Tree Injections
SPLAT-verb Treatments
Western Pine Beetle Biology

Evaluation of Stem-injected Emamectin Benzoate and Propiconazole for Protecting Ponderosa Pines from Western Pine Beetle

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Emamectin benzoate (EB), an avermectin derivative, shown some efficacy against against bark beetles
Propiconazole – fungicide that can limit growth of blue-staining fungi

Stem-injected ponderosa pines with EB (4% AI) and Propizol (14.3% AI) , (Arborjet, Inc.)

2 Formulations of EB - Tree-äge & Tree-äge G4 -new formulation that is a General Use Pesticide.

Mean dbh of experimental trees was ~18 inches
(n = 75; 30 Stanislaus, 45 Lassen)

Objectives

-- to evaluate the efficacy of this combination treatment as an individual tree protectant for ponderosa pine against WPB.

-- to determine residual concentrations of EB in phloem of trees treated with the Tree-äge products.

-- to evaluate bole utilization of experimental trees by WPB and fungal associates.

Quik-jet

Viper

Methods

Ponderosa pines were stem-injected with one Tree-äge product and Propizol in April 2016 using the Arborjet QUIK-jet and Viper injection systems. Each tree was injected every 4-5 inches around its base; Tree-äge product first, immediately followed by Propizol.

Target injection rates: 5 ml per dbh inch for Tree-äge products
6 ml per dbh inch for Propizol

- **Trees were baited from June to September 2016 using a WPB attractant lure placed on a stake 1 m from the tree bole.**

- **Flight activity was monitored using three traps per site during this period.**

Treatments are being evaluated by biological and chemical assays; efficacy was determined by tree mortality via protocols established by Shea et al. (1984).

Phloem samples were collected in June 2016 to evaluate EB residues using ELISA kits (Horiba, Inc., Kyoto, Japan).

bioassay/bole utilization by western pine beetle

2016 (treated & baited) - 2017 Results

Stanislaus NF	**Brown**	**Dying***	**Green**	**% Dead**
Untreated	15	0	0	100
Treated G4	8	3	4	73
Lassen NF				
Untreated	12	0	3	80
Treated G4	1	4	10	33
Treated TA	0	2	13	13

2016 (treated) - 2017 (baited) Results

Lassen NF	**Brown**	**Green**	**% Dead**
Treated G4	2	12	14
Untreated	11	3	79

Summary

-- Stanislaus NF - Tree-äge G4/Propizol injected into ponderosa pines in April 2016 DID NOT prevent tree mortality. WPB colonization was much reduced at breast height despite tree mortality being unaffected.

-- Lassen NF - mortality of treated trees was 33% for Tree-äge G4/Propizol and 13% for Tree-äge/Propizol. For 2 year trees on LNF – mortality was 14% (G4).

-- Chemical and biological evaluations of phloem are not complete, but stem-injections with Tree-äge formulations and Propizol did appear to influence phloem utilization patterns by WPB.

--Study trees were felled at both sites in spring 2017. Samples were taken every 10 ft along the bole to determine % of sample occupied by blue stain fungi and obtain phloem for chemical residues to provide further insight into treatment failures.

2016 (EB treated) -2017 (baited and SPLAT) results

Stanislaus NF	**mass attacked**	**strip attacked**	**RTB attacked**
Untreated	3	4	0
Treated G4	2 + RTB	3	2
SPLAT	0	0	3

