

**Potentials in a World of Becoming: Ecological
Correspondence in Compositional Practice**

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A Thesis submitted in partial
fulfilment of requirements for the
degree of Master of Music(Composition)

Sydney Conservatorium of Music

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December 2022

I declare that the research presented in this submission is my own work and it contains no material that has been submitted for the award of a higher degree.

Signed:

Date: 23/12/2022

Abstract

This thesis and portfolio examines my growing engagement with ecological thinking in my compositional practice. Grounding my ecological understanding in ideas of active, complex interconnectivity; open modes of engagement; and an ecological conception of materiality, I examine how this approach has helped refine and guide my creative process over the course of my masters research project. Sitting alongside these themes are recurring ideas of assemblage and vulnerable engagement. These are both approaches to composition and provide an analytical lens through which overarching ecological ideas can be examined. The compositions included in the portfolio range from small chamber to large orchestral works and the differing sizes and scales of these pieces allows for the examination of the overarching themes from a variety of angles and perspectives. Ideas of assemblage provide a structural approach in the examination of the mixed chamber octet *Mycelium* (2022). Ideas of assemblage are then further explored within the context of the orchestra, with the works *drawing together, apart* (2021), *Detritus* (2022) and *Whale Fall* (2022). Ideas of materiality and vulnerable engagement are then used as the primary lens for an analysis of the chamber works *Etchings of Light* (2021), *Marine Snow* (2022) and *Phytoplankton* (2022).

Key Terms: *Ecological Thinking, Interconnection, Openness, Materiality, Assemblage, Vulnerable Engagement*

Acknowledgements

The majority of this thesis was written on the stolen land of the Gadigal people of the Eora Nation and I pay my respects to their Elders, past and present. Sovereignty was never ceded.

This research project would not have been possible without the incredible insight, guidance, and support of my lead supervisor, Professor Liza Lim. I am immensely grateful for all the time and effort she has put into helping me undertake this project.

I also extend my gratitude to Dr Benjamin Carey for listening to concerns, and providing invaluable feedback on my work over the last two years. My thanks also to Dr Damien Ricketson for his input into this project.

I am immensely grateful to the many people who requested and/or played the works that constitute the portfolio of this thesis. Though COVID-19 disruptions have meant changes to a multitude of plans I am nonetheless immensely thankful for all your time encouragement and trust in my work. Particular thanks goes to Daryl Buckley and ELISION, the Royaumont Foundation, Marie Ythier, Ensemble ICTUS, Mark Menzies, the Arditti Quartet, David Felder and June in Buffalo, Ben Northey, Marc Taddei, Roger Benedict, the New Zealand Symphony Orchestra, Orchestra Wellington, Damien Ricketson and the Sydney Conservatorium New Music Ensemble, Hannah Darroch, Debbie Rawson, Justin DeHart, Alex MacDonald, Heather Lewis, the Composers Association of New Zealand, and the SOUNZ Centre for New Zealand Music. The support of each and all of these people and organisations was essential to the writing and

performance of the works in my portfolio and for all your support I am incredibly grateful.

This study was made possible thanks to the financial assistance of a number of organisations and as such my thanks go to Universities New Zealand for their administration and award of a 2021 William Georgetti Scholarship, to the University of Sydney for the Alison Burrell Bequest, and the University of Otago for the award of the Ida White Travelling Scholarship. I am also grateful to the Australian Government for the Research Training Programme Tuition Fee Offset I received to undertake my study.

This thesis would not exist without the support of my family. My thanks to my parents Rachael and Jonathan for your support through COVID related changes of plans and everything else. Thanks also to rest of my family: Vivienne, Malcolm, Luke, and Sylvia, for supporting me, be that through attending concerts, or simply meeting me for lunch in the middle of busy weeks.

My final note of thanks must go to Ihlara McIndoe for her strong, unwavering support and for providing constructive and insightful feedback on many aspects of this project as it developed.

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Portfolio of Compositions

1. *Mycelium* (2022)

for bass flute, trumpet, percussion, electric guitar, electric keyboard,
violin, 'cello, double bass

Premiere: September 4th 2022 as part of the 2022 Royaumont Académie
Voix Nouvelles

Marie Ythier and Ensemble ICTUS

Conductor: Tom De Cock

Bass Flute: Michael Schmid

Trumpet: Susana Santos Silva

Percussion: Gerrit Nulens

Electric Guitar: Tom Pauwels

Electric Keyboard: Jean-Luc Plouvier

Violin: Aisha Orazbayeva

'Cello: Marie Ythier

Double Bass: Hugo Abraham

Royaumont Abbey, Asnières-sur-Oise, France

Duration: 13 minutes

2. *drawing together, apart* (2021)

for orchestra

Recording Session: October 30th 2021

Orchestra Wellington

Conductor: Marc Taddei

Michael Fowler Centre, Wellington, New Zealand

Duration: 8 minutes

3. *Detritus* (2022)

for orchestra

Premiere September 23rd 2022 as part of the 2022 SOUNZ New Zealand
Composer Sessions

New Zealand Symphony Orchestra (NZSO)

Conductor: Benjamin Northey

Michael Fowler Centre, Wellington, New Zealand

Duration 8 minutes

4. *Whale Fall* (2022)

for chamber orchestra

Premiere: October 21st 2022

Sydney Conservatorium of Music New Music Ensemble

Conductor: Roger Benedict

Sydney Conservatorium of Music, Sydney, Australia

Duration: 13 minutes

5. *Etchings of Light* (2021)

for string quartet

Recorded: August 19th 2022 as part of June in Buffalo 2022

Arditti Quartet

Violin 1: Irvine Arditti

Violin 2: Ashot Sarkissjan

Viola: Ralf Ehlers

'Cello: Lucas Fels

Buffalo, New York, USA

Duration: 12 minutes

6. *Marine Snow* (2022)

for alto flute, bass clarinet, percussion, violin, viola, 'cello

Premiere: July 8th 2022 as part of the 2022 Nelson Composers Workshop

Alto Flute: Hannah Darroch

Bass Clarinet: Debbie Rawson

Percussion: Justin DeHart

Violin: Mark Menzies

Viola: Alex MacDonald

'Cello: Heather Lewis

Conductor: Nathaniel Otley

Nelson Centre for Musical Arts, Nelson, New Zealand

Duration 8 minutes

7. *Phytoplankton* (2022)

for flute and bass flute

Premiere: 2023 Melbourne Australia

ELISION Ensemble

Duration: 9 minutes

Recordings and scores can be accessed using the link below:

<http://bit.ly/3HSOXoQ>

Introduction

Over the past several years I have found myself concerned with how issues of the environment and ecology can be meaningfully integrated into compositional practice. Climate change is undeniable, with communities around the world now living with the effects of anthropogenic global warming and an increasingly limited timeframe for the world to seriously curb emissions and change their way of living to avoid catastrophic rates of temperature rise. This has led to an increased awareness of humanity's relationship with the environment, as climate change forces us into an epistemological reconsideration of the relationship between humans and the environment.

