What the bug is that?

Todd Murray

Agriculture & Natural Resource Unit Director

Washington State University Extension

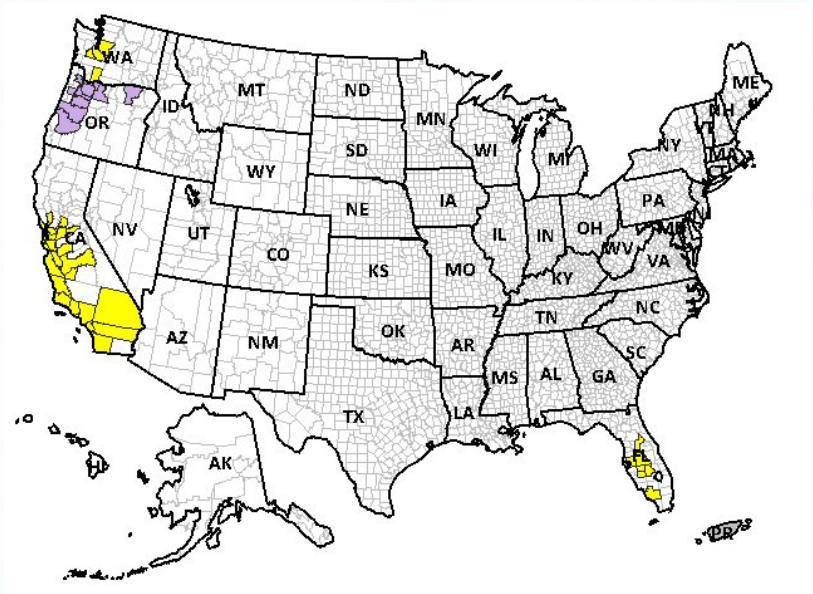
Washington State Invasive Species Council

Seattle 1999 - World Trade Organization Conference

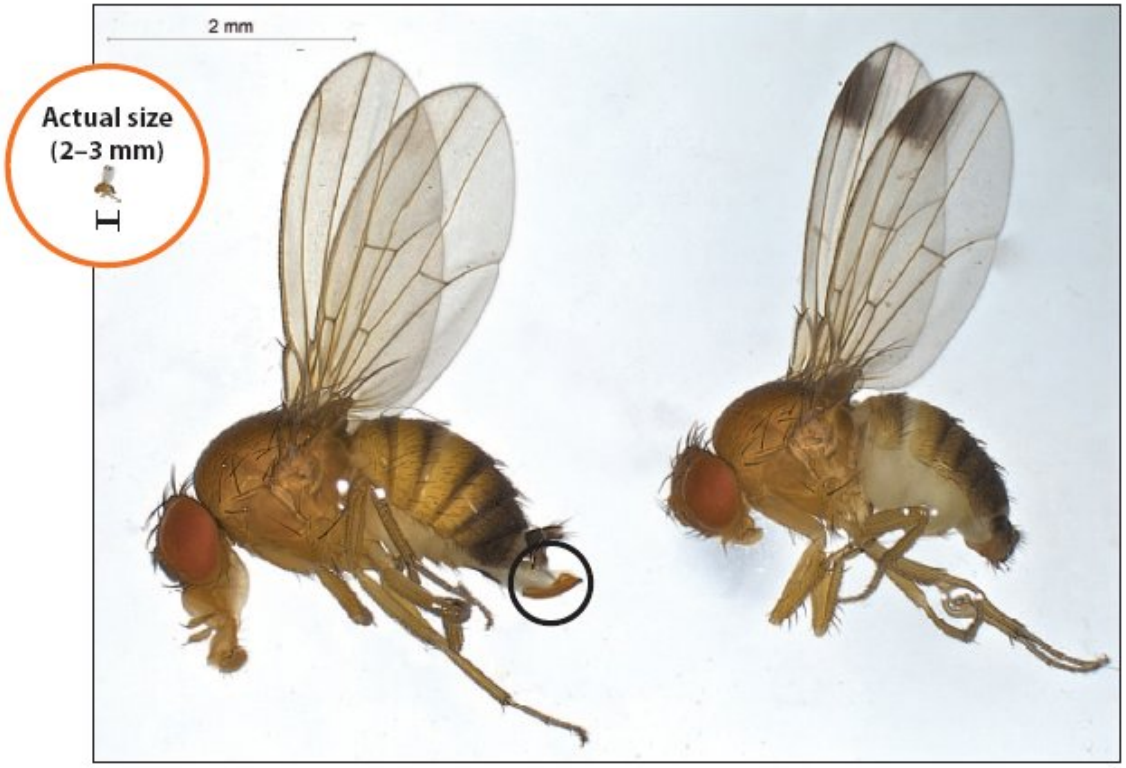
http://fredrunkel.com/wto-protests-seattle-1999

- World Trade increased at a rate of 7.5% annually from 1950 to 2007
- This rate has increased since 2007 and will significantly increase in the next 20 years (WTO, 2013)

Seattle 2009 – Spotted Wing Drosophila



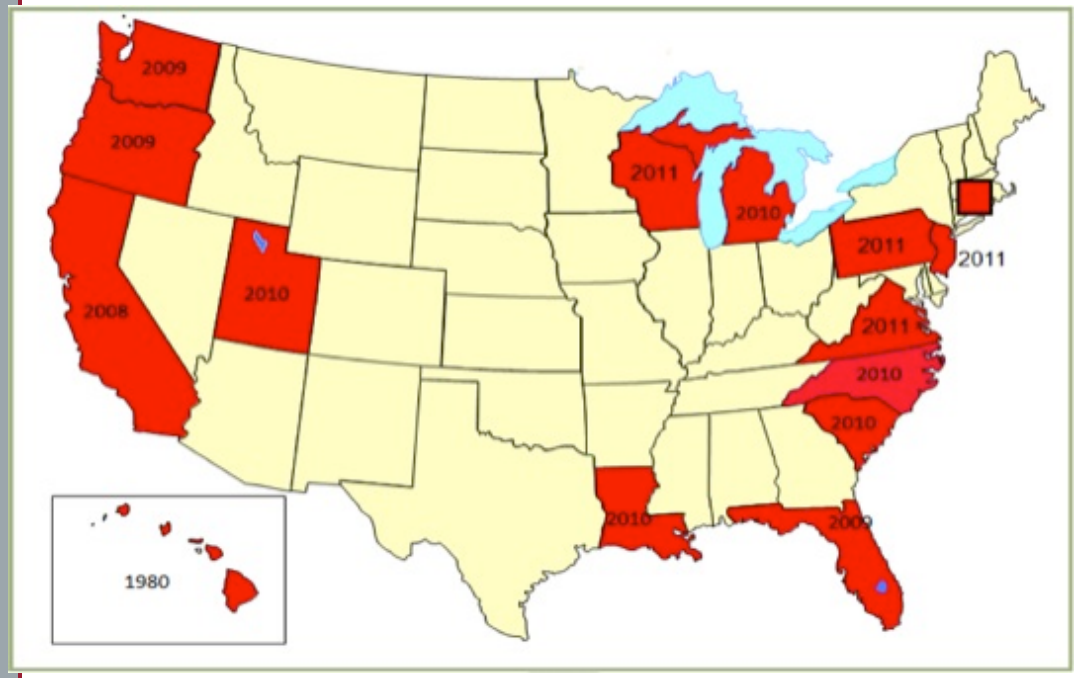
SPOTTED WING DROSOPHILA: *Drosophila* suzukii

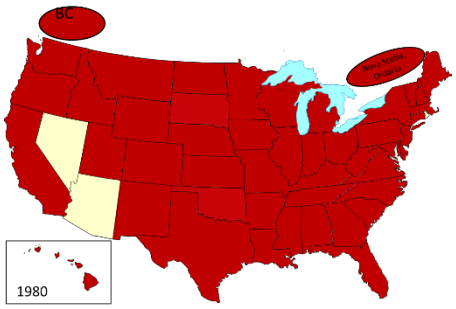


E. LaGasa, WSDA

- Native to Costal Asia and Japan

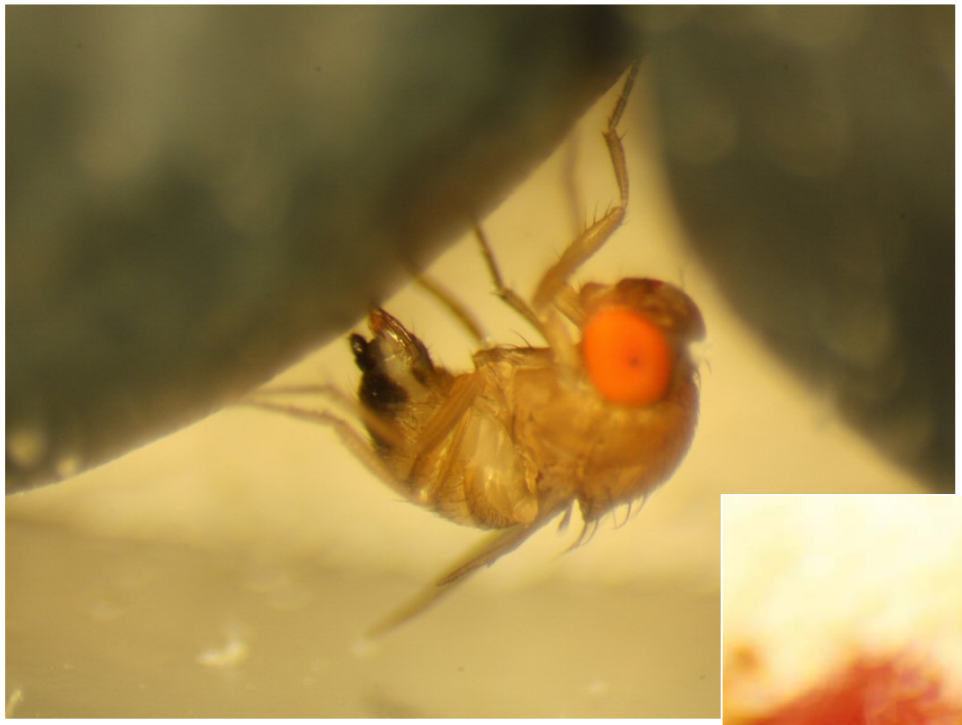
SWD Distribution in North America





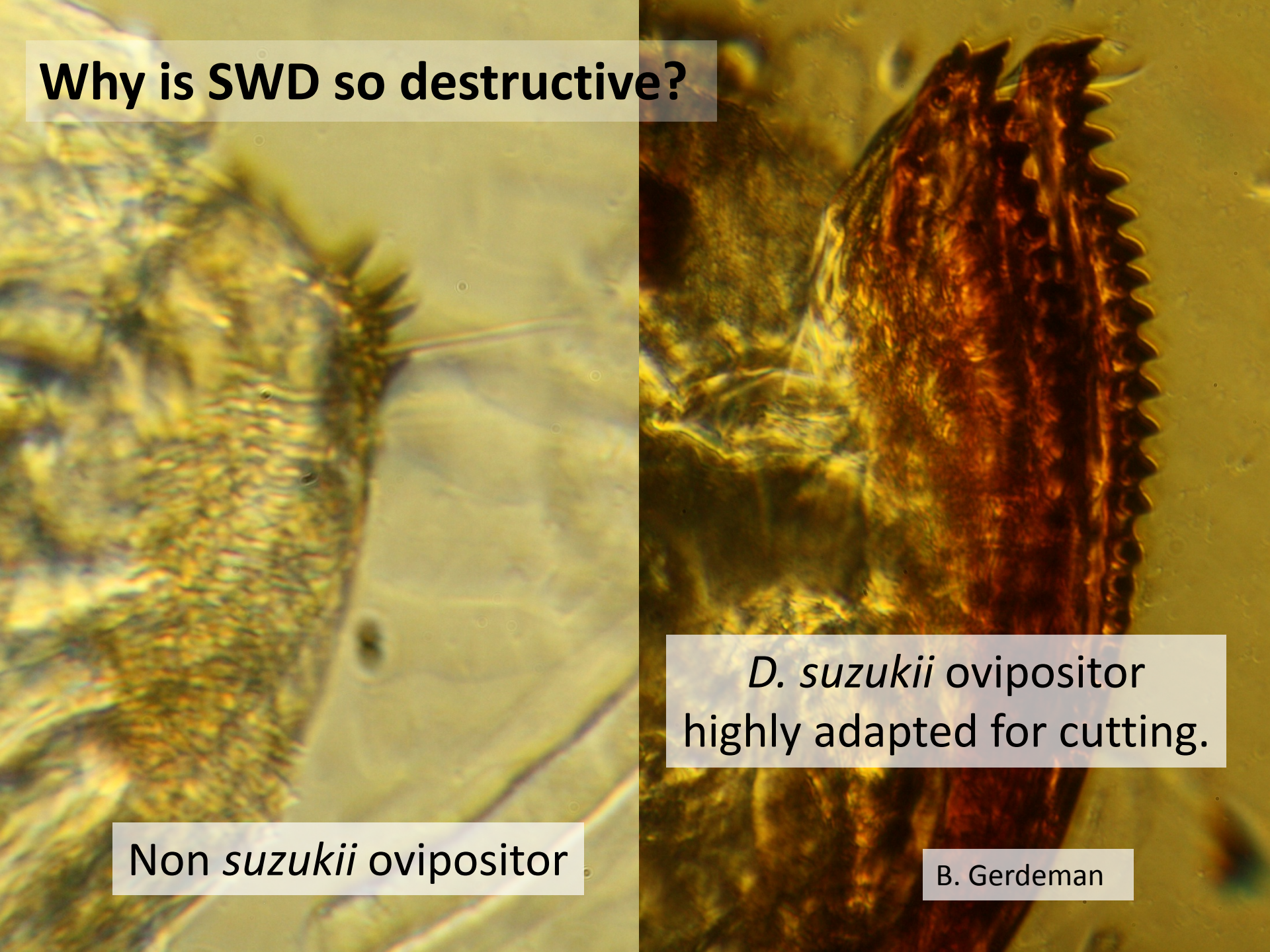
- 2008-California fruit
- 2009-OR, WA and FL; British Columbia CA
- LA, SC, NC, MI & UT in 2010
- WI, PA, VI, CN NJ in 2011
- 2013 wide spread in over 30 states
- 2014 widespread and distributed throughout the world and in over 42 mainland US

Pest Status in the Pacific Northwest



- At 20% fruit loss, the 2008 fruit value would lose $118.3 million in losses to OR & WA (Bolda et al. 2009)

Why is SWD so destructive?



