2012

Cooperative Agricultural Pest Survey Report

Montana Department of Agriculture

Montana Department of Agriculture

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Cover photo: *Xerolenta obvia* (Menke) in Cascade County Montana crushed by pavement roller, 2012, I. Foley.

Introduction to the Program

The Cooperative Agricultural Pest Survey (CAPS) 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 introduced 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, US-Forest Service, and others.

The Interns and Other Program Assistants

The Montana Department of Agriculture conducts several of the surveys. This would not be possible without the assistance of a group of dedicated people, who join the department for the summer as interns and/or survey technicians. We also had the invaluable assistance of Montana USDA-APHIS-PPQ and Amy Gannon, Forest Entomologist with DNRC. In addition, several MDA Agricultural Specialists, led by Velda Baltrusch of Great Falls, assisted in gathering Karnal bunt samples.

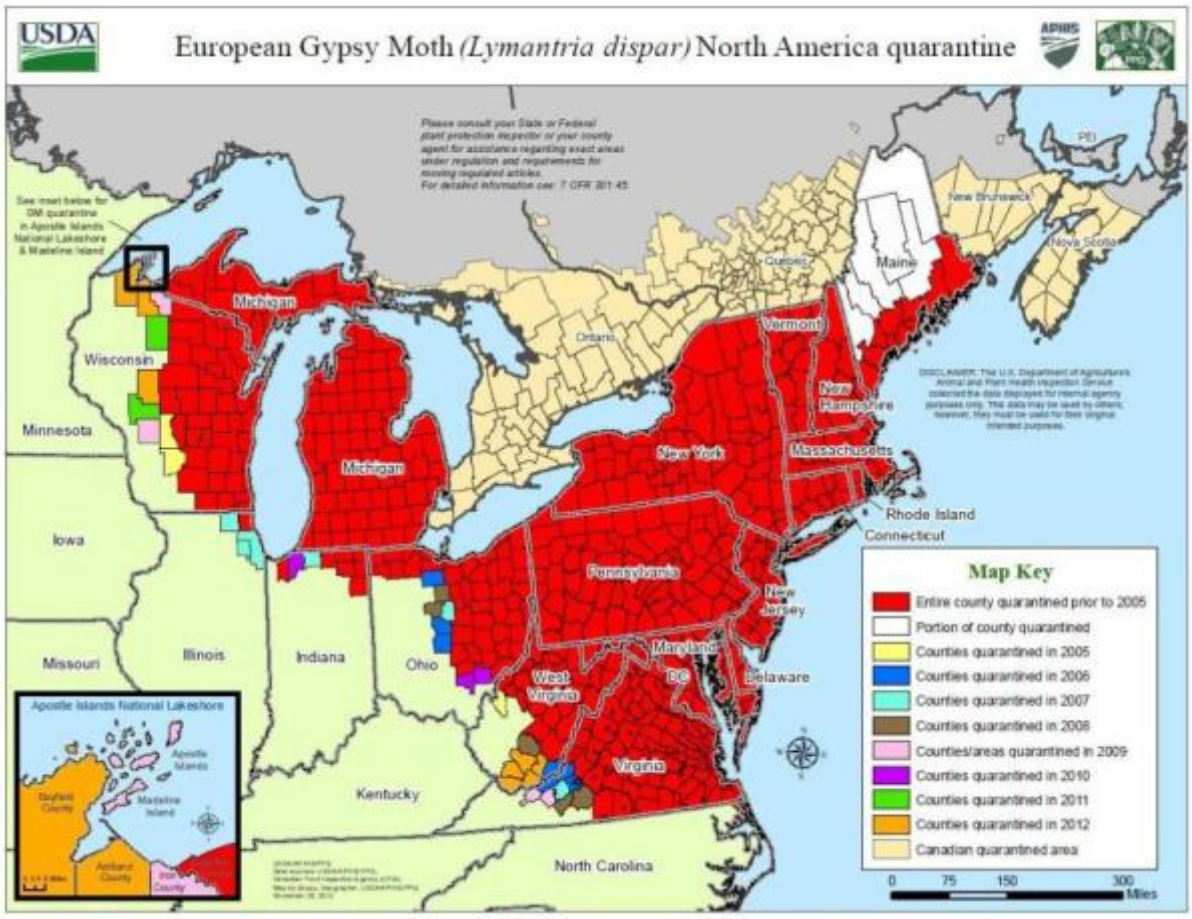
In 2012, the CAPS program hired Allesha Lynch as a Survey Technician. Allesha is a recent graduate of the University of Montana-Helena College Environmental Science Program. She displayed an exceptional work ethic and interest in insects and other pests; the program could not have gone forward without her assistance.

Gypsy Moth (GM) Detection Survey

Lymantria dispar (L.)

The European strain of the gypsy moth (*Lymantria dispar* (L.)) was initially introduced into the Eastern U.S. in the mid-1800s. It established rapidly and became a serious defoliating pest. Over 500 susceptible host plants have been identified. Most are deciduous trees and shrubs, but older gypsy moth larvae will also consume pines and spruces. In Montana, aspen and western larch are particularly important potential native tree hosts 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 covered with scales and hairs, and have been found on Christmas trees, boats, RVs, outdoor furniture, RV's, 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.



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

There have been several positive GM 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 that 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 a female sex-pheromone lures and only attract males.

Gypsy moth caterpillar

In Montana, responsibility for the trapping of gypsy moth 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). The USDA APHIS PPQ placed traps mainly in the northeastern portion of the state, while the MDA trapped in the western part of the state. The DNRC put out 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: One hundred fifty five traps were placed by the MT Dept. of Agriculture, sixty-nine traps were placed by the Montana Department of Natural Resources and Conservation, and 512 traps were placed by USDA-APHIS. Traps were baited with lures effective for both the Asian and the European strains of gypsy moths. Additional traps were placed in the Billings area, where a gypsy moth was captured in a trap in 2011. All traps were negative in 2012.