My desire to engage with environmental issues in a musical context began in 2019 resulting in several environmentally themed works including the orchestral work *biosphere degradation* and the chamber work *...dimension of loss*. These are works that are best characterised as environmentally conscious, addressing specific issues of habitat destruction and species extinction. As time went on however, I began to find this approach restrictive, too surface, and at times overly literal. I was also conscious that this approach risked a type of 'greenwashing' of my compositional practice, where environmental issues were used to validate music I may have written with or without the extramusical idea. I felt hemmed into an approach that acknowledged the global environmental situation only when explicitly stated, be that in a title, programme note,

or vocal text when in actual fact, the Anthropocene and environmental issues are an ever-present, ever-connected, and ever-changing reality of the present that does not disappear simply because our attention is directed elsewhere. I thus wanted to find ways to integrate environmental consciousness into my compositional practice in a more meaningful way.

This led me to the field of ecological thinking which has challenged many of my preconceived notions of both music and the world. This focus has led to a process of engaging with ideas of interconnectedness and tentacularity, vulnerable engagement, assemblage, anti-hylomorphic models,¹ and a greater examination of material agency and solidarity with non-human aspects of our world.

The result is a portfolio of compositions in which ecological ideas are both embedded in the conception of works and used throughout the creative decision making process. This thesis examines instances and implications of these uses. It is important to note, however, that the examples given are often only a small snapshot of the use of these ideas within my broader practice, a single patch on a larger quilt, or one section of a complex mycorrhizal web.

In Chapter one I examine the lines of ecological thinking that this research has followed, focussing on the core themes of interconnectivity, openness, and materiality. In Chapter two I examine how mycelial and assemblage thinking influenced and led my creative process in the creation of the work *Mycelium* for mixed chamber octet. Chapter three

¹ Hylomorphism being the Aristotelian theory that divides matter from form. For more see Tim Ingold, "The Textility of Making," *Cambridge Journal of Economics* 34, no. 1 (2010). 92.

looks at how ecological thinking and vulnerable engagement can be used in writing for larger ensembles, with particular focus on the potential of ideas of assemblage. The final chapter examines ecological processes related to instrumental physicalities and materialities, primarily through the examination of the works *Etchings of light*, *Marine Snow*, and *Phytoplankton*.

1 A Foundation of Ecological Thinking in Compositional Practice

1.1 Background

Growing out of environmental and conservation activist movements, ecological thinking sits alongside other ecocritical scholarship as work that tries to understand the implications of living in a world increasingly defined by the effects of anthropogenic climate change. Some of the earliest reference points for many modern scholars of ecological thinking are works of mid-20th century scholarship including Rachel Carson's *Silent Spring* and Gregory Bateson's work on the "ecology of mind."² These texts, resonate with ecological scholars as they identify defining principles of ecological thought, including ideas of interconnectivity, openness of thinking, and an understanding of the world through a focus on specificity, an approach that many ecological scholars implement through the lens of materiality.

1.2 Knots of Meaning

This chapter examines three core principles of my ecological thinking that guide this thesis. These ideas function as structural focal points that my research runs both to and

² Rachel Carson, *Silent Spring* (Boston: Houghton Mifflin, 1962). & Gregory Bateson, *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology* (University of Chicago Press; repr., 2000).

from, with each theme central to the later analysis and discussion of individual works within my portfolio. These three principles are:

- Interconnectivity
- Openness
- Ecological Materiality

While these three principles remain very broad, they allowed me to navigate a range of scholarly discussion to find a conception of each that resonates with my own ecological understanding. In the following discussion I detail a specificity of understanding of each that allows for a more precisely located, vibrant discussion of the compositional work in chapters 2-4.

1.3 Interconnectivity

Interconnectivity is one of the themes that arises in the work of both Carson and Bateson. In Carson's work, it emerges through her examination of the intended and unintended consequences of widespread pesticide use, demonstrating their effects on broader environments and ecosystems than was generally assumed at the time.³ By contrast, Bateson's acknowledgement and theorising of interconnectedness examines cognition, articulating the impossibility of disentangling the functions of mind, body, and environment in the cognitive system of perceiving the wider world.⁴ These ideas of

³ Carson, *Silent Spring*.

⁴ Bateson, *Steps to an Ecology of Mind*.

interconnectivity have become central to modern ecological thinking to the point where Timothy Morton has articulated interconnectivity as “the most basic ecological fact”.⁵

My understanding of interconnectivity is rooted in the work of anthropologist Tim Ingold and feminist science and technology scholar Donna Haraway. While these scholars operate in quite different fields, their understanding of interconnectivity shares the key characteristic of being active and vastly complex. For Tim Ingold, these active lines of movement and growth form what he terms the meshwork, a conception of interconnectivity that differs from a more static or *a priori* model of a ‘network’ due to the way it forms entanglements.⁶

Where the network has nodes, the meshwork... has knots. Knots are places where many lines of becoming are drawn tightly together. Yet every line overtakes the knot in which it is tied. Its end is always loose, somewhere beyond the knot, where it is groping towards an entanglement with other lines, in other knots.⁷

Connections in the meshwork thus build identity through their complex interactions, in the ‘knottings with’, and ‘reachings towards’ other lines of movement and growth. Donna Haraway advocates a similarly lively understanding of interconnection. For Haraway, there is a need to conceive interconnectedness not as something disembodied but as something active that sits with and alongside the things being connected, a concept she refers to as ‘the tentacular ones.’.

⁵ Timothy Morton, *Being Ecological* (Mit Press, 2018). 29.

⁶ Tim Ingold, *Making: Anthropology, Archaeology, Art and Architecture* (Routledge, 2013). 132.

⁷ Ingold, *Making*. 132.

The tentacular ones make attachments and detachments; they [m]ake cuts and knots; they make a difference; they weave paths and consequences but not determinisms; they are both open and knotted in some ways and not others.⁸

Notable in this conception of interconnectedness is how vividly it articulates that connections are not constant or fixed once made, but rather are entities constantly evolving in systems of complex interconnection. Thinking things in such a tentacular manner allows greater attention to be paid to the way things gain and make identity through the connections they form, with active, living connections having the ability to function as extensions to things, and not just theoretical linkages. Within my own ecological thinking, I see Haraway's challenge of tentacular thinking as a way of enhancing my understanding of Ingold's meshwork. The conceptual stimulant of actively made and remade connectivity that the tentacular metaphor provides, turns Ingold's meshwork into something that is more unruly, constantly changing, and alive. This idea of active interconnectivity became a tool of provocation that I used to understand processes of meaning-making, movement, and growth within my compositional practice.

1.4 Openness

1.4.1 Specificity

One of the strengths of ecological thinking as a mode of engagement is its ability to be enacted in ways specific to situation and context. As philosopher Lorraine Code writes,

⁸ Donna J Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Duke University Press, 2016). 31.

