2016

Cooperative Agricultural Pest

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Montana Department of Agriculture

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Montana Department of Natural Resources and Conservation
US Department of the Interior
Montana Urban and Community Forestry Association

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Cover photo: Blooming pea field in northeastern Montana, agr.mt.gov.

Introduction to the Program

The Cooperative Agricultural Pest Survey (CAPS) program conducts science-based national and state surveys targeted at specific exotic plant pests, diseases, and weeds identified as threats to U.S. agriculture and/or the environment. These activities are accomplished primarily under USDA funding that is provided through cooperative agreements with state departments of agriculture, universities, and other entities. Surveys conducted through the CAPS Program represent a second line of defense against the entry of harmful plant pests and weeds. These surveys enable the program to target high-risk hosts and commodities, gather data about pests specific to a commodity, and establish better baseline data about pests that were recently introduced in the United States. The mission of the CAPS program is to provide a survey profile of exotic plant pests in the United States deemed to be of regulatory significance through early detection and surveillance activities.

Cooperative Agricultural Pest Survey is a nationwide survey effort initiated by the USDA Animal Plant Health Inspection Service (APHIS) Plant Protection and Quarantine (PPQ), to detect and/or monitor the spread of invasive plant pests. To achieve this goal, the USDA APHIS PPQ enlists the assistance of state cooperators. In Montana, state cooperators are coordinated through the Montana Department of Agriculture (MDA), and include not only the Department of Agriculture, but also Montana State University, the Montana Department of Natural Resources and Conservation, USDA Forest Service, and others.

CAPS Program Internet Resources

CAPS Website: https://caps.ceris.purdue.edu/home

National Agricultural Pest Information System (NAPIS): http://pest.ceris.purdue.edu/

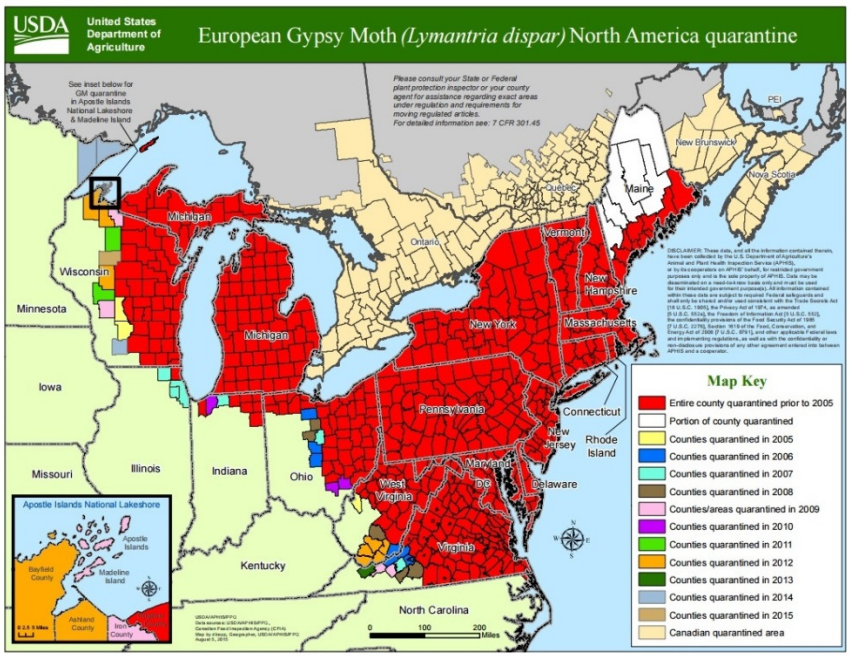
Hungry Pests: http://www.hungrypests.com/

Montana Wood Boring Insect Project: http://mtent.org/WoodBor.html

Gypsy Moth (GM) Detection Survey
Lymantria dispar (L.)

The European strain of the gypsy moth (*Lymantria dispar* (L.)) was initially introduced into the eastern United States in the mid-1800s. It established rapidly and became a serious defoliating forest pest. Over 500 susceptible host plants have been identified. Most are deciduous trees and shrubs, but older gypsy moth larvae will also consume pine and spruce. In Montana, aspen and western larch are of particular importance as potential native tree host of the gypsy moth, especially in the western half of the state. Most landscape plants, urban trees and shrubs throughout the state would also be subject to GM defoliation.

Females of the European strain are flightless but crawl actively as they seek out oviposition sites. The egg masses are brownish clumps covered with scales and hairs, and have been found on Christmas trees, boats, RVs, outdoor furniture, firewood, and virtually any other object that might be left outdoors in an infested area. They are thus readily transported to new areas by human activity. The gypsy moth is the most destructive forest pest in the eastern United States and large areas of the northeastern and midwestern US are under a federal quarantine to prevent the spread of this pest. There are several other sub-species of closely related gypsy moths from Asia that are not known to occur in North America but are attracted to the same pheromone lure. Asian Gypsy Moth (AGM) pest pressure has increased in recent years due to increased populations in their native range and changes in international shipping logistics. There have been several detections of AGM sub-species adults in the Pacific Northwest. In this sub-species, the female moths can fly and the caterpillars are more likely to feed on coniferous trees.



http://www.aphis.usda.gov/plant_health/plant_pest_info/gypsy_moth/downloads/gypmoth.pdf

There have been several positive gypsy moth traps in Montana counties in recent years: Cascade (1989, 1990), Gallatin (1988), Glacier (2001, 2003, 2007, and 2008), Lewis and Clark (1988), Lincoln (2009), Liberty (1992), Missoula (1996), Park (2001), and Yellowstone (1993 and 2011). Given the distance between Montana and the quarantined portions of the US and eastern Canada, it is almost certain these introductions were the result of human activity. Isolated detections result from the movement of egg masses and pupae on contaminated vehicles and equipment or adult moths "hitchhiking" with vehicles or other conveyances.

Male Gypsy Moth. Traps are baited with female sex-pheromone lures and only attract males.

Gypsy moth caterpillar

In Montana, responsibility for the trapping of gypsy moths is a multi-agency cooperative effort between the USDA APHIS PPQ, the Montana Department of Agriculture (MDA), the Montana Department of Natural Resources & Conservation (DNRC), and the USDA Forest Service (USDA FS). In 2016, USDA APHIS PPQ placed traps along the Canadian border, MDA placed traps in the western portion of the state, and DNRC placed traps in Mineral and Missoula counties. The USDA Forest Service, US Fish and Wildlife Service, Bureau of Indian Affairs, and other agencies coordinate trapping at a large number of campgrounds and other public recreation areas. The Department of the Interior placed traps in Glacier and Yellowstone National Parks. All traps were placed by early June, and checked throughout the summer.

RESULTS: 150 traps were placed by MDA in 2016. All traps were negative in 2016.

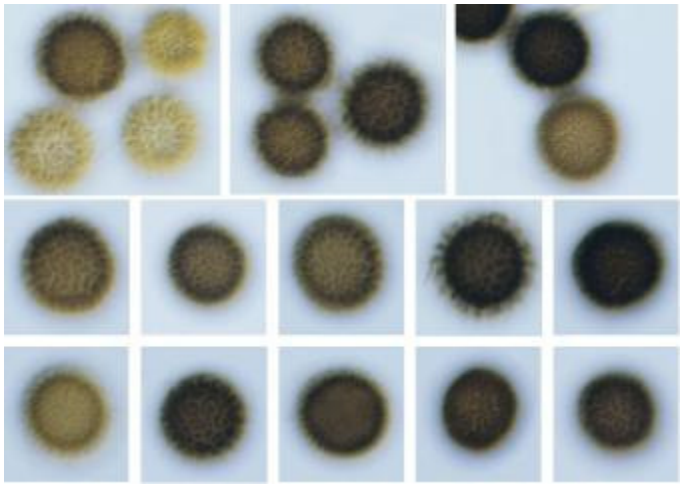
Karnal Bunt Detection Survey

Tilletia indica Mitra

Karnal bunt (KB) is a fungal disease that affects wheat, durum wheat, and triticale. The disease was discovered near Karnal, India in 1931, hence the name. The first detection of KB in the United States was in Arizona in 1996, in durum wheat seed. Subsequently, the disease was found in portions of Southern California and Texas. The disease has never been detected in Montana field production. KB thrives in cool, moist temperatures as the wheat is starting to head out.

