SASTA OLIPHANT SCIENCE AWARDS

SOUTH AUSTRALIAN SCIENCE TEACHERS ASSOCIATION

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Citizen Science

Secondary

ASMS Class Project 1

Australian Science and Mathematics School

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To what extent does the weather impact the activeness of insects?

Insects hold a significant role in being able to maintain healthy ecosystems. They keep the soil healthy, recycle nutrients, pollinate flowers and crops, and control pests (World Wildlife 2023). Weather has always held importance in controlling the development and quantity of insects in different environments. Warmer weather is recognised to increase the amount of insect activity due to increased reproductive rates, which in some cases may lead to insect infestation and invasion. Due to the creatures being warm blooded, weather has a larger impact on their likelihood of survival in warmer months, causing migration to warmer areas and an influx of insect activity as the temperatures grow warmer.

In cases of cold weather and rainfall, insects and bugs hide to keep warm causing less insects and bugs to be seen. This project was chosen because of the diversity of ecosystems at school. Before finalising on this project, a discussion was done in class about the interests of each student. As a LSG we came up with the idea of going outside and recording the bugs we see to verify the health of the ecosystem in the back of our school. Through this project we got to investigate the potential impacts on insect health there may be due to changes in weather as insects are an essential part of the environment and local ecosystems. This is due to concerns with climate change in the future possibly majorly affecting the amount and density of insect populations within the natural environment. Our project was focused on finding a link between insect number and environmental conditions and extrapolating the effect of future climate on insects. By confirming the effect of weather conditions on insect populations, further arguments could be formed against climate change and its numerous destructive effects.

In a time span of 6 weeks, we went outside every Thursday between 12:30 and 12:50 pm. Eeach student chose a specific area to look after for the time the experiment was run for. Every Thursday 10 minutes were allocated to data collection. If there were any insects the students couldn't recognise a picture of the insect was uploaded to an app called iNaturalist. From the data we collected, each student reflected on the area they chose and the insects they saw.

Student perspectives:

The area surveyed by students Max and Luca was a wet woodland, with many debris, including fallen tree branches and built up leaf litter. The soil was moist, loose, and nutrient rich, providing a very suitable environment for many insect species to inhabit.

The area observed by the larger group consisted of heavily controlled wet woodlands consisting mostly of gum trees and other large trees. The ground consisted mostly of small grass fields in the gardened area. Where there has been a limited amount of interference a far more natural layering of leaves and organic matter this could have been a point of inconsistency for the other groups, as the natural layering would promote arthropods.

The area investigated by students Lakshana and Macy was next to a small body of water that was only filled with water on the days where it was raining. Next to the body of water was a fallen over tree that many insects would hide in. Lizards were found in the pound when it was dry and many ants were found hiding in the tree. Edie investigated an area that was next to a large rock. Many ants and millipedes were found in the grass, shaded by the rock.

We collected quantitative data to display how many bugs were seen and qualitative data to display specific species which were seen.