“ecological thinking relocates inquiry “down on the ground” where knowledge is made, negotiated, [and] circulated.”⁹ This locating of practice in place and circumstance means that ecological thinking becomes vibrant, always changing specific to the circumstances it is enacted in. An open mode of thinking grows out of this understanding as context-oriented ecological thinking will differ from person to person and situation to situation, resisting ideas of generalisation and mastery in favour of patchiness. An open mode of thinking that acknowledges the importance of not knowing and that constantly seeks to find new ways of knowing and doing thus becomes essential for the practice of ecological thought.

1.4.2 Accounting for Difference

Openness also provides a useful framework to accommodate difference that arises from the specific locatings of ecological thinking. Anthropologist Anna Tsing, channelling the work of Marilyn Strathern, advocates an approach of openness to ideas in her discussion of Anthropocene that is particularly lively. Tsing challenges us to:

...let fragmented philosophies and fragmented histories sit amongst each other, the better to pay attention to what is possible. When it comes to living landscapes we need those juxtaposed fragments to even notice them. Muddles that give rise to tangles and vice versa.¹⁰

⁹ Lorraine Code, *Ecological Thinking: The Politics of Epistemic Location* (Oxford University Press, 2006). 5.

¹⁰ Anna Tsing, "A Feminist Approach to the Anthropocene: Earth Stalked by Man" (Helen Pond McIntyre Lecture, Barnard Centre for Research on Women, 2015). 50:12.

This challenge to openness allows us to account for and pay attention to the patchwork of views that arise from the locating of ecological thinking in context. Tsing also argues that, in fact, these patchworks are vital in order to notice the vibrant difference and divergence that occurs in the “assemblages of liveability” that constitute the Anthropocene.¹¹ Tsing’s description of muddles and tangles also echoes the interconnection detailed above by Ingold and Haraway, showing how the core themes in this research are deeply interrelated. As a composer this approach of openness has the potential to present different creative questions to ones that attempt to theorise, generalise, and imagine works as logical, homogenous wholes. It asks if music can be created that exists in a patchy state, containing a range of vastly distributed, complex, and specific ideas in polyphonic assemblage.¹²

Amitav Ghosh also talks about the need for an increased openness in order to address issues of Anthropocene.¹³ Ghosh writes that traditional literary fiction’s scepticism of wild and improbable happenings at a time when such events are happening on a regular basis constitutes “an aspect of the broader imaginative and cultural failure that lies at the height of the climate crisis.”¹⁴ Ghosh proposes that an openness to such improbabilities is thus essential for artistic mediums to be able to effectively address volatile issues of the present and Anthropocene.

¹¹ Anna Tsing, "Earth Stalked by Man," *The Cambridge Journal of Anthropology* 34, no. 1 (2016). 4.

¹² Tsing, "Earth Stalked by Man." 3-4.

¹³ Amitav Ghosh, *Uncanny and Improbable Events* (Penguin Books Limited, 2021). 8.

¹⁴ Ghosh, *Uncanny and Improbable Events*. 7.

1.4.3 Vulnerable engagement

Tsing's call to "pay attention to what is possible" also opens avenues for learning and experimentation within practice that tend away from ideas of mastery and towards a world of vulnerable engagement. This movement away from Western epistemic mastery is another aspect Lorraine Code identifies as crucial for ecological thinking,¹⁵ and is discussed specifically as a tool for decolonial engagement by English scholar Julietta Singh.¹⁶ Singh writes that mastery:

as a pursuit, ... invariably and relentlessly reaches toward the indiscriminate control over something—whether human or inhuman, animate or inanimate. It aims for the full submission of an object—or something objectified—whether it be external or internal to oneself. In so doing, mastery requires a rupturing of the object being mastered, because to be mastered means to be weakened to a point of fracture. Mastery is in this sense a splitting of the object that is mastered from itself, a way of estranging the mastered object from its previous state of being.¹⁷

An approach to practice that aims for mastery thus does not allow for the contingent vibrancy of a complex ecological world, as attempting mastery over something is the very opposite of the Tsing/Strathern dynamic of paying attention to what is possible. It is instead an attempt to create a world of predictability through the rupturing of the potential of a thing. Mastery is thus, in a sense, related to the model of hylomorphic

¹⁵ Code, *Ecological Thinking*. 6.

¹⁶ Julietta Singh, *Unthinking Mastery: Dehumanism and Decolonial Entanglements* (Duke University Press, 2017).

¹⁷ Singh, *Unthinking Mastery*. 10.

creation that Tim Ingold argues against in “The Textility of Making”, a mode of creating where one attempts to impose one’s will upon the materials being handled, with no room for the consideration of, and working with, the vibrancy that exists within these materials.¹⁸

Moving away from these masterful approaches does not do away with the importance of skill to ecological practice. While ideas of mastery and skill are often inextricably linked in a western academy context, Singh argues that they should be separated as doing away with the concept of mastery does not necessitate the loss of skilled relationships with one’s field.¹⁹ Instead, Singh advocates a movement from masterful practice to:

...a practice of vulnerable engagement... of opening ourselves up to our dependence on other discourses, peoples, beings, languages (that we know and do not yet know), and things that give rise to the ways that we think and the claims that we make.²⁰

It is this idea of vulnerable engagement that has been particularly helpful in this research project as it distils so much of the ideas of openness into a single concept. Vulnerable engagement encourages us to examine the “critical potentialities of feeling, recognizing, and inhabiting our own discomforts”²¹ challenging us to engage with and find ways to live with this discomfort rather than ignoring or running away from it. In an explicitly

¹⁸ Ingold, “The Textility of Making.” 91-93.

¹⁹ Singh, *Unthinking Mastery*. 90.

²⁰ Singh, *Unthinking Mastery*. 90-91.

²¹ Singh, *Unthinking Mastery*. 150.

ecological context Donna Haraway's idea of 'staying with the trouble' as a response to the Anthropocene is advocacy of this type of vulnerable response.²² These processes of vulnerable engagement have, through this project, become crucial to my compositional practice and have forced me to address and reckon with ideas and materials that are less stable, as well as areas of my composition that were not as developed.

1.5 Materiality and Collaboration

1.5.1 Materiality

Conceptions of materiality are vital within ecological contexts. Central to almost all discussions of such ecological materiality is the recognition of the liveliness and agency that exists beyond the human. Philosopher Timothy Morton draws from an object-oriented ontology (OOO) background to provide a challenge to human centred material thinking, detailing the importance of understanding the strangeness, unknowability and openness of objects.²³ Morton posits that what we claim we know about any object is merely a correlation we draw from our own observation and experience, and just because we experience an object in a particular way does not mean that we therefore fundamentally understand what that object is.²⁴ Such thinking begs questions like can we tune (to use Morton's phrasing) our interactions with these objects so that we can glean more about them through open thinking and ecological engagement. This reach towards solidarity with the non-human is, for Morton, a core principle and focus of any ecological thinking.²⁵ For Morton, art therefore exists in an inherently ecological zone, as it is almost always concerned with some form of solidarity with non-human objects and ideas. To

²² Haraway, *Staying with the Trouble*. 10.

