Mid-Atlantic Areawide Project

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Funding

USDA United States Department of Agriculture National Institute of Food and Agriculture
Specialty Crop Research Initiative

Collaborating Institutions

ars · NC State University · PennState · OSU Oregon State · University of Maryland · University of Georgia · Washington State University · Northeastern IPM Center · Cornell University · Utah State University · Rutgers University · The Ohio State University · University of Kentucky · UC Davis · University of Minnesota · Virginia Tech · Berkeley · Michigan State University · UC Riverside

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Multi-State, Multi-Institution Effort

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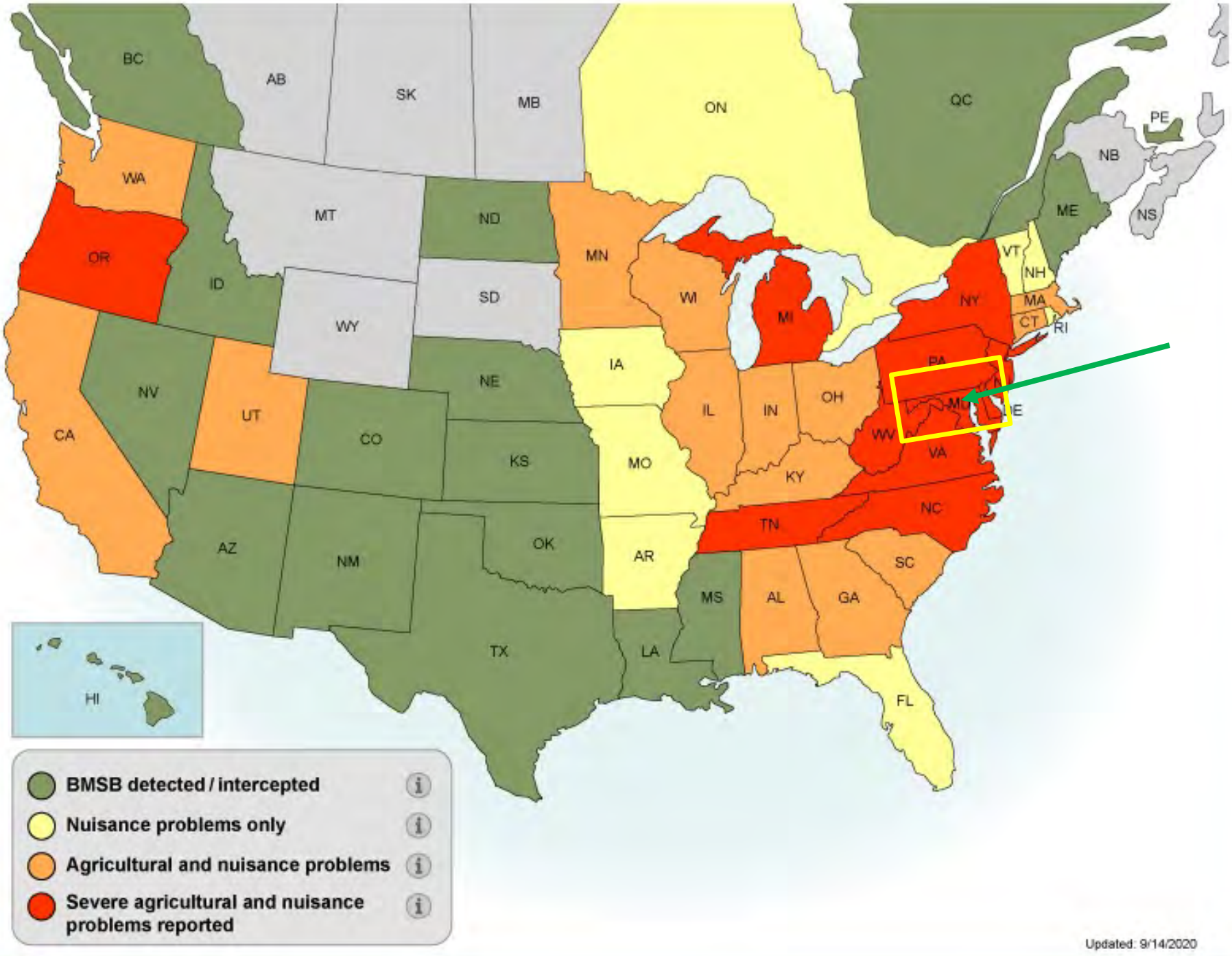
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RI
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DE
HI
BMSB detected / intercepted
Nuisance problems only
Agricultural and nuisance problems
Severe agricultural and nuisance problems reported
Updated: 9/14/2020

Areawide Objectives

- We propose to:
  - (1) implement biorational management of BMSB in key specialty and row crops;
  - (2) advance strategies for enhanced biological control of BMSB;
  - (3) assess impact of biointensive management on BMSB populations at a landscape scale;
  - (4) promote adoption and implementation of biointensive tactics for management of BMSB.
- Through these combined landscape-level approaches, suppression of BMSB populations can truly be achieved, reducing the ecological and environmental impacts of this devastating invasive species.

