Do Toads and Certain Insects come hand in hand?

By Eli Perr

About

- Question: Are certain orders of insects correlated with the number of toads found in a given area?

- Note: This project relates to Owen, Jared and Sam Q's* research which compared **number** of insects to number of toads but didn't consider **types** (in this case orders) of insects.
- *OJS

Hypothesis

- Hypothesis: Insects preferred by the toads will be found in larger numbers in areas where toads live.
- Why? Preferred insects would need to exist in larger numbers for toads to rely on them.
- Note: I was fairly unsure about types of insects and didn't know what type of insects the California Toads, the ones living in the pool studied, would prefer. I still cannot find information regarding their diet beyond eating insects.

California Toad

California Toads live in pools of water in front of Clair Tappan lodge

About California Toad

- AKA Western Toad
- Diet: waits for prey (moving insects) on ground or shallow burrows
- Fun Fact: Eggs laid in open water from February to July. Average clutch size is 100,000 eggs!

Method

- Toads: Data collected with OJS. I worked them on the first day catching and counting toads. We kept toads in water filled bins and allowed 20 minutes to spot toads in each sites.
- OJS repeated this the second day I collected their data.

- Sites: wet areas with toads, wet areas without toads, dry areas near toad habitats.
- Insects: Collected in sticky fly traps at each site.
- counted and identified by order approximately an hour after placement on first day
- Traps kept overnight counted and identified on second day approximately 24 hours after placement

Materials

- 10 Sticky fly traps
- *The Laws Field Guide to the Sierra Nevada* (to help identify insects)

Orders of insects

- Taxonomy: Domain Kingdom Phylum Class ***Order*** Family Genus Species
- Orders discovered include:
- Diptera(flies, mosquitoes & gnats)
- Hemiptera (True Bugs)
- Hymenoptera (ants, bees and wasps)
- Neuroptera (lacewings)
- Homoptera (Hoppers)

Diptera

- Lit. “two wings”->only two wings
- AKA “True flies”
- Flies, mosquitoes and gnats

Common housefly

Hemiptera

- Lit. “half wings”
- AKA “true bugs”
- Wings form an “X” pattern

Stink bug

Hymenoptera

- Lit. “membrane wings”
- Four wings
- Ants, bees, wasps

wasp

Neuroptera

- Lit.“nerve wings”
- AKA “lace wings”
- Four wings
- Thin lacy, wings with many crossveins
-

Green lacewing

Note: not included in results because only one was identified

Homoptera

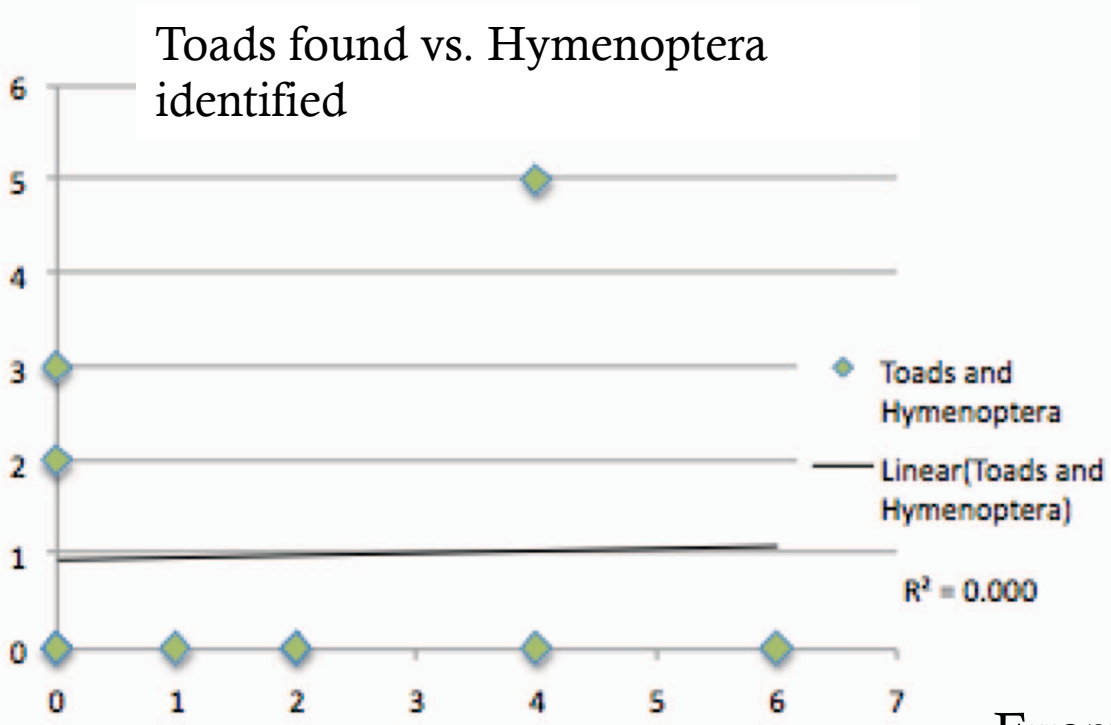
- Lit. “same wings” AKA “hoppers”
- Cicadas, aphids and leafhoppers
- Wings held over the back with a peak
- Sucking mouth parts
- Sometimes/previously considered suborder of hemiptera