Karnal bunt spores are windborne and can spread through the soil. Spores have the ability to survive within the soil for several years. Grain can also become contaminated through equipment. Therefore, controlling the transportation of contaminated seed is essential in preventing the spread to Montana production areas. In addition, early detection is essential if any type of control or eradication is to be attempted. Montana's participation in the annual karnal bunt survey is part of the early detection grid set out across the United States.

RESULTS: Montana continued to sample for KB during the 2016 harvest. A total of 160 samples were collected from 34 counties across Montana. The APHIS Arizona State Plant Health Director's (SPHD) office Karnal bunt lab conducted the testing. All samples tested negative for the presence of KB. This sampling is critical for wheat growers in Montana. It confirms our wheat is free from KB, ensuring access to international export markets.

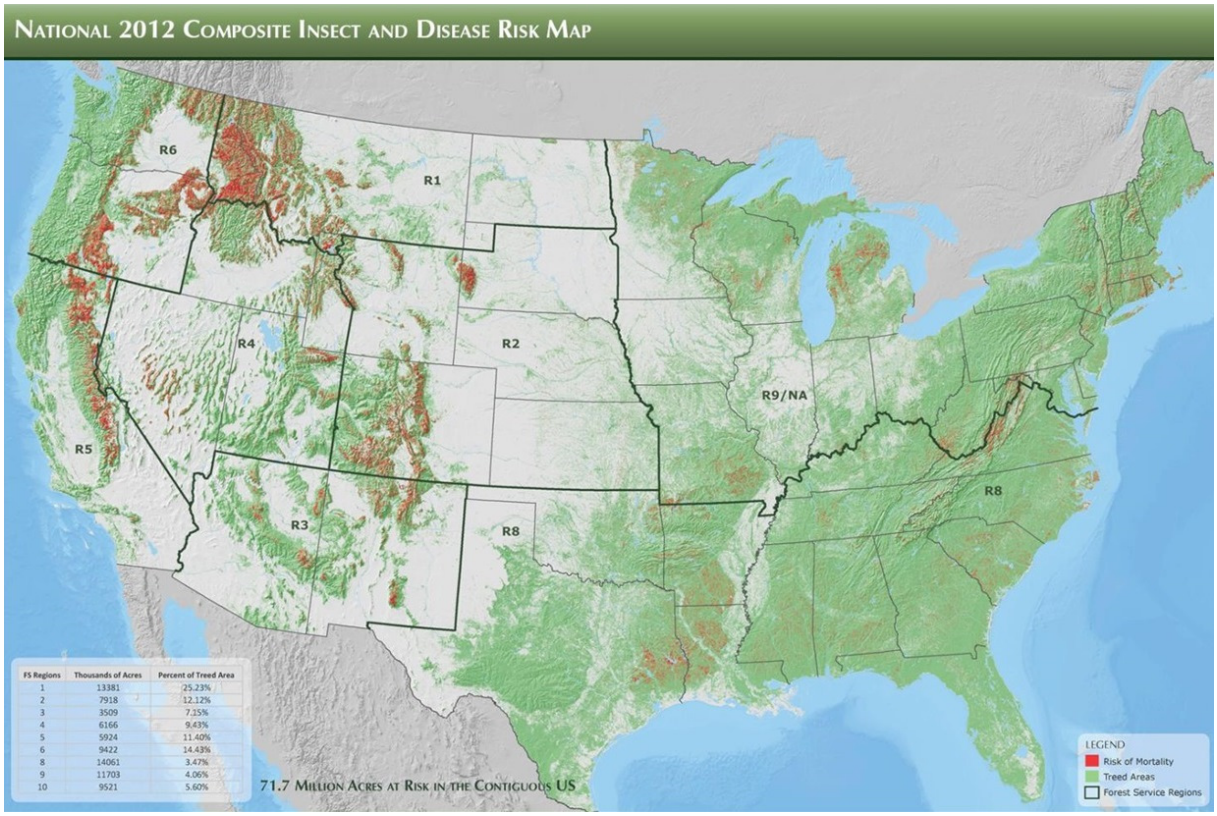


Credits: Teliospores of Tilletia indica (Karnal bunt of wheat) showing surface ornamentation patterns. EPPO.

Credits: R. Duran, Washington State University www.forestryimages.org **Bunted Wheat**

Forest Pest Survey
Pest Detection Survey

Forest land occupies an estimated 23 million acres in Montana. Seventy-one percent (16.3 million acres) is publicly owned and under the jurisdiction of federal and state agencies (MT DNRC, 2010). Ecologists recognize 10 different major forest types in Montana. Douglas-fir (*Pseudotsuga menziesi* var. *glauca*), lodgepole pine (*Pinus contorta*), and ponderosa pine (*Pinus ponderosa*) predominate on the forest landscape and are the most commercially important species (MT DNRC, 2010). Montana forests provide a wide variety of commercial and recreational benefits that are at risk from both native and invasive forest pests.



USFS National forest insect and disease risk map. http://www.fs.fed.us/

Pine Sawfly Detection Survey
Diprion pini (L.)

Diprion pini is considered one of the most serious pests of pine in Russia, Ukraine, and Belarus. In Russia, outbreaks usually occur in 3 - 6 year intervals after hot and dry summers (Sharov, 1993). Larvae are gregarious feeders and attack the shoots as well as mine the needles from the side. Larvae may also eat the bark of the shoots and may sometimes consume the shoots completely. Sawflies, including *D. pini*, highly prefer pine stands on infertile and well-drained soils as well as stands that are affected by unfavorable climatic or anthropogenic factors (Augustaitis, 2007).

A native sawfly, *Neodiprion* sp. (male), caught in a pine sawfly trap. Photo: I. Foley

RESULTS: 50 pine sawfly traps were placed by MDA in 2016. All traps were negative.

Rosy Gypsy Moth (RGM) Detection Survey
Lymantria mathura Moore

Both the gypsy and the rosy gypsy moth are members of the moth family Lymantridae. This family includes several native tussock moth forests pests. Many members of the family are serious plant defoliators.

Images from http://www.padil.gov.au

Female (left) and male (right) rosy gypsy moth

Rosy gypsy moth larvae are polyphagous and feed on a diverse range of deciduous trees. Hosts include oak, willow, fruit trees, birch, and ash. Larvae can feed on some conifers, but those hosts are generally not preferred and result in lower levels of survivorship. This moth is native to China, Bangladesh, India, Japan, Korea, Pakistan, Taiwan, and the Russian Far East and is not established anywhere in North America. The rosy gypsy moth and other exotic gypsy moths in the CAPS surveys are considered to have a higher risk of introduction in the western portion of the state, and also pose a higher risk to the area should they be introduced.

RESULTS: 50 rosy gypsy moth traps were placed by MDA and 19 by USDA APHIS PPQ in 2016. No RGM or suspects were trapped or submitted. MDA traps were concentrated west of the

Continental Divide and placed during different trips than European gypsy moth traps because the pheromone lures have been shown to have antagonistic affects (CAPS approved methods, 2013).

Siberian Silk Moths (SSM) Detection Survey
Dendrolimus sibiricus (Chetverikov), *D. superans* (Butler), *D. punctatus* (Walker), *D. pini* (L.)

