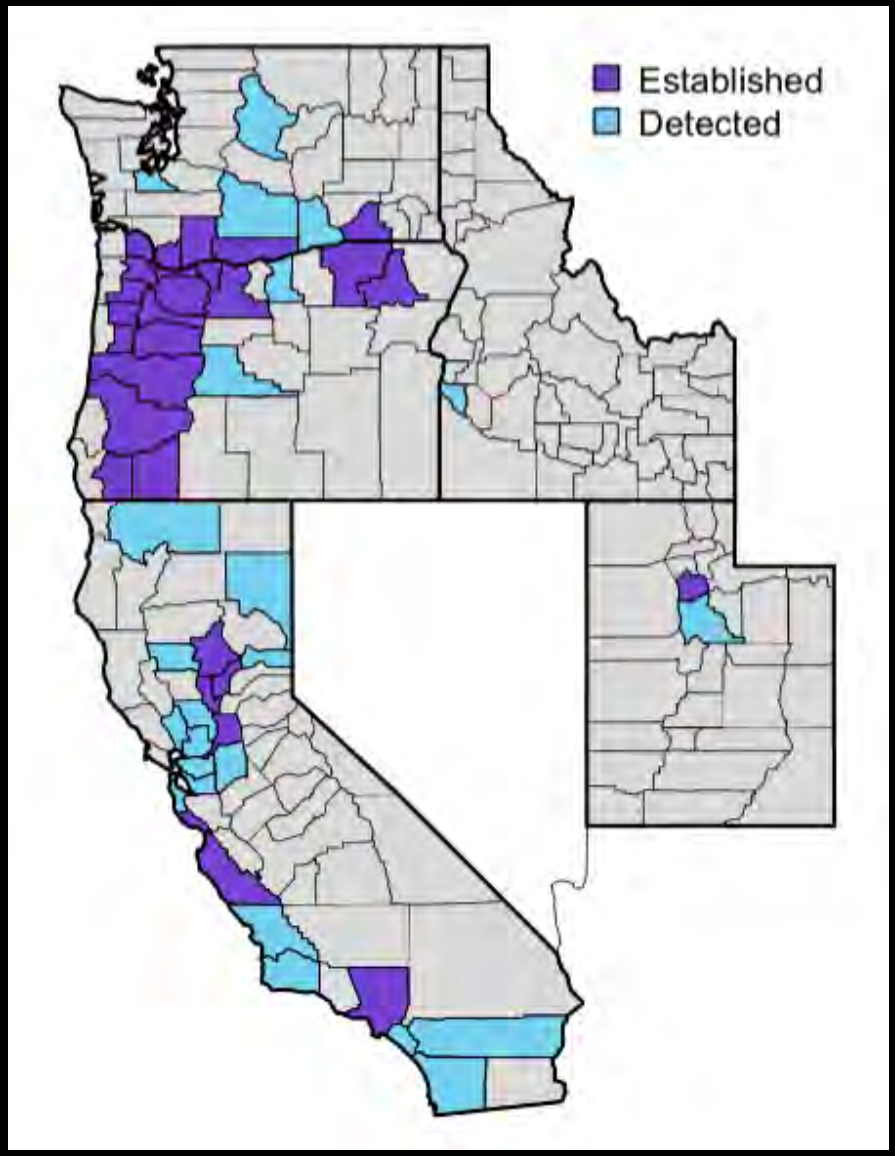
BMSB in Western Region



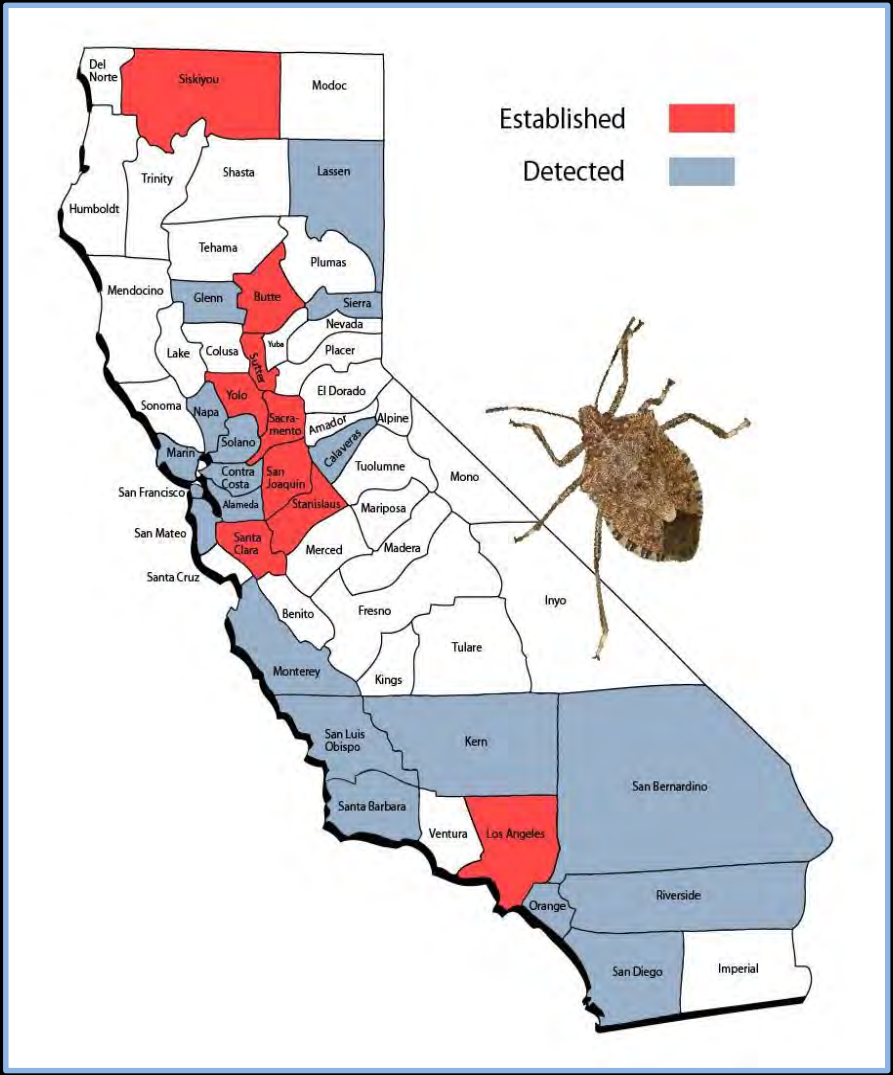
California

Monica Cooper, Kent Daane, Larry Godfrey, Mark Hoddle, Chuck Ingels, Shimat Joseph, Jhalendra Rijal, Emily Symmes, Frank Zalom

Utah

Diane Alston & Lori Spears

BMSB In California



- $54 billion output in 2015
- Top agricultural counties are in San Joaquin Valley

- Almonds ($5.8 B)
- Grapes ($5.2 B)
- Walnuts ($1.8 B)
- Pistachios ($1.6 B)
- Oranges ($950 M)
- Peaches ($356 M)
- Kiwifruit ($32 M)

Established in 9, detected in 19 counties

Ex.: Sacramento Trapping (2014-2016)

