

The background of the slide is a close-up photograph of dark, granular soil. Scattered across the soil are several light-colored, elongated plant seeds or stems, some of which are partially buried. The lighting is natural, creating soft shadows and highlighting the textures of the soil and the organic matter.

Invertebrate Research Update

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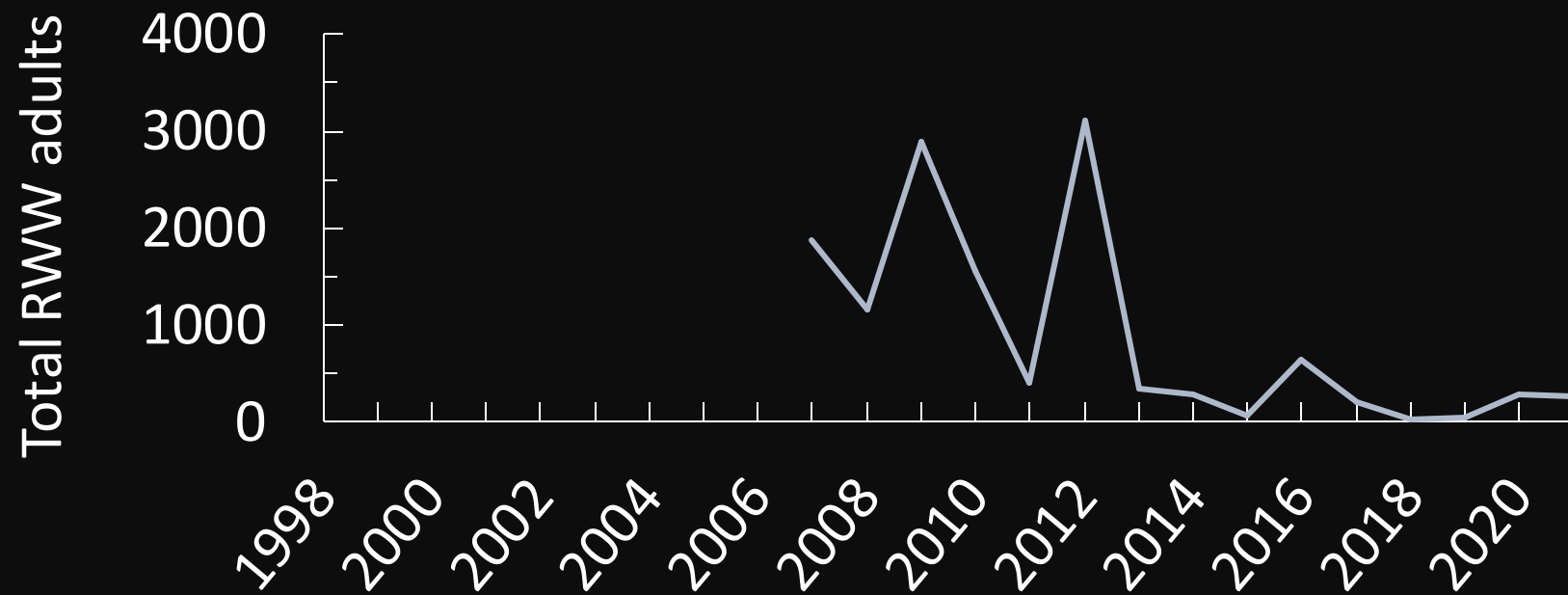
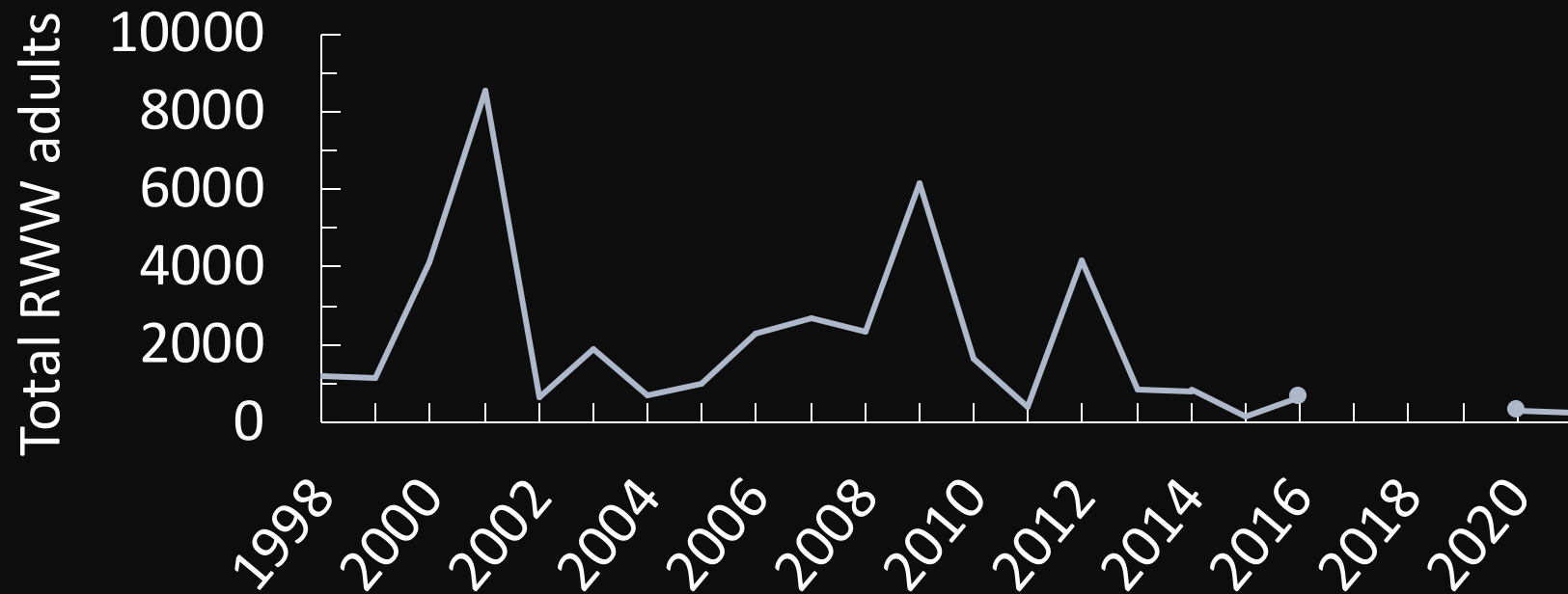
²UC Cooperative Extension, Colusa, CA

Rice water weevil

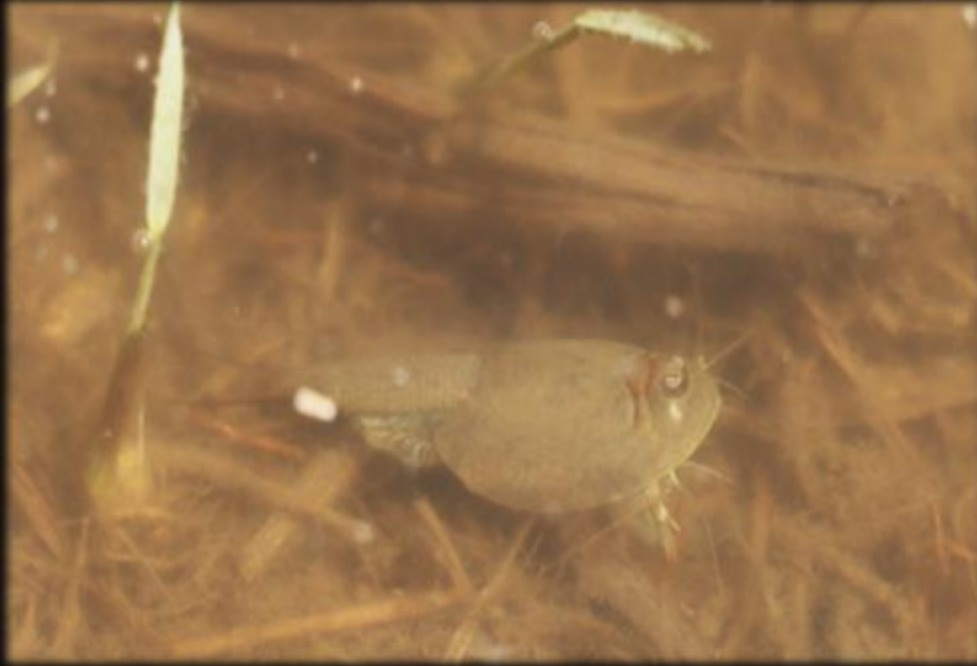


Long-term monitoring of rice water weevil





Tadpole shrimp

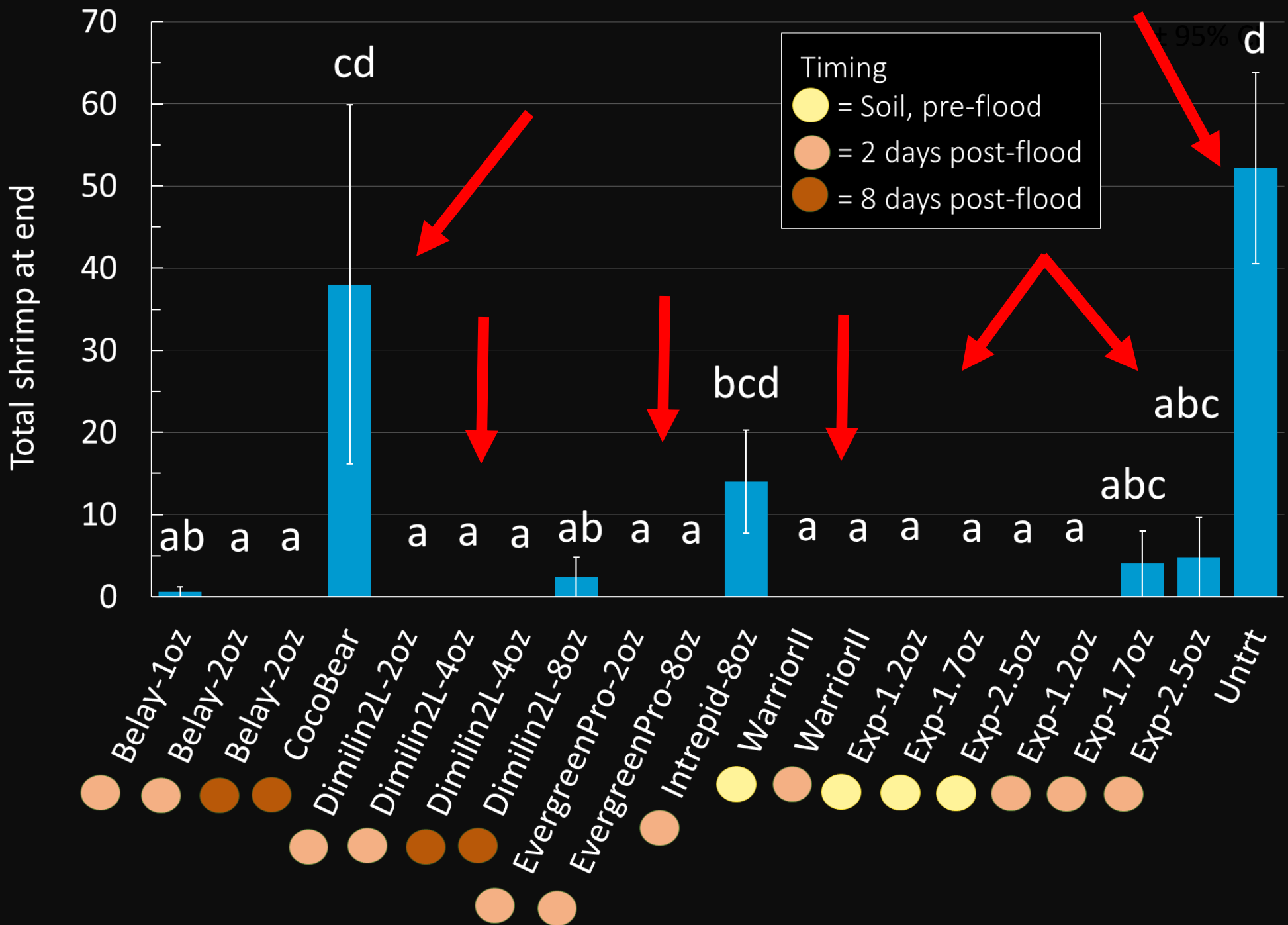


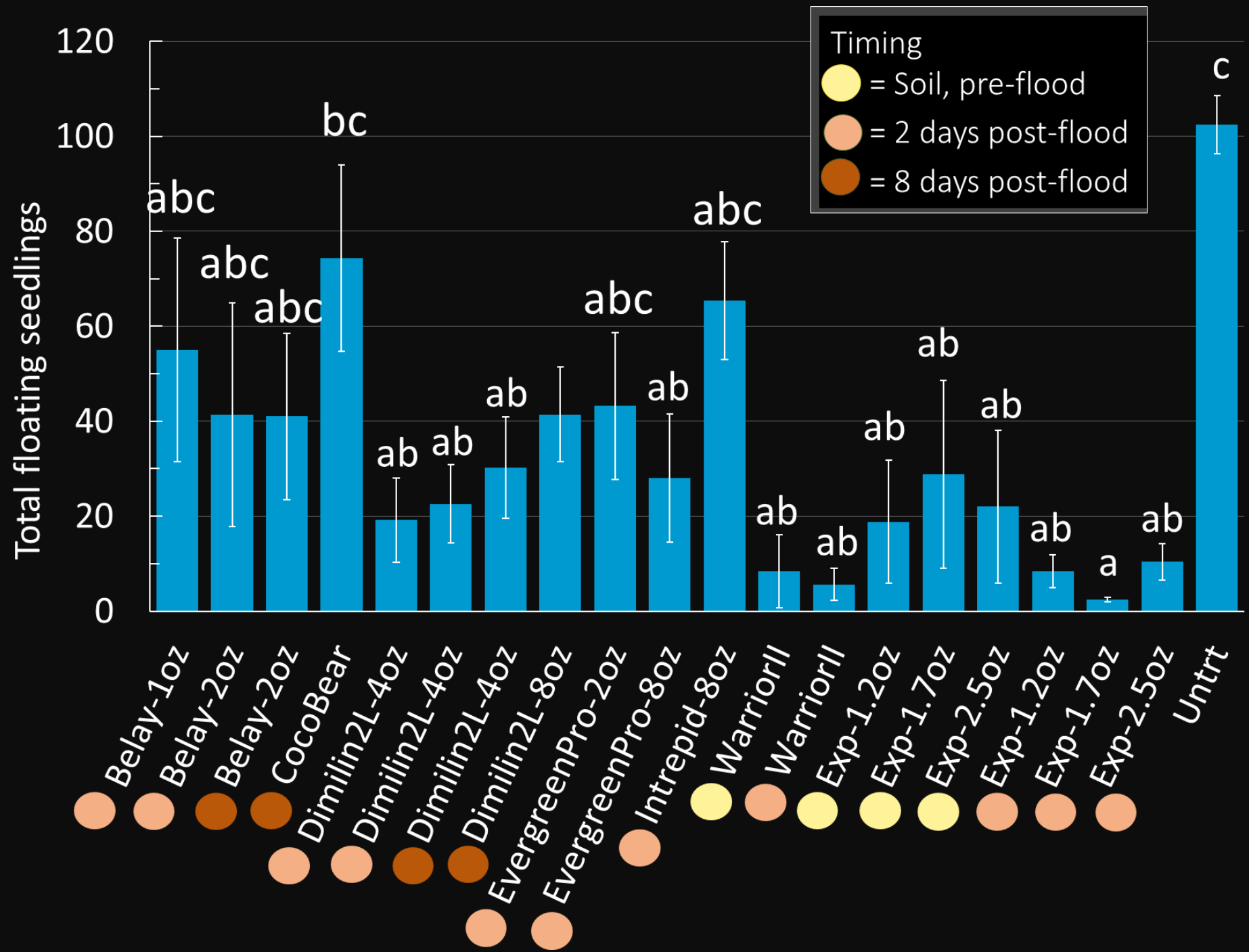
TPS insecticide ring trial



Treatment	AI	Rate (oz/ac)	Timing
Untreated	--	--	--
Warrior II	Lambda-cyhalothrin	1.6	Pre-flood
Warrior II	Lambda-cyhalothrin	1.6	2-day post-flood
Dimilin 2L	Diflubenzuron	2	2-day post-flood
Dimilin 2L	Diflubenzuron	4	2-day post-flood
Dimilin 2L	Diflubenzuron	4	8-day post-flood
Dimilin 2L	Diflubenzuron	8	8-day post-flood
Belay	Clothianidin	1	2-day post-flood
Belay	Clothianidin	2	2-day post-flood
Belay	Clothianidin	2	8-day post-flood
CocoBear**	oil**	192	8-day post-flood
Evergreen Pro	Pyrethrins+PPO	2	2-day post-flood
Evergreen Pro	Pyrethrins+PPO	8	2-day post-flood
Exp	Chlorantraniliprole	1.2	Pre-flood
Exp	Chlorantraniliprole	1.7	Pre-flood
Exp	Chlorantraniliprole	2.5	Pre-flood
Exp	Chlorantraniliprole	1.2	2-day post-flood
Exp	Chlorantraniliprole	1.7	2-day post-flood
Exp	Chlorantraniliprole	2.5	2-day post-flood
Intrepid	Methoxyfenozide	8	2-day post-flood





