

Introduction

My name is Grey-Winter Jones, and I previously studied Environmental Science at the City of Bristol College. I've always had a strong passion for environment and ecosystems studies, and during the course I was studying I was given a fantastic opportunity, in October 2016, to visit a local nature reserve, Troopers Hill and to study and write about it for a graded assessment.

This visit was part of the course's attempt to interpret the methodology involved in keeping an ecosystem running at the desired levels, and we visited as a group. A couple of the park's volunteers saw us around the multiple compartments and gave an explanation of the strategies in place to protect the wildlife which is nestled into the middle of a busy city.

The following text is the extracted Section 1 of 2, from an essay about managing the natural environment I wrote as part of the course, and it details some of the things I learned about Troopers Hill during our October visit. It was graded merit but unfortunately I didn't get to complete the entire course.

I take trips to the park regularly, and hope to see many more do the same!

Managing the Natural Environment

Palaeoclimate: An ecosystem deflected or stunted in development by human influence. This includes cutting vegetation or interfering with abiotic factors like water pollution.

Ecosystem: A system in which living organisms interact with each other and the environment which they inhabit.

Troopers hill is a small paleoclimatic ecosystem located in North Bristol, overlooking the river Avon. The site itself is several acres in size, and functions as the home for several rare species, and therefore a management plan has been enforced to conserve the area.

This is a map of Troopers Hill, defining the compartments this report will be concerned with:



(Image downloaded from Google Maps - Annotated in S note image editor)

The park is divided into 11 compartments for more precise management, as there are a variety of separate seres, each requiring a unique management approach to ensure the desired array of plant and animal life will remain constant.

The park represents several stages of seral progression with a variety of Autotrophs and Primary consumers more common to the more elevated areas of the UK. Each of these stages of development are vaguely defined by a respective compartment: Lowland Heathland found primarily in compartments 4 and 5, Acidic grassland found in compartments 3 and 11 and a small patch of deciduous woodland and scrub in compartments 9 and 10. The site is remarked for the large patch of heathland at its core, which is uncommon in the local area and is populated with a variety of invertebrate communities. The most notable of which being an endangered bee called *Nomada Baccata*, who takes advantage of both the variety of heathland flora it's accustomed to, and the homes and larvae of other species of insect.

A majority of the park's soil has a pH of around 6 and below; meaning acidic, due to a large presence of pennant sandstone dating the formation of the hill back to 300 million year old tropical swampland, and the industrial occupation of the area during the industrial revolution. This abiotic, or nonliving, factor has caused the soil to be of poor quality, hence a large populous of finer grasses and shrubs with an ecological niche to living in these nutritionally poorer conditions can be found on both the grassland and heathland. Some examples of common plants to the area mouse-eared hawkweed (*Hieracium pilosella*), Heather (Ling and Bell varieties) and. You will generally find however that grasses around the paths have a thicker, more lush grass population. This is primarily due to the local community's dogs, who's ammonia rich urine enriches the soil with nitrates to allow for a better soil condition in isolated strips around the pathways cutting through the park.

As detailed previously, the functions of this ecological community are heavily influenced by human activity. If the location were unmanaged, it is highly likely that due to a large culture of fast growing trees like Silver birch and Holm Oak scattered around the site, and a variety of other dominant plant saplings would begin to spread, the grounds; this would eventually deprive the ground of direct sunlight, advancing the area through seral progression by overgrowing smaller plants. The lack of trees on the open areas allows these less advanced plants to photosynthesise, and prevents roots from ravaging infiltrated water.

Compartment 10 is entirely formed of an unmanaged section of deciduous woodland. This area contains penultimate climax vegetation like Birches and Oak and is surrounded by shrubs like Broom (*Cytisus scoparius*) Broom is known as a nitrogen fixing plant; it stores a large amount of nitrogen in it's root systems and deposits this in the soil, improving its nutritional quality. Due to the dark, moist and rich soil under the plants there, it's common to find a few rare species of fungi, mosses and lichens. These enclosed spaces also make ideal habitats for small rodents and a few species of birds uncommon to the area.