Emerald Ash Borer (EAB) Detection Survey

Agrilus planipennis Fairmaire

The emerald ash borer (EAB) is an exotic wood-boring pest that attacks and kills ash trees (*Fraxinus* sp.). In the eastern United States it is a severe threat to ash trees in hardwood forest ecosystems and the urban landscape. While native ash in Montana and the intermountain west is limited to riparian areas, green ash (due to its rapid growth, hardiness, and cold tolerance) has been planted in some Montana neighborhoods at densities approaching 100%.

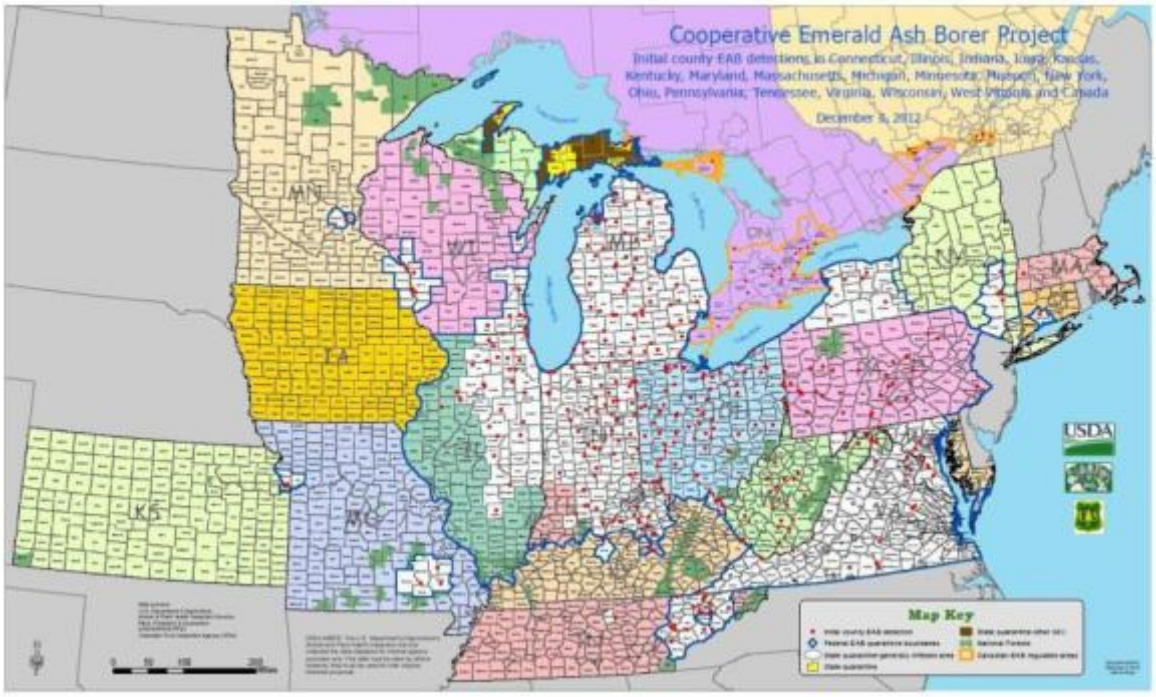
Emerald Ash Borer

The emerald ash borer is native to Asia, but was introduced into the eastern United States through international trade sometime in the 1990s, most likely in solid wood packing materials. It was first discovered in southeastern Michigan in 2002. Since then EAB has been detected in Indiana, Illinois, Iowa, Maryland, New York, Tennessee, Michigan, Ohio, Pennsylvania, West Virginia, Wisconsin, Kansas, Missouri, and Minnesota. EAB larvae consume the cambium layer of ash trees, preventing the flow of nutrients and water up and down the tree. The insect will attack and kill both healthy and stressed trees; the average time to mortality, even for a healthy tree, is only two to three years. It is estimated that EAB has killed 40 million ash trees in Michigan alone, with tens of millions more having been killed in other adjacent states.

The success of outreach efforts regarding EAB is indicated by the increasing number of inquiries we receive each year about this insect. Unfortunately, the increasing number of reports also suggests a general decline in the health of Montana's ash trees. Each report is investigated on a case by case basis. So far, EAB has not been found in Montana.

Emerald ash borer traps are hung in ash trees (*Fraxinus* sp.). The large purple trap is sticky on the outside and acts as a panel flight intercept trap. The trap is baited with a Manuka oil lure that mimics the volatile compounds released by a damaged ash tree (image on the right courtesy of entomology.wisc.edu). Many Ash trees in Montana are highly-stressed because of site conditions, old age, other insect pests, and a variety of abiotic factors. Damaged or poorly growing Ash trees should be inspected for emerald ash borer damage.

The map below shows the national distribution of EAB as of December 2012.



EAB trapping in Montana has focused on highways, campgrounds, and urban areas where the insect is most likely to be introduced. In 2012, the majority of traps in the eastern part of the state followed a risk based model developed by the USFS-Forest Health Technology Enterprise Team (FHTET).

RESULTS

One-hundred ninety seven (197) EAB traps were placed in Montana in 2012, by the Montana Department of Natural Resources and Conservation, USDA-APHIS-PPQ, and Montana State University. No suspected EAB were captured in 2012. The EAB National Survey Program is being modified based on the widespread establishment of this pest in the US, pest prioritization, and decreased funding available to USDA-APHIS-PPQ for Emerald Ash Borer. The Montana Department of Agriculture remains concerned about the potential impacts of this pest in Montana, particularly on ash trees in Montana urban communities.

