2018 Insect Report

UTAH DEPARTMENT OF AGRICULTURE AND FOOD
PLANT INDUSTRY AND CONSERVATION

EUROPEAN CORN BORER
Ostrinia nubilalis (Hübner)

INSECT PROGRAM

MORMON CRICKET - VELVET LONGHORNED BEETLE - EMERALD ASH BORER
NUN MOTH - JAPANESE BEETLE - PINE SHOOT BEETLE - APPLE MAGGOT
GYPSY MOTH - PLUM CURCULIO - CHERRY FRUIT FLY - LARGE PINE WEEVIL
LIGHT BROWN APPLE MOTH - ROSY GYPSY MOTH - EUROPEAN HONEY BEE
BLACK FIR SAWYER - GRASSHOPPER - MEDITERRANEAN PINE ENGRAVER
SIX-TOOTHED BARK BEETLE - NUN MOTH - EUROPEAN GRAPEVINE MOTH

Program Contributors and Partners

USDA Animal and Plant Health Inspection Service

DHS Customs and Border Protection

Utah State University Plant Pest Diagnostics Lab

Utah Nursery and Landscape Association

USDA Forest Service Forest Health Protection

UTAH WEED CONTROL ASSOCIATION

USDA CENTER FOR PLANT HEALTH SCIENCE AND TECHNOLOGY

UTAH STATE HORTICULTURE ASSOCIATION

The Utah Department of Agriculture and Food Insect Program thanks all program contributors and partners.

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MESSAGE FROM THE MANAGER

Insect Program Manager Kristopher Watson discusses how UDAF protects agriculture and improves Utah's quality of life.

On behalf of the Utah Department of Agriculture and Food (UDAF) Plant Industry's Insect Program, thank you to all the farmers, ranchers and constituents of the great state of Utah that support and protect our agricultural and natural resources from invasive and endemic agriculture pests. UDAF has been delegated the extremely difficult task of controlling and eradicating pests that threaten our natural resources and food supply. In 2018, Utah saw a significant increase in grasshopper populations, honey bee disease and nursery quarantine related issues.

Endemic rangeland pests are an ongoing problem in the West, and Utah is no exception. Fortunately for the past several years we have seen moderate to low populations of grasshoppers, however in 2018 we saw a 50% increase of infested acres. UDAF continues to assist in suppressing populations of rangeland pests on both state and private lands as cyclical populations of these problematic insects are on the rise.

The Apiary Program staff has been extremely busy, as 2018 brought a high rate of American foulbrood, a contagious and deadly bee disease. Our staff and county inspectors have been helping the apiary industry adjust to the new FDA Veterinarian Feed Directive by providing disease diagnostics and giving technical assistance on how to obtain antibiotics under recently enacted federal regulations. The honey industry is growing amongst hobbyist and sideline beekeepers and it remains extremely important to the beehive state to maintain a healthy and robust apiary industry. Thank you to all the county inspectors that help to make this program a success.

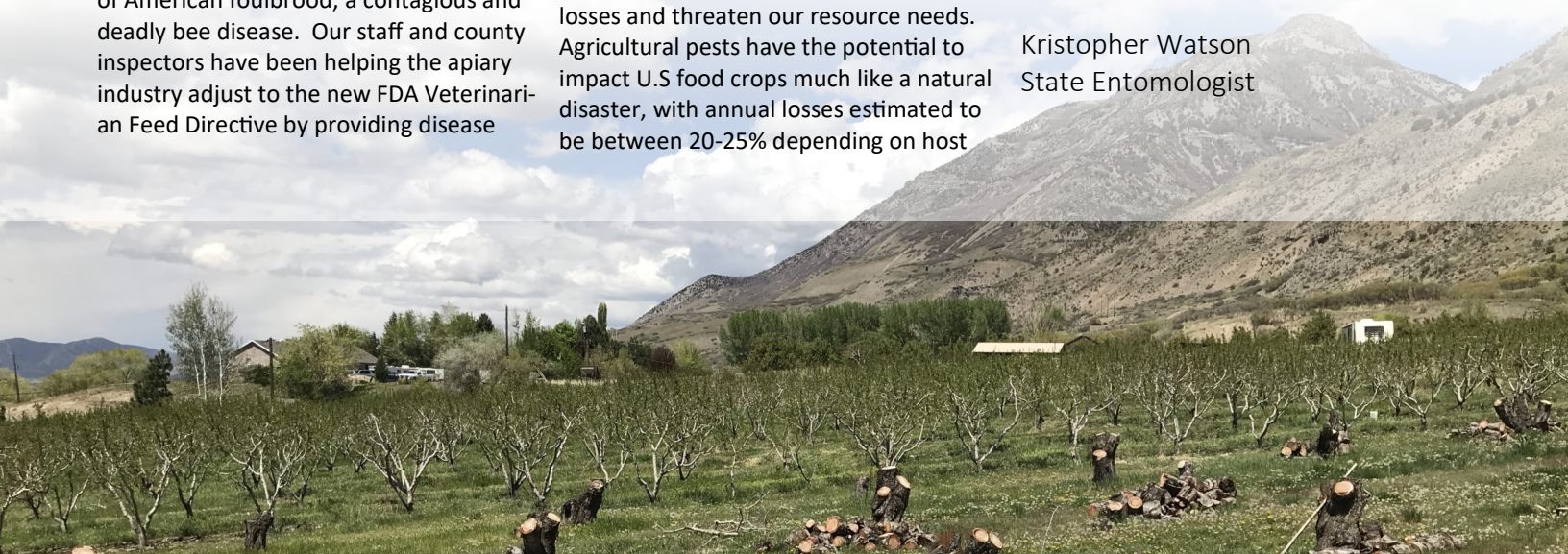
I cannot thank our staff enough as they continue to work hard to help protect, monitor and control invasive pests and diseases in an effort to maintain a competitive market, minimize losses and protect the future of agriculture here in the state. Our Insect Program staff, which includes agriculture inspectors and seasonal staff, placed, checked and retrieved over 5,000 detection traps for over 20 different invasive pest species. Invasive pests and diseases are moving around the world at an alarming rate, due to the growth of commerce and world-wide trade. These developments have created new pathways for pest introduction that have never been seen before. Additional changes in monoculture farming, weather patterns and climate all contribute to agriculture losses and threaten our resource needs. Agricultural pests have the potential to impact U.S food crops much like a natural disaster, with annual losses estimated to be between 20-25% depending on host and species. While many insects are beneficial and we support pollinators, invasive pest infestations can be devastating to agriculture as well as our environment.

UDAF has been addressing insect issues since pioneer agriculture began here in Utah, over 160 years ago. With your help and support, we have managed to find small populations of new invasive pests (such as Japanese beetle and gypsy moth) and prevented establishment before they impact our state for generations to come. The importance of early detection and rapid response is critical to the success of future projects and the viability to agriculture in the state of Utah.

As we are challenged by new invasive pests moving forward, I give you my commitment, as well as that of the Insect Program staff, to do our very best to protect the social, environmental and economic integrity of Utah. With your help, we will continue to protect the state's agricultural industries, food supply and our quality of life from endemic and invasive species for years to come.

It comes with my deepest respect, in which I say, thank you!

Kristopher Watson
State Entomologist



THE UTAH APIARY PROGRAM

State and county governments collaborate to protect honey bees from diseases, pests and abiotic threats.

For more than 125 years the state of Utah has cooperated with county governments to protect the health of honey bees *Apis mellifera* (Linnaeus) through inspection of managed operations. Identifying the numerous diseases, parasites and other maladies that affect Utah's honey bee colonies is just as important today as it was over a century ago when the program began. Utah's cooperative bee program allows county governments to appoint an inspector upon the petition of five beekeepers; it permits the state to hire inspectors as well. These coordinated efforts help safeguard the approximately 37,000 beehives that call Utah home and protect an industry estimated to be worth between $20-30 million dollars a year.

2018 was a productive year for both state and county inspectors. In total they visited more than 300 operations throughout the state and inspected approximately 4,500 individual hives. Unfortunately, rates of major disease and pest issues spiked in 2018. Of particular concern were increases in American foulbrood (*Paenibacillus larvae*) and European foulbrood (*Melissococcus plutonius*) diseases. The prevalence of both pathogens has been relatively low in recent years. However, new changes in federal regulations of antibiotic use likely contributed to the increased prevalence of both diseases in 2018 (see "Honey Bees and Antibiotics" section on page four). Varroa mite *Varroa destructor* (Anderson and Trueman) parasitism and a condition associated with this pest known as parasitic mite syndrome (PMS), was also up compared to previous years. The parasite is particularly severe in the months of August through October; this is having an intensively negative effect on the state's colonies. The invasive bee pest small hive beetle (SHB) *Aethina tumida* (Murray) was also detected for the first time in Millard County in 2018, adding to previous findings in Washington and Davis counties in 2016 and 2017 respectively. Due in large part to Utah's dry climate, SHB is unlikely to be a major problem for Utah beekeepers, as the pest thrives in humid environments. However, individual beekeepers may experience occasional outbreaks and vigilance is needed to avoid economic impact. Beekeepers who suspect that SHB may be in their hives are asked to contact UDAF. In light of these overall inspection results, pest and disease issues are likely to be a major issue for Utah's beekeepers in 2019.