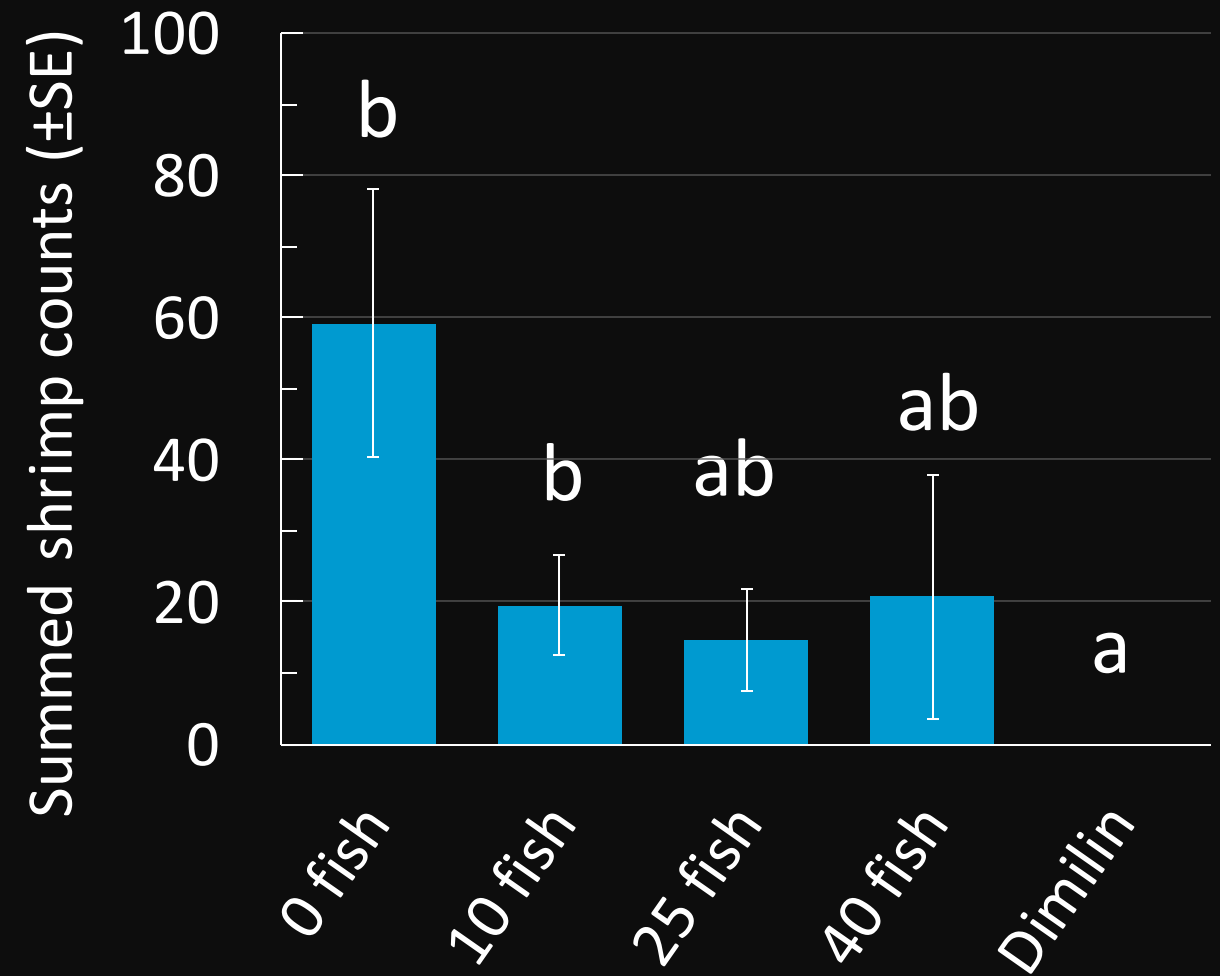


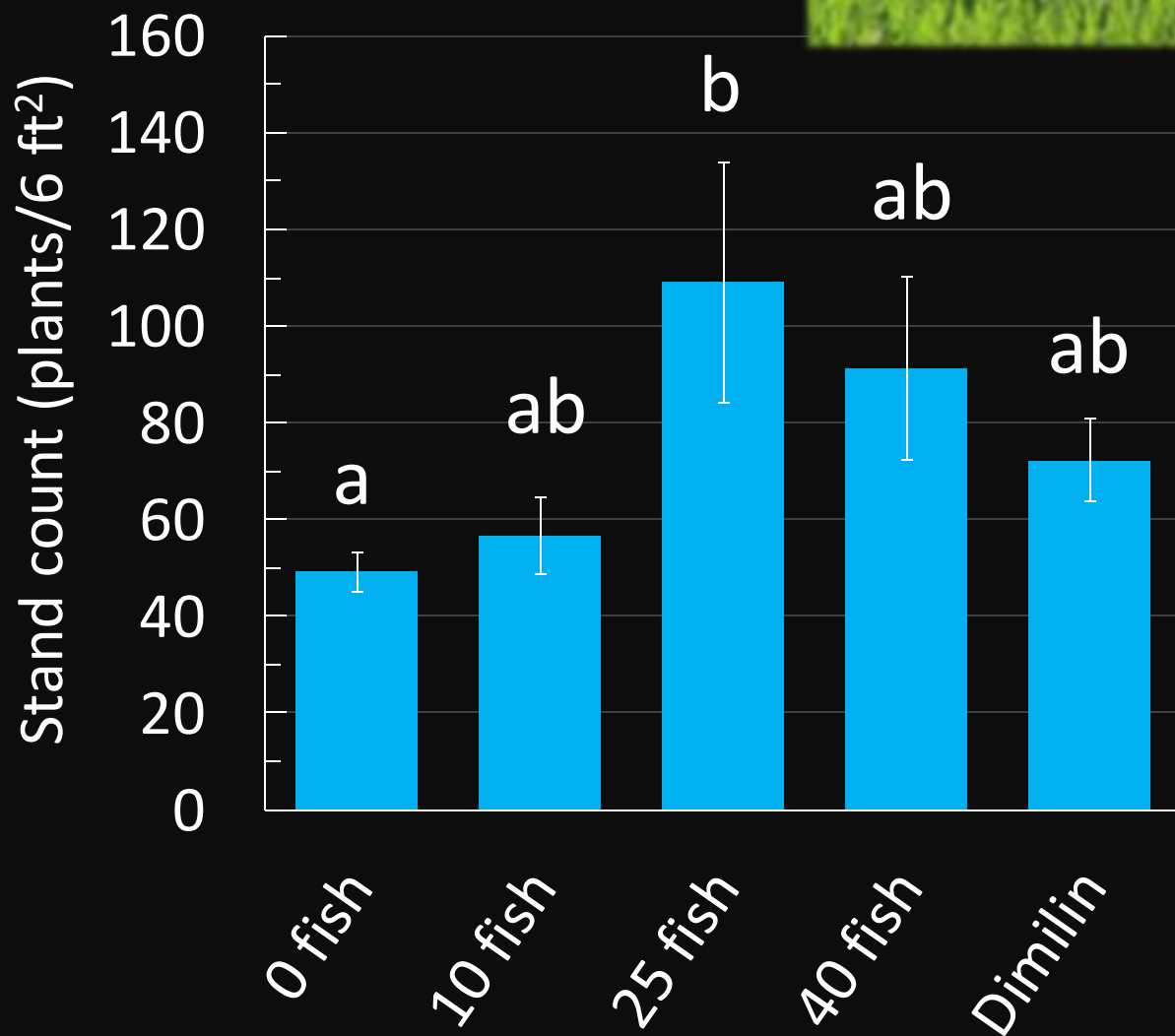
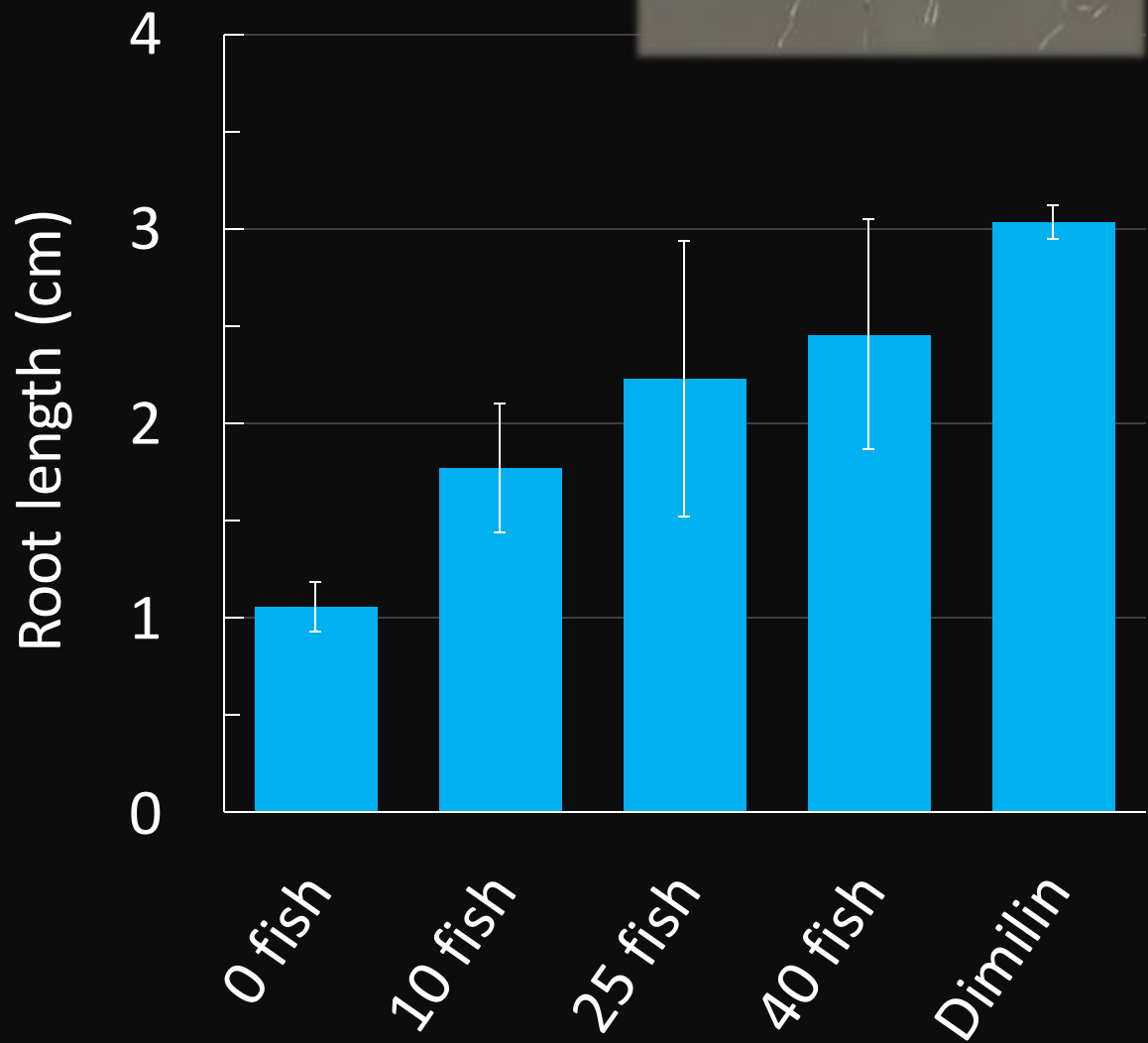
- Two trials
- Treatments
 - 0 fish
 - 10 fish
 - 25 fish
 - 40 fish
 - Dimilin