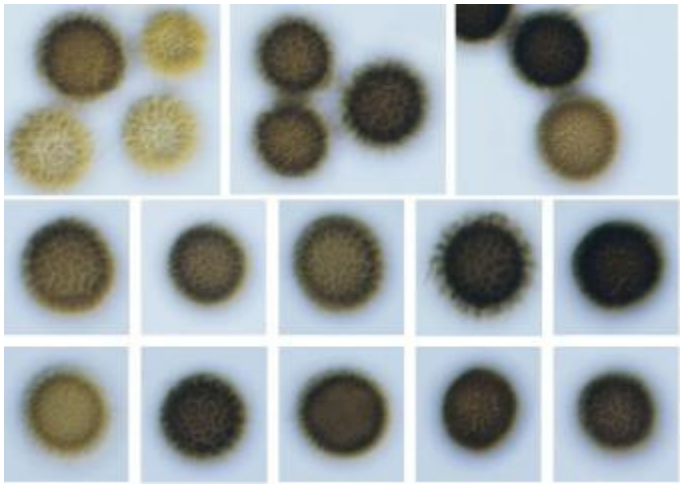
Karnal Bunt Detection Survey
Tilletia indica Mitra

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. KB was first detected in the United States in 1996, within the state of Arizona 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 2012 harvest. A total of 152 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: R. Duran, Washington State University
www.forestryimages.org **Bunted Wheat**



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

Wheat Production in Montana in 2011						
2012 Karnal Bunt Sample Numbers						
County	**2011**	**2012 Samples**		**County**	**2011**	**2012 Samples**
Beaverhead	819,000	0		Petroleum	535,000	0
Big Horn	5,041,000	4		Phillips	4,051,000	3
Blaine	5,752,000	5		Pondera	9,004,000	7
Broadwater	1,967,000	1		Powder River		0
Carbon	364,000	0		Powell		0
Carter	571,000	1		Prairie	456,000	1
Cascade	5,523,000	6		Ravalli	179,200	0
Choteau	21,942,000	23		Richland	775,000	4
Custer	426,000	0		Roosevelt	6,060,000	8
Daniels	6,532,000	5		Rosebud	372,000	1
Dawson	3,789,000	3		Sanders	37,000	0
Deer Lodge		0		Sheridan	6,422,000	7
Fallon	263,000	1		Silver Bow		0
Fergus	4,915,000	7		Stillwater	1,123,000	1
Flathead	388,000	1		Sweet Grass	95,000	0
Gallatin	3,208,000	3		Teton	7,744,000	6
Garfield	2,217,000	2		Toole	6,609,000	6
Glacier	4,741,000	4		Treasure	491,000	0
Golden Valley	951,000	1		Valley	7,151,000	7
Granite		0		Wheatland	937,000	1
Hill	19,626,000	14		Wibaux	402,000	1
Jefferson	69,000	0		Yellowstone	3,239,000	2
Judith Basin	2,078,000	3		**Totals**	**162,396,200**	**152**
Lake	1,029,000	1				
Lewis & Clark		0				
Liberty	8,958,000	7				
Lincoln		0				
Madison	751,000	0				
McCone	3,597,000	5				
Meagher	157,000	0				
Mineral		0				
Missoula	91,000	0				
Musselshell	671,000	0				
Park	278,000	0				

http://www.nass.usda.gov/Statistics_by_State/Montana/Search/index.asp

Exotic Woodborer and Bark Beetle Survey (EWBB)

Detection Survey

Wood boring insects are some of the most dramatically destructive invasive species that have been 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 using Lindgren Funnel traps baited with various ultra-high release (UHR) ethanol, bark beetle pheromone, and plant volatile lures. Funnel traps also have passive flight intercept capabilities, and the resulting trap catches include many native woodboring beetles and a wide range of non-target families. While not specifically targeted, Lindgren Funnel traps do capture beetles in the family Buprestidae and have the potential to trap exotic buprestids such as the Emerald Ash Borer.

In 2012, seventy-six funnel traps were placed and monitored across the state cooperatively by MDA and Montana State University. Trap sites focused on businesses that import commodities from foreign countries that are often associated with solid wood packaging materials, native oak and ash forests in Southeastern Montana, recreation sites with campgrounds, and high traffic tourism areas.

RESULTS: No target species were collected.

Siricidae: In a 2006 publication on the woodwasps of North America (Schiif et al. 2006), six species of Siricidae were specifically recorded from Montana as *Sirex juvencus californicus* (Ashmead), *Sirex longicauda* Middlekauff, *Sirex varipes* Walker, *Urocerus californicus* Norton, *Urocerus cressoni* Norton, and *Xeris spectrum* (Linnaeus).The woodwasps of the Western Hemisphere were recently revised by Schiff et al. (2012). This work resulted in significant changes to the nomenclature and species concepts of woodwasps found in Montana. In this more recent publication, ten species of Siricidae are recorded from Montana as *Sirex abietinus* Goulet, *Sirex californicus* (Ashmead), *Sirex nitidus* (T.W. Harris), *Sirex varipes* Walker, *Urocerus albicornis* (Fabricius), *Urocerus californicus* Norton, *Urocerus flavicornis* (Fabricius), *Tremex columba* (Linnaeus), *Xeris caudatus* (Cresson), *Xeris indecisus* (MacGillivray). Four additional species of the genus *Sirex* may occur in Montana based on the expected geographic

distributions of the species *Sirex areolatus* (Cresson), *Sirex behrensii* (Cresson), *Sirex longicauda* Middlekauff, and *Sirex nigricornis* Fabricius.

Buprestidae: There are approximately 80 species of Buprestids recorded from Montana (Nelson et al. 2008, Bellamy 2008).

Cerambycidae: There are 152 species of longhorned beetles recorded from Montana (Hart et al. 2012 in review). 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).

Urocerus californicus Norton (left) and *Xeris caudatus* (Cresson) (right). Images from Guide to the Siricid Woodwasps of North America, Nathan M. Schiff, Steven A. Valley, James R. LaBonte, and David R. Smith.

Exotic Moth Surveys

Detection and Quarantine Support

European Pine Shoot Moth (EPSM), *Rhyacionia buoliana* Denis & Schiffermüller)
Quarantine Support Survey

Montana has had a quarantine for the European pine shoot moth (EPSM) since prior to 1962. This insect is a pest in the production of lumber, nursery stock and Christmas trees that are from long-needled pines. Feeding by the larval stage in the growing tips causes death of leaders, resulting in trees with Y-shaped trunks, or other deformities, which are aesthetically unpleasing (lowering value in nursery and Christmas tree trade) or are not usable for major lumber markets due to a need for additional work to salvage merchantable trunks.