Of particular concern [in 2018] were increases in American foulbrood and European foulbrood diseases. The prevalence of both pathogens has been relatively low in recent years.

Figure 1. State inspector Stephen Stanko takes a sample of dead brood to test for pathogens.

It should be noted however, that the problems in beekeeping are not strictly disease and pest related. Over the past five years there has been a concerning trend of increased theft and vandalism of hives in Utah. In order to better understand this problem, UDAF will begin recording all reported instances of theft and vandalism in 2019. There is also concern about the impact of pesticides on the health of bees; therefore the state has also been active in promoting best practices of pesticide use to avoid bee poisonings, as outlined in the next page.

APIARY PROGRAM HIGHLIGHTS

Managed Pollinator Protection Plan

In response to concerns about pesticide misuse and their negative impacts on bees, UDAF brought together beekeepers, commercial growers, pesticide applicators, landowners and the general public to create a Managed Pollinator Protection Plan (MP3) in 2015. The plan is designed to facilitate communication and cooperation between stakeholders with the goal of reducing bee exposure to pesticides. Since its implementation the state has undertaken extensive education and outreach efforts. In 2018 these activities included:

- Distributing hundreds of bee-friendly seed packets to the public at events around the state.
- Placement of educational displays at pesticide retailers around Utah, including Intermountain Farmer's Association (IFA), Steve Regan and Home Depot.
- Pesticide use education at the Utah Nursery and Landscape Association annual conference, Utah Weed Supervisor's Association pesticide workshop, and Utah Pesticide Safety Education Program events.

The National Honey Bee Survey

USDA-APHIS began the National Honey Bee Survey (NHBS) in 2009 to address the problems in honey bee health. This survey takes an epidemiological approach to document honey bee diseases, pests and pathogens. Additionally, NHBS monitors for invasive threats to honey bees, including the parasitic mite *Tropilaelaps clareae* (Delfinado and Baker) and the exotic Asian honey bee *Apis cerana* (Fabricius). Although it is a federal program, money is allocated to participating states to conduct sampling and data collection. Sampling involves collection of adult bees, immature bees and wax from operations that have 10 or more hives. These are sent to the USDA Bee Research Laboratory in Beltsville, Maryland where they are tested for exotic pests, pathogens and pesticide residues. UDAF and beekeepers throughout the state have participated in NHBS since 2011 and have contributed hundreds of samples to this important body of scientific data. In 2018 state inspectors completed a record high of 39 NHBS samplings statewide. To date, no exotic pests or pathogens have been detected in Utah. Data collected thus far has demonstrated that Varroa mite infestations are, on average, in excess of levels thought by scientific authorities to be acceptable from the months of August through October (mirroring state data). The complete results of this survey can be viewed at the Bee Informed Partnership website: https://bip2.beeinformed.org/state_reports/

Africanized Honey Bee

Since 2008 when Africanized honey bee (AHB) *Apis mellifera scutellata* (Lepeletier) was first detected in Southern Utah the UDAF Apiary Program has monitored its spread through the state. Though AHB can be dangerous, they have been unfairly sensationalized in the media. Thankfully, education efforts have successfully decreased panic and stinging incidents nationwide. In Utah, there have only been a few instances of AHB attacking humans or other animals. Nevertheless, if a person has no experience managing bees, it is best practice to keep clear of any encountered honey bees and to treat all colonies with the respect they deserve.

The counties with known established AHB populations are: Emery, Garfield, Grand, Iron, Kane, San Juan, Washington and Wayne. State inspectors continue to track

APIARY PROGRAM HIGHLIGHTS

movement to new areas by placing swarm traps and testing aggressive bees in uninfested counties. UDAF is committed to ensuring that all stakeholders are made aware whenever AHB moves into a new county. No new county records were found in 2018. Looking forward to next year, detection efforts will again be focused on counties at highest risk for establishment.

Honey Bees and Antibiotics

As a response to the growing threat of antibiotic-resistant strains of pathogens, the FDA implemented the Veterinary Feed Directive (VFD) rule in 2017. This rule established new requirements for the use of antibiotics in animal feed. Over the past two years this change has significantly impacted beekeepers by restricting their access to antibiotics and prohibiting prophylactic use. Beekeepers are now required to go through a veterinarian to access antibiotics. This change has likely been a significant contributing factor to Utah's higher rates of both American and European foulbrood diseases in 2018.

In an attempt to ease the impact of the new regulations on beekeepers UDAF has been working to educate vets about their new responsibilities, facilitate communication between stakeholders and provide timely pathogen test results. The addition of qPCR disease diagnostic capabilities to the UDAF Entomology Lab (see page 18) in 2018 was critical in the success of this effort; now vets and beekeepers can expect to get accurate test results in days rather than weeks.

Western Association of State Departments of Agriculture (WASDA)

Figure 2. Gov. Gary Herbert examines an observation hive at the WASDA meeting.

The Apiary Program presented at the dinner of the Western Association of State Departments of Agriculture (WASDA) Annual Meeting on August 6th in Salt Lake City. WASDA is an association of commissioners of agriculture from Western states. Attendees learned about Utah's long-running Apiary Program and the history of beekeeping in Utah. An observation beehive allowed everyone to get an up-close look at the inner workings of a honey bee colony. The event gave an opportunity for Utah to showcase to the nation its extraordinary efforts in promoting bee health.

Honey Bee Health Conference

The annual Utah Honey Bee Health Conference was hosted during November in Vernal City and was a great success. Most of the beekeepers that were present lived in the Uintah Basin, though some made a trek from other areas of the state to attend. Attendees included professional, sideliner and hobbyist beekeepers.

The conference began with an update on honey bee health in Utah from state and county inspectors. This was followed by a presentation from Sharah Yaddaw, Communications Director of Project Apis m., a non-profit organization devoted to funding direct research on improving honey bee health. The presentation covered projects funded by Project Apis m. on Varroa mite resistance, Nosema disease treatment and long-term stock improvement. After the presentations, beekeepers were given the opportunity to attend breakout sessions that covered foulbrood detection, Varroa mite measurement, Varroa mite treatment, and small hive beetle identification.

Agricultural Compliance Specialist Jason Noble stands beside an insect trap at an orchard sentinel site.

THE ORCHARD SENTINEL SURVEY

The Insect Program monitors for invasive and native pests in Utah's multi-million dollar fruit industry.

The Insect Program's orchard sentinel survey is an assemblage of five different insect traps placed at 16 fruit growing sites along the Wasatch Front. While some locations have been forced to move due to urban development, for the most part, these traps have been put at the same sites for nearly a decade. The purpose of the survey is threefold: 1) provide early detection of invasive fruit pests not known to be in Utah; 2) track movement of pests that are present in certain fruit growing counties but not others; 3) inform growers of the presence of native or established insect pests in their orchards. Utah's fruit industry is composed of about 615 operations, which farm roughly 6,700 acres of land. These growers annually produce an estimated $34 million dollars worth of nutritious food. Insect pests have the ability to wreak havoc on commercial fruit production; this is especially true of invasive insects. Early detection of non-established exotic pests and good data regarding the presence of native or established exotic pests is critical in the management of these insects.

The orchard sentinel survey monitors for the following insect pests:

1) Apple maggot *Rhagoletis pomonella* (Walsh) is native to the Eastern United States (U.S.); its first detection in the West occurred in 1979 in Oregon. It was later detected in Utah in 1985. It is likely that the introduction occurred via the transport of fruit from eastern states. A quarantine of this pest is maintained by the state of Washington to prevent it from spreading to the east of the state, most of which is un-infested. When the pest is found in Utah, it is usually in abandoned

orchards or in home gardens. As the name suggests it is a pest of apples, however it is known to attack other fruits as well (see the table on this page for the pest/host list). Traps are deployed at the sentinel orchards to monitor populations of this pest and ensure that it does not become a severe problem for professional fruit growers. In 2018, no apple maggots were detected at any sites that were trapped.

