Analysis – investigating the effects of trampling on

A basic trend can be drawn from the results collected. The kite diagram emphasises clearly the effects of trampling on species distribution near footpaths. On the path very little to no species grew, whereas towards the edges of the footpath there was an increase in species number and variety.

Moreover, the data gathered from testing the footpath for compaction revealed that the path itself has greater compaction than the areas to either side of it. Further more, the drainage time of the soil showed a similar trend in that where areas of soil were more compact, the drainage time was higher. Also where areas of soil were less compact the drainage time was less. The spearman's rank value supports this trend by revealing a positive correlation between the drainage time and the compaction of the soil.

The kite diagram reveals the trend that less species tend to grow on footpaths. This is due to the fact that as people walk on the footpaths the soil becomes increasingly compact. This leads to the soil particles being forced closer together creating a decrease in air space which results in the water taking longer to drain into the soil. As soil becomes compact, root growth is inhibited due to lack of air space. The roots grow shorter and thicker which largely decreases the overall surface area of the roots which leads to the plant being unable to absorb adequate nutrients and moisture. Moreover, as the roots become inhibited, they are limited to the amount of soil they can explore. This can decrease the plant's ability to take up nutrients. Similarly, as water runs off compact soil it dissolves the nutrients and carries them away, a process known as leeching.

As the drainage time is far greater on the footpath, this lack of water results in the soil having very little nutrients. The lack of air space reduces the number of aerobic bacteria. Atmospheric nitrogen is fixed by bacteria. Lack of bacteria will result in a decrease of nitrates for the plants. Plants need nitrates for proteins and for nucleic acids and will die without these. The nitrogen cycle is unable to progress as less water and oxygen leads to fewer microbes and less decay which results in less nutrients. Compact soil may hold little water which will lead to plants with xerophytic adaptations being able to thrive.

More plants are able to grow better in less compact soil due to an increase in the air space available. This can provide the roots with space to grow and the water with space to drain through. Therefore more nutrients and water provide the plant with adequate living conditions. Grass has a very low growing point allowing it to survive after being cut short. Its rolled leaves provide added protection when being trampled upon.

From the kite diagram we are able to see that grass can grow on the footpath but there is less of it. This maybe due to the possibility of the footpath not being used by the public for a while, thereby giving the grass time to develop. However, as grass has its growing point at the base of the plant, and is therefore not damaged when cut, grass is better adapted to survive in trampled areas than other plants that have their growing points in more vulnerable areas. Rosette plants have a growing point which is protected by leaves which emerge from a central point. This enables the plant to be highly adaptable to varied conditions. In contrast, the Violet plants are very delicate and their growing point is exposed. This results in

the plant being less adaptable and more likely to survive in well controlled, less compact environments.

The plant Heather prefers slightly more acidic soil to obtain the best growing conditions. They also need a significant amount of moisture in the soil, which will not be found on highly compact pathways. The growing point of Heather is quite vulnerable, being at the base of a plant that will often spread out. The kite diagram supports this as no Heather was located on the footpath.

Spearman's rank calculation demonstrates a positive correlation between the drainage time and the compaction of the soil. If the soil is less compact then in general, the drainage time should be less also. Similarly, if the soil is more compact then the drainage time should take longer than normal. Water that is trapped in compact soil has difficulty moving up through the soil surface where it can evaporate and reduce soils temperature. Therefore the soil water in compact areas can heat up from increased thermal conductivity of the denser soil.

This can cause significant damage to the roots of plants. Compaction can result in significant reduction of the rate at which rainwater can penetrate the soil's surface. This is confirmed by the spearman's rank calculation showing a positive correlation, and the data gathered when measuring the drainage time of both compact and less compact soil on the footpaths. Heavily compact soil has a reduced rate of both water infiltration and drainage from the compacted layers. This is because compact soil contains few large pores which are the most effective in moving water through the soil when it is saturated.

In conclusion, the reasons why trampling on species near footpaths affects their distribution is due to a range of factors; the soil compaction, drainage time and the species itself. The soil is proven to be generally more compact on the footpaths than in the surrounding areas. This compact soil on footpaths leads to increases drainage time as the soil has less pores or air space which would normally aid water absorption. The growth point of a plant can also be a factor as to why trampling on species on footpaths affects their distribution. A trend was shown from the data collected that grass, a very adaptable and sturdy plant, was able to grow on footpaths and withstand the trampling.

This is due to grass having a growing point at the base of the plant where it is protected well. In contrast, the Violet plants were recorded to only grow in the surrounding areas of the footpaths. This is due to the growing point being highly exposed. The spearman's rank value shows a positive correlation between drainage time and the compaction of the soil. As the spearman's rank value is greater than the critical value, 0. 414> 0. 377, it can be valued as reliable. Moreover, the confidence level of the spearman's rank calculation is 95% which can be valued as very reliable.