cicada

Results

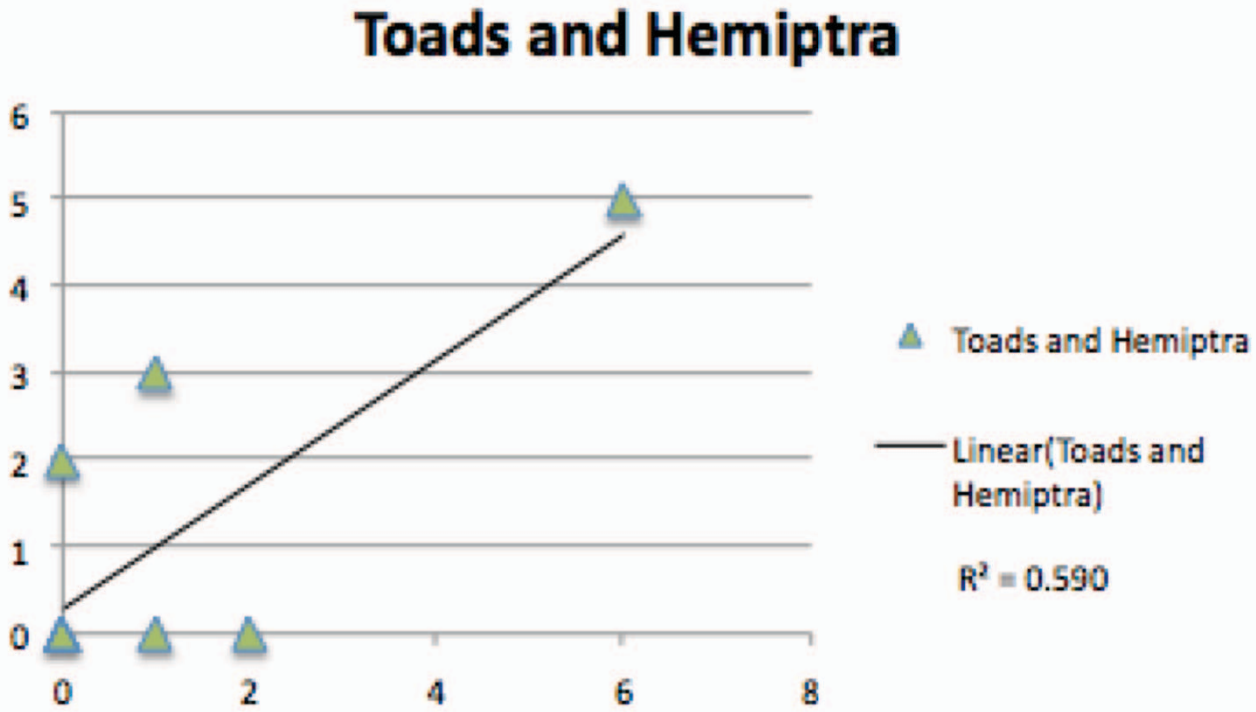
- not completely conclusive
- Day 2, more data but less reliable, as many insects seemed to be lost or destroyed overnight
- Possibly some correlation between toads and hemiptera and/or toads and hymenoptera
- See graphs