Non *suzukii* ovipositor

D. suzukii ovipositor highly adapted for cutting.

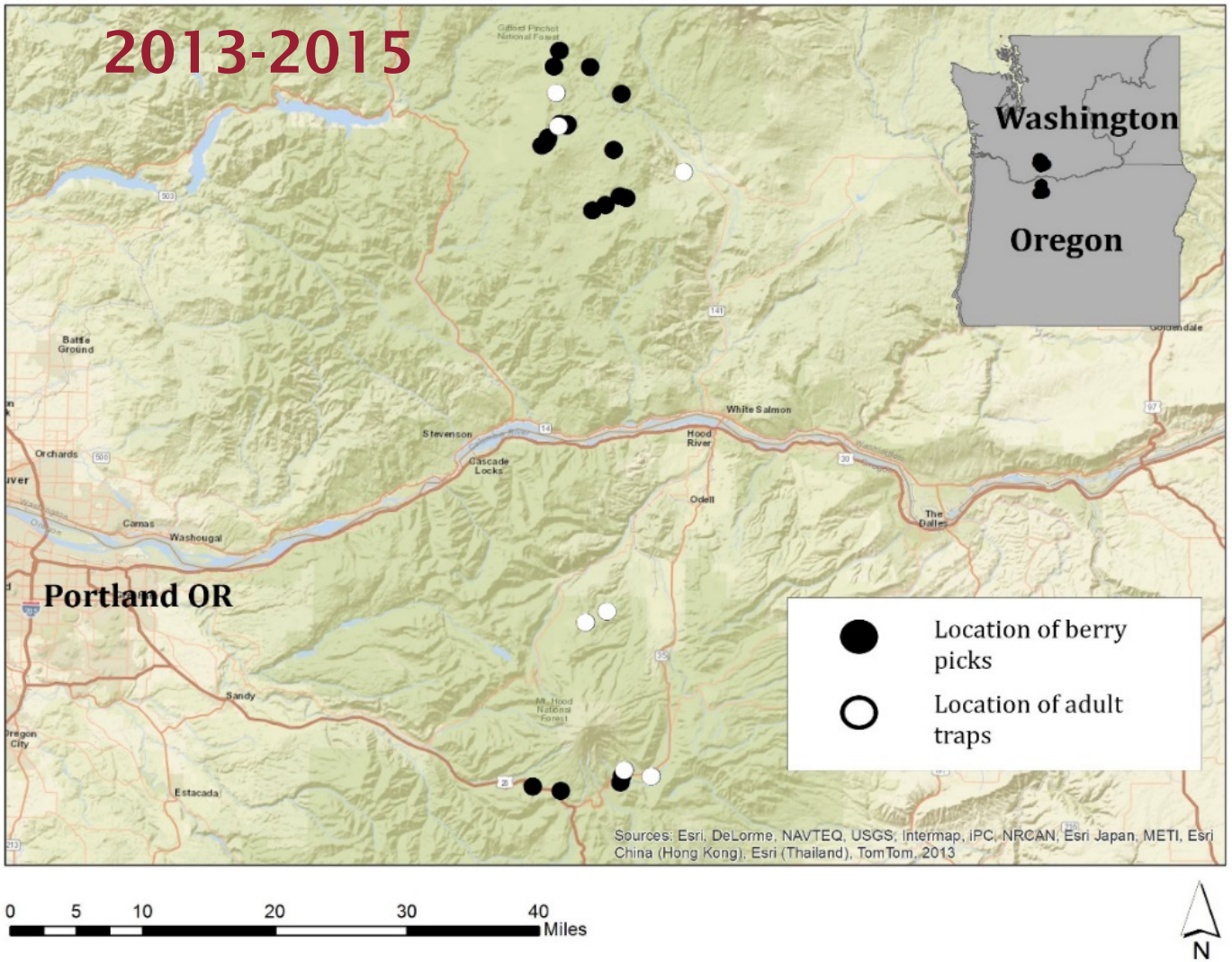
B. Gerdeman

August 2013

I've been picking huckleberries in the same spot for over 80 years and I ain't never had no worms in my berries before. Every damn berry was wormy this year. Fix my berries. I pay taxes dammit!"

August of 2013 – Indian Heaven Wilderness Area (GPNF)

- *V. membranaceum*
  - Thinleaf huckleberry
- *V. ovalifolium*
  - Alaska blueberry
- *V. deliciosum*
  - Cascade blueberry

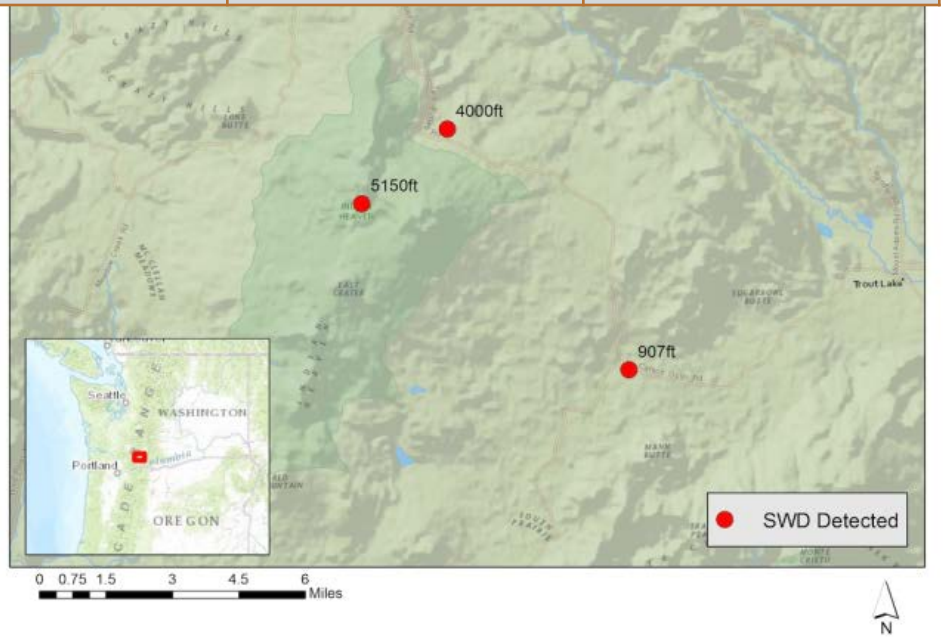

2013-2015
Washington
Oregon
Portland OR
Location of berry picks
Location of adult traps
Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013
0 5 10 20 30 40
Miles
N

Year and date	State	Location (decimal coordinates)	Elevation (m)	No. berries picked	Adult D. suzukii reared from sample*
2013					
26 Aug	WA	46.024502, -121.782077	1506	50	+
26 Aug	WA	46.048522, -121.741446	1250	50	+
26 Aug	WA	45.968738, -121.657901	916	38	+
2014					
22 Aug	WA	46.04713, -121.74338	1250	60	-
22 Aug	WA	46.08351, -121.76029	1285	50	-
12 Sept	WA	46.08351, -121.76029	1285	24	-
29 Aug	WA	46.11356, -121.70784	1089	11	-
29 Aug	WA	46.13092, -121.7561	1202	60	+
29 Aug	WA	46.11306, -121.76425	1279	100	+
12 Sept	WA	46.0209, -121.66833	1106	24	+
12 Sept	WA	45.9668, -121.6475	918	45	+
12 Sept	WA	46.08351, -121.658023	1092	17	-
16 Sept	WA	45.95855, -121.68024	987	75	+
16 Sept	WA	45.95264, -121.70071	990	67	-
21 Aug	OR	45.324956, -121.637422	1373	50	-
11 Sept	OR	45.324956, -121.637422	1373	23	-
28 Aug	OR	45.490136, -121.701119	1087	37	+
28 Aug	OR	45.318194, -121.595672	1177	11	-
11 Sept	OR	45.30063, -121.73526	1198	100	+
11 Sept	OR	45.31873, -121.64043	1529	21	+
11 Sept	OR	45.30486, -121.77908	1079	67	+
17 Sept	OR	45.310738, -121.642864	1423	15	-
17 Sept	OR	45.324956, -121.637422	1373	20	-
2015					
11 Aug	WA	45.968738, -121.657901	916	13	+
11 Aug	WA	46.026293, -121.776571	1550	100	+
11 Aug	WA	46.030174, -121.773411	1547	100	+
11 Aug	WA	46.024502, -121.782077	1509	100	+
11 Aug	WA	46.033337, -121.772188	1526	100	+

- Adult SWD reared from 18 locations (2013-2015)
- Elevations ranging from 610 m -1570 m

SWD present in all three locations in 2013

Site	Percentage	Elevation (ft)
Peterson Prairie	47%	2900 (907m)
Hidden Lake	28%	4000 (1220m)
Clear Lake	18%	5150 (1570m)



What's the Big Deal?

- 11 species of *Vaccinium* and 10 species of *Rubus* in this National Forest, let alone other potential hosts
- Utilizing higher altitude fruits a key feature of SWD in Japan [Mitsui et al. (2010)], India [Guruprasad et al. (2009)].

For almost 10,000 years, people have been traveling to Indian Heaven Wilderness to harvest huckleberries.

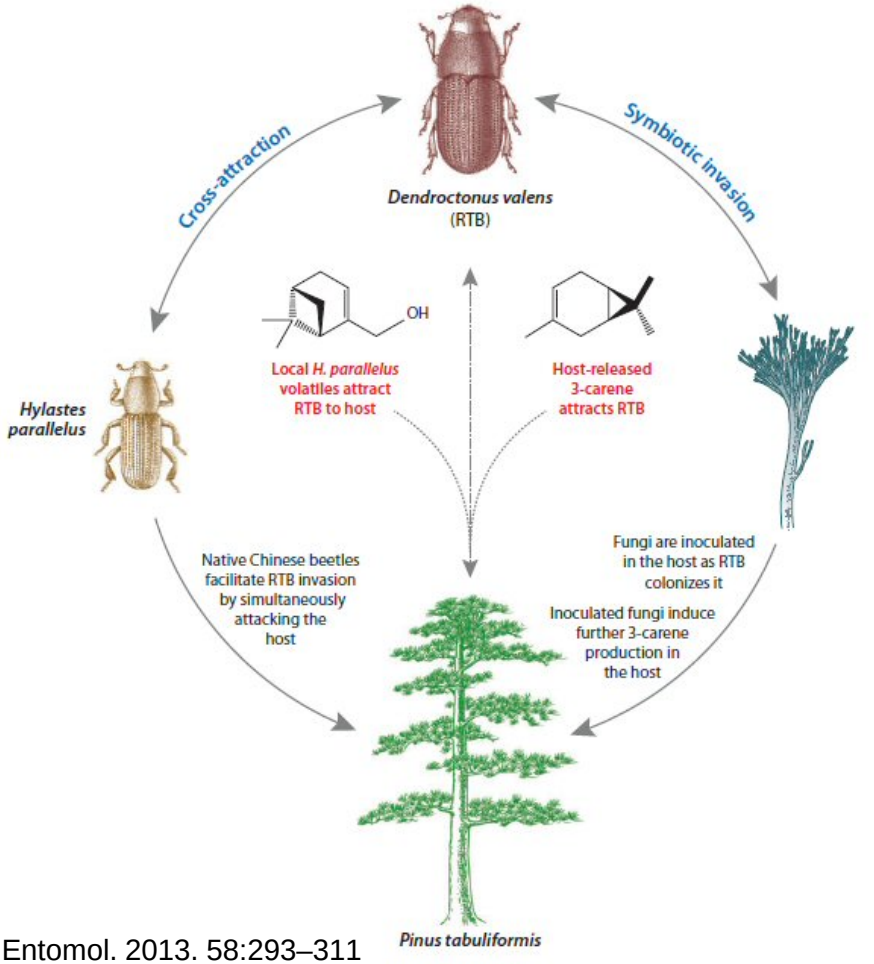
What is a Pest?

- Summer of 1998

P. Alsop. Smithsonian Magazine Nov. 2009

It Gets Complicated

- Red Turpentine Beetle, *Dendroctonus valens*
  - Native to North America
- Introduced to China
  - New fungal association resulting in aggressive attack and high tree mortality
- Threat of reintroduction to North America with new fungal associate!



Sun et al. Annu. Rev. Entomol. 2013. 58:293–311

2013
Russia, a coastal town 150 km northeast of Nakhodka.

2018

C.L. Campbell

Port of Vancouver, WA August 2014

A new atypical AGM pathway

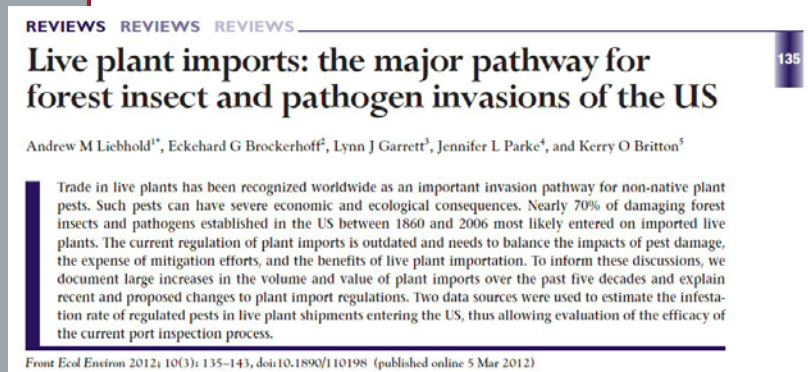
C.L. Campbell

Regulated Movement of Species

- 65 full-time personnel inspect incoming plant shipments at 17 Plant Inspection Stations
- Imports of 3.15 billion plants in 2007
- In 2010, average workload of 43 million plants per inspector