2) European grapevine moth *Lobesia botrana* (Denis & Schiffermüller) is a serious pest throughout Europe, West Africa, the Middle East and eastern Russia. As the name suggests, it attacks grapes *Vitis* spp. but also can be feed on blackberry *Rubus* spp., sweet cherry *Prunus* spp. and other important plants.

A population of these moths was identified in California in 2009. With the cooperation of the state, USDA-APHIS eradicated the pest and therefore it is no longer known to be in the U.S. However the Insect Program continues to monitor for this pest, as reintroduction to the country is a constant concern. In Utah, no detections were found in 2018.

3) Plum curculio *Contrachelus nenuphar* (Herbst) is a true weevil (family Curculionidae) native to the Eastern U.S. The insect moved from wild host material to cultivated fruit trees in the last century. Since then it has become a major pest of pome and stone fruits in its native range. The weevil was first detected in Utah in 1983. The pest became established in Box Elder County but has not yet been identified in any other counties in the state. Utah is the only part of western North America with known establishment of plum curculio.

The Insect Program surveys for plum curculio at all sentinel sites to track population dynamics in Box Elder County as well as confirm the absence of the pest in other fruit growing counties, such as Davis and Utah counties. In 2018 no plum curculio were detected at any of the 16 orchard sentinel trapping sites.

4) Light brown apple moth (LBAM) *Epiphyas postvittana* (Walker) is major pest of pome fruits and ornamental plants. It is native to Australia, but it has spread through various parts of the world over the last century. The moth was first found in the mainland of the U.S. in California in 2007. Today thirteen counties in California are under quarantine to prevent its spread. To ensure that the pest does not become established in Utah, trapping is conducted at each sentinel survey on an annual basis. No LBAM have been detected since trapping began.

5) Western cherry fruit fly *Rhagoletis indifferens* (Curran) is a native insect that was first reported attacking commercial orchards in the early 1900s. It is a serious pest of Utah's commercial tart and sweet cherry industry. Western cherry fruit flies are captured on the same traps that are placed for detection of apple maggot. UDAF entomologists examine these traps on bi-monthly basis and will inform growers if detections are made. Though it is not a quarantine pest, data is easy for UDAF to collect and provide to growers. This information can be used to better time pesticide applications or make other changes to pest management strategies. 2018 trapping detected 93 specimens at six locations.

INSECT	STATUS	HOSTS
Apple maggot	Established in Utah	Apple, apricot, hawthorn, pear, plum, sweet cherry, tart cherry
Cherry fruit fly	Native to Utah	Sweet, tart and wild species of cherries
European grapevine moth	Not known to be in the United States	Grape, blackberry, sweet cherry, prune, carnation
Light brown apple moth	Established in California; not known to be in Utah	Alfalfa, apple, blackberry, clover, grape, hawthorn, poplar, rose
Plum curculio	Established in Utah: Box Elder County	Apple, apricot, peach, plum, nectarine, sweet cherry, tart cherry.

KEEPING UTAH FREE FROM JAPANESE BEETLE

Eradication was declared in Utah, yet reintroduction remains an ongoing concern and monitoring continues.

The invasive pest Japanese beetle (JB) *Popillia japonica* (Newman) was first detected in the U.S. at a nursery in New Jersey in 1916. Over 100 years later, it has spread to more than 30 states—most of which are in the Midwest and East. In its native Asia, Japanese beetle is not known to be a pest species; this is likely due to host-plant resistance and numerous natural enemies that help keep their populations in check. In the U.S. it has been a different story. In spring months, the larval (grub) stage of the beetle feeds on the roots of grass and is considered a severe turf pest. The beetle pupates under the soil in late spring and then emerges as an adult in early summer. Adults have a voracious appetite and can feed on the foliage of over 300 host plants. It is estimated by the USDA that nearly a half a billion dollars is spent annually to directly control the pest and to replace damaged host plants. Because Utah is free of JB, the state's nurserymen, landscape managers, fruit and vegetable growers and homeowners do not have to shoulder any of these financial burdens.

Eradication in Utah

It should be noted that it is no coincidence or matter of luck that Utah is free of JB. Indeed, the state came quite close to becoming infested just over a decade ago. The first detection of this pest was made when an Orem resident found JB in her home garden in 2006. She reported the finding to UDAF, which set in motion an extensive trapping effort to determine the extent of infestation. A total of 675 JB would be found in that year alone. The next year would prove worse, with over 2,000 beetles detected in a single season.

Figure 1. The dorsal view of an adult Japanese beetle (JB).

The infestation area measured approximately 100 square residential blocks. At the time, eradication of an infestation this large had never been attempted elsewhere in the country. Nonetheless UDAF, in cooperation with the city of Orem, decided to embark on an unprecedented effort to rid the state of this scourge. Intensive pesticide treatments of the affected areas followed in subsequent years. The annual captures of JB began rapidly falling year over year. By 2011, not a single beetle was detected and just three years later it was declared eradicated.

Keys to success

Former State Entomologist Clint Burfitt identified five key factors in the success of the eradication effort:

I. Community support

The cooperation of local government and Orem City residents was absolutely critical to success. Support from the community was facilitated by a public outreach campaign to improve residents' understanding of the potential long-term impact of the infestation on the agricultural industry of Utah, as well as the impact on individuals.

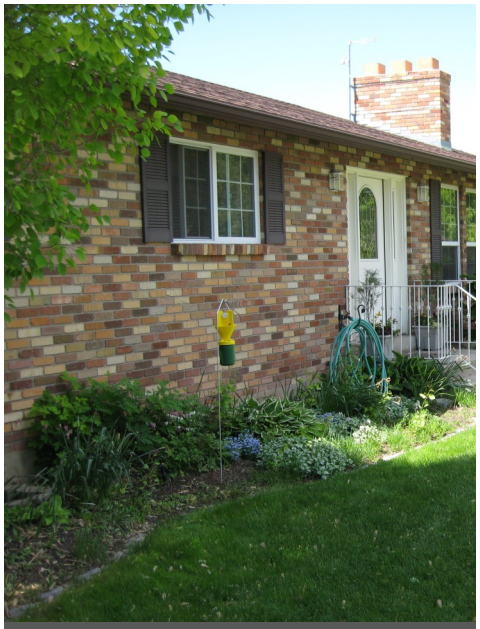


Figure 2. A JB trap placed at a home.

II. Detection methodology

A scientifically credible detection method was available in the form of a trap and lure combination for JB. Trap density methodology also existed, which outlined how closely traps needed to be placed. This helped state officials know how many traps needed to be deployed and how far apart.

III. Effective treatment methods

Effective methods of controlling JB were available to the state. These controls had low mammalian toxicity. Information about appropriate timing of pesticide applications to ensure effectiveness was known as well.

IV. Legislative authority

UDAF was able to declare a state of emergency under the Insect Infestation Emergency Control Act (Utah Agricultural Code 4-35) when JB was detected. This gave UDAF the authority to establish and execute the eradication plan.

V. Non-lapsing funds

Emergency funds are available to the Commissioner of Agriculture in situations where timeliness is critical to a project's success. This proved useful in acting quickly so that JB could not establish.

JB Quarantine

To keep JB out of the state, the Insect Program annually places a large number of standard detection traps (see box on the right side of the page). However, trapping is not the only effort Utah makes to exclude the pest. Utah also maintains a quarantine of JB (Utah Administrative Code R68-15), which regulates out-of-state soil, sod and nursery stock in order to prevent importation of this pest. The rule identifies a number of states and Canadian provinces which are infested with JB and regulates the importation of articles from these areas that may harbor the pest. For more information about this regulatory work, see the "Nursery Program Update" on page 21.

Years after eradication

In the years since JB eradication was declared a small number of beetles have been detected in other areas of the state. Between 2012 and 2015 a few were found in downtown Salt Lake City and in the Avenues neighborhood. Intensive trapping of these locations has demonstrated that these populations did not establish. In 2017 an unauthorized, untreated shipment of soil from Missouri harboring JB grubs was intercepted in Provo by a state nursery inspector. The shipment was ordered to be treated and sent back to the state of origin. Extensive trapping of the area of interception was conducted, with no target beetles detected.

2018 and future efforts

In July of 2018, routine trapping of Salt Lake City's industrial district detected a single JB. 150 traps were immediately deployed to determine the extent of infestation. Two more specimens were found shortly after. High density trapping will continue next year in both Provo and Salt Lake City to ensure that these areas do not become infested. Routine trapping will also continue in all 29 counties in Utah.