Day 1



R^2 value=0 (exactly!)->absolutely no correlation

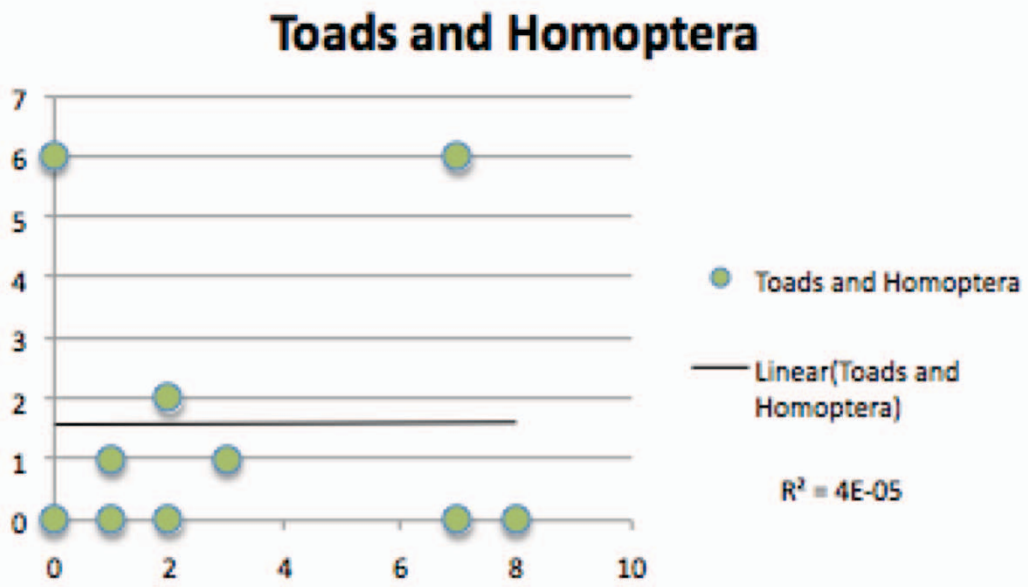
Exemplifies data found on first day for all insect orders (except hemiptra!)



R^2 value of around 0.6 considered a possible correlation in the field of ecology

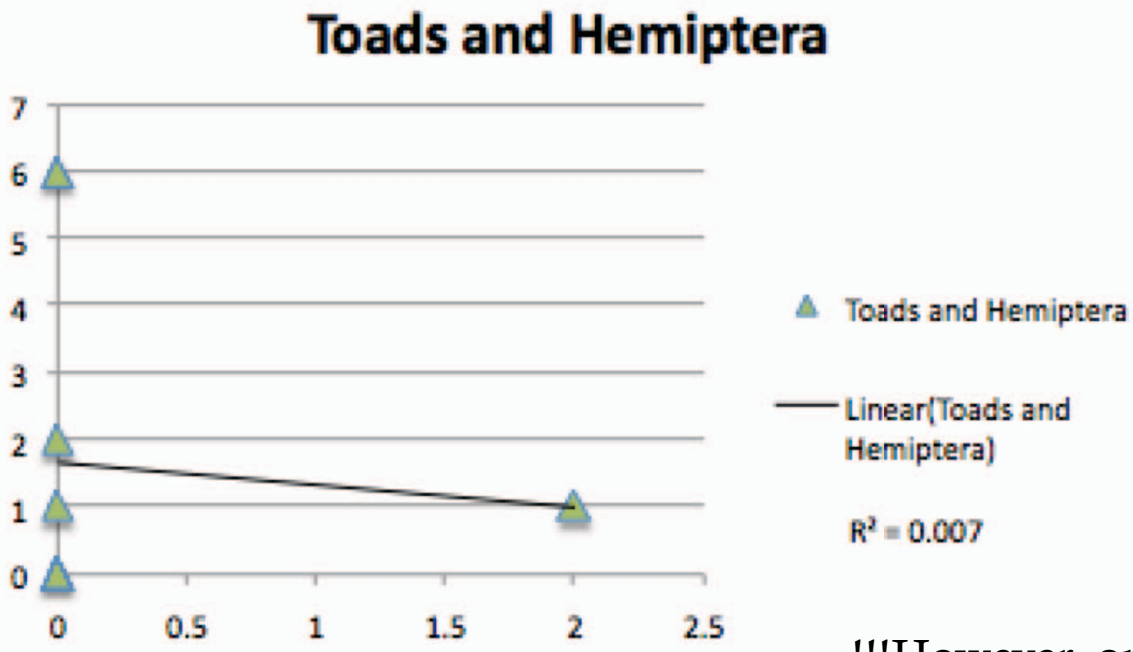
Only order that correlated on day 1.