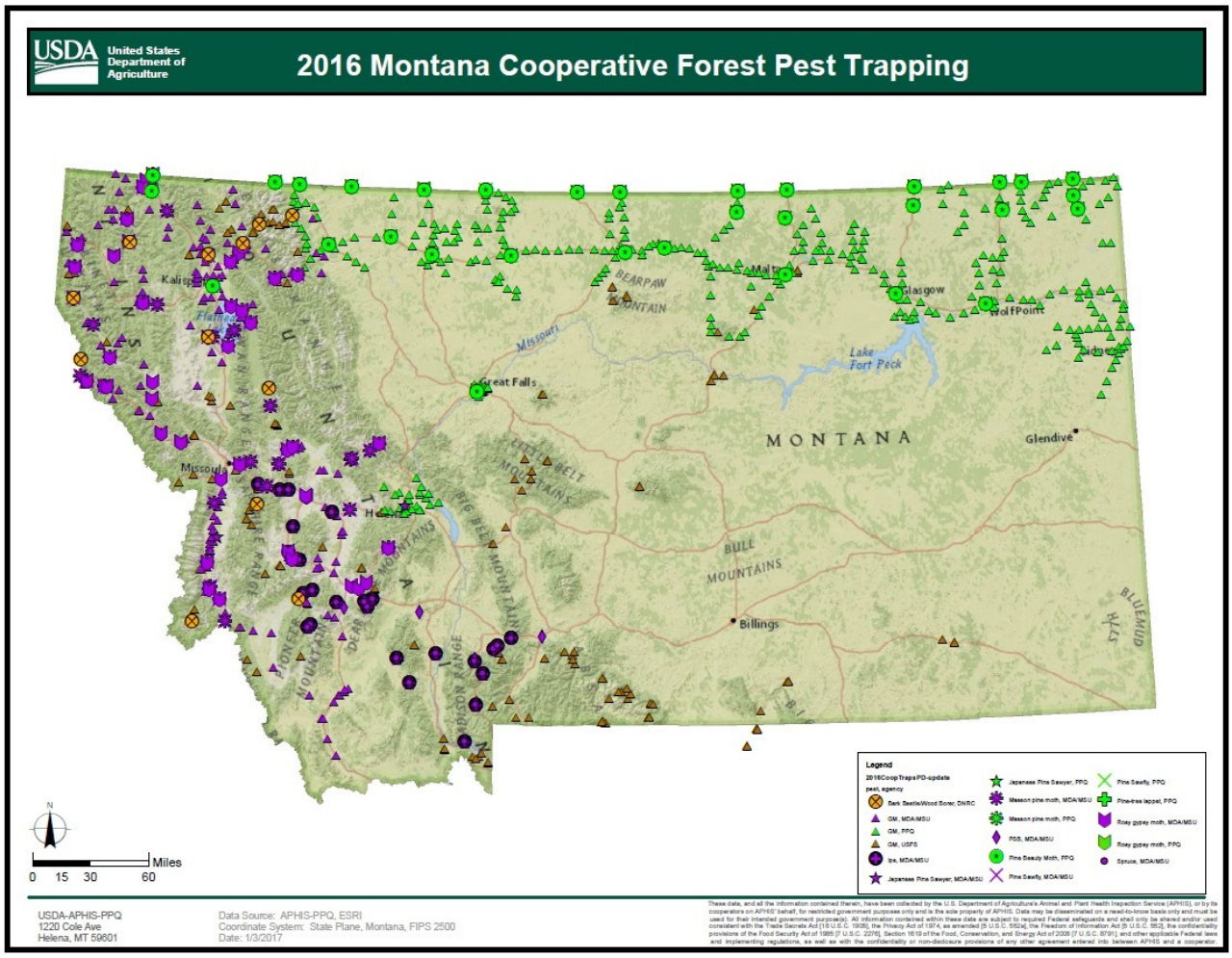
The Siberian silk moths are polyphagous defoliators of conifers with confused taxonomic histories and species concepts. Laboratory tests in the US have indicated that Douglas Fir would be a highly preferred host in the western states. In its native range (Russia, Kazakhstan, North and South Korea and Mongolia) SSM is responsible for damage similar to that done by the European gypsy moth in outbreak areas of eastern North America.

SSM adult male, Image from http://www.padil.gov.au

If established in western North America, the impact on forest health would probably be greater than that of the gypsy moth on northeastern forests because conifers are more prone to mortality when repeatedly defoliated. Infestations can lead to slower overall forest growth as well as the death of repeatedly or heavily infested trees. In addition, infested forests are unsightly and unattractive for tourism and other recreation, a major issue in Montana and other western states. Trapping for this moth involves green gypsy moth milk carton traps that are modified to capture a larger moth (40-80mm).

RESULTS: A total of 50 traps were placed for *Dendrolimus punctatus* the "masson pine moth" in Montana in 2016. No suspect moths were trapped or submitted. The most commonly collected moth in the traps was the western forest tent caterpillar, *Malacosoma californicum* (Packard).

Visual Surveys for Plant Pathogens
Samples of symptomatic plant tissue were collected at several sites. All samples were negative for target pathogens and most damage was the result of draught stress or other abiotic damage.

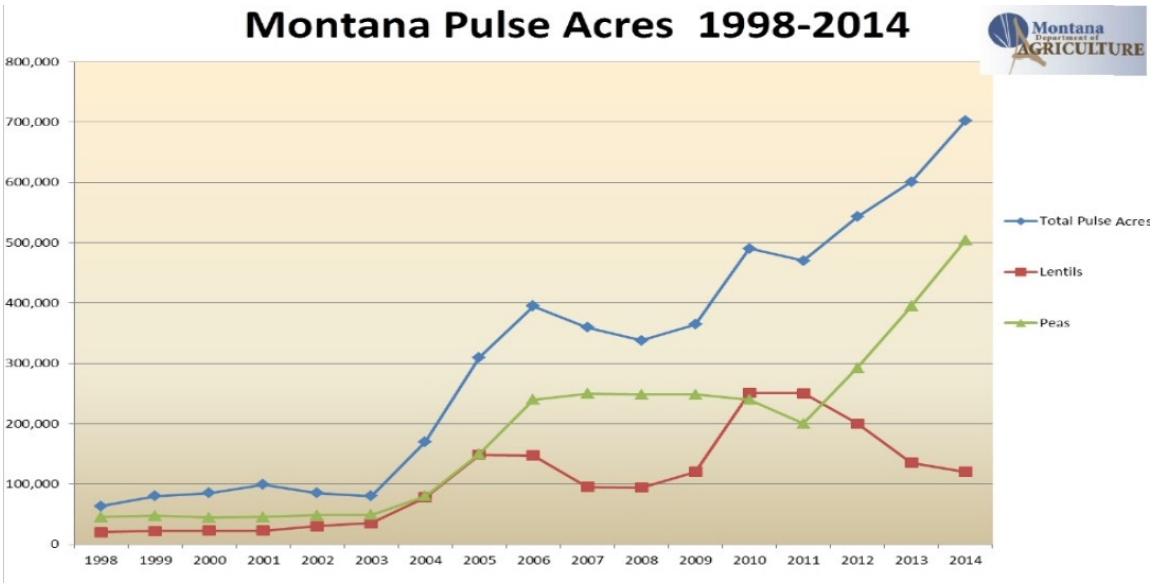


Location of forest pest traps across Montana placed by MDA, MSU, Montana APHIS-PPQ, USFS, and MT DNRC.