Liebhold et al. 2012
Front Ecol Environ; 10(3): 135–143

*Adapted from J. LaBonte ODA



REVIEWS REVIEWS REVIEWS

135

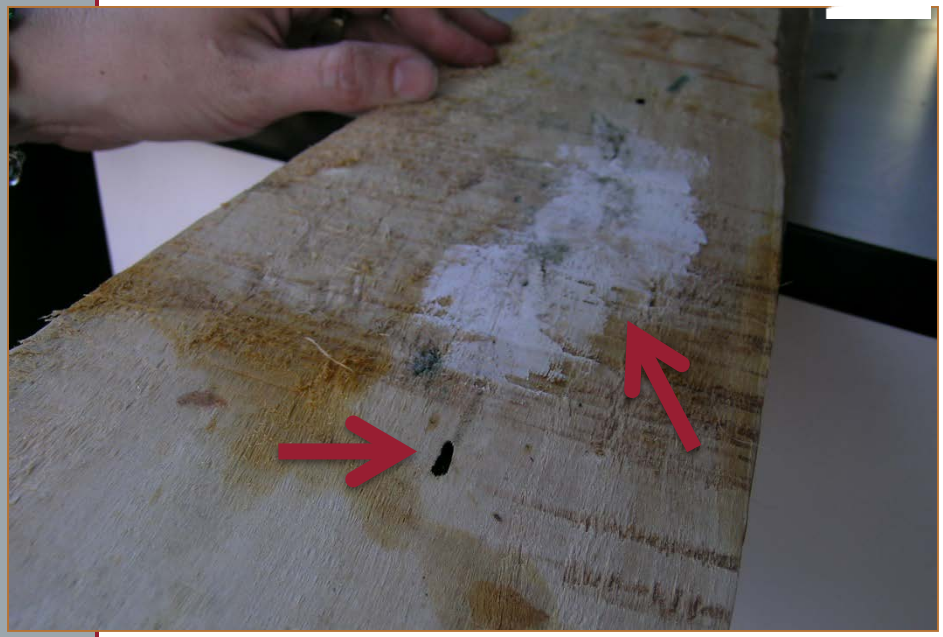
Live plant imports: the major pathway for forest insect and pathogen invasions of the US

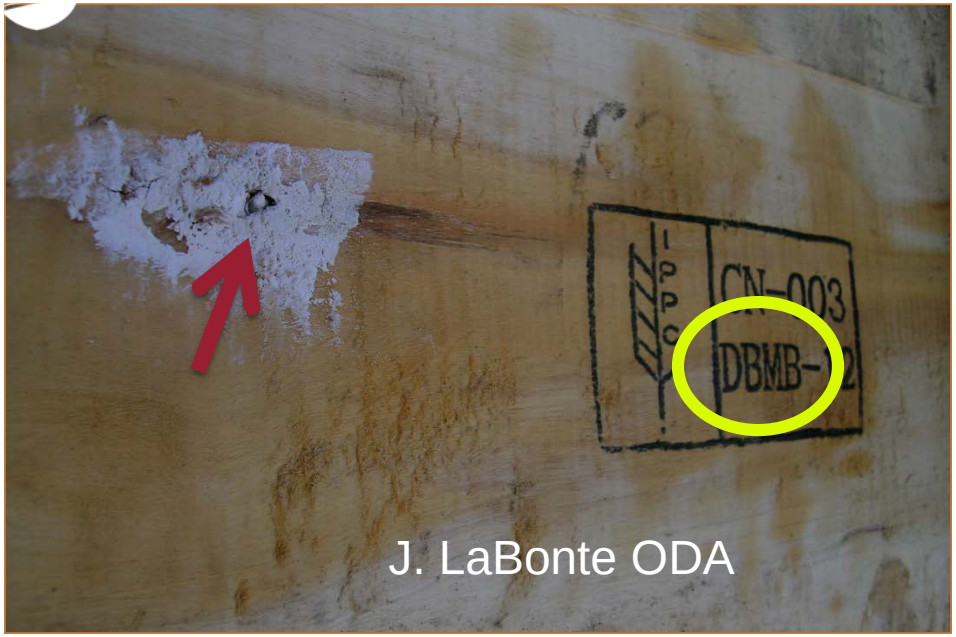
Andrew M Liebhold[1*], Eckehard G Brockerhoff[2], Lynn J Garrett[3], Jennifer L Parke[4], and Kerry O Britton[5]

Trade in live plants has been recognized worldwide as an important invasion pathway for non-native plant pests. Such pests can have severe economic and ecological consequences. Nearly 70% of damaging forest insects and pathogens established in the US between 1860 and 2006 most likely entered on imported live plants. The current regulation of plant imports is outdated and needs to balance the impacts of pest damage, the expense of mitigation efforts, and the benefits of live plant importation. To inform these discussions, we document large increases in the volume and value of plant imports over the past five decades and explain recent and proposed changes to plant import regulations. Two data sources were used to estimate the infestation rate of regulated pests in live plant shipments entering the US, thus allowing evaluation of the efficacy of the current port inspection process.

Front Ecol Environ 2012; 10(3): 135–143, doi:10.1890/110198 (published online 5 Mar 2012)

ISPM-15 “treated” crates of Chinese iron castings, at receiving business, Portland, September 2006





Live pupa of horn-tail wasp

Live larva of clear-wing moth

J. LaBonte ODA

Adult, found alive, of horn-tail wasp, *Tremex fuscicornis*

Not-so-bright outlook

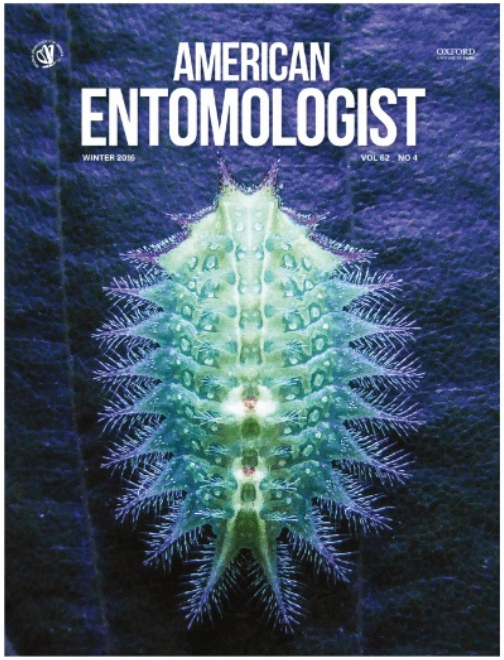
- 1. Changing climate produces susceptible hosts
  - Changing climates will shift origins of imports
- 2. Increased number of species introduced
- 3. Relative decreased regulatory support

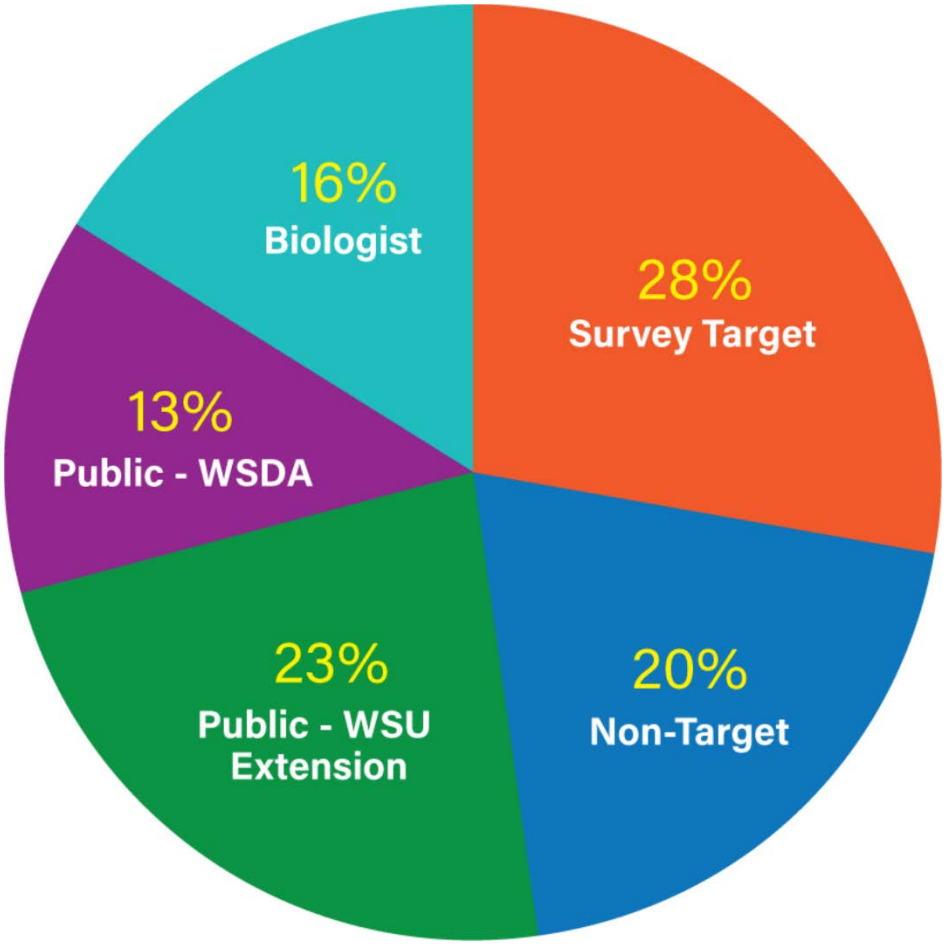
Over 70%!!!

"There is a 32% risk that a new borer that is as damaging or more costly than the emerald ash borer will invade in the next 10 years." (Aukema et al. 2010)

New Bugs in the PNW

- Oregon Department of Agriculture documented 66 new introductions since 2007 (LaBonte 2014)
- Washington State Department of Agriculture documented 70 new introductions since 1991 (Looney et al 2017)

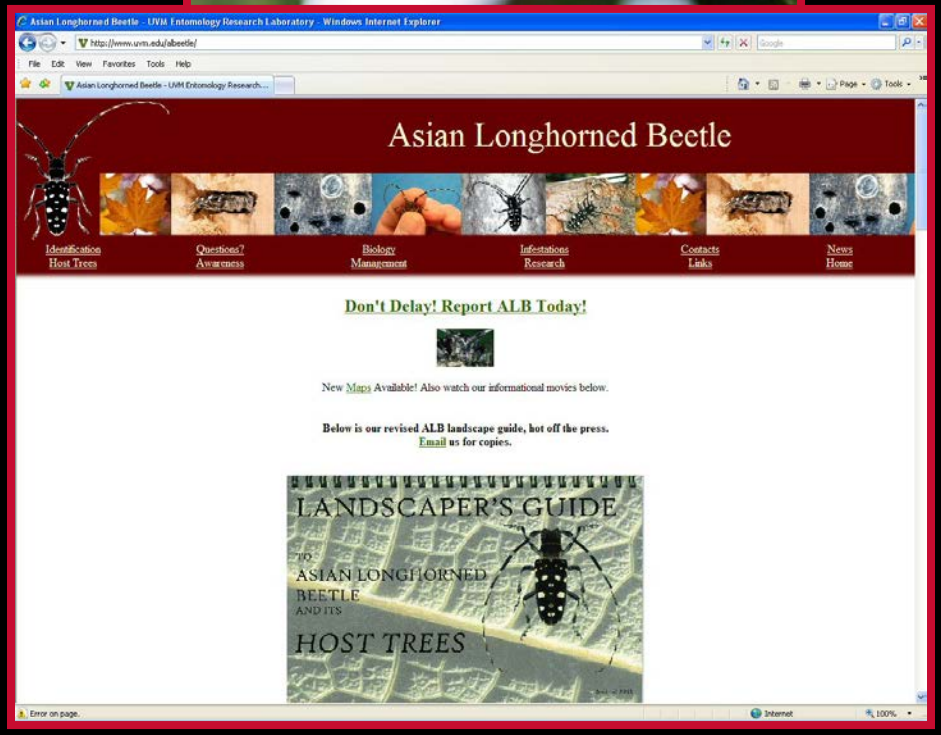


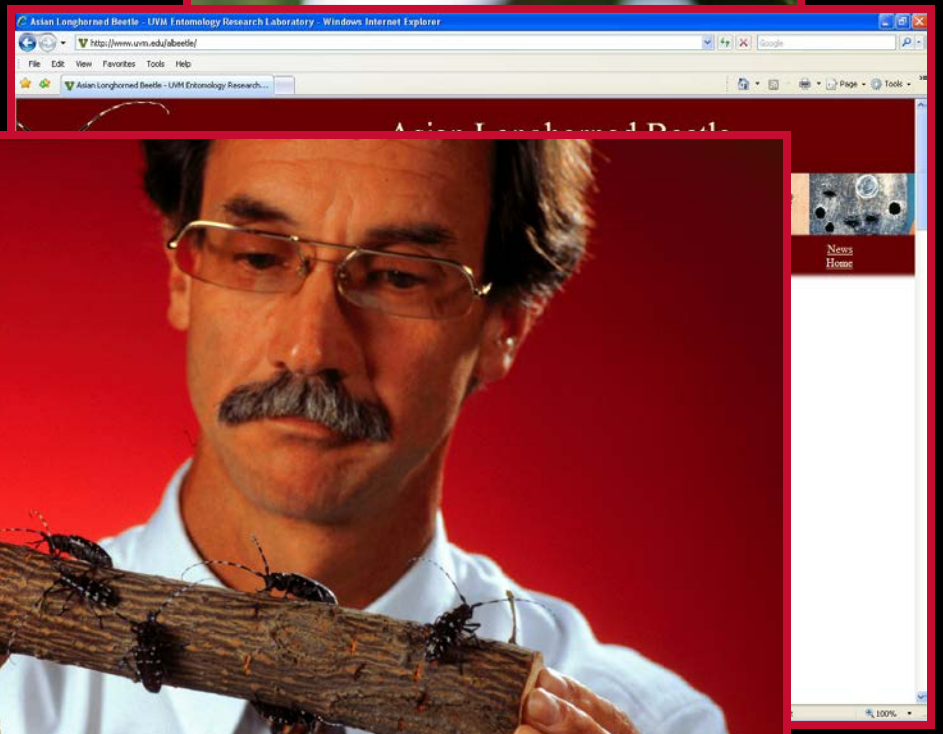


From: Shadow Surveys: How Non-Target Identifications and Citizen Outreach Enhance Exotic Pest Detection

Am Entomol. 2016;62(4):247-254. doi:10.1093/ae/tmw063

1998


Asian Longhorned Beetle - UVM Entomology Research Laboratory - Windows Internet Explorer
http://www.uvm.edu/albeetle/
File Edit View Favorites Tools Help
Asian Longhorned Beetle - UVM Entomology Research...
Asian Longhorned Beetle
Identification
Host Trees
Questions?
Awareness
Biology
Management
Infestations
Research
Contacts
Links
News
Home
Don't Delay! Report ALB Today!
New Maps Available! Also watch our informational movies below.
Below is our revised ALB landscape guide, hot off the press.
Email us for copies.
LANDSCAPER'S GUIDE
TO
ASIAN LONGHORNED
BEETLE
AND ITS
HOST TREES
Error on page.
Internet
100%


Asian Longhorned Beetle - UVM Entomology Research Laboratory - Windows Internet Explorer
http://www.uvm.edu/albeetle/
File Edit View Favorites Tools Help
Asian Longhorned Beetle - UVM Entomology Research...
News
Home


Asian Longhorned Beetle
Jersey City - Hoboken Regulated Area
Bowers St
Webster Ave
11 St
Summit Ave
Hudson River
October 15, 2002
Quarantine Zone