²³ Timothy Morton, *Realist Magic: Objects, Ontology, Causality* (Open Humanities Press, 2013). 55.

²⁴ Morton, *Realist Magic*. 48-49.

²⁵ Timothy Morton, *All Art is Ecological* (Penguin Books Limited, 2021). 57-58.

move into a zone of what Morton calls ecologically explicit art, this solidarity with the non-human, rather than existing in the background, is brought into the forefront of perception,²⁶ something that Morton himself has explored in collaboration with composer Jennifer Walshe in the creation of the performance-art opera *Time Time Time* (2019).²⁷

While Morton's ideas of non-human solidarity and tuning to the potential of objects have been useful to this project, I increasingly found the vocabulary that Tim Ingold uses in his conception of materials more productive. In *Making*, Ingold recasts objects as materials, noting that thinking things in this way highlights materials' ineffability and "inherent tendency to run amok."²⁸ Ingold advocates that recasting objects as materials allows them to exist in a dance of animacy in a world of active material engagement.²⁹ This idea of a flow of matter in a way that resists traditional hylomorphic models of creation resonated more with me creatively than Morton's world of objects which, for my own creative practice, seemed to isolate things in ways that thinking things as materials didn't. The idea of following the flows of materials is, to Ingold, critical to a process of inquiry:

In the art of inquiry, the conduct of thought goes along with, and continually answers to, the fluxes and flows of the materials with which we work... Here, every work is an experiment... in the sense of prising an opening and following where it leads.³⁰

²⁶ Morton, *All Art is Ecological*. 58.

²⁷ Jennifer Walshe and Timothy Morton, *Time, Time, Time* (2019).

²⁸ Ingold, *Making*. 17.

²⁹ Ingold, *Making*. 17.

³⁰ Ingold, *Making*. 6-7.

Here Ingold's conception of materiality is codifying an approach for openness that decentres the human through encouraging a focus on the specificity of the materials one is working with. This approach is also a way of implementing Julietta Singh's ideas of vulnerable engagement because to engage with materials in a way that fosters these fluxes and flows is to open yourself up to, and indeed welcome, unintended and unpredictable happenings that occur through working with the grain of materials. For me compositionally, this working takes a variety of forms, from the unpredictable registral jumps that can occur when simultaneously singing and playing through the flute, to contingent sound practices that arise through the alterations of harmonic finger pressure on the violin.

Sitting alongside the work of Ingold is the work of Lambros Malafouris who, in his essay "At the Potter's Wheel" argues that material interaction, in this instance between human and clay on a potter's wheel, is best understood as a *collaboration* between potter and mass of clay.³¹ In this process both potter and clay have agency that informs how the clay is shaped.³² Malafouris argues that if we take this to be true then separating any material and human agency becomes an impossible and pointless task, something that we can trace in ecological thought all the way back to Gregory Bateson's writings about an entangled 'ecology of mind'.³³

³¹ Lambros Malafouris, "At the Potter's Wheel: An Argument for Material Agency," in *Material Agency* (Springer, 2008). 34.

³² Malafouris, "At the Potter's Wheel: An Argument for Material Agency." 22.

³³ Malafouris, "At the Potter's Wheel: An Argument for Material Agency." 22.

Karen Barad is another scholar who is interested in such vibrancy of matter. Barad, from her background in theoretical physics, examines epistemological and ontological challenges of what matter and material are.³⁴ Barad is particularly interested in looking at agency and matter in what she terms intra-active processes, ones where the parties involved are viewed as engaging in a system where their agencies become entangled.³⁵ This, for Barad, forms an important epistemological difference from that of a process of interaction which implies the separation and isolation of the agencies of such parties.³⁶ This idea of intra-activity³⁷ has the effect of decentring human agency, turning engagement processes into more democratic encounters like the one Malafouris details between potter and clay.

In a compositional context, these conceptions of materiality encourage us to ‘stay with’³⁸ our materials to see how they might flow and to engage with them in a way that allows for the agency of materials to be more meaningfully integrated into the compositional process. Conceptions of materiality also have connotations for our understanding of performance, as it highlights the fact that a performer does not interface in a unidirectional way with an instrument but rather that we can see a performer and instrument interfacing with one another in intra-action, a lively area for ecological exploration through collaborative practice.

³⁴ Karen Barad, *Meeting the Universe Halfway* (Duke University Press, 2007). 33.

³⁵ Barad, *Meeting the Universe Halfway*. 33.

³⁶ Barad, *Meeting the Universe Halfway*. 33.

³⁷ Which has links to Ingold’s idea of material correspondance. Ingold, *Making*. 31.

³⁸ To allude back to Haraway’s idea of “staying with the trouble”. Haraway, *Staying with the Trouble*.

1.5.2 Collaboration

A lively 'working with' approach that foregrounds processes of vulnerable engagement has been core to this creative research. Collaborative processes have been essential in this, moving my practice into ecological zones that foreground solidarity with materials and other non-human elements in less prescriptive, more open modes of creation.

In developing these creative approaches there has been a great deal of literature that has guided and furthered my understanding of the function and necessity of collaborative practice. The work undertaken by Scott McLaughlin, Zubin Kanga and Mira Benjamin on developing contingent sounds in compositional practice provided excellent insights into how deep engagement with the instruments one is writing for can produce lively and unexpected happenings that unfold in space and time.³⁹ The examination of the work of Liza Lim also demonstrates ways in which collaboration can be used to increase the vibrancy and meaning of musical composition. Lim examines the intense one on one composer-performer collaboration that led to her work *Axis Mundi* (2013), detailing how the composer-performer relationship opened up avenues for the production of a solo in which "[t]he creative 'DNA' of the performer [in this case bassoonist Alban Wesley] is an intimate part of the compositional work."⁴⁰ The broader look at ensemble collaboration undertaken by Lim, Eric Clarke and Mark Doffman⁴¹ was also useful in this project, particularly in developing approaches to rehearsals that would facilitate the opening up of avenues for creative discussion, individual expression, and instrumental agency. rather

³⁹ Scott McLaughlin, Zubin Kanga, and Mira Benjamin, "Composing Technique, Performing Technique," *Journal for Artistic Research*, no. 23 (2021).

⁴⁰ Liza Lim, "A Mycelial Model for Understanding Distributed Creativity: Collaborative Partnership in the Making of 'Axis Mundi' (2013) for Solo Bassoon" (paper presented at the CMPCP Performance Studies Network Conference, Cambridge, 2013). 12.

⁴¹ Eric Clarke, Mark Doffman, and Liza Lim, "Distributed Creativity and Ecological Dynamics: a Case Study of Liza Lim's 'Tongue of the Invisible'," *Music and Letters* 94, no. 4 (2013). 654.

than being overly prescriptive and closing such doors. Knowledge of these examinations of collaborative practice aided this research greatly.