Adult European pine shoot moth, www.padil.gov.au

The insect itself is very small. The wingspan of the typical adult is under ¼ inch. However, the adult is very brightly colored, with orange and silver patterning on the wings. There are a number of native pine shoot moths with similar coloration, so identification is dependent on dissection of the male genitalia. The larvae initially feed in the tips of the branches in the new year's growth where they web the needles together for protection. Older larvae move to the needle sheath and mine into individual needles, after which they move on to the needle buds. They overwinter as larvae in the infested branch tips. Larvae emerge to feed again in the spring. This spring feeding is the most damaging, as it involves large larvae feeding on new foliage. The larvae pupate in the needle foliage in the tunnels and webbing they created while feeding. Moths emerge in mid-summer.

Monitoring for the EPSM is done using wing traps and species specific pheromones. These pheromones are attractive to the male moths, but female moths can also be caught in the traps.
There are several native tortricid species in the genus *Rhyacionia* that occur in Montana, cause similar damage, and are also caught in EPSM traps.

RESULTS: In 2012, 50 European Pine Shoot Moth traps were placed in Montana by MDA. These traps were concentrated west of the Continental Divide and were all negative.

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.

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

SSM adult male

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 forest growth, tree death in cases of repeated infestation, and unsightly forests that are not attractive for recreation, thus reducing tourism a potentially large 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 71 SSM traps were placed in Montana. No Siberian Silk Moths or suspects were trapped or submitted. The most commonly collected moth in the SSM traps was the western forest tent caterpillar, *Malacosoma californicum* (Packard).

Rosy Gypsy Moth (RGM) Detection Survey
***Lymantria mathura* Moore**

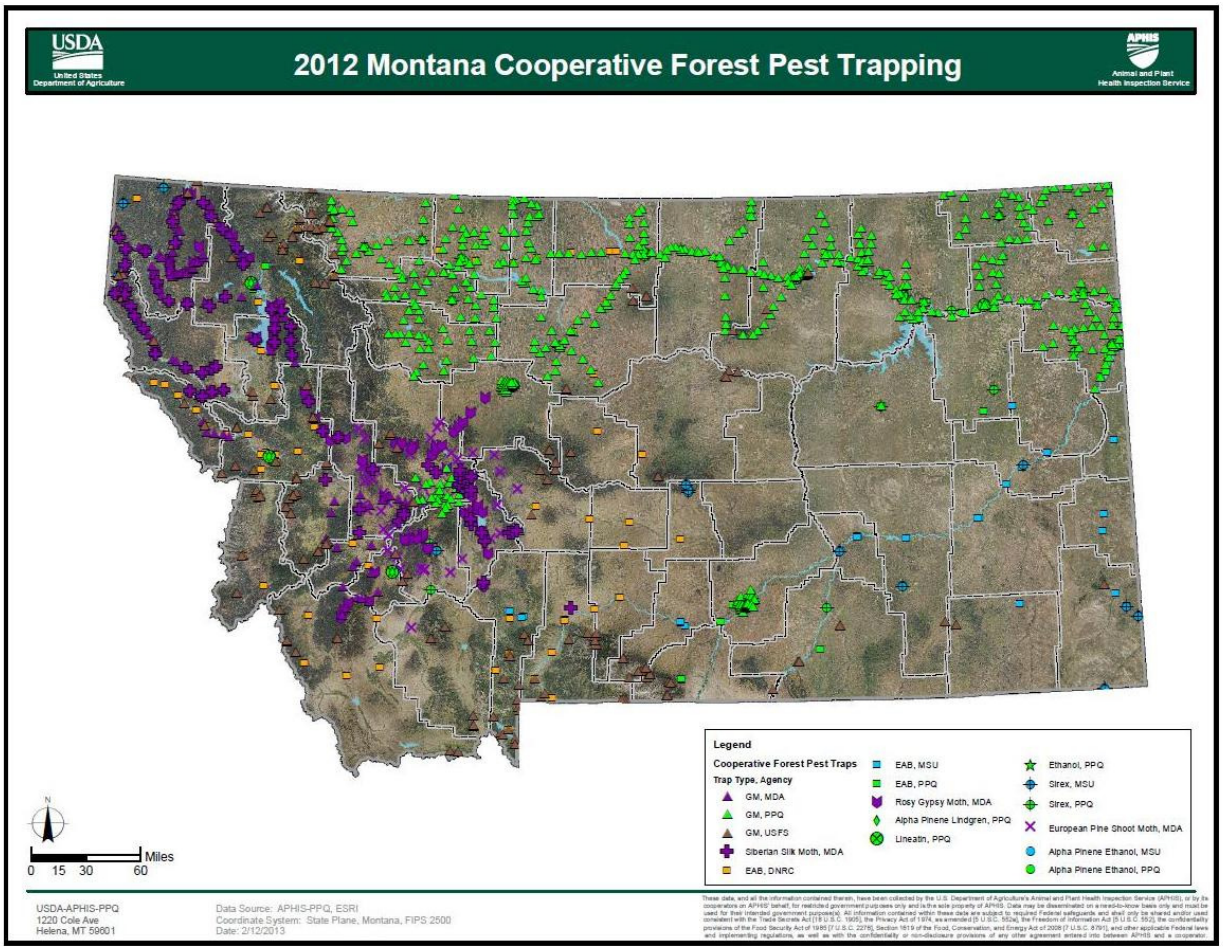
Both the gypsy moth and the rosy gypsy moth are members of the moth family Lymantridae. This family includes several native tussock moth forests pests and many members of the family are serious plant defoliators.

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 oaks, willows, fruit trees, birches, and ashes. 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 moths in the CAPS surveys are considered to have a higher risk of introduction in the western portion of the state, and also to pose a higher risk to that area should they be introduced.