(n = 30 on Stanislaus) - confirm fate of trees again this spring

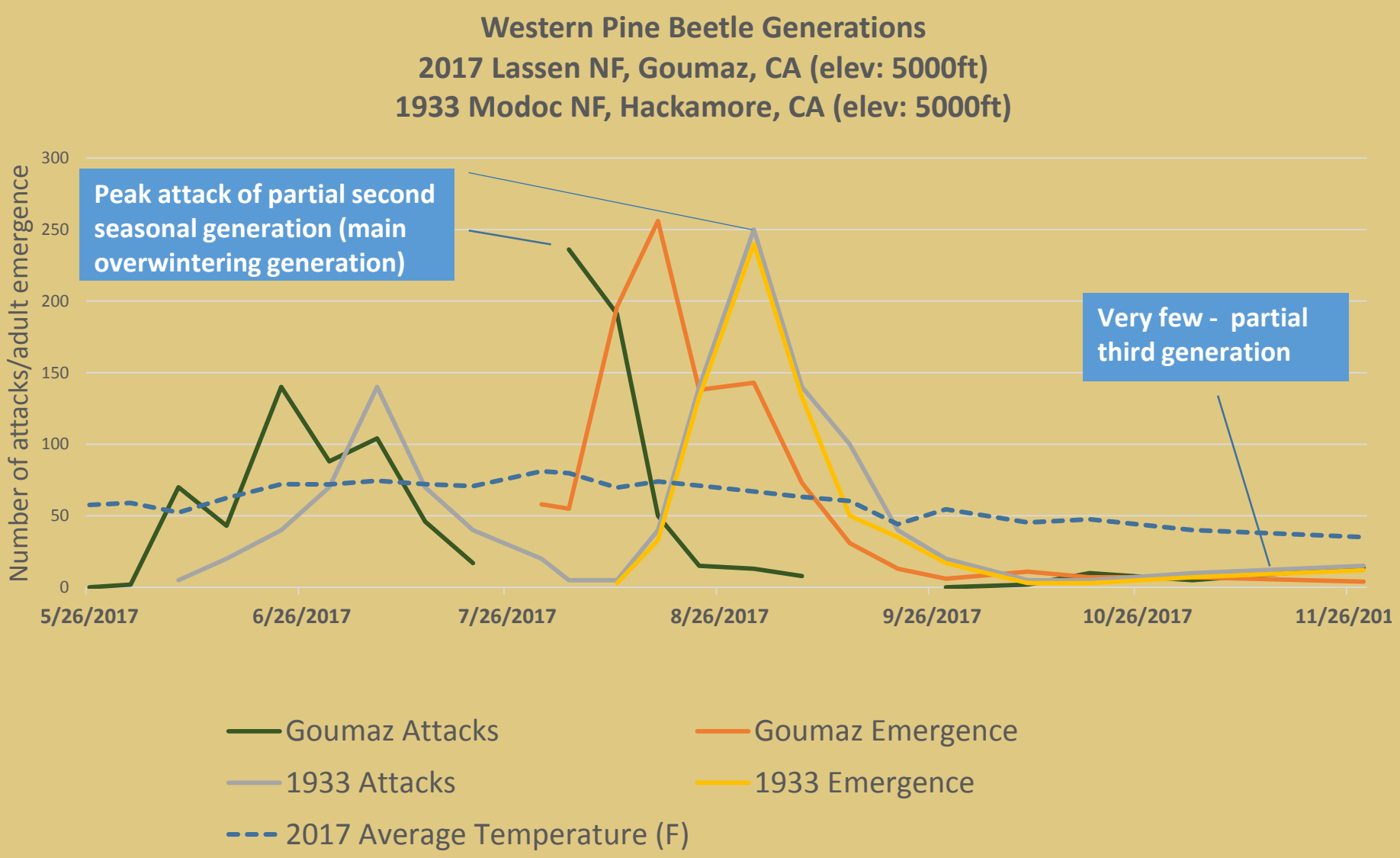
SEKI NP (Tom Warner)	
SPLAT (605 trees, no controls)	*** 4 attacked of which 2 were dead**