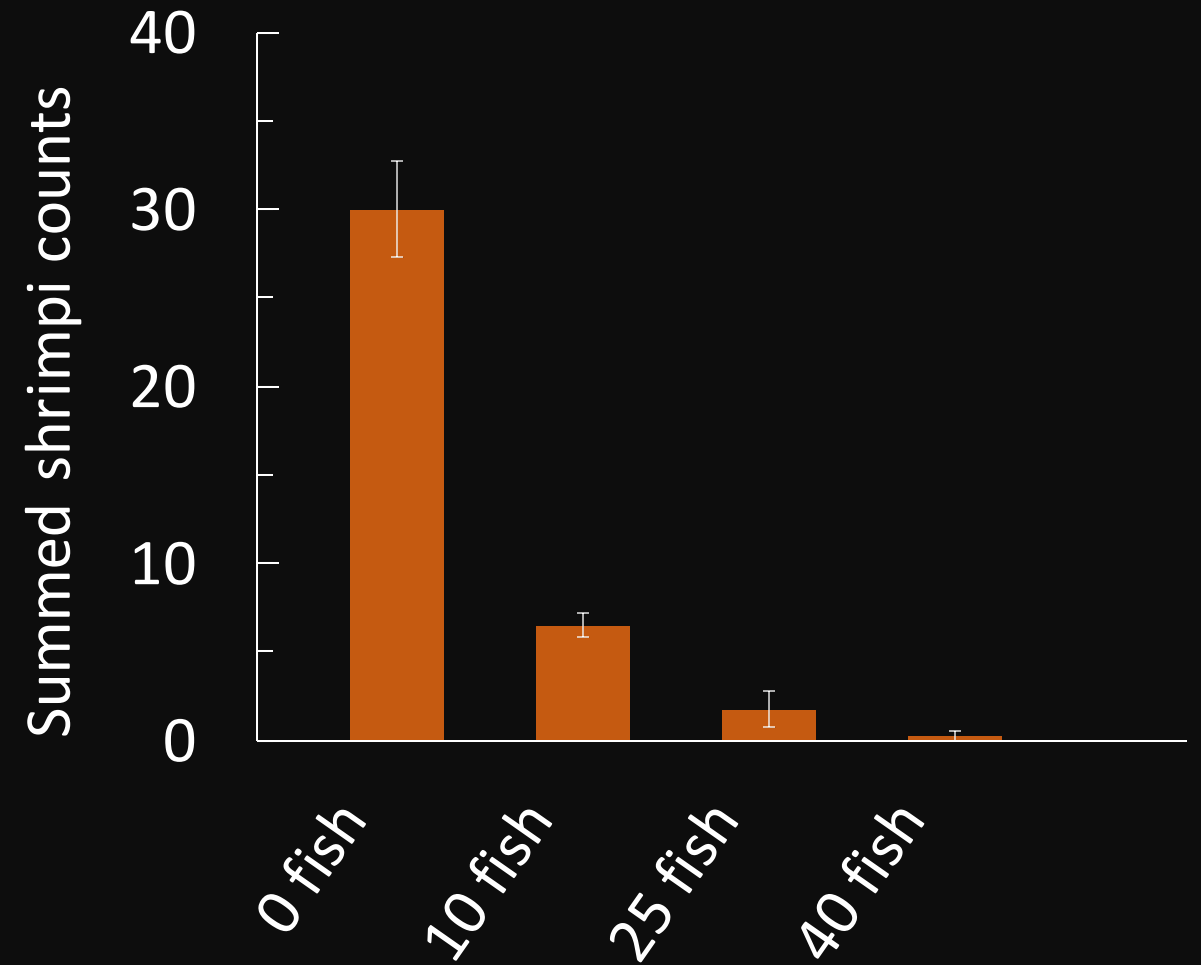
High shrimp pressure







Lower shrimp
pressure



Armyworms



Armyworms 2021

- Intrepid available
- Larval pressure was very low



Eureka

Shasta-Trinity
National Forest

Redding

Lassen National
Forest

Plumas National
Forest

Chico

Yuba City

Sacramento

Santa Rosa

Reno

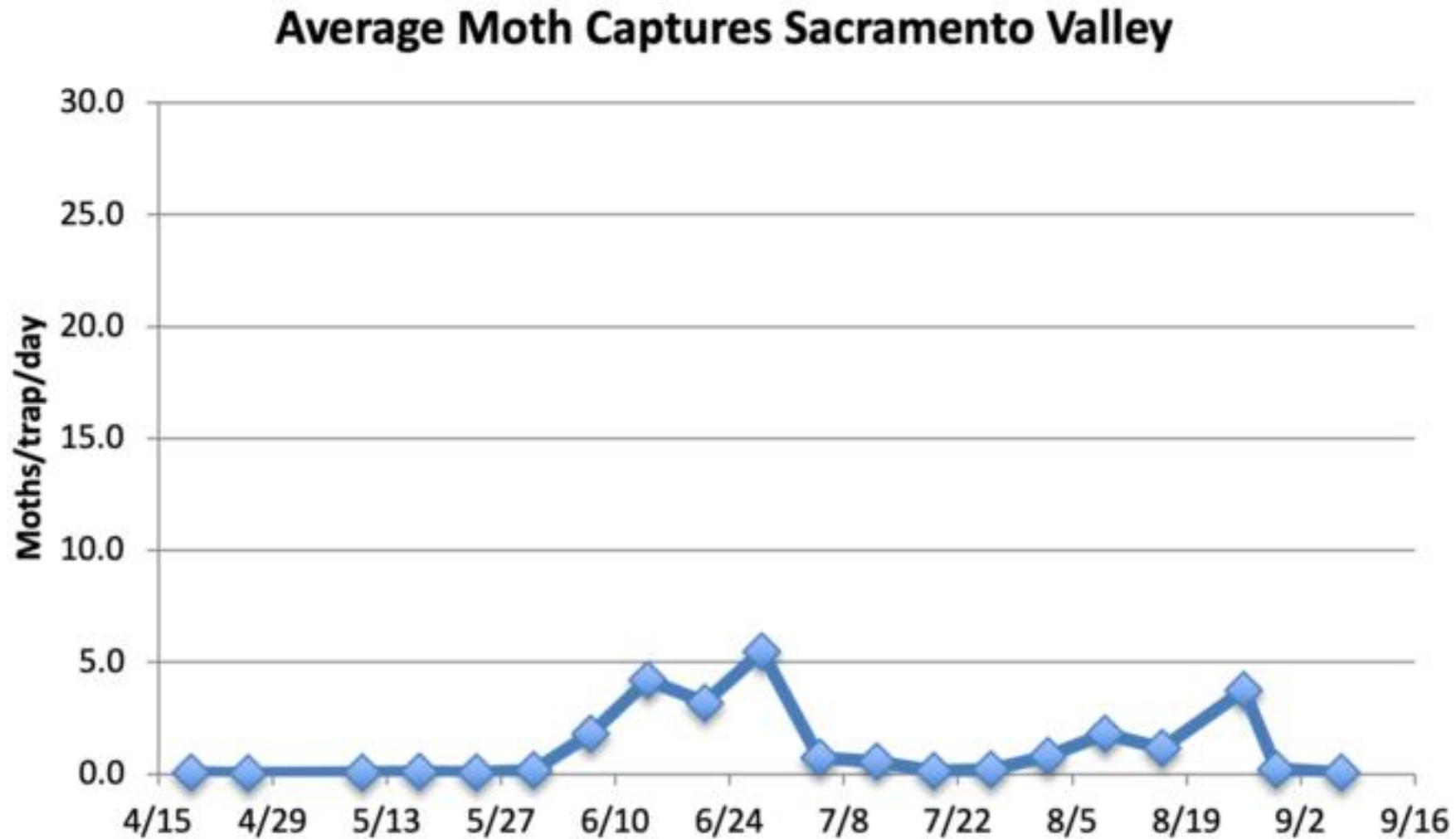
Tahoe National
Forest

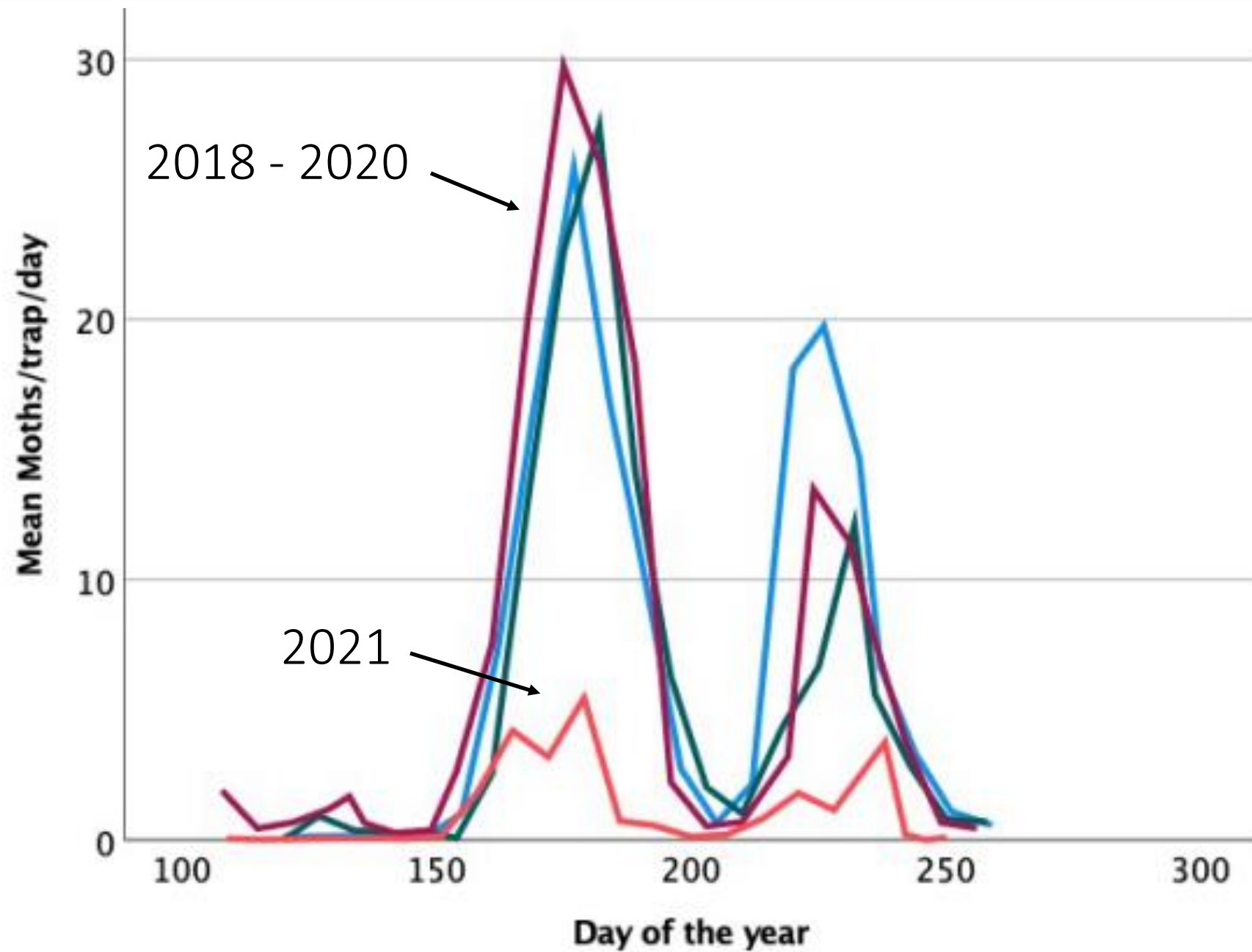
Carson City

Humboldt-Toiyabe
National Forest



Armyworm flights in 2021







Questions:

1. Are trap captures related *temporally*?
2. Are trap captures aggregated *spatially*?



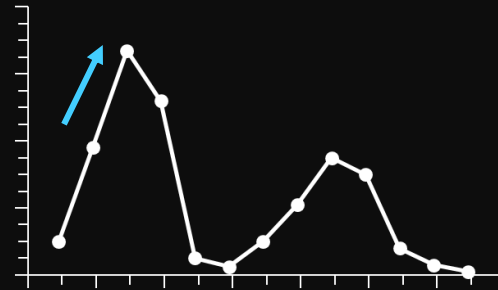
Grid of traps

- Pheromone-baited bucket traps
- 2020: $4 \times 5 = 20$ traps
- 2021: $4 \times 6 = 24$ traps
- Traps checked weekly



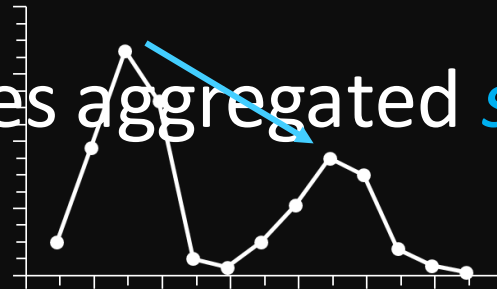
1. Are trap captures related *temporally*?

