

Coming Soon, to a Landscape Near You



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Coming Soon, to a Landscape Near You



- Five “new” pests.
- How you contribute to pest detections.



*Argyresthia
pruniella*

Argyresthia pruniella: Cherry Blossom Moth



- European native
- 1st North American detection in 2009 Vancouver, BC
- (Specimens collected in Nova Scotia in 1960s found at the USNM!)

Cherry Blossom Moth

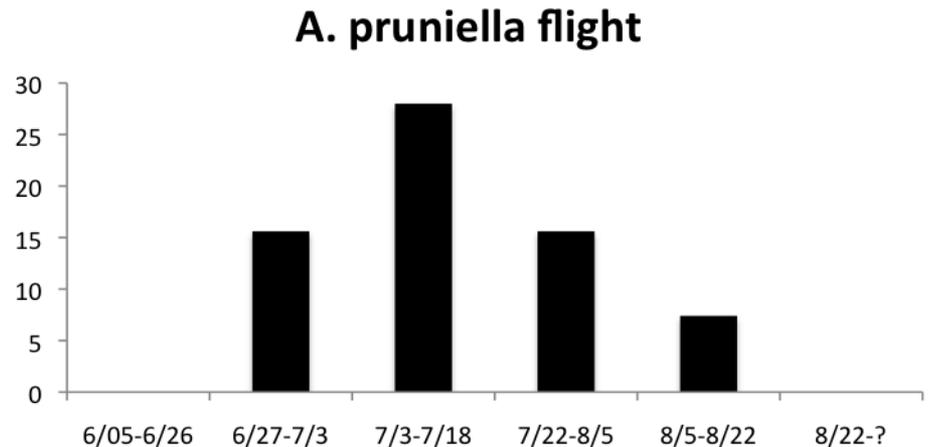


2012 *Argyresthia pruniella* Survey Sites (Dark = positive).

Cherry Blossom Moth



- Adults fly mostly in June-July
- Adults still on wing in September in Blaine



Cherry Blossom Moth



- Eggs laid in bud scars and bark crevices
- Eggs are the main overwintering stage
- In spring, larvae feed on developing flower buds and ovaries

Cherry Blossom Moth



Cherry Blossom Moth



- Larvae pupate in the soil, inside a double-layer cocoon
- Adults emerge after ~20 days

Cherry Blossom Moth



- Soil cultivation
- Chemical control
- Biocontrol?



Conifer Sawflies:
Diprion similis &
Neodiprion sertifer



Conifer Sawflies



- Hymenoptera: Symphyta
- Males with pectinate antennae
- Females insert eggs in needles
- Caterpillar-like larvae eat pine, fir, spruce, etc.

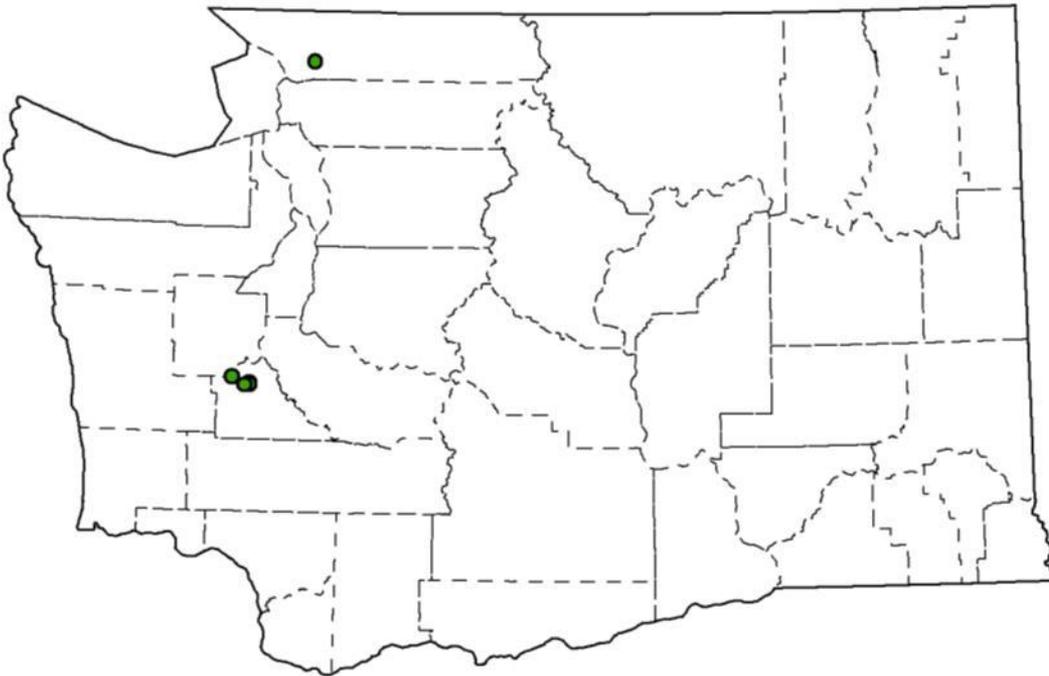


Diprion similis: Introduced Pine Sawfly



- Eurasian, from Britain to China
- East coast introduction before 1914?
- Was only known as far west as North Dakota

Introduced Pine Sawfly



- 2012 – found in Mason, Thurston, and Whatcom Co.
- Survey in western WA in 2013 detected... nothing?