HISTORIC JB TRAPPING DATA IN UTAH

YEAR	TRAPS PLACED	JB DETECTED
2018	2,240	3
2017	1,860	0
2016	2,014	0
2015	2,247	2
2014	2,178	2
2013	1,909	1
2012	2,048	3
2011	3,183	0
2010	3,260	2
2009	3,280	7
2008	3,471	101
2007	3,000	2,152
2006	581	675

**Years in dark blue indicate when the state sprayed for the Orem JB infestation.*

ASIAN DEFOLIATOR SURVEY

Monitoring efforts focus attention on close relatives of European gypsy moth, which are not known to be established in the U.S.

European gypsy moth (EGM) *Lymantria dispar* (Linnaeus) has wreaked economic and ecological havoc on infested forests since its invasion of the Eastern U.S. While state and federal efforts continue to stop the spread of this devastating pest (see page 15), there is also work being done to prevent other closely related moths (that are not known to be established in the U.S.), from entering the country. Three other moths in the same genus are potential threats to urban and natural forests. These include Asian gypsy moth (AGM) *Lymantria dispar asiatica* (Vnukovskij), nun moth *Lymantria monacha* (Linnaeus) and rosy gypsy moth *Lymantria mathura* (Moore). While outbreaks of these moths don't always directly kill trees, host plants that are defoliated and heavily stressed are much more susceptible to insect damage and disease, which consequently increases tree mortality.

AGM is quite similar to EGM, however a notable distinction is that AGM females fly, whereas EGM do not. This difference, coupled with a broader host range (nearly double the number of host species that EGM attacks), may result in faster dispersal potential compared to EGM. Regulatory standards for east Asian countries were adopted in 2012 that requires ships and cargo containers to be found free of AGM before leaving an infested port, or a port of origin itself to be certified free of the pest. However, the number of ships at U.S. ports found with AGM egg masses has only increased in recent years. Consistent monitoring efforts by federal and state agencies have resulted in many interceptions. Nonetheless, small populations of AGM have been detected in the Pacific Northwest in recent years. Oregon and Washington states have collaborated with federal agencies to attempt eradication of these populations, with early results showing promise.

Nun moth, also known as black arches moth because of its numerous dark wavy lines on the forewing, is considered a major forest pest of conifer and hardwood species in Asia and Europe. Outbreaks of this pest have resulted in large scale forest disturbances in recent decades, causing areas of conifers, pine and spruce to die. The time between outbreak intervals has also decreased, happening every several years instead of every few decades.

Finally, rosy gypsy moth is major defoliating pest of forests and fruit trees in eastern Asia, sometimes resulting in complete defoliation of forests. Both the male and female moths are capable of flying, and the dispersal rates of larvae on wind currents are higher than that of AGM and EGM. Though it has not been found in the U.S., it is thought to be a high risk for introduction and establishment around the country including many areas of Utah. Like the other Asian defoliators, rosy gypsy moth has a large host range of deciduous and coniferous woody plants.

Containerized cargo carried on airplanes, ships and trains are thought to be prime opportunities for the artificial spread of these pests due to the bright lighting in shipping ports at night and the tendency of the moths to lay eggs masses in small, hidden crevices. Therefore, trapping efforts are focused on high-risk pathways, such as railroad and highway corridors. In 2018, 555 traps were placed in Davis, Morgan, Salt Lake, Utah and Weber counties, with no target pests detected.

Figure 1. Asian gypsy moth *L. asiatica*

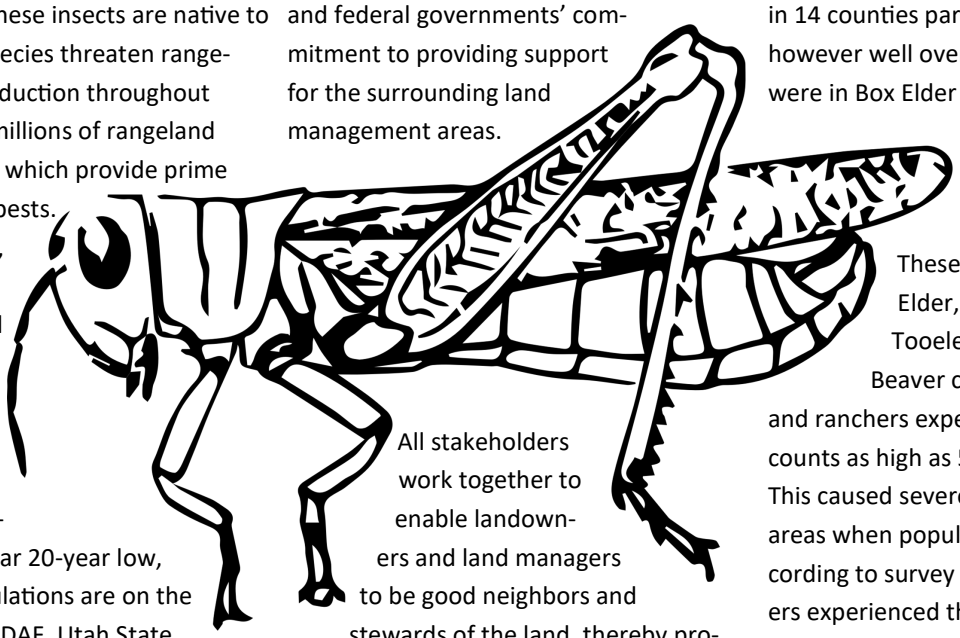
Figure 2. Nun moth *L. monacha*

Figure 3. Rosy moth *L. mathura*

GRASSHOPPER AND MORMON CRICKET SUPPRESSION

State and federal governments partner with private landowners to control rangeland pests.

Utah has been suppressing populations of endemic pests such as grasshoppers (various genera) and Mormon crickets *Anabrus simplex* (Haldeman) since it was a territory. While these insects are native to the area, many species threaten rangeland and crop production throughout Utah. There are millions of rangeland acres in the state, which provide prime habitat for these pests. If left unmanaged, these insects will destroy rangeland and compete for food with livestock and wildlife. While Mormon cricket populations are at a near 20-year low, grasshopper populations are on the rise. Every year UDAF, Utah State University (USU) Extension and USDA-APHIS cooperate on grasshopper and Mormon cricket surveys to monitor populations. When necessary these organizations will qualify projects for the state cost share program. The cost share program provides landowners reimbursement of up to 50% of the price tag for treating economically threatening grasshopper or Mormon cricket populations on their property. To qualify, land must be infested in excess of eight insects per square yard. When infestations are high, UDAF suppresses grasshopper and Mormon cricket populations on state lands and USDA-APHIS suppresses them on federal land. These efforts are part of the state and federal governments' commitment to providing support for the surrounding land management areas.



All stakeholders work together to enable landowners and land managers to be good neighbors and stewards of the land, thereby protecting rangeland and crop yields.

A total of 2,769 surveys of grasshopper and Mormon crickets were conducted throughout the state by USDA-APHIS staff in 2018. Mormon cricket populations were found to be extremely low and there were no reports from private landowners of these insects causing significant damage. However, grasshopper populations were on the upswing, with nearly 600,000 infested acres confirmed. This is a sharp rise from last year. For instance, in 2017, UDAF approved just 25 cost share agreements; in 2018, the number of approvals exploded to 115 agreements. Roughly 30,000 private acres were treated through these cost share agreements. Landowners in 14 counties participated in the program, however well over half of the participants were in Box Elder and Sanpete counties.

Pest populations were largely detected in historical areas of concern. These places include: Box Elder, Sanpete, Sevier, Millard, Tooele, Duchesne, Uintah and Beaver counties. Some farmers and ranchers experienced grasshopper counts as high as 50-70 per square yard. This caused severe damage to cropland areas when populations persisted. According to survey data, private land owners experienced the highest grasshopper populations with 291,431 infested acres; federal property was second with 182,950 infested acres. However, all program funds were provided to cost share agreements with private landowners and no aerial or ground treatments were carried out by state or federal governments in 2018.

The predominant grasshopper species detected in 2018 were as follows: *Melanoplus confusus* (Scudder), *Camnula pellucida* (Scudder), *Aulocara elliotti* (Thomas), *Melanoplus packardii* (Scudder) and *Melanoplus sanguinipes* (Fabricius).

GETTING TO KNOW THE VELVET LONGHORNED BEETLE

State and federal agricultural authorities continue to learn more about this recently introduced invasive pest.