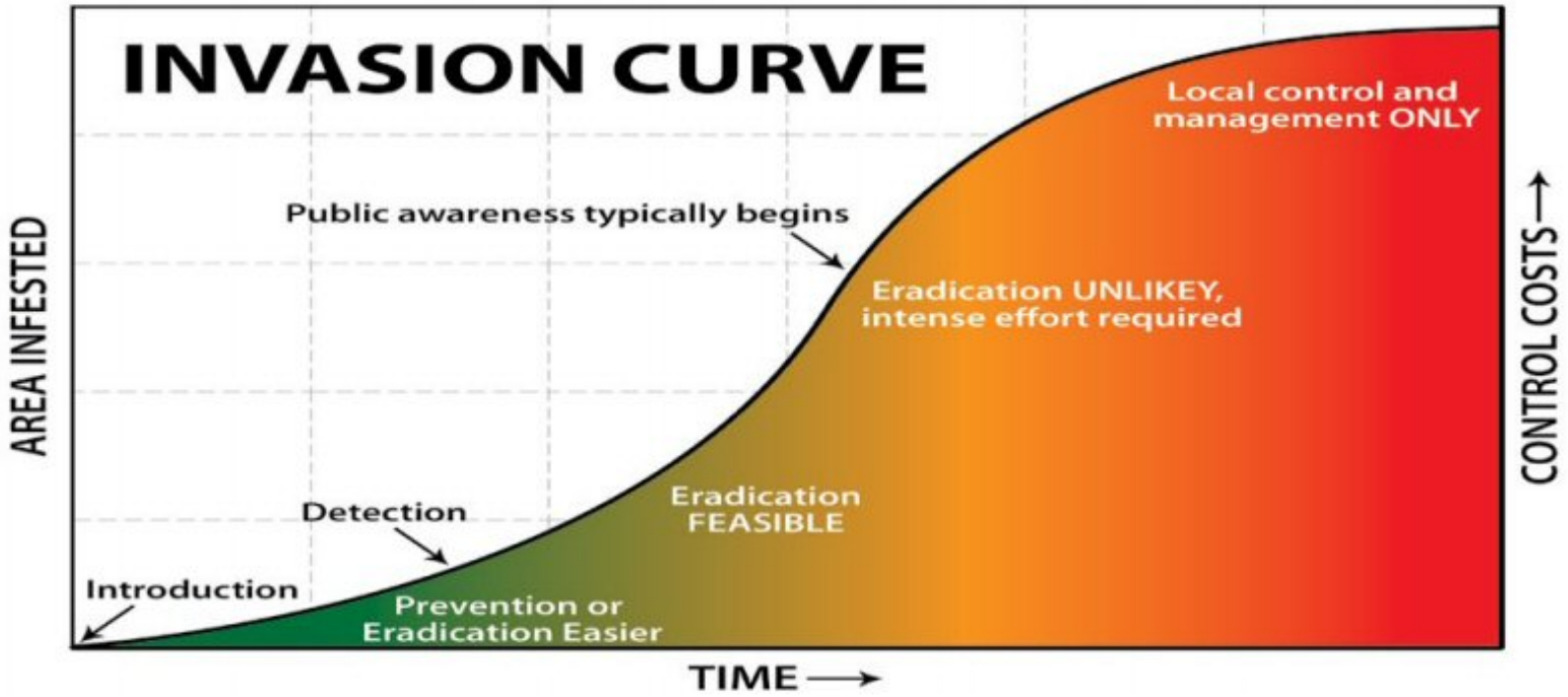
$100,000,000

- Removal and total destruction of more than 1,700 trees
- 92,000 trees were treated.

2001

Cost < 1,000,000

The Invasion Curve



Washington Invasive Species Council

Early Detection and Rapid Response

Washington Pest Watch:

A “new” network led by the Washington Invasive Species Council and partners with the goal of harmonizing messaging, resources, and reporting pathways between existing programs.

U.S. Department of Agriculture Animal and Plant Health Inspection Service

- Plant Protection and Quarantine
- Wildlife Services

Washington State University

- Washington State University Extension
- Washington State University Plant Pest Diagnostic Clinic
- Western Plant Diagnostic Network

Washington State Department of Agriculture

- Plant Protection Division Pest Program

Washington State Department of Natural Resources

- Urban and Community Forestry Program

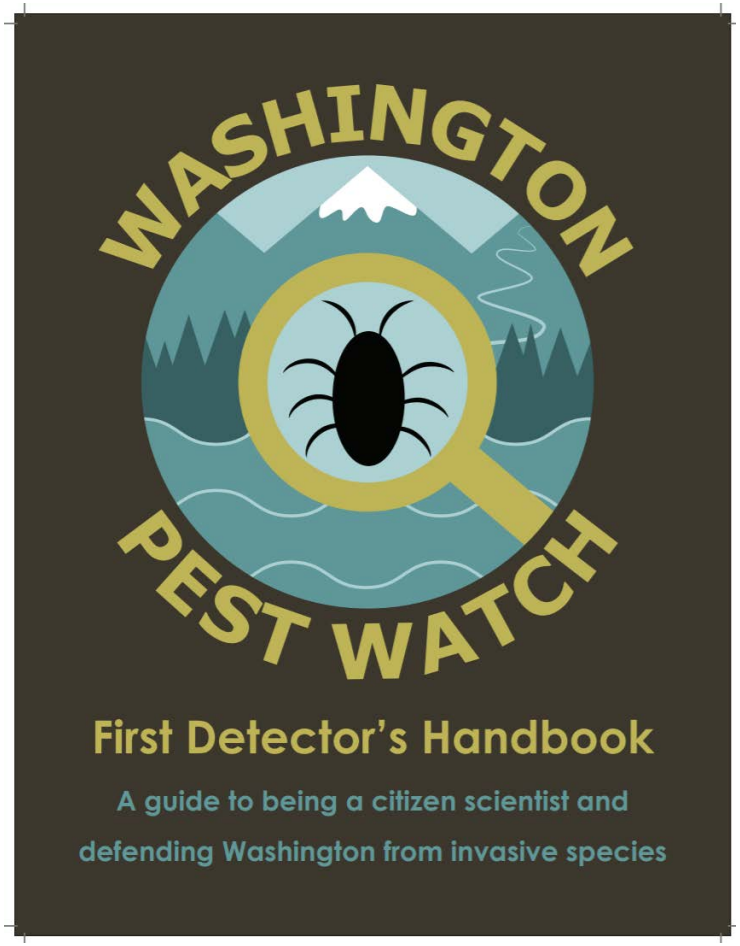
Washington Invasive Species Council

Early Detection and Rapid Response

Washington Pest Watch:

Educational Tools

- First detector handbook- similar to
  - Intro to Washington Pest Watch
  - Intro to invasive species
  - Target species
  - How to participate
  - How to take good photos
  - Appendix: partners
- Slide series
- Washington Pest Watch Publication Series
- WA Invasives app trifold brochure
  - about invasive species
  - how to get and use app
- Washington State USDA Hungry Pest trifold brochure



Invasive Species in Washington State

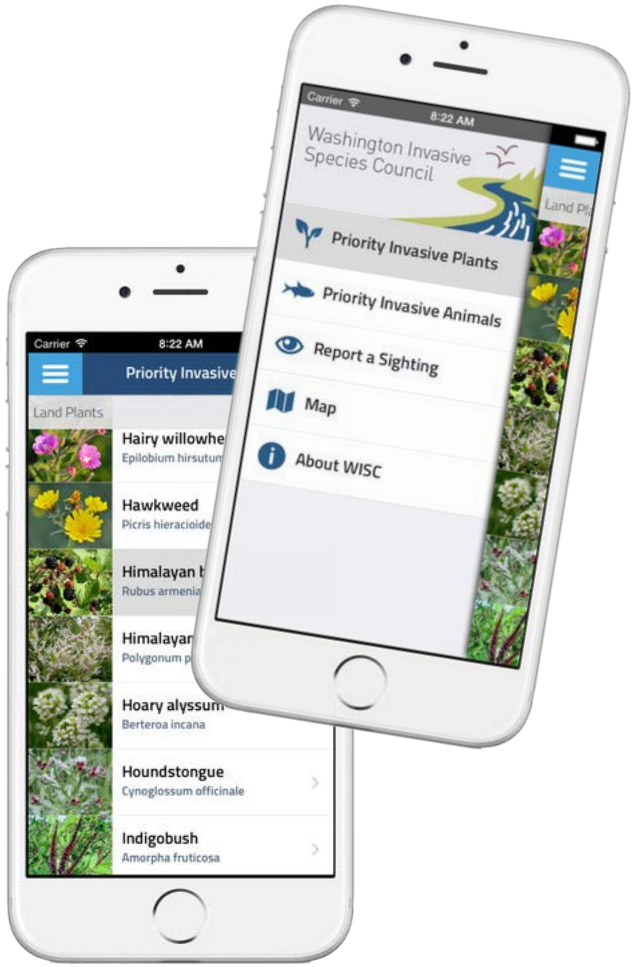
How can you help?

See it? Reporting it!

Report
Invasive Species Sightings

1) Phone:

- Emergency Aquatic Invasive Species Hotline
  - 1-888-WDFW-AIS
- WA/OR/ID Feral Swine Hotline
  - 1-888-268-9219



2) Mobile app:

- WA Invasives for iOS and Android

3) Website:

- http://www.invasivespecies.wa.gov/report.shtml

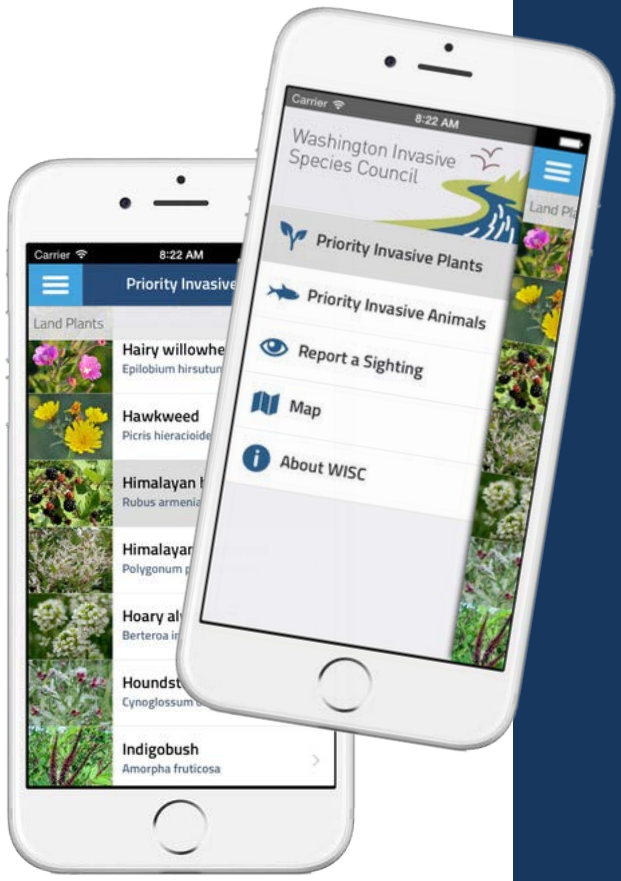
WISC

Invasive Species in Washington State

How can you help?

See it? Reporting it!

Report
Invasive Species Sightings



Local WSU Extension office
https://extension.wsu.edu/

BC Invasive Species Council
- http://bcinvasives.ca/

ID Invasive Species Council
- http://invasivespecies.idaho.gov/

OR Invasive Species Council
- https://www.oregoninvasivespeciescouncil.org/

WA Invasive Species Council
- http://www.invasivespecies.wa.gov/report.shtml

WISC

Japanese beetle

- Native to Japan
- First detected in southern New Jersey in 1916
- By 1972 it was found in 22 states
- 430 known host plants
- Annual turf damage=$156m
- Most important turf pest in the US
- Oregon trapped over 12,000 beetles in August 2017
- Found in British Columbia in 2018

Adult Japanese beetle damage. Daniel Herms.

Adult Japanese beetle. Pest and Diseases Image Library.

Lifecylce

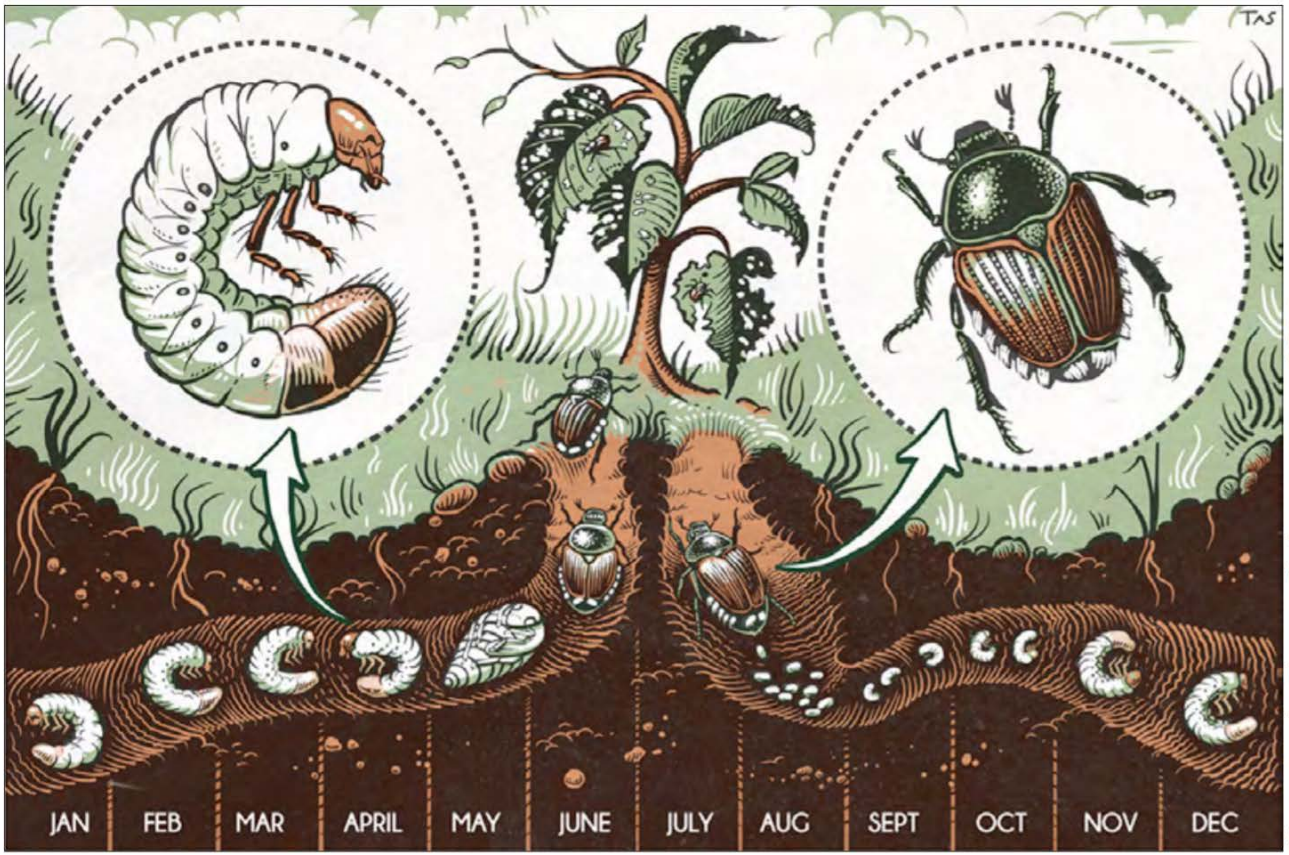


Illustration by Thomas Shahan, courtesy of ODA.

