THE CONNECTION BETWEEN ACOUSTICS AND ECOLOGY

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AGED 11

STAMFORD HIGH SCHOOL

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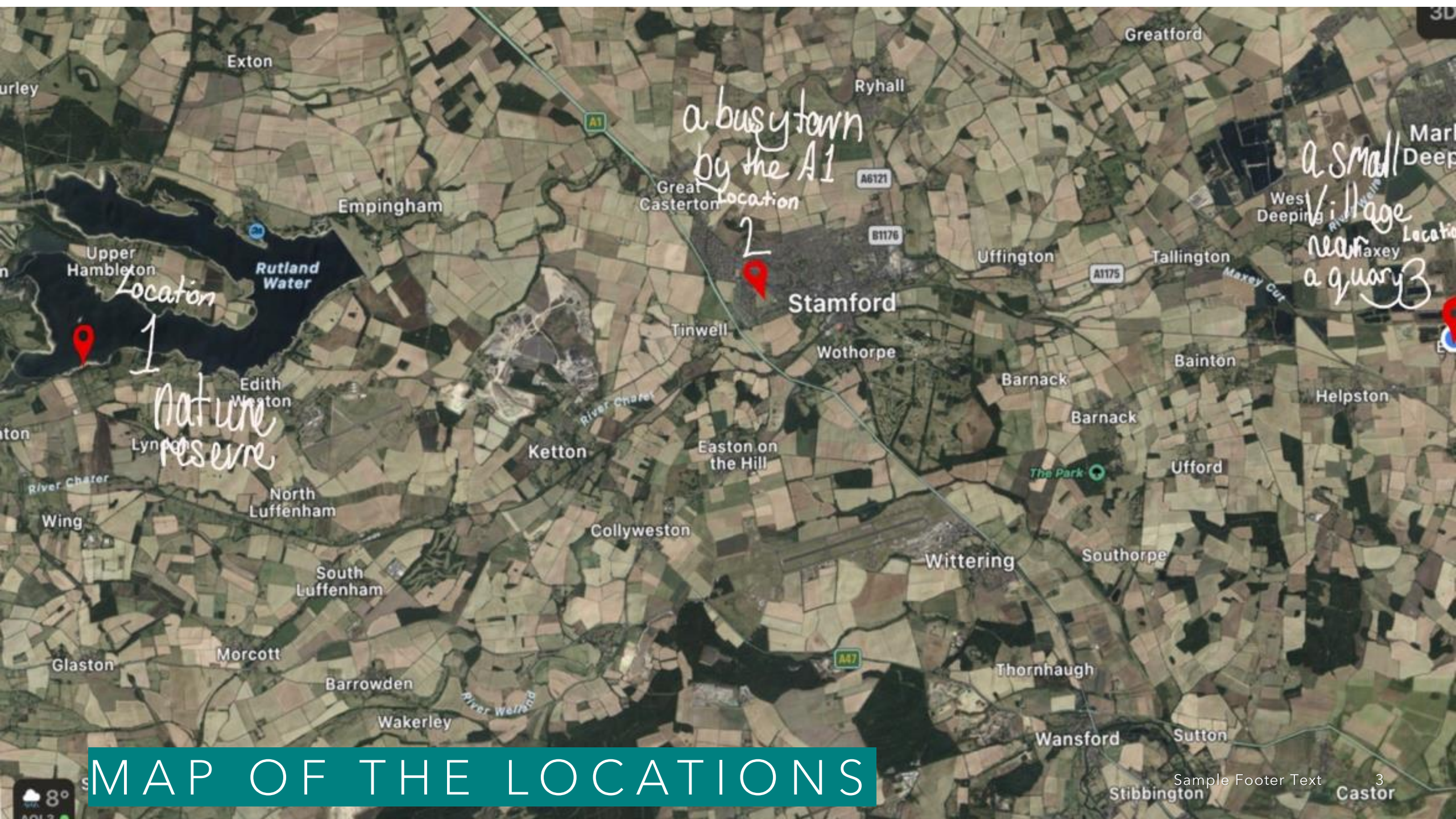