Management of Troopers Hill

In 1995 the park was declared a Local Nature Reserve by Bristol City Council due to the wide and often rare variety of wildlife, due to the acidic soils. The site employs many volunteers to carry out a variety of management strategies; each in place to retain the desired functioning of the ecosystem.

Since the area's most cherished communities are the Heathland and Grassland, there is a strong focus on holding back competition from invading species like brambles, broom and birch. These open areas of the park require large amounts of direct sunlight, a large soil moisture budget and poor soil quality. The presence of nitrogen fixing shrubs would reverse the character of the soil, brambles dominate the land with deep roots and long creeping tendrils, and Birch trees become a threat to the nature of the community when they block sunlight and leave litter. Due to the presence of dense patches of quick expanding plant life, the management plan involves employing the power of a device known as a Scag. This device is a highly efficient cutting tool, shredding entire patches of shrubs and saplings in minutes, in comparison to the much slower process of hand cutting. Due to the industrial quality of the device, the management team only employ it out of bird nesting seasons so as to avoid discouraging nesting. There are however flaws to this method, as the tool is incredibly indiscriminate; destroying anything in its path. This could potentially mean the destruction of a variety of plant and animal life of a desired nature. Another potential problem is that the device leaves all the debris for later hand collecting. It is likely that enough litter would remain to form a humus and thus offsetting soil quality. An alternative to the scag could be the introduction of a small goat herd under supervision, however they to present the same problem with indiscriminate destruction, and the potential of re-nourishing the poor soil through leaving excrement.

The park has been under ownership of Bristol City Council since 1956, and thus has been a popular destination for the community to walk dogs and admire the wildlife for a notable timeframe. To date, the park team still actively encourage the local population to visit the area. This is an efficient way to gain publicity for the park and its management since the area is littered with information points and many references to their website and management plan, with the intention of education and protecting the area. Despite the presence of clear paths, the community's walkers are encouraged to stray as another strategy to manage invasive species. It could however be arguable that due to a dwindling number of many rare species of insect inhabiting the area, a variety of compartments should have restricted access so as to avoid destruction of habitats underfoot. There is also the potential that some of the rarer plant life at the park may be desirable to members of the community for foraging. An example I was informed about on a field trip is the Goldenrod flower, which a few members of the public have been spotted harvesting for medicinal uses. Foraging in the area is discouraged, but not enforced legally, and the team intend to implement an enforceable legislation to prevent deaths of potential endangered plants and animals.

In the recent years, an invasive species of perennial plant known as Japanese knotweed has sprouted up around the UK after it was introduced as an ornamental piece in 1825. Around a decade ago, a large community of this plant were spotted sprouting in Troopers Hill in the areas close to the entrance and amongst sections of shrub. The presence of this knotweed is incredibly damaging to flora in the area it inhabits as it grows at an aggressive speed, as it uses surface creeping roots which efficiently plant themselves and indiscriminately overthrowing its neighbors. Its reputation has meant it is a legal requirement to kill the plant upon appearance, and treat all the plant's biomass as a controlled waste to be destroyed or disposed of at licensed landfills. Due to the sensitive nature of this plant, drastic measures have been employed at the Local Nature Reserve to kill off, and prevent the appearance of the plant, involving the quarterly spraying of Glyphosate herbicides on the affected areas. This method has proved incredibly successful at inhibiting the growth of the plant, and it appears to have been sated to date. Glyphosate herbicides are an incredibly harsh way of inhibiting plant growth as they will indiscriminately kill off nearly all plants so it's important to keep application to the leaves or cut stems of Knotweed. Although not directly toxic to humans in small doses, a long term presence of these chemicals has been known to be carcinogenic to rats in laboratory testing, and the unintentional inhalation has been known to cause respiratory and digestive irritation lasting a few hours. An alternative method would be to pull the roots thoroughly at regular intervals, since the plant sprouts rhizomes it's incredibly easy to neglect a small sections which leads to a repeated outbreak, this method has however proven to be much less efficient.