Initially in this project, I intended on having a strong focus on pre-compositional close collaboration. However, COVID-19 lockdowns led to more limited opportunities to work directly with performers in person. This necessitated a search for other approaches to build collaborative principles into my music that were not as reliant on one-to-one pre- and mid- compositional collaboration. A key approach in this regard was a greater focus on exploring contingent sounds and practices already documented in online and print resources⁴² as well as through my own explorations as a violinist. Of particular interest in these explorations were wind and string multiphonics, unpredictable bowing techniques, and other approaches to playing, including vocalisations. These are all ways of playing that carry a unique identity depending on the player and instrument for any given performance and as such these contingent and unpredictable sounds are a way to move beyond desires for control and mastery and towards a music-making that is more inherently performer-, instrument-, and site-specific. It is here that we see how an ecological approach has moved my practice beyond more traditional modernist uses of extended techniques and towards one where extended techniques are specifically used in a process to foster active co-creative identity between composer, performer and instrument.

⁴² Resources that were useful included "Heather Roche: Blog/Index," accessed 14th December 2022, <https://heatherroche.net/>; Phillip Rehfeldt, *New Directions for Clarinet* (Scarecrow Press, 1994); Pascal Gallois, *The Techniques of Bassoon Playing* (Bärenreiter, 2009); Peter Veale, *The Techniques of Oboe Playing* (Bärenreiter, 1994). and scores such as Liza Lim, *Cello Playing -as Meteorology* (Ricordi, 2021); Scott McLaughlin, *Natura Naturans* (Self Published, 2021); Andrew Norman, *The Companion Guide to Rome* (Schott Music, 2010).

1.6 Harmony and Large Scale Structure

While not the primary focus of this thesis it is worth briefly commenting on the way this ecological approach has affected approaches to harmony and large scale form. While harmonic approaches vary piece to piece, reoccurring harmonic devices that see extensive use in this research are semitonal clusters and spectral harmony. For me, these two approaches to harmony allow me to find pathways between timbral and more pitch centred styles of writing. I also find these two approaches fruitful as I find there is common ground between close partials of high spectral harmony and semitonal clusters. This common ground is often used as a pivot point, creating a transitional space within which the two harmonic approaches can exist.

In terms of specific pitch choices a recurring method guiding compositional choices has been via working with players to find points on an instrument where particular sound or timbre is best suited. A particularly clear example of this occurs in the opening of *Whale Fall* where the opening pitch of Db was chosen as one that is both relatively simple to play on the horn as well as able be sung by most voice types. From there, the opening section of the piece was built around this pitch allowing the sung multiphonics on the horn to occur in a range that is most comfortable. Other instances of such affordance-based pitch decisions include the settling around the pitches A, Bb, D and E that occurs in *Mycellium* these pitches being the lower open string of various instruments in the ensemble.

An engagement with instrumental timbre guides much of the long term structural thinking within my work. The work *Etchings of Light* provides a useful example as the work moves between delicate high timbres and lower, more granular sonorities with the pitched material and centres remaining relatively consistent throughout and a secondary

consideration to that of colour and gesture. Similarly the orchestral work *Detritus* is structured around percussion textures and timbres, moving over time from a focus on metallic to wooden percussion sounds, a change that moves in terms of pitch from lower to higher and from darker to lighter in terms of timbre. This progression then informs other instrumental writing throughout the piece. This is most clear in the different approaches the two wind section *tutti* take, the first of which (bars 18-28) utilises the bass clarinet and contrabassoon alongside breath sounds while the second (bars 93-100), uses the entire full wind section playing normally, flooding the texture with higher pitches and a more discernible polyphonic vibrancy. Approaching structure through this lens of timbre allows long term form to develop organically through a process of following compositional threads that emerge as the piece is composed rather than being bound to a rigid and pre-determined compositional form.

1.7 Conclusion

Ecological conceptions of interconnectedness, openness and materiality have been central in the composition of the creative works in this project. These three themes run throughout the next chapters which examine in more musical detail a multitude of the implications of the theoretical thinking laid out in this opening chapter. Each of the following chapters examines a significant aspect of my portfolio with a focus on one of these themes. Ideas of interconnectivity are explored in Chapter two through the use of a mycelial metaphor. Ideas of openness are then fostered in Chapter three through a compositional engagement with ideas of contingency and assemblage. Finally, materiality is the primary focus in the discussion of the development of specific instrumental writing in Chapter four.

2 Composing Mycelial Entanglements

2.1 Background

Beneath the ground lie vast structures of fungal threads (*hyphae*) that create networks known as mycelium (plural mycelia).⁴³ These mycelia form an “architecture of webs and filaments”⁴⁴ creating and sustaining connections between organisms that to our human, above-ground eye, appear to lack such connectivity. These mycorrhizal webs connect not just fungi to one another but also to trees and other flora extending these complex networks into webs that facilitate and cultivate lively interspecies cohabitation. These mats of mycelial interconnection provided provocation and background for the creation of my composition *Mycelium*, a chamber work written between April and August 2022.

2.2 Mycelia

Over the last half century there has been an increase in academic interest in mycelia and mycelial properties. In the field of science, this interest grows out of an increase in the understanding of mechanisms of fungal growth: from why these mycelial networks are successful, to examining on a microbiological level how these networks are formed and grow.⁴⁵ In the field of humanities this interest in fungi is often tied to searches for new

⁴³ Anna Tsing, "Arts of Inclusion, or How to Love a Mushroom," *Manoa* 22, no. 2 (2010). 191.

⁴⁴ Tsing, "Arts of Inclusion, or How to Love a Mushroom." 191.

⁴⁵ MJ Carlile, "The Success of the Hypha and Mycelium," in *The Growing Fungus* (Springer, 1995). and Mark Fricker et al., "The Mycelium as a Network," *The Fungal Kingdom* (2017).

ways of living and being brought on by the climate crisis and Anthropocene. This is the literature that interests me most as a composer concerned with ecological thinking. Anna Tsing's 2015 book *The Mushroom at the End of the World* is a particularly important text which documents the social importance and networks created by the Matsutake mushroom.⁴⁶ Tsing examines in detail how these mushrooms enable the forging of vast social and economic connections across the world, through connecting individuals, communities, and business interests in an incredibly complex network not dissimilar to mycelial networks. In Tsing's work it is also abundantly clear how specific these networks are to this particular species of mushroom. This is because unlike many other species of mushroom, scientists have, at present, been unable to cultivate and grow Matsutake mushrooms in controlled environments.⁴⁷ Matsutake thus resist generalisation and mass cultivation as their growing conditions are complex, highly specific and to date elusive.⁴⁸ This had, to me, clear potential for musical parallels in that the identity of a musical composition is so often similarly elusive and dependant on various aspects of location and materiality.