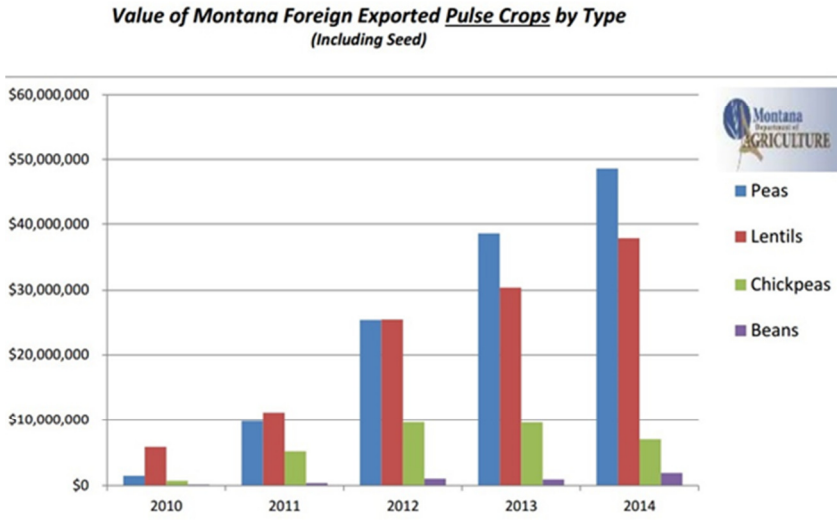
Pine Commodity Survey				
Target Species	**Common Name**	**Pest list**	**Approved Method**	**Sites**
Cronartium flaccidum	Scots Pine Blister Rust	AHP #2	Visual	50
Phytophthora alni	Alder Root and Collar Rot	AHP #12	Visual	50
Lymantria mathura Moore	Rosy Gypsy Moth	AHP #15	Wing trap/lure 84 days	50
Monochamus sutor (L.)	small white-marmorated longhorned beetle	AHP #26	Visual	50
Dendrolimus punctatus (Walker)	masson pine moth	AHP #28	Wing trap/lure 21 days	50
Candidatus Phytoplasma pini 1	Pine Witches' Broom	AHP #36	Visual	50
Monacha spp.	hygromiid snails	AHP #38	Visual	50
Monochamus saltuarius (Gebler)	Sakhalin Pine Sawyer	AHP #42	Visual	50
Mycosphaerella gibsonii	Needle Blight of Pine	AHP #46	Visual	50
Diprion pini (L.)	Pine Sawfly	AHP #47	Large Delta/lure 28 days	50
Monochamus alternatus (Hope)	Japanese pine sawyer	Pine Commodity	Multi-Funnel/lure	5

Pulse Crop Commodity Survey
Pest Detection Survey

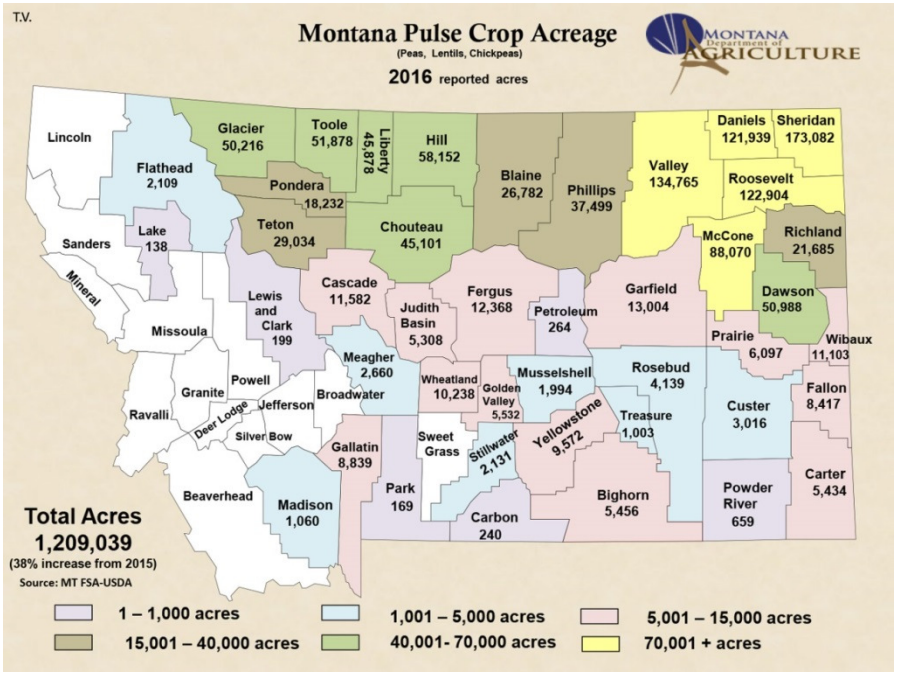
For over a decade, the production of pulse crops (peas, lentils, and chickpeas) has seen substantial growth in Montana. Montana has become a world-class pulse production region as acreages continue to expand and as Montana's reputation for quality becomes increasingly recognized across the globe. Pea acres increased from less than 100,000 in 1998 to 1,209,039 acres in 2016. In 2011, Montana took over the lead in lentil and pea production in United States, accounting for over half of all lentil acres and nearly half of all pea acres. Montana currently produces 48% of U.S. dry peas and 39% of U.S. lentils.



There are a number of factors driving expansion of the pulse industry. Global demand is being driven by population growth and economic gains in other parts of the world. Additionally, Montana peas and lentils serve as less expensive substitutes for other pulses and beans grown in south Asia.



Exports from Montana are not limited to south Asia and China; significant volumes are exported to countries in Europe, South America, Latin America, Africa, and the Middle East. In recent years, the world pulse supply has been tight because of demand factors, weather events, and loss of acres to other crops.



Montana's major pulse crop production region is northeastern Montana but significant acres have spread to other areas. In the past, northeastern Montana has accounted for roughly 80% of Montana's pulse crop acreages. Despite the likelihood that pulse acres will continue to increase in northeastern Montana, that region's share of the total pulse acreage in Montana will likely decline as pulse acreage growth accelerates elsewhere in the state, particularly in the Golden Triangle (the region in north central Montana defined by an imaginary line between Great Falls, Havre, and Cut Bank that includes Cascade, Chouteau, Glacier, Hill, Pondera, Teton, and Toole counties).

Pulse Crop Commodity Survey				
Target Species	Common Name	Pest list	Approved Method	Sites
Veronicella spp.	Veronicellid Slugs	AHP #21	Visual	25 (50 samples)
Spodoptera littoralis (Boisduval)	Egyptian Cottonworm	AHP #23	Bucket Trap/lure 84 days	25
Helicoverpa armigera (Hübner)	old world bollworm	AHP #3	Bucket Trap/lure 28 days	25
Monacha spp.	Helicid Snail	AHP #38	Visual	25 (50 samples)
Diabrotica speciosa Germar	cucurbit beetle	AHP #45	Visual	25 (50 samples)
Succinea spp.	amber snail	TTG #15	Visual	25 (50 samples)
Theba pisana Müller	Mediterranean snail	TTG #2	Visual	25 (50 samples)
Cernuella virgata (daCosta)	Vineyard snail	TTG #4	Visual	25 (50 samples)
Xerolenta obvia (Menke)	Eastern heath snail	TTG #6	Visual	25 (50 samples)
Ditylenchus angustus	Rice Stem Nematode	AHP #17	soil sample	25
Heterodera cajani	pigeonpea cyst nematode	Cyst Nematode	Soil sample	25
Heterodera latipons	Mediterranean cereal cyst	Cyst Nematode	Soil sample	25
Heterodera filipjevi	cereal cyst nematode	Cyst Nematode	Soil sample	25
Ditylenchus dipsaci	stem and bulb nematode	export concern	Soil sample	25
Halyomorpha halys (Stal)	BMSB	State	Visual	25 (50 samples)
Noxious Weeds	Noxious Weeds	State	Visual	25

PULSE CROP PEST DETECTION SURVEY RESULTS: All moth traps, visual surveys, soil sample, and plant samples were negative for target species listed below. Economic levels of pea leaf weevil were detected in one sample. The following diseases were detected in samples and reported to participating growers: Alternaria leaf spot, Ascochyta leaf spot, Septoria leaf spot, Phoma leaf spot, Stemphylium leaf spot, Fusarium root rot, and white mold.