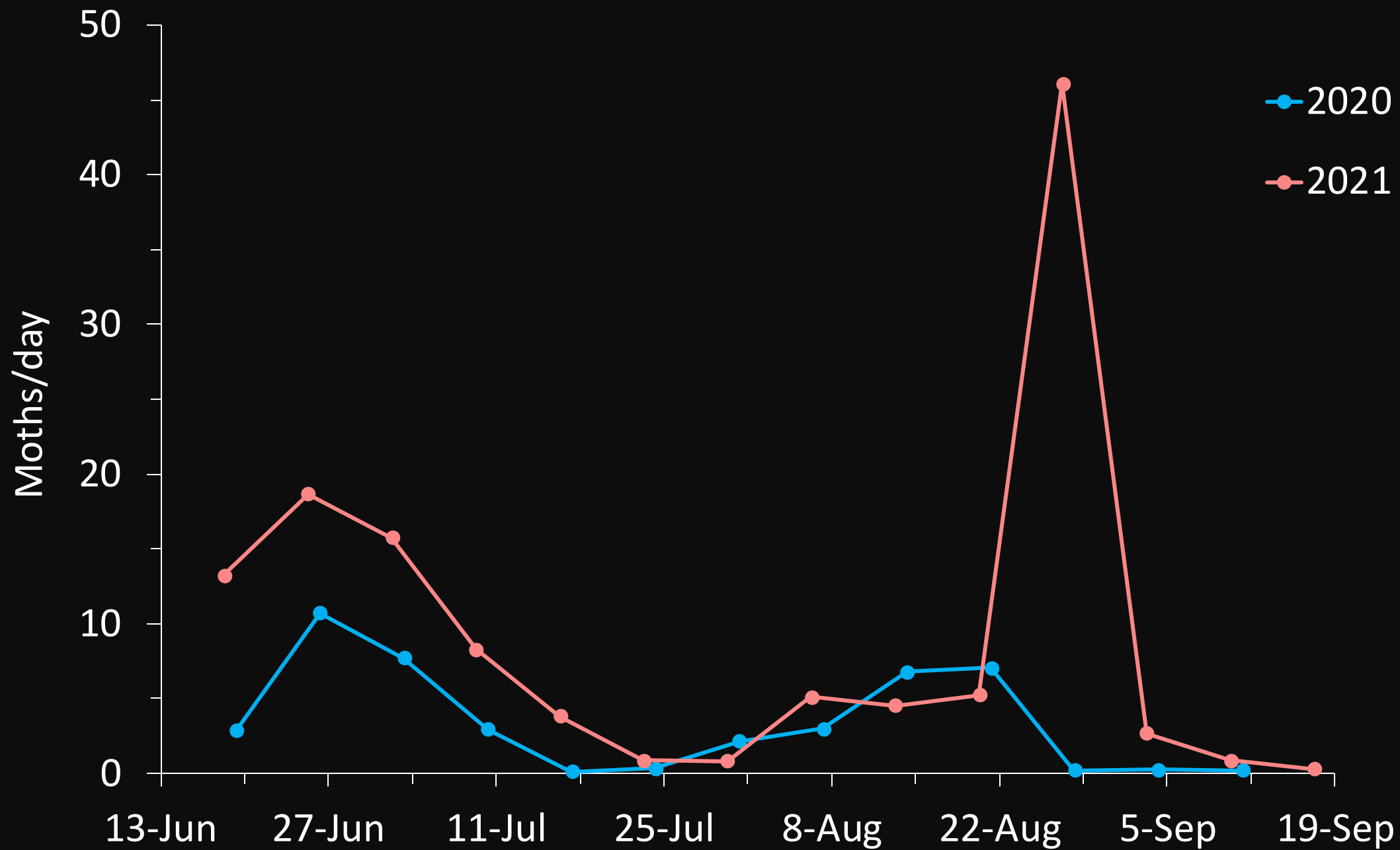
A. Successive dates



B. Peaks 1 and 2

2. Are trap captures aggregated *spatially*?

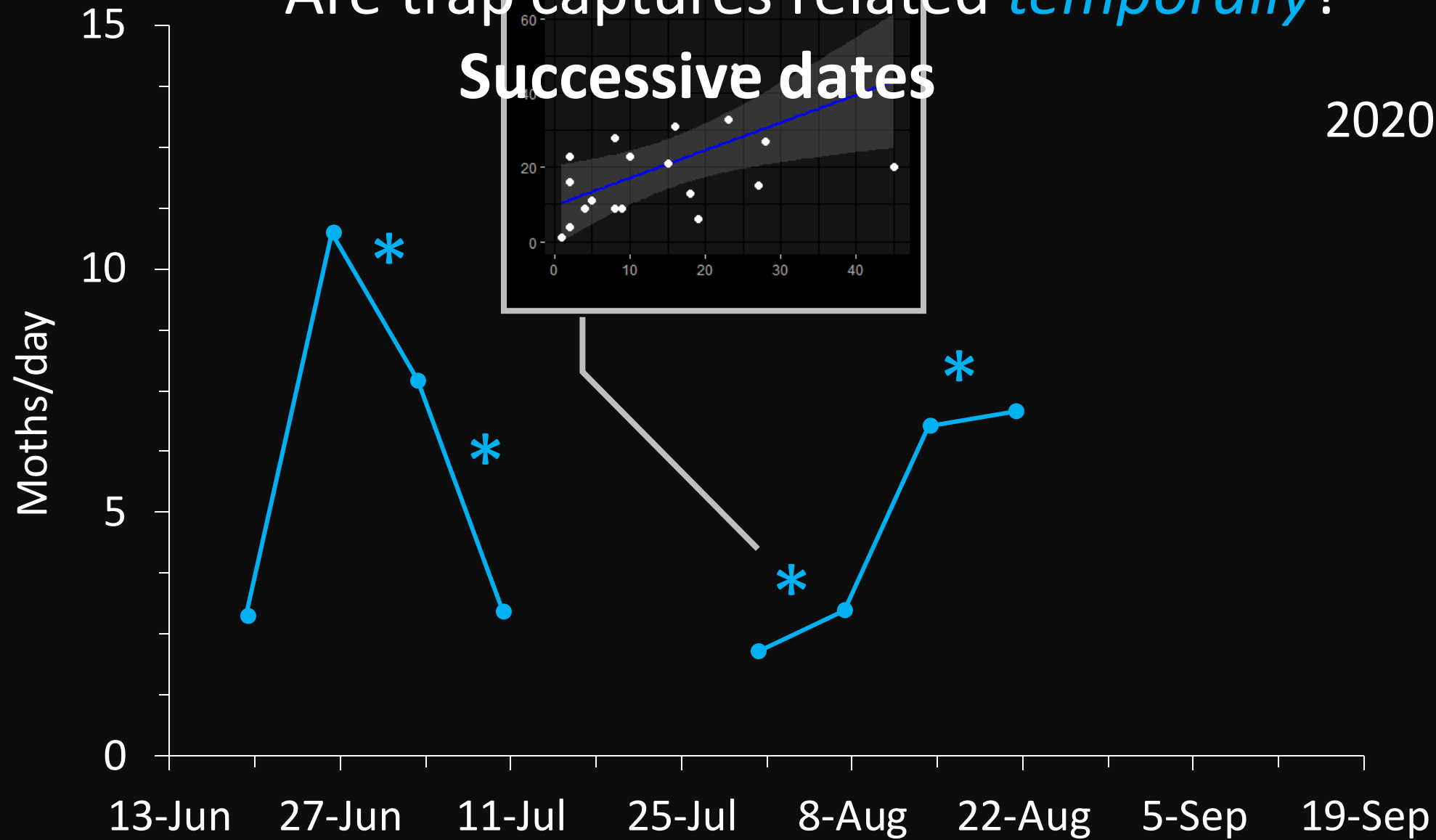


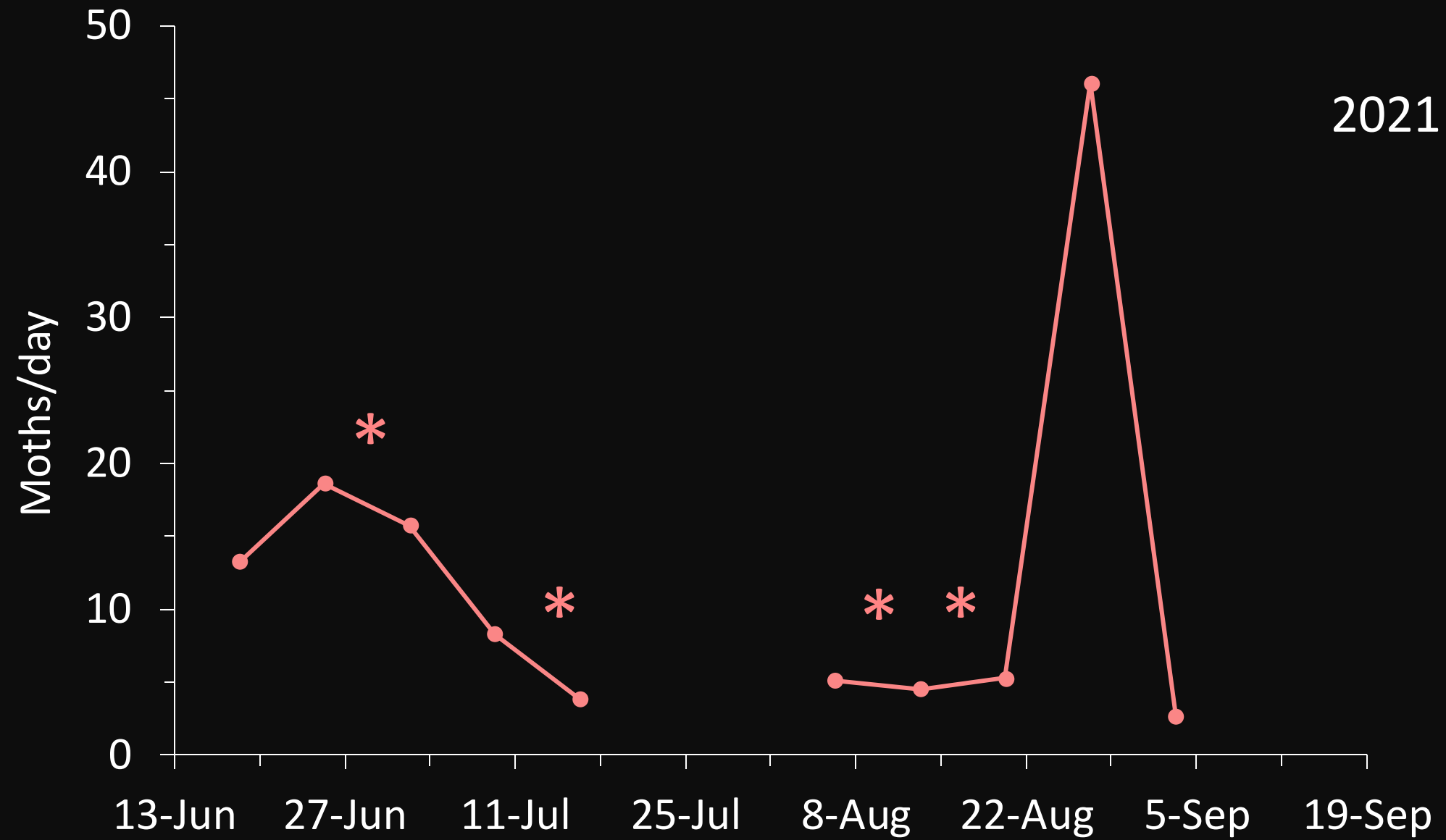


Are trap captures related *temporally*?

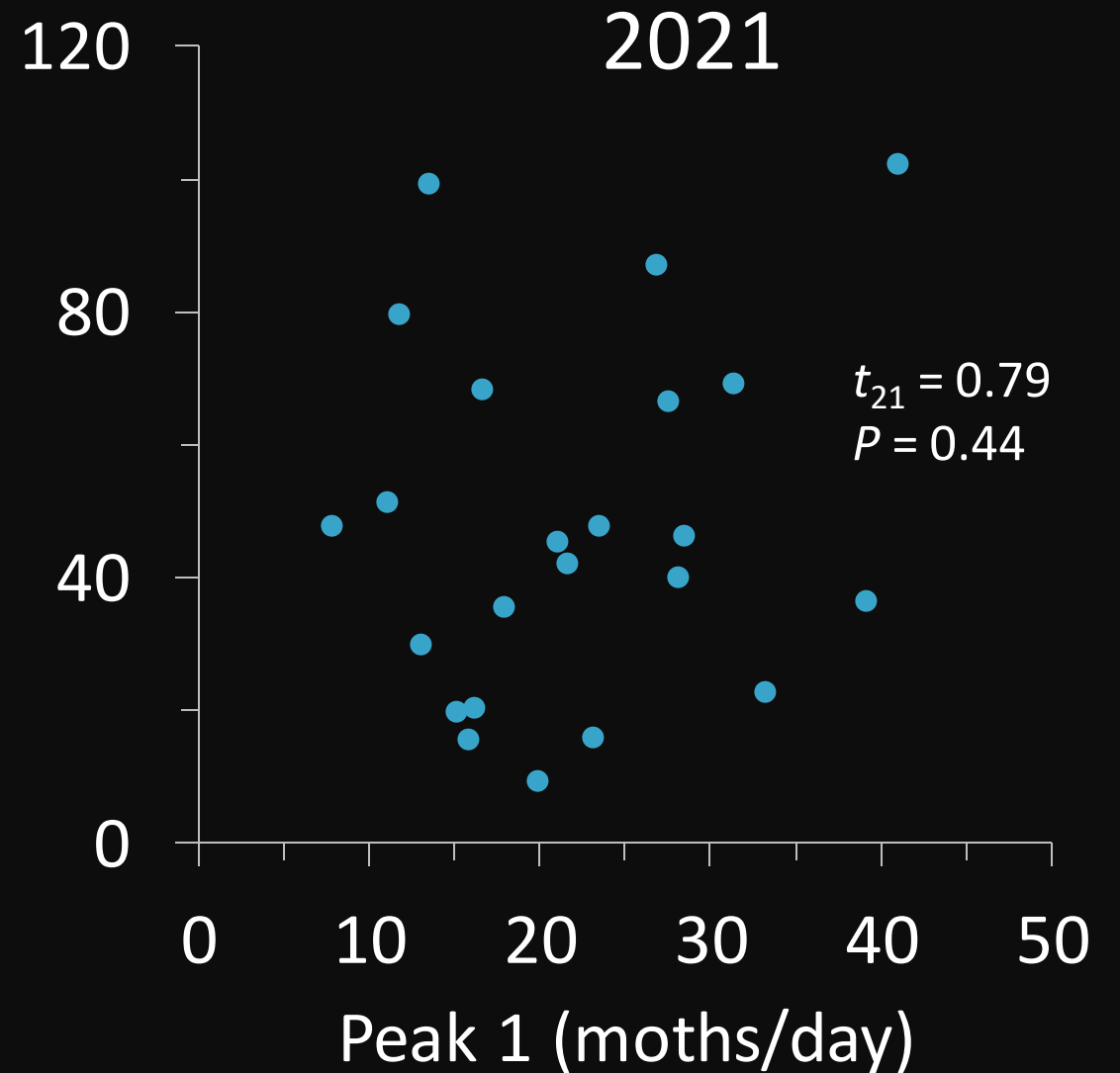
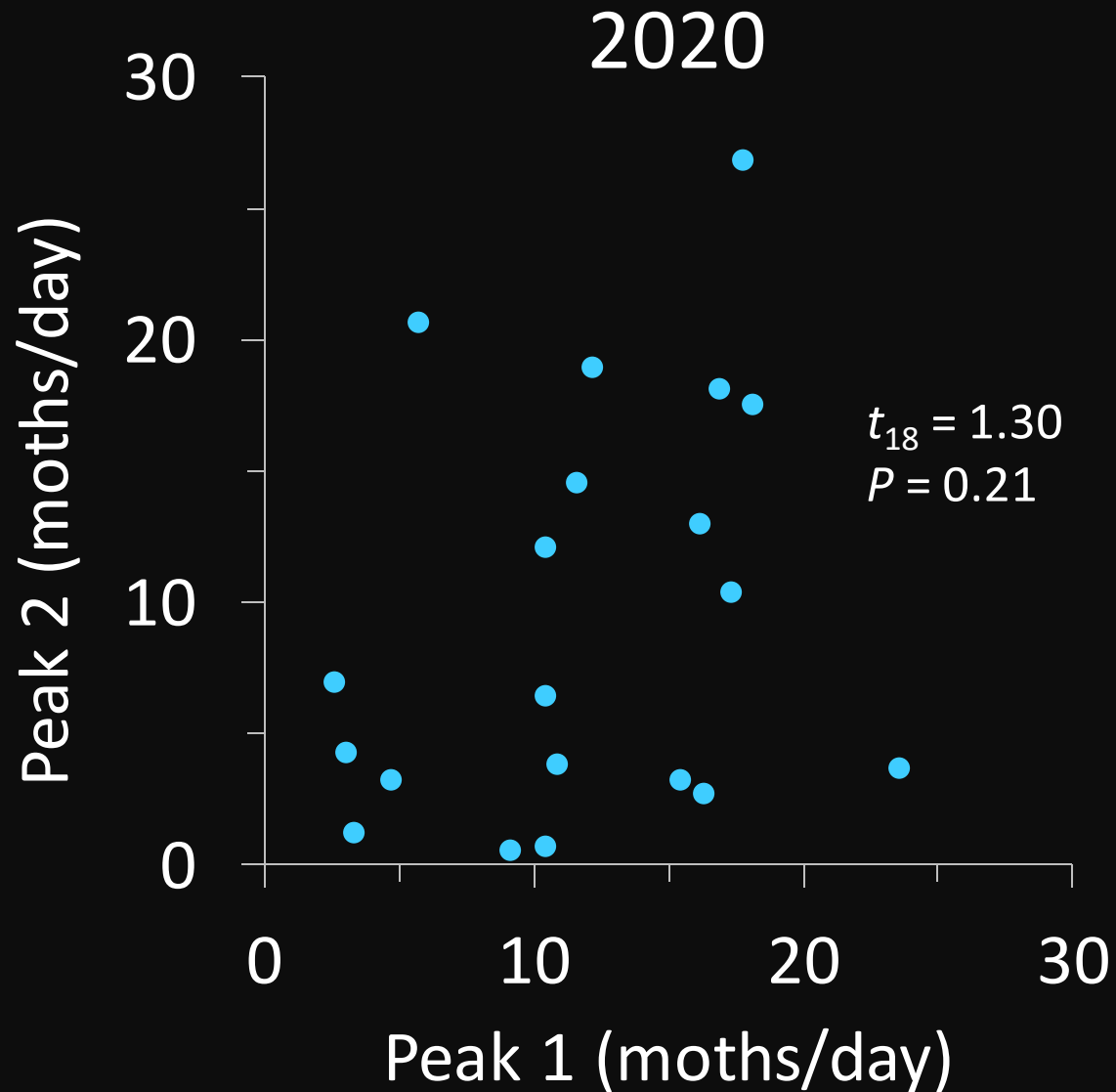
Successive dates