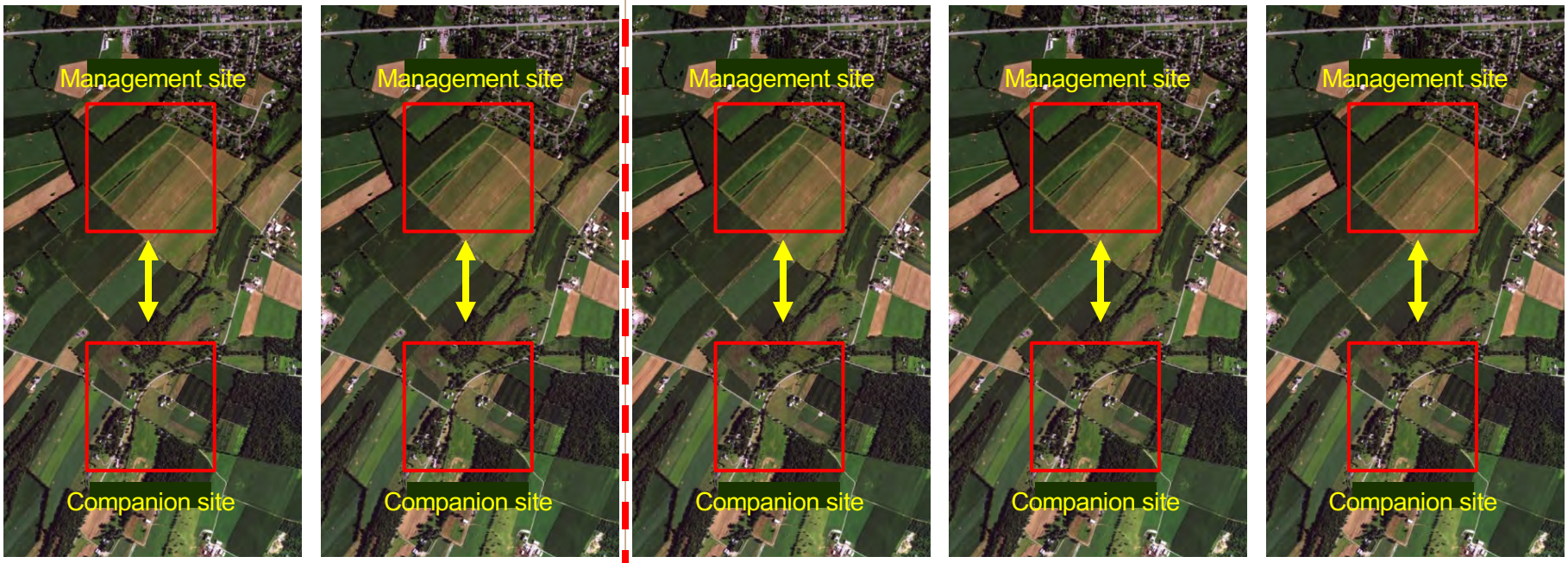
Design of Areawide Management

Areawide Management of BMSB

Baseline Data

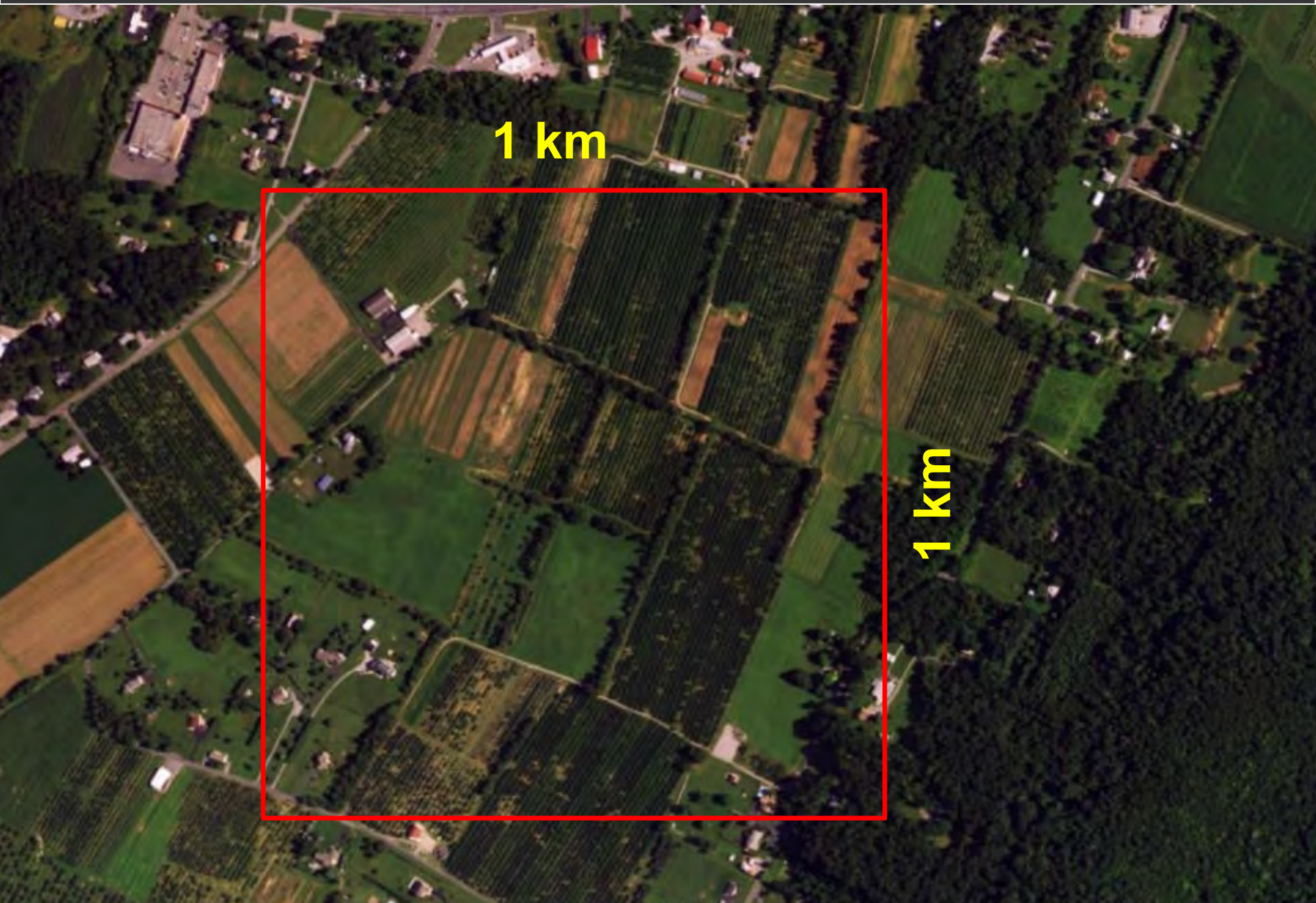
Biointensive Management of BMSB

Year 1 | Year 2 | Year 3 | Year 4 | Year 5

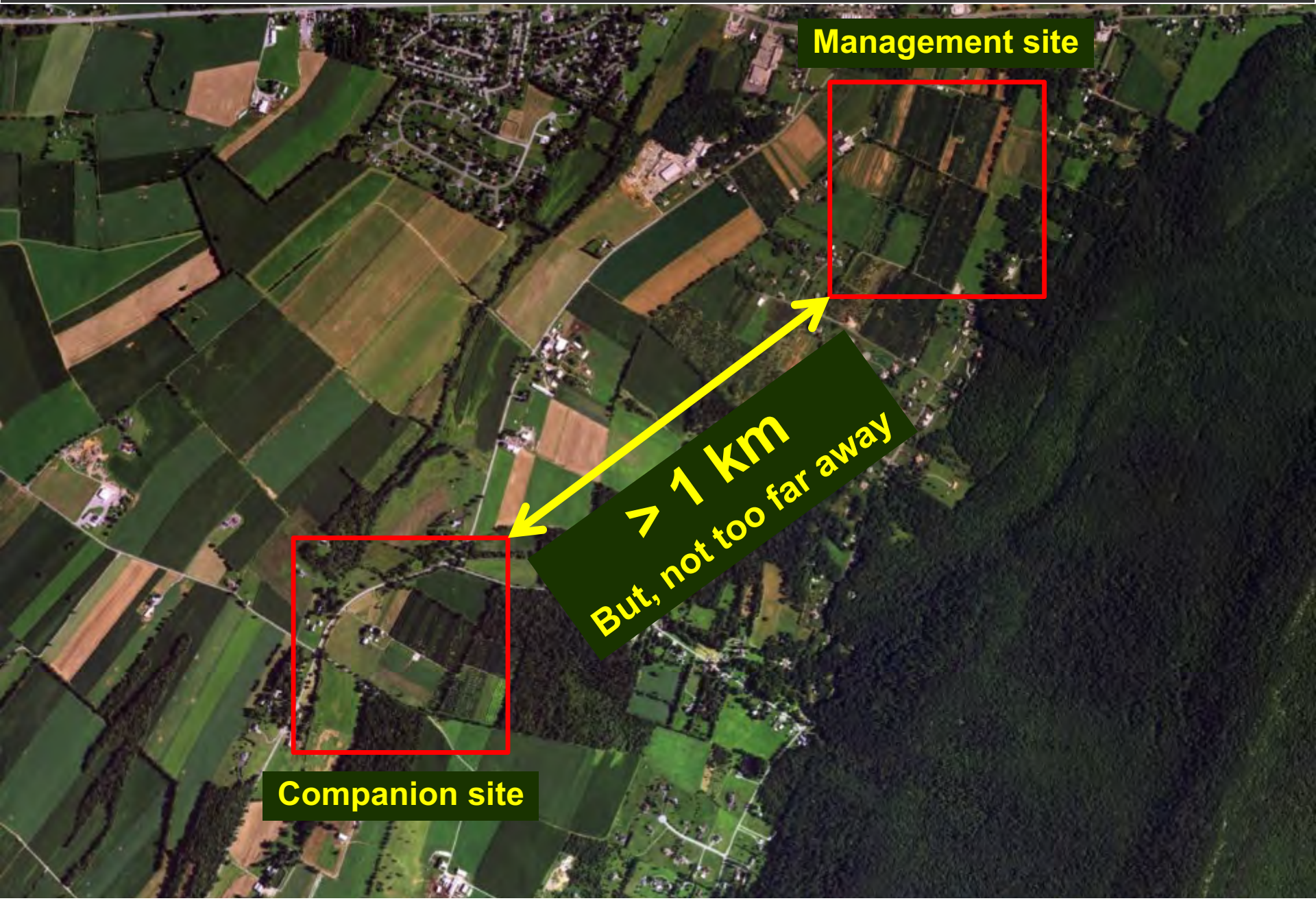


Replicated AWM Research

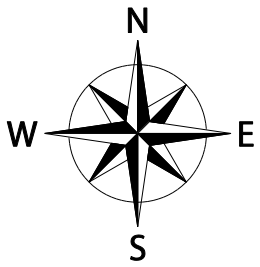
Size of Management and Companion Sites