Introduced Pine Sawfly



- Prefer white pine; also feed on Scots, Mugo, longleaf, Austrian, etc.
- Adults emerge in spring, insert eggs in needles
- Early instar larvae are gregarious



Introduced Pine Sawfly



- Later larval instars solitary
- Pupate on branches or in duff
- Overwinter as pupae
- 1-2 generations/yr

Introduced Pine Sawfly



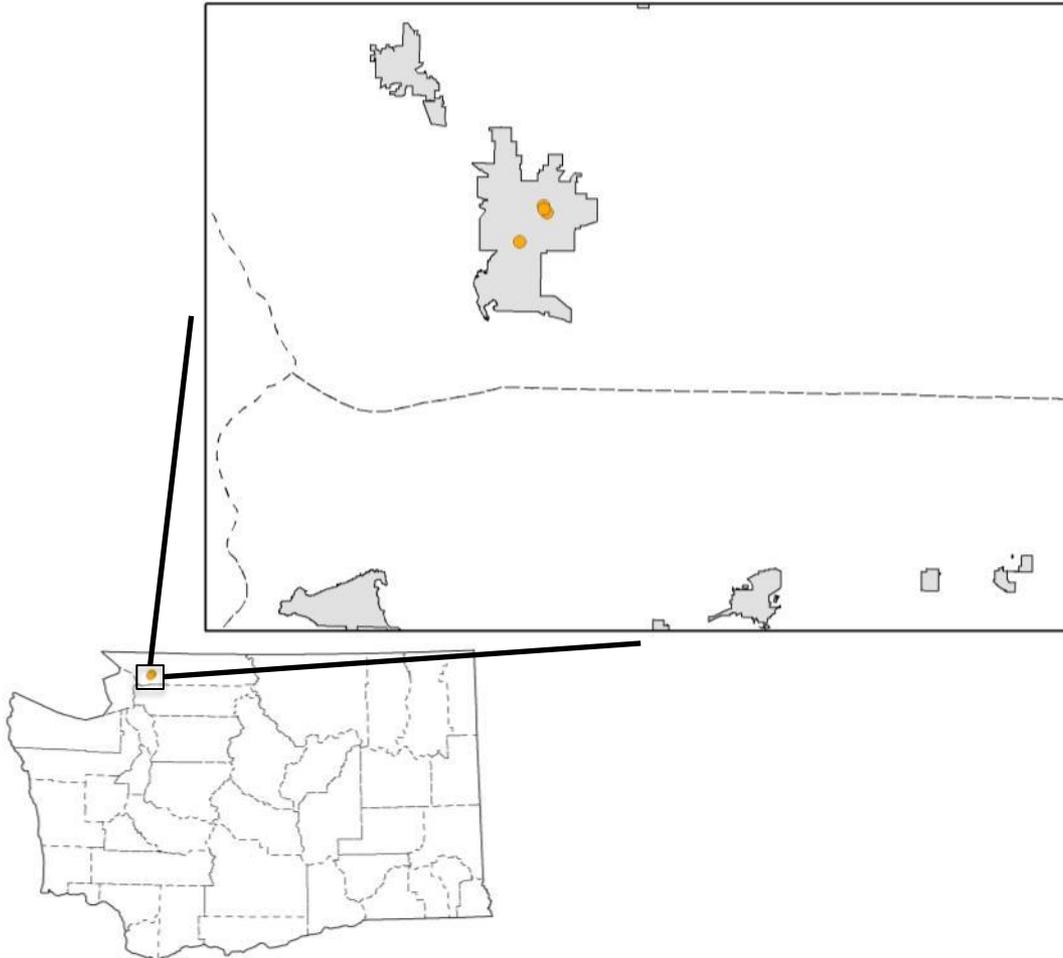
- Seldom pestiferous
- Rare outbreaks impact young trees
- Natural enemies and weather
- Petrochemical sprays & insecticidal soaps registered for sawflies

European Pine Sawfly: *Neodiprion sertifer*

- European, introduced in 1925
- Known as far west as Iowa



European Pine Sawfly



- Detected in Bellingham, 2008
- Still there, but not yet found outside of the city

European Pine Sawfly



- Overwinter as eggs
- Larvae active April-June
- Gregarious larvae
- [Writhing anti-predator behavior](#)
- Pupate in duff or on trees
- Mugo, Scots, etc.