In 2010 the Insect Program detected the invasive velvet longhorned beetle (VLB) *Trichoferus campestris* (Faldermann) in an urban environment. VLB is indigenous to Asia and was not known to be established anywhere in the country. In the U.S., it has previously been intercepted at ports of entry and in warehouse settings across the Midwest and East. The pest was found in an area of Salt Lake County called "Tile Mile," a nickname given because of the neighborhood's numerous floor-covering merchants. A possible pathway of introduction was via wooden pallets, which carried products from Asia to Utah. The detection of this insect in the middle of a populous part of land-locked Utah demonstrates the global nature of today's commerce and adds credence to the notion that large natural barriers such as oceans cannot be relied upon to prevent exotic pest transmission.

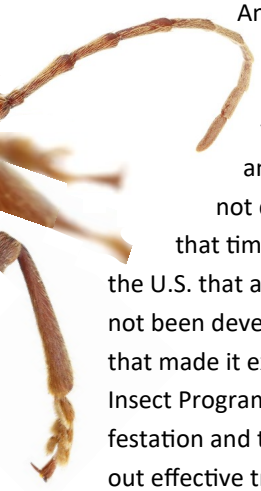
VLB is a wood boring pest, meaning its larval stage tunnels inside the tree, pupates and later emerges from the host as an adult. While VLB was of concern to UDAF due to its preference for ornamental trees such as birch *Betula* spp., honey locust *Gleditsia* spp. and willow *Salix* spp., even more distressing was that this pest was also known to attack live apple *Malus* spp. trees. Years later this concern became a reality when a large population was found in a commercial fruit orchard in Utah County. Upon learning of the infestation in Utah, scientists from USDA-APHIS's Center for Plant Health Science and Technology (CPHST) and Xavier University began two separate studies to determine a full account of tree species that might be affected and to develop an effective trapping method. UDAF has assisted with these multi-year efforts and there is much to report about the pest's host preferences and new trapping methodology.

Although VLB was first detected in Utah inside an insect trap, this trap was not designed to attract VLB. At that time, the pest was so new to the U.S. that an effective trap and lure had not been developed.

The "host study" as it has come to be known, is led by Dr. Baode Wang and Dave Cowan of CPHST. The study involves the attachment of sleeve cages to random limbs and trunks of potential host trees in areas of heavy VLB infestation. Sleeve cages are made of flexible wire mesh, which is wrapped around the tree and secured with zip ties. Trappers check to see if any wood boring beetles have emerged from the tree and become stuck in the cages. If a beetle emerges from a species of tree that are not previously known to be a host this provides useful information and is declared a "new host record." Likewise, in a research orchard, trappers will purposely introduce a male and female VLB into sleeve cages, expecting that they will mate and the female will lay eggs on the bark (see "Box 1" on page 12). If new adults emerge from the tree in the following year, scientists will know that this plant species is a potential host for VLB. If no adults emerge, then it is not likely good host material. The study is not complete yet, so a full host list has yet to be published. However it was discovered through these efforts that VLB can attack live trees in the genus *Prunus*, such as

peach and cherry. This was a stunning and disconcerting development. As mentioned, it was previously known that this pest attacked apple trees; however it was not known whether it would feed on other fruit trees. Approximately 150 sleeve cage traps were placed, checked and serviced in 2018 as part of this study.

The second study, involves the development of an effective trap and lure technology for this pest. This study is led by Dr. Annie Ray of Xavier University and Dr. Joseph Francese of CPHST. Although VLB was first detected in Utah inside an insect trap, this trap was not designed to attract VLB. At that time, the pest was so new to the U.S. that an effective trap and lure had not been developed. This was one factor that made it extremely difficult for the Insect Program to determine areas of infestation and track pest movement. Without effective trap and lure technologies, pest-detection programs are limited to the time consuming and extremely expensive option of visual survey.



The "trap and lure" study has been ongoing for multiple years now and has evaluated the effectiveness of various trap assemblies and colors which are attractive to VLB. The research has also assessed the proper height of trap deployment. Although the study is not concluded, an effective trapping method has already been developed and is currently in use around the country for survey purposes. The study continues to work on the development of a pheromone lure, which would make the new trap even more effective. In 2018, nearly 100 traps with experimental pheromone lures were placed at an infested orchard and golf course.

Now that an effective trap has been developed, the Insect Program is currently conducting a survey to determine the extent of VLB infestation in Utah.

Now that an effective trap has been developed, the Insect Program is currently conducting a survey to determine the extent of VLB infestation in Utah. Over the past two years, dozens of traps have been placed around the state to track movement of the pest. Trapping efforts to date have revealed this beetle to be in Davis, Salt Lake, Tooele and Utah counties. VLB is currently thought to be absent from Box Elder, Summit and Weber counties. No new county records were found in 2018. However VLB were detected for the first time in the southern part of Utah County, which is home to numerous large commercial fruit growing operations.

UDAF hopes that research and survey work will help inform the best path forward in the management of this largely unknown, newly introduced pest. In 2019, the Insect Program will continue to assist with both of CPHST's scientific studies and conduct survey work in counties that are not known to be infested with the beetle. The state will also keep growers up to date on new developments and best practices for suppressing populations of this pest.

Box 1. VLB Host Study

UDAF has been assisting scientists from CPHST on a "host study" to determine what trees may be affected by VLB. Sleeve cages are placed around the trunks and branches of woody plants and live VLB male and females are sealed inside. After mating, the females will lay eggs on the bark surface. If VLB can attack the tree, a larvae will burrow into the cambium, pupate and emerge from the bark the following season.

Photo 1. A sleeve cage around the trunk of a young apple tree. A slit was deliberately cut into the bark because VLB females prefer to lay eggs in crevices of the tree surface.
Photo 2. Three cherry tree limbs with sleeve cages attached.
Photo 3. VLB tunnels inside a tree trunk that was attacked in a previous season.

WOOD BORING BEETLE SURVEY

Invasive beetles have the potential to put further stress on forest health.

Utah's urban and natural forests have endured conspicuous damage in recent years. Forest disturbance is caused by multiple complex factors such as drought, fire, disease and insects. Insects of concern include the wood boring beetles. Wood borer is a term that can refer to a number of different beetle families, but only three families have pests that are surveyed for in Utah. Bark beetles (subfamily Scolytinae) are minute brown or black beetles that mine the inner bark of woody material. Longhorned (family Cerambycidae) and jewel (family Buprestidae) beetles can range in size from half a centimeter to upwards of several centimeters, with a great variation of colors and habitus. The larvae of these beetles infest the inner wood of trees. Most species of these families feed on dead or dying trees, but some will attack and even kill healthy trees. Many of these insects are native; yet the number of exotic species in the U.S. is increasing.

Exotic wood borers are of particular concern for many reasons, including: 1) without natural enemies from their endemic range, exotic wood borer populations may be poorly regulated; 2) invasive insects can introduce exotic plant pathogens or may serve as effective vectors of established plant pathogens; 3) there may be overlap in ecological niches of native and exotic organisms, which may result in the native species being displaced. Exotic wood borers can be transported in pallets, crates, packing material, nursery stock and other untreated wooden products. Beetles are some of the most common insects intercepted on wood containers and products. This is likely due to many of them being specialized for living and feeding on woody plants.

SURVEY PEST LIST

- Pine shoot beetle (*Tomicus piniperda*)
- Black fir sawyer (*Monochamus urussovii*)
- European spruce bark beetle (*Ips typographus*)
- Japanese pine sawyer (*Monochamus alternatus*)
- Large pine weevil (*Hylobius abietis*)
- Mediterranean pine engraver (*Orthotomicus erosus*)
- Sixtoothed bark beetle (*Ips sexdentatus*)
- Velvet longhorned beetle (*Trichoferus campestris*)

With financial assistance from USDA-APHIS, the Insect Program monitors for the introduction of new exotic wood borers. Every year a total of 80 traps are placed at 20 different sites around the state. In 2018, traps were distributed around Morgan, Salt Lake, Summit, Wasatch and Weber counties. One of the prominent target pests for this survey is the pine shoot beetle *Tomicus piniperda* (Linnaeus), an invasive bark beetle from Europe that was first detected in Cleveland, Ohio in 1992. Since its introduction, pine shoot beetle has spread throughout much of the Northeast and Midwest. Utah maintains a quarantine of this insect because of its ability to kill healthy trees and due to its severe pest status in its native range. In addition to pine shoot beetle, the survey monitors for seven other species of beetles (see table above) that are considered damaging and at high risk for introduction. With the exception of the velvet longhorned beetle, none of the pests have ever been detected in Utah.

EMERGENCY PREPAREDNESS

Multiple agencies prepare for invasive insect threats by practicing the Incident Command System (ICS) in a full-scale exercise.