MAP OF THE LOCATIONS

WHAT I DID TO FAMILIARISE MYSELF WITH THE BIRDNET APP AND METHODOLOGY

- The app was very straightforward and intuitive. The home screen immediately took me to the first step; recording. Next the second step, selecting which part of the recording you would like to analyse, and the third was analysing it and finding out the species of bird acoustically we had identified in the vicinity.
- To familiarise myself I watched the tutorial and read the information on the app. I was also very impressed about how it could show you what bird species were found in your area, even when several birds were calling or singing at the same time. It recorded and could saved natural, human or mechanical noises which was helpful for the study.
- The measurements recorded and analysed were saved in 'observations'. They were labelled at what time of day and where. If you clicked on it, it can replay the sound that was analysed and allowed me to import this into this power point.
- Methodology, I decided to use to use the App three times at each of the three locations. I recorded sounds on different days at approximately the same times of the day, 8am, 12noon and 5pm to make sure I was capturing sufficient data and allow for different weather conditions. This was important as when it was very windy or raining it was much more difficult to hear all the bird noises. I recorded over a 1 hour period each time, making a total of 9 hours of a recording window.

THE DESCRIPTION OF THE SOUNDSCAPES

I chose Stamford as an example of an Urban soundscape. I walk through town every day to school so I am very aware of the volume of noise and different types which can be alarming. It can sometimes be very chaotic and unexpected loud impulsive noise makes me jump. Whilst the intermittent church bells are at a pitch and tone that is lovely when they ring, the motorbikes and car noises bounce off the many buildings and reverberate. There is always an ambient continuous noise around due to the traffic, especially during rush hours. On Fridays ,which is market day, there is greater noise as there are many people and traders setting up their stalls, using scaffolding. There was also a low frequency noise from generators running the stalls. Sometimes workman on building sites add to the din and make it hard to hear any bird noise at all.

My Rural soundscapes is the village of Etton. By comparison, this is more peaceful and quieter compared to the urban soundscape. The soundscape is characterised by the sounds of natural surroundings such as birds, insects, rustling leaves and trees. The soundscape is often dominated by natural sounds and provides more tranquil environment, however there is occasionally a low background noise from the A14 and strange mechanical noises from the nearby quarry. There is a bund around the village to limit the effects of these man made auditory intrusions. Overall I find this to be relaxing and the absence of loud clangs and bangs and loud traffic noise much less stressful.

Water reserves, like the third soundscape, Rutland water, have unique soundscapes that are characterised by the sound of water, such as the gentle lapping of waves against the shore, the sound of wind and the calls of wildfowl and aquatic animals. The sound environment is soothing and calming to me, providing a sense of peacefulness and tranquility. Rutland water is surrounded by fields and trees which mute the noise and it seems to softly reverberate around the basin, as the reservoir is in a hollow in the landscape. Additionally, Rutland water reserve had some unique sounds due to the presence of human activities such as fishing boats, and sailing boats, when their rigging makes a tapping noise. These sounds can add to the overall soundscape and create a unique audio environment that is associated with water reserves.

BIRD SPECIES AT LOCATION 1 (RUTLAND WATER)

- Over 270 species of bird have been known to inhabit Rutland water at various times of year. The most common bird on the nature reserve I heard was the Common Chiffchaff; this bird is found in areas of woodland, fields and hedgerows around the reservoir and usually feeds on insects, seeds and fruit. Another bird I identified, using the BirdNET app, was the Mute Swan which is very common to find when around the water. The Eurasian Wren was a common occurrence also. At Rutland Water, I saw the Osprey on its nest which is home to 4 eggs of which 3 chicks survived. In addition to this famous species I also saw a Red Kite and Buzzard. A mandarin duck was also spotted on our walk, I was very fascinated by the vibrant colours of the ducks' feathers. The mandarin duck is one of the few introduced species in Britain that hasn't produced any environmental problems. A highlight was hearing a Swallow, Cuckoo, Wagtail and Treecreeper. It was also quite windy when close to the reservoir alongside the lapping of the water at the shoreline . This made it quite hard to pick up the many wildfowl on the reserve, like Wigeon, Tufted Duck, Goldeneye and Smew but I did hear a Great Egret, Coot and Mallard. The soundscape was very natural and little noise-pollution was experienced in this area as there weren't many man-made noises. The only mechanical noise I could occasionally hear was a small fishing boat. While listening to the sounds around me I thought about how calming this place was and the serenity of nature's unique soundscape, wild and unspoilt.

