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Our Ancient Woods: The Animal Voice Within The Compositional Process

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ABSTRACT

Our Ancient Woods is an electroacoustic work created using recordings of past and present British wildlife. This article documents the use of animal vocalisations and behaviours within this work in order to create new sonic means for conservation awareness, public engagement, and nature connection.

Our Ancient Woods is available at https://www.sarahkeirle.co.uk/our-ancient-woods

KEYWORDS

Nature connection, Conservation, Animals, Electroacoustic composition, Transmodal perception

Introduction

The electroacoustic work *Our Ancient Woods*, composed using animal vocalisations and behaviours, was created to engage listeners with British wildlife of the past and present in an attempt to facilitate a greater connection to nature.

The use of animal vocalisations and behaviours has a long history within human culture. Songs based on animal calls and movements are widespread across the world and may form the earliest musical systems of some cultures (Keeling 2012). References to animal calls can be found throughout literature (De Bruyn 2021); composers from Janequin to Messiaen have tried to reproduce birdcalls with instruments (Ensen 1985; Cheong 2008); recordings of animal calls have featured in orchestral music, pop music, and musique concrète (Brumm 2012), as well as more recent electroacoustic work (Doolittle 2008). Acoustic ecology and soundscape studies often use animal vocalisations and my compositional practice is firmly rooted in these traditions; *Our Ancient Woods* focuses on 'the interrelationship between sound, nature and society' (Westerkamp 2002) and shares the 'essence' of soundscape composition – the 'sonic transmission of meanings about place, time, environments and listening perception' (Westerkamp, 1999). *Our Ancient Woods*, however, cannot be described as a soundscape; instead of the 'musical essence' emerging from or being discovered within the recorded sounds, the aesthetics have been designed and inspired by the animal body and its movement, using tools from Denis Smalley's 'Spectromorphology' (1997) as a guide.

Use of Spectromorphology

As Smalley states, 'descriptive and conceptual tools which classify and relate sounds and structures can be valuable compositional aids' (1997, 107). I have not explicitly mapped animal behaviours and movements onto transformed sounds using these tools, but instead exercised my 'spectromorphological awareness' while composing; I used the tools as a reference while I

was manipulating the sounds and structuring the composition.

By using animal behaviours as an imagined cause for certain sounds, I facilitate the listeners' engagement with 'source bonding', described by Smalley as 'the natural tendency to relate sounds to supposed sources and causes, and to relate sounds to each other because they appear to have shared or associated origins' (1997, 110).

Smalley also states that the word bonding 'evokes a binding, inescapable engagement or kinship between listener and musical context' (1997, 110). This is especially relevant for *Our Ancient Woods* as it was composed to engage people with the musical context – nature in Britain and its varied inhabitants across the ages.

Nature Connection

The best way to engage listeners with the natural world is to create and nurture emotional bonds (Rapp et al. 2018). Evidence suggests that it is not simply time spent in nature that increases one's nature connection, but rather reflecting on the emotions that nature evokes (Passmore 2017). While the study of emotions towards nature is fragmentary (Jacobs and Vaske 2019, 65), research shows that a feeling of 'nature-connectedness', or an emotional bond with nature, can encourage nature protective willingness (Kals, Schumacher, and Montada 1999, 180). There is a strong causal link between a feeling of nature connection and nature-friendly behaviours (Richardson et al. 2020, 823); people are more likely to engage in difficult or inconvenient behaviour for causes that they care about (Frantz and Mayer 2014, 86), and since a considerable amount of decision-making about our behaviour is driven by emotions rather than rational thought, it is vital to 'go beyond filling information gaps to connect emotionally with target audiences' (Veríssimo, Tully, and Douglas 2019, 343). It has been argued that emotional affinity is as powerful as indignation and cognitive interest for predicting nature-protective behaviour (Kals, Schumacher, and Montada 1999, 197); these three methods – creating and nurturing emotional affinity towards nature, inspiring cognitive interest in the natural world, and stimulating emotional indignation about insufficient nature protection – have influenced the sonic content and compositional methods of *Our Ancient Woods*.

Emotional affinity towards nature can also improve human wellbeing. There is a strong relationship between nature-connectedness and positive affect (Clayton and Meyers 2015, 353), with consistent evidence showing the important role nature has in maintaining our mental health (Richardson et al. 2021, 8). The Biophilia hypothesis suggests that our wellbeing depends to a great extent on our relationship with the natural world (Wilson 1984). Studies show that even virtual experiences of nature have positive effects on mental health (Clayton and Meyers 2015, 349); evidence shows that auditory experiences of nature, such as listening to birdsong, can distance listeners from stress or cognitive demands (Ratcliffe, Gatersleben, and Sowden 2013, 226). Sonic explorations of real or imagined natural environments and creatures, like in *Our Ancient Woods*, therefore have the potential to grant similar stress-reducing and restorative benefits as physically engaging with the natural world.