RESULTS: A total of 99 Rosy Gypsy Moth traps were placed in Montana. No RGM or suspects were trapped or submitted. These traps were concentrated west of the Continental Divide and placed during different trips than European GM traps because the pheromone lures have been shown to have antagonistic affects (CAPS approved methods, 2012).


USDA
United States Department of Agriculture
2012 Montana Cooperative Forest Pest Trapping
APHIS
Animal and Plant Health Inspection Service
Legend
Cooperative Forest Pest Traps
Trap Type, Agency
GM, MDA
GM, PPQ
GM, USFS
Siberian Silk Moth, MDA
EAB, DNRC
EAB, MSU
EAB, PPQ
Rosy Gypsy Moth, MDA
Alpha Pinene Lindgren, PPQ
Lineatin, PPQ
Ethanol, PPQ
Sirex, MSU
Sirex, PPQ
European Pine Shoot Moth, MDA
Alpha Pinene Ethanol, MSU
Alpha Pinene Ethanol, PPQ
N
0 15 30 60
Miles
USDA-APHIS-PPQ
1220 Cole Ave
Helena, MT 59601
Data Source: APHIS-PPQ, ESRI
Coordinate System: State Plane, Montana, FIPS 2500
Date: 2/12/2013

2012 Plum Pox Virus Survey
National Detection Survey

Plum pox virus (PPV) is a devastating disease of stone fruit tree species such as cherries, peaches, and plums. PPV can be spread throughout live nursery stock in grafts and budwood of infected plants. It is transmitted from one plant to another by the feeding of several species of aphid.

PPV poses a special threat in Montana due to the cherry industry around Flathead Lake. Many nurseries in the area also produce various types of ornamental *Prunus.* There are native populations of *Prunus virginiana,* or Chokecherry, throughout the state that are susceptible to PPV.

Sampling is done in the early summer months because as temperatures increase the PPV virus in infected trees is harder to detect. Samples are collected from throughout the tree canopy and are immediately sent to the diagnostic lab for testing.

During the survey in 2012, 125 *Prunus* samples were collected from two nurseries. The samples were tested by personnel at the Schutter Diagnostic Laboratory at Montana State University using the ELISA method.

RESULTS: All samples were found negative for all strains of PPV.

Plum pox potyvirus: spots on apricot stones (left).

Status Report
Japanese Beetle (*Popillia japonica* Newmann)

Japanese beetles (JB) were discovered in Billings in 2001 near the Logan International Airport. Early delimitation surveys found Japanese beetles in the neighborhoods below the Rimrocks, a series of dry sandstone cliffs immediately south of the airport. Thus far JB has only been found in an area within a one mile radius of the campus of Montana State University – Billings, near the intersection of Montana State Highway 3 and Rimrock Road. In 2008 an official regulated area was established to prevent the spread of infested material out of this area. The regulated area includes over 650 properties including many private homes and a few large landowners including MSU-B and Rocky Mountain College, the airport and other land managed by the City of Billings. Details of the State of Montana interior quarantine can be found here: http://agr.mt.gov/weedpest/pdf/quarantineJBeetle.pdf

In 2012, a limited number of traps were placed in areas that were found to have JB in previous years. Plastic JB traps baited with a floral scent and female sex pheromones were used to survey for JB adults (Figure 1).

Figure 1. Japanese beetle trap placed below Virginia creeper vines on the Leavens Pumping Station fence. This trap yielded more than 400 adult JB in 2009. The fence encloses a large area of well irrigated turf grass, some of which appears to be damaged by wild turkeys foraging for JB larvae.

RESULTS: 44 traps were placed at nurseries in Flathead County. Fifty-eight (58) adults were trapped in two nurseries in Flathead County. Japanese beetle was previously detected in Lake County in 2007 and Flathead County in 2008 and 2011; in previous instances subsequent trapping in those areas was negative. It is known that Japanese beetle adults are being moved into this area and throughout the state on regulated articles including nursery stock. In 2013, trapping efforts will be focused throughout the state at nurseries known to have received infested stock.

Japanese Beetle Trapping, USDA APHIS PPQ, MONTANA AIRPORTS 2012

The USDA APHIS PPQ traps for Japanese beetles at selected high risk airports within the state. Based on airport size, and number of flights from infested areas, traps are placed around the perimeter of the airports, and in any landscaping that might increase risk of JB infestation.

During 2012, the USDA APHIS PPQ placed and monitored 31 traps.

There were no detections of JB during the 2012 season in traps monitored by the USDA APHIS PPQ.

2011-2012 National Honey Bee Survey

National Detection Survey

Montana has a substantial beekeeping industry and thus was one of the participating states in the 2007 pilot program of this survey. (The other was Florida, which also has a large beekeeping industry and, like Montana, statutory authority and an established bee-inspection program.)

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 as well as to the states where Montana-based bees provide pollination. USDA estimates that honey bee pollination adds some $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.

A healthy frame of brood.

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 will be identified at the molecular level by the USDA "bee lab" in Beltsville, MD.

Varroa mites on a drone pupa.

RESULTS: Ten of the 25 samples were collected in the fall of 2011 before the weather cooled to the point that further collecting was not possible. The remaining samples were collected in the Spring and very early summer of 2012.

Two of the boxes of live bees simply disappeared in transit while in the possession of the US Postal Service. Two more took 14 and 21 days to arrive in Beltsville and arrived dead.

Of the 18 samples for which virus testing has been completed, one was positive for Israeli Acute Paralysis Virus, 17 were positive for Deformed Wing Virus, and 14 were positive for Black Queen Cell Virus. Fourteen of the 20 samples tested positive for *Nosema ceranae*. None tested positive for *N. apis*. (*Nosema* levels are notoriously variable within an individual hive.)

No tracheal mites or *Tropilaelaps* mites were found. *Varroa* mites were present in 18 of the 20 samples.

