**Martin Down: a Long-Term Monitoring Network report**

The information presented here is a summary of the vegetation data collected through the LTMN project. LTMN aims to investigate environmental change over decades, and the project is still relatively young. Nevertheless, we are starting to reach three surveys for each site and it is possible that trends may be starting to emerge. This form of report has been structured so that as each new survey is implemented, the data is added to this report and will be available rapidly after data collection. The content is also being updated and we would greatly appreciate any feedback on the kind of information that is most useful, which parts of the report are difficult to use and any site specific data to present (such as individual species or groups of species).

Surveys are normally undertaken at similar times of year, but slight differences in survey date or interannual variations might have affected the species present.

**Habitats**

The sites of the LTMN project have been chosen to represent key UK habitats. Individual plots are assigned a BAP broad and priority habitat when data is collected, and where this categorisation is missing, it is filled using the other available data (such as NVC habitat classification).

Each circle on the map represents a plot or quadrat. The locations of the plots are fixed so that they can be revisited during each survey. This means plots can be compared from year to year. The exact location is recorded using feno markers placed in the ground. Sometimes these are lost between surveys and in such cases, the coordinates are used to roughly match the location. This can mean that sometimes the plots move a couple of metres. In some cases, not all plots are surveyed each time, typically due to time restraints on the survey.

There are usually a mix of habitats on LTMN sites with certain habitats being more prominent. We take roughly 50 quadrats each survey which means that the lesser represented habitats usually make up around 2-4 quadrats each. We will in general omit these from the analysis as they are not numerous enough to trust that any changes are not due to chance.

After the plant species data has been collected for each plot, it is processed using MAVIS software which uses the plants and their frequency to categorise each plot into an NVC community. ~~classifications~~. The matching coefficient (the confidence with which MAVIS has ascribed the plot to the NVC community) can be seen by hovering the mouse over the data points on the map below along with the NVC community ~~subgroup~~ (NVC community :confidence).

For each habitat, the individual NVC community split is displayed below over the years.

**Species**

Species richness (the number of different species found in each plot) and Simpson’s diversity index are recorded and mapped onto the site. A darker shade of blue indicates a higher richness/diversity. Only plots from the most recent survey are included on this map.

A community dominated by a small portion of the species is considered to be less diverse than one in which more of the species present have a similar abundance. The Simpson diversity index takes this into account as well as total species present. Values of diversity range from 0 to 1 with 0 meaning a total lack of biodiversity (monoculture) and 1 meaning a completely even spread of species.

**Vegetation structure**

The vegetation height in a plot is measured by placing a disk on top of the sward and letting it fall until it is supported by the vegetation. This is done in each division of the larger quadrat and the height is recorded. The average of these is then taken for each plot and is given in cm.

Presence of litter is recorded in each of the 25 subdivisions of the larger quadrat and each plot is then given an overall recording of 0-25 for presence of litter.

Presence of bare ground is recorded in each of the 25 subdivisions of the larger quadrat and each plot is then given an overall recording of 0-25 for presence of litter.

**Ellenberg scores**

These are scores of ‘light’, ‘fertility’, ‘pH’, and ‘wetness’ for each plot, derived from the plant species present. A high wetness score means the plants in that plot favour a wet environment and a low fertility score means the plants favour a relatively infertile soil. Ellenberg scores were first assigned by Ellenberg *et al.* (1991) for a large number of European flora species, based on experimental work as well as field observation. These scores were assigned using a central European environment and so were later adapted by Hill *et al.* (1999, 2000) for the British environment.

The pH scores here are not ‘pH’ but a value of alkaline preference of the plants found on the plot. They have no units and do not scale in the same way that pH scales (with 7 as neutral). Large scores mean that the plants on the plot prefer alkaline soils.

The light Ellenberg score gives an indication of how the plants on a plot favour light. A score of 1 indicates the plant prefers deep shade at all times, a score of 5 indicates semi shade and a score of 9 indicates the plant favours full light.

The fertility Ellenberg score gives an indication of how the plants on a plot favour nitrogen in the soil. A score of 1 indicates the plant prefers minimal levels of nitrogen, a score of 5 indicates an average favourability and a score of 9 indicates the plant favours excessive supply.

~~A score of 1 indicates the plant prefers extremely acidic soils, a score of 5 means mildly acidic conditions are preferred, and a score of 9 indicates the plant favours alkaline soils.~~

The wetness Ellenberg score gives an indication of how the plants in the plot prefer the wetness of the soil. A score of 1 indicates dry soil is preferred, 5 would indicate the plants favour a moist soil, 9 suggest wet soil is preferred and a score of 10-12 indicates the plant favours underwater conditions.

**Grime’s scores**

Universal adaptive strategy theory (UAST) is a method of categorising plants according to their survival strategy. There are three main ways in which a plant can specialise in order to take advantage of its environment. The first is by taking advantage of availability of resources and maximising acquisition at the expense of competitors. Plants are given a ‘competition’ score to represent the extent to which they use this strategy. The second is by being able to deal with a small amount of resources while other species are not able to thrive in such a stressful environment. Plants are given a ‘stress tolerator’ score to represent the extent to which they use this strategy. The third and final strategy is for rapid completion of the life-cycle which can be advantageous in disturbed environments, frequently lethal to other plants. Plants are given a ‘ruderals’ score to represent the extent to which they use this strategy.

A large number of British species were placed in this triangle with assigned scores for stress, competition and ruderals by Grime *et al.* (1988, 1995)

Plants with a high competition score thrive in environments with low disturbance and low intensity stress. They are able to outcompete other plants for the most valuable resources through rapid growth, physical spread and a high capacity for phenotype plasticity (enabling them to adapt to seasons and changing availability of resources).

Plants with a high stress score have adapted to live in highly stressful environments such as alpine or arid habitats, deep shade, nutrient poor soils or areas with extreme pH levels. They are slow growing plants with high nutrient retention and do not do well with lots of disturbance.

Ruderals thrive in low stress environments but with lots of disturbance. They will quickly complete their lifecycle and often release a large amount of seed. Plants that have adapted to this strategy are often found in recently disturbed land and are often annuals.