2020

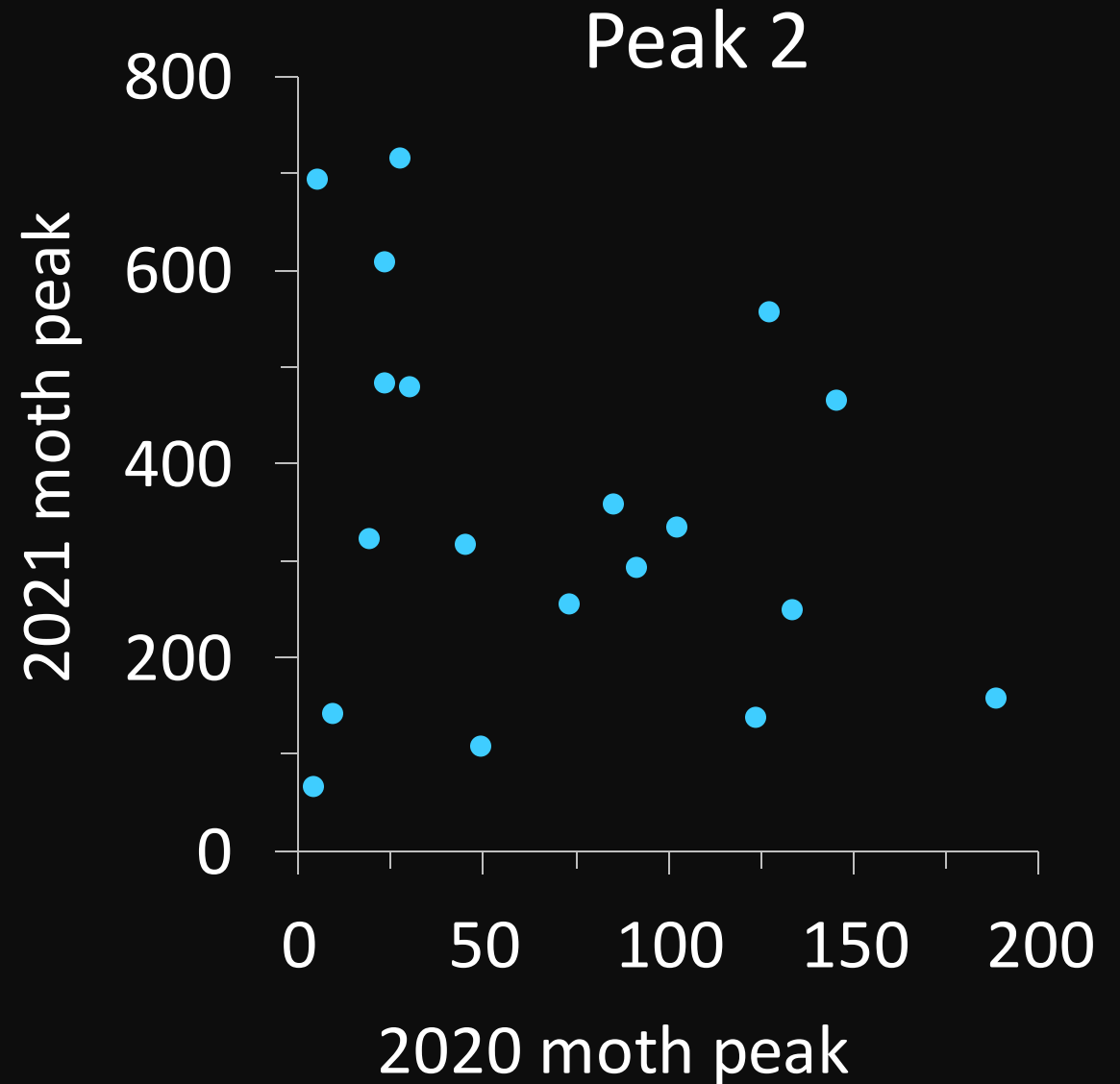
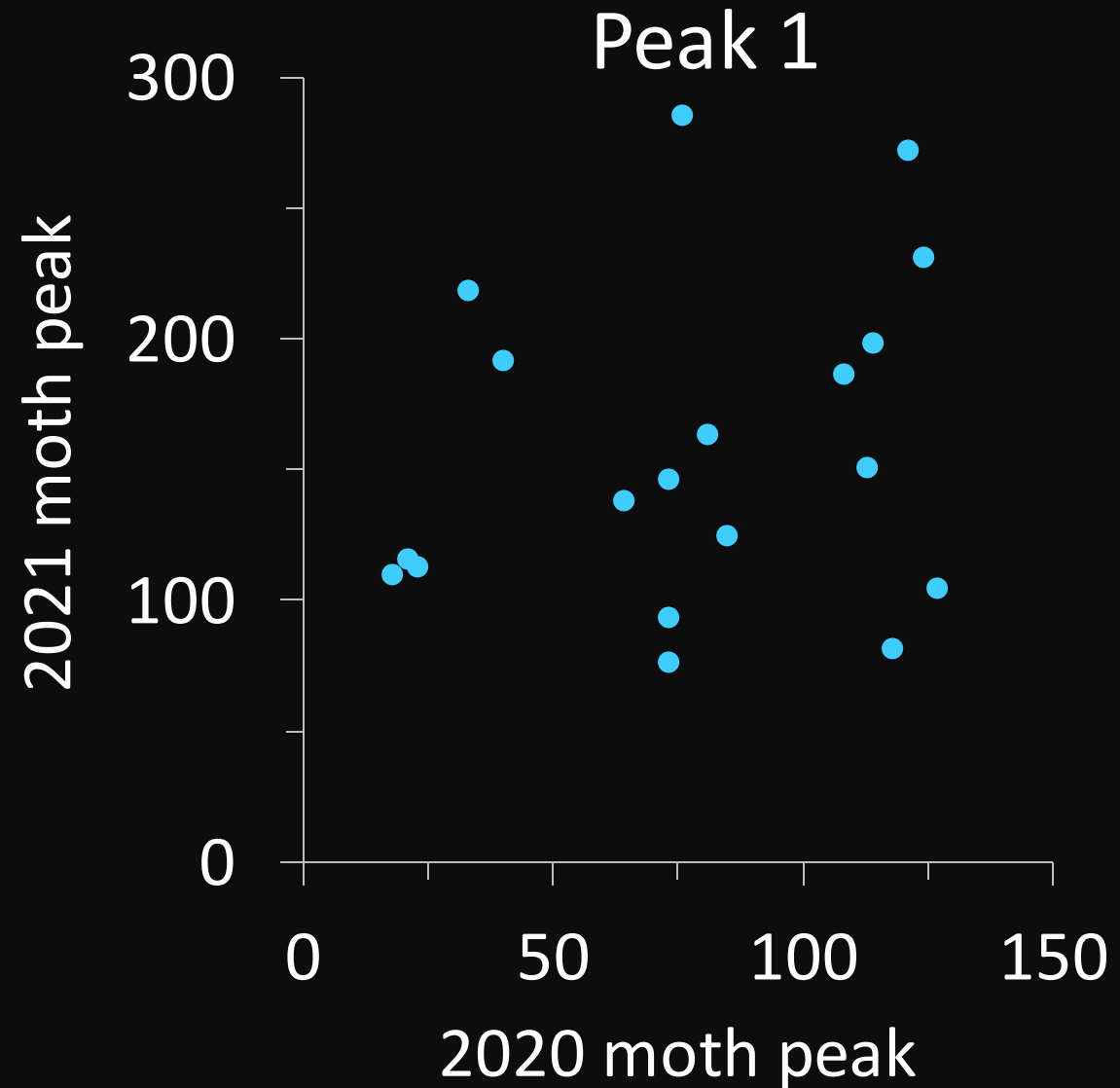




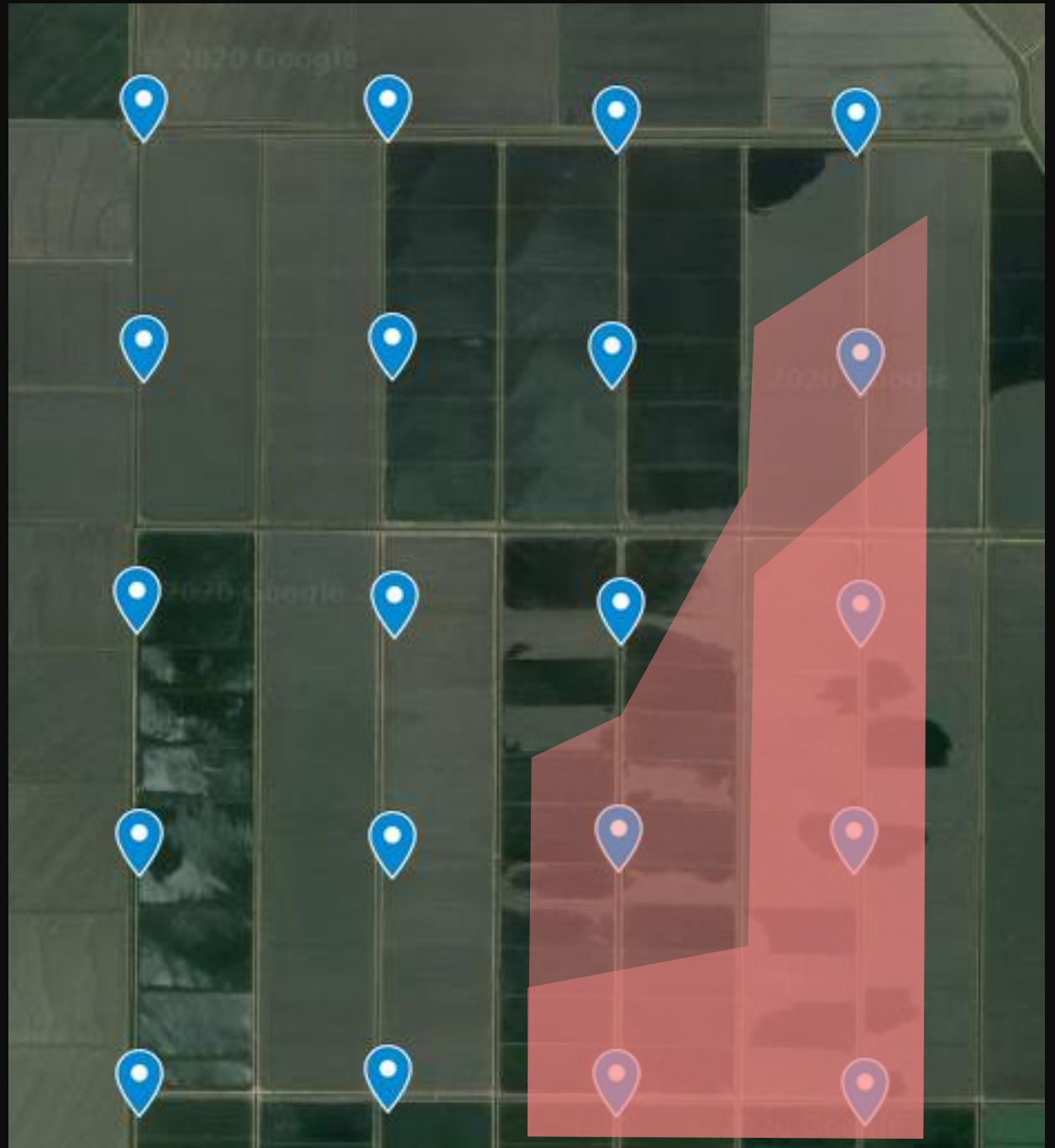
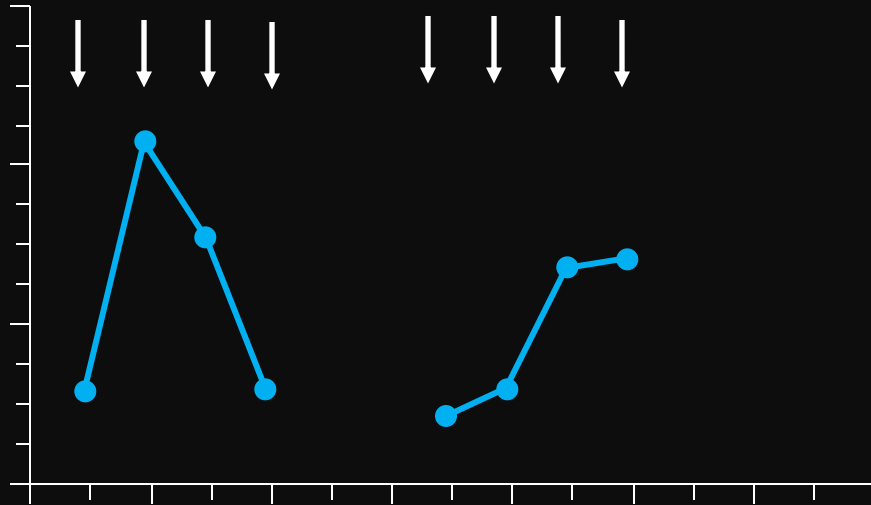
Peak captures not correlated