Eastern Heath Snail Detected in Cascade County
15 August, 2012

On August 9th, 2012 the detection of the Eastern Heath Snail (Mollusca: Hygromiidae, *Xerolenta obvia* (Menke)) in Cascade County, Montana was confirmed by the USDA national malacologist. The Eastern Heath Snail is slightly smaller than a dime in diameter and is white with dark brown spiral bands. This snail can be found on a wide range of plants including, alfalfa, clover, lupine, wheat, barley, fruit trees, and weeds as well as on vegetation, under rocks, boards, or attached to other hard surfaces including homes and barns. This species is known for climbing on vegetation, fence posts, and other upright objects to escape high temperatures and will aggregate in enormous numbers in a behavior called massing. The snails were observed during this massing behavior about 15 miles southeast of Great Falls along State Highways 200, 331, and 89. Individual snails numbered in the millions. The snail prefers dry grassy areas and survives long periods of dry conditions by withdrawing into its shell and sealing the opening with a mucous membrane.

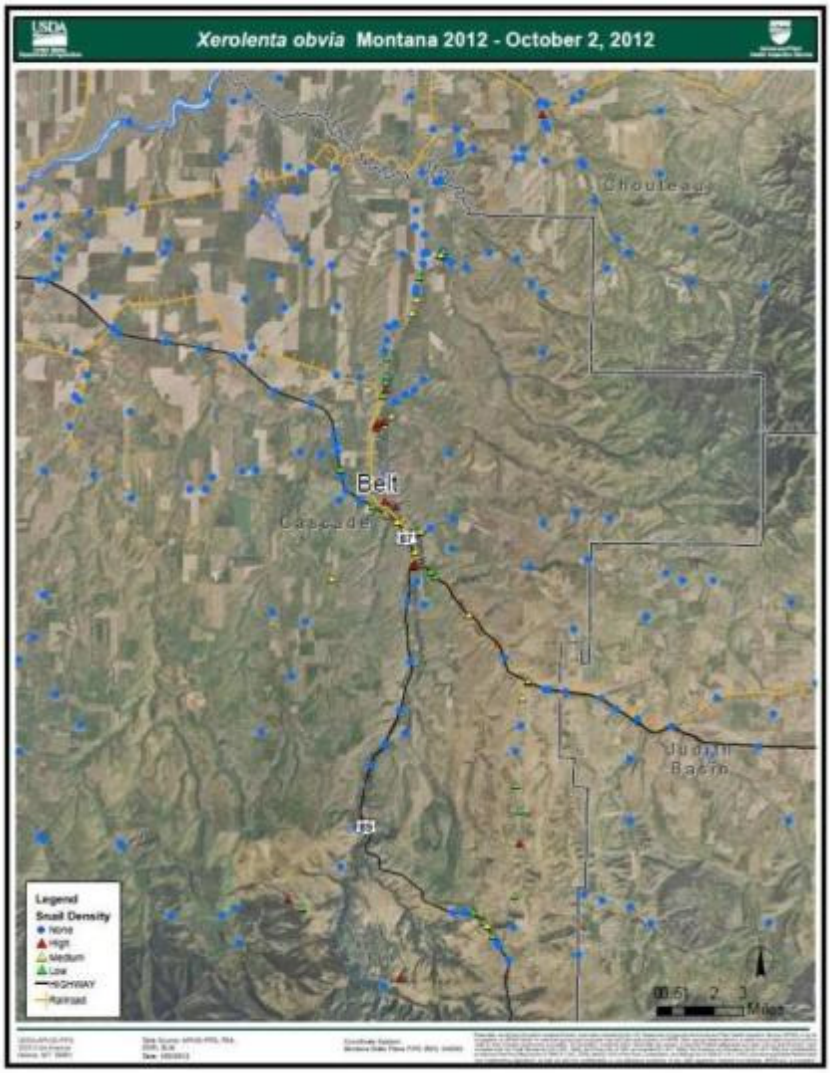
Photo by I. Foley

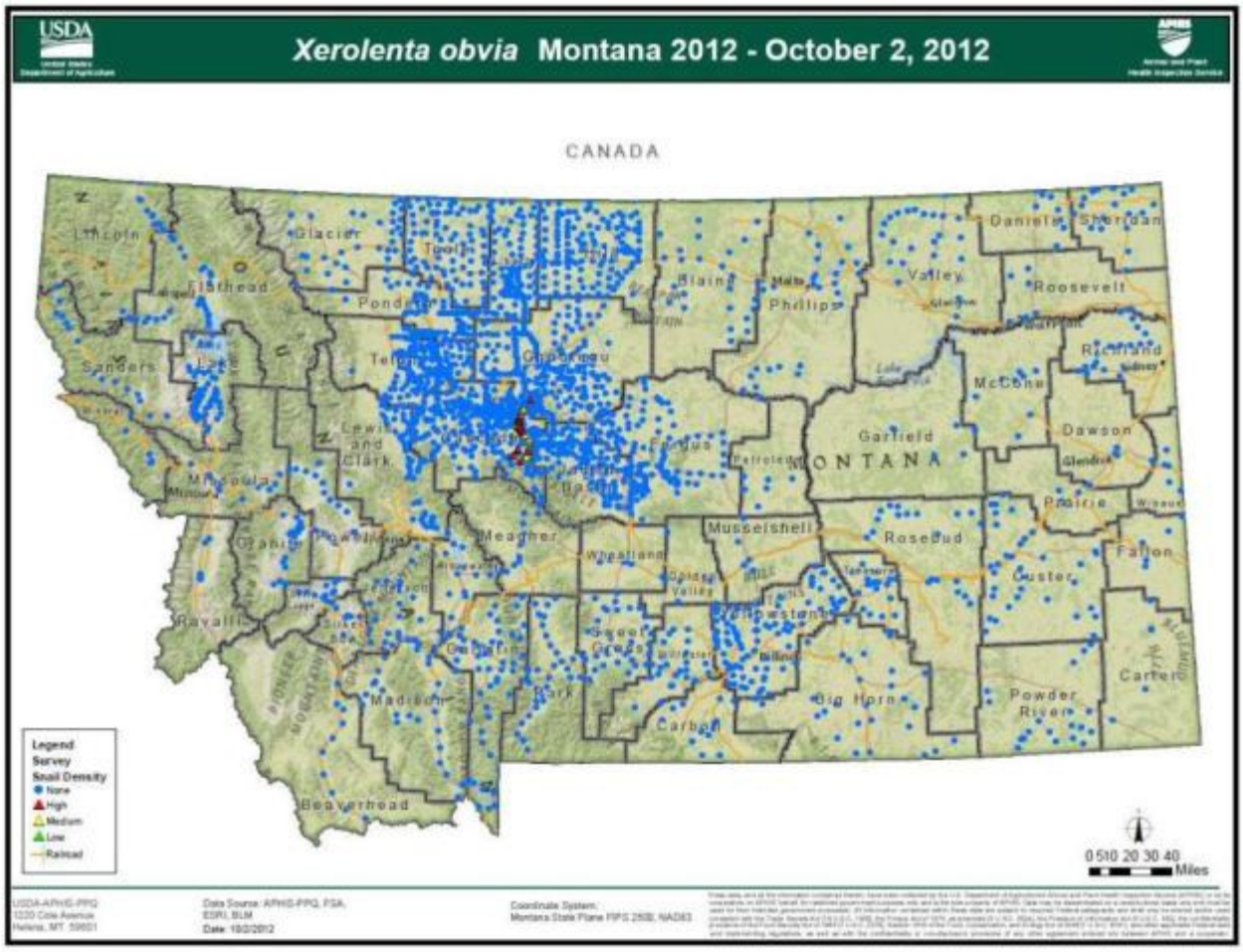

Photo by D. Rise

The Eastern Heath Snail is native to Eastern Europe but has been introduced into eastern North America in Ontario, Canada and Detroit, Michigan. The detection in Montana is the first population reported in western North America. The snail readily attaches to hard surfaces such as rail cars, international, shipping containers, stone and granite tile, and other conveyances used in international trade.

The Montana land snail fauna is known to include 62 species (Hendricks 2012). This number includes 59 native species and 3 exotics. This new snail pest has the potential to reduce crop yield and quality, contaminate fruits, vegetables, and hay, and transmit plant and animal diseases.

The Montana Department of Agriculture is working with the United States Department of Agriculture Animal Plant Health Inspection Service (APHIS) to determine the extent of the population and possible local origin of this new to Montana pest. *Xerolenta obvia* is a terrestrial snail that prefers dry habitats where it aestivates above ground on vegetation or other hard surfaces to avoid the hot dry summer months. When conditions are right the snails can aestivate in huge numbers in an event called "massing" (D. Robinson unpublished). Sightings of any snails exhibiting massing behavior should be reported to the Montana Department of Agriculture, USDA APHIS PPQ, or your local county extension agent.





The Montana Department of Agriculture and USDA APHIS PPQ are actively working to explore options for suppression, containment, and additional surveys for this snail in 2013. Montana State University is planning to conduct basic research on the risk this new invasive species poses to Montana agriculture and the natural environment. Very little is known about the biology of this animal or how it will behave in Montana. This biological information is necessary to determine what the potential impacts are and any effective control options for this invasive species in Montana.

Montana Department of Agriculture Pest Survey Report 2012

Allesha Lynch

August 2012