Common chiffchaff

Mandarin Duck

Osprey seen but not heard!

BIRD SPECIES AT LOCATION 2 (STAMFORD, A BUSY TOWN)

I couldn't hear many birds above the noise of the town, One of the few I identified in the heart of the Stamford High Street was the Blue Tit, as they have been known to adjust their pitch of noise so other birds can hear it over the noise pollution. There was many cars and honking. You can really see how much the noise affects the variety and density of bird species. Even when I moved to areas on the outskirts of the town where it was slightly quieter and there were a few trees in gardens, I was only able to identify the European Goldfinch, Blackbird and a Starling. In the churchyard there was a few Crows but I couldn't pick them up on BirdNet due to the ambient noise of the generators and motorbikes which seemed to reverberate around the close packed buildings.

Stamford high street

In the meadows a quiet field in Stamford

Blackbird

BIRD SPECIES AT LOCATION 3 (ETTON)

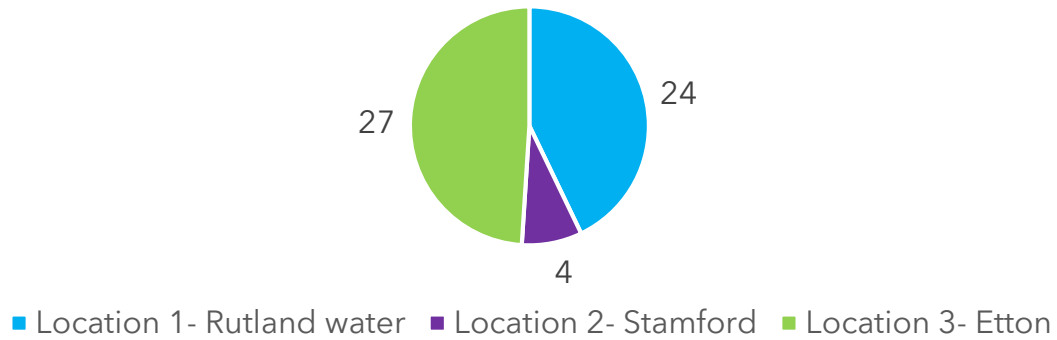
- At location three, one of my favourite birds, the European goldfinch, was a frequent visitor. It was wonderful to hear the diversity of bird species in the gardens of Etton. A high density of trees and hedgerows allows many species to thrive. The Song Thrush made a beautiful addition to this soundscape alongside the Mistle Thrish, Skylark and Dunnock, However, closer to the Quarry, you hear fewer birds, many of them are on Islands in the middle of the lagoons making them difficult to identify on the BirdNet App.. We did hear several Herring Gulls in this area. During lockdown we saw hundreds of Sand Martins making their homes in the surrounding banks of gravel and sand.
- At some points of the day, you could notice the planes flying over from Wittering RAF base nearby. There were also many more species like a House Sparrow, European Greenfinch, Goldcrest, Blue Tit, Robin and the Eurasian Wren. On the rooftops were Pigeons, Rooks and Jackdaws. We also picked up a Great Spotted Woodpecker who frequents our garden and we find holes in our trees. The common chaffinch seemed only to appear around midday. Although this is a small village the noise pollution can increase during rush hour. At night we often hear the Barn Owl and see it swooping for food at dusk or sunrise. The app identified the Kingfisher, which is often nearby but we didn't spot it with it!