Distance between Management & Companion Sites



Mapping Landscape Elements



Structure/house

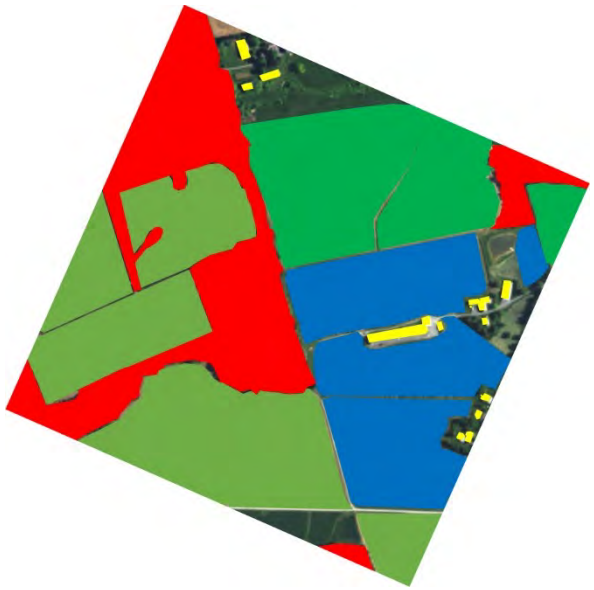
Woodlot/windbreak

Fruit trees

Vegetable/field crops

Matching Landscape Elements between Two Sites

Management

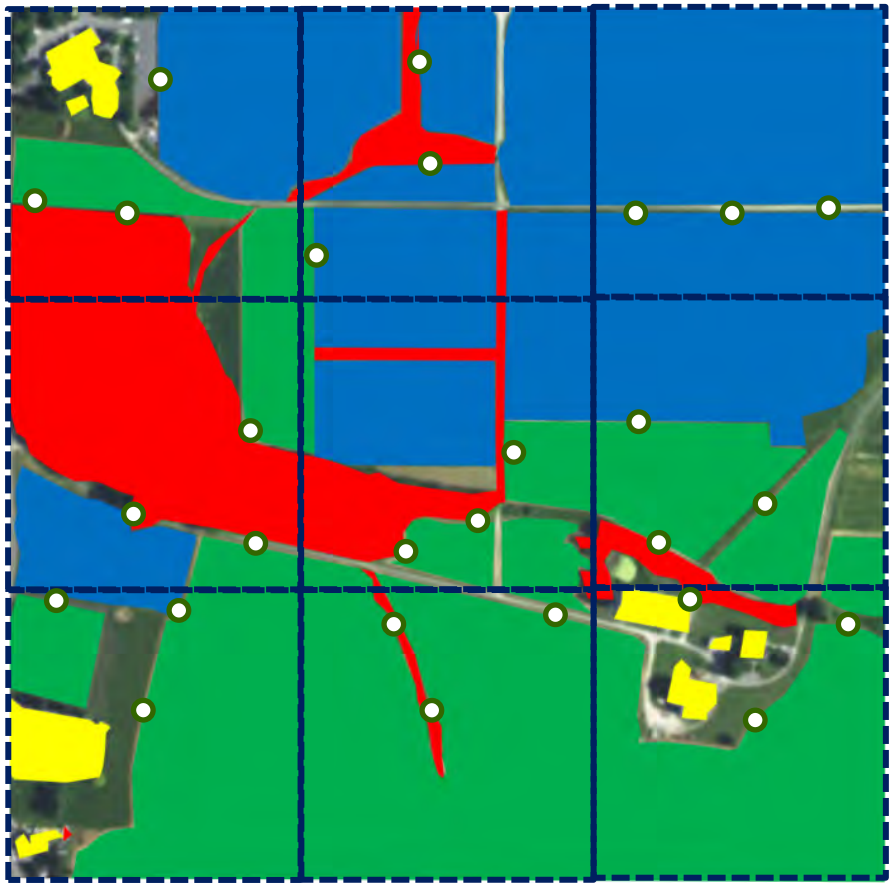


20%	Woodlot	13%
20%	Fruit trees	34%
46%	Field crops	37%
1%	Structure	2%
13%	Lawn/others	14%