Transmodal perception

In-person experiences with nature are powerful for creating and nurturing emotional bonds and improving wellbeing in part because they engage all five senses (Kals, Schumacher, and Montada 1999, 183); 'contact' – engagement through the senses – is one of the five pathways to nature connection outlined by Ryan Lumber (2016). A multi-sensory encounter with an animal, where one is invited to be physically close to or touch the animal, makes one 'likely to learn more, remember more, and make a personal connection that can spark interest, understanding,

and compassion' (Rapp et al. 2018, 411). These experiences, however, are limited by many factors, including location, accessibility, expense, season, time of day, the cautious or disruptive behaviour of both people and wildlife, and species extinction.

The use of digital technology to explore the natural world and conservation issues has the potential to facilitate creative experiences that would be difficult to achieve in the physical world (Ahn et al. 2016, 400). For example, using acousmatic compositional methods to create an experience of the natural world allows for the construction of impossible sonic environments that no longer exist in nature and cannot, therefore, be experienced physically nor recorded for soundscape performance and dissemination (Fischman 2008, 111). Digital technology also allows for the reduction or removal of human-generated sounds, which continue to spread to even remote natural areas (Dumyahn 2011, 1328), through careful editing, noise-reduction software, or even masking with other layers of sound.

The transmodal potential of sound, especially within acousmatic music, makes it an ideal medium within which to create virtual experiences of the natural world. As Smalley states, 'although acousmatic music may be received via a single sensory mode, this does not mean that the other senses lie dormant; in fact they spill over into sonic experience' (2007, 39). Acousmatic music's capacity for the evocation of image especially is recognised as 'a cornerstone of the medium's aesthetic potential' (Young 2007, 25). Transmodal perception is also deeply connected to how listeners experience space; our sense of sonic space is affected not only by spectral range, or how closely spectromorphologies seem to act to our ears, or how we respond emotionally to the sound, but is closely linked to our corporeal, multi-modal perception of the physical world (Demers 2010, 118).

Our Ancient Woods utilises electroacoustic music's potential for transmodal perception through the careful creation of sonic materials, spatial design, and even the choice of source recordings – animal sounds are clearly source-bonded and therefore not only infer spatial attributes (Smalley 2007, 38) but are also strongly related to visual and even tactile sensations due to our personal experiences with pets and wildlife.

Methodology

Our Ancient Woods was composed and disseminated using the following methodology:

- Recording: record a catalogue of sounds from animals at Wildwood Trust, a centre for the conservation of past and present British wildlife, experimenting with directional and in-enclosure recording techniques, noting the perceived movements and body language.
- Composition: develop these sounds in the studio, using the physical movements and behaviours of the animals as inspiration, with the aid of concepts explored by Smalley in 'Spectromorphology' (1997).
- Listening: explore the way that animal sounds and movements within the composition activate transmodal linking and contribute to how listeners experience space.
- Dissemination: Share and perform the composition both online and in real-world performance contexts and find a way to analyse whether people feel a greater connection to nature and/or desire to support current conservation efforts after listening.

Recording

Our Ancient Woods was composed using a library of sounds recorded during seven days of fieldwork at Wildwood Trust in November 2020. This sound library contains sounds from 27 species, both vocal calls and movement sounds, as well as 'ambience' recordings of rain, trees, and wild birdsong. During my fieldwork, I also took notes on the animals' behaviour and movement to use as an inspiration for gestures, textures, and structures during composition, as shown in Table 1. Undertaking recording fieldwork personally, instead of using pre-recorded sounds, also enabled direct experience with the spatial and temporal qualities of the recording location – Blean Woods, Wildwood Trust – which helped the subsequent work to be 'geographically anchored' (Keller 2006).

Animal Species	Behaviour Notes
Arctic Fox	Sleeping curled up in a ball. Sudden jump. Play and Noises when waiting for food.
Barn Owl	Stillness. Sitting tucked together, up high. Flight is perfectly horizontal, silent, and ghostly.
Boar	Nosing through the mud, lying down.
Common Crane	Calling in pairs. Elegant walk. Fluffing up feathers.
Eagle Owl	Stillness while sleeping. Head all the way round when I walk past. Responds when you hoot at her. Fluffing up feathers.
Eurasian Elk	Approaches when you pass. Slowly moving and chewing, eating leaves. Responds when you talk to her.
Eurasian Lynx	Lying hidden, waiting. Pacing in circle and growling. Watching warily, short tail moving.
Eurasian Otter	Sleek in water, jumping in after food. Noises when waiting for food. Emerges from the water, then re-submerges.
European Bison	Standing and watching. Slow and heavy walk. Huff and growling at me. Messy eaters and drinkers.
European Brown Bear	Adults are grumpy and sleepy. Lie down often. Growl because tired. Cubs are energetic, playing with each other. Running around in circles.
European Polecat	Curious, running around, following me. Play in the leaves, climbing and falling.
European Wildcat	Stretching. Pacing in circles when I approach. Meows at me.
Fallow Deer	Carefully watching, running at slightest movement. Skittish.
Grey Wolf	Padding around. Play bow, chasing each other, jumping over each other. Warning huff when matriarch sees me. Matriarch growls at her children.
Konik Horse	Approach when I walk towards them. Curious, snort at each other. Grazing.
Little Owl	Watching carefully, flies away when I approach.
Pine Marten	Very curious, erratic movements; running, climbing, jumping.
Raven	Sits and caws. Flies to new perch, sometimes to the ground. Rubs beak against wood, holds mate's beak.
Red Deer	Calm, watching carefully. Stag in rut charges at me and chases the does.