Interest in fungi and mycelial properties is prevalent across a variety of modern artistic fields. Within music, John Cage is perhaps the most well-known composer to have a particular affinity for mushrooms. An amateur mycologist his interest in fungi while extensive is not something that found its way into his music in easy to discern ways⁴⁹ although they do occasionally show up explicitly in works such as *Indeterminacy*.⁵⁰ For

⁴⁶ Anna Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton University Press, 2015).

⁴⁷ Tsing, *The Mushroom at the End of the World*. 40.

⁴⁸ Tsing, *The Mushroom at the End of the World*. 40.

⁴⁹ Sabrina Small, "Harmony of the Spores: John Cage and Mycology," *Gastronomica: The Journal of Food and Culture* 11, no. 2 (2011). 19.

⁵⁰ Tsing, "Arts of Inclusion, or How to Love a Mushroom." 194.

more explicit mycelial engagement I look to the work of composer Liza Lim. Lim has written about the development of a “mycelial model for understanding distributed creativity” over the course of the creation of her 2013 bassoon solo *Axis Mundi*.⁵¹ In her writing, Lim describes how a complex and reciprocal co-creative process resulted in the creation of a work that “is both fruit and archive” of the co-creative process.⁵² Lim also examined mycelial properties within the 2016 work *How Forests Think*. Here mycelial thinking is used to build large scale connectivity within the musical work, showing the way in which forests are interconnected and communicating.⁵³ Other artistic practitioners who have looked at and examined fungi or mycelium in their work include the visual artist Cy Twombly who in the set of lithographs *Natural History Part I, Mushrooms* uses the mushroom as a medium to explore connections between natural and human histories, an act that subverts and challenges nature-culture dualisms.⁵⁴

Within my own work mycelial ideas fostered vibrant connectivity between disparate bodies, slowly entangling initially unconnected material and instruments in webs of meaning. Taking this approach meant that rather than seeking homogeneity, I could instead let difference and inconsistency exist, building connections through highlighting and exploring unstable, fertile sites of encounter.

2.3 Mycelial Materiality and Instrumentation

One of these sites of encounter was found in the instrumentation of the work. The ensemble for *Mycelium* was somewhat unusual, with the mix of acoustic instruments

⁵¹ Lim, "A Mycelial Model for Understanding Distributed Creativity."

⁵² Lim, "A Mycelial Model for Understanding Distributed Creativity." 4.

⁵³ Tim Rutherford-Johnson, *The Music of Liza Lim* (Wildbird Music, 2022). 83.

⁵⁴ Alissa A Walls, "Cy Twombly and the Art of Hunting Mushrooms," *American Art* 28, no. 2 (2014). 51.

(bass flute, trumpet, percussion, violin, 'cello, double bass) and modern electric instruments (electric guitar, electric keyboard) lending the piece a unique sonic identity with distinct compositional challenges. One of these was finding ways to compose that both allowed instruments to retain their individual identity but also ensured that amplified and naturally louder instruments did not totally swamp the instruments that have a softer sonic character. The mycelial connectivity I was trying to build also meant that solving these balance issues by keeping these instruments isolated, or in separate groupings, was undesirable. Several approaches were taken to circumvent these issues. In particular, the density and saturation of sound and colour was extensively manipulated across the ensemble. Key to this was reverting to writing melodic lines in the guitar and keyboard parts, and the manipulation of instrumental technique, including the use of tremolo in the guitar, registral characteristics, the harmon mute in the trumpet, and the found object percussion instrumentation.

A broader focus on melodic lines and polyphony within the work also helped in addressing balance considerations. This approach fit in nicely with the overarching mycelial focus as it resonated with Anna Tsing's musings when discussing Matsutake of polyphonic assemblage.⁵⁵ For Tsing, thinking things through polyphony is a useful tool that opens doors to unusual zones of noticing.

When I first learned polyphony, it was a revelation in listening; I was forced to pick out separate, simultaneous melodies *and* to listen for the moments of harmony and dissonance they created together. This kind of noticing is just what

⁵⁵ Tsing, *The Mushroom at the End of the World*. 23.

is needed to appreciate the multiple temporal rhythms and trajectories of the assemblage.⁵⁶

Thus within the work I tried to evoke and create atmospheres that fostered such polyphonic ways of listening. This was done both through the writing of note focused polyphonic lines but also through engaging with more material polyphony, creating timbral harmony and dissonance as lines of instrumental character and identity are interwoven. Heterophony becomes a particularly useful compositional device in these sections, particularly that between the flute and 'cello in the opening section (analysed in Figures 3 & 4).

I also sought to create micro-acoustic or ambient spaces within the body of the ensemble by retuning the lower stringed instruments. In the work both the 'cello (C string tuned down to a Bb) and double bass (D-A-D-A) have strings tuned outside their normal configurations. This changes how one writes for these instruments significantly, with the modified pitches opening up different pitch areas and natural harmonics to standard instrumental tunings. The nature of these scordatura affected the harmonic trajectory of sections of piece as several moments revolve around the low D of the double bass that simply is not available in standard tuning. Similarly, the identity of the opening section revolves around the 'cello scordatura Bb, first as providing a clear harmonic relation to the Db introduced by the flute, and then later as the grounding note for the opening up of the harmony that occurs in bars 17-18.

⁵⁶ Tsing, *The Mushroom at the End of the World*. 24. Italics in the original

2.4 Dynamic interactions

Within *Mycelium*, the physical properties and characteristics of the instruments afforded the transformation and elaboration of simple musical material. One instance of this can be found in the opening flute melody, which was initially conceived as the following Varésian melodic line whose main pitches are elaborated (Figure 1).

Figure 1 *Mycelium* (Draft Version): Bass Flute, Bars 1-7

The image displays three staves of musical notation for Bass Flute, labeled 'B. Fl.', covering bars 1 through 7. The tempo is marked as quarter note = 54. The key signature has one flat (B-flat). The notation includes various dynamic markings: *p* (piano), *f* (forte), *mp* (mezzo-piano), *ff* (fortissimo), and *pp* (pianissimo). The first staff (bars 1-3) features a melodic line with dynamics *p*, *f*, *mp*, *f*, and *ff*. The second staff (bars 4-6) shows dynamics *f*, *p*, and *f*. The third staff (bar 7) ends with a *pp* dynamic. The notation includes slurs, accents, and fingering numbers (3, 7, 5, 7, 3) indicating specific playing techniques.

From this initial draft, the melody was transformed through a process of more specifically locating the melody in the physical properties and affordances of the bass flute. The result of this process (Figure 2) is a solo where the backbone of the melodic line in Figure 1 remains, but it has now become obfuscated through a process of paying greater attention to the affordances of the flute. This final version of the melody is notable in that it increases the engagement of the player physically, utilising the rolling of the mouthpiece back and forth to engage modes of playing (tongue rams, inhaling/exhaling through mouthpiece) that draw the attention of both the player and the audience to these physical affordances.