Companion

Stratified Systematic: BMSB Sampling Protocol

○ trap



Trapping

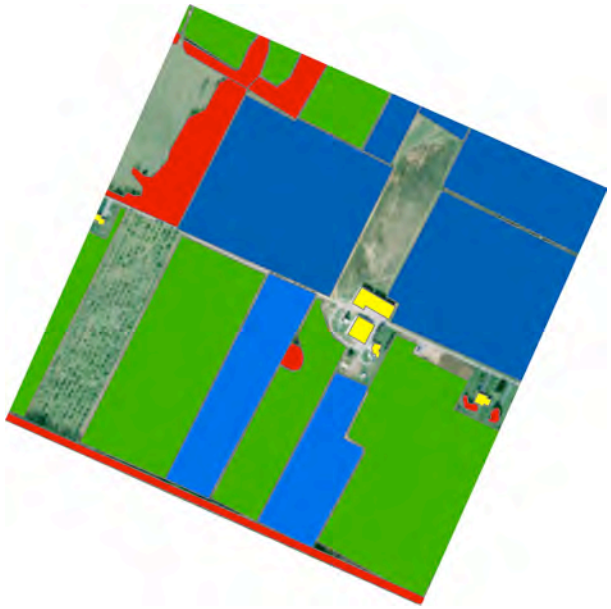
- 27 traps per site
- At least 50 m
- May to October

Baseline Data
2017 and 2018

WV sites

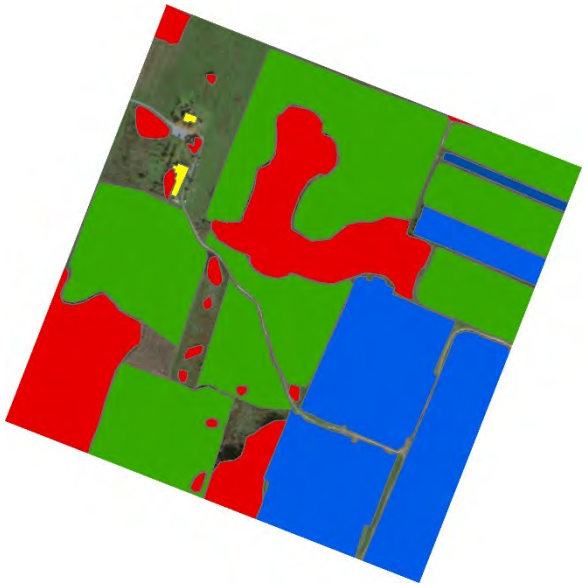
WV Sites

Elliott (Management)



9%	Woodlot	17%
34%	Fruit trees	24%
37%	Field crops	40%
<1%	Structure	<1%
19%	Lawn/others	19%

Sharp (Companion)



Chi-square test for similarity of landscape element composition
P > 0.05: "No statistical difference"

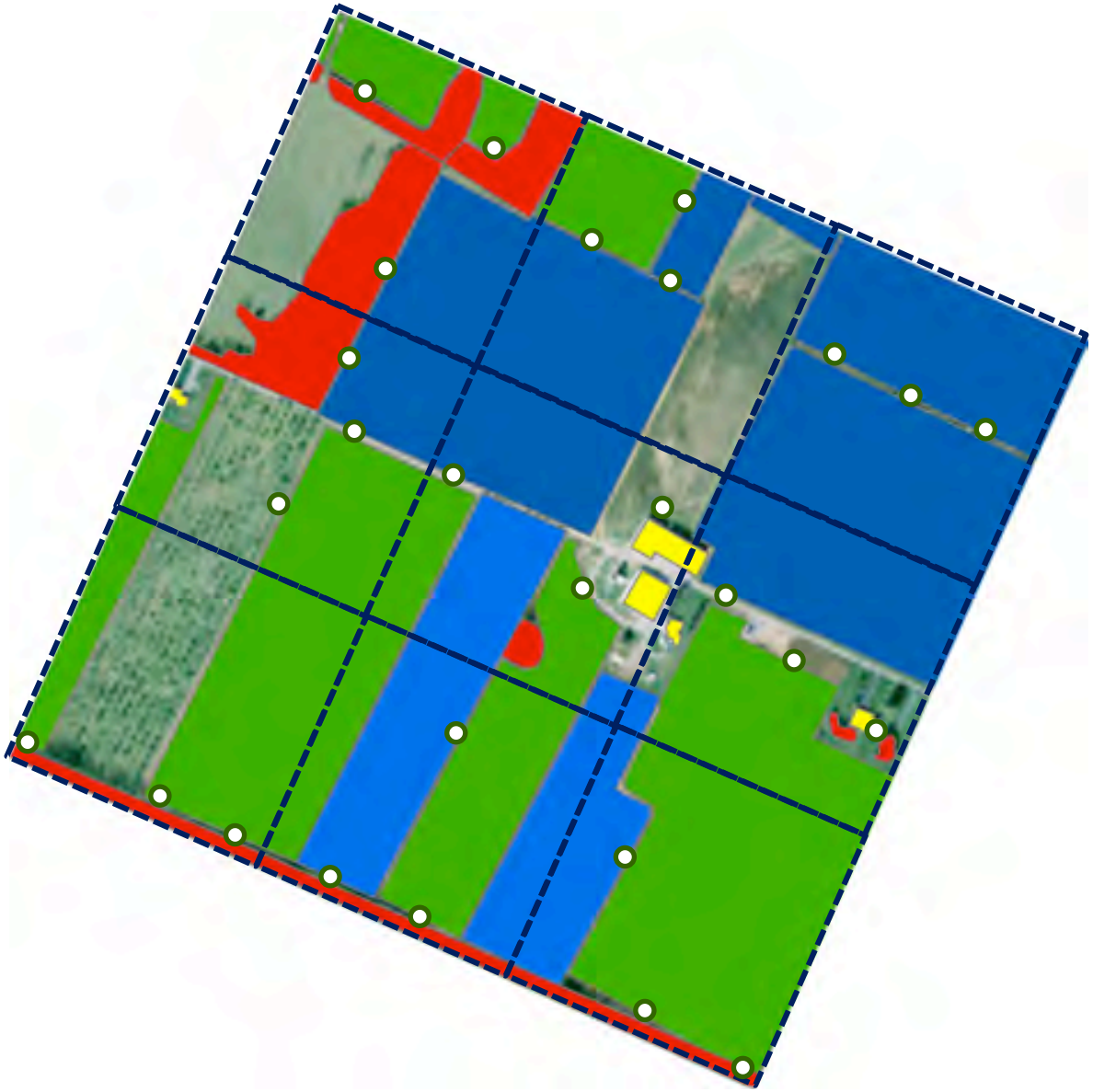
WV: Management Site

Management

trap

N
W
E
S

Structure/house
Woodlot/windbreak
Fruit trees
Vegetable/field crops



Interface	Eliott	Sharp
Red-Yellow	1	1
Green-oepn	3	3
Yellow-open	1	1
Green-Red	8	8
Green-Green		1
Blue-Green	7	7
Blue-Red	3	3
Blue-Blue	4	3
Total	27	27