* preliminary results

western pine beetle monitoring

B. Bulaon, D. Cluck, B. Bentz, S. Smith

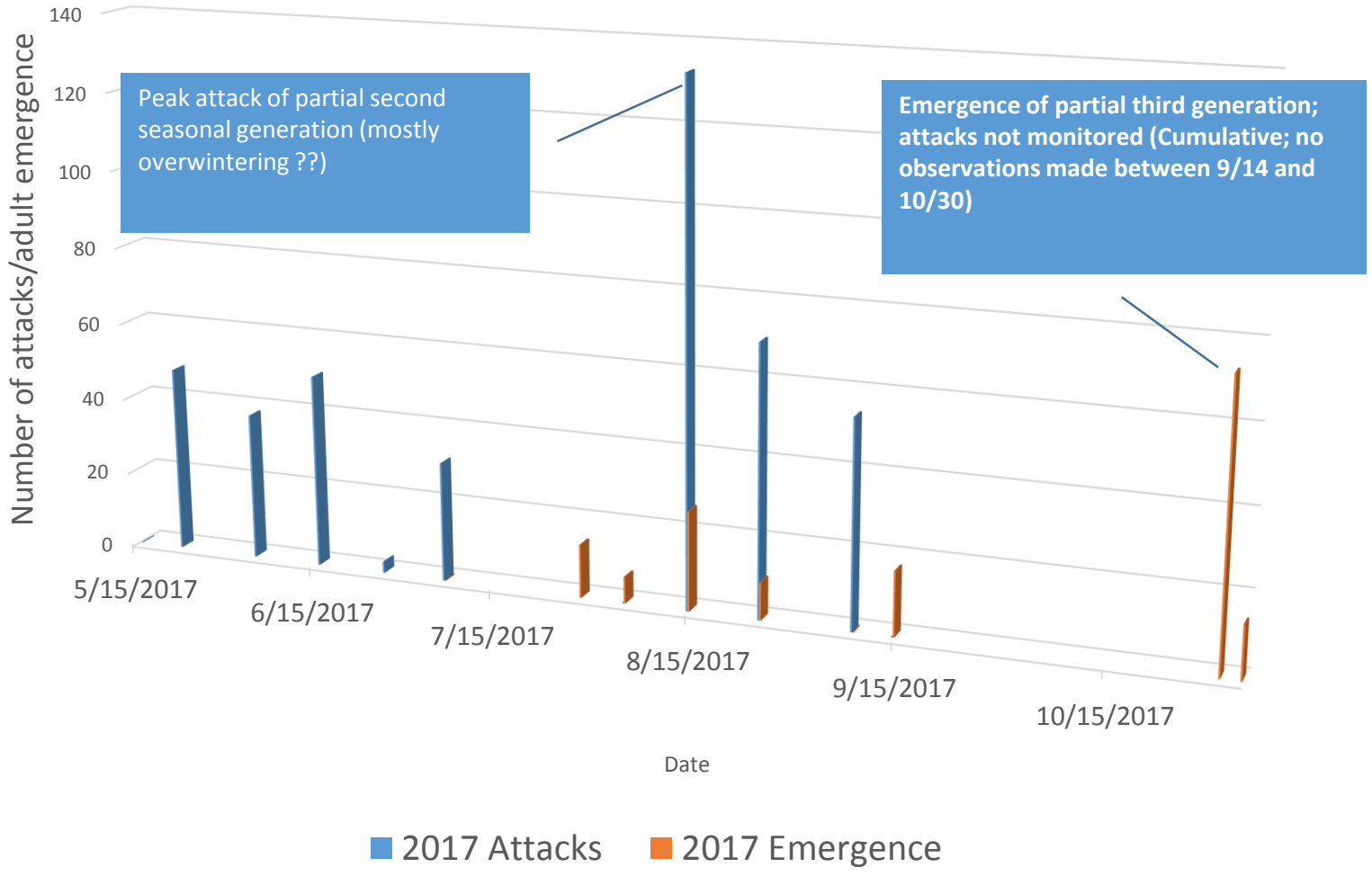
- Monitored attacks on baited ponderosa pine from May to November on the Lassen and Stanislaus National Forests
- Counted beetle emergence after mass attack
- Photographed tree crowns during attack/emergence phases
- Collected temperature data
- 3 groups/5 trees each on LNF; 2 groups/5 trees each on STF