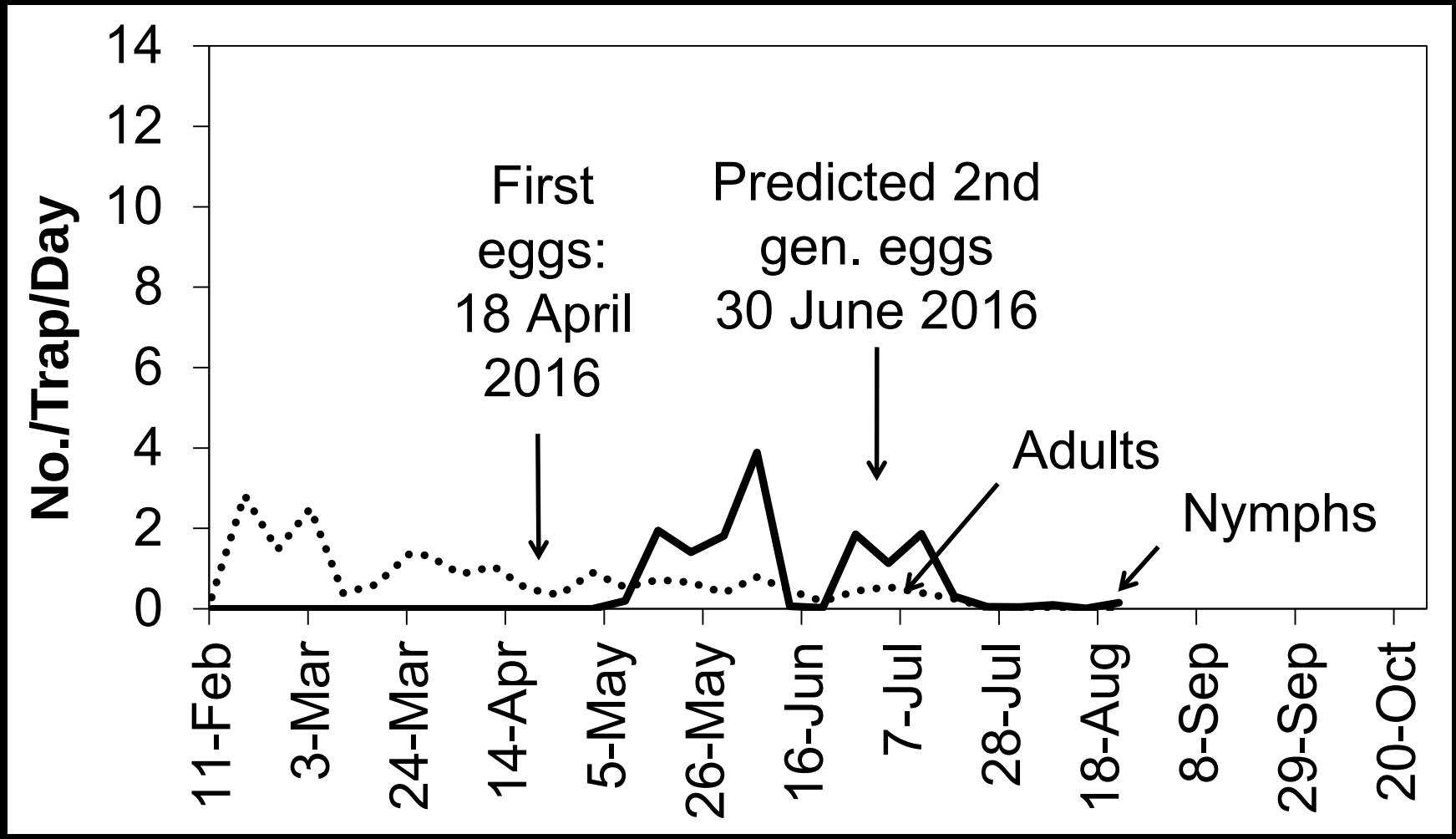
AgBio
Pyramid Trap

Trece Double Cone
(1-qt.)

Chuck Ingels
(Sacramento Valley)

UC CE
University of California
Cooperative Extension

Sacramento Trap Counts (2014-2016)



Similar Sampling in other Counties (2016)

Emily Symmes
(north central valley)

Jhalendra Rijal
(central valley)

Shimat Joseph
(central coast)

Monica Cooper
(north coast winegrapes)

UC CE
University of California
Cooperative Extension

Similar Sampling in other Counties (2016)

To date, most BMSB finds are in gardens and landscape trees (e.g., tree of heaven).