WV: Companion Site

Companion

trap

N
W
E
S

Structure/house
Woodlot/windbreak
Fruit trees
Vegetable/field crops

Interface	Elliott	Sharp
Red-Yellow	1	1
Green-oepn	3	3
Yellow-open	1	1
Green-Red	8	8
Green-Green		1
Blue-Green	7	7
Blue-Red	3	3
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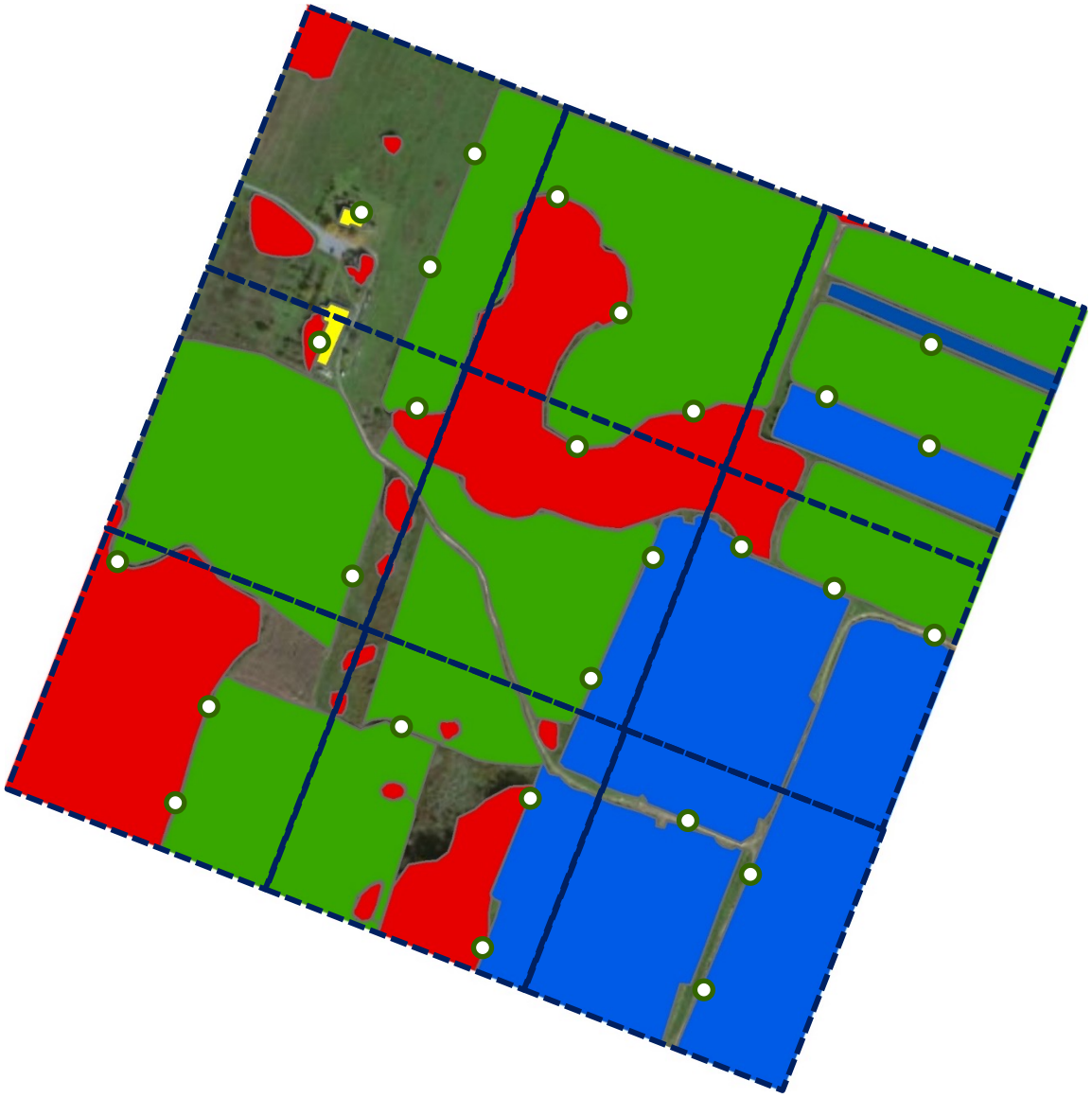
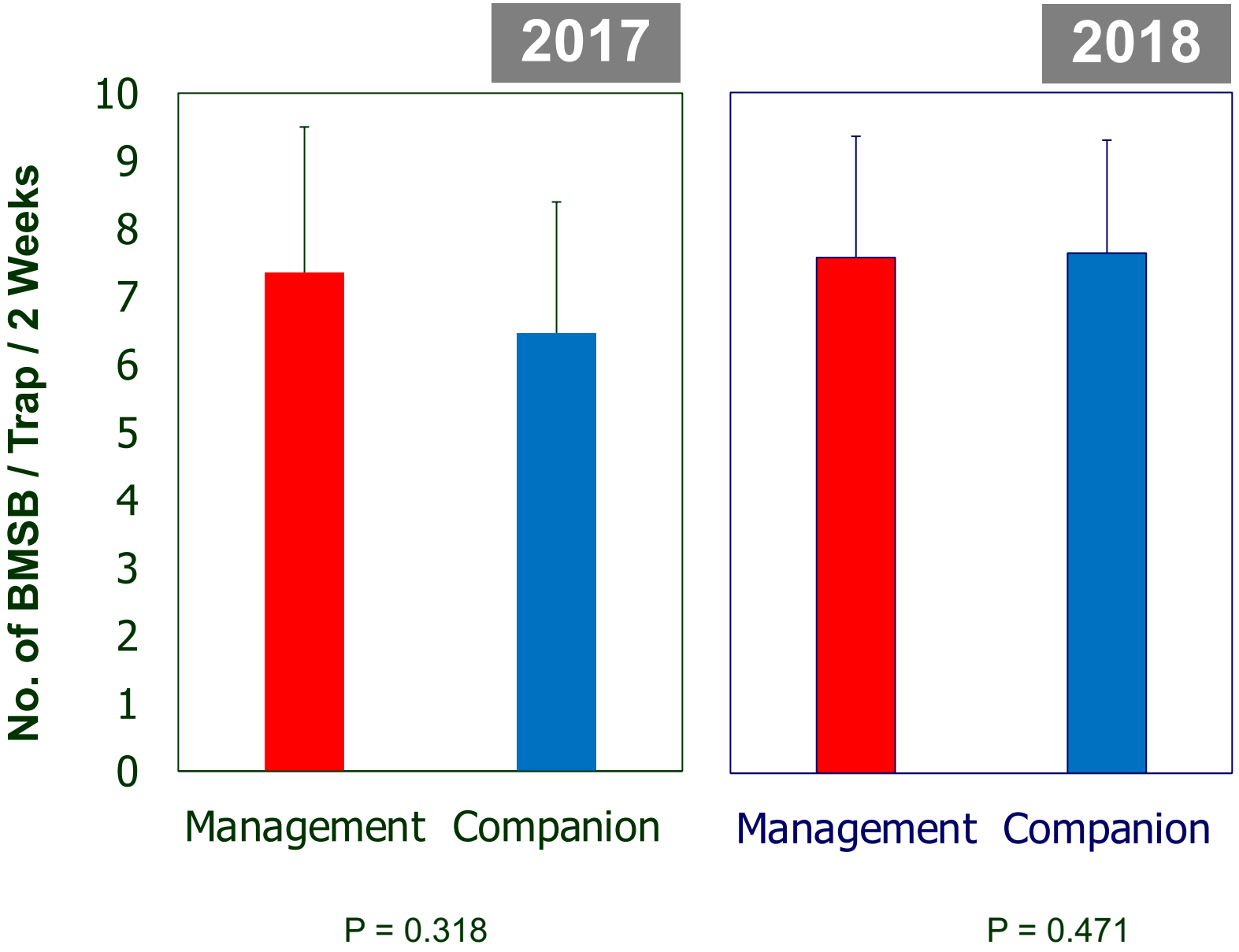
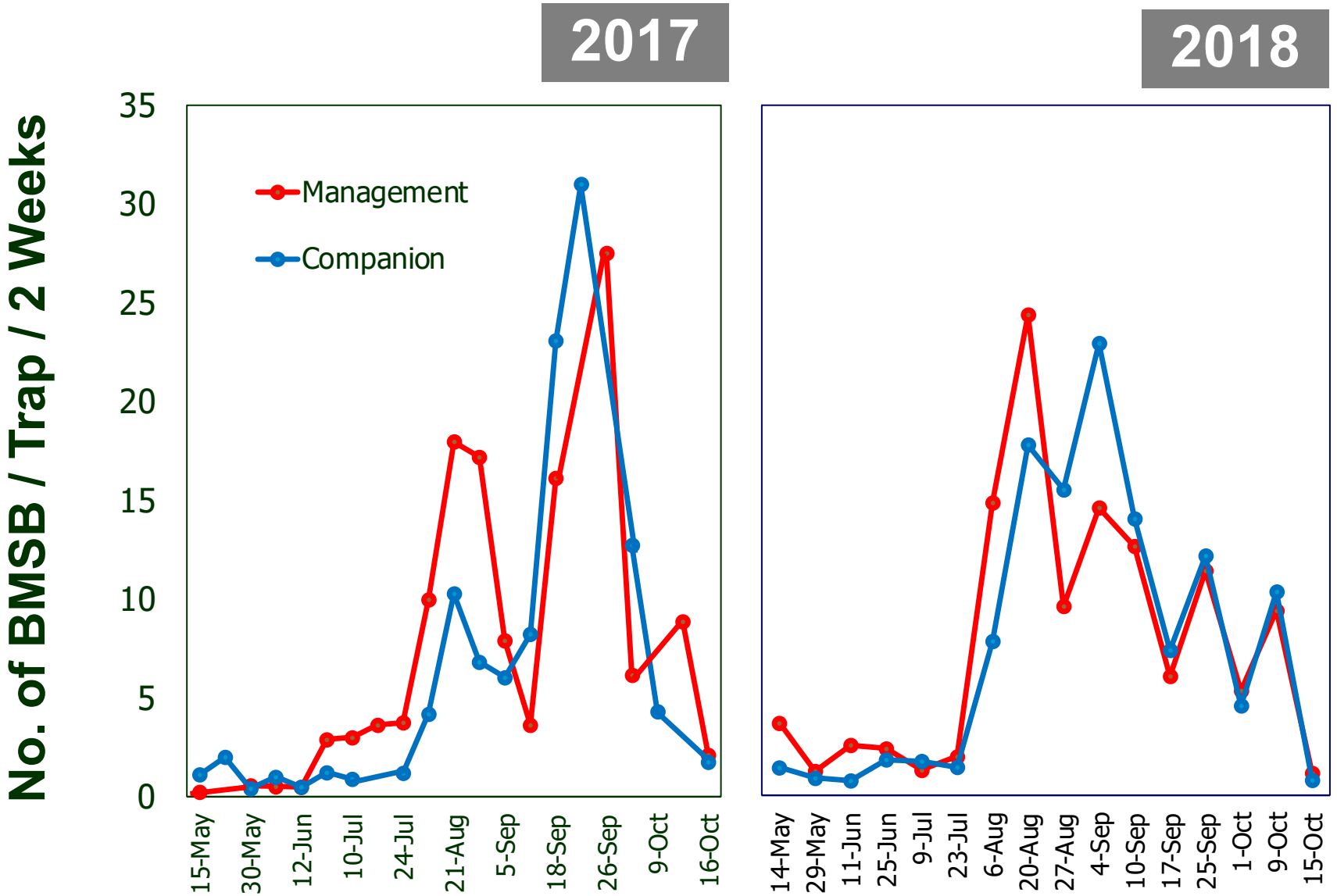
Total	27	27