2016 NEMATODE SURVEY RESULTS		
Species of Regulatory or Economic Concern	**Group**	**POSITIVE/NEGATIVE**
Bursaphelenchus xylophilus (Steiner and Buhrer)	Pine wilt	NEGATIVE
Ditylenchus destructor Thorne	Potato rot	NEGATIVE
Ditylenchus dipsaci (Kühn)	Bulb and stem	NEGATIVE
Globodera pallida (Stone)	Potato cyst	NEGATIVE
Globodera rostochiensis (Wollenweber)	Potato cyst	NEGATIVE
Heterodera glycines Ichinohe	Soybean cyst	NEGATIVE
Heterodera latipons Franklin	Cereal cyst	NEGATIVE
Meloidogyne arenaria (Neal)	Root knot	NEGATIVE
Meloidogyne artiellia Franklin	Root knot	NEGATIVE
Meloidogyne chitwoodi Golden et al.	Root knot	NEGATIVE
Meloidogyne fallax Karssen	Root knot	NEGATIVE
Meloidogyne hapla Chitwood	Root knot	NEGATIVE
Meloidogyne incognita (Kofoid & White)	Root knot	NEGATIVE
Meloidogyne javanica (Treub)	Root knot	NEGATIVE
Meloidogyne mayaguensis Rammah and Hirschmann	Root knot	NEGATIVE
Nacobbus aberrans (Thorne)	False root knot	NEGATIVE
Other Plant-Parasitic Genera	**Group**	**POSITIVE/NEGATIVE**
Anguina	Seed gall	NEGATIVE
Aphelenchoides	Bud and leaf	NEGATIVE
Belonolaimus	Sting	NEGATIVE
Cactodera	Cactus cyst	NEGATIVE
Ditylenchus other species	Other	POSITIVE
Helicotylenchus	Spiral	POSITIVE
Heterodera other species	Cyst	NEGATIVE
Hemicycliophora	Sheath	NEGATIVE
Hoplolaimus	Lance	NEGATIVE
Longidorus	Needle	NEGATIVE
Mesocriconema	Ring	NEGATIVE
Paratrichodorus	Stubby root	NEGATIVE
Paratylenchus	Pin	POSITIVE
Pratylenchus	Root lesion	POSITIVE
Quinisulcius	Stunt	POSITIVE
Rotylenchulus	Reniform	NEGATIVE
Trichodorus	Stubby root	NEGATIVE
Tylenchorhynchus	Stunt	POSITIVE
Xiphinema	Dagger	POSITIVE

Exotic Woodborer and Bark Beetle Survey (EWBB)
Detection Survey

Wood boring insects are some of the most dramatically destructive invasive species introduced into the forest and urban landscape of the United States (e.g. Asian longhorned beetle, emerald ash borer). Some native wood boring insects (e.g. mountain pine beetle) also cause significant damage to Montana's forest resources, but the threat of exotic wood borers is significant for Montana agriculture, wood products, tourism, and recreation industries.

The Exotic Woodborer and Bark Beetle (EWBB) survey targets primarily three groups of insects; longhorned beetles (Cerambycidae), bark beetles (Scolytinae), and wood wasps (Siricidae). Within these groups more than 20 species are specifically targeted including the Asian longhorned beetle, Japanese pine sawyer, European spruce bark beetle, brown spruce longhorned beetle, and spruce engraver. This survey is conducted by using Lindgren funnels and panel traps baited with various ultra-high release (UHR) ethanols, bark beetle pheromone, and plant volatile lures. Funnel traps also have passive flight intercept capabilities, and the resulting trap catches include many native wood-boring beetles and a wide range of non-target families. While not specifically targeted, flight intercept traps do capture beetles in the family Buprestidae and have the potential to trap exotic buprestids such as the Emerald Ash Borer.

In 2016, 50 funnel traps and 25 cross vane panel traps were placed and monitored across the state cooperatively by MDA and Montana State University. Trap sites focused on forested areas near the Canadian border and recreation sites with campgrounds, and high traffic tourism areas.

Target Species	Common Name	Approved Method	Lure	Sites
Chlorophorus strobilicola	slender-banded pinecone longhorn beetle	Visual	N/A	25
Ips sexdentatus	six-toothed Ips	Black Multi-Funnel Trap	Ips sp. Lure	25
Ips typographus	European spruce bark beetle	Black Multi-Funnel Trap	Ips sp. Lure	25
Monochamus alternatus	Japanese pine sawyer	Black Multi-Funnel Trap	Monochamol, Alpha Pinene UHR, Ethanol	25
Monochamus saltuarius	Sakhalin pine sawyer	Visual	N/A	25
Monochamus sutor	small white-marmorated longhorn beetle	Visual	N/A	25
Tetropium castaneum	black spruce beetle	Cross Vane Panel Trap	Spruce Blend, Geranyl Acetol, Ethanol	25
Tetropium fuscum	brown spruce longhorn beetle	Cross Vane Panel Trap	Spruce Blend, Geranyl Acetol, Ethanol	25
Tomicus minor	lesser pine shoot beetle	Visual	N/A	25

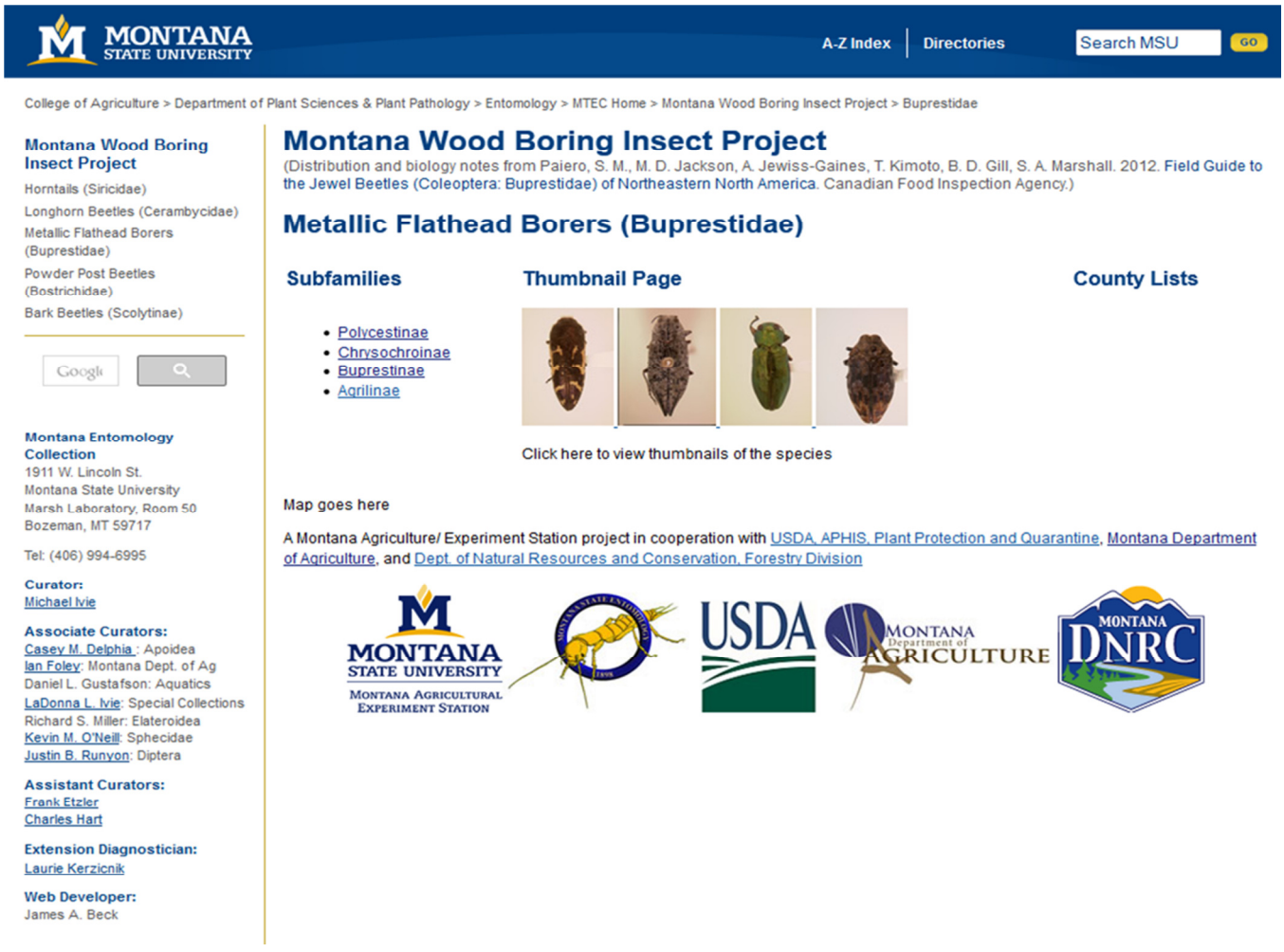
RESULTS: No target species were collected.