European Pine Sawfly



- Larvae feed on previous year's growth

- Causes distinctive "bottle-brush" branches



European Pine Sawfly



- Remove egg-infested needles
- Watch for dry needles on previous growth
- Prune and squish
- Petrochemical sprays & insecticidal soaps registered for sawflies (best in early spring)

Lilioceris
lilii

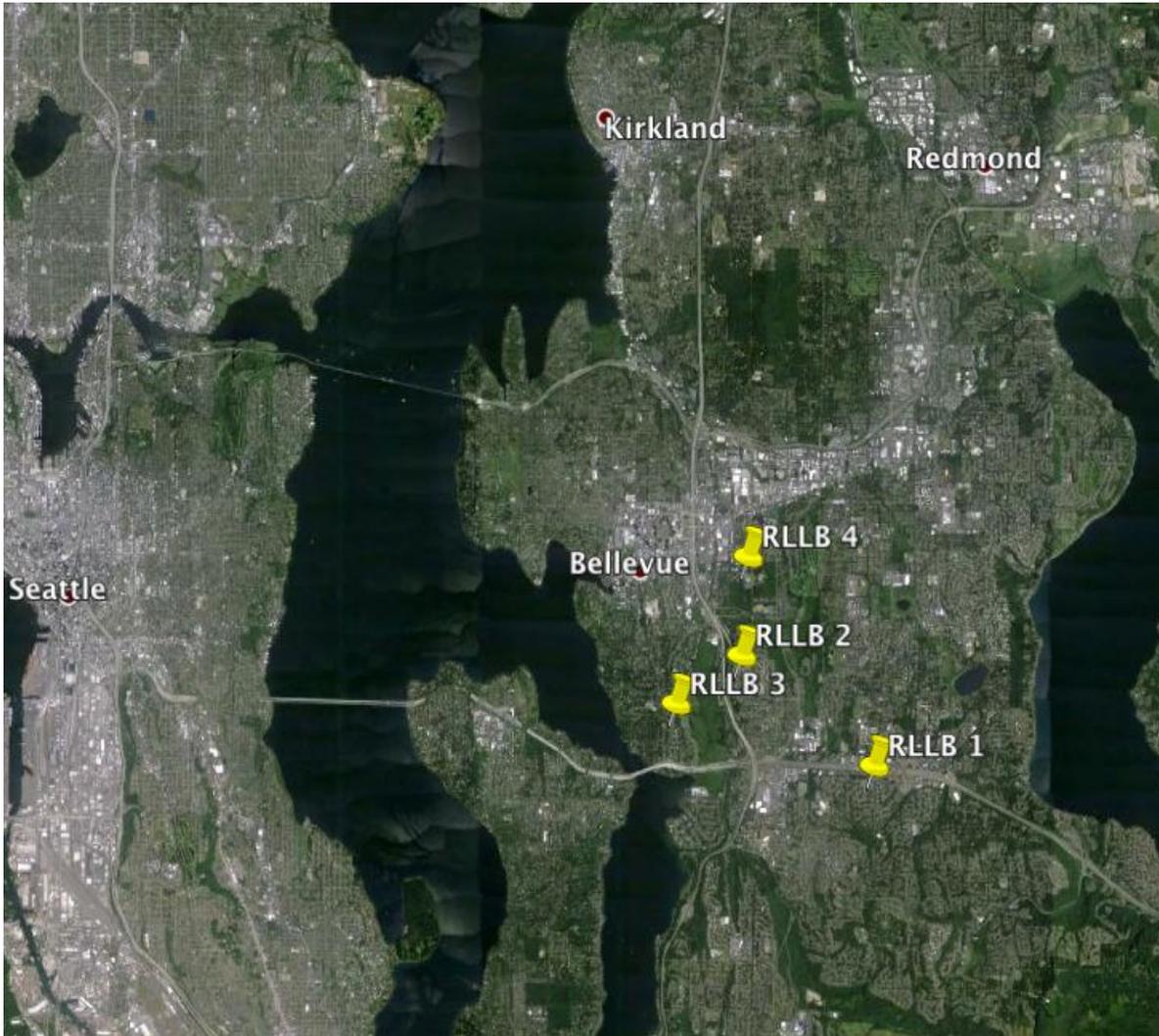


Red Lily Leaf Beetle: *Lilioceris lili*



- Introduced from Europe in 1945 in Canada
- First US records from 1992, Cambridge Massachusetts

Red Lily Leaf Beetle



- Discovered in Bellevue in 2012
- Currently known from four sites

Red Lily Leaf Beetle

- Adults overwinter in soil
- Emerge in spring to feed, mate and lay eggs
- Adults make a distinctive, squeaking sound when pestered.
- Squeaky Beetle Movie!

http://www.youtube.com/watch?v=mnMwbBgV_D4

Red Lily Leaf Beetle



- Eggs laid in small batches on the underside of leaves
- Up to 450 eggs laid per female
- 4-8 days to hatch