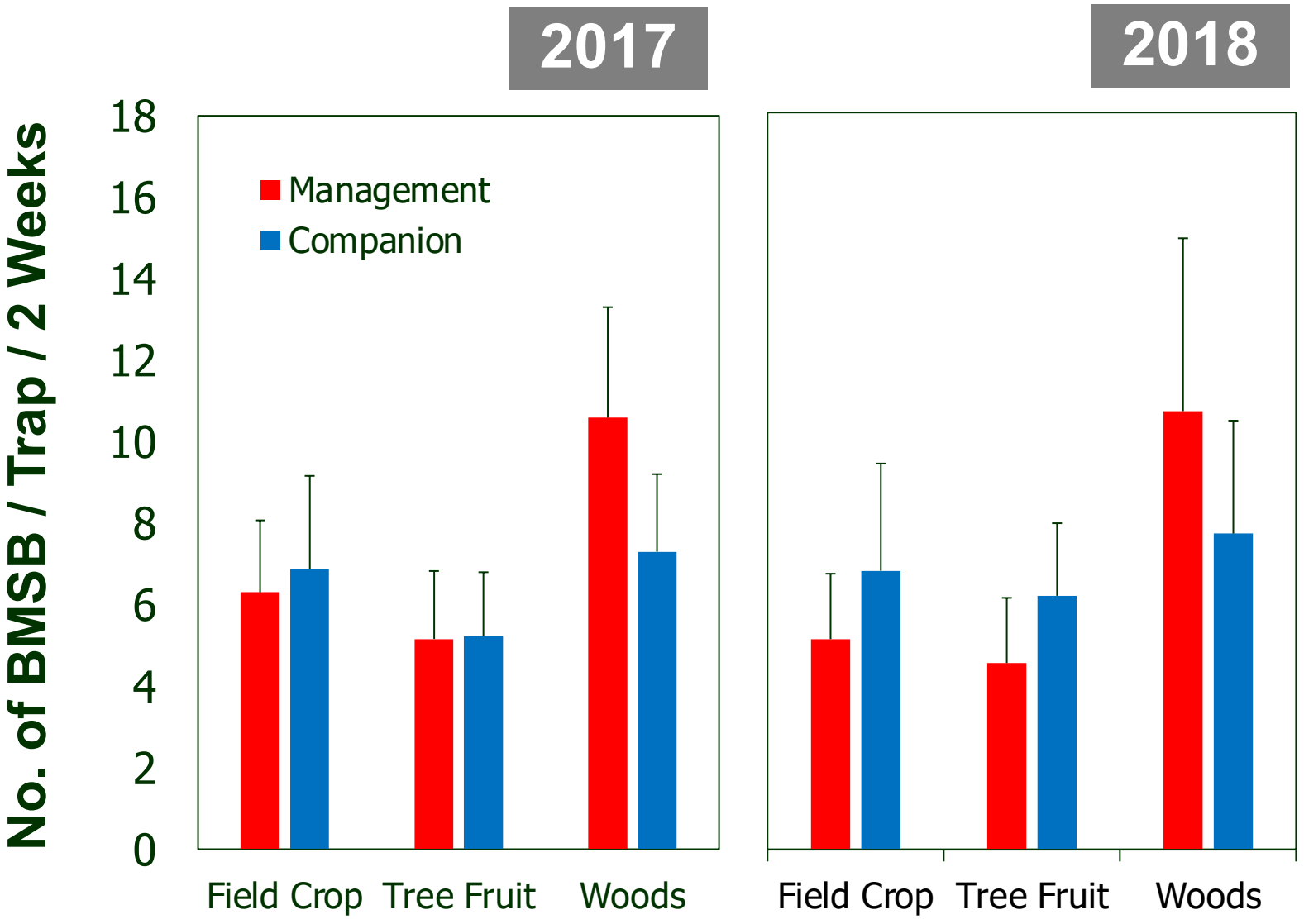
West Virginia



West Virginia



West Virginia



P > 0.05 for all pairwise comparisons between management and companion sites

Spatial Analysis

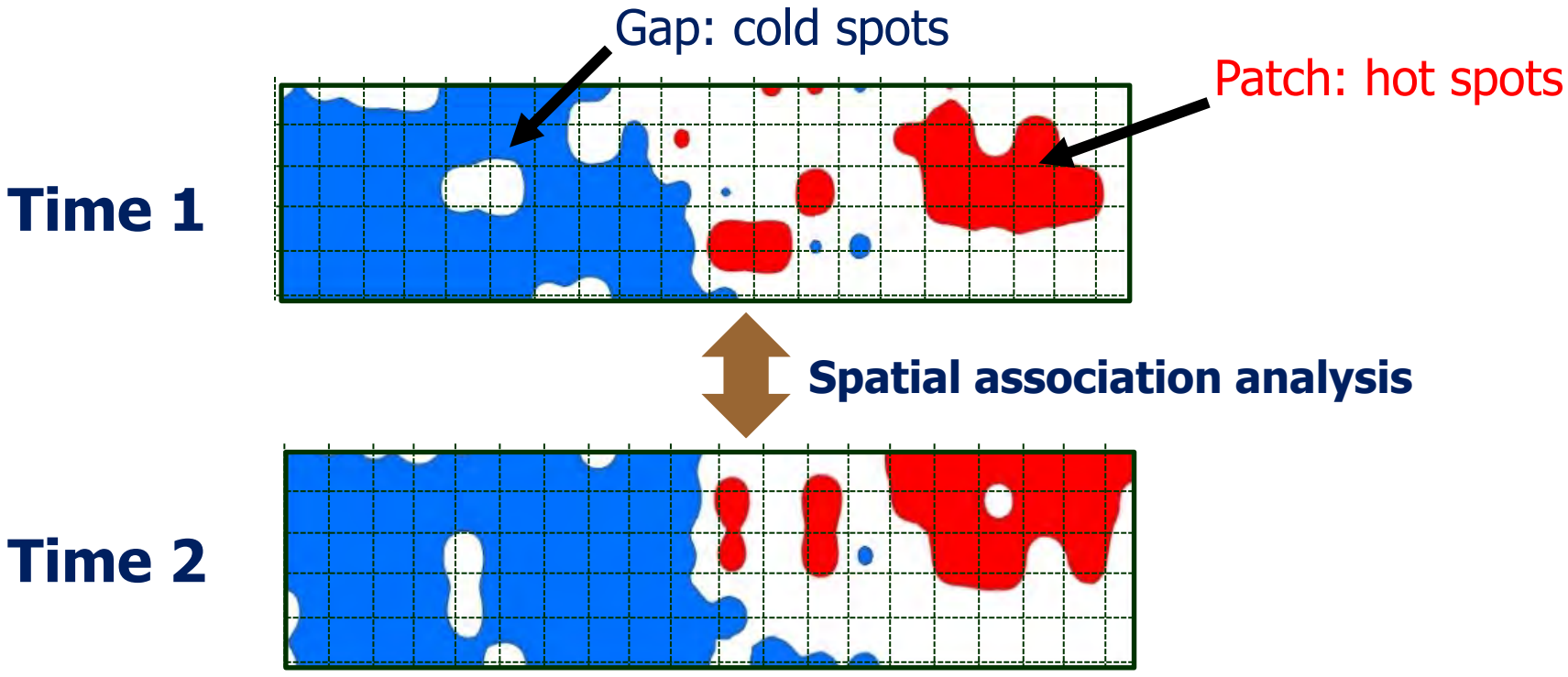
SADIE: Spatial Analysis by Distance IndicEs (Perry et al. 1995)

Measuring and mapping spatial clusters in count data.