Cerambycidae: There are 152 species of longhorned beetles recorded from Montana (Hart et al. 2013). The most common species in funnel traps include *Asemum striatum* (Linnaeus), *Arhopalus asperatus* (LeConte), *Neandra brunnea* (Fabricius), *Neospondylis upiformis* (Mannerheim), *Xylotrechus longitarsis* Casey, *Acmaeops proteus* (Kirby in Richardson), *Monochamus scutellatus* (Say), *Rhagium inquisitor* (Linnaeus), and *Tetropium velutinum* LeConte.

Solytinae: There are approximately 100 species of bark beetles recorded from Montana (Gast et al. 1989, NAPIS 2012).

Montana Wood Boring Insect Project

Montana State University through the Montana Agricultural Experiment Station (MAES) and Montana Entomology Collection (MTEC) has developed an online portal for the "Montana Wood Boring Insect Project". This website contains county level distribution data and images of all of the long-horned and metallic wood boring beetles known to occur in Montana. Many of the non-target species collected through the CAPS program have been incorporated into this project and are maintained in the MTEC. The project website can be found at: http://mtent.org/WoodBor.html

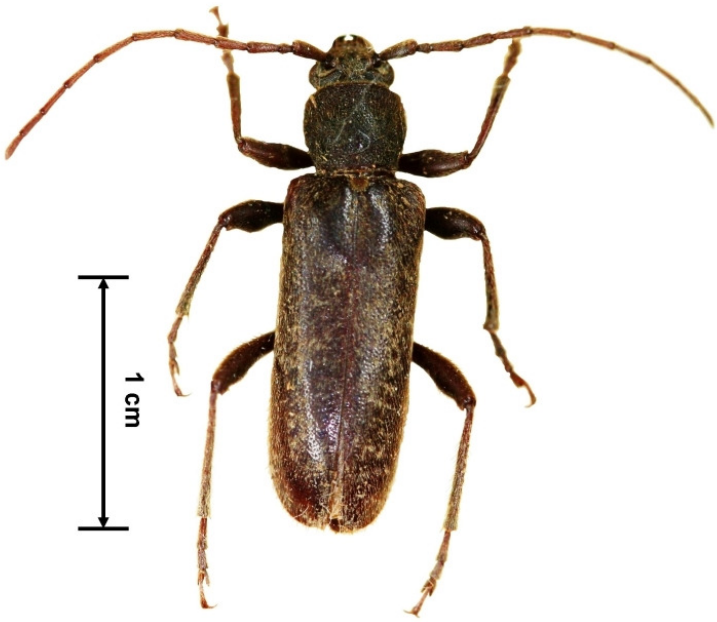


Furniture Pest Alert
Velvet Longhorned Beetle

Trichoferus campestris Faldermann

Native range: Asia and eastern Europe

This wood borer is a serious pest and could be devastating to our forest, apple, and cherry industries.



Christopher Pierce, USDA APHIS PPQ,
forestryimages.org

UGA2154045

The velvet longhorn beetle is an exotic species that has the potential to become a pest in Montana. Preferred hosts of the velvet longhorned beetle include apple (*Malus*) and mulberry (*Morus*). This beetle has also been recovered from maple (*Acer*) in Canada and is attacking living cherry and peach trees in Utah (*Prunus*). The host range appears to be broad and not enough is known about this insect to know what hosts are at greatest risk in Montana. This insect has the ability to complete development under dry wood conditions, so the range of potential hosts may include dry cut wood with bark as well as recently cut logs and living trees. In its native range, larvae overwinter in wood and emerge in spring. Adults emerge from wood and are active from June to August. Females lay eggs on the bark of trees. Larvae tunnel under the bark and eventually into the wood. This insect seems to be particularly tolerant of tunneling in dry wood and this has been demonstrated from inspecting infested furniture. In some pieces of infested furniture, insect activity was not detected until 18 months after the furniture was purchased.

Many species of longhorned beetles have a similar appearance. If you have active insect activity in any purchased furniture products, please contact the Montana Department of Agriculture or your local Montana State University Extension office.

2016 National Honey Bee Survey
Farm Bill 10007

In an average year Montana has about 150,000 to 160,000 beehives, of which the majority are migratory. Montana has about 150 registered beekeepers, about half of whom are commercial operators. Most of these provide commercial pollination services outside Montana. Migratory beekeepers typically travel to California in the early spring for almond pollination, then move to fruit crops in Washington and Oregon before moving back to Montana for the summer. Ranked by revenue, beekeeping is the 10th largest agricultural industry in Montana; pollination fees make up the majority of that income.

Pests of honey bees are a serious threat to the agricultural economy of Montana and to the states where Montana-based bees provide pollination. USDA estimates honey bee pollination adds approximately $15 billion to the value of American agriculture. In 2006 beekeepers began reporting unexplained and unexpected losses of 30% or more of their hives. What eventually came to be called "colony collapse disorder" was characterized by the rapid disappearance of worker bees from apparently healthy hives. Despite a considerable increase in honey bee research, the cause of colony collapse remains unknown, and unexplained losses continue at about 30% per year.

Montana bee yard, photo C. Lay

A healthy frame of brood, photo C. Lay

In 2009 the USDA-APHIS initiated the National Honey Bee Pests and Diseases Survey in all 50 states. The primary objectives of the survey are to confirm the absence of tropical bee mites in the genus *Tropilaelaps*, the absence of the Asian honey bee *Apis ceranae*, and the absence of slow paralysis virus (a honey bee disease associated with *A. ceranae)*. Secondary objectives include evaluating the overall health of the apiaries sampled to establish a baseline for future research. Samples submitted from the survey will be evaluated for their mite loads (*Varroa,* tracheal mites, and other parasitic mites) and the degree to which viruses and other pathogens are present (particularly *Nosema ceranae*, a more virulent *Nosema* species associated with tropical honey bees). Viruses are identified at the molecular level by the USDA "bee lab" in Beltsville, MD.

Varroa mites on a drone pupa, photo I. Foley

RESULTS: 9 National Honey Bee Survey samples were collected in 2016 and submitted to laboratories at the University of Maryland. Some results are pending analysis. Nosema Disease (Nosema spp.), Lake Sinai-2 virus, Kashmir Virus, Israeli Acute Bee Paralysis, Chronic Bee Paralysis Virus, Deformed Wing Virus, and Black Queen Cell Virus were all detected in at least one sample.

Eastern Heath Snail Update
Xerolenta obvia Menke
Farm Bill 10007

Background

Snail samples collected in Cascade County in late July of 2012 were confirmed as eastern heath snail, *Xerolenta obvia*, one of twelve USDA listed invasive terrestrial snails of national concern. The Montana Department of Agriculture and Montana PPQ conducted survey work in August and September of 2012 to delimit the infested area, determine whether eastern heath snail was present in grain and alfalfa production areas in the state, and to support export of Montana agricultural commodities and products. Survey work confirmed the presence of snails in the Belt area along transportation corridors, residential areas, rangeland, hay fields, and yards. Extensive survey work outside the infested area showed snails were not yet present in grain production areas. Through discussion with individual Belt area landowners and residents, it was determined the snails have been present in the area for at least 25 years, perhaps much longer. Pathways of introduction include rail, mining, travel, and trade/commerce. There is a strong correlation between rights-of-way activities and local distribution of the snail. In 2013, two additional populations of *Xerolenta obvia* were confirmed in Cascade County (in the city of Great Falls and near Monarch).

Survey

The department received Farm Bill 10007 funding to conduct a broad invasive snail and slug survey across Montana. Survey sites included high-risk transportation areas, recreational areas, and nurseries.