The internship I so graciously received from the Montana State Department of Agriculture was for late spring and summer of 2012. My duties included setting up insect traps as well as monitoring them for potential invasive species. The invasive species that the Montana Department of Agriculture had me set traps for were the Gypsy Moth (GM), Rosy Gypsy Moth (RGM), European Pine Shoot Moth (EPSM), Siberian Silk Moth (SSM), and Japanese Beetle (JB). I set up approximately 500 traps mostly within the western portion of Montana. So many traps are placed in Montana to ensure early detection of any invasive species mentioned above. GM, RGM, EPSM, SSM, and JB are invasive because they are not native to Montana which means they have no natural predators, and thus destroy the beautiful natural habitat at a devastating pace. These species are highly dangerous to Montana's ecosystems and to Agricultural Businesses. Without these traps, Montana has the potential to be overrun with invasive insects. Each insect has their own color of trap on the outside and a lure is placed inside the trap. The lures have specific pheromones to attract exact species of invasive insects.

I started my field work by setting out Gypsy Moth traps. They are bright orange and triangular shaped with clear sticky goo on the inside. The lures are dark grey with a treat like appearance. They come in white packages of 25. Both were provided by the USDA (United States Department of Agriculture). Cam Lay, the Montana Department of Agriculture State Entomologist, accompanied me to the USDA's office to acquire the traps and lures. He brought me out into the field and trained me on the fundamentals of setting up, as well as prime placement areas for the traps. I had to set these traps to the west side of the Continental Divide. I set traps by Butte, Lincoln, Kalispell, Libby, Plains and other small towns in those areas. Prime locations include but are not limited to campgrounds, fishing accesses and recreation sites. People are the number one cause of moving this invasive moth to different parts of the United States.

The Gypsy Moth's scientific name is *Lymantria dispar* Linnaeus. GM caterpillars defoliate hardwood, ornamental, and deciduous trees because of their veracious appetite. The moths themselves don't kill the trees; it is the larva that kills the trees from the outside by destroying the foliage on the trees. The female moths are white and heavy due to the massive number of eggs she internally carries and thus cannot fly but does crawl. They rely on the male moths to find them in order to mate. This is why lures are placed inside of the traps. The lures are meant for the males only. Once fertilized, the females will lay their eggs on the truck of the tree as well as the branches (egg lying also takes place on campers and vehicles of all kinds). The eggs stay where the females lay them through the winter and emerge the following spring. Once they hatch, the larva will strip the tree of its leaves and then search for other trees to inhabit and kill. Once the larva is large enough, they pupate and the cycle continues after the adults emerge. Males fly in search of fertile females. An infestation of Gypsy Moths has the potential to spread

far and wide because of the moth's ability to hitch rides on cars, trucks, campers and just about anything that will provide them with transportation.