This attention to affordance is also seen in the engagement of the flute through physical transitions. In Figure 2 (bars 1 & 4) we see the flute playing through the rolling of the mouthpiece to execute tongue ram, a process that requires awareness of exactly when and where the pitch quality of the note will be lost. The bar 4 tongue ram is then followed by inhaling and exhaling through the instrument in closed position, integrating all aspects of breath action within the notation. Finally, connectivity between techniques is fostered through the fricative vocalisations and staccato harmonics in bar 5, both of which require an increased utilisation of breath and tongue articulation. In this bar, the attention of the player is also drawn to the role of embouchure as the main difference between the unpitched vocalisations and the harmonics is whether the embouchure of the player is properly engaged.

Figure 2 *Mycelium* (Final Version): Bass Flute, Bars 1-7

The musical score for Bass Flute, Bars 1-7, is presented in three systems. The first system (bars 1-3) begins with a tempo marking of quarter note = 54. It features dynamics of *p*, *f*, *mp*, and *f*, with articulation marks like 'U' and '3'. The second system (bars 4-5) includes dynamics *p* and *ff*, a fricative vocalisation mark '/t-t-t-t-t/' in bar 5, and articulation marks like 'U' and '5'. The third system (bars 6-7) starts with a dynamic of *f* and includes articulation marks like '7' and '3'.

Through engaging in these processes of ‘noticing’ and acting with the affordances of the instrument and musician, composition, rather than being a unidirectional process,

becomes a something much more dynamic and playful, an intra-active process that decentres and distributes agency between composer, instrument and performer.

Further focus on instrumental affordance within the work occurs in the heterophonic ‘cello-flute dialogue that begins at bar 8. In this extensive passage, the prevailing melody is taken and ‘run through’ the physical characteristics of the bass flute and ‘cello. The result of this is a heterophonic melody with numerous instances of divergence and reconvergence. Figure 3 demonstrates this heterophony in practice, with the ‘cello and flute lines beginning in octaves before diverging as each instrument engages with the unfurling chromatic line. The two instruments then reconverge in unison at bar 23. The heterophony in this example is also enhanced by a timbral polyphony, with effects including flutter tonguing, flautando bowing and col legno tratto playing creating timbral difference even when the notes being played may be in ‘unison’.

Figure 3 *Mycelium*: Bass Flute, ‘Cello bars 21-23

The image shows a musical score for two instruments: Bass Flute (B. Fl.) and Cello (Vc.). The Bass Flute part is written in the upper staff, and the Cello part is in the lower staff. The Bass Flute part begins with a forte (f) dynamic, followed by a piano (p) section with fingerings 5, 6, 6, and 7. The Cello part starts with a mezzo-forte (mf) dynamic, followed by a piano (p) section with fingerings 5, 7, 5, 7, and 6. The Cello part is marked with '(c.l.t.)', 'flaut.', and 'non flaut.'.

Figure 4 gives us another example of heterophony in action. Beginning at the end of bar 8 with the ‘cello harmonic trill and flute on G3, each instrument works its way to Db4 through idiomatic instrumental interaction, the flute with a flourishing energetic line, the ‘cello with a jump across the string, followed by a glissando down to Db. The lines from this point remain tightly interwoven through bars 10-11, with each instrument retaining

individuality by adjusting and exploring playing techniques (playing position for the flute, bow technique and glissandi for the 'cello). From bar 12, now joined by the trumpet, there is an increase in the divergence of the melodic line, both rhythmically and timbrally creating a vibrancy and energy that builds as the passage reaches its dynamic peak in bars 13-14.

Figure 4 *Mycelium*: Bass Flute, Trumpet, 'Cello, Bars 8-14

The image shows a musical score for three instruments: Bass Flute (B. Fl.), Trumpet (Tpt.), and 'Cello (Vc.). The score is written in 5/4 time and covers bars 8 to 14. The Bass Flute part starts with a dynamic of *f* and features complex rhythmic patterns with slurs and accents. The Trumpet part enters in bar 12 with a dynamic of *mf* and includes a 'harmon mute' instruction. The 'Cello part starts with a dynamic of *ff pp* and includes instructions for 'arco', 'm.s.t.', 'flaut', and 'non flaut'. The score is marked with various dynamics including *f*, *p*, *pp*, and *mf*, and includes numerous slurs, accents, and articulation marks.

The fact that the opening section becomes so focussed on these divergent melodic lines means that heterophony becomes a structural point of reference within the work, a place where *hyphae* within a mycelial network come together for a period, however briefly. While occurring mainly in the opening section, where it serves to cultivate connectivity between instruments of the ensemble (bass flute & 'cello etc.), later heterophonic returning points serve as strong moments of allusion and focus. The moment at bar 80-81 (Figure 5) where the lines of the trumpet, guitar, violin, 'cello and bass suddenly converge on a melodic line is a strong example of a later brief 'knot' of mycelial interconnectivity in a section that is otherwise focussed on a vibrancy of physicality, with unfurling lines of energy (finger or hand movement) being transferred across the

ensemble.⁵⁷ The highly rhythmic section from bar 89 also routinely spills from unisons into heterophony, a fact that highlights the inability of a complex mycelial network to stick to a single line of growth, movement, and connection.

Interactions with instrumental affordance are also integral to the harmonic trajectory of the piece. Much of the harmonic movement in *Mycelium* is centred around the pitches of the lower open strings of the guitar, 'cello and double bass. As such the harmony in this work is almost exclusively moving away from or to one of the pitches E, Bb, A and D, with the only other prominent reoccurring harmonic point being Db, which the flute introduces at the work's opening. As the work progresses, the underlying harmonic rhythm is manipulated to compliment the nature of the other musical material that is present at any given moment, be that driving the music towards the energetic swells that occur at bars 86 and 157, or remaining largely static in moments of calm such as that beginning at bar 46.

⁵⁷ One can trace this energy through the violin part in bar 79 into the bass flute (79), into the guitar and keyboard (80-81) into the trumpet and bass flute (81-82) before the violin takes back over at the end of bar 81, with other small elaborations aiding this connectivity in the percussion and 'cello parts (80-82)

Figure 5 Mycelium: Full Score, Bars 79-82

This musical score page contains the notation for bars 79-82 of the piece "Mycelium". The score is arranged in a standard orchestral layout with the following parts from top to bottom:

- B. Fl.:** Features complex rhythmic patterns with slurs and dynamic markings of *p* and *f*. A measure number "79" is indicated at the start.
- Trpt.:** Plays a melodic line with slurs and dynamic markings of *p* and *f*. A measure number "17" is indicated at the end.
- Perc.:** Shows a series of rests, indicating a silent part for the percussionist.
- E. Gtr.:** Features a driving, rhythmic pattern with slurs and dynamic markings of *f* and *mf*.
- Kbd.:** Includes a section marked "bright, resonant" with a *ffp* dynamic, followed by a *f* dynamic. It features complex textures with slurs and dynamic markings of *mf* and *ff*.
- Vln.:** Plays a melodic line with slurs and dynamic markings of *f* and *p*. A measure number "7" is indicated.
- Vcl.:** Features a melodic line with slurs and dynamic markings of *f* and *p*. A measure number "7" is indicated. The instruction "ond (sp)" is present.
- Ch.:** Features a melodic line with slurs and dynamic markings of *f* and *ff*. The instruction "pizz" is present.