Red Fox	Sitting curled then running suddenly, staying hidden.
Red Squirrel	Hiding, then eating. Jumps towards me, curious. Short, sharp movements.
Red-Billed Chough	Flying all over the place.
Reindeer	Calmly grazing.
Rook	Sitting still, calling when I approach.
Soay Sheep	Chasing each other. Approaches when I walk past. Grazing.
Tawny Owl	Sleeping calmly.
White Stork	Elegant walk.

Table 1. Wildwood Behaviour Notes.

Composition

The sonic transformations undertaken on recordings from the sound library were inspired by the notes on animal movements and behaviours in Table 1, using Smalley's tools in 'Spectromorphology' (1997) as a guide, as illustrated in Figure 1 below. Some behaviours have been translated literally into sound (for example, the water emergence and submergence at 6:05 is a sonic recreation of the otter's movement) and other behaviours have been translated more abstractly during sonic transformations. An example of this methodology, using the barn owl, can be seen in Figure 2.

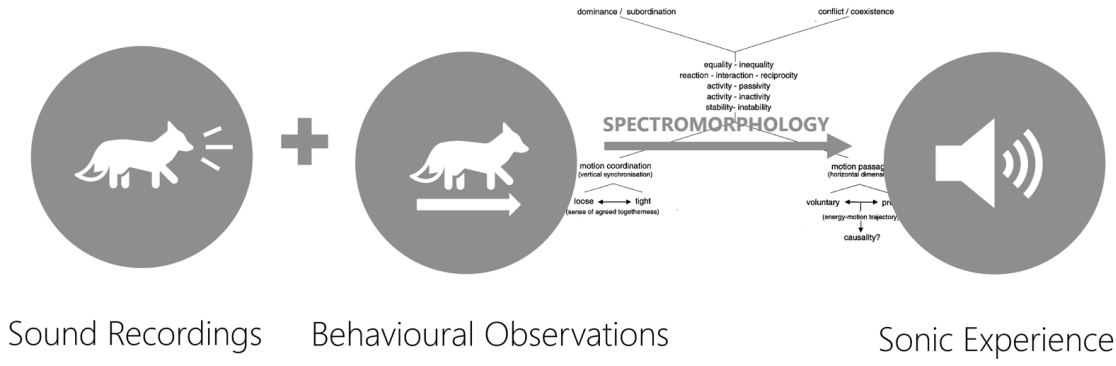


Figure 1. Composition methodology of *Our Ancient Woods.*

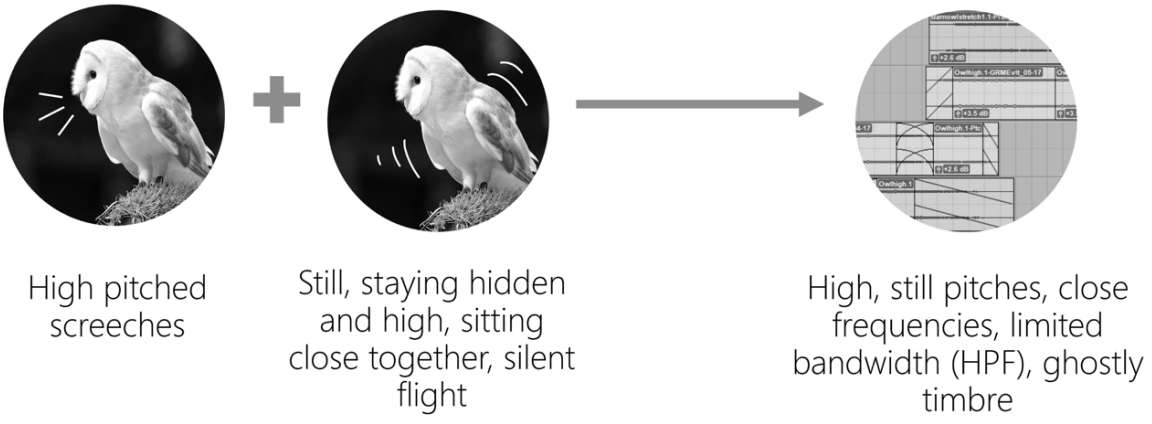


Figure 2. Composition methodology for the barn owl in *Our Ancient Woods*.