In September of 2018 USDA-APHIS and UDAF hosted an Incident Command System (ICS) exercise to train employees in biosecurity emergency preparedness. ICS is a way of organizing personnel, equipment and infrastructure from multiple institutions under one umbrella organization that follows a common set of standards and rules. It arranges activities under functional groups such as: command, operations, planning, logistics, finance and administration. The system is effective in enabling multiple agencies to identify key concerns associated with an incident and address problems in an orderly and unified manner. The system has been used in real-life emergencies, such as during the gypsy moth infestations in Utah during the 1980s and 1990s.

Participants were presented with a scenario where Asian longhorned beetle (ALB) *Anoplophora glabripennis* (Motschulsky), a federally quarantined pest, was detected at multiple locations along the Wasatch Front. Various agencies dedicated employees to the functional groups associated with the system. This gave everyone an opportunity to practice how operations would proceed under ICS. The simulation presented various obstacles for the group to overcome, such as difficult members of the public, equipment failure, employee injury and a flurry of media attention.

Along with USDA-APHIS and UDAF, USU Plant Pest Diagnostics Lab, U.S. Customs and Border Protection and Nevada Department of Agriculture were also involved. Should an invasive pest threat require a multi-agency response, participants and agencies that were involved in this exercise will be ready to "hit the ground running" on ICS.

Figure 1. Insect Program Manager Kristopher Watson examines a map that details the location of the ALB "infestation."

Figure 2. Participants discuss strategies for containing the invasive insect during a practice planning meeting.

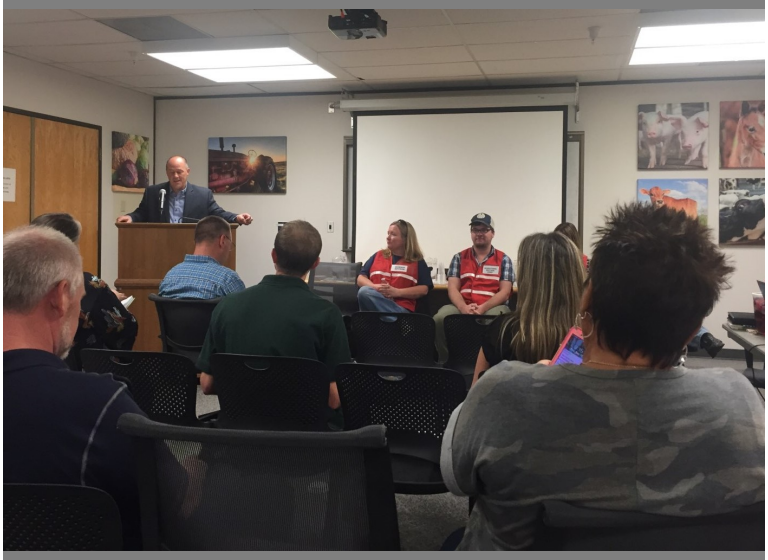


Figure 3. UDAF Public Information Officer Doug Perry (podium) presides over a mock press conference to alert the public.

KEEPING AN EYE ON
EUROPEAN GYPSY MOTH

A 30 year project to keep an invasive moth out of Utah is successful.

On a quest to find a better silk producing moth, an amateur entomologist imported the European gypsy moth (GM) *Lymantria dispar* (Linnaeus) into the U.S. in the 19th century. The idea was to find a moth that produced as well as the silkworm *Bombyx mori* (Linnaeus), but was resistant to the many diseases which inundated commercial production. Some of the adults accidently escaped their containment and began defoliating trees in the city of Medford, Massachusetts. By 1902 the pest had spread throughout much of New England and in subsequent decades it became established in the Mid-Atlantic. Today GM is still present in these areas and has been transported to some areas in the Midwest and South.

GM is arguably the most devastating pest of forest and shade trees in the Eastern U.S. It prefers hardwood trees, such as aspen *Populus* spp., linden *Tilia* spp., oak *Quercus* spp. and willows *Salix* spp., however—it isn't picky. GM can feed on over 300 different trees and shrubs. The damage is caused by larval feeding, which often results in heavy defoliation of the plant. Established populations will fluctuate dramatically year-to-year, with some seasons being worse than others.

The first confirmed detection of GM in the state was in 1988 on the University of Utah campus in Salt Lake City. Additional insect traps were placed in the area and surrounding counties. Trapping would reveal that there were moth populations in urban areas and connecting canyons of Davis, Salt Lake, Summit and Utah counties.

A multi-agency effort between UDAF, USDA Forest Service, USDA-APHIS and Utah Department of Natural Resources (DNR) began work on eradicating the nascent GM populations. Over the next five years a tremendous plan was implemented. First, the public was made aware of the moth detections and a quarantine of recreational vehicles and household articles was enacted around the areas of infestation. This required inspection of such items before removal from the quarantined areas. Next, tens of thousands of traps were deployed. In 1992 alone, nearly 11,000 were placed. Finally, federal and state authorities financed the treatment of 72,000 acres of public and private land over a five-year period (1989-1993). These areas were treated with the bioinsecticide

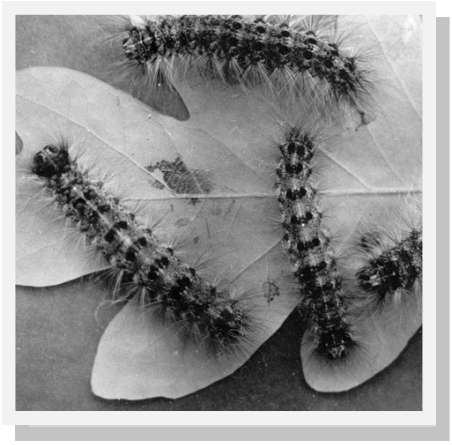


Figure 1. Gypsy moth larvae feed on an oak leaf.

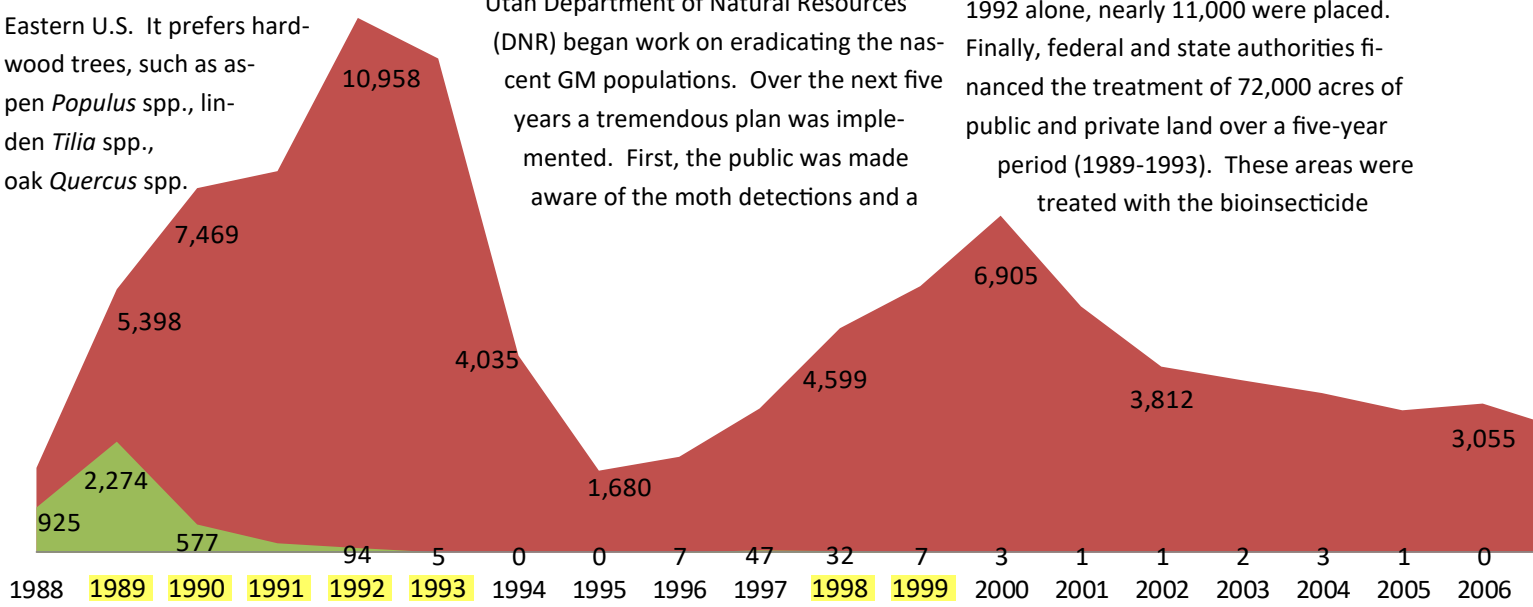


Figure 2. An historic map (circa early 1990s) outlining treatment areas for gypsy moth.

