

# Ecological Factors Influencing Behavior of Forked Fungus Beetles (*Bolitotherus cornutus*)

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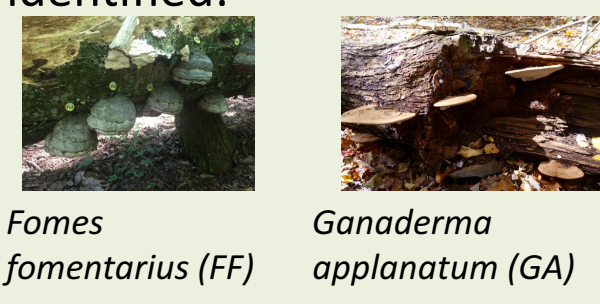
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## Introduction

Forked fungus beetles, *Bolitotherus cornutus*, can be found on rotting logs, using various species of fungus as a resource for food and reproduction. The fungi also serve as social arenas where social networks are formed. **What characteristics of these fungi drive the behavioral use of the brackets? Are different brackets used for social behaviors or reproduction?**

## Factors and Behaviors Analyzed

Ecological Factors		Behaviors	
Factor	How it was measured	Behavior	How it was measured
Host Species	Two species were identified:  <i>Fomes fomentarius</i> (FF) <i>Ganoderma applanatum</i> (GA)	Probability of Use	Whether there were one or more beetles seen on the bracket at any point in the season.
Total Size of Bracket	Volume of the bracket (cm <sup>3</sup> ).	Number of Observations	The sum of observation of a beetle on the bracket seen during the season.
Age	Qualitative scale 1-5.	Number of Social Interactions	Beetles 5 cm away or closer from another individual were recorded to be social partners. This count included mating behaviors.
Distance to Closest Bracket	The nearest bracket was calculated using the X and Y coordinates relative to assigned meridians.	Number of Mating Events	One of three mating behaviors: courting, copulation, or guarding.