Target Species	Common Name	Pest list	Approved Method	Number of Sites
Monacha spp.	Helicid Snail	AHP #33	Visual	50
Veronicella spp.	Veronicellid Slugs	AHP #22	Visual	50
Theba pisana Müller	Mediterranean snail	TTG #2	Visual	50
Cernuella virgata (daCosta)	Vineyard snail	TTG #4	Visual	50
Succinea spp.	amber snail	TTG #15	Visual	50
Xerolenta obvia (Menke)	Eastern heath snail	TTG #6	Visual	50

Survey work was focused on presence or absence of snails and no attempt was made to quantify the snail population. Survey work appears to indicate that snails have not spread beyond the infested boundaries identified in 2012. However, little is known about the biology or invasive behavior of this snail and predictions of future population growth or spread cannot be made with any certainty with current information and data. It remains important to conduct survey work in the future to monitor the snail population in the Belt area and determine presence or absence in other areas to support Montana's export markets.

***Cochlicella* sp. on grain**

Maritime garden snail, *Cernuella virgata*

Mollusks have only recently been identified as a threat in Montana. Movement of various materials protected by solid wood packing material into and through Montana increases the risk of introduction of pests – not only through standard commerce, but also through the movement of materials from the seaport inland. Interstate 90, a major route across the U.S., travels the entire width of Montana, from a point just west of Missoula to east of Glendive. The Montana "banana belt," a region of milder climate, runs from the Flathead Valley to the Bitterroot. This area has experienced a rapid influx of people and an increase in the building of higher-value homes. These properties often include imported materials such as tile, marble, and wood.

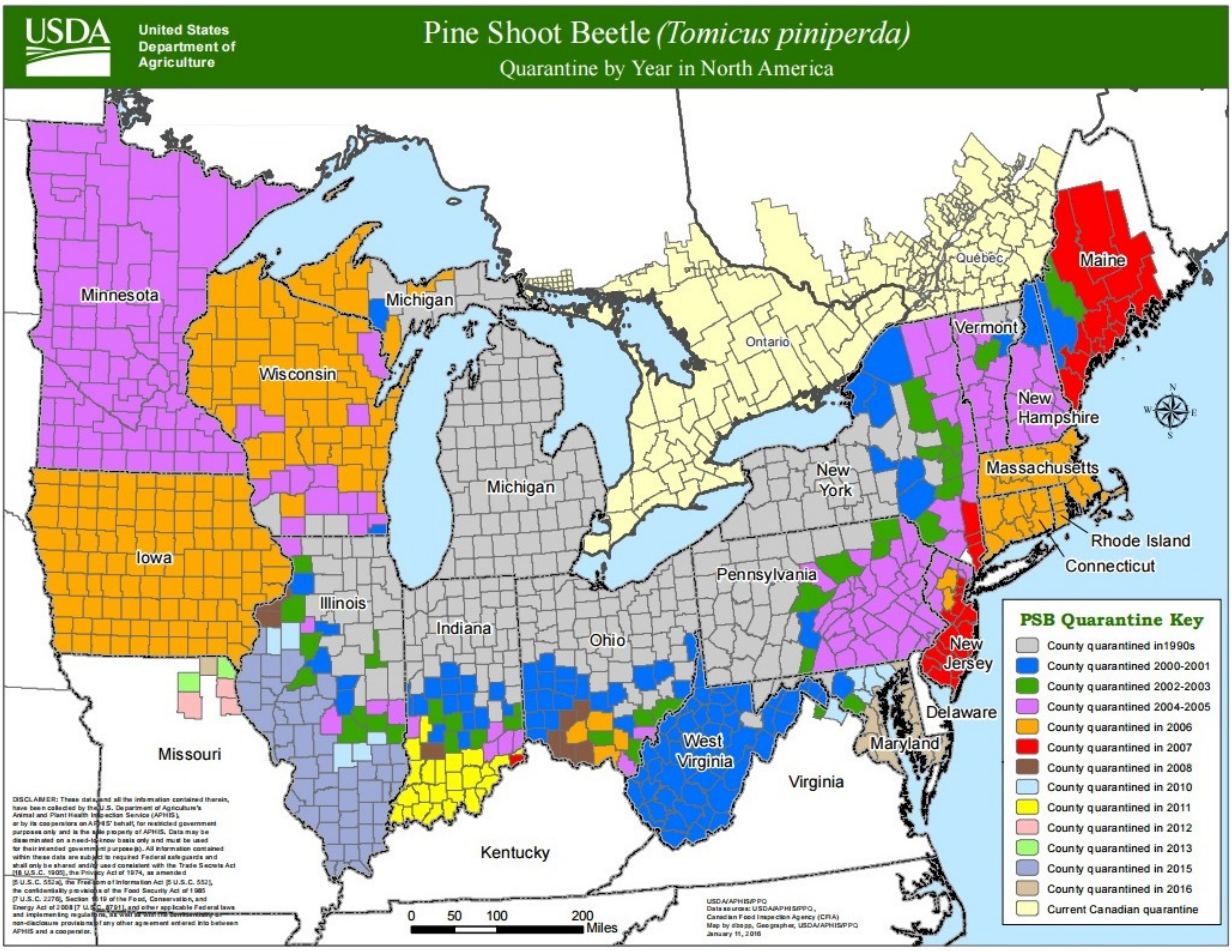
The entire state of Montana is a Mecca for recreation including activities of all types. All of these serve as routes of entry into the state for organisms such as the various Veroncellid snails, as well as *Monacha* spp., *Cernuella* spp., and *Cochlicella* spp. These snails could, if established, not only out-compete native species, but also eliminate portions of the food web that are currently supporting the state's famous trout fisheries, become mechanical obstacles to field crop harvest, and directly damage desirable plant species including wheat.

RESULTS: No additional invasive mollusk species were discovered in 2016.

Pine Shoot Beetle (PSB) Detection Survey
Tomicus piniperda (Linnaeus)

Tomicus piniperda, the pine shoot beetle, is a member of the economically important bark beetle sub-family Scolytinae. There are approximately 101 species of bark beetle known to occur in Montana (Gast et al., 1989). These include many economic species of forestry and wood products. The principal hosts of *T. piniperda* are pines (CABI, 2004). It will attack the stem of weakened trees during breeding and the shoots of weakened or healthy trees during sexual maturation (Haack and Kucera, 1993). *Tomicus piniperda* is considered a major forest pest in Europe and China (CABI, 2004; Ye, 1991). *Tomicus piniperda* and other bark beetles are also a trade concern because it will readily move in dunnage and solid wood packing materials.

In 1992, *T. piniperda* was detected in a Christmas tree plantation near Cleveland, Ohio (Haack and Kucera, 1993). Since then it has been detected in 14 states and resulted in 473 regulated U.S. counties due to natural spread, human movement of infested commodities in the regulated area and increased surveys (Haack and Poland, 2001; Heilman et al., 2005; NAPIS, 2005; USDA-APHIS, 2005). The purpose of the survey in Montana is to continue to document that Montana is free from this pine pest.



The presence of *T. piniperda* in the U.S. has resulted in quarantines on the movement of potentially infested articles (CFR, 2003, 2005). Regulated pine articles include: 1) Christmas trees, 2) nursery stock, 3) logs with bark, 4) lumber with bark, 5) stumps, and 6) bark nuggets.

Montana has concentrated areas of suitable hosts for PSB that are often stressed by fires and drought and could be at risk for establishment (CABI, 2004; Swetnam, 2001). However, the west in general may also be the easiest region to protect from *T. piniperda* introduction with regulatory methods. This is because a lack of concentrated host material in the plains states and a lack of effective aggregation pheromones may mitigate the natural movement of *T. piniperda* to at risk Montana pine resources (Haack and Kucera, 1993; USDA-USFS, 1991).

RESULTS: Lindgren funnel traps with lures designed for pine shoot beetle were placed at 30 sites in 14 counties across Montana. Traps were placed cooperatively by the Montana Department of Agriculture and Montana State University. The traps were screened by Montana State University and non-target bark beetles were added to the ongoing Montana wood-boring insect project at MSU. No pine shoot beetles were detected in 2016.