Bacillus thuringiensis (Bt). This pesticide was used because of its effectiveness in killing GM and due to its excellent safety record for humans and other mammals. In 1994, no moths were caught in any of the thousands of traps placed; the next year yielded the same result.

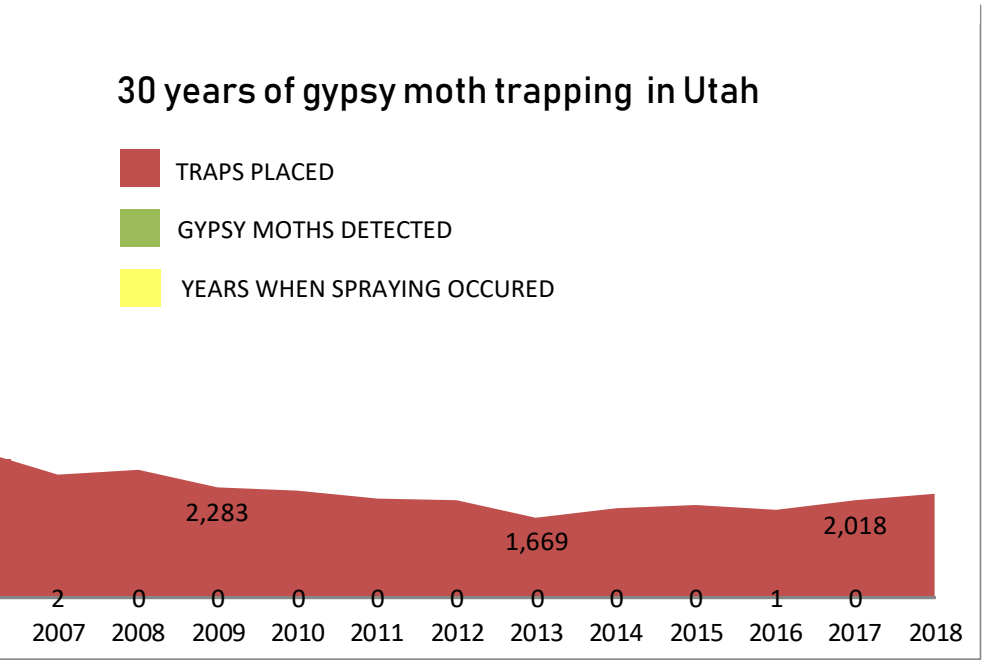
However, the battle wasn't quite over. In 1996 seven GM were detected in Salt Lake County. These moths were in different locations than where GM had been previously found. High density trapping the following year resulted in 47 more target insects captured in traps. These findings indicated that there were other growing populations in two separate areas of Salt Lake County's east-bench. More than 1,600 acres would be sprayed over a two year period (1998-1999) to eliminate these populations. By the year 2000 the multi-year, multi-million dollar eradication effort was proclaimed a success. This joint effort had proven that large, separate populations of GM could be eradicated if detected early by pest survey.

Since that time, the Insect Program has been vigilantly monitoring for new GM introductions into the state by annually placing approximately 2,000 traps in all of Utah's 29 counties. From the period of 2008 to 2015, not a single GM was captured. In 2016 one moth was caught in Davis County, but subsequent high density trapping has not detected any others. In 2018, 2,138 traps were placed and zero moths were detected.

Besides trapping efforts, UDAF administers a quarantine (Utah Administrative Code R68-14) to prevent GM from being introduced into the state. This rule requires inspection of household items, firewood, Christmas trees and vehicles that are entering the state from quarantined areas of the country. Every year, agricultural compliance specialists visit Christmas tree lots to inspect for GM and other pests. Firewood for sale at retail locations is also regularly inspected. On occasion, Insect Program staff is deployed to state ports of entry to inspect vehicles and cargo entering Utah from quarantine areas.

The Insect Program also conducts extensive public outreach on GM detection. In 2018, staff presented at the Utah Nursery and Landscape Association annual conference and USU Extension's First Detector Workshop. Hundreds of attendees learned about the economic and ecological importance of GM and how to identify this important pest.

Utah's arid climate, mountainous terrain, lack of natural predators and plethora of host material make the state at high risk for GM infestation and subsequent mass deforestation. However a decision was made many years ago that Utah would stay free of GM. That decision, while costly at the time, continues to pay dividends to this state in economic, environmental and social benefits. The Insect Program is dedicated to making this legacy endure by preventing future GM introductions.



EUROPEAN CORN BORER

Utah's quarantine continues to protect the state's corn growers.

European corn borer (ECB) *Ostrinia nubilalis* (Hübner) was first identified in Boston, Massachusetts just over 100 years ago. It is thought to have made its way into the country on broom corn imported from Hungary and Italy. Over the years, the pest spread throughout the East and Midwest and became a serious pest of corn.

During most of its history in the U.S., the pest was notoriously difficult to control because the larvae bored into cornstalks and therefore was protected from insecticide applications. An assessment of ECB damage published in 1996 put the annual costs due to yield loss and chemical control measures at $1 billion annually.

However, the situation was dramatically improved with the extensive adoption of transgenic Bt corn by growers in the late 1990s. Many infested areas have reported steep declines in ECB populations since this technology became widely utilized in corn growing and the seriousness of the pest has been downgraded. Despite this success, the development of resistance to Bt corn is a cause for concern. If in the future, transgenic corn is no longer effective in controlling ECB it will likely become a pest of great importance once again. Furthermore, non-Bt corn remains subject to major damage from this pest.

Utah has successfully maintained a quarantine of this pest for many decades. The effort to keep Utah free of ECB includes pest-free certification of certain agricultural commodities imported into the state, as well as a state-wide trapping survey. In 2018, 39 traps were placed across Cache, Carbon, Emery, Grand, Millard and Sevier counties. No ECB were detected in any of the traps placed in these corn-growing counties.

ENTOMOLOGY LAB

The UDAF insect lab utilizes expert staff and the latest in technology to support the Insect Program's goals.

The UDAF Entomology Laboratory provides support services to the Insect Program with expert staff and the latest technology. The lab takes phone calls for general questions regarding insects, and offers walk-in requests for insect identification. Other important functions include:

Wood borer survey processing: The lab processes all of the exotic wood borer, sentinel, and emerald ash borer survey trap catches. This amounts to approximately 150 individual traps that are sampled multiple times in a given season. A technician sorts through every catch and separates the wood borers for identification. In 2018, 6,613 beetles were identified to species. No new exotic species were detected by the lab.

Honey bee disease diagnostics: Samples of honey bees are taken at apiary inspections or are submitted by veterinarians and concerned beekeepers. Adult bees are tested for Varroa mite load using an ethanol wash, tracheal mites by dissection and Nosema disease by microscopy. Immature bees can be tested for American and European foulbrood diseases. Detection of these pathogens is done through a state of the art process known as qPCR (see Box 1). Results from these tests help beekeepers manage healthy hives.

Insect reference collection curation: The UDAF insect collection houses over 5,000 individual specimens representing 150 families of insects collected over approximately 60 years. New specimens are added every year, with emphasis placed on families of agricultural importance. Insects from Utah constitute the majority of the collection with a small portion from other states. Having a quality reference collection of Utah's native and naturalized insects is critical in fulfilling the mission of the Insect Program. Indeed, when entomologists have a thorough understanding of what is already endemic to the state, exotic pests are easier to detect.

Box 1. qPCR testing UDAF's Entomology Lab proudly began offering beekeepers in-house diagnostic testing for two devastating bee diseases, American and European foulbrood in 2018. By utilizing real-time quantitative polymerase chain reaction (qPCR) methods, UDAF was able to offer testing services that were faster, more accurate, and cost competitive with previous methods. This proved vital for both beekeepers and veterinarians who needed diagnostic results to quickly manage outbreaks of foulbrood diseases.

Real-time qPCR is a molecular biology technique that like conventional PCR makes billions of copies of a small segment of a target organism's DNA or RNA. Unlike traditional PCR, qPCR allows for the real-time monitoring of the copies being made and also allows for the quantification of the starting amount of target DNA in an unknown sample. This is achieved using chemical compounds called "fluorophores" that fluoresce under specific wavelengths of light when new copies of target DNA are made.

The addition of qPCR capability to the Entomology Lab will allow UDAF to better serve agriculture in Utah through faster, more accurate and more reliable disease and pest diagnostics. This was the first year that the UDAF Entomology Lab was able to use qPCR and it proved to be an extremely powerful and effective technology.