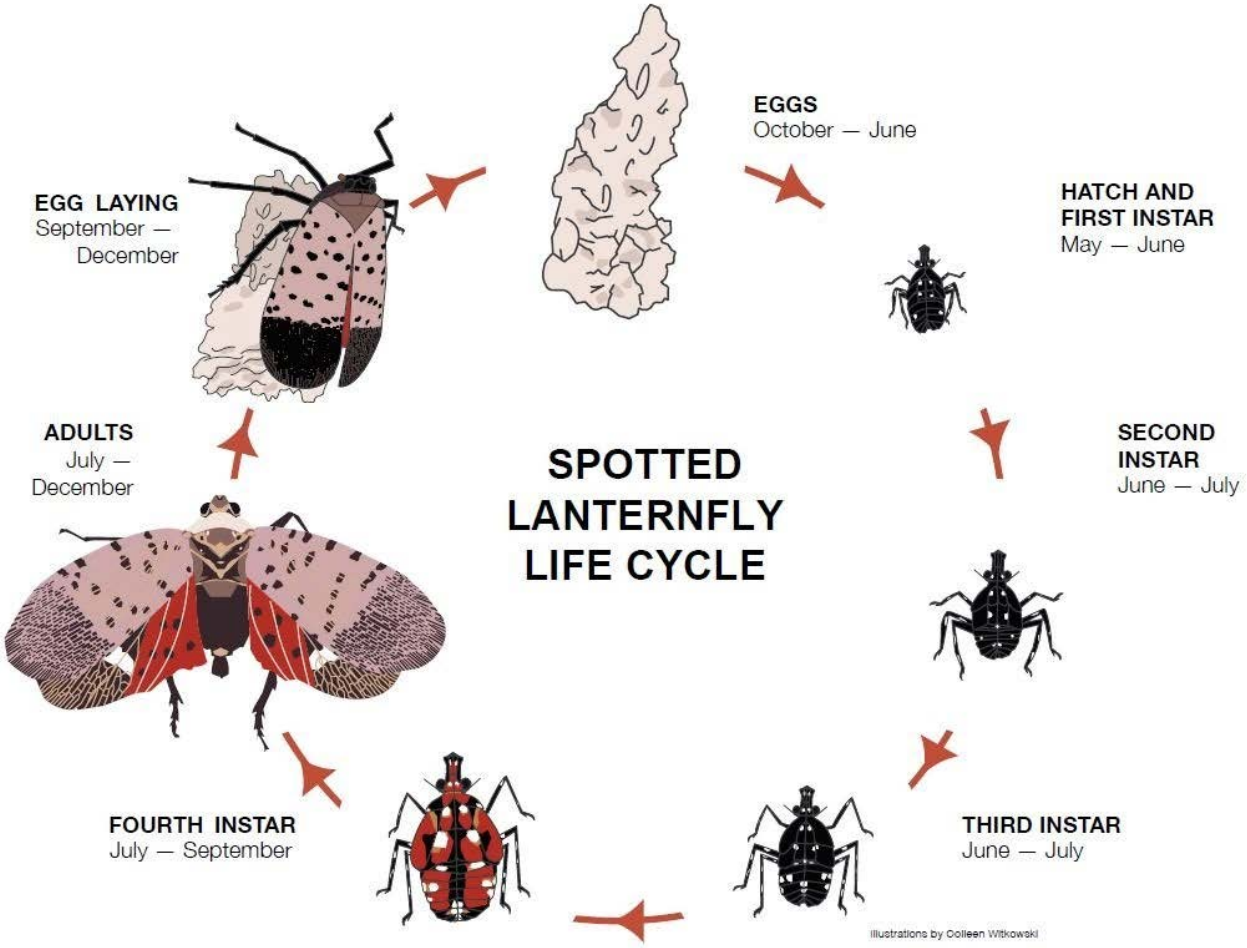
Look for it! Report it!

Spotted Lanternfly

- Discovered in 2014 in PA
- Native to SE Asia
- Feeds on 70+ species including:
  - Apples, grapes and hardwoods
- Tree of heaven (*Ailanthus altissima*)

Until November 2017, this invasive insect was only known to Pennsylvania. It has now been reported from Delaware (Nov. 20, 2017), New York (Nov. 29, 2017, Sept. 11, 2018, and Oct. 19, 2018), Virginia (Jan. 10, 2018), New Jersey (July 17, 2018), Connecticut (Oct. 22, 2018), and Maryland (Oct. 25, 2018)

Spotted Lanternfly



What to look for…

What to look for…

Fri, Nov 16, 2018

Newsweek

U.S. | World | Business | Tech & Science | Culture | Sports | Health

U.S.

WARNING: CHRISTMAS TREE SPOTTED LANTERNFLY COULD INFEST HOMES

BY JASON HALL ON 10/15/18 AT 5:14 AM

Adult spotted lanternfly with wings open. The spotted lanternfly makes use of over 70 different plant species, including fruit trees, ornamental trees, woody trees, vegetables, herbs and vines, including agricultural crops like grapes.
NEW JERSEY DEPARTMENT OF AGRICULTURE

SHARE

Emerald Ash Borer

- Native to Eastern Russia
- First noticed in Michigan and Ontario, Canada in 2002
- Quickly moved throughout the Northeast and Midwest—in 28 states
- Has killed tens of millions of ash trees in US
- Projected damage at $10.7 billion from 2009 to 2019 (Kovacs et al. 2010).
- Rapid dispersal is due to:
  - Movement of wood packing material and firewood
  - The beetle's own dispersal capabilities (~20mi/yr)(Bauer et al., 2004)
- USDA APHIS removing the quarantine???

Debbie Miller, USDA Forest Service, Bugwood.org


Emerald ash borer damage. Nicholas Aflitto

Emerald Ash Borer

Identification

- Size: 0.4 – 0.5 inches
- Metallic green
- Coppery red under wing cover
- Several native lookalikes

Debbie Miller, USDA Forest Service, Bugwood.org

Pest and Disease Library, bugwood.org

Emerald Ash Borer

Look for…

“D-shaped” emergence holes

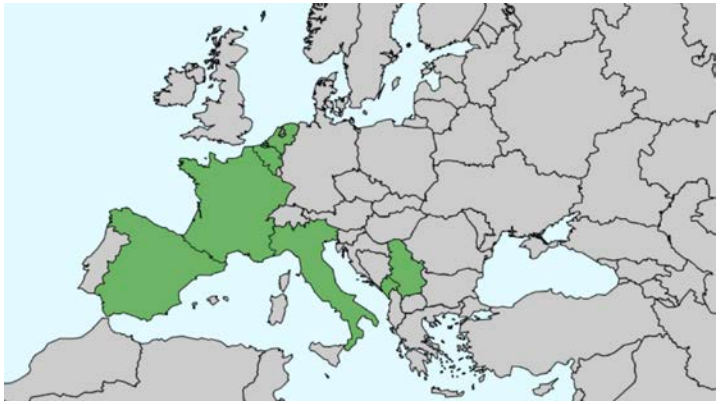
Epicormic growths and shoots on the main stem

Emerald Ash Borer Management

- Population size and distribution make eradication beyond reach
  - Do not contribute to the spread
    - Adhere to quarantines
      - Do not move firewood, green ash lumber or brush
- Preventive insecticide use for high-value trees
  - Most effective in healthy trees
  - Limit use to within 15 miles of a confirmed outbreak

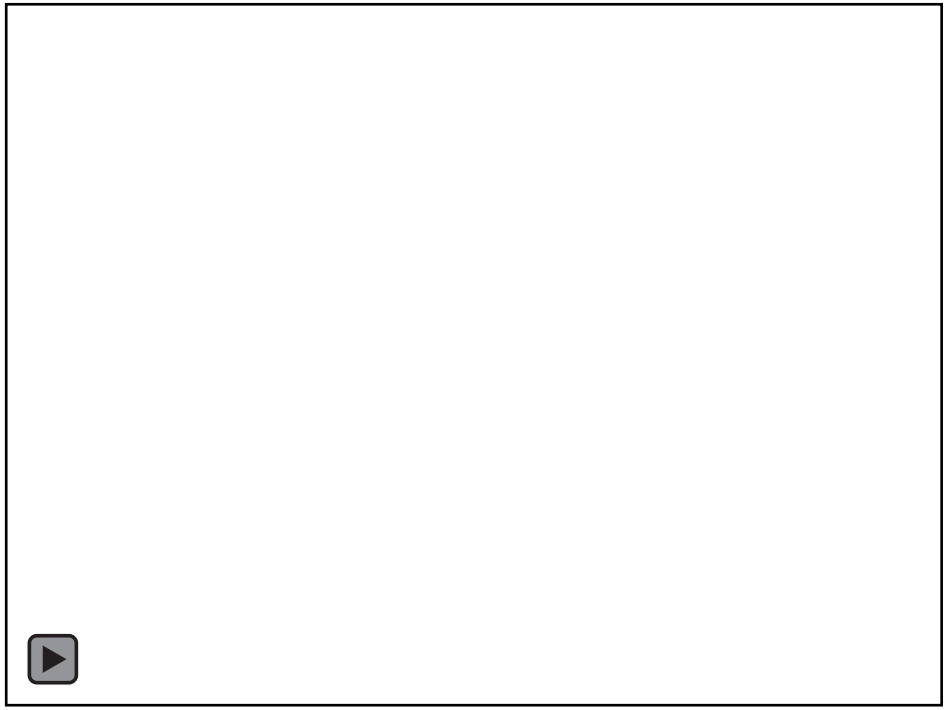
David Cappaert, MSU

European Chafer
Amphimallon majale



European Chafer
Amphimallon majale

- Adults active mid-June through July
- Brick red to light brown
- ½ inch
- Up to 50 eggs



Evening Swarms

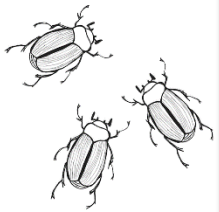
European Chafer
Amphimallon majale

- Larvae feed from fall to spring usually in the first 2” of soil
- Pupae begin in April
- One generation per year

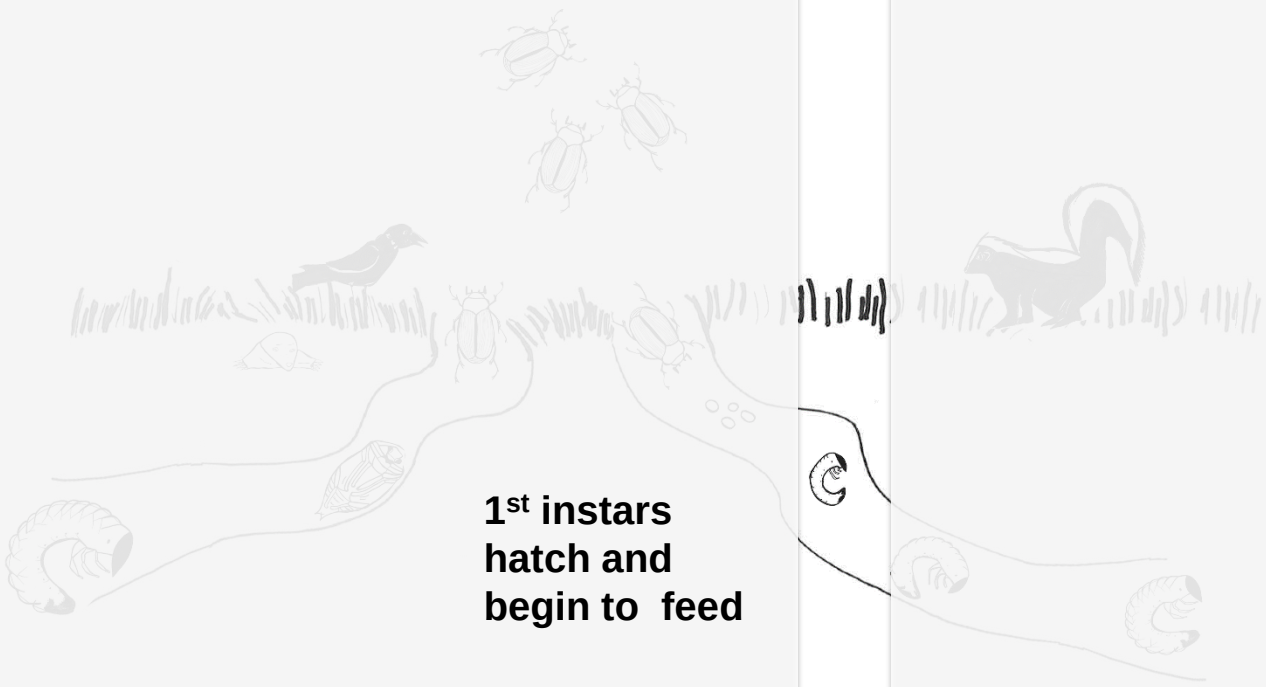
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Adult swarms are visible in late spring and early summer

Adults live for about two weeks, and fly for ~five days

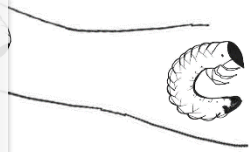


JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC



1st instars hatch and begin to feed

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC



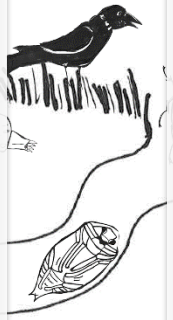
3rd instar grubs overwinter in earthen cells, or….

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

… 3rd instar grubs feed throughout the winter.

3rd instar grubs overwinter in earthen cells, or….