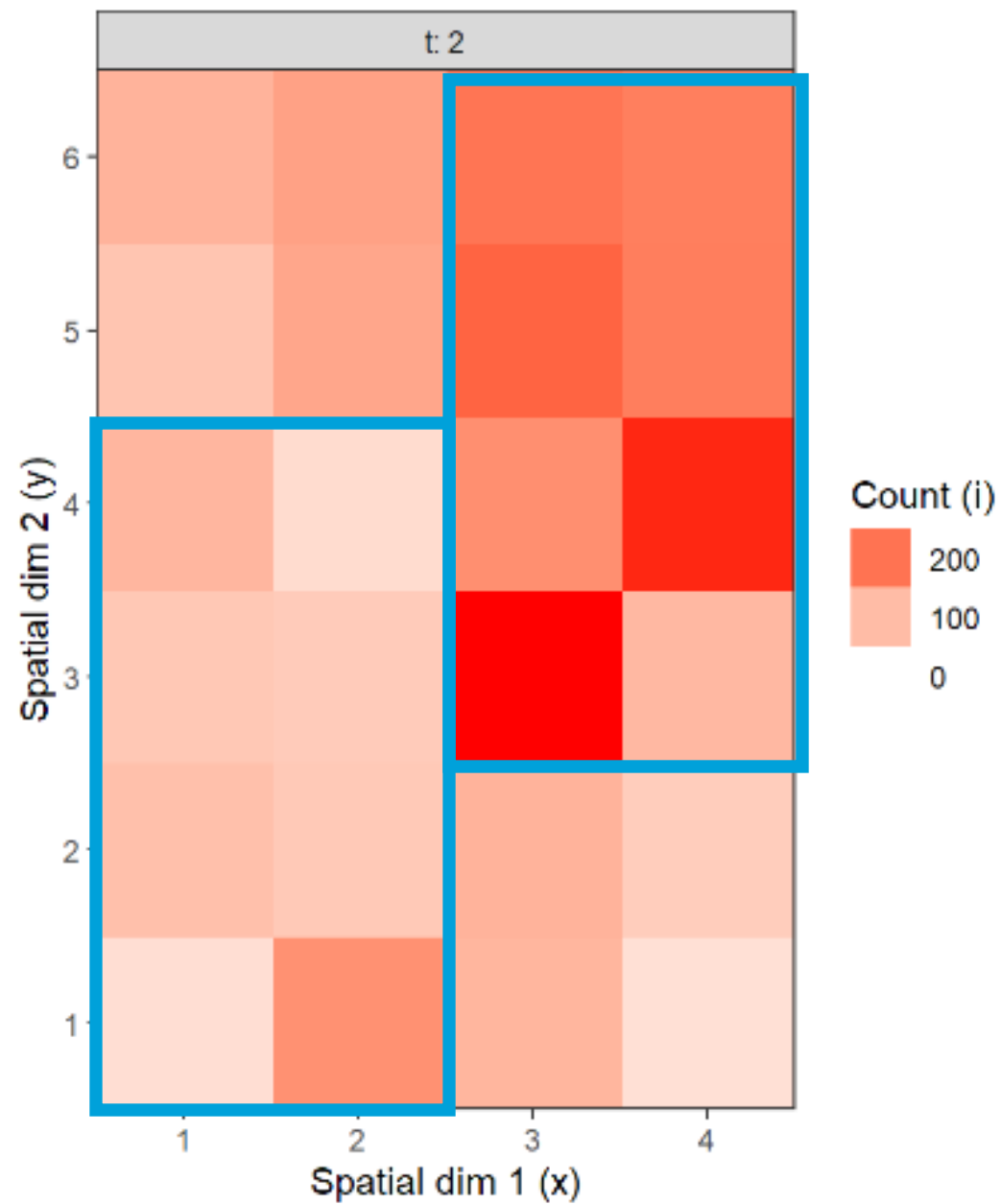
Captures not correlated across years



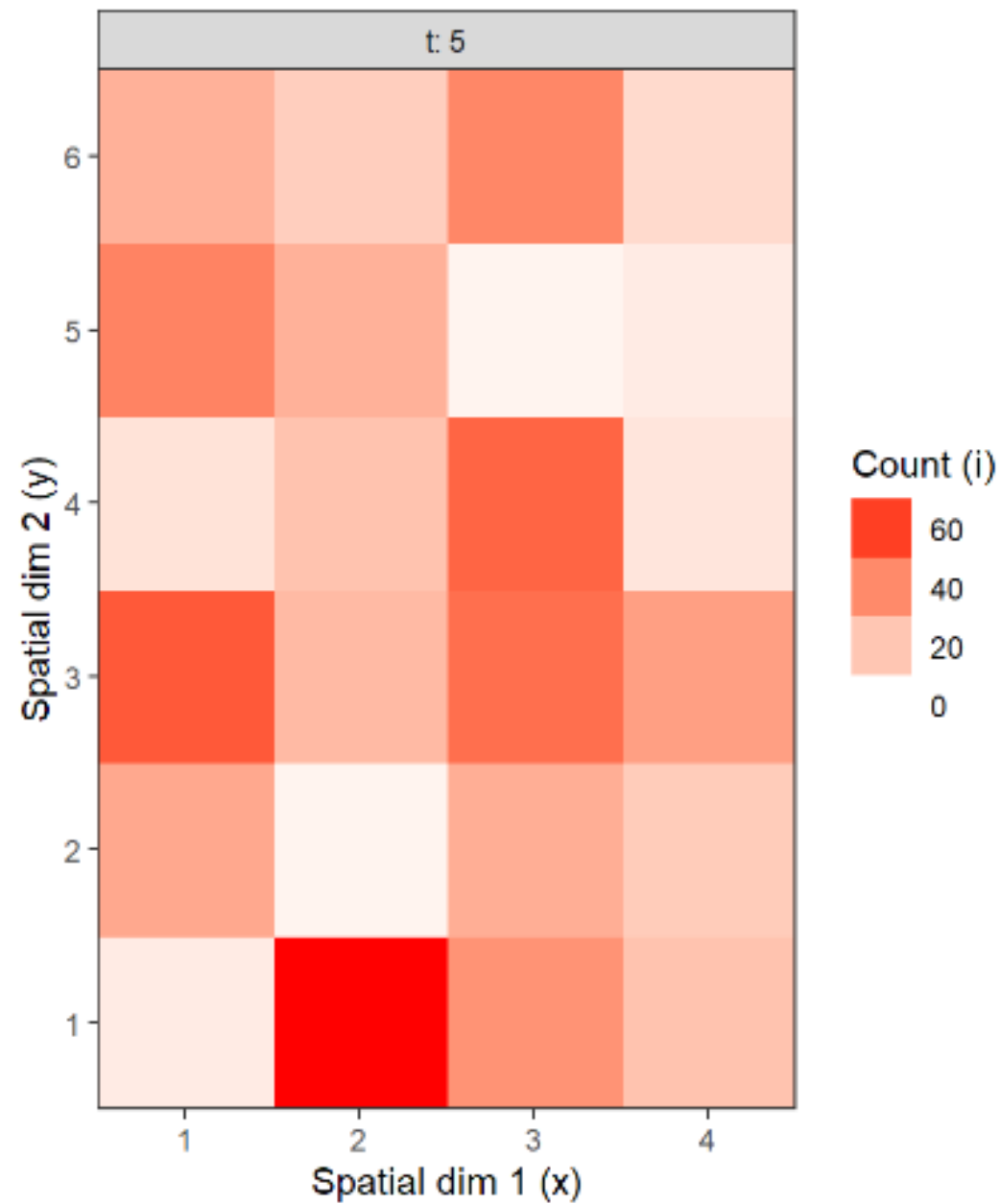
2. Are trap captures aggregated *spatially*?



Aggregated

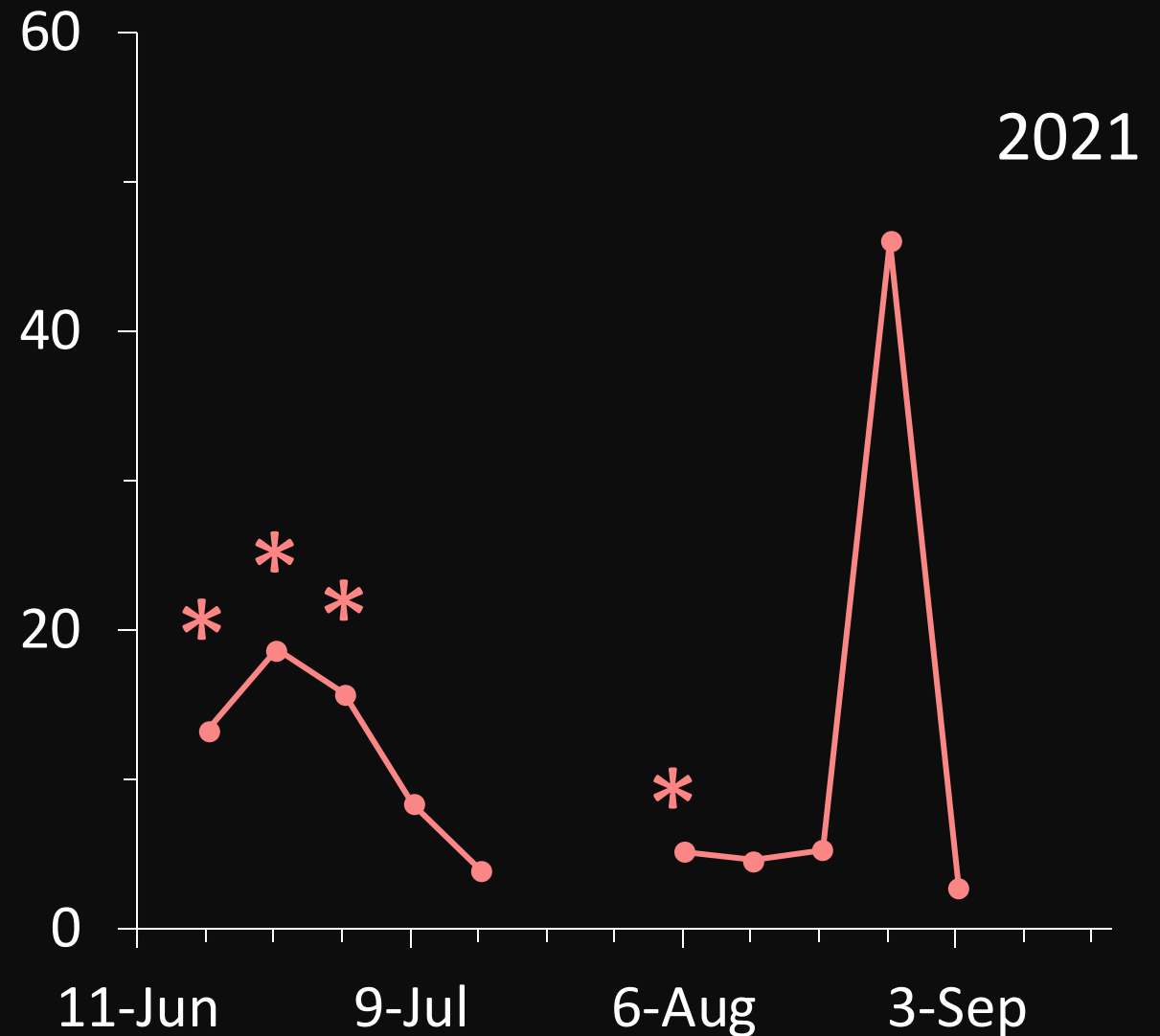
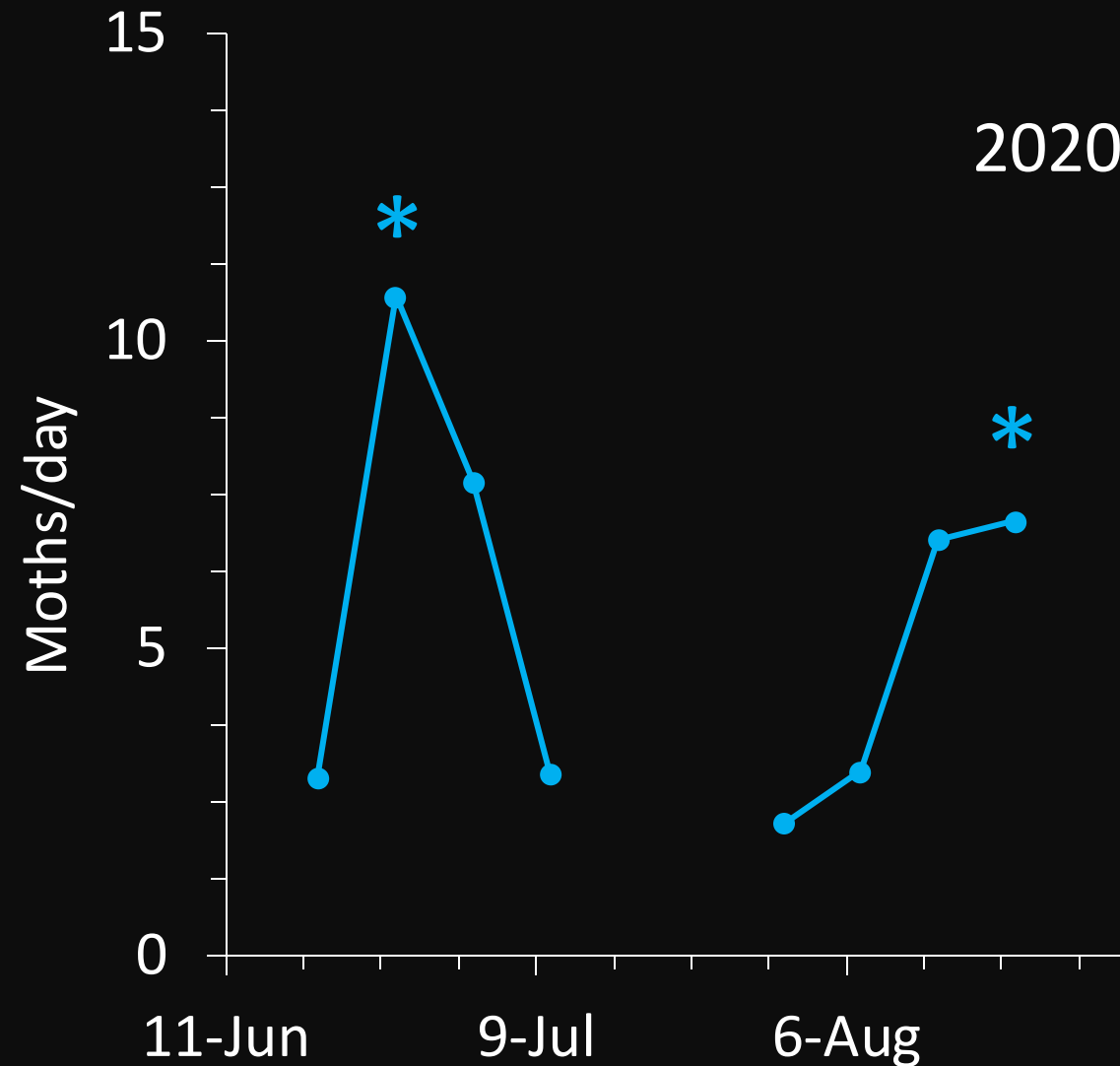