There are certainly more instances of sonic-behavioural linking in *Our Ancient Woods* than are stated below, but this article will only explore the processing that was consciously chosen during composition. Only the most relevant of Smalley's tools were used as a guide during the compositional process.

Motion and Growth Processes

> Quite often listeners are reminded of motion and growth processes outside music and the terms selected are intended to evoke these kinds of connections. (Smalley 1997, 115)

Several of Smalley's motion and growth processes, displayed below in Figure 3 and Figure 4, can be linked to animal behaviours I observed. The underlined words in these two diagrams were used in combination with animal behaviours to create sonic transformations, as shown in Table 2. The 'Time Featured' column of Table 2 marks one or two clear examples of the process in *Our Ancient Woods* – they are by no means the only instances when the process is featured in the piece.

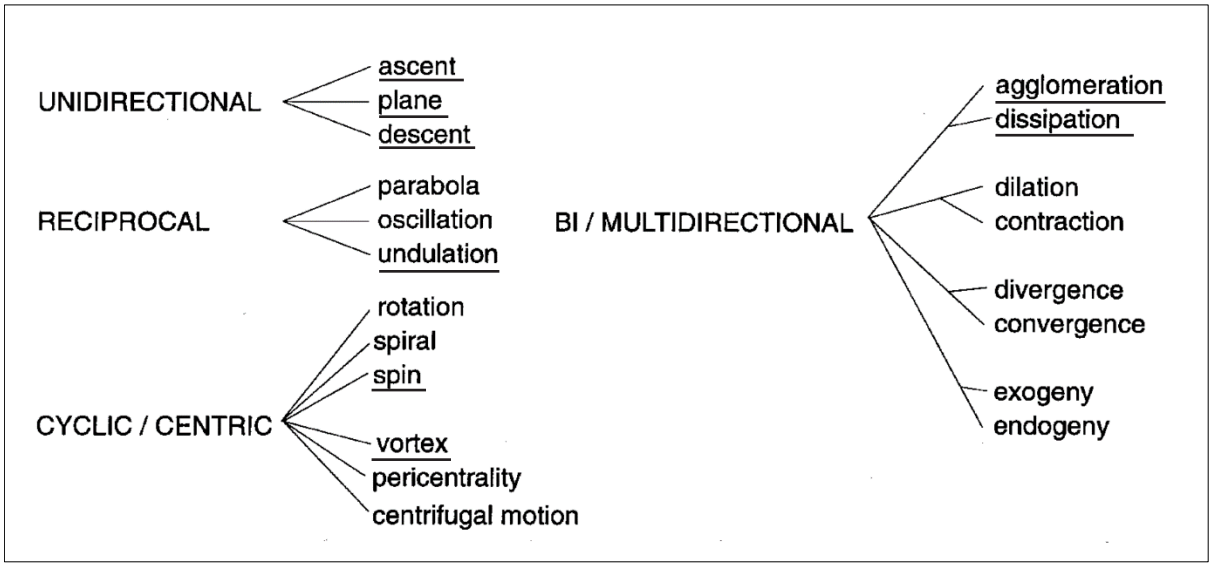


Figure 3. Tools used from Smalley's 'Motion and growth processes' diagram (1997, 116).

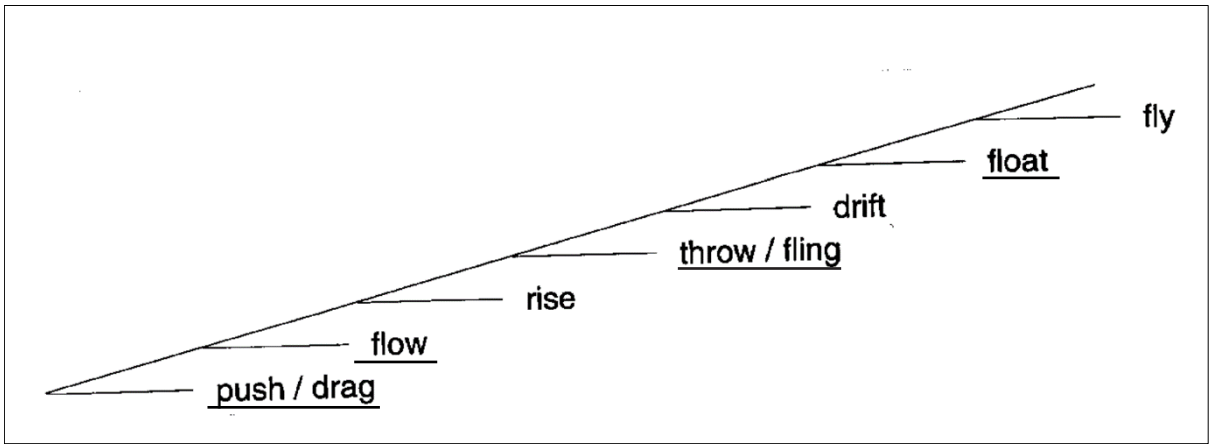


Figure 4. Tools used from Smalley's 'Seven characteristic motions' diagram (1997, 117).