The score includes various musical notations such as slurs, ties, and dynamic markings (*p*, *f*, *mf*, *ff*, *ffp*) to guide the performers. Measure numbers "79" and "17" are placed at the beginning and end of the respective staves.

2.5 Temporal Allusions

The potential for varying types of temporal allusions was also something that I increasingly considered as the piece was written. The start of this consideration is again located in the works instrumentation due to the mix of more traditional classical and modern electric instruments. The nature of having a new work performed in a 13th century abbey also drew my attention to questions of how the work was temporally situated. I subsequently used small allusions to stylistic and temporal details of other music as a way to nod to various aspects of the strangeness of the ensemble and situation. Some of these moments are incredibly brief and largely indiscernible, including the triplet figure in the Double Bass in bars bar 74 and 75 which is designed to hint at the opening of Bach's *St Matthew Passion*, as well as the harmonic series jumps in the trumpet that allude to the playing style of natural trumpets. These sorts of allusions are not just confined to the classical instruments, with the way the guitar and keyboard parts move through grungy, distorted areas designed to hint at their own origins in more contemporary genres.

On a less elusive level, the rhythmic section at bar 89 is somewhat of an awkward hybrid of temporal allusion and strangeness. This section, which recontextualises earlier flowing, descending chromatic lines in a highly rhythmic way, turns what has been used as an outline between two pitches into a feature in and of itself centred around an anchor pitch of Bb. While this section is set up by rhythmic patterns in bars 54, 56 and 59 this sudden shift to a pulsed rhythmic pattern conflicts with the previously flowing nature of the piece. This section is also interesting for several temporal allusions as well as reversions to fundamental cultural identities of certain instruments. For the percussion the sudden, steady, regular rhythmic line is designed as a reimagined echo of a medieval

processional drum, a nod to the 13th century abbey in which the work was premiered. This slots in with the electric guitar keyboard, and trumpet, for whom rhythmic playing is very typical as instruments used extensively in jazz, pop and rock music. The fact that such driving rhythm is common to both worlds builds connectivity between instruments that is slowly extended across the ensemble as the section develops. Despite this rhythmic shift, the previously established character of the piece remains strong due to deeply embedded motivic aspects (moving thirds and chromatic lines) that continue to be prevalent.

2.6 Conclusion

Mycelial networks are an incredibly valuable lens through which to consider ecological interconnectivity. Musically, the provocation provided by a mycelial model gives rise to revisioned modes of listening that seek to locate our understanding of instruments and sound within the specificity of complex webs of musical understanding and meaning. In my own work *Mycelium*, ideas of polyphonic assemblage and the material interaction between player and instrument were particularly useful and led to the creation of a work in which dynamic interactivity, heterophony, and temporal allusions built shifting layers of vibrant connectivity, locating the identity of the work specifically in the interactions between instruments and players within the ensemble.

3 Assemblage and Openness in Orchestral Composition

3.1 Background

In some respects the orchestra was always an obvious medium in which to explore ecological thinking. The orchestra is, by its very nature, a sprawling mass of instruments brimming with potential and opportunity. As an institution, however, the orchestra also presents a number of challenges due to the way it is traditionally conceived and run, with principles of tradition, authority, hierarchy, and instrumental mastery running against both broadly experimental and explicitly ecological compositional aesthetics.

The following discussion examines approaches taken in this research project to foster ecological engagement in orchestral writing. In particular, it focuses on how ideas of assemblage, contingency, and ‘vulnerable engagement’ have fostered ecological openness across three orchestral works. In the first of these works, *drawing together, apart* (2021), assemblage is used as a structural tool that brings together and fosters the exploration of a number of contingent sonic practices . In discussing *Detritus* (2022), I detail how percussion within the work was conceived as assemblage, as well as exploring how emergent sonic practices within the work challenge aspects of traditional orchestral thinking. Finally, I will discuss how individual and group dynamics function in the

chamber orchestra work *Whale Fall* (2022), where the reduced size of the ensemble allows for greater individual instrumental exploration.

3.2 Assemblage

Within ecological literature, assemblage is often used as a lens through which to view ideas of ecology and Anthropocene.⁵⁸ Key to ecological conceptions of assemblage is the recognition of a vibrant range of non-human objects/critters/materials that contribute to the dynamic assemblages that form the Anthropocene.⁵⁹ For Anna Tsing considering things in this way opens our thinking to the potential for unexpected happenings.⁶⁰

Patterns of unintentional coordination develop in assemblages. To notice such patterns means watching the interplay of temporal rhythms and scales in the divergent lifeways that gather.⁶¹

This idea of divergent and independent lifeways links back to Tsing's conception of assemblage as a polyphonic occurrence, and it is within this polyphony of lifeways that we see the patterns of coordination Tsing describes develop. In a compositional context the orchestra is an ideal medium in which to explore this, as the sheer number of instruments and players involved allows for the composition of such dynamic and varied assemblages.

⁵⁸ Tsing, "Earth Stalked by Man." 5.

⁵⁹ Tsing, "Earth Stalked by Man." 4; and Tsing, *The Mushroom at the End of the World*. 23.

⁶⁰ Tsing, *The Mushroom at the End of the World*. 23.

⁶¹ Tsing, *The Mushroom at the End of the World*. 23.

Philosopher Jane Bennett writes with a more granular focus on the identities of individual components of assemblage. For Bennett, assemblage is a lens through which to understand 'thing power', a broad concept of the potentiality and vibrancy of objects that is revealed by attending to the influence of the non-human.⁶² Bennet writes:

“a material body always resides within some assemblage or other, and its thing-power is a function of that grouping. A thing has power by virtue of its operating in conjunction with other things.”⁶³

Bennet's conception of assemblage thus allows for a high degree of openness to the individual vibrancy and agency of things/objects/materials. This conception also provides ways to understand the complex interactions that occur within assemblage, be they collaborative, adversarial or somewhere in between. From an artistic perspective, a naturally arising question from this is how assemblage can be conceived so that the unintentional patterns Tsing describes are allowed to develop and flourish. Here, Tsing's ideas of assemblage as polyphonic is again helpful as it encourages the fostering of numerous independent happenings at any given moment.⁶⁴

Compositionally, assemblage is a valuable structural lens, particularly in large ensemble contexts. In *Extinction Events and Dawn Chorus* (2018) composer Liza Lim uses

⁶² Jane Bennett, "The Force of Things: Steps Toward an Ecology of Matter," *Political Theory* 32, no. 3 