington is the top producer of sweet cherries in the country, so this pest poses a particularly dangerous threat to our state.

Images

Adult



Alison Morris, Bugwood.org

Larvae



C. Daniel and J. Grunder NIH

Pupae



Alison Morris, Bugwood.org

100 traps annually



Whitney Cranshaw, Colorado State University, Bugwood.org

European Grapevine Moth (*Lobesia botrana*)

Potential damage/risk

- Larvae cause the damage. They feed on both grape flowers as they develop and on developing and ripe grapes. Feeding on ripe grapes exposes the grapes to further damage with fungal infections.
- Also infest blackberries, currants, gooseberries, kiwi fruit, stone fruit, barberry, carnation, St. John's wort, rosemary, red clover, and many other crops.

Identification highlights

- About 1/3 of an inch long having bell shaped wings with patterns. Microscopic examination by a trained entomologist required for a positive identification.

Most likely to be found

- Spring, summer, fall

Quick facts

- First discovered in the U.S. in 2009 in California and fully eradicated in 2016.
- Can have 2-4 generations per year.

Images

Adult



Todd M. Gilligan and Marc E. Epstein, TortAI: Tortricids of Agricultural Importance, USDA APHIS PPQ, Bugwood.org

Adult



Todd Gilligan, Screening Aids, USDA APHIS PPQ, Bugwood.org

Larva



Todd M. Gilligan and Marc E. Epstein, TortAI: Tortricids of Agricultural Importance, USDA APHIS PPQ, Bugwood.org

300 traps annually



Gypsy Moth (*Lymantria dispar*)

Potential damage/risk

- European and Asian gypsy moths feed on about 500 types of trees and shrubs and can defoliate entire forests.
- Defoliation can kill trees and have a cascading effect of other ecological harm, such as loss of habitat for wildlife and increasing stream temperatures, which would negatively impact spawning salmon and steelhead.

Identification highlights

- Males are tan with large, feathery antennae.
- Females are off-white with chevron wing patterns. European females cannot fly.
- Egg masses are tan and fuzzy. Can be laid on any outdoor surface, but usually at the base of tree trunks.
- Larvae (caterpillars) have five pairs of blue dots and six pairs of red dots on their backs.

Most likely to be found

- Larvae – Late spring/early summer
- Adults – Summer
- Egg masses – Fall to spring

Quick facts

- Many people are allergic to gypsy moth caterpillars, getting a rash if they handle them.
- In 2016, gypsy moth damage in New England could be seen from space.
- WSDA has successfully prevented gypsy moth from establishing in Washington for over 40 years.
- Learn more about gypsy moth at agr.wa.gov/gypsymoth

Images

Adults



Larva



Egg masses



20,000 to 30,000 traps annually



Introduced Stink Bugs and Relatives

Potential damage/risk

- Larvae and adults use needle-like mouthparts to suck juices from plants, including fruit and vegetables.
- Heavy feeding reduces crop yield and attacked fruit can rot at the injury site.
- Large outbreaks become a nuisance for homeowners and producers, and the stink bugs' unpleasant smell can taint agricultural products.

Identification highlights

- Shield-shaped adults.
- Immature stages of many species have distinctive patterns of contrasting spots.

Most likely to be found

- Adults and nymphs are found outdoors from April-October.
- Overwintering adults of many species are common in houses during cold months.

Quick facts

- Warmer winter temperatures have helped some species recently establish in Washington State. Yellow-spotted stink bug and Sunn pest are two species often intercepted in international cargo and are at risk for being pests in the state.
- Washington State University has a program to distribute tiny wasps that feed on BMSB to help control it in our state.

Images

Brown Marmorated Stink Bug (*Halyomorpha halys*)



Susan Ellis, Bugwood.org

Southern Green Stink Bug (*Nezara viridula*)



Adult Yellow spotted stink bug (*Erthesina fullo*)



Pennsylvania Department of Agriculture

Sunn pest (*Eurygaster integriceps*)



Boris Loboda

Invasive Hornets (*Vespa* spp.)

Potential damage/risk

- Asian hornet species attack honeybees as well as native bees and other pollinators. European hornets also attack soft fruit. Some hornets pose serious threats to human health.
- Asian giant hornets attack many insects but especially honeybees. Only a few hornets can kill an entire honeybee hive in a matter of hours. Asian giant hornet is the largest hornet in the world.
- Typical beekeeping attire will not protect you from Asian giant hornet stings. They can also sting repeatedly and their venom is more toxic than native bees and wasps.

Identification highlights

- Adult hornets are often larger than our native wasps and yellow jackets - over 1 inch in length. Several species have disproportionately large heads.
- **Some of these hornets are extremely dangerous!** Send a photograph unless a suspect specimen is found already dead.

Most likely to be found

- July to October

Quick facts

- The Oriental hornet was intercepted and eradicated in Washington.
- Several species of invasive hornets were reported in British Columbia in 2019.
- Asian giant hornet was detected in Washington in late 2019.
- Learn more at agr.wa.gov/hornets

Images

Asian Giant Hornet



Bee kill



Teddy McFall

European Hornet



John Yuschock, Bugwood.org

Hornet-eaten pears



Pennsylvania Department of Agriculture

Japanese Beetle (*Popillia japonica*)

Potential damage/risk

- Feeds on about 300 species of plants, devouring leaves, flowers, and overripe fruit, but roses seem to be their favorite.