Random



Captures aggregated at times,
random otherwise, never uniform

* = *Aggregated*
None = *Random*



Defoliation trials

Defoliation treatments

- No defoliation
- 50% height above water
- 75% height
- 100% height



Varieties

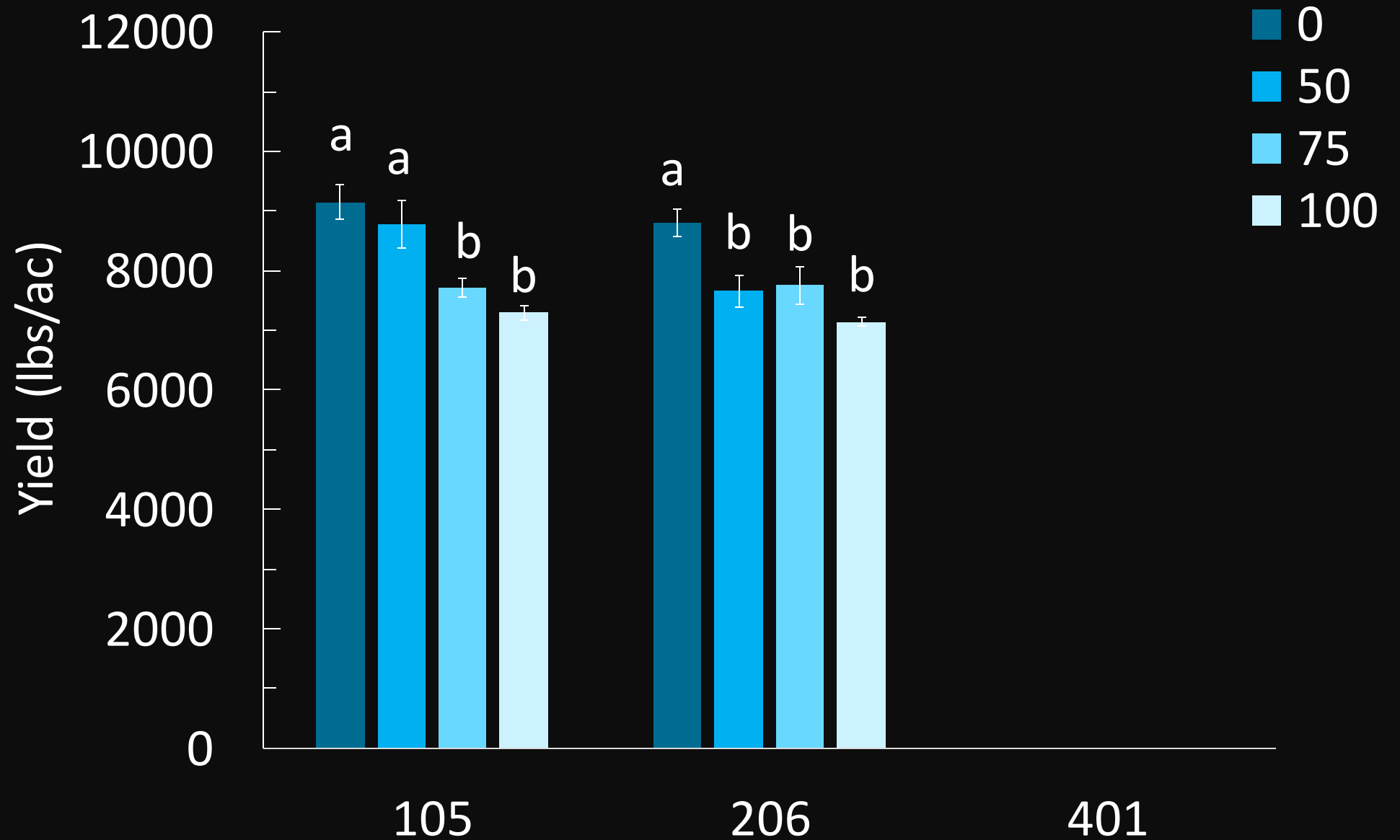
- M-105
- M-206
- M-401

Topdress

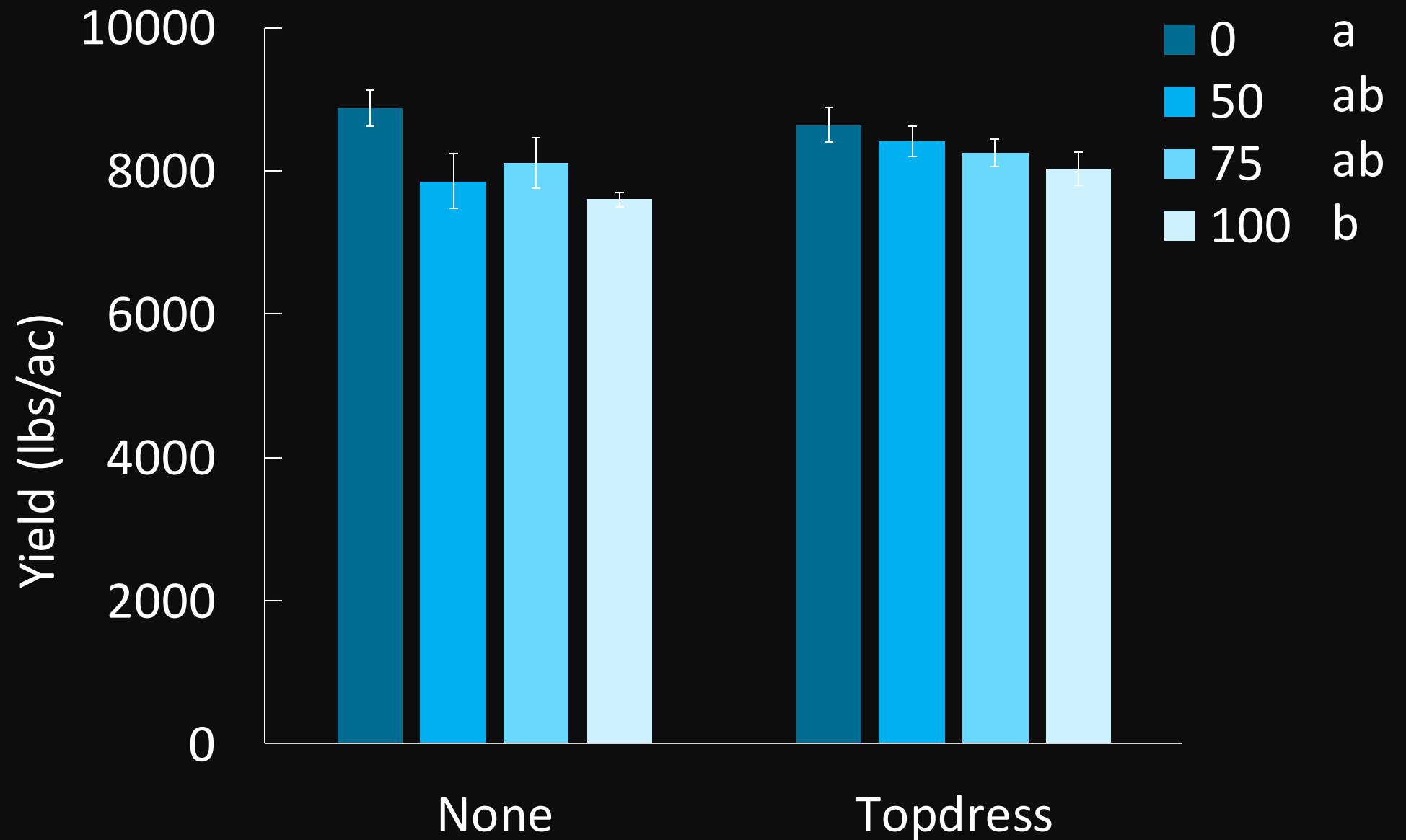
- None
- 30 lbs N/a, ammonium sulfate at panicle initiation



Defoliation effect depended on variety



No topdress*defoliation interaction



Pyrethroid resistance

What we need

- Fields with tadpole shrimp
- Access to fields to collect soil+eggs this spring

→ run bioassays

Share your contact info
in the back!



Acknowledgements

- Grettenberger lab
- Espino lab personnel
- Corteva – armyworm monitoring network
- Trece for armyworm supplies
- Rice Experiment Station
- Funding: CA Rice Research Board





Insecticide trial: Butte Co., 10x20 ft plots (July 2nd appl.)

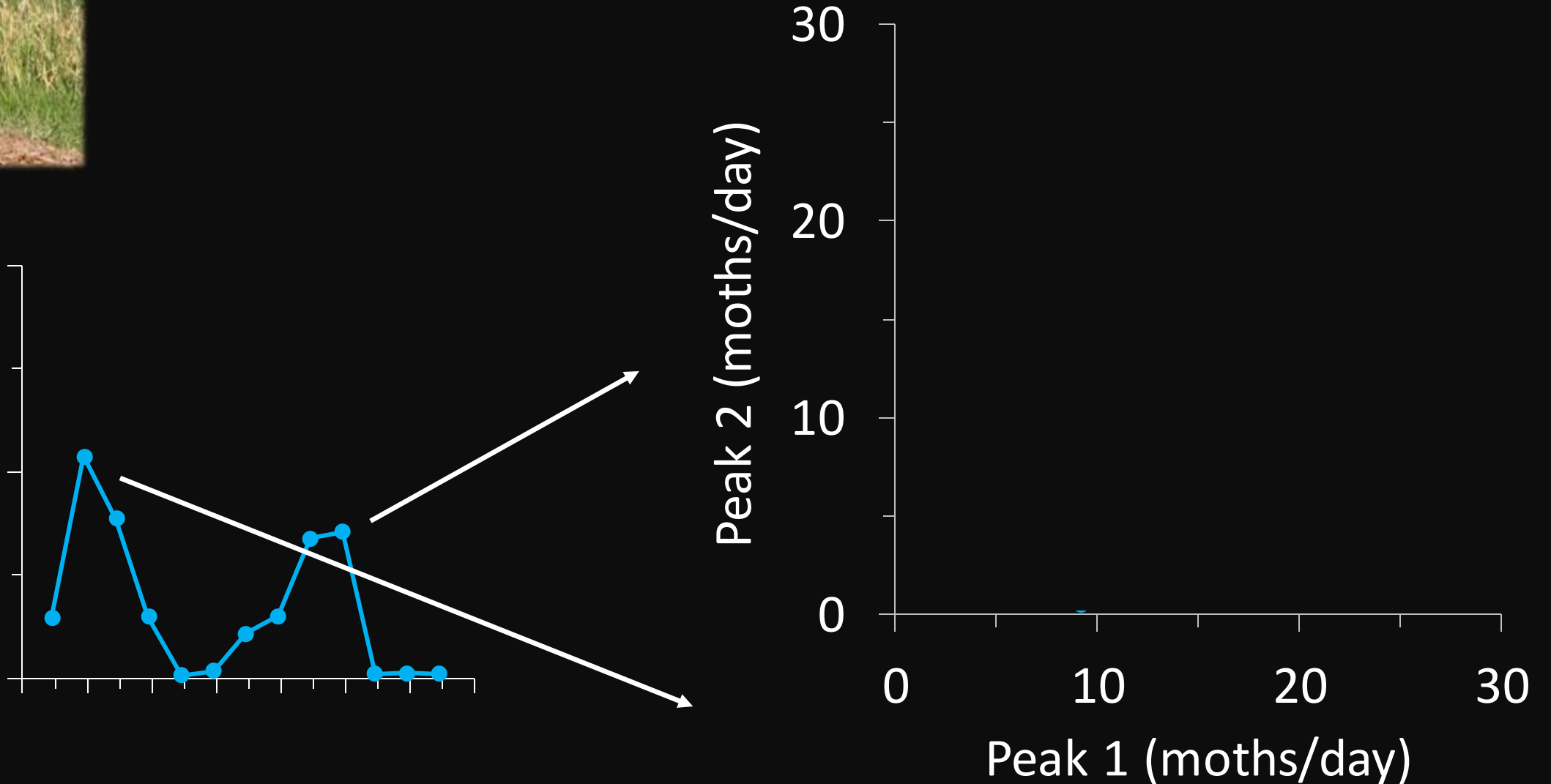
Treatment	Rate/a	Number of larvae/2 min search		
		0 DAT	4 DAT	7 DAT
Untreated	--	1.75	1.42	1.40
Javelin	1.5 lb	1.56	0.33	0.47 *
Vantacor	1.2 oz	1.22	0.58 *	0.20 *
Vantacor	1.7 oz	1.44	0.17 *	0.07 *
Mustang Max	4 oz	1	0.75	0.93
Dimilin	8 oz	2.11	0.75	0.80
Intrepid	10 oz	2	0.00 *	0.07 *
SpearLep+Leptotec	2pt+1pt	1.22	0.58 *	1.00
SpearLep+Leptotec	1pt+1pt	1.22	0.17 *	0.47 *
Leptotec	1pt	1.44	0.92	0.80





Are trap captures related *temporally*?

Peak captures



IPM of Rice Invertebrate Pests

- Rice water weevil remained a minimal pest, but important for registrations
- Decline of rice water weevil
- Continued issues with tadpole shrimp
- Armyworms are not predictable
- Regulatory issues