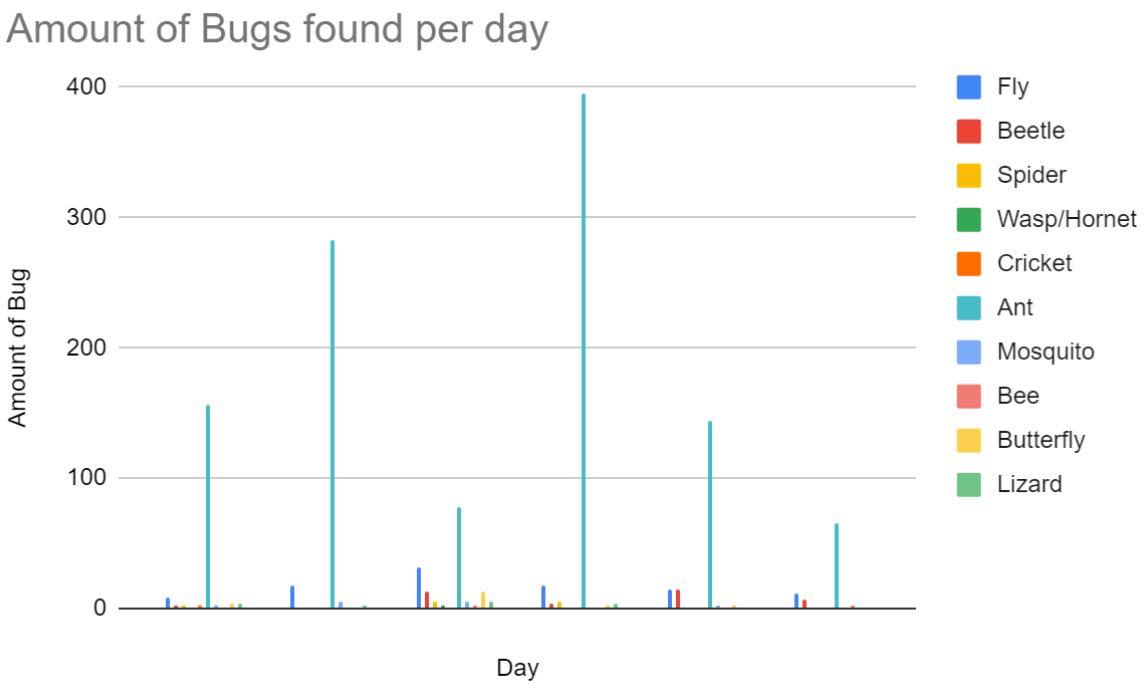

Figure 1: Number of Bugs found per day

Upon observation of the graph within Figure 1, it is shown that ants are primarily the most recurring species each day within the chosen area were ants. Within these recorded numbers, it is likely there were recounts of some ants since there were ant nests present. Because of this, approximations regarding the number of ants observed were made. This is likely the reason the number of ants recorded is increasingly larger than other recorded insects. A factor that may have impacted the total number of insects observed could be the weather conditions for certain weeks (Table 1). During the data collection period, some weeks would have more abundance of rain than others. From prior research, it was found that rainfall can impact certain insect species by disrupting feeding activities. The colder weather would also greatly impact insects. From the research conducted prior to data collection, it was found that lower temperatures can inhibit insect activity. This is due to insects being cold blooded.

Table 1: Weather and conditions on data collection days.

Date	**Weather (^{0}C)**	**Conditions**
16/03/2023	24	Bright and Sunny
23/03/2023	27	Bright and Sunny
30/03/2023	17	Moderately Cloudy
06/04/2023	26	Sunny
13/04/2023	20	Moderately Cloudy
04/05/2023	16	Overcast

Figure 1 does leave out some outliers in numbers though, as some bugs were only sighted in 1 week. In order to keep data readable and to-the-point, many of these outliers were discarded in favour of consistent sightings across weeks.

From this project, we have learned about the importance of bugs in the ecosystem, and how the climate and weather can affect the numbers of bugs present and within view. This data could potentially be compared to bug records in the future to assess the damage climate change is doing, or to records in the past to assess what damage has already occurred to bug numbers. Using this data, the effect on the environment could be extrapolated, as bugs are an essential part of the environment and surrounding ecosystems. Presently, it has little use, as the small dataset makes it difficult to find a strong correlation between the number of bugs found and conditions surrounding the day they were sighted.

Limitations of data collection:
This data is limited due to a variety of reasons, the main ones being the distance between data collections and the faulty methodology. Data was only collected once per week, and even though the conditions at the time were noted, the reliability of the data could be improved if more days were allocated for finding bugs. There is also limitations on the amount of time given to locate and note down bug numbers, with 1 Learning Studies session (40 mins) given once a week to complete data collection. Similar to the number of days allocated to collecting data, if the amount of time per day to collect data was increased, the results could be seen as more reliable due to increased time to locate bugs that may have otherwise been missed. Even if these factors were changed, some issues with the way data collection was conducted would likely effect the data the most. The main issue with the method of finding bugs is that wide areas with little cover were often checked, which tend to have lower amounts of bugs due to their vulnerability out in the open. This may have contributed to the large amount of ant sightings, as ants travel more commonly in open areas while scavenging for food. Areas with a potentially higher bug density (such as within bushes, under rocks and in areas with high coverage) were mostly ignored, due to difficulties in accessing these areas.

Timing is an essential factor to consider as well, as the similar times that each period of data collection was completed allowed for similar types of bugs to be found, as varying the timing within the day or into night would produce unfair observations. These observations would not be valid as due to differing sleep and active cycles, some bugs are only moving around during certain times, such as night or day. As we kept the time within the day the same, the sightings were fairly consistent within the data collection periods.