Red Lily Leaf Beetle



Red Lily Leaf Beetle



- Primarily attack *Fritillaria* and *Lilium*



Red Lily Leaf Beetle

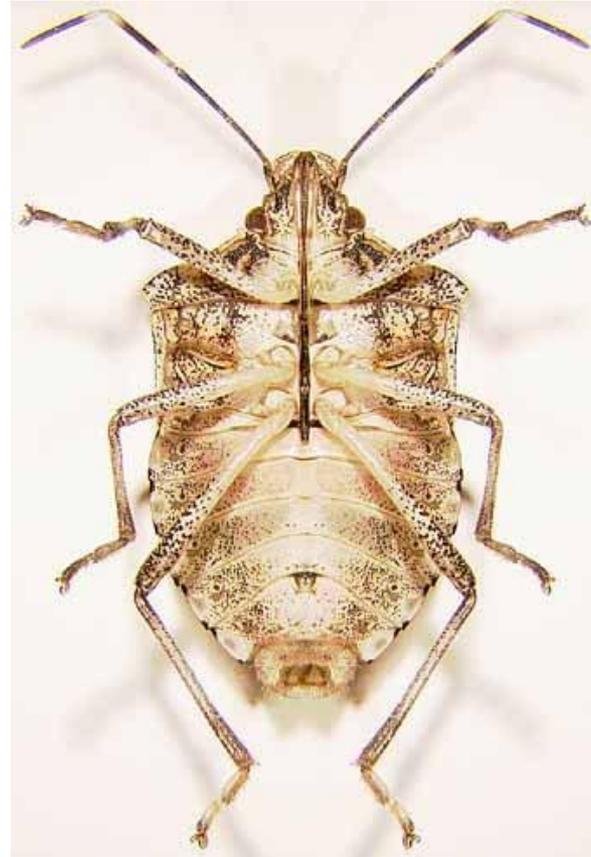
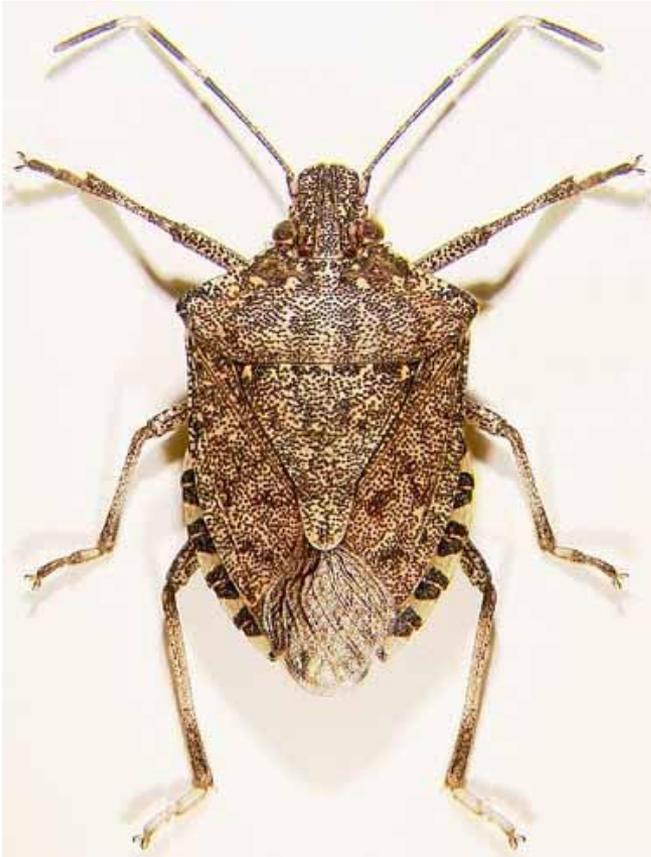


- Hand-pick small populations (yuck)
- Neem, imidacloprid, and spinosad are reportedly effective against larvae
- Biological control efforts at Rhode Island show promise