Day 2



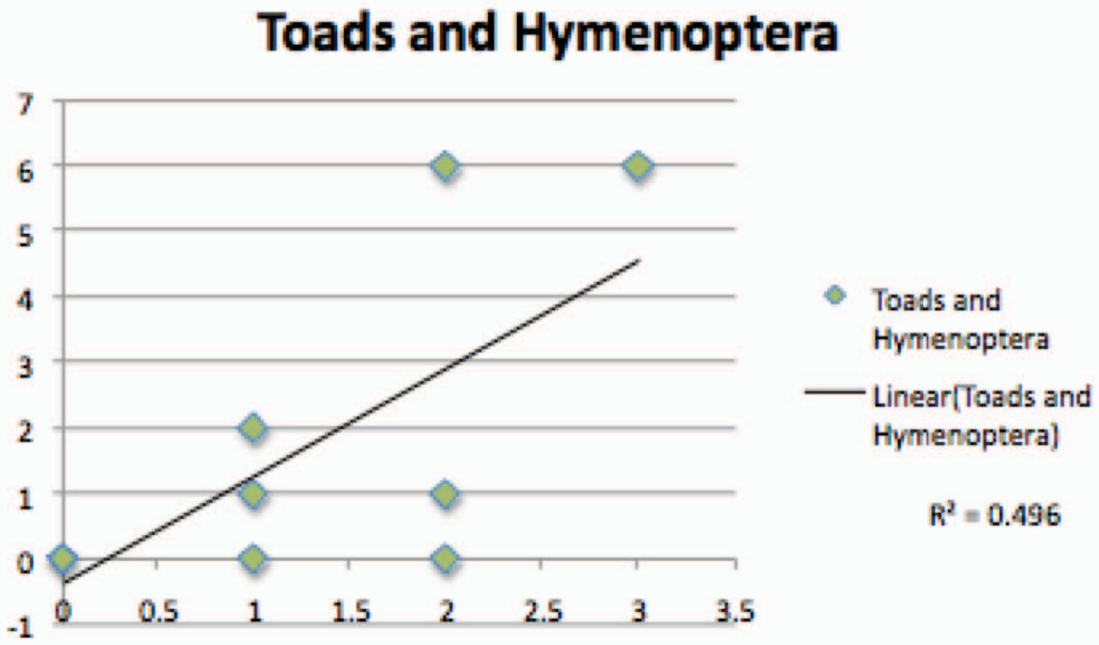
R^2 value incredibly close to zero-> no correlation

Reminiscent of most insect orders on day two.



R^2 value incredibly close to zero-> no correlation

!!!However, only one site was found with hemiptera compared to three on the first day.
-expected to increase
-data collection inaccurate: Must have fallen off/escaped overnight



R^2 value close to 0.5-> chance of correlation

Has more data changed correlation?

conclusion

- More research will need to be done to find conclusive evidence regarding correlation or no correlation

Sources of Error

- Some orders of insects more likely to fall into traps than others, escape or be squashed
- For example diptera were the most easily squashed, hemiptera easily escaped
- No beetles were found but I watched one beetle struggling and eventually escaping-> too strong
- Therefore biased to bugs who are caught, stay there and are identifiable
- In addition squashed bugs are hard to identify
- Insects smooshed beyond identification were ignored
- Uncontrolled variables in ecosystem:
- Perhaps different pools have different depths, pH values, hardness, other organisms etc.

Further research

- Do not leave traps overnight instead leave for an hour and watch carefully
- More sites and more data!
- Compare with sites not near to Claire Tappan
- Further questions:
- Do toads correlate with size of insects found?
- Do other organisms correlate with orders of insects?