Motion/Growth Process	Animal Behaviour	Sonic Manipulation	Time Featured
Ascent + Fling	Raven flying upwards to new perches.	Sounds of flight EQ'd to create the effect of sudden ascent.	0:37
Plane	Barn Owl flying horizontally.	Stable pitches created from barn owl screeches.	0:00
Descent	Raven landing on the ground.	Pitched processing to create sonic descent.	4:40
	Bear lying down.	Bass descending in pitch made from bear growls.	7:50
Undulation	Otter emerging from the water and then submerging.	LPF applied to recordings of otter moving and squeaking in water to emulate emergence and submergence.	6:05
Spin	Sheep chasing each other in circles.	Spinning doppler effect and tremolo applied to sheep and lynx calls.	5:10
	Lynx pacing in circles around enclosure.		
Vortex	All Animals gather wildly around keeper when they are fed.	Vortex of animal calls to suggest overabundance of life surrounding the listener.	0:12, 7:52
Agglomeration	Eagle Owl gaining size when fluffing up feathers.	Agglomeration of grains made from eagle owl calls, increasing in size.	2:13
Dissipation	Fox disappearing into the undergrowth	Movement sounds granulated and processed to dissipate	3:37
Push/drag	Boar and Elk wading through mud.	Unprocessed mud footsteps to create sense of environment.	1:45
		Processed to create short 'stuck' noise within a spectral enclosure that can't escape.	2:25
Flow	Otter's smooth movement in water.	Flowing sounds of moving underwater using otter recordings.	0:29
Float	Little owl flying away, other birds graceful flight	Removal of all low-frequency content, repetition of little owl screeches and other bird sounds over high-pass-filtered pitches	8:30

Table 2. Smalley's terms for motion and growth processes combined with animal behaviour as inspiration for sonic manipulations.

Behaviour

> The metaphor of behaviour is used to elaborate relationships among the varied spectromorphologies acting within a musical context. (Smalley 1997, 117)

Smalley's behavioural diagram (1997, 119), shown in Figure 5, contains several references to relationships I observed between animals and others of their own species, different species, and even human beings, as shown in Table 3.