Rice invertebrate pests

- Tadpole shrimp
- Armyworm
- Rice water weevil

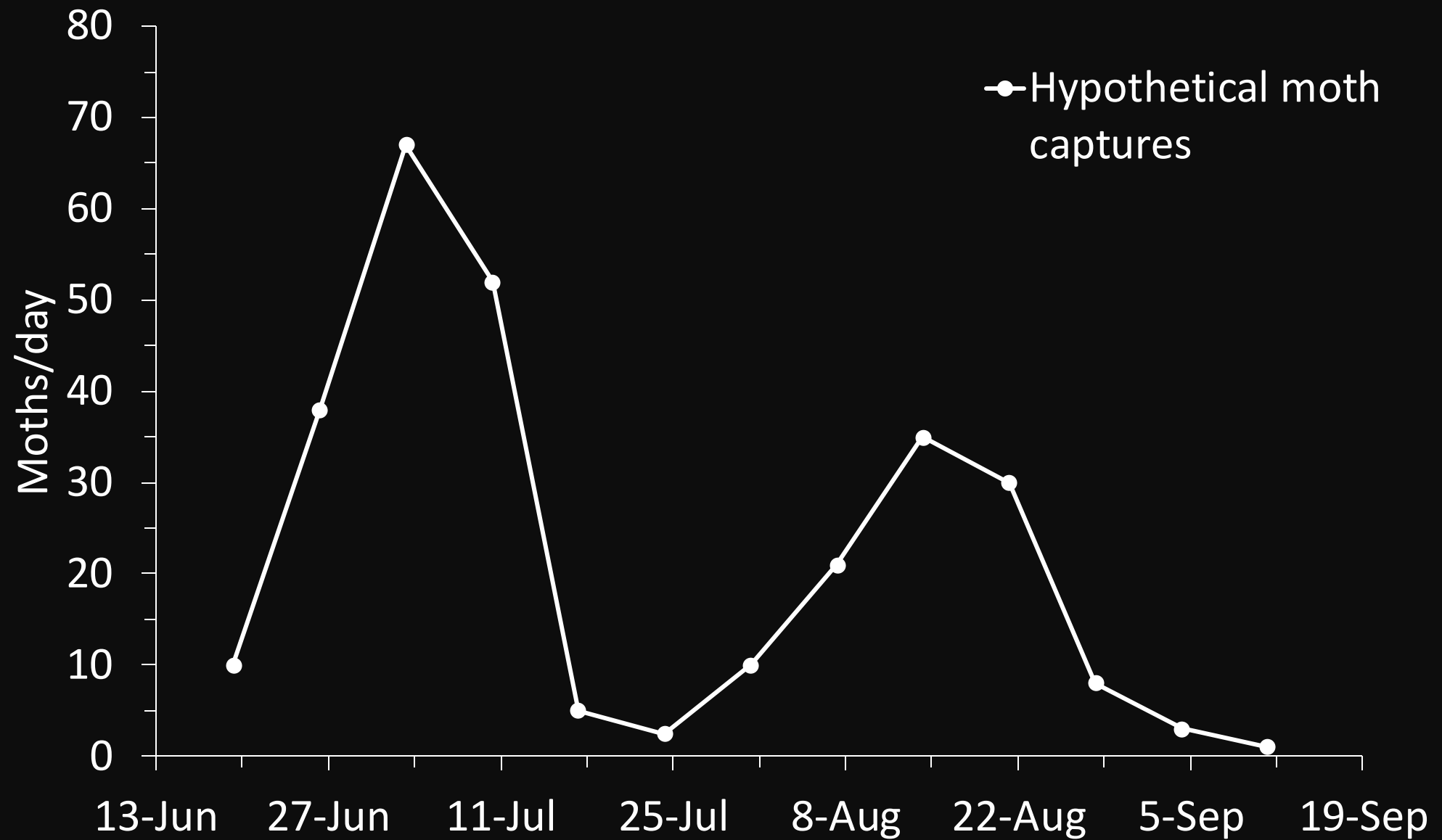


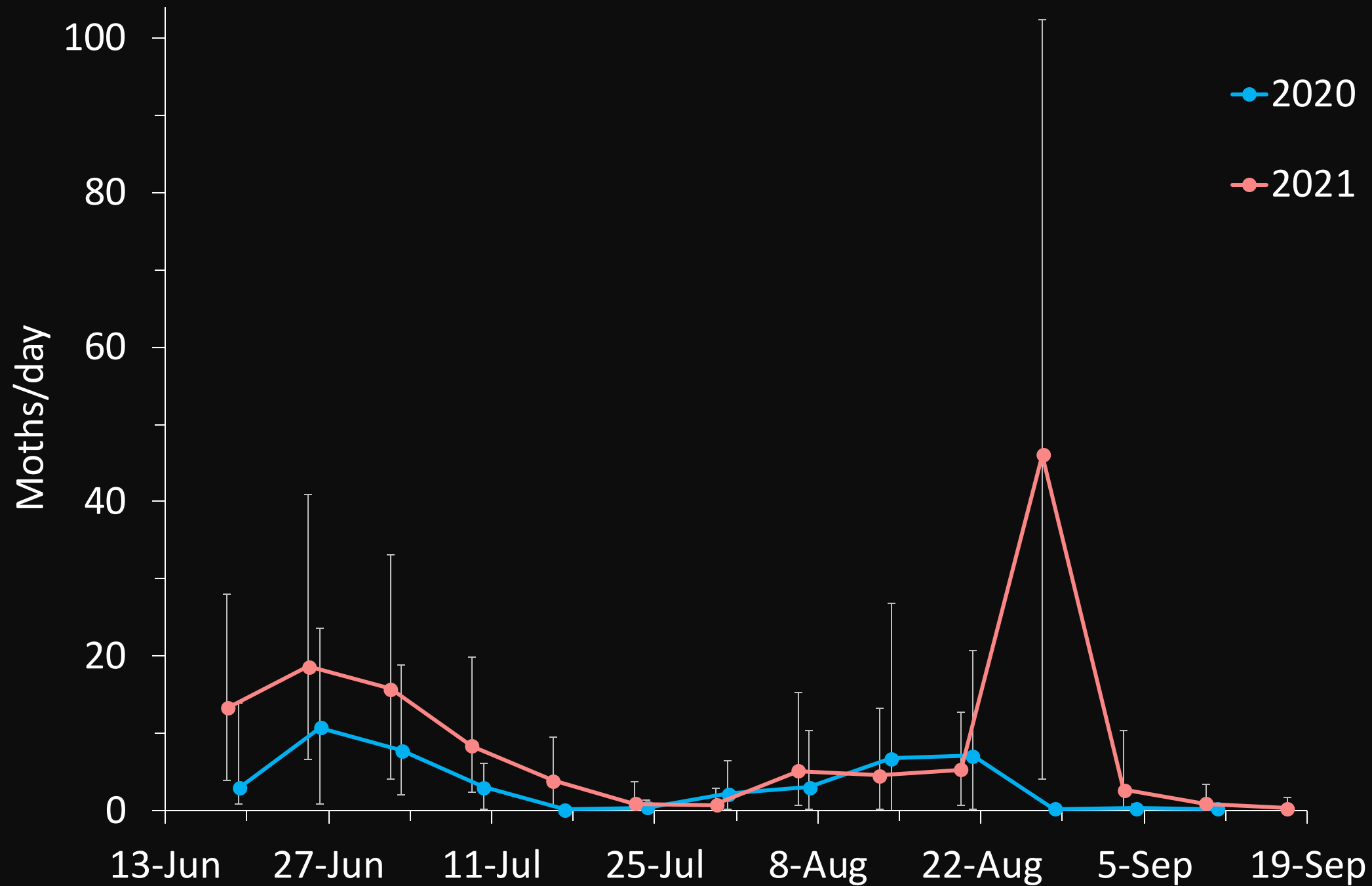
Photo by Bugwood.org

Questions:

1. Are trap captures related *temporally*?
 - A. Successive dates for individual traps
 - B. Peaks 1 and 2 for individual traps
2. Are trap captures aggregated *spatially*?
 - For given time point, across landscape

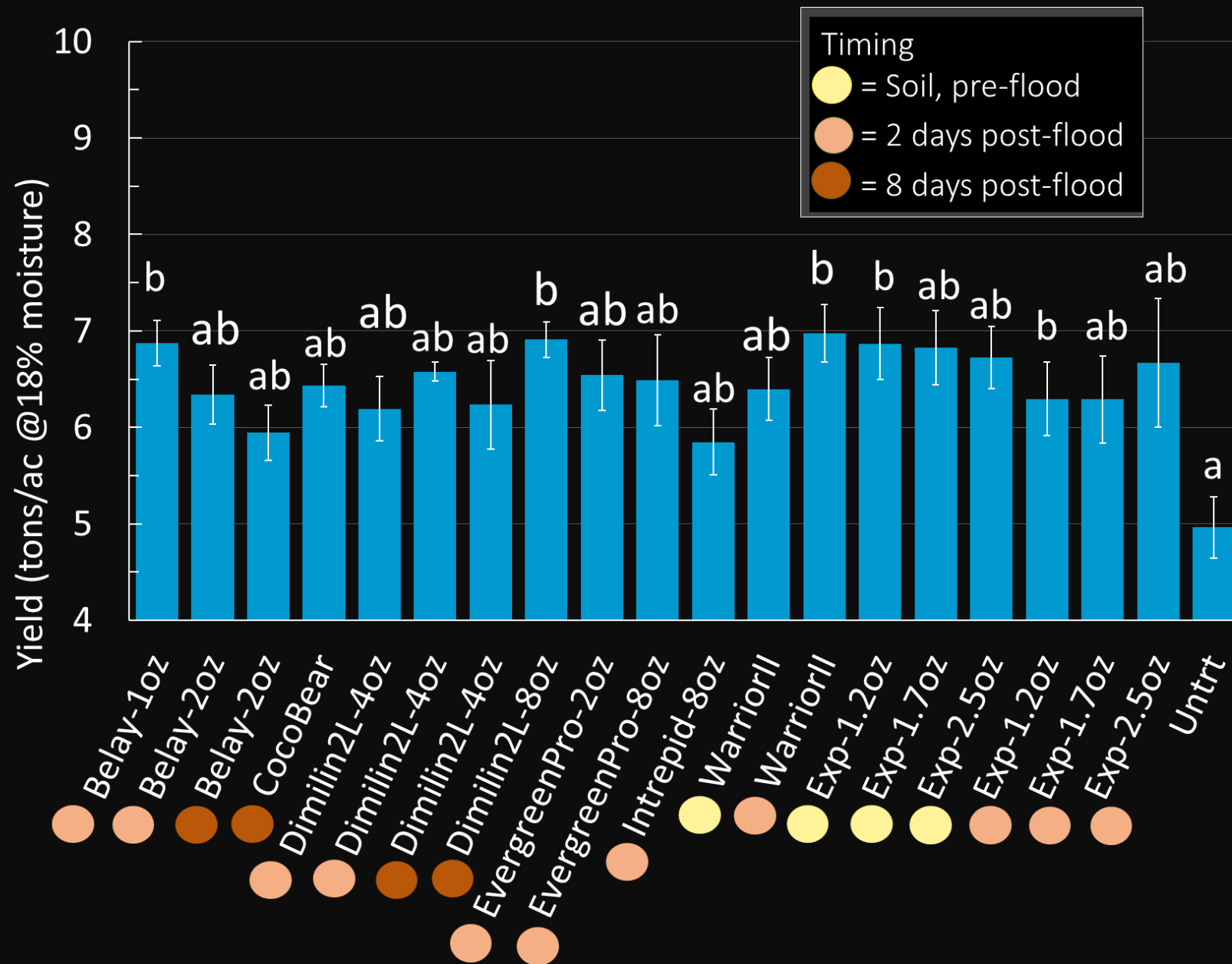


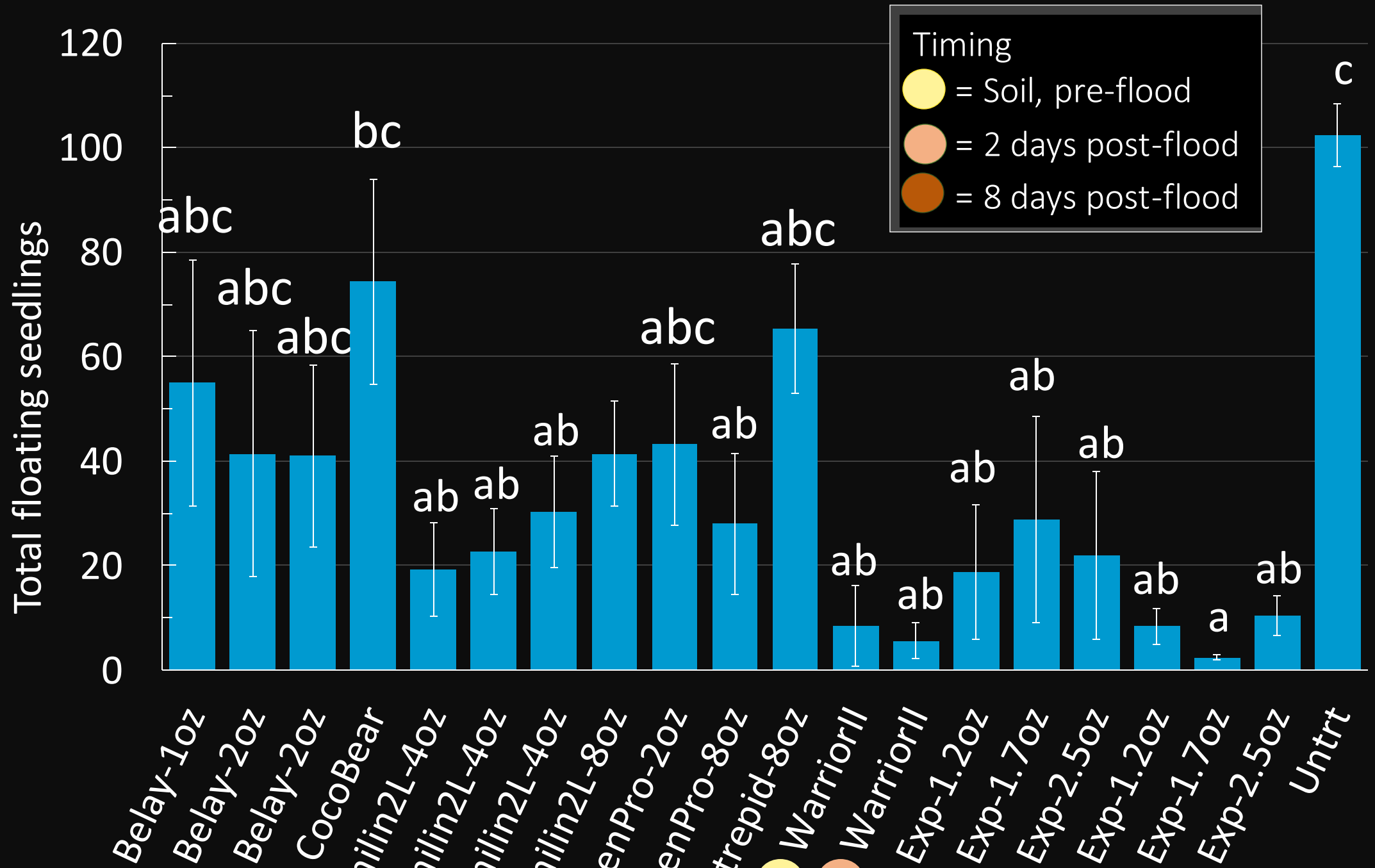


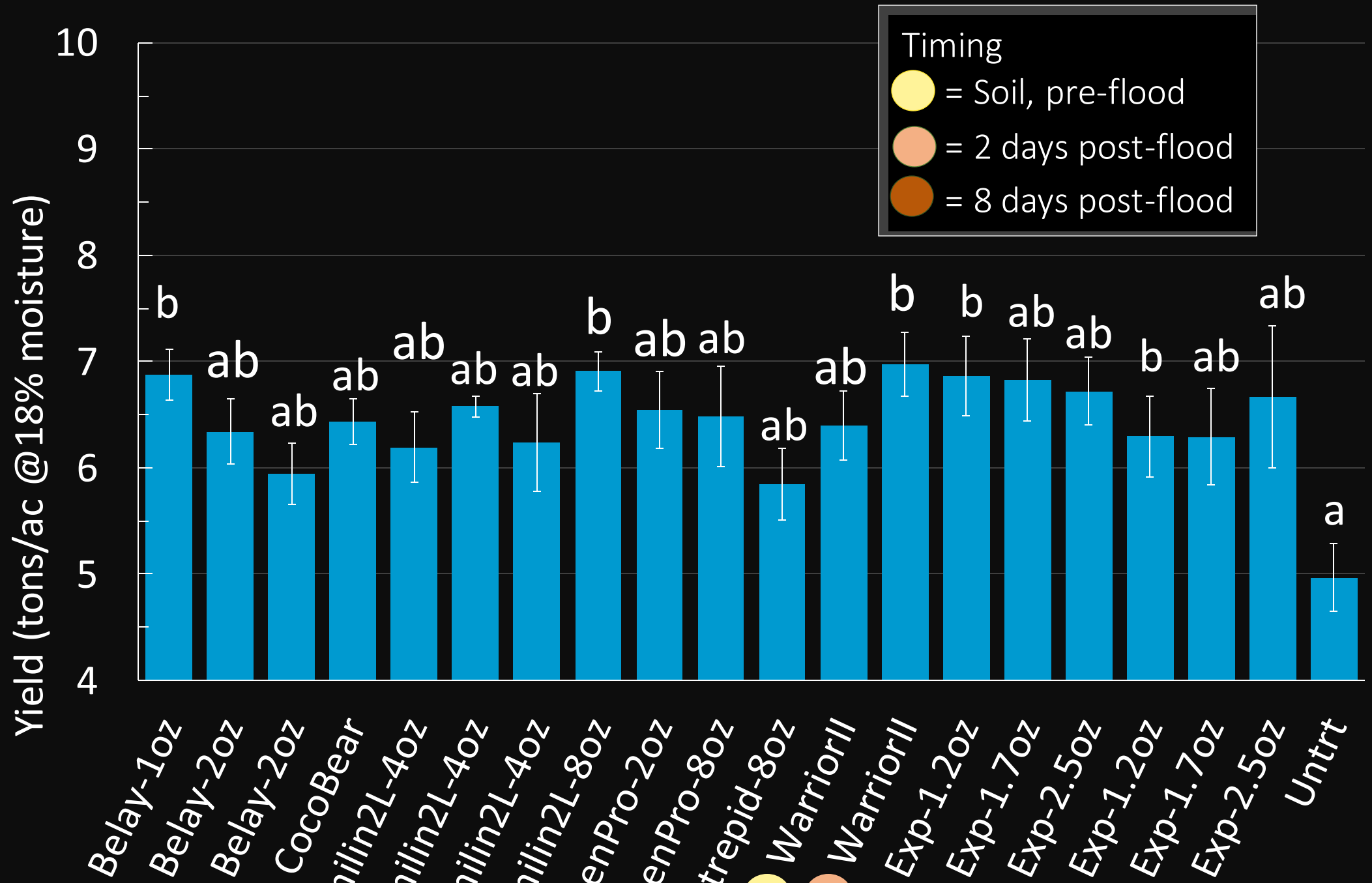


1.A. Are trap captures related *temporally*? Successive dates









cd

Timing

● = Soil, pre-flood

● = 2 days post-flood

● = 8 days post-flood

bcd

abc

abc

ab a a

a a a ab a a

a a a a a a