Berkeley
UNIVERSITY OF CALIFORNIA

UCDAVIS
AGGIES

UC
RIVERSIDE

UCCE
University of California
Cooperative Extension

Similar Sampling in other Counties (2016)

… finds in commercial orchards have been reported, although no economic impact has yet to be seen

Berkeley
UNIVERSITY OF CALIFORNIA

UCDAVIS
AGGIES

UC
RIVERSIDE

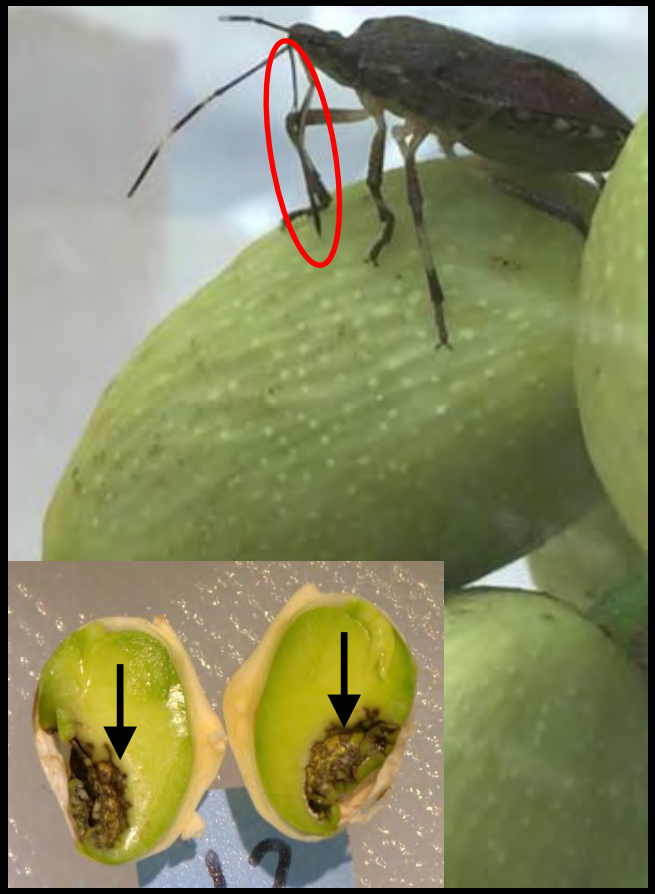
UCCE
University of California
Cooperative Extension

Specialty Crop-based Studies

Kiwifruit

Detected on Sutter County (2015) and adults are able to damage kiwifruit in lab studies

Pistachios & Almonds



Detected on Kern County (2015) and adults are able to damage developing kernels in lab studies

Mark Hoddle

Ricky Lara

UC RIVERSIDE

UC CE University of California Cooperative Extension

BMSB Egg Parasitoids

Review Article

Biological control program is being developed for brown marmorated stink bug

by Jesus Lara, Charlie Pickett, Chuck Ingels, David R. Haviland, Elizabeth Grafton-Cardwell, David Doll, James Bethke, Ben Faber, Surendra K. Dara and Mark Hoddle

Brown marmorated stink bug (BMSB) is an invasive, polyphagous pest that has been detected in 42 U.S. states. In 2010, it caused millions of dollars in crop damages to apple growers on the East Coast, where it arrived from Asia during the 1990s. In 2002, BMSB was reported in California; since then, it has been detected in 28 counties and is established in at least nine counties. Although this pest has not yet been found on commercial crops in the state, detections of BMSB in commercial orchards have been documented in Oregon and Washington. Proactive research in California has joined national efforts led by U.S. Department of Agriculture researchers to develop a classical biological control program for BMSB. A study is under way to determine potential non-target effects of a specialist egg parasitoid, Trissolcus japonicus (Hymenoptera: Platygastridae), imported from Beijing, China, part of the home range of BMSB. In addition, the role of BMSB natural enemies residing in California is being assessed. A review of the recent research outlines the possible opportunities for reducing the threat BMSB poses to California.