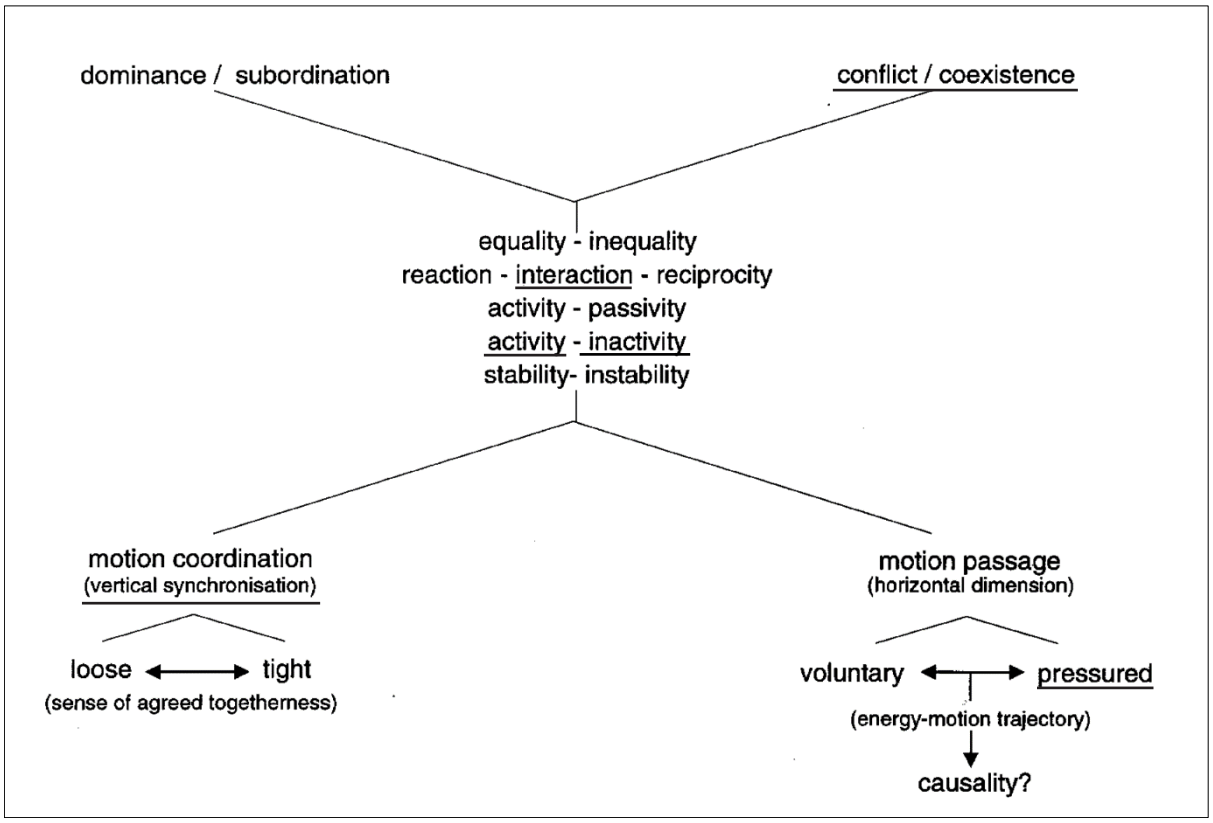


Figure 5. Tools used from Smalley's 'Behaviour' diagram (1997, 119).

Sonic Behaviour	Animal Behaviour	Sonic Manipulation	Time Featured
Conflict	Red Deer stag in rut charges and chases the does.	Stretched and processed to create dissonance and tremolo	5:40
	Wolf growling at her children.	Pitch-shifted growls to increase sense of aggression	5:37
Coexistence	All Wetland birds coexist in the same enclosure.	Combining raw wetland bird recordings together to create wetland environment.	6:08

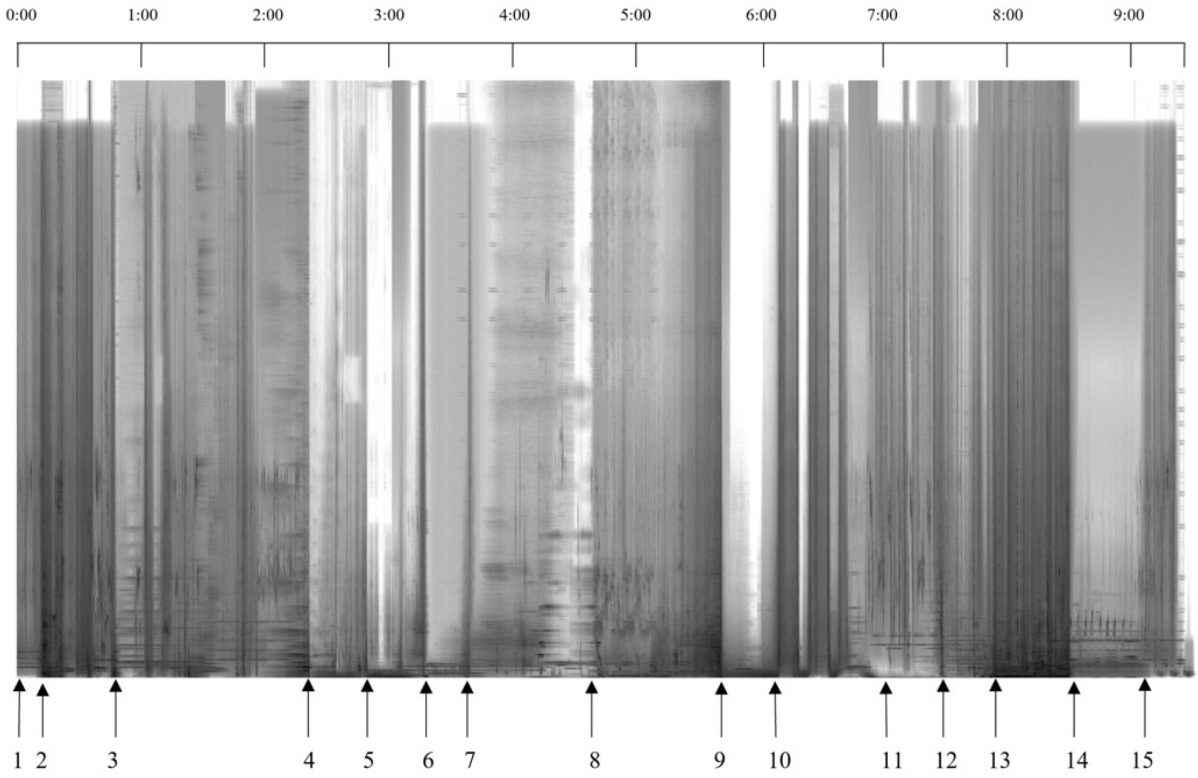
Interaction	Horses stomp and make noises at each other.	Placement of unprocessed recordings; for horses, interaction between each other, and for the elk, interaction between her and the listener, by having her approach before 'speaking'.	7:41
	Elk interacts with people, responds when you talk to her.		1:45
Activity	Pine Marten and Polecat running, climbing, jumping, making erratic movement	Foregrounded, unprocessed movement sounds	0:00, 9:16
Inactivity	Barn Owls sitting still for most of the day.	Stable pitches created from barn owl screeches.	0:47
	Bears preparing for torpor, very lazy.	Rooted bass made from bear growls	2:45
Motion Coordination	Cranes call in mated pairs.	Two processed pitches, made from the calls of a mated pair, played one after another in the same motion coordination as the unprocessed crane calls	3:15
Pressed Motion Passage	Otters jump into water to follow food given by keepers.	Placement of wolf growls and otter sounds to sound like the otter/listener is being chased into the water	5:37
	Wolf matriarch ordering around other wolves.		