Identification highlights

- This metallic green and copper beetle has a row of six white spots along each side of its abdomen as well as two white spots on the back end of the abdomen.

Most likely to be found

- Larvae – During the spring, often in lawns
- Adults - Summer

Quick facts

- Japanese beetles are most frequently introduced through air travel. WSDA focuses its trapping near airports.
- WSDA has trapped for Japanese beetles for over 30 years. There are still no established populations of Japanese beetle in the state.

Images

Adult



Whitney Cranshaw, Colorado State University, Bugwood.org

Larva



David Cappaert, Bugwood.org

Adults



USDA Agricultural Research Service, Bugwood.org

2,000 traps annually



Oregon Department of Agriculture

Lily Leaf Beetle (*Lilioceris lili*)

Potential damage/risk

- Attacks the leaves, stems, buds, and flowers of lilies, fritillaries, and giant lilies.
- Feeding causes immediate loss of aesthetic value. Repeated feeding can kill plants.

Identification highlights

- Adults – Bright red bodies without spots and black legs
- Eggs – Orange about the size of a grain of rice clustered on undersides of leaves
- Larvae – Often appear brown/black due to covering themselves with excrement and look like clumps of wet slug or bird droppings.

Most likely to be found

- Adults – March to October
- Larvae – April to August

Quick facts

- While it prefers cultivated lilies, research indicates that the beetle will also feed on wild native lilies and other plants in the lily family.
- WSDA has successfully released two species of specialized parasitoid wasps to help control this beetle. Extensive research indicates that the wasps will not feed on native beetle species in North America.

Images

Adult



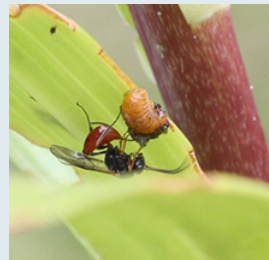
Larvae



Adult laying eggs



Parasitic wasp attacking larva



Sirex Woodwasp (*Sirex noctilio*)

Potential damage/risk

- Attack healthy and unhealthy trees. Populations of Washington's native pines and other conifers could suffer severe damage from an infestation.

Identification highlights

- Cylindrical body, spear-shaped plate at the end of the abdomen, black antennae.
- Females: metallic blue head and body, orange legs.
- Males: metallic blue head and thorax, orange and black abdomen.

Most likely to be found

- Adults found May - October, most common in July

Quick facts

- These wasps are one of the most commonly detected invasive species at U.S. ports.
- Has cause damage to pine plantations in Australia, South Africa, and Argentina.
- Washington has many similar-looking native species that don't cause extensive harm.

Images

Adult



Steven Valley, Oregon Department of Agriculture, Bugwood.org

Adult female



David R. Lance, USDA APHIS PPQ, Bugwood.org

Larva



Vicky Klasmer, Instituto Nacional de Tecnología Agropecuaria, Bugwood.org

Sap beads from wasp wounds



Dennis Haugen, Bugwood.org

Spotted Lanternfly (*Lycorma delicatula*)

Potential damage/risk

- Major pest of grapes, hops, nursery stock, fruit trees, herbs, and hardwood trees.
- Ejects large quantities of honeydew which coats cars, decks, plants, and animals. The honeydew promotes mold, killing plants and ruining fruit.

Identification highlights

- Adults - light grey spotted forewings and red hind wings.
- Nymphs - black with white spots and develop red patches as they age.
- Eggs - laid in rows and covered by a waxy substance that looks like a splash of mud.

Most likely to be found

- Nymphs – May to July
- Adults – August to October, frequently on tree of heaven

Quick facts

- Although it feeds on many species of plants, it strongly prefers tree of heaven.

Images

Adult



Pennsylvania Department of Agriculture

Nymphs



Pennsylvania Department of Agriculture

Warming grapes



Pennsylvania State University

Egg laying on garden tool



Kenneth R. Law, USDA APHIS PPQ, Bugwood.org

Vineyard Snail (*Ceruella virgata*)

Potential damage/risk

- They consume cereal and legume crops, pasture vegetation, and some native plants. They go into a dormant stage in the summer, often on top of crops, which can clog harvest machinery as well as contaminate and spoil crops.
- They can carry plant, animal, and human diseases.

Identification highlights

- The shell has 5-7 convex whorls, which are white or tan in color and usually have dark brown spiral bands.
- The shell's mouth is round with an internal rib, which may be white or brown.

Most likely to be found

- September and October after rains

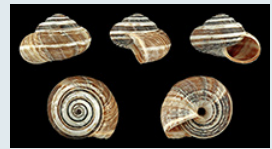
Quick facts

- Invasive snails enter the United States almost exclusively through international container movement.
- Vineyard snails were first detected in Washington in 2005.

Images



Udo Schmidt



H. Zell



Arthur Chapman

WSDA INFORMATION

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Cover photos:

- ¹ Spotted Lantern Fly -
Lawrence Barringer, Pennsylvania Department of Agriculture, Bugwood.org
- ² Emerald Ash Borer -
Jared Spokowsky, Indiana Department of Natural Resources, Bugwood.org
- ³ Brown Marmorated Stink Bug Nymphs -
Gary Bernon, USDA APHIS, Bugwood.org

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