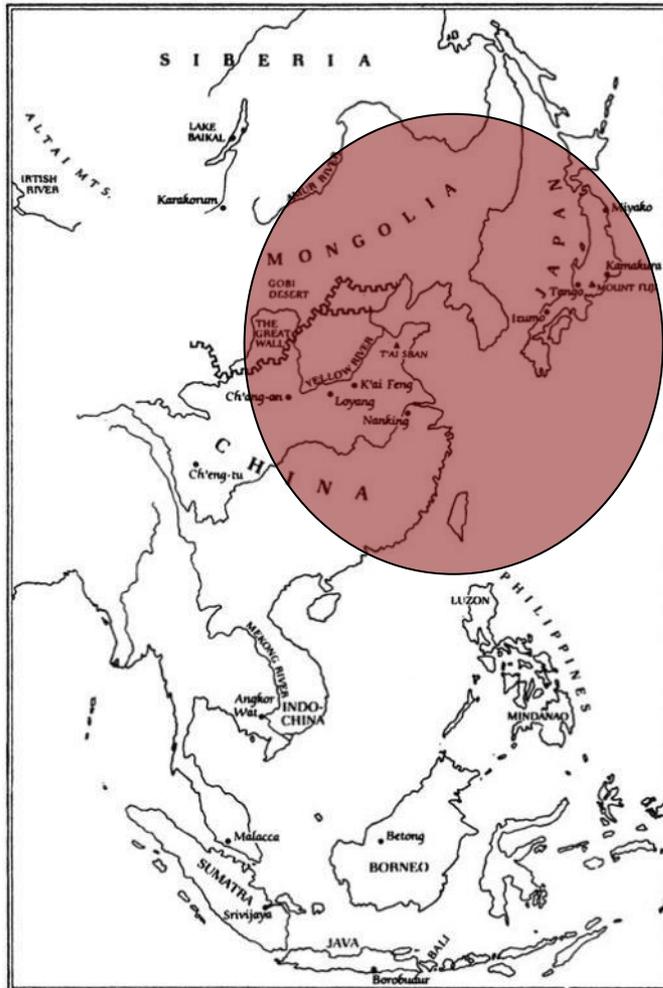
*Halyomorpha
halys*



Halyomorpha halys: Brown Marmorated Stink Bug

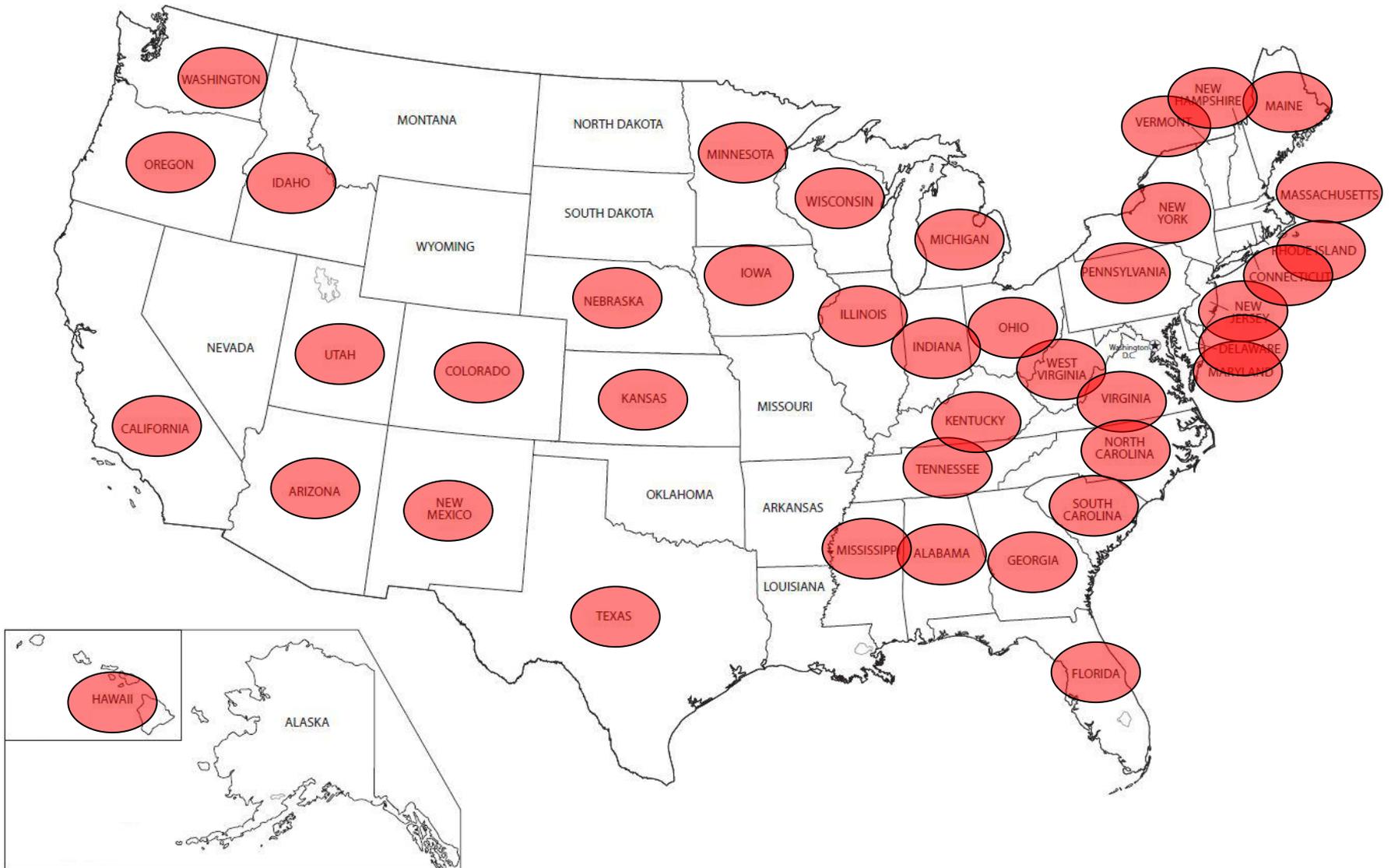


Brown Marmorated Stink Bug



- Native to Japan, Korea, Taiwan and China
- First US records in Pennsylvania, 1998
- A sleeper...

Brown Marmorated Stink Bug

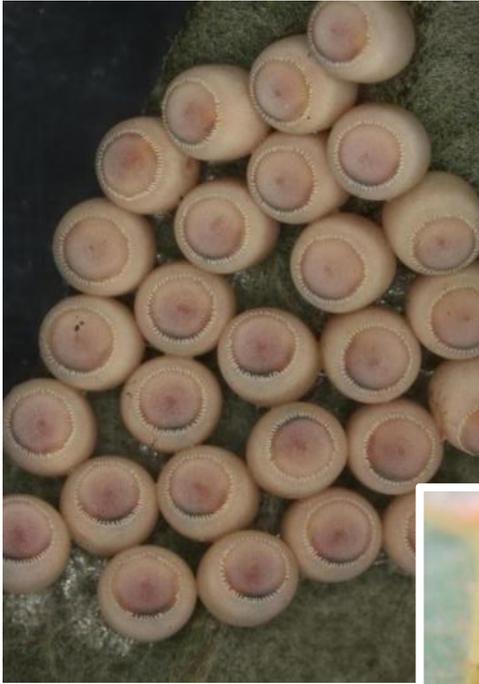


Brown Marmorated Stink Bug



- Overwintering adults emerge in early spring
- One generation per year in the PNW