Brown marmorated stink bug (BMSB), *Halyomorpha halys* (Stål) (Hemiptera: Pentatomidae), has a native range that includes China, Japan, Korea and Taiwan. Its host plant range extends to more than 170 species, among which are valuable ornamentals and agricultural fruit, nut and vegetable crops (Lee et al. 2013; Rice et al. 2014). BMSB can cause direct injury to crops while using its piercing-sucking mouthparts to feed. Characterization of feeding injury to marketable crops such as surface discoloration, depressed areas, deformation or abortion of fruit bodies and internal tissue damage can vary by crop (Rice et al. 2014). BMSB was first detected in the United States in 1996 in Allentown, Pennsylvania. Since then, BMSB has been detected in 42 U.S. states, with establishment (reproduction) confirmed in at least 26 states where nuisance and/or agricultural problems associated with its presence and ensuing economic losses to crops have been reported (NIPMC 2015).

Crop losses from BMSB and aggregations in human-made structures have been significant in the eastern United States, where BMSB first established (Rice et al. 2014). The establishment of BMSB in this region confirms its tolerance to climates outside of its home range. Field and laboratory research is needed to characterize the degree to which BMSB can tolerate temperature stresses (i.e., winter cold and summer heat) and how this may influence population dynamics in other geographic locations within the United States (Cira et al. 2016). In addition, the invasion process of BMSB in the United

Online: http://californiaagriculture.ucanr.edu/landingpage.cfm?article=ca.v070n01p15&fulltext=yes
doi: 10.3733/ca.v070n01p15

BMSB adult feeding on kumquat fruit. In California, BMSB populations are found mainly in urban locales, but there is risk they will move into agricultural areas.

Conservation, Augmentation

Identify and measure the ability of resident natural enemies to attack BMSB

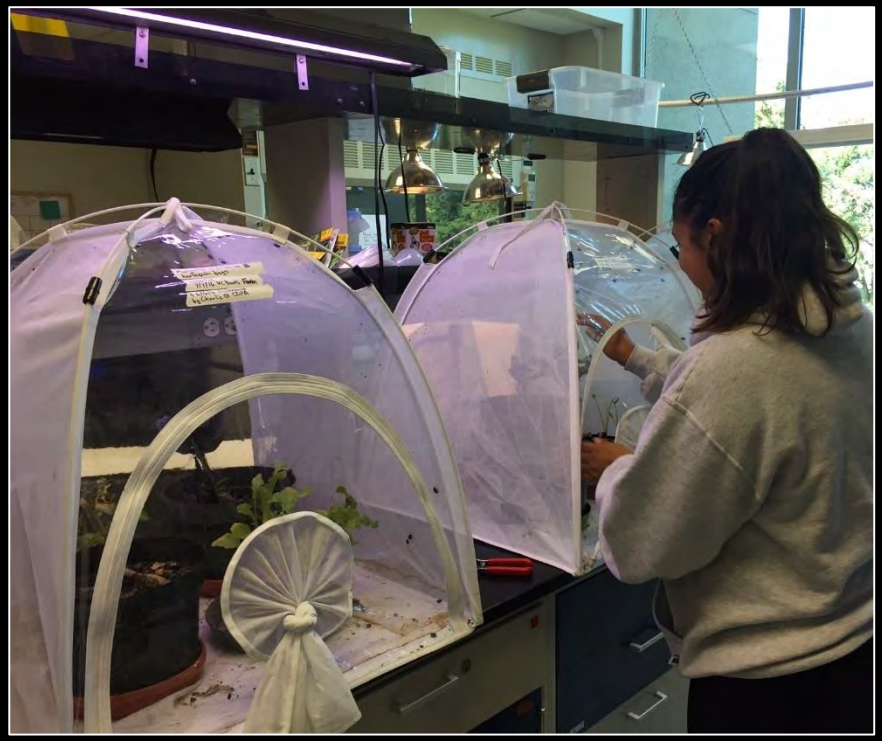
Classical BioControl:

Determine host range of a candidate natural enemy

Compare performance with resident natural enemies

UC RIVERSIDE

Sentinel eggs of BMSB and Other Stink Bugs



Similar to other regions, California researchers are looking at egg parasitism

Berkeley
UNIVERSITY OF CALIFORNIA

The Future Grows Here

RIVERSIDE

cdfa

BMSB Population Dynamics in CA

Larry Godfrey

Frank Zalom

Zalom and Godfrey have also sampled for BMSB populations and plan to investigate its potential geographic range based on temperature development