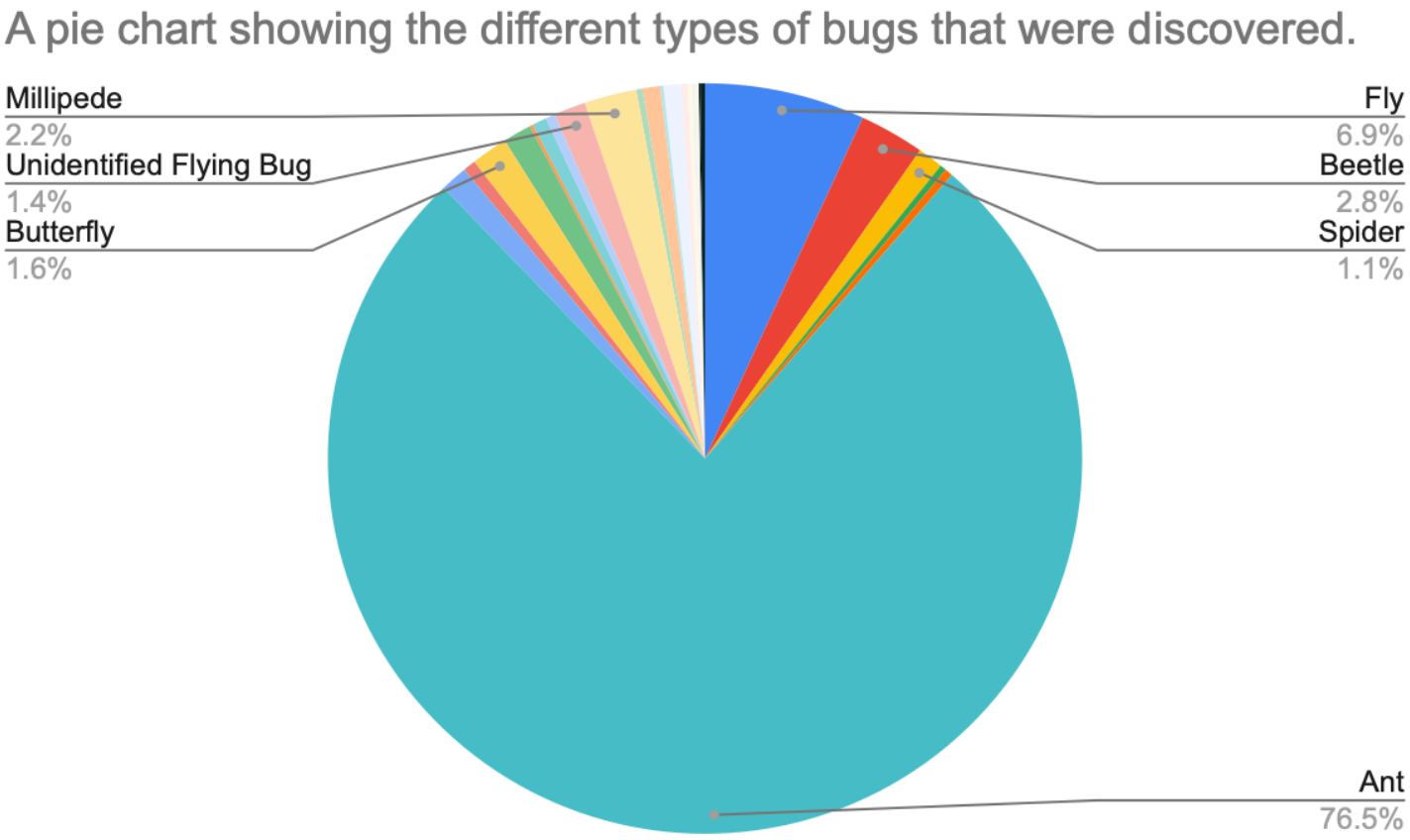

Figure 2: A pie chart showing the demographics of the bugs found in the area.

This pie chart shows the types of bugs that we found and the number of bugs that we found. As observed in the pie chart, the bug that was found the most was the ant, with Ants accounting for over 75% of all bugs found.

From this report, it is difficult to come to a solid conclusion. However, it can be seen that the number of bugs seen in raining and colder conditions were less than those seen in warmer and drier conditions. This indicates that insects thrive in warmer conditions, and they seek for shelter in colder conditions causing them to not be seen as much. Therefore, it can be assumed that a global shift towards drier climate, such as an El Nino that is currently or will soon be happening in Australia, will reduce the general number of insects present.

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