EMERALD ASH BORER:

THE GREEN MENACE

Utah prepares for first contact with this destructive exotic pest.

Known for its striking iridescent appearance and penchant for devastation of all species ash *Fraxinus*, emerald ash borer *Agrilus planipennis* (Fairmaire) has been on the radar of plant protection authorities, urban foresters and homeowners since its first detection in Michigan in 2002. Although small (1/2 inch in size), it should not be underestimated. To date, the pest has destroyed tens of millions of ash trees in 30 states. EAB is mostly found in the East, South and Midwest. However, the threat to Utah's native and naturalized ash trees became all the more evident when it arrived in the neighboring state of Colorado in 2013.

UDAF has been preparing for EAB introduction by partnering with USDA-APHIS, USDA Forest Service, USU Pest Diagnostics Laboratory, Utah DNR, and city arborists. This coalition of groups has embarked on a multifaceted campaign to prevent introduction and facilitate early detection. Efforts include educating the public about the dangers of moving firewood, outreach to local tree care professionals on EAB identification and active surveying for this pest. In areas of the state deemed high-risk for introduction, state, federal and local officials have been involved in trapping, visual surveys and caged rearing of ash limbs which are suspected to be infested. UDAF and others have also responded to dozens of claims of EAB infestations by homeowners and landscape managers. However, to date, no infested trees have been found by any of the groups participating in monitoring.

To date, EAB has not been detected in Utah by trapping, visual survey or caged rearing of ash limbs.

As the pest has continued to spread, there have been considerable strains on federal funding dedicated to containment. In 2017, UDAF learned that USDA-APHIS was proposing the removal of their domestic EAB quarantine. Consequently federal funds directed toward trapping would be reallocated to biocontrol and research. As a result of this announcement, UDAF made the decision to increase the number of state traps placed and to employ an improved trapping methodology. The latter was accomplished by utilizing new trapping techniques described by Ryall et al. (2013), which claim to provide improved detection of EAB when infestation rates are low. The method involves close placement of two green Lindgren funnel traps (see "Figure 1") per site and a combination of chemical lures (hexanol and lactone) attached to each trap. This trapping method is thought to be advantageous to the previously used method—a purple prism trap baited with Manuka oil.

UDAF placed 40 EAB traps at 23 sites within Cache, Carbon, Grand, Salt Lake and Sevier counties in 2018. Trap site placement was prioritized for high-risk areas such as: places that were likely to have out-of-state firewood introduced, vicinities where trees have been reported as potentially infested by arborists or homeowners and neighborhoods identified as having numerous ash trees in decline.

State survey work in previous years has sampled other areas of the state, including Zion National Park, where there is abundant single-leaf ash *Fraxinus anomala*. This species is native to Utah and is susceptible to EAB attack. There is great concern that EAB may be introduced to this area because of the plethora of firewood which is transported to campsites. UDAF worked with National Park Service (NPS) in 2017 to place numerous traps inside campsites and around the nearby city of Springdale. No EAB were detected from these efforts. Trapping was not conducted in Zion in 2018, however EAB awareness literature and education was made available to park-goers.

Other outreach work in 2018 included EAB education to various interested groups. Insect Program staff gave presentations about the pest to a group of landscape professionals and a class for Master Gardeners. On both occasions, EAB identification and host plant damage was covered. Attendees were able to see actual (dead) specimens and real wood that had been damaged by EAB.

Finally, the state recently enacted a quarantine (see Utah Administrative Code R68-23) which prohibits the importation of firewood from other states unless the materials are certified to be free of plant pests. This measure is intended to prevent the importation of EAB and other pests into Utah. Both commercial firewood distributors and members of the general public are subject to these new rules. In 2018, UDAF developed and distributed literature to educate firewood distributors and the general public about the new rules. State compliance specialists have also been visiting retail locations that sell firewood, to make merchants aware of the new regulations. In 2019 the Insect Program will continue trapping efforts, visual survey and education about EAB and the firewood quarantine.

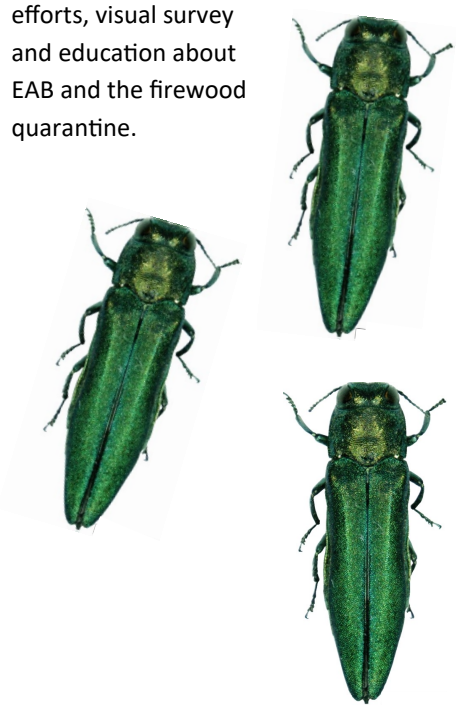


Figure 1. Megan Gyongyosi, a state insect trapper, prepares a green Lindgren funnel trap and raises it into the mid-canopy of an ash tree in Salt Lake City. In 2018, 40 of these traps were placed at 23 different locations in five counties.

NURSERY PROGRAM UPDATE

State inspectors protect the nursery, forestry and horticultural industries and environmental quality.

There are 785 registered nurseries in Utah, which are part of the state's $128 million floriculture industry. The Utah Nursery Act (Utah Agricultural Code 4-15) protects the state's agricultural, forestry and horticultural interests and promotes general environmental quality by means of nursery stock inspection. The act also ensures fairness in the nursery industry and protects retail and wholesale customers through labeling and quality standards.

Nursery stock can harbor pests, pathogens and weeds which are economically devastating. Out-of-state nursery stock is of special concern, as it may be a pathway of introducing exotic organisms into Utah. As a result, state law requires out-of-state operations in areas of concern to meet specific precautionary standards before materials can be imported. For instance, nursery stock that is infested with a weed designated as noxious or is infested with a quarantined insect is not allowed into the state.

In 2018, approximately 665 inspections were performed and four major regulatory actions were taken. In April, 231 ornamental trees imported from Tennessee were quarantined and disposed of by deep burial at the Salt Lake County Landfill. In that same month, 560 trees from an Oklahoma nursery were ordered to be returned. In both instances the nurseries had failed to notify UDAF of the importations and the stock itself was not in compliance with precautionary measures to prevent the importation of Japanese beetle (JB) (see page seven). Both nurseries reside in parts of the U.S. quarantined by Utah.

Figure 1. An inspector issues a "stop sale" on nursery stock that is not in compliance.

Later in the year, Oregon Department of Agriculture (ODA) notified UDAF that a large number of Fraser fir Christmas trees infested with elongate hemlock scale *Fiorinia externa* (Ferris) had potentially been sent to Utah. ODA was aware of this situation because California Department of Food and Agriculture (CDFA) had alerted them of a tree shipment to California that was infested. The scale is native to Japan, but has been introduced into the Eastern U.S., where it has caused damage to native host flora. Nursery inspectors were immediately dispatched to outlets which were likely to have received these trees. Samples of scale insects on trees were taken at multiple retail locations. The specimens collected would later be confirmed as the pest of concern. These trees had been imported by two out-of-state companies, which had sourced tree stock from infested eastern states. All trees imported by both companies were ordered returned.

The regulatory actions on these out-of-state nurseries may have prevented the importation and establishment of devastating exotic plant pests in Utah. These instances demonstrate that well-trained nursery inspectors and good relations with neighboring states are helpful in early detection and rapid response to problematic agricultural pests.

INSECT PROGRAM STAFF AND SEASONAL CREW

TOP ROW (from left to right): Trey MacQueen (Japanese beetle/gypsy moth trapper), Dalton Morgan (Japanese beetle/gypsy moth trapper), Natalee Thompson (honey bee inspector), Alan Lindsay (Japanese beetle/gypsy moth trapper), Stephen Stanko (honey bee inspector), Megan Gyongyosi (wood boring bark beetle trapper), Kristopher Watson (program manager/state entomologist), Anne Johnson (GIS specialist) and Sharon Gilbert (lead trapper).

BOTTOM ROW (from left to right): Sarah Schulthies (lab technician), Karissa Johnson (Asian defoliator trapper), Joey Caputo (survey entomologist/honey bee inspector) and Sydni Eager (Japanese beetle/gypsy moth trapper).

NOT PICTURED: Jerry Shue (Japanese beetle/gypsy moth trapper).

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