Brown Marmorated Stink Bug



- >475 Eggs per female
- Underside of leaves
- ~ 28 eggs/ cluster



Brown Marmorated Stink Bug



- 5 instars
- Nymphs feed and damage plants



Brown Marmorated Stink Bug



- 300 host plants in Asia
- 170 US host plants and counting
- apple, plum, peach, pear, cherry, raspberry, grape, blueberry, pecan, beans, peppers, tomato, corn, cucumber, soybean, holly, dogwood, hawthorn, elm, crabapple, sycamore...

Brown Marmorated Stink Bug



Brown Marmorated Stink Bug

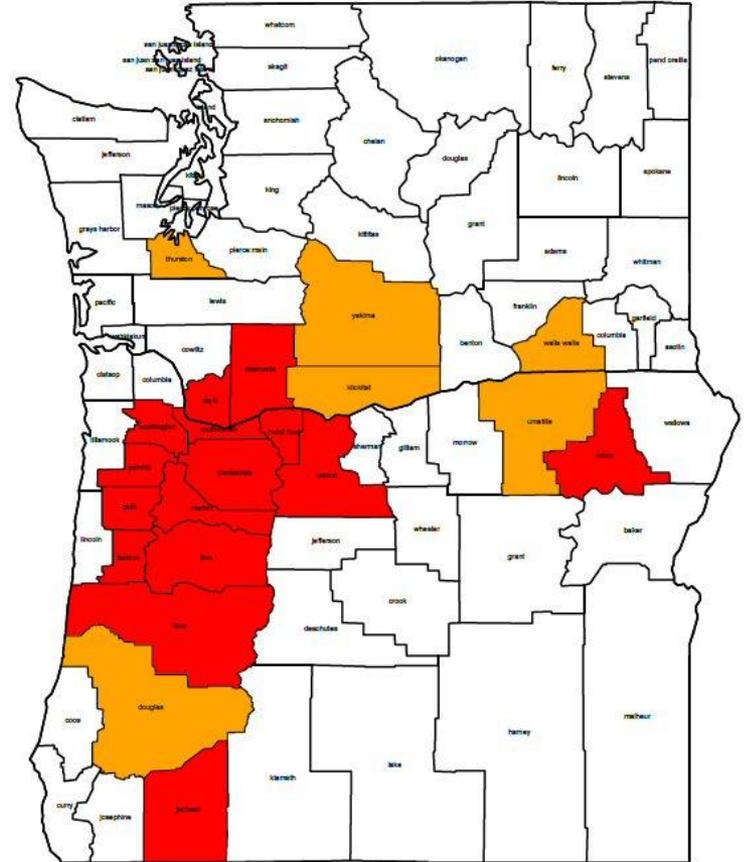


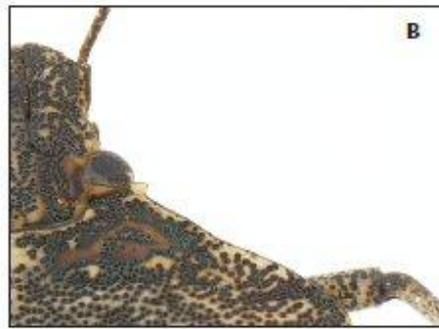
- \$37 million in damages to apple growers in MD PA and WV in 2009-2010
- Fruit and vegetable damage this year in Clark Co.

Brown Marmorated Stink Bug



Brown Marmorated Stink Bug





Brown Marmorated Stink Bug (*Halyomorpha halys*)

White bands on antennae (a) and a smooth shoulder (b)



***Euschistus* sp. (consperse stink bug)**

No bands on antennae (a) and a toothed shoulder (b)



***Holcostethus* sp. (Chlorochroa stink bug)**

No bands on antennae (a) and a smooth shoulder (b)



***Brochymena* sp. (Rough shield stink bug)**

White bands on legs (a) and a heavily toothed shoulder (b)

Brown Marmorated Stink Bug



- Physical barriers
- Sweep into soapy water
- Vacuum and freeze
- <http://stopbmsb.org>
- Control mechanisms are still being developed