Two forms of spatial cluster

Patch: a region of relatively large counts close to one another

Gap: a region of relatively small counts close to one another

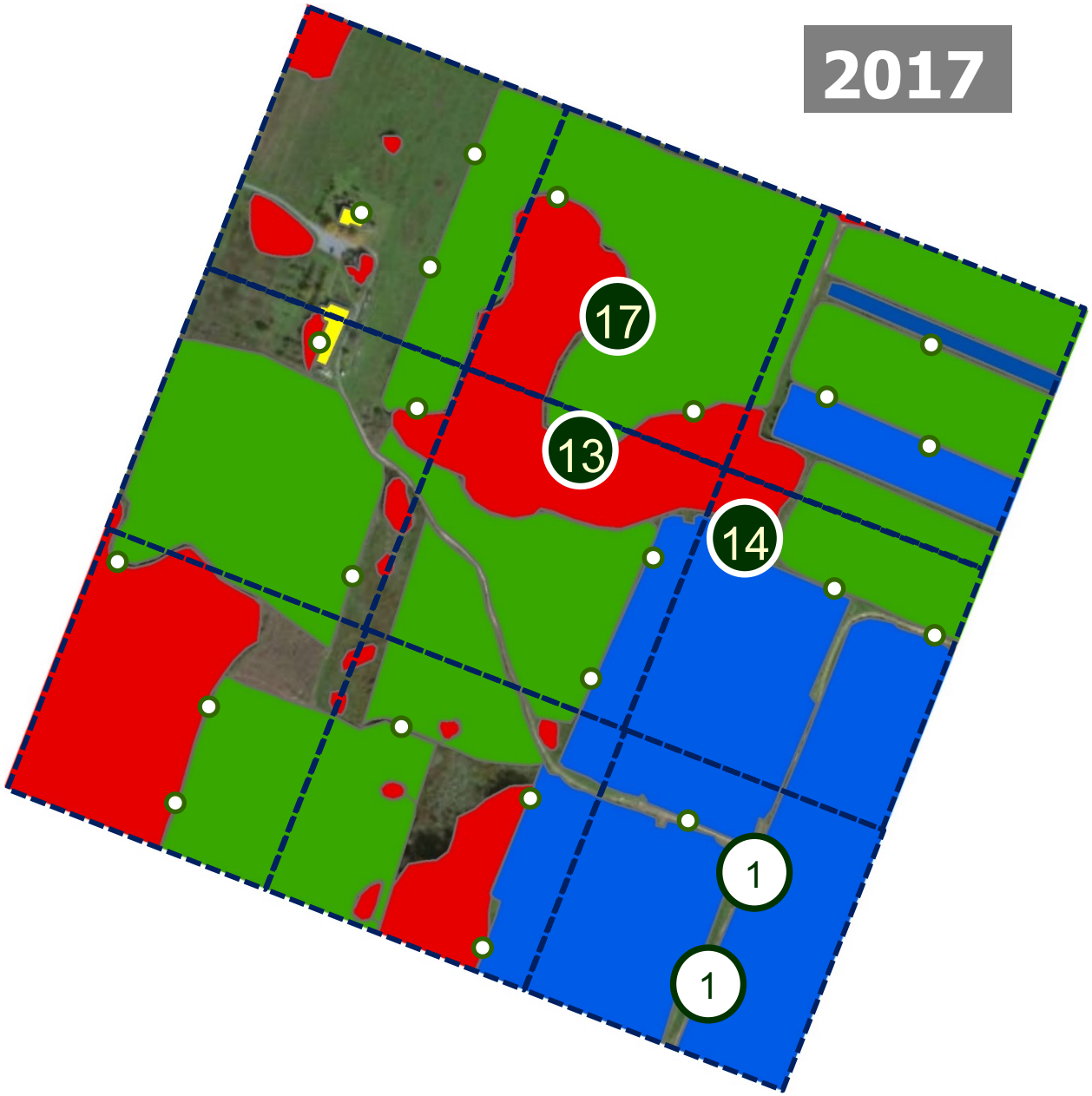


West Virginia

Companion

Patch / Hotspot

Gap / Cold spot



Structure/house

Woodlot/windbreak

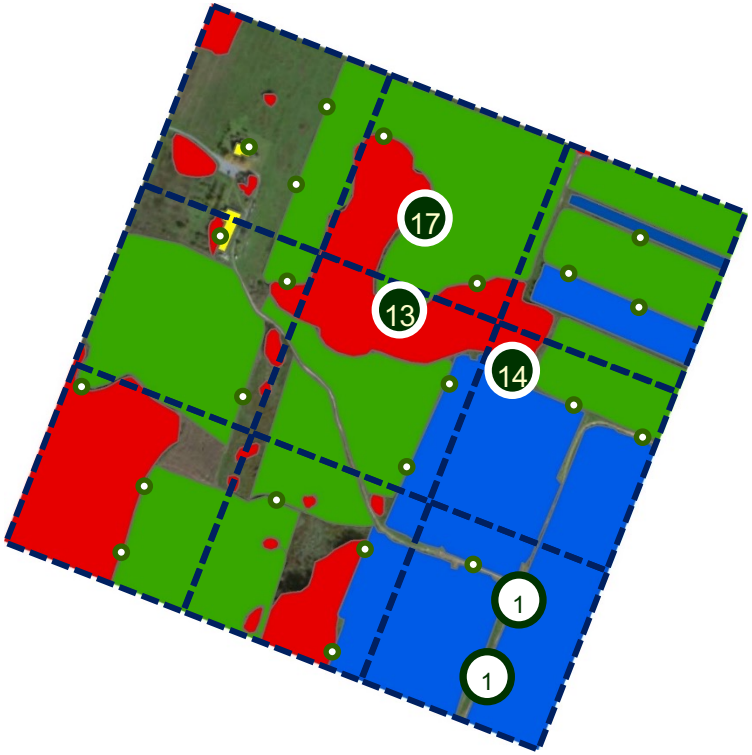
Fruit trees

Vegetable/field crops

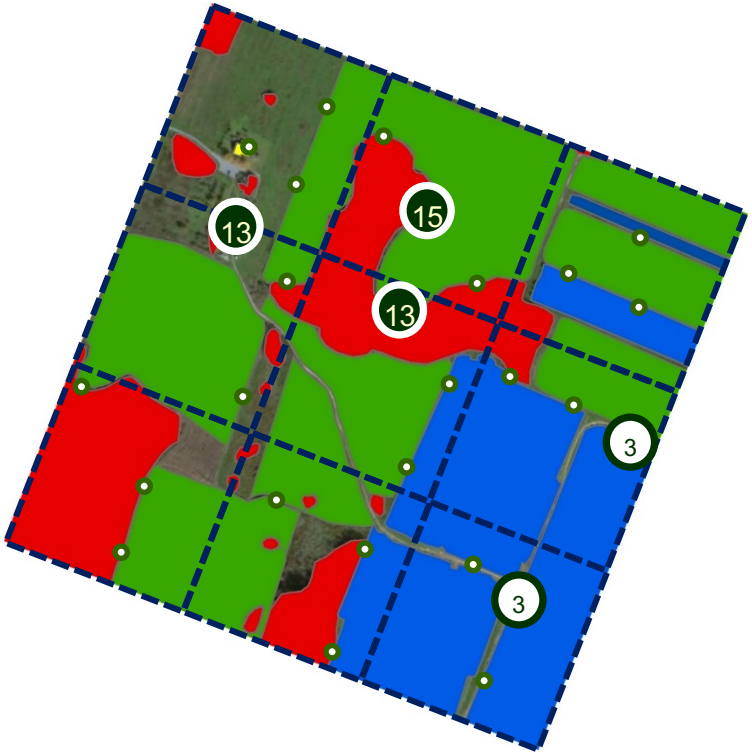
West Virginia

Companion

2017



2018



Structure/house

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Fruit trees

Vegetable/field crops

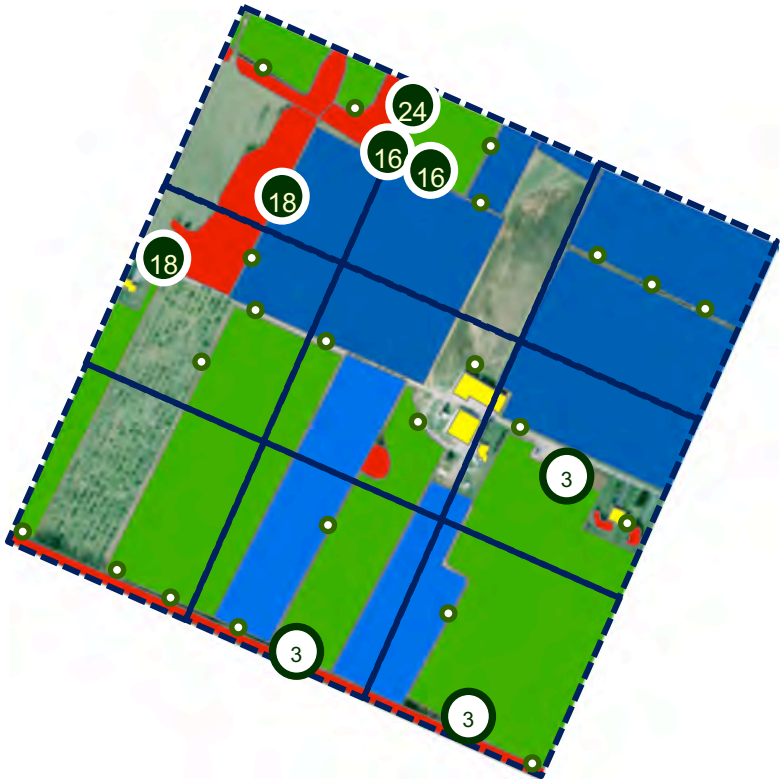
Patch / Hotspot

Gap / Cold spot

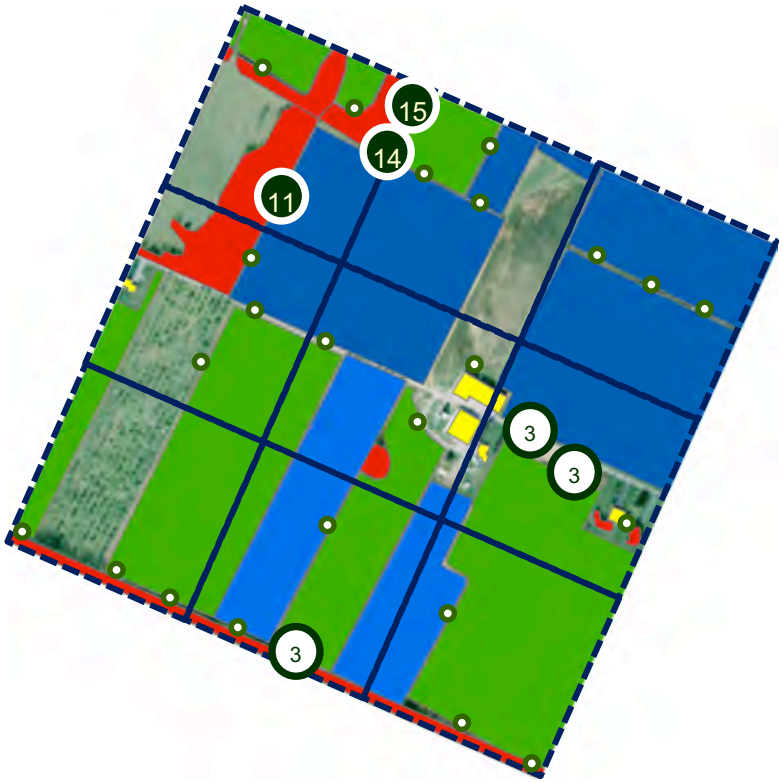
West Virginia

Management

2017



2018



Structure/house

Woodlot/windbreak

Fruit trees

Vegetable/field crops

Patch / Hotspot

Gap / Cold spot

2019-2020

- Continue monitoring Areawide and Companion Sites for BMSB and natural enemies.
- Release Trissolcus japonicus in Areawide sites, but not companion sites.
- Promote adoption of advanced IPM tactics for vulnerable tree fruit crops.
  - Trap-based treatment thresholds
  - Attract and Kill
  - Use of phenological models to time sprays
  - Border sprays.

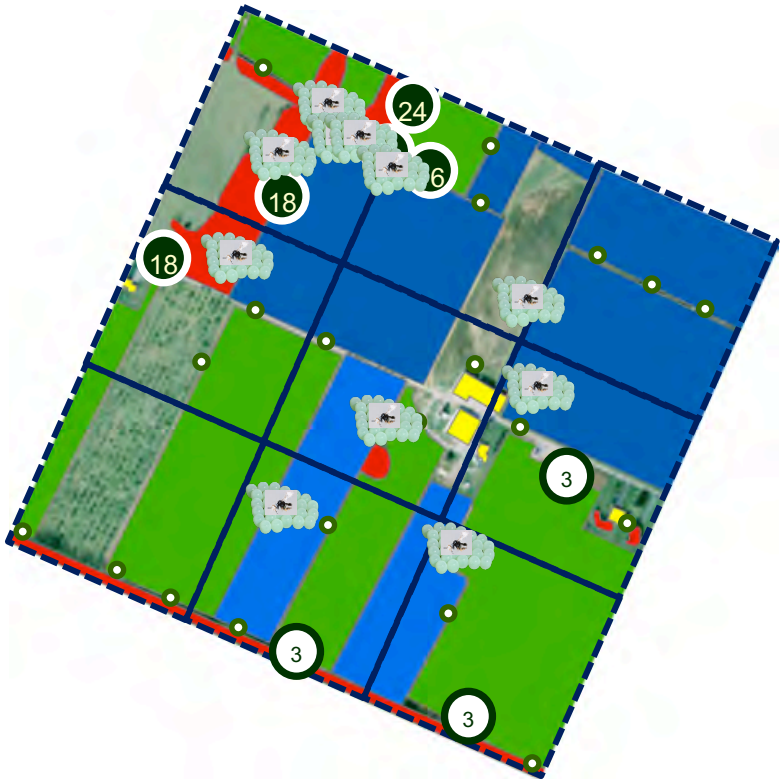
T. japonicus Releases in 2019-2020

- 100 parasitized egg masses at two points in the season: early June and late July.
- 30-50% of egg mases deployed along woodlines, wind breaks and fragmented patches of host tree in quadrats with BMSB hot spots. Remainder placed along similar habitats in other quadrants.
- Recovered egg masses to record % emergence and monitored with yellow sticky cards.