Image, Pest and Diseases Image Library, www.forestryimages.org

National Agriculture Pest Information System (NAPIS)
2016 Summary Report

Pest Common	Pest Scientific	Data Source	Counties	Positives	Negatives	Total
Alder root and collar rot	Phytophthora alni	State Ag Dept.	11	0	51	51
Alder root and collar rot	Phytophthora alni	University/Extension	10	0	55	55
Amber snail	Succinea sp./spp.	State Ag Dept.	16	0	25	25
Amber snail	Succinea sp./spp.	University/Extension	10	0	55	55
American foulbrood	Paenibacillus larvae larvae	State Ag Dept.	5	0	9	9
Asian gypsy moth	Lymantria dispar asiatica	State Ag Dept.	9	0	150	150
Asian gypsy moth	Lymantria dispar asiatica	USDA-APHIS	13	0	235	235
Asian honey bee	Apis ceranae	State Ag Dept.	5	0	9	9
Black spruce beetle	Tetropium castaneum	State Ag Dept/Univ.-Exten	9	0	25	25
Brown marmorated stink bug	Halyomorpha halys	State Ag Dept.	11	0	24	24
Brown marmorated stink bug	Halyomorpha halys	State Ag Dept.	16	0	25	25
Brown spruce longhorned beetle	Tetropium fuscum	State Ag Dept/Univ.-Exten	9	0	25	25
Cereal cyst nematode	Heterodera filipjevi	State Ag Dept.	16	0	25	25
Chalk brood	Ascosphaera apis	State Ag Dept.	5	0	9	9
Chronic bee paralysis (CBPV)	Unassigned Chronic Bee Paralysis Virus	State Ag Dept.	5	0	9	9
Cucurbit beetle	Diabrotica speciosa	State Ag Dept.	16	0	25	25
Deformed wing (DWV)	Iflavirus Deformed Wing Virus	State Ag Dept.	5	0	9	9
Eastern heath snail	Xerolenta obvia	State Ag Dept.	26	2	78	80
Eastern heath snail	Xerolenta obvia	University/Extension	10	0	55	55
Egyptian cottonworm	Spodoptera littoralis	State Ag Dept.	16	0	25	25
Emerald ash borer	Agrilus planipennis	Municipal/City	1	0	6	6
Emerald ash borer	Agrilus planipennis	University/Extension	1	0	2	2
European foulbrood	Melissococcus plutonius	State Ag Dept.	5	0	9	9
European gypsy moth	Lymantria dispar dispar	State Ag Dept.	9	0	150	150
European gypsy moth	Lymantria dispar dispar	USDA-APHIS	13	0	235	235
European spruce bark beetle	Ips typographus	University/Extension	9	0	25	25
Golden nematode	Globodera rostochiensis	State Ag Dept.	1	0	1	1
Great spruce bark beetle	Dendroctonus micans	University/Extension	10	0	55	55
Greater wax moth	Galleria mellonella	State Ag Dept.	5	0	9	9
Hokkaido gypsy moth	Lymantria umbrosa	State Ag Dept.	9	0	150	150
Hokkaido gypsy moth	Lymantria umbrosa	USDA-APHIS	13	0	235	235
Hygromiid snails	Monacha sp./spp.	State Ag Dept.	16	0	25	25
Hygromiid snails	Monacha sp./spp.	University/Extension	10	0	55	55
Israeli acute bee paralysis (IAPV)	Aparavirus Israeli Acute Paralysis Virus	State Ag Dept.	5	0	9	9
Japanese pine sawyer	Monochamus alternatus	State Ag Dept/Univ.-Exten	13	0	30	30
Japanese pine sawyer	Monochamus alternatus	USDA-APHIS	13	0	32	32
Karnal bunt	Tilletia indica	State Ag Dept.	30	0	160	160
Kashmir virus	Aparavirus Kashmir Virus	State Ag Dept.	5	0	9	9
Lake sinai-2 (LSV-2)	Unassigned Lake Sinai Virus-2	State Ag Dept.	5	0	9	9
Leatherleaf slugs	Veronicella sp./spp.	State Ag Dept.	16	0	25	25
Leatherleaf slugs	Veronicella sp./spp.	University/Extension	10	0	55	55
Lesser pine shoot beetle	Tomicus minor	University/Extension	10	0	55	55
Maritime garden snail	Cernuella virgata	State Ag Dept.	16	0	25	25
Maritime garden snail	Cernuella virgata	University/Extension	10	0	55	55
Masson pine moth	Dendrolimus punctatus	State Ag Dept.	11	0	51	51
Masson pine moth	Dendrolimus punctatus	USDA-APHIS	13	0	32	32
Mediterranean cereal cyst nemat	Heterodera latipons	State Ag Dept.	16	0	25	25
Needle blight of pine	Pseudocercospora pini-densiflorae	State Ag Dept.	11	0	51	51
Needle blight of pine	Pseudocercospora pini-densiflorae	University/Extension	10	0	55	55
Okinawa gypsy moth	Lymantria albescens	State Ag Dept.	9	0	150	150

Pest Common	Pest Scientific	Data Source	Counties	Positives	Negatives	Total
Okinawa gypsy moth	Lymantria albescens	USDA-APHIS	13	0	235	235
Old World bollworm	Helicoverpa armigera	State Ag Dept.	16	0	25	25
Pale cyst nematode	Globodera pallida	State Ag Dept.	1	0	1	1
Parasitic mite	Tropilaelaps sp./spp.	State Ag Dept.	5	0	9	9
Parasitic mite syndrome	Parasitic Mite Syndrome	State Ag Dept.	5	0	9	9
Pigeonpea cyst nematode	Heterodera cajani	State Ag Dept.	16	0	25	25
Pine beauty moth	Panolis flammea	USDA-APHIS	13	0	32	32
Pine sawfly	Diprion pini	State Ag Dept.	11	0	51	51
Pine sawfly	Diprion pini	USDA-APHIS	13	0	32	32
Pine shoot beetle	Tomicus piniperda	State Ag Dept/Univ.-Exten	10	0	30	30
Pine witches' broom	Candidatus Phytoplasma pini 16SrXXI-A	State Ag Dept.	11	0	51	51
Pine witches' broom	Candidatus Phytoplasma pini 16SrXXI-A	University/Extension	10	0	55	55
Pine-tree lappet	Dendrolimus pini	USDA-APHIS	13	0	32	32
Rosy moth	Lymantria mathura	State Ag Dept.	17	0	62	62
Rosy moth	Lymantria mathura	USDA-APHIS	8	0	19	19
Sakhalin pine sawyer	Monochamus saltuarius	University/Extension	10	0	55	55
Scots pine blister rust	Cronartium flaccidum	State Ag Dept.	11	0	51	51
Scots pine blister rust	Cronartium flaccidum	University/Extension	10	0	55	55
Siberian silk moth	Dendrolimus sibiricus	USDA-APHIS	13	0	32	32
Sixtoothed bark beetle	Ips sexdentatus	University/Extension	9	0	25	25
Slender-banded pinecone longho	Chlorophorus strobilicola	University/Extension	10	0	55	55
Slow bee paralysis (SPB)	Iflavirus Slow Bee Paralysis Virus	State Ag Dept.	5	0	9	9
Small hive beetle	Aethina tumida	State Ag Dept.	5	0	9	9
Small white-marmorated longhor	Monochamus sutor	University/Extension	10	0	55	55
Stem and bulb nematode	Ditylenchus dipsaci	State Ag Dept.	16	0	25	25
White garden snail	Theba pisana	State Ag Dept.	16	0	25	25
White garden snail	Theba pisana	University/Extension	10	0	55	55
White-winged gypsy moth	Lymantria postalba	State Ag Dept.	9	0	150	150
White-winged gypsy moth	Lymantria postalba	USDA-APHIS	13	0	235	235
REPORT TOTAL				2	4211	4213