Male Gypsy Moth


Female Gypsy Moth w/ Eggs


Gypsy Moth Caterpillar

The next insect trap I set out was for the European Pine Shoot Moth. The scientific name is *Rhyacionia buoliana.* The traps are white with a separate top and bottom. The stick goo that is used to capture the moth is located on the bottom part of the trap. The lure is small, rubber, and clear (they also come in lime green). As the name suggests, EPSM invade pine trees. The larvae burrow into the sheath and eat the inside of the pine needles then they move into the new buds of the pine tree. This invasive insect could do substantial damage to Montana because our forests are largely composed of pine trees. The EPSM deposit their eggs on Red pine, Scotch pine and other pine trees. The moth prefers pine tree nurseries that grow Christmas trees. The larvae rarely kill the host tree but the tree is left with a deformed forked trunk as well as deformed branch growth. This is why it is so important to put out baited traps for EPSM.

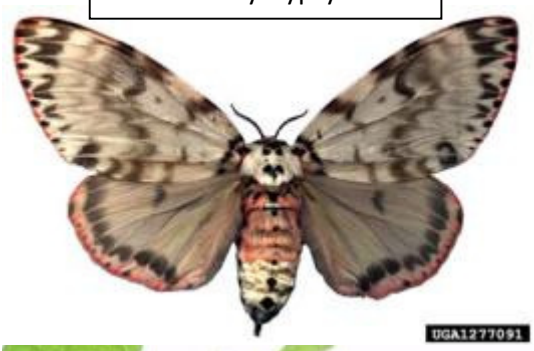

European Pine Shoot Moth


European Pine Shoot Moth Larvae

After EPSM, I set out Rosy Gypsy Moth (*Lymantria mathura*) traps. These traps are tan in color, triangular shaped with clear goo on the inside just like the orange GM traps. The lure also looks identical to the GM lures but these ones come in their own individual package. For every trap that is set out, one packet is opened every time. The RGM is a close relative of the GM. RGM females also do not fly. The females are also heavy from the weight of eggs. They do, however, crawl from place to place. This is how they end up on campers and other vehicles to lay eggs and move from place to place. RGM have not made it to the United States yet. They have a high potential of causing severe devastation here in the United States. RGM host are

deciduous trees. Deciduous means that the tree sheds its foliage in the fall. Most, if not all, of the towns in Montana have deciduous trees along streets, in resident's yards and in local and State Parks. It is very important for the Department of Agriculture, more specifically the Pest Management Bureau (PMB), to put out traps and monitor pest like the RGM, GM, EPSM, SSM, and JB.

Female Rosy Gypsy Moth



Male Rosy Gypsy Moth

Rosy Gypsy Moth Larvae

After the RGM, I moved on to the Siberian Silk Moth traps. These traps look just like cardboard milk cartons only they are neon green and have a cardboard canopy to help detour rain from getting in the trap. The SSM trap does not have a sticky substance on the inside. Instead, a plastic insert goes in the middle just below the open holes. Below the insert a lure is placed. The lure is grey, rubbery, and resembles a pencil eraser. Unlike the other traps, which clutch insects inside of the trap with goo, a small yellow square has to be cut off of a slow poison vapor releasing insect strip. The strip comes in a hard plastic container that has to be taken off. Unfortunately the strip is toxic if touch, so I had to use rubber gloves to handle the rubber toxin every time I set out a trap. I would say that the SSM traps were the most time consuming to prepare. SSM have a wide range of host trees such as conifers and pine trees but is not limited to those hosts. This invasive species has the potential to devastate forests if given a chance. That is why it is important to trap for the SSM in Montana.

Adult Siberian Silk Moth

Siberian Silk Moth Larvae

The last pest I set out traps for was the Japanese beetle. This insect, unfortunately, has made its way into Montana. I set out 20 traps with Beth Eiring, a Nursery and Quarantine Specialist in the PMB, at 2 different plant nurseries in the Kalispell area. Then I set out 10 traps on my own around the Capitol Building in Helena. These traps are made of hard plastic with a medium green bottom and a yellow or green top that twists on. The bait for the JB had the strongest smell out of all the lures I used. It had an over powering musky smell which stayed on my clothes as well as my hands until I could wash them properly. These lures were in a plastic bag that had to be opened carefully as to not rip the white plastic mesh on the inside. After the lure was opened successfully, a portion of the back was peeled off to reveal the sticky rectangle which was placed on the top portion of the JB trap. For fear that these beetles might have made their way to Helena I had to check the traps 2-3 weeks later for potential JB. That was the shortest amount of time from placement to checking compared to all the other insect traps. Luckily all traps around the Helena area were negative for JB.

Adult Japanese Beetle

Japanese Beetle Larvae

To sum it all up, this was the best job experience I have ever had. On a daily basis I enjoy playing, touching and dissecting insects so this job suited me very well. Having first-hand

involvement with insects and receiving a paycheck for the experience was absolutely phenomenal. This job opportunity made going to school and taking all the Environmental Science classes worth my time, effort, and money. Insects and arachnids are my passion. Truly, I would love to take my degree and become a Forensic Entomologist. It would be a dirty, stinky, foul job but I think it would be fun. For all the potential internists for this job, I would recommend having all field gear organized and ready before going out to set/ check traps. Make sure that the data sheets are fairly specific because if they are too vague, a long search for the traps could potentially waste valuable drive time. Unfortunately, the state vehicles I drove did not have CD players. The radio was my best friend on the road. I had to listen to some back woods country in some parts of Montana because that was all the reception I could get. If possible, bring a tape compatible device. Most of all make sure you read up on the invasive species you are trapping for. People stopped me all the time when I was on the road. They would ask me about the traps I was setting up as well as the insect I was looking for. It was a nice change of pace to have a job that coincided with my degree. All the classes I have taken make more sense today because I was given the fantastic opportunity to work in the field with insects and work with people who also love insects.