50 Pests, 20 Years

| | | | |
|------|-------------------------------|-------------|---------------|
| 1991 | <i>Enarmonia formosana</i> | Lepidoptera | Tortricidae |
| 1991 | <i>Notocelia rosaecolana</i> | Lepidoptera | Tortricidae |
| 1993 | <i>Yponomeuta padella</i> | Lepidoptera | Yponomeutidae |
| 1994 | <i>Dasineura mali</i> | Diptera | Cecidomyiidae |
| 1994 | <i>Pandemis cerasana</i> | Lepidoptera | Tortricidae |
| 1994 | <i>Pandemis heparana</i> | Lepidoptera | Tortricidae |
| 1994 | <i>Acleris holmiana</i> | Lepidoptera | Tortricidae |
| 1994 | <i>Pasiphila rectangulata</i> | Lepidoptera | Geometridae |
| 1994 | <i>Recurvaria nanella</i> | Lepidoptera | Gelechiidae |
| 1995 | <i>Archips fuscocupreanus</i> | Lepidoptera | Tortricidae |
| 1995 | <i>Hemithea aestivaria</i> | Lepidoptera | Geometridae |
| 1995 | <i>Hedya nubiferana</i> | Lepidoptera | Tortricidae |
| 1996 | <i>Xyloterinus politus</i> | Coleoptera | Curculionidae |
| 1996 | <i>Xyleborinus alni</i> | Coleoptera | Curculionidae |
| 1996 | <i>Melanotus cete</i> | Coleoptera | Elateridae |
| 1997 | <i>Carcina quercana</i> | Lepidoptera | Oecophoridae |
| 1997 | <i>Notocelia cynosbatella</i> | Lepidoptera | Tortricidae |
| 1997 | <i>Haplotinea ditella</i> | Lepidoptera | Tineidae |
| 1998 | <i>Clepsis spectrana</i> | Lepidoptera | Tortricidae |

50 Pests, 20 Years

| | | | |
|------|--------------------------------|--------------|------------------|
| 1999 | <i>Tipula oleracea</i> | Diptera | Tipulidae |
| 1999 | <i>Polistes dominula</i> | Hymenoptera | Vespidae |
| 1999 | <i>Oulema melanopus</i> | Coleoptera | Chrysomelidae |
| 2000 | <i>Archips podana</i> | Lepidoptera | Tortricidae |
| 2000 | <i>Agriotes lineatus</i> | Coleoptera | Elateridae |
| 2000 | <i>Gypsonoma aceriana</i> | Lepidoptera | Tortricidae |
| 2000 | <i>Agriotes obscurus</i> | Coleoptera | Elateridae |
| 2000 | <i>Rhyparochromus vulgaris</i> | Hemiptera | Rhyparochromidae |
| 2001 | <i>Pyrrhalta viburni</i> | Coleoptera | Chrysomelidae |
| 2001 | <i>Anoplophora chinensis</i> | Coleoptera | Cerambycidae |
| 2002 | <i>Raglius alboacuminatus</i> | Hemiptera | Rhyparochromidae |
| 2002 | <i>Metapoplax ditomoides</i> | Hemiptera | Oxycarinidae |
| 2003 | <i>Aphis vaccinii</i> | Hemiptera | Aphididae |
| 2004 | <i>Thrips flavus</i> | Thysanoptera | Thripidae |
| 2003 | <i>Largus cinctus</i> | Hemiptera | Largidae |
| 2004 | <i>Argyresthia conjugella</i> | Lepidoptera | Argyresthiidae |
| 2004 | <i>Ceratothrips ericae</i> | Thysanoptera | Thripidae |
| 2004 | <i>Noctua pronuba</i> | Lepidoptera | Noctuidae |
| 2004 | <i>Xylosandrus germanus</i> | Coleoptera | Scolytidae |