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC



pupation in spring

1st instars hatch and begin to feed

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Damage

- Grubs feed on fibrous roots
- Feed on all lawn and pasture grasses, many cereal species
- Causes frequent die-back, especially in any sub-ideal growing conditions

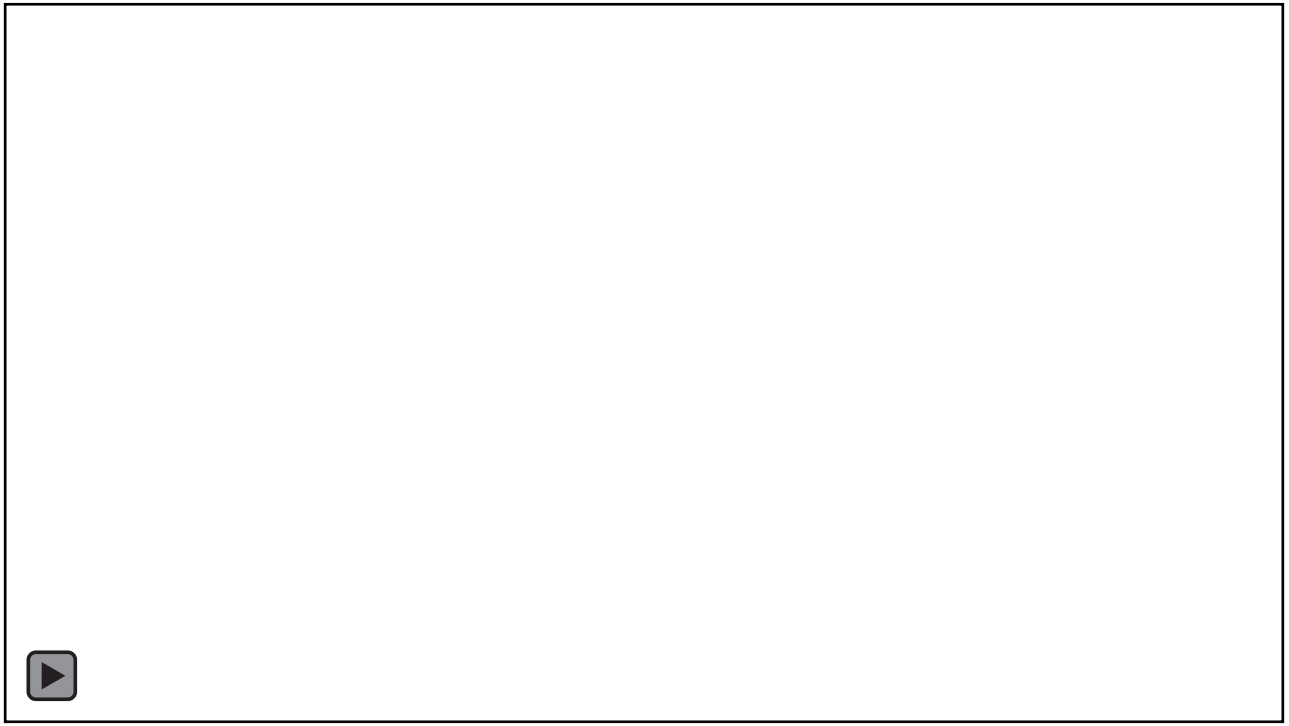
Damage to lawn from vertebrates digging for grubs

Peter Isaacson
DessIsaa Horticultural Consultants Inc.
Surrey, British Columbia

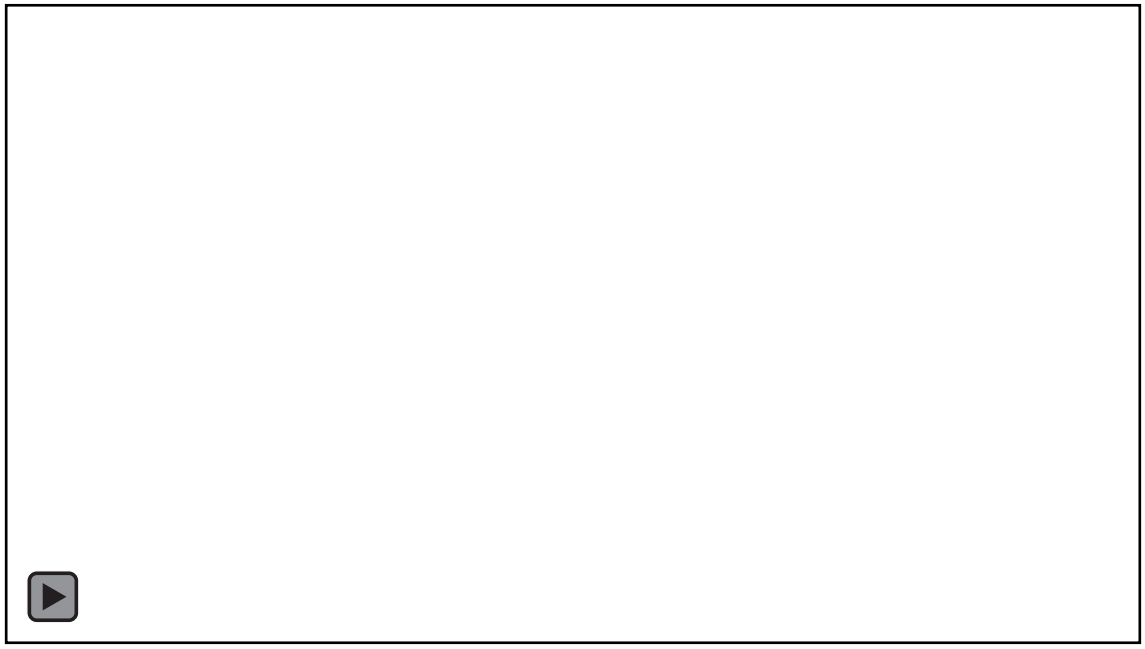
Damage to lawn by Crows

Peter Isaacson
DessIsaa Horticultural Consultants Inc.
Surrey, British Columbia

Damage

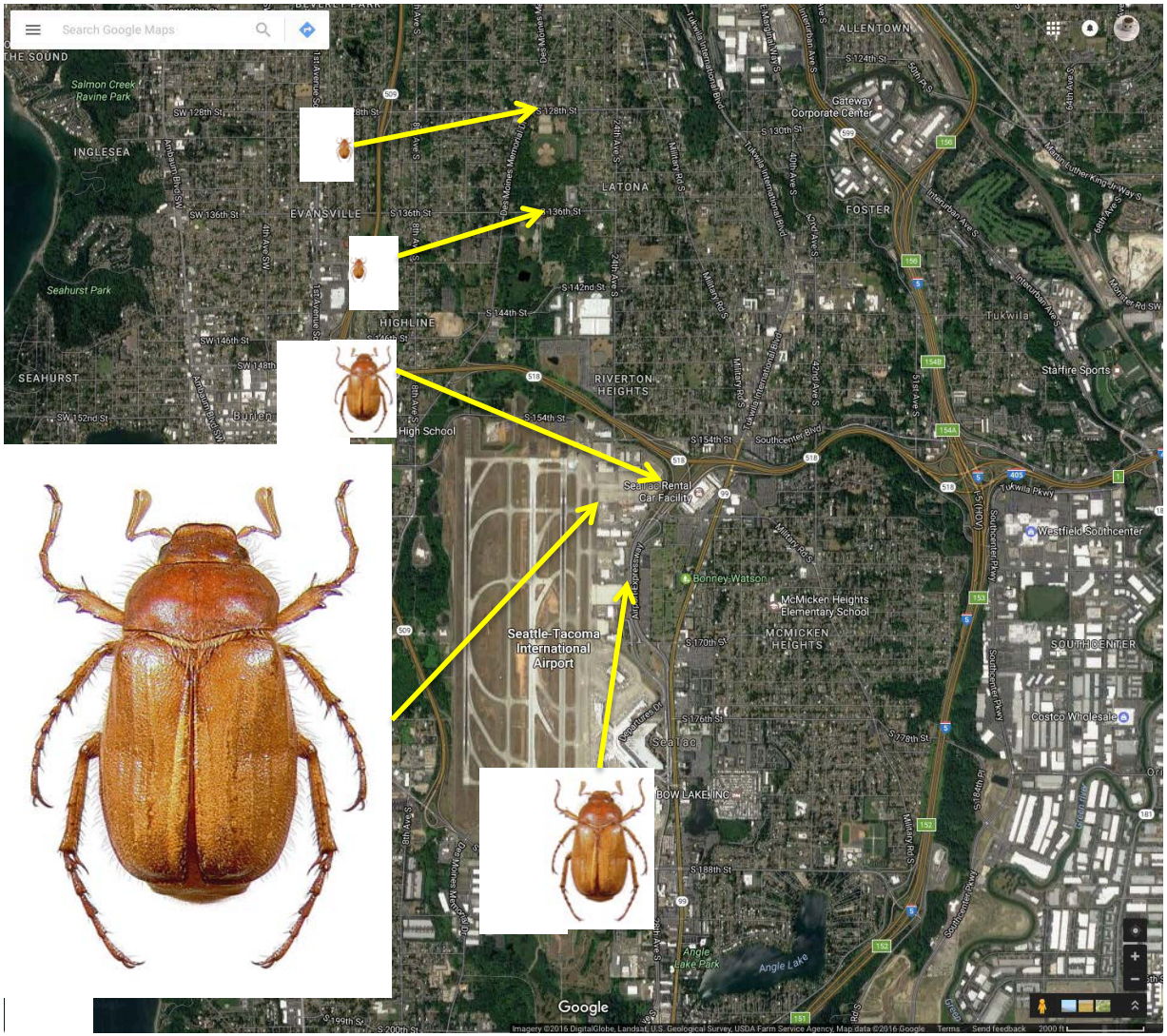


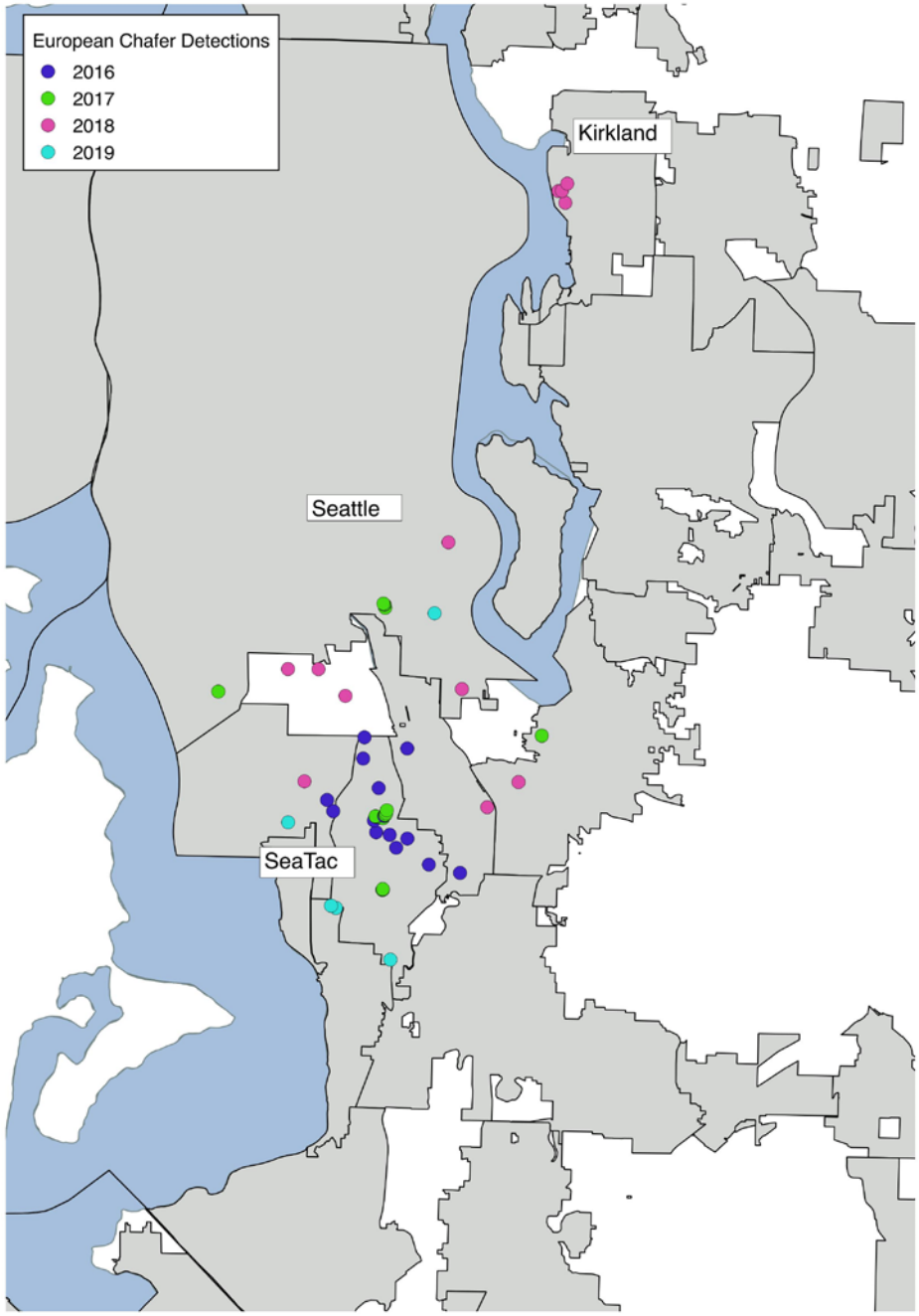
Damage



Distribution

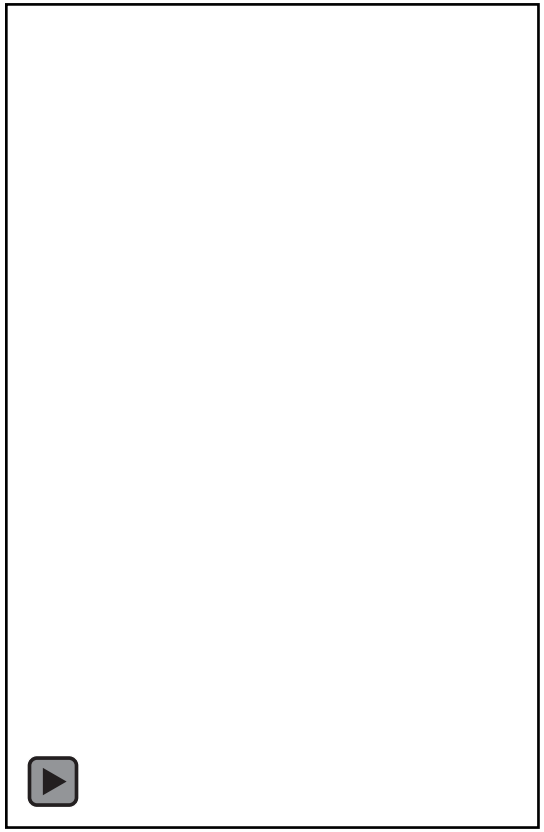
- Detected in British Columbia in 2001 (MG!)
- Light trap surveys in Blaine, WA in 2002 – not found
- Detected periodically in Japanese beetle surveys (four locations in 2008, including Spokane)
- Detected in SeaTac in 2016 (MG!)


