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PRA0003

Assignment #4- Determining Species Richness for the taxa *Coleoptera* of Ontario, Canada

ABSTRACT
Beetles are the largest order of insects and these abundant species existing in various ecosystems can help serve to understand species richness. Large organisms such as the Coleoptera that are easily identifiable are difficult to examine on the basis of complete census. Hence, to understand species richness for the specific taxa, *Coleoptera*, we surveyed a number of plots, or trees, in a forest to estimate the total number of species that would be present. A plot of known area was sampled and every species found in each plot was observed. The data obtained included the number of species per plot and from that data the new species per plot and the cumulative number of species encountered was determined.

INTRODUCTION
Extrapolation of species richness can help determine an estimate of the number of species of an abundant organism that may be difficult to identify by means of counting each individual. Specifically focussing on insect species in Ontario, the beetles from the order *Coleoptera* are the largest order of insect species (Wettlaufer et. al., 2018). Due to their large population, these insects are useful contributors to ecosystems. For example, they help pollinate, control other insect populations, help decompose ect. Moreover, by understanding the species richness of the beetles in Ontario we can get a good understanding about the ecosystem they contribute to. The experiment conducted in the lab surveyed a number of plots, or trees, to find an estimate for the total number of species present. Its hypothesized that the results will show an increased number of additional species after observing the first plot since more species of the *Coleoptera* will be observed after the first plot, or tree. The cumulative number of species observed will increase as more species of insects are found in the plots following and then stabilize showing the cumulative *Coleoptera* species across the plots. This is an indicator of the true species richness because no more new species of *Coleoptera* can be observed. The results will show a declining rate after because no more new species of *Coleoptera* will be observed.

A similar study conducted a beetle inventory across northern Ontario in determining species richness for the tiger beetles, *Coleoptera repanda* (Jumean et. al., 2017). They reported new extensions for the tiger beetles that was previously not observed, such as the *Cicindela longilabris* (Jumean et. al., 2017). Tiger beetle species were collected from North Ontario in multiple sites and pitfall traps were used to collect the species (Jumean et. al., 2017). At Queen's University eleven new species of carrion beetles, *Coleoptera silphidae* were discovered to coexist across different habitats between ground and forest canopy *Coleoptera silphidae* (Wettlaufer et. al., 2018). The *C. silphidae* were collected by plotting 50 randomly generated points of baited lethal traps (Wettlaufer et. al., 2018). Both studies have shown that there is a wide range of species richness that is present that we are unaware of. By going out and sampling

the species present, we can determine an estimate of the total number of species present and find new populations that were unknown to the habitat.

RESULTS

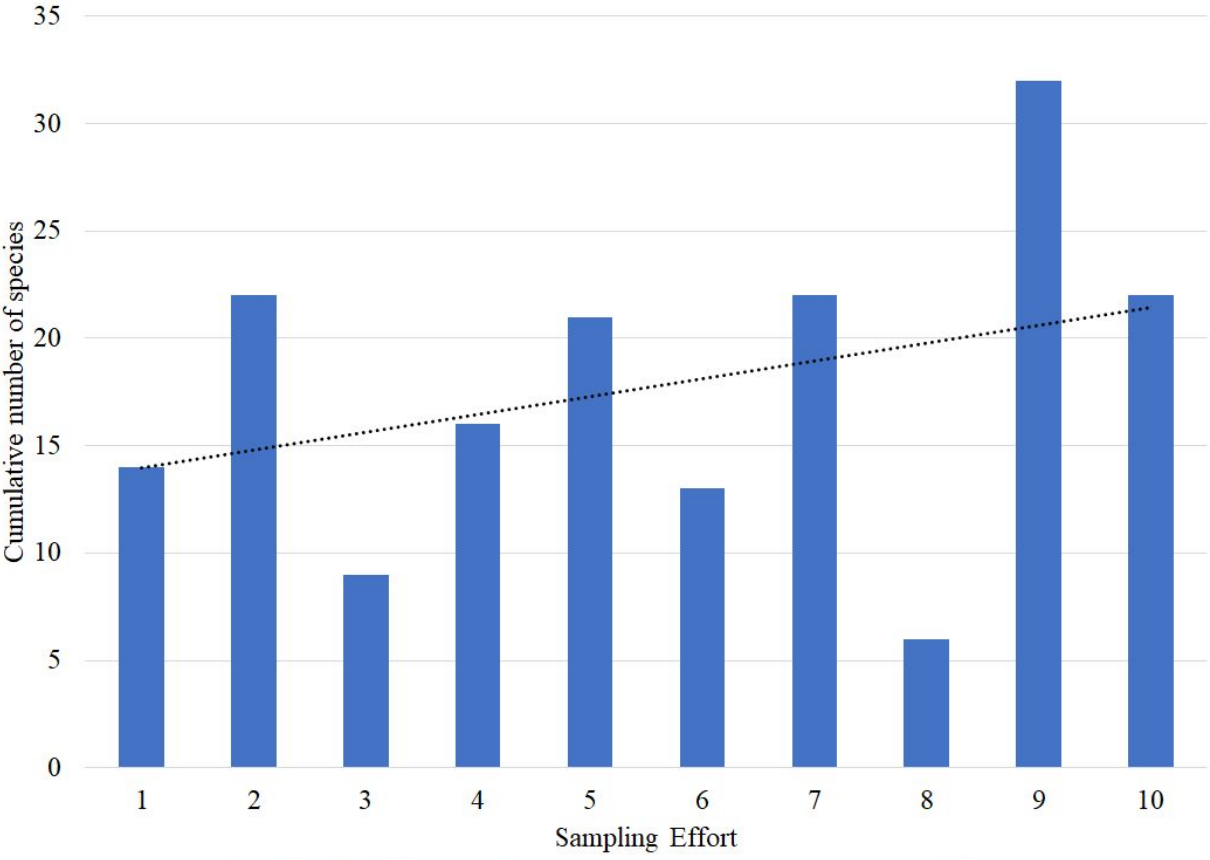

Figure 1. Cumulative number of species per sampling effort found for the taxa *Coleoptera*

QUESTION

A challenge of specimen collection for insects is the use of pitfall traps or light traps. Such traps are placed so that the organism is unable to escape. This form of passive collection can be a problem if the organism is able to send a pheromone, or chemical signal, warning the others of the trap. This may alter the data because in addition to the species of that organism, similar species of that organism that is able to pick up on the signals may not come towards the trap. This will give an inaccurate of the species of organism that is being collected. A solution to this problem would be to monitor the area surrounding the traps using cameras to see the movement of organisms surrounding the area.

REFERENCE

Jumean, Z., Oldham, M. J., Fleming, K. J., Duran, D. P., & Beresford, D. V. (2017). Geographic range updates for the tiger beetles (coleoptera: Carabidae: Cicindelinae) of northern Ontario, canada. *The Coleopterists Bulletin, 71*(4), 707-720. doi:10.1649/0010-065X-71.4.707

Wettlaufer, J. D., Burke, K. W., Schizkoske, A., Beresford, D. V., & Martin, P. R. (2018). Ecological divergence of burying beetles into the forest canopy. Retrieved from https://doaj.org/article/ccebf63daeac42e8b88ed949d1f86036.