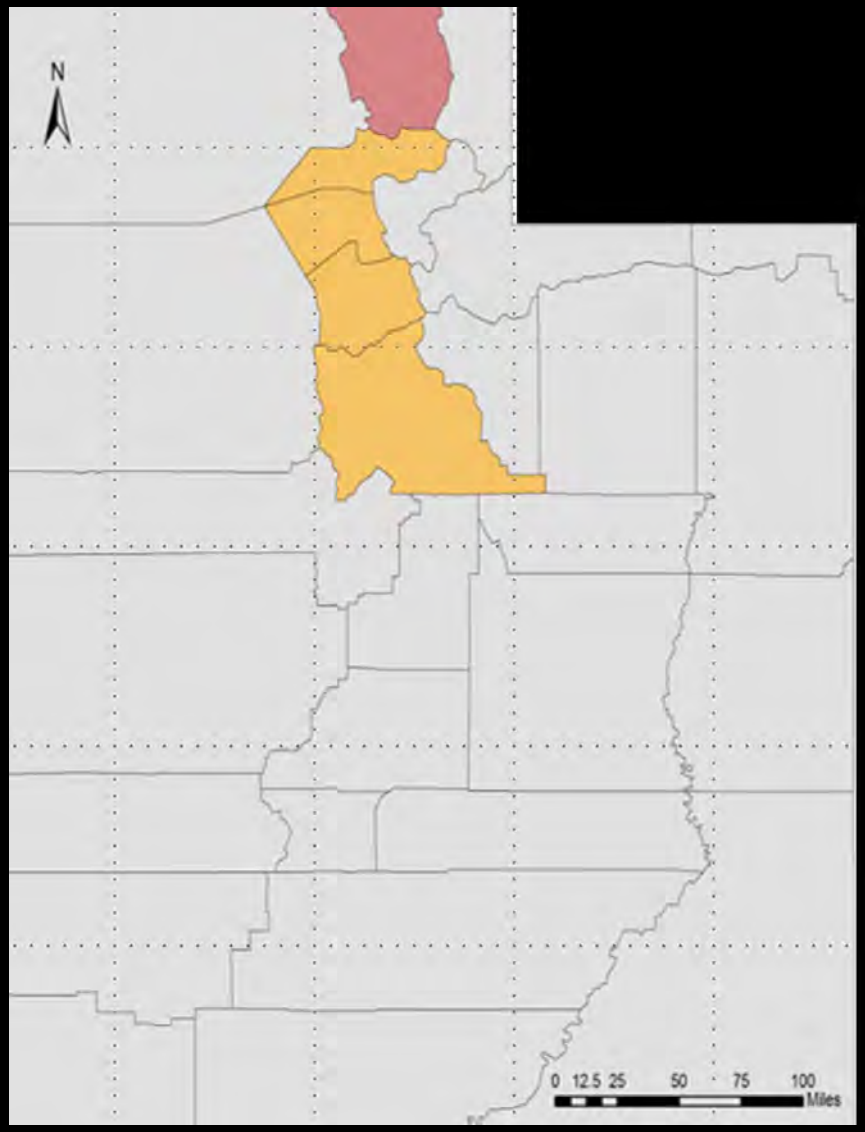
Jeffrey Aldrich

Roberta Tognon

They have also teamed Jeff Aldrich to look at stink bug egg volatiles in regulating parasitism by endemic parasitoids