West Virginia

Management

2019



2020

Structure/house

Woodlot/windbreak

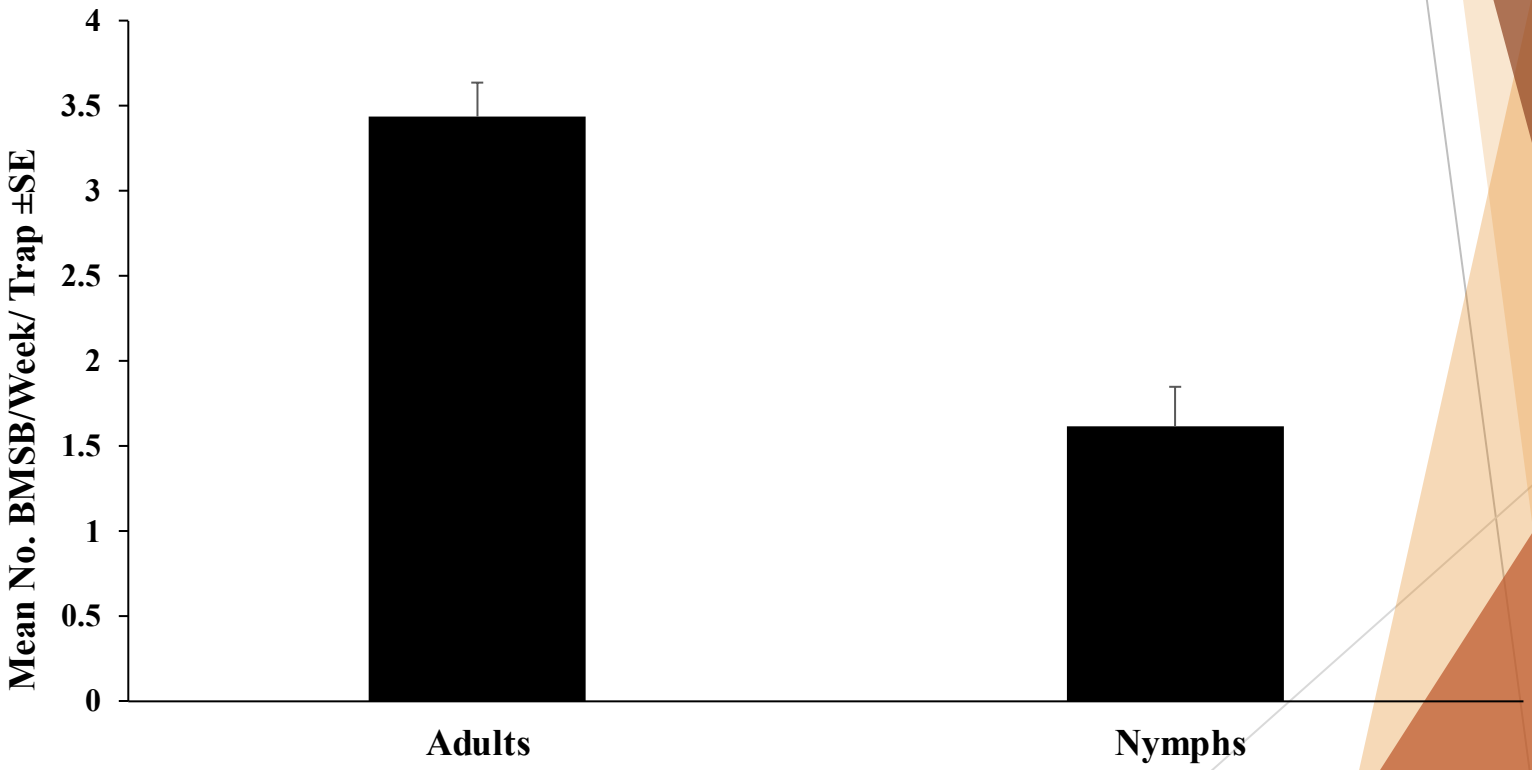
Fruit trees

Vegetable/field crops

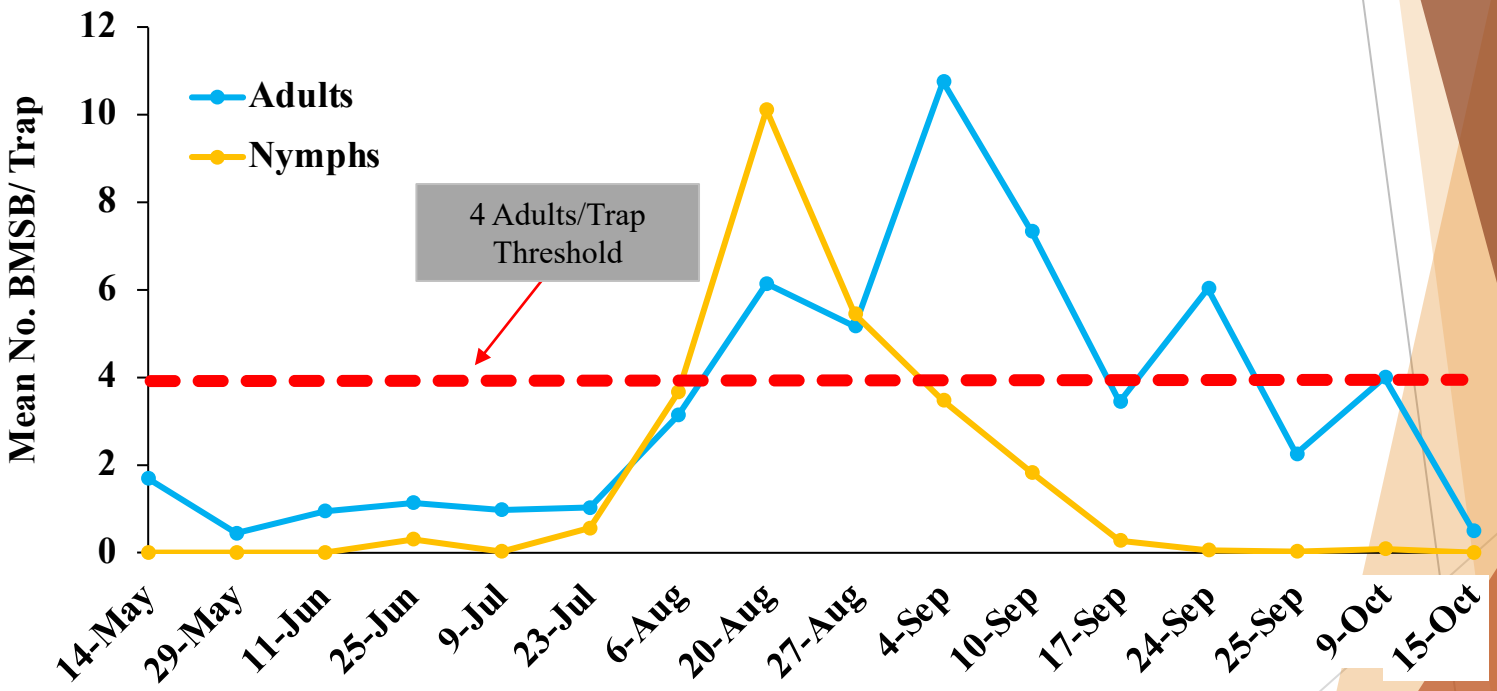
Patch / Hotspot

Gap / Cold spot

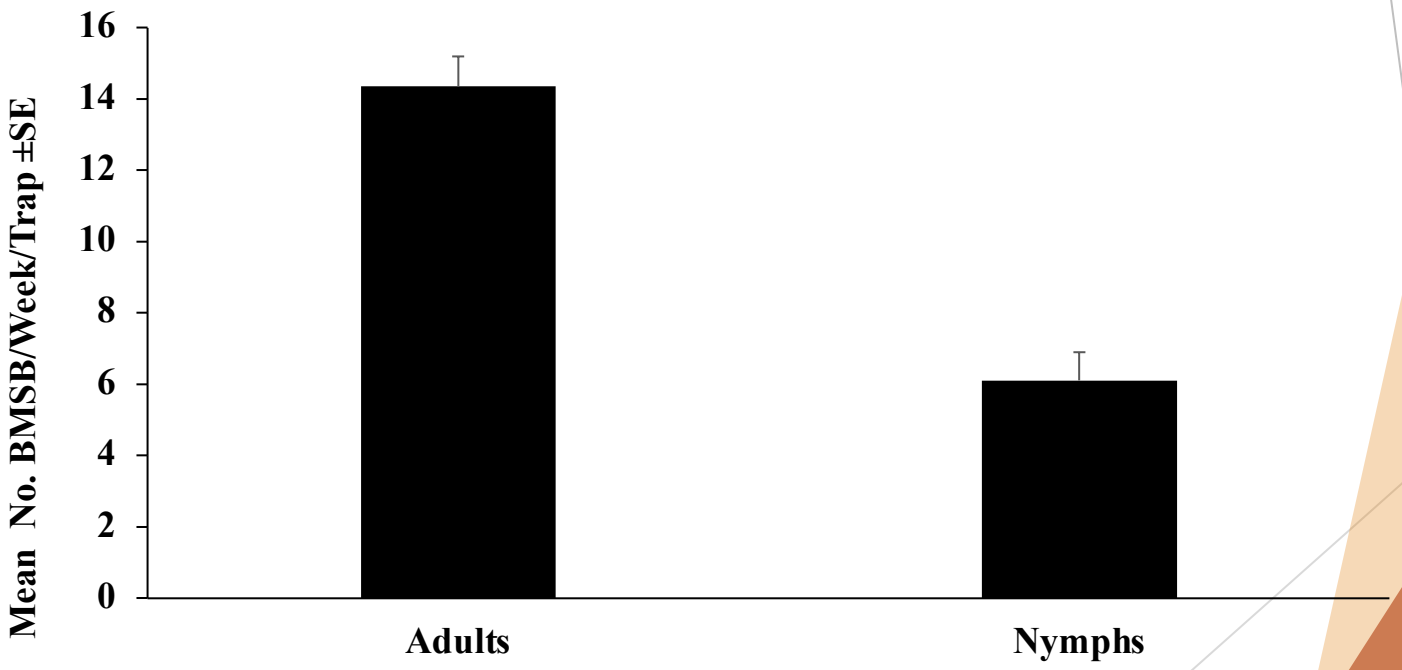
2018 Mean Season Long Captures on Clear Sticky Panels



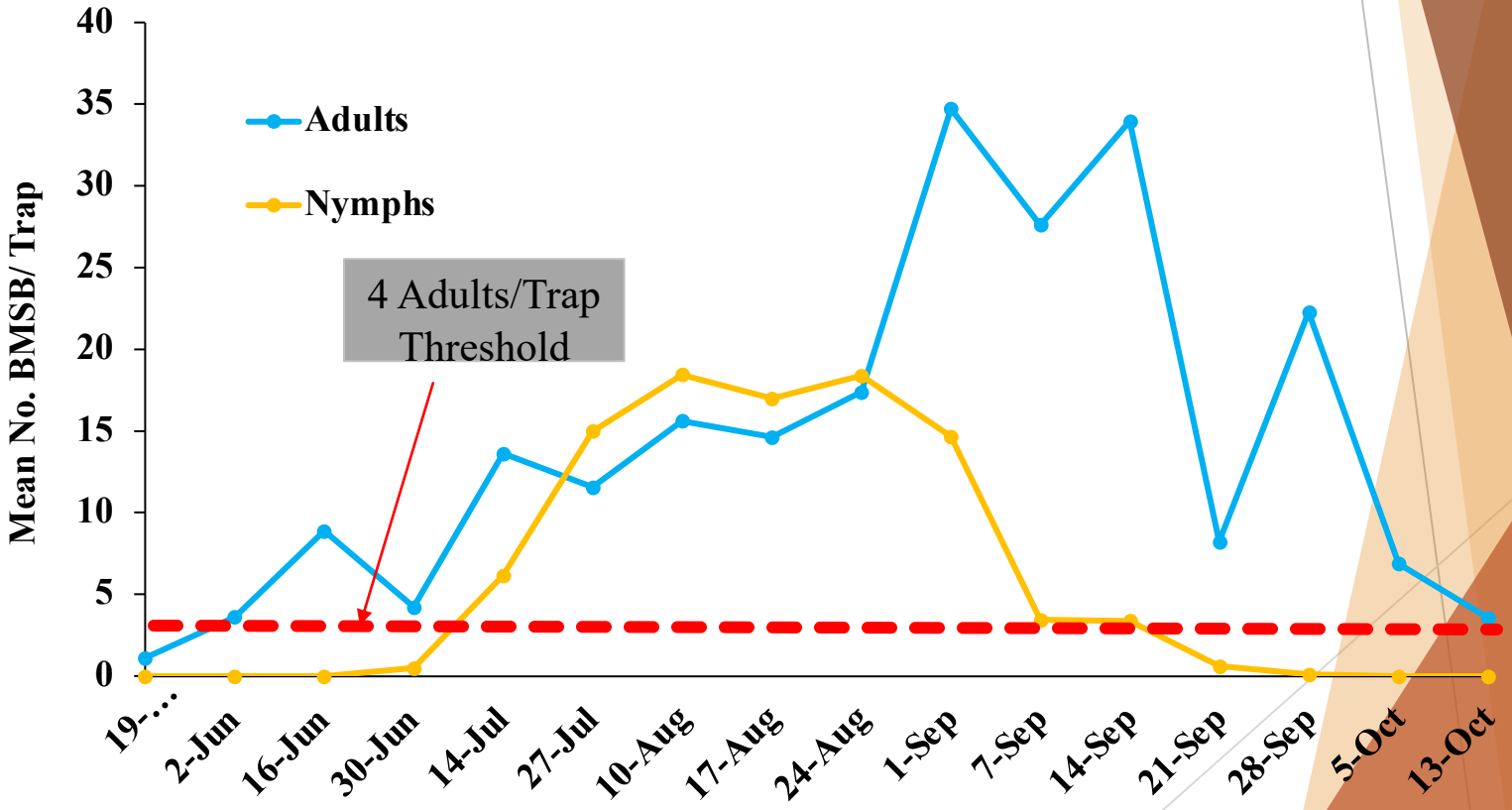
2018 Seasonal Phenology of Adult and Nymphal Captures on Clear Sticky Panels



2020 Mean Season Long Captures on Clear Sticky Panels



2020 Seasonal Phenology of Adult and Nymphal Captures on Clear Sticky Panels



Next Steps for Mid-Atlantic Areawide Project

- Continue to monitor at Areawide and Companion sites for BMSB to look at longer term trends.
- Continue to release *T. japonicus* as it may take longer for augmentative releases to show an impact.
- Better understand the influence of abiotic conditions like hot dry summers on BMSB and *T. japonicus* population dynamics.

Thank You

It’s time for a few polling questions