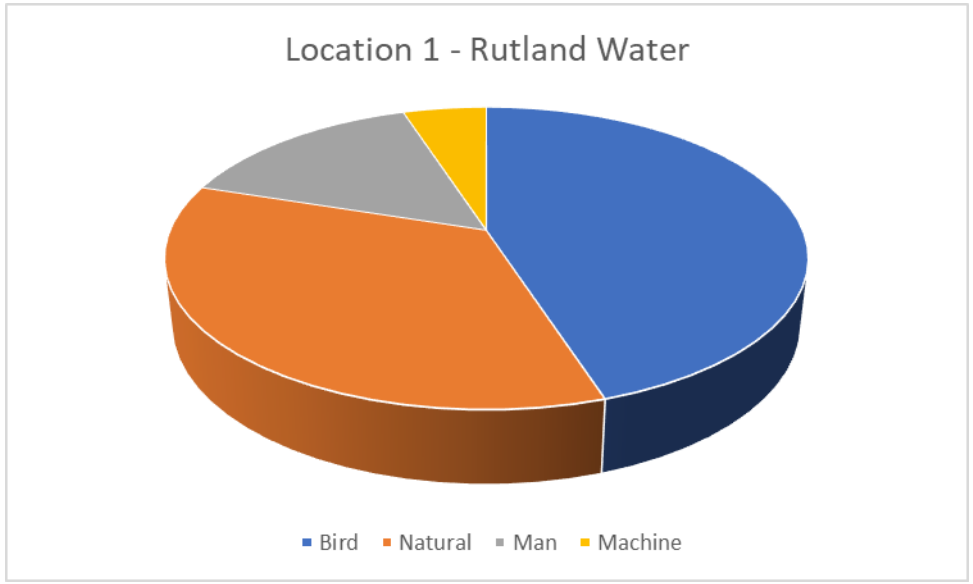
Goldfinch

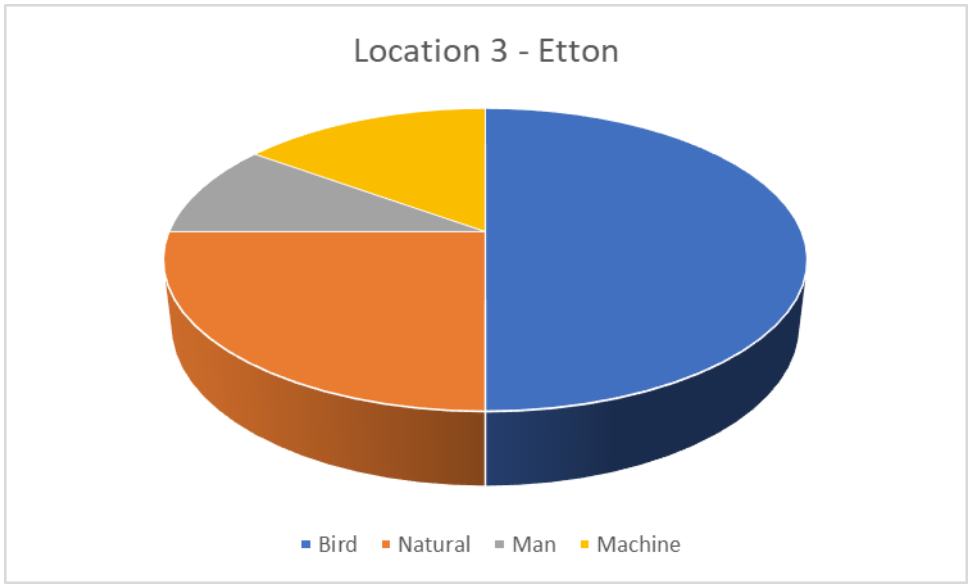
Great Spotted Woodpecker

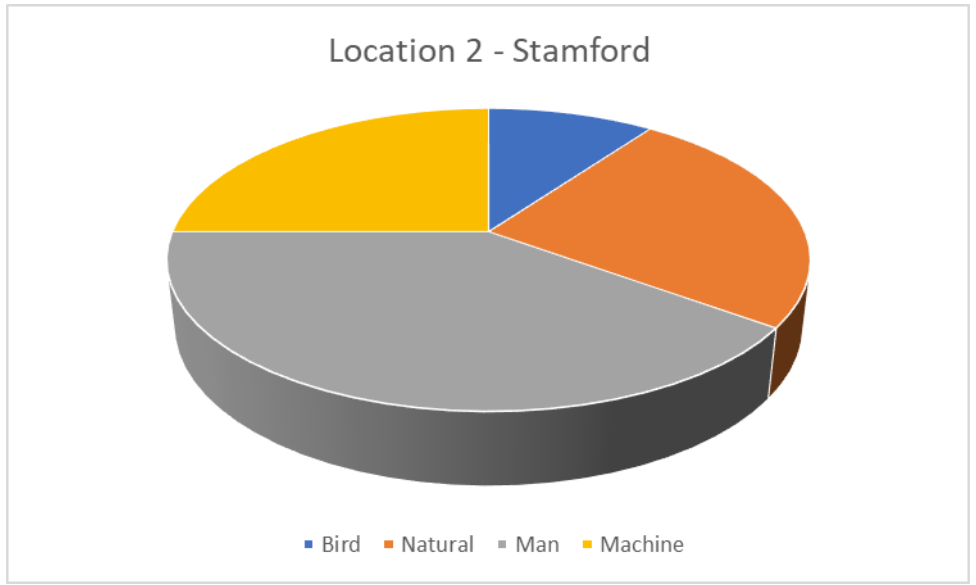
RESULTS

Amount of different species of birds identified in each area









Species identified in each location using BirdNet

Rutland Water Nature Reserve	Stamford Town	Etton VIllage
Barn Swallow	European Starling	Song Thrush
Great Tit	European Goldfinch	Mistle Thrush
Whooper Swan	European Blackbird	European Robin
European Robin	Eurasian Blue Tit	Eurasian Wren
Dunnock		Eurasian Blue Tit
European Robin		Eurasian Treecreeper
Eurasian Blue Tit		Common Wood-Pigeon
White Wagtail		Rock Pigeon
European Goldfinch		Herring Gull
Eurasian Greenfinch		Eurasian Collared-Dove
Rook		Common Chaffinch
Great White Egret		House Sparrow
Common Cuckoo		Ring-necked Pheasant
Coal Tit		European Goldfinch
Eurasian Tree Creeper		Common Chaffinch
Eurasian Jackdaw		Eurasian Wren
Goldcrest		Great Tit
Eurasian Collared-Dove		Long tailed Tit
Common Wood-Pigeon		Common Kingfisher
Mute Swan		Dunnock
Common chaffinch		European Greenfinch
Spotted Flycatcher		Eurasian Blackcap
Long-tailed Tit		Coal Tit
Eider Duck		Eurasian Jackdaw
Garden Warbler		
Common Redstart		
Greater Whitethroat		

FINDNGS AND CONCLUSIONS

HOW NOISE POLLUTION AFFECTS WILDLIFE

- Soundscapes allow us to identify how diverse an ecosystem is. Diversity is really important to our wellbeing and that of our wildlife. By listening to the sounds of birds, nature, machines and humans at three different locations we get a clearer picture of the affect of noise pollution and the variety of different factors affecting the ecology. The busy town had fewer bird species and less numbers of birds than both the village and natural reserve. The morning was the best time to hear the birds at all locations, this was when they seemed to call the most and surrounding noise lower to allow their song to be heard.