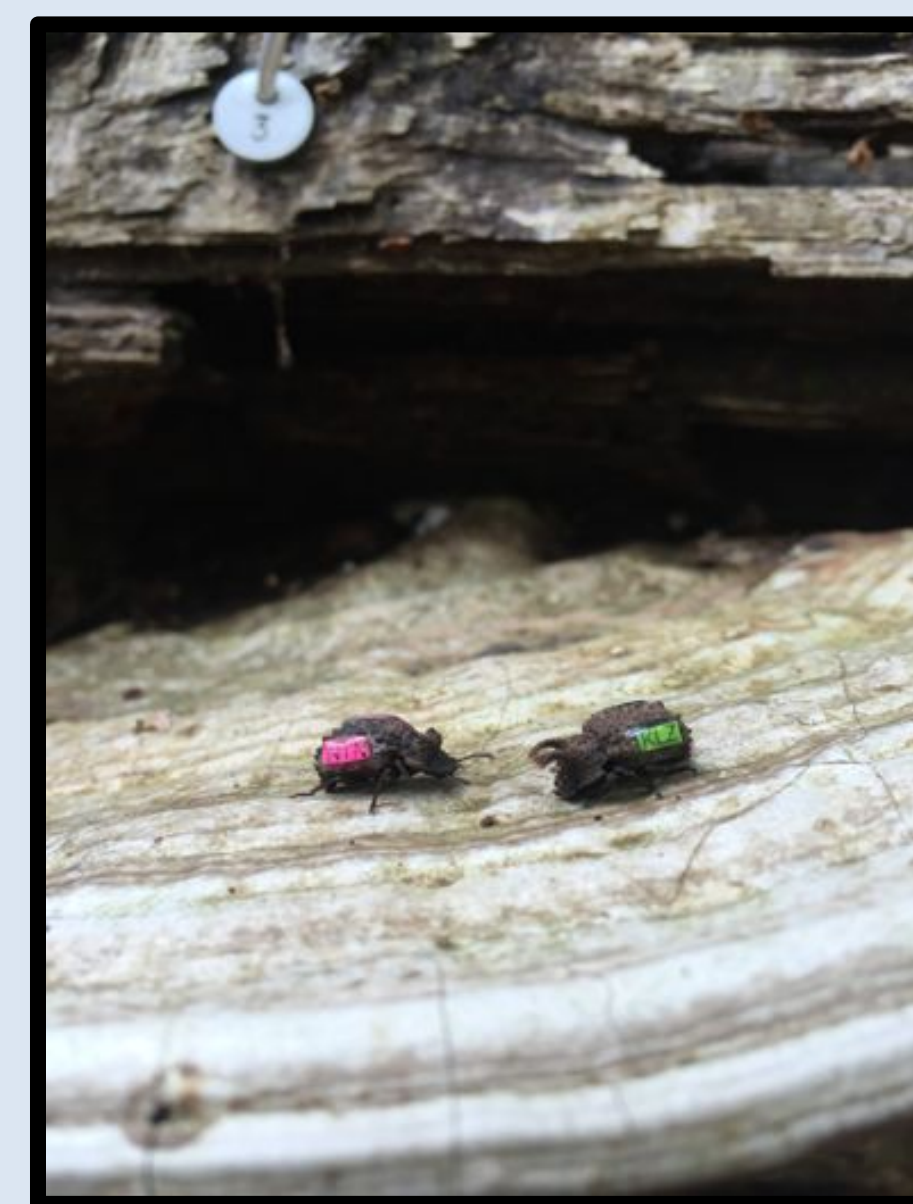
## Methods

### Field Work

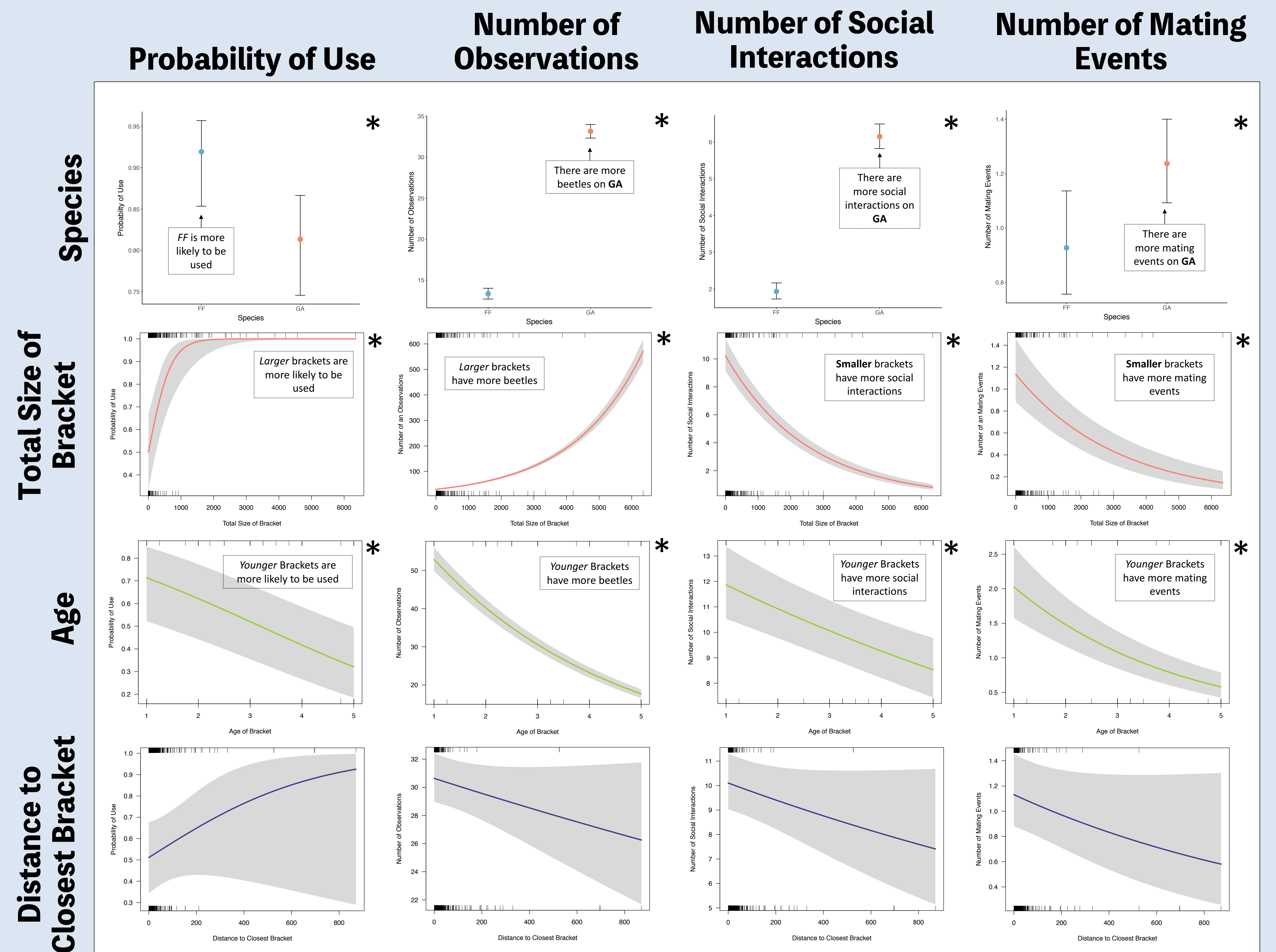
- All fungal brackets on 13 populations were searched for *B. cornutus* three times a day.
- The behavior, location, and mating/social partners were recorded when beetles were discovered.
- After the season, data was collected on the size, age, species, and location of fungal brackets in the populations.

### Data Analysis

- A *binomial GLM* was used for probability of use and the ecological factors while controlling for all ecological factors that were not in the model and the population. All brackets were analyzed in this dataset.
- A *Poisson GLM* was used for the number of observations, social interactions, and mating events. This dataset only had brackets that were used at least once in the season. The following was controlled for:
  - Population
  - The ecological variables that were not the factor being analyzed
  - The number of observations (for the social interaction and mating behavior models).



## Results



\* statistically significant

## Discussion

- Younger brackets have greater behavioral activity. Younger and larger brackets would have more live fungus and therefore be a greater resource. The energetic value of the resource could also explain why *G. applanatum* had more activity.
- However, **the amount of resource did not drive social or mating behaviors** since more of those behaviors were observed on smaller brackets. On a smaller surface there is a greater chance that the individuals will be within a 5cm length of one another if on the bracket. Furthermore, this is the distance estimated for chemical signal transmission which would explain why individuals on this bracket may have mated more as they were able to identify those possible mates.
- The distance to the closest bracket had no influence. Would a measure of distance to all brackets represent the spatial distribution better? Do brackets that are more clustered affect the likelihood of the behavior counts?
- Further research could include GIS analysis of the entire populations to determine the distribution of all brackets relative to one another. The nutritional value of the two species of fungus could also be determined to see if that is driving the difference in activity amount.

## Acknowledgements

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