Search Google Maps
THE SOUND
Salmon Creek Ravine Park
INGLESEA
SW 128th St
SW 136th St
EVANSVILLE
S 128th St
S 136th St
LATONA
ALLENTOWN
S 124th St
Gateway Corporate Center
S 130th St
FOSTER
Tukwila
Seahurst Park
HIGHLINE
S 142nd St
S 144th St
SW 145th St
SW 148th
SEAHURST
SW 152nd St
Burien
RIVERTON HEIGHTS
S 154th St
High School
Southcenter Blvd
Sea-Tac Rental Car Facility
Westfield Southcenter
Bonney-Watson
McMicken Heights Elementary School
MCMICKEN HEIGHTS
SOUTHCENTER
Seattle-Tacoma International Airport
S 170th St
S 176th St
Sea-Tac
Costco Wholesale
BOW LAKE, INC
S 188th St
Angle Lake Park
Angle Lake
S 199th St
S 200th St
Google
Imagery ©2016 DigitalGlobe, Landsat, U.S. Geological Survey, USDA Farm Service Agency, Map data ©2016 Google
Terms
Send feedback
2000 ft


European Chafer Detections
2016
2017
2018
2019
Kirkland
Seattle
SeaTac

Survey techniques

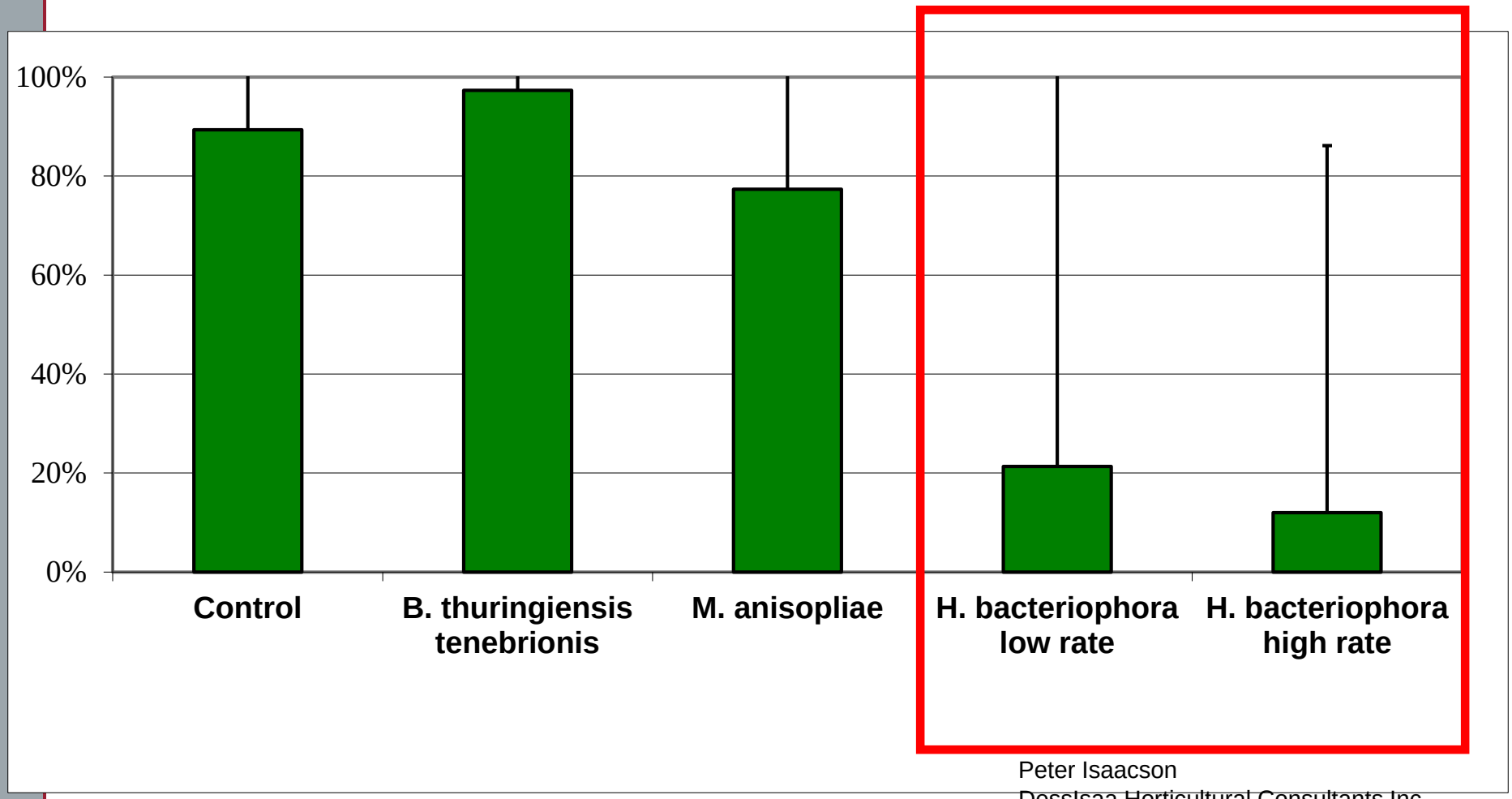
- Cut turf back in 12x12 inch square to look for grubs
- Management at:
  - 5-10 grubs/sq ft, low maintenance
  - 15-20 grubs/sq ft, daily irrigated



Management

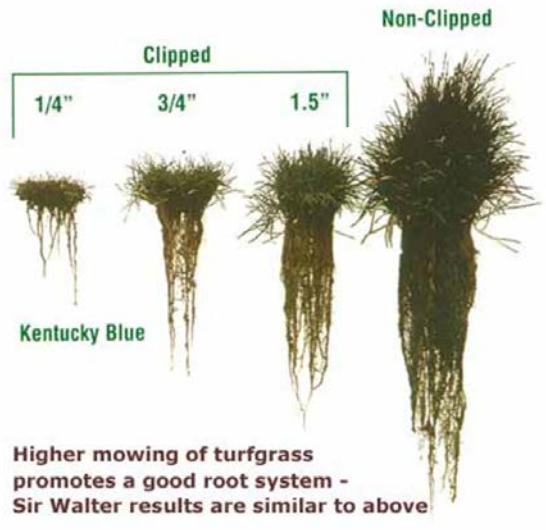
- Promote healthy/drought tolerant lawns
  - Mowing high, irrigation, nutrition
- Foresee increased pesticide use upon introduction
- Cultural methods
  - Frequent watering during flight

Survival of 2nd Instar Chafer Larvae 2 Weeks Post Treatment



Peter Isaacson
DessIsaa Horticultural Consultants Inc.
Surrey, British Columbia

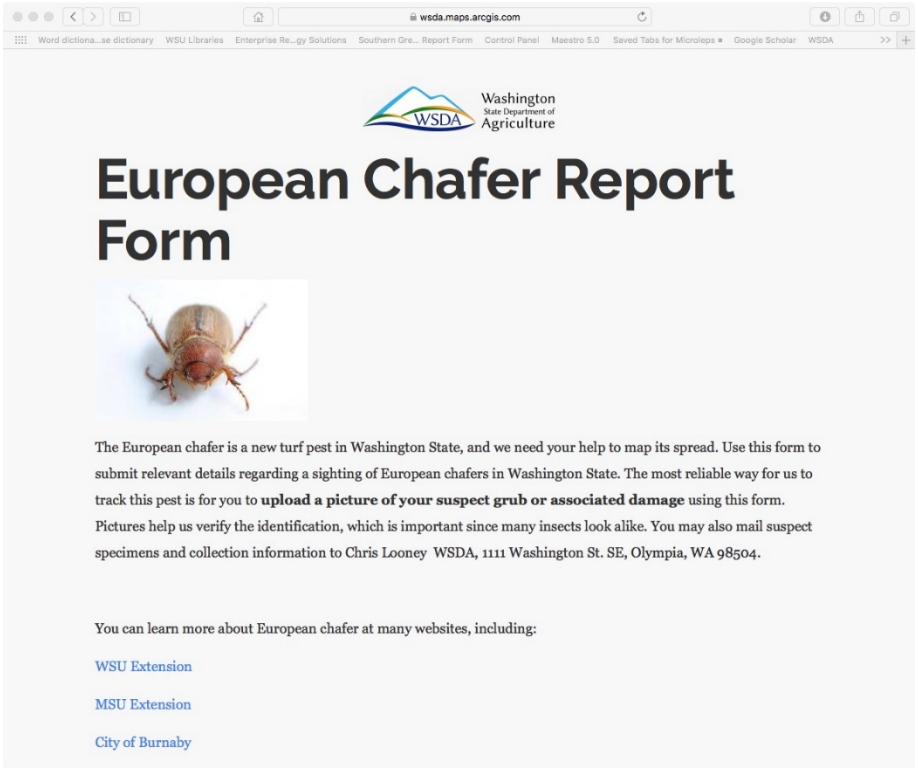
Turf Health



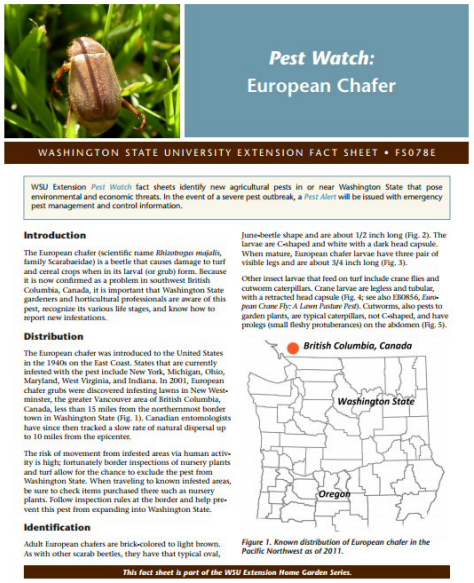
- High Maintenance Turf…
  - Mowing
    - 2 to 3 inches
    - 1 x week
    - Returning clippings
  - Fertilization
    - 4 x year, twice in spring and twice in the fall
    - 1 lb N per 1,000 sq ft per application (4 lbs per 1,000 sq ft annually)
  - Irrigation
    - 4 x week at ¼ inch per application
    - Memorial Day to Labor Day

Alec Kowalewski
Associate Professor, Turf Specialist OSU

REPORTING SITE (COMING SOON)



PestWatch: European Chafer FS078E



European Fire Ant *Myrmica rubra*

- Vast native range from Ireland to Siberia (Czechowski et al., 2000)
  - Broad range illustrates potential to spread around the U.S.
- First found in MA in 1908
  - Established throughout the northeast in NH, NJ, PA, WA D.C., RI, ME (Groden et al., 2005)
  - Also in British Columbia and parts of Washington State (Seattle)

Gary Alpert, Harvard University

Eli Sarnat, USDA APHIS ITP

European Fire Ant
Myrmica rubra

Identification

- Adults are approx. 0.2 in long
- Head and thorax are deeply striated (grooved) (see photo)
- Do not form nest mounds

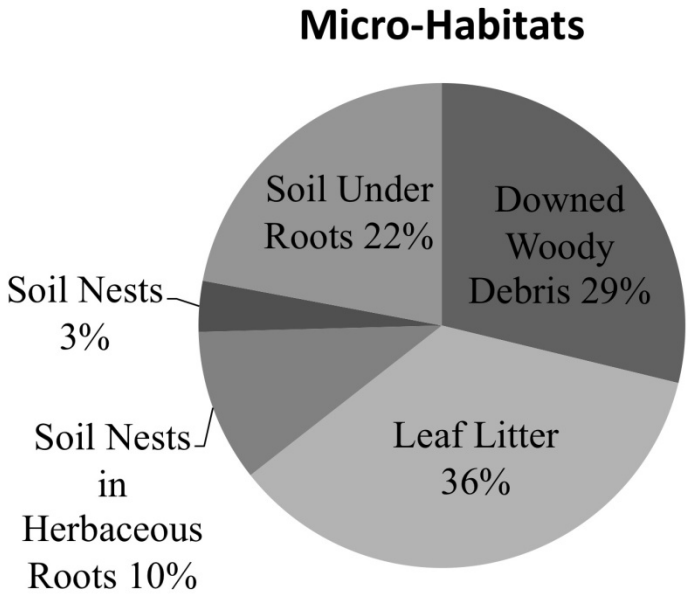
Gary Alpert, Harvard University

Eli Sarnat, USDA APHIS ITP

European Fire Ant
Myrmica rubra

Identification

- Prefer moist nest sites
- Densely packed infestations
  - many have an average of 1.25 nests per square yard
- Wide variety of micro-habitats utilized (Groden et al., 2005)