50 Pests, 20 Years

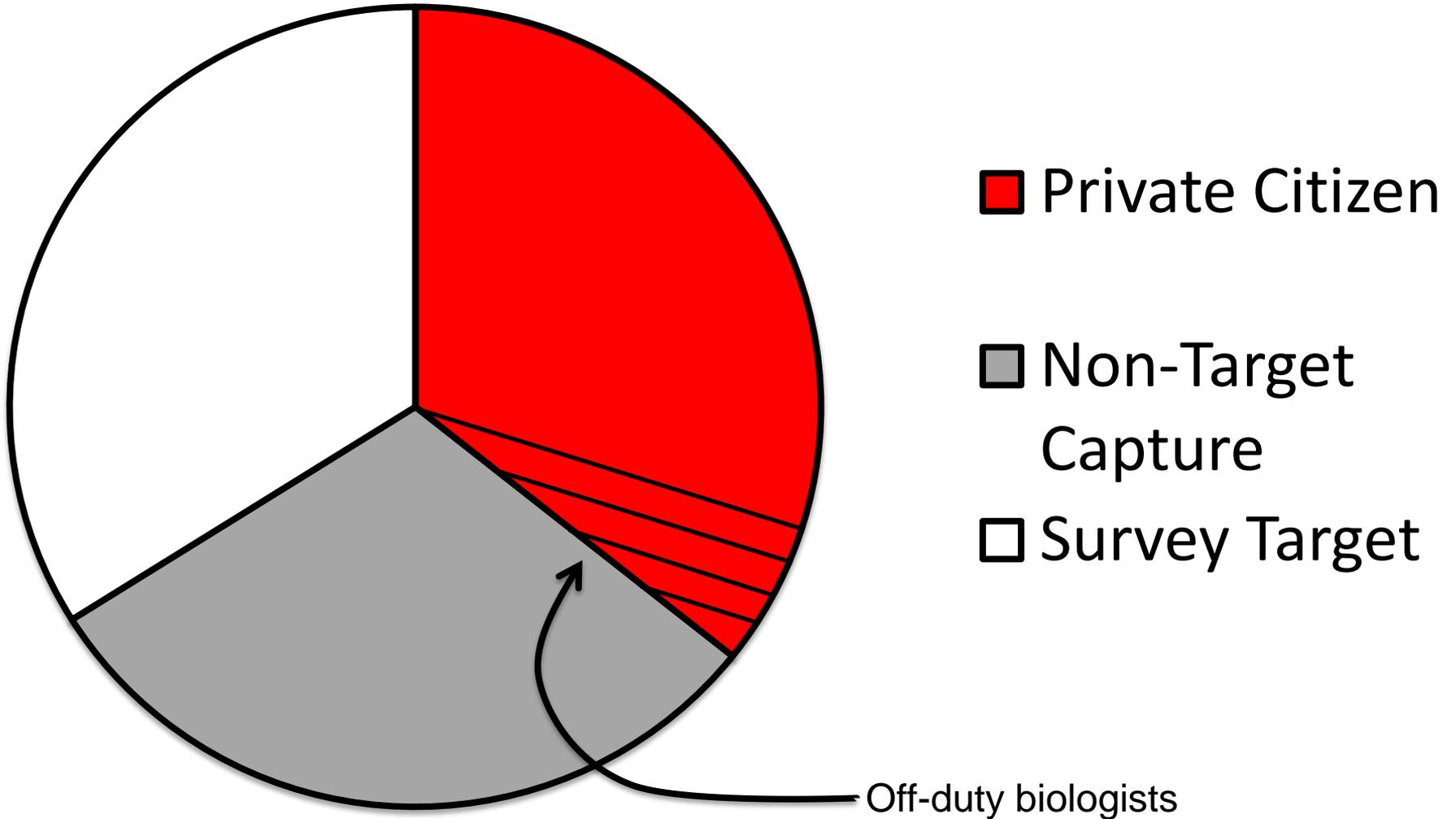
| | | | |
|------|---------------------------------|-------------|----------------|
| 2005 | <i>Cydia coniferana</i> | Lepidoptera | Tortricidae |
| 2005 | <i>Cernuella virgata</i> | Eupelmonata | Helicidae |
| 2005 | <i>Noctua comes</i> | Lepidoptera | Noctuidae |
| 2006 | <i>Candidula intersecta</i> | Eupelmonata | Helicidae |
| 2006 | <i>Synanthedon myopaeformis</i> | Lepidoptera | Sesiidae |
| 2007 | <i>Contarinia quinquenotata</i> | Diptera | Cecidomyiidae |
| 2007 | <i>Heliothis virescens</i> | Lepidoptera | Noctuidae |
| 2007 | <i>Hecatera dysodea</i> | Lepidoptera | Noctuidae |
| 2008 | <i>Trypodendron domesticum</i> | Coleoptera | Scolytidae |
| 2008 | <i>Synanthedon scitula</i> | Lepidoptera | Sesiidae |
| 2008 | <i>Neodiprion sertifer</i> | Hymenoptera | Diprionidae |
| 2009 | <i>Drosophila suzukii</i> | Diptera | Drosophilidae |
| 2009 | <i>Ips paraconfusus</i> | Coleoptera | Scolytidae |
| 2010 | <i>Homadaula anisocentra</i> | Lepidoptera | Galacticidae |
| 2010 | <i>Duponchelia fovealis</i> | Lepidopera | Pyralidae |
| 2010 | <i>Halyomorpha halys</i> | Hemiptera | Pentatomidae |
| 2010 | <i>Monsoma pulveratum</i> | Hymenoptera | Tenthredinidae |
| 2010 | <i>Myrmica rubra</i> | Hymenoptera | Formicidae |

50 Pests, 20 Years

- WA 4th most at risk state
- Climate
- Trade
- Introductions
- Detections...but how?



50 Pests, 20 Years



50 Pests, 20 Years

- Stay In School
- Keep alert, and collect samples!
- Report suspect pests:
 - WSDA (Pest Program – Western WA
pest@agr.wa.gov)
 - Washington State University Extension
 - Smartphone Apps:
 - whatsinvasive.com

Acknowledgements

Thank you to the many landowners who provided access to trapping sites in Washington State. This work was partially funded by grants from USDA-APHIS and USFS Forest Health Program.

Photo Credits

Diprion similis

Eggs: John H. Ghent, USDA Forest Service, Bugwood.org

Cocoon: Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org

Parasitoid: Arnold T. Drooz, USDA Forest Service, Bugwood.org

Neodiprion sertifer

Eggs: Andrea Battisti, Universita di Padova, Bugwood.org

Adult female and male: Luis Oscar Aguado Martin, Lepidopteros.com

Damage: Joe Boggs, the Ohio State University

Lilioceris lillii

Damage: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Parasitoid: Tim Haye, Universität Kiel, Bugwood.org

Halyomorpha halys

Adult habitus: Daveid Shetlar, the Ohio State University

Eggs: Susan Ellis, Bugwood.org

Cleaning: Steve Ruark, The New York Times

Unattributed photos are property of WSDA/WSU, or else I missed one. Let me know if that's the case!