Table 3. Smalley's terms for behaviour combined with animal behaviour as inspiration for sonic manipulations.

Listening

> Welcome to Britain, thousands of years ago. Walk through *Our Ancient Woods*, our rivers and wetlands, our open meadows, and dense forests, all thick with the sounds of nature. (*Our Ancient Woods* Programme Notes 2021)

Space is one of the most significant elements of acousmatic musical experience, whether listeners are familiar with the medium or not, and there is evidence to suggest that spatiality plays a central role regarding empathy processes during listening (Ratti 2017, 403). Space was therefore a fundamental parameter to consider during the composition of *Our Ancient Woods* – an exploration of the different spaces travelled through in the work is shown in Figure 6. Many spaces are designed to some extent through spectral range and can be clearly seen on this spectrogram.



1. Open space, foregrounded movement.
2. Surrounded by animals, moving terrains swiftly; from ground to water to air.
3. Stillness; birds, quiet stream, some rain, mud.
4. Low-rooted section, birds and other higher frequency animal sounds disappear.
5. Undergrowth space enclosed by bass and LPF filter.
6. Bass removed; feeling of being stuck in mud, stillness, spectral enclosure.
7. Abstract open space, foregrounded microsound.
8. Down to rooted bass; trees and birds to make a woodland. Other animals become clearer and louder, emerging from the trees, creating conflict.
9. Chased underwater; LPF to imitate underwater sound.
10. Emerges from water to hear wetland animals, then submerges again, finally emerging and walking through mud.
11. Foregrounded soft movement and bird sounds, hidden forest.
12. Space begins to open as bigger grassland animals appear.
13. Dense spectral space as listener is surrounded by moving animals.
14. Sudden spectral translucency, birds masked by filters, moved into hidden canopy.
15. Clearer movement sounds emerging into open space, until finally moving down to the ground.

Figure 6: Spectrogram (all channels mixed) of *Our Ancient Woods* showing the structure of spaces within the work.

Many of the sonic spaces in *Our Ancient Woods*, as mentioned in the programme notes, are strongly associated to the physical spaces animals inhabit in the real world, due to the fact that animal calls – and even some animal movement sounds, such as a bird flapping its wings – are so clearly source-bonded. Placing unprocessed animal sounds within a composition therefore has the potential to conjure images of the environment in which that animal usually resides; for example, the duck quacks at 6:10 create the image of wetlands and a horse whinny, such as at 7:33, may invoke the image of fields or grasslands. Combined with 'ambience' recordings of specific environments, like trees creaking or mixed birdsong for a wood or forest, this evocation of a natural space causes automatic transmodal linking (Smalley 2007, 39). Creating a sonic woodland space may cause transmodal responses such as imagining shades of green, the texture of grass and bark, feelings of exertion due to walking, etc., even though these senses are not directly activated. We recall and psychologically experience these physical actions due to *functional equivalence* – 'the close resemblance between the neuronal apparatus involved in actions and/or perceptions and in the imagined actions and/or perceptions' (Godøy 2004, 56).

The clearest example of using space and transmodal linking in *Our Ancient Woods* is the underwater section that begins at 6:05. The sonic content – otters swimming, with low-pass filters applied – creates an underwater space and automatically triggers transmodal linking; the spectral enclosure of low frequencies while underwater, plus the context of the sound of splashing preceding this section, causes the listener to make connections to their own experiences underwater. The longer the sounds remain low-pass-filtered, the greater the stress for the listener, as they may recall past experiences of holding their breath. When the sonic vantage point moves out of the water, this space is created not only through the re-emergence of high-frequency content, but through the presence of duck and goose calls and otter squeaks. Listeners may also connect this emergence with the physical relief of taking a breath, the release of pressure on the ears, and the reappearance of clear visuals.