UCDAVIS AGGIES

BMSB In Utah



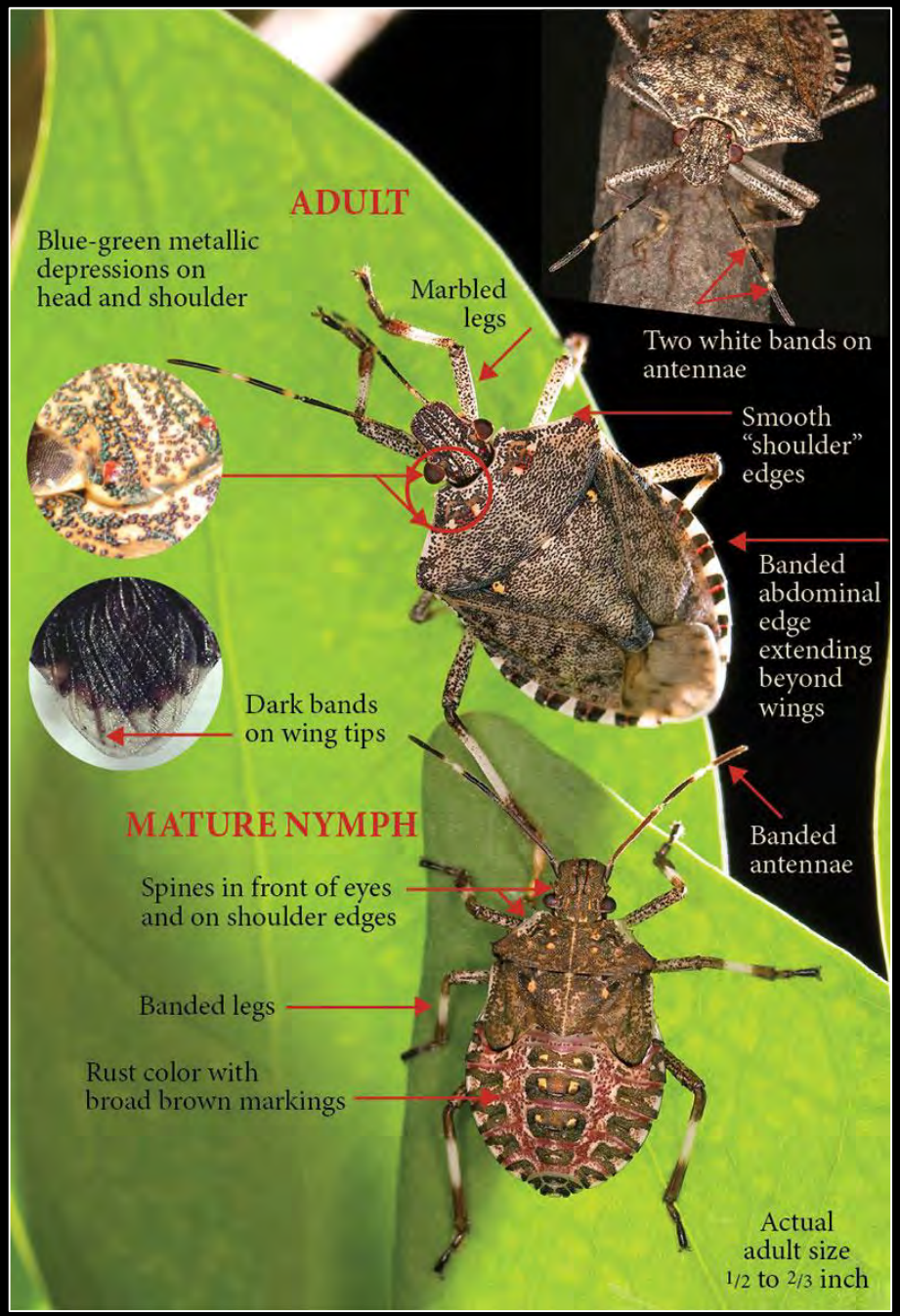
- First detected in 2012
- Established in 4 counties; detected in another
- Reproducing populations on ornamental trees; massing adults on buildings
- Considered a nuisance problem in Salt Lake City
- Starting to show up in agricultural crops; no damage has been reported

BMSB In Utah

More success with beating trays and visual surveys than pheromone baited traps in Utah

- 2015:
- 30 traps (20 traps in orchards)
- 322 adults, 220 nymphs, 13 egg masses
- 14 adults in traps

- 2016:
- 45 traps (40 traps in orchards)
- 600+ adults and nymphs collected, 12 egg masses
- 9 adults in traps



Extension of Information:

All team members have been involved with outreach and education, largely based on information developed on the east coast