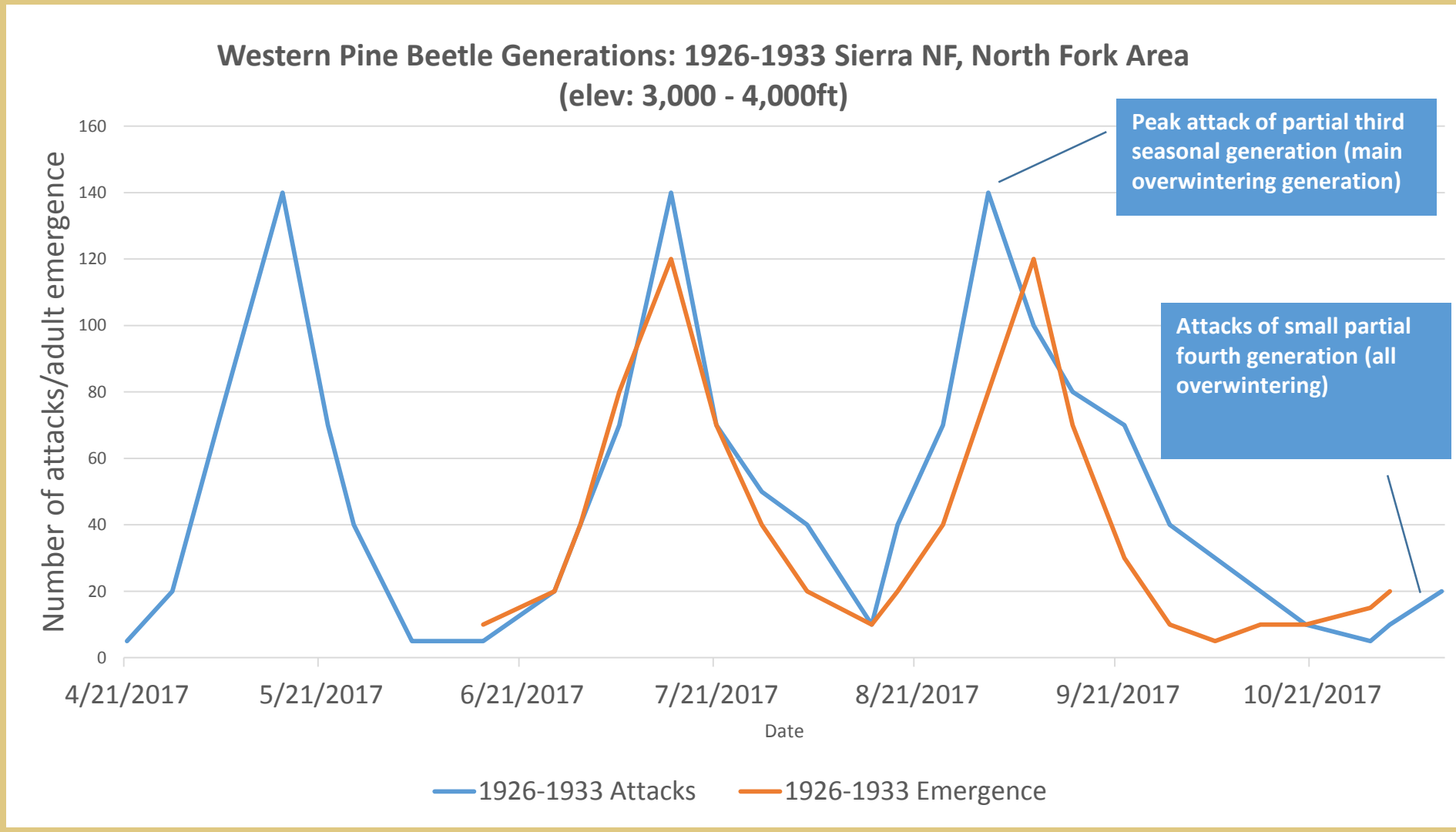


attacks and emergence offset by a couple of weeks between 1933 and 2017;
did not observe a difference of an additional generation

Miller & Keen 1960

Western Pine Beetle Generations: 2017 Stanislaus NF, Bald Mountain, CA (elev: 5,400ft)





Lower in elevation compared to Bev's site by ~ 2000 ft

did not observe a difference of an additional generation based on Bev's data

Miller & Keen 1960

Thank You

Jodi, Susie, John and other organizers