European Fire Ant
Myrmica rubra

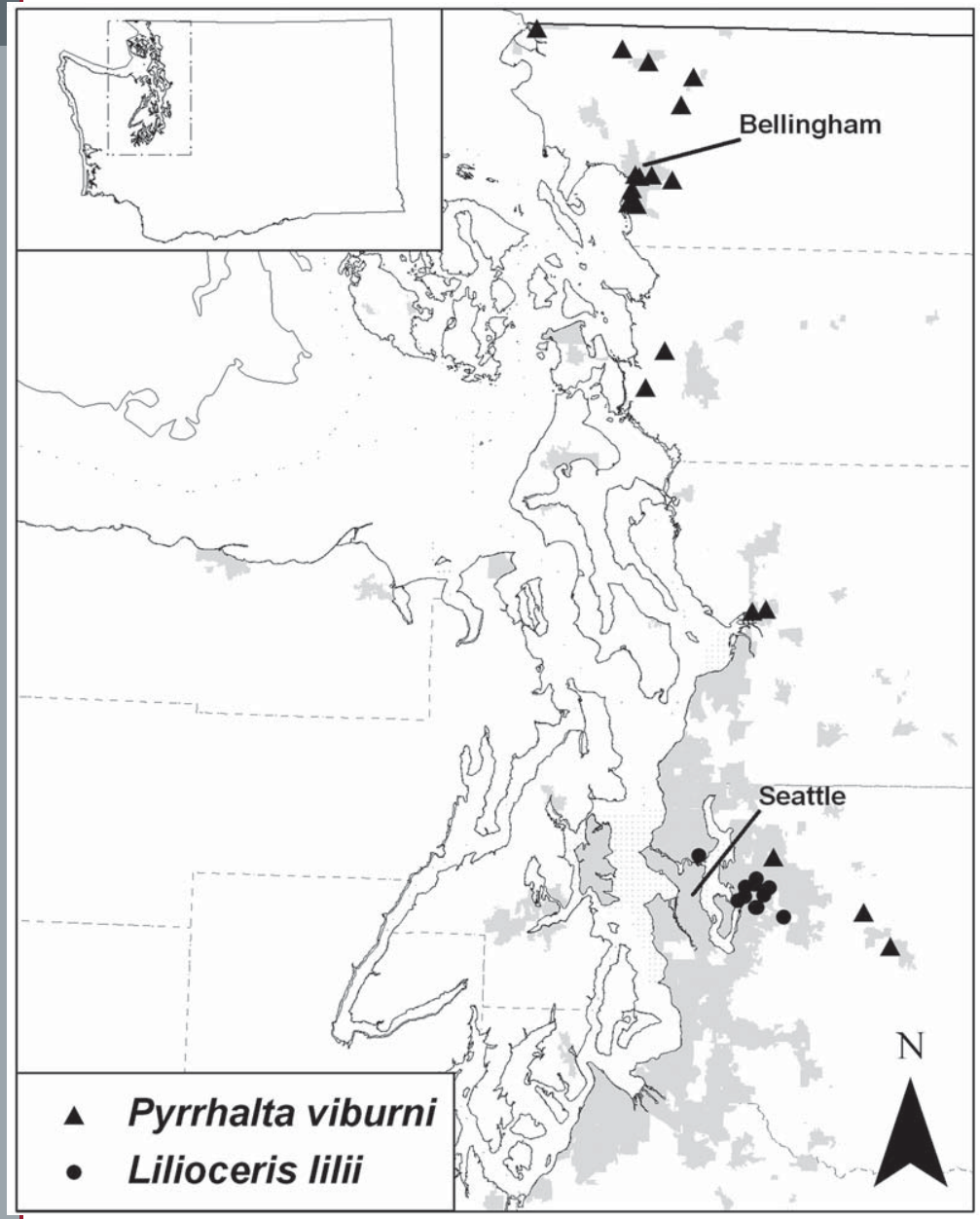
Damage

- Highly aggressive
- Conflicts with humans are rising as the ant spreads
  - Prefers nest sites near rivers, lakes, and gardens
    - Increasing conflict with recreationists

Peter Grainger, CTV News, Vancouver, B.C.

Viburnum Leaf Beetle

- Ontario in 1947
- 1996 found in NY and surrounding states
- Found in Vancouver 2001 and Whatcom County in 2004



Current Distribution in the PNW

- Spokane WA

Pyrrhalta viburni

- Eggs overwinter on stems in protected wounds.

Pyrrhalta viburni

- Larvae hatch and begin to feed in spring as leaves appear

VLB Larvae

VLB Pupa

- In June, mature larvae migrate to the soil to pupate for about 1-2 weeks.

VLB Adults

VLB Adults

- Adults emerge in July and feed on foliage
- Adults lay eggs into green stems
- Adults active until first killing frost

Damage

Damage

Host Susceptibility

Susceptible

- *V. dentatum* complex - arrowwood
- *V. opulus* - European cranberrybush
- *V. opulus var. americana* - American cranberrybush
- *V. rafinesquianum* - Rafinesque viburnum
- *V. sargentii* - Sargent viburnum

Resistant

- *V. burkwoodii* Burkwood viburnum
- *V. x carlcephalum* Carlcephalum viburnum
- *V. carlesii* Koreanspice viburnum
- *V. x juddii* Judd viburnum
- *V. plicatum var. tomentosum* doublefile viburnum
- *V. x rhytidophylloides* Lantanaphyllum viburnum
- *V. rhytidophyllum* leatherleaf viburnum
- *V. setigerum* Tea viburnum
- *V. sieboldii* Siebold viburnum

Impact on wildlife

- LOSS OF SOUTHERN ARROWWOODS (VIBURNUM DENTATUM) IS ASSOCIATED WITH CHANGES IN SPECIES COMPOSITION AND MASS GAIN BY SPRING MIGRANTS USING EARLY SUCCESSIONAL HABITAT

- Smith & Hatch (2017) reported:
  - Decrease in diversity
  - Changes in capture rates, both decrease and increase in species
  - No evidence in mass gain after infestation

PestWatch: Viburnum Leaf Beetle FS202E

WASHINGTON STATE UNIVERSITY EXTENSION

PEST WATCH: VIBURNUM LEAF BEETLE

Home Garden Series

By
Todd Murray, Associate Professor, WSU Extension Pullman. **Eric LaGasa**, Entomologist (retired), Washington State Department of Agriculture. **Chris Looney**, Ph.D., Entomologist, Washington State Department of Agriculture. **Nick Aflitto**, Administrative Professional, WSU Extension

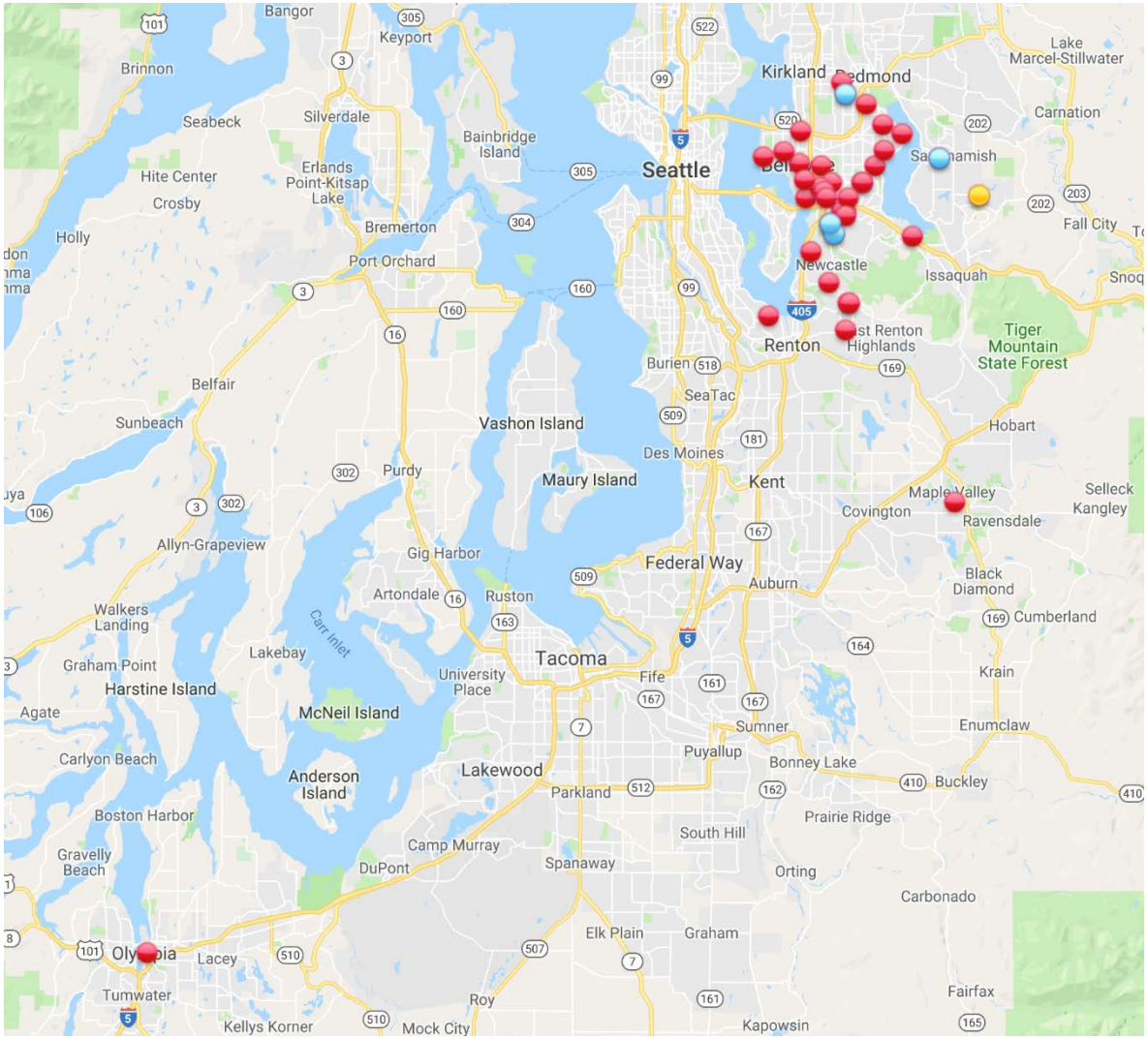
WSU PEER REVIEWED
FS202E

Lily Leaf Beetle in North America

- Introduced from Europe in 1945
- First US records 1992, Cambridge
- Rapid spread soon after…

http://lilybeetletracker.weebly.com/map.html

Lily Leaf Beetle in Washington



Discovered in Bellevue in 2012

Lily Leaf Beetle: *Lilioceris lilii*

- Brilliant red beetles
- Emerge in spring to feed, mate, and lay eggs
- Adults make a distinctive, squeaking sound when pestered.

Lily Leaf Beetle: *Lilioceris lilii*

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

Lily Leaf Beetle: *Lilioceris lilii*

Lily Leaf Beetle: *Lilioceris lilii*

- Larvae are ready to pupate in the soil after three to four weeks.
- Adults emerge three to four weeks later, and get to work eating foliage until fall.

Lily Leaf Beetle: *Lilioceris lilii*

- Primarily attack *Fritillaria* and *Lilium*

Impacts to the Understory

- *Lilium columbianum*
- *Calochortus*
- *Nomocharis saluensis, Polygonum sp., Convalaria sp. (Hesse 1932), Solanum dulcamara (Slate 1953, Tempere 1926), Solanum tuberosum (Fox-Wilson 1943, Mohr 1966, Franz 1974, Slate 1953), and Chimonobambusa marnorea*

PestWatch: Lily Leaf Beetle FS084E

Pest Watch:
Lily Leaf Beetle

WASHINGTON STATE UNIVERSITY EXTENSION FACT SHEET • FS084E

WSU Extension *Pest Watch* fact sheets identify new agricultural pests in or near Washington State that pose environmental and economic threats. In the event of a severe pest outbreak, a *Pest Alert* will be issued with emergency pest management and control information.

Introduction

The lily leaf beetle (LLB), *Lilioceris lilii*, is a bright red beetle in the Chrysomelid family native to Europe and Eurasia. In its native range, LLB is a pest of exotic and hybrid lilies.

Distribution

Lily leaf beetle was first discovered in North America in Montreal, Canada, in 1945. In 1992, LLB was found for the first time in the United States in Cambridge, Massachusetts. Since then, LLB has spread through New England and now occurs in Maine, New Hampshire, Massachusetts, New York, Connecticut, Rhode Island, and Vermont. In the spring of 2012, an alert homeowner reported this beetle to the Washington State Department of Agriculture and LLB was recorded in Washington State for the first time. Upon investigation, LLB was found in the southwest neighborhoods of Bellevue, just east of Seattle.

Figure 1. Adult lily leaf beetles in Bellevue, Washington. (Photo courtesy of E. LaGasa, WSDA.)

Identification and life cycle

Adult beetles are 1/4 to 3/8 inch long and conspicuously colored bright scarlet red, with the head, underbody, legs, and antennae black (Figure 1). Adult beetles are very active and mobile, and they make a defensive chirping or squeaking noise when provoked. Adult beetles overwinter in the soil and emerge in the spring to feed on developing foliage and seek mates.

Lily leaf beetle can complete its life cycle on true lilies (*Lilium* spp.) and fritillaries (*Fritillaria* spp.). Mated adult females lay eggs in small batches in irregular rows on the underside of host plant leaves, laying up to 450 eggs during the season (Figure 2). The small orange-brown eggs hatch in one to two weeks. Larvae are orange to light green, but cover themselves in excrement and resemble slime-covered

Figure 2. LLB eggs laid in irregular rows. (Photo courtesy of E. LaGasa, WSDA.)

This fact sheet is part of the WSU Extension Home Garden Series.

Azalea Lace Bug (*Stephanitis pyrioides*)

- Completely fried azaleas in 2007
- Confirmed in 2008 in King County
- Confirmed in 2009 in Portland
- Kissing cousins to the Rhodie lace bug (*Stephanitis rhododendri*)

Azalea Lace Bug

- Damage recognized by tar-like spots and stippled leaves


J. LaBonte ODA


J. LaBonte ODA

Novel Hosts

Based on Garden & Nursery Observations and Host Plant Trials (ODA)

3 New Host Families:

- Betulaceae
- Caprifoliaceae
- Rosaceae

14 New Host Genera

Agapetes	*Epigaea*
Andromeda	*Gaultheria*
Chamaedaphne	*Kalmiopsis*
Corylus	*Phylliopsis*
Cotoneaster	*Prunus*
Crategus	*Vaccinium*
Daboecia	*Viburnum*

30 New Host Species

J. LaBonte ODA

Impact of Azalea Lace Bug to Native Understory

- Impact to native understory
  - *Kalmiopsis leachianum*
  - *Gaultheria shallon*
  - *Rhododendron groenlandicum*
  - *Vaccinium ovatum & V. uliginosum*

Azalea Lace Bug

Biology and management in commercial nurseries and landscapes

Robin Rosetta

EM 9066 • July 2013

Azalea lace bug (*Stephanitis pyrioides,* Figure 1) is a damaging pest of azaleas belonging to the family of insects called Tingidae or lace bugs. This introduced pest, native to Japan, was first detected in New Jersey in 1915. It spread quickly to other mid-Atlantic and southeastern states. *S. pyrioides* was confirmed in 2008 in Washington State and 2009 in Oregon. Damage from this new introduction was noticed first on evergreen azalea plants in landscapes.

Description and life cycle

Azalea lace bug overwinters in the egg stage. Eggs are generally laid along the midrib on the underside of leaves and covered with dark brown excrement (Figure 2, page 2). Adults can lay 300 eggs, at the rate of 5 to 7 eggs per day.

In the Willamette Valley, azalea lace bugs emerge from their eggs beginning in mid-May to early June.

Figure 1. Azalea lace bug adult with light and dark patterns on its wings.