- Across the three sites the app identified over 55 species of bird many of which I didn't know inhabited my village, school town or nature reserve. It was incredible to hear them and made me appreciate the diversity of species and how human, road and traffic noise can have a huge negative impact on birdlife.
- Noise pollution can affect birds in many ways,. Recent studies have found that the sounds of passing cars reduced the birds ability to find food. There is mounting evidence that human made noise has a variety of negative effects on wildlife. For birds in towns such as Stamford his may mean a diminished ability to communicate, particularly important during courtship.
- Noise pollution can even affect the migration routes of birds. Loud noise has been shown to cause blackbirds to have fewer chicks. Birds have even been known to mimic ambulance and police sirens. These all show the devastating effects of noise pollution.
- Research has shown the human made noise pollution can make Robins living in rural areas to become more aggressive. Robin rely on acoustic signals to mark their territory and keep out other individuals, changing their songs to ward off intruders. Thus disrupting their natural songs interferes with the signalling behaviour and has serious implications for their survival and population. . Much like in humans excess noise can cause chronic stress in birds
- Protecting our natural environment from noise is a important challenge we face in the future. We need creative solutions to help protect our natural soundscapes and improve urban ones with different tyres, roads and electric vehicles. Soundscaping design can also play a party as we plan new cities and housing developments. We need to fiercely protect our nature and let it sing.

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