Transmodal perception and proprioceptive experience also helps listeners to deduce the energy behind gestures and movements (Smalley 1996, 84). *Our Ancient Woods* features many unprocessed soft movement sounds, sometimes foregrounded, like the footsteps in leaf litter at 0:08. We know through our embodied knowledge of effort, energy, and tension that gentle sounds like these are made through gentle movements (Barreiro 2010, 39); making these soft movement sounds more foregrounded than in other listening situations – such as real life, where it is unlikely a wild animal would allow a human close enough to hear their footsteps so clearly – gives the impression of physical closeness to the listener. In addition, animal movement sounds are often soft due to an attempt to be secretive, so foregrounding these sounds gives the impression of witnessing something intimate and usually hidden to humans. (Sonic intimacy is often achieved through microphone proximity, so it was useful that many of the animals were close to the microphone during the recording process, and that the microphone was directional.) These gentle movement sounds resemble microsound, where sound particles are so short that their pitch becomes unclear (Thomson 2004, 207) suggesting closer links to physical sensations and touch than traditional notes (Demers 2010, 75). This heightens the sense of physical closeness and intimacy; touch is 'the most personally experienced of all sensations' and is often associated with intimate encounters (Hall 1966, 59).

Dissemination

Our Ancient Woods has been featured at various festivals, exhibitions, conferences, and albums both in the UK and abroad. (A full list of these performances can be found in Appendix 1.) The

next step is to measure changes in nature connectedness after listening to *Our Ancient Woods*. This will be done using an online survey during 2022 and 2023. The survey will use themes set out by the Nature Connection Index (NCI), a short and simple nature connection measure created to be clearly understood by both adults and children (Hunt et al. 2017). The NCI focuses on affective relationships with nature rather than cognitive evaluations (Richardson et al. 2019) and research shows that it can be used to detect an increase in nature connection by measuring pre- and post-intervention (Richardson et al. 2018).

As well as quantitative data concerning nature connection, participants will be asked to provide written qualitative data summarising in three words what they enjoyed or find most engaging about the piece. These three-word responses will be connected to pre-defined themes, the five pathways to nature connectedness: contact, emotion, meaning, compassion, and beauty (Lumber 2016), as well as a non-affective pathway, cognition. A brief explanation and an example word from the pilot study are provided for each:

- *Contact*. Engagement through the senses. (Immersive)
- *Emotion*. Affective engagement with nature. (Moving)
- *Meaning*. Using nature to communicate a concept (Inspiring)
- *Beauty*. Perceptions of positive qualities in nature. (Enchanting)
- *Compassion*. Feeling part of nature and being moved to care for it. (Precious)
- *Cognition*. Finding nature fascinating. (Intriguing)

These qualitative responses will be used to see through which pathway acousmatic music using animal sounds is most effective at facilitating nature connection.

A limitation to this study is that participation will appeal to those already interested in or connected with nature, and without further measures taken, it is difficult to know how short or long-term any increase in nature connection will last.

Conclusion

Nature connection, which is important for both fostering nature protective willingness and improving wellbeing, is nurtured by one's experiences with nature; virtual experiences can bypass real-world limitations to engage people creatively with the natural world and conservation issues. Sound, being not only an aural but a visual, tactile, and proprioceptive experience, is an effective medium through which to foster a sense of nature connection, especially within the realm of electroacoustic composition. Animal sounds have a long history in many creative areas of human culture, including electroacoustic composition, but outside the realm of soundscapes, animal sound recordings are not often chosen as the central source material for the purpose of engaging people with conservation. *Our Ancient Woods* is an attempt to use the electroacoustic medium to enhance the affective potential of animal sounds by combining them with animal behaviours and movements during sound processing, composing with transmodal perception in mind, and using space as a key compositional parameter. Through this compositional process, *Our Ancient Woods* has the potential to increase a listener's sense of nature connection.

Appendix 1

As of September 2022, *Our Ancient Woods* has been featured in the following festivals, exhibitions, conferences, and albums:

- 16 April 2021, MANTIS Festival, Manchester, UK.
- 9 September 2021, MeCCSA-PGN Conference, UK.
- 26 September 2021, REF – Resilience Festival, Foggia, Italy.
- 14 October 2021, Skipton Big Ideas Exhibition, Jersey.
- 19 October 2021, NWCDTP ResConf, UK
- 21 October 2021, The Sound of Colour, Jersey.
- 27 November 2021, MANTIS Festival, Manchester, UK.
- 7 January 2022, BFE/RMA Research Students' Conference, Plymouth, UK.
- 21 January 2022, FIXED.wav 2021 album, Empirica Records.
- 26 June 2022, NYCEMF, USA.
- 4 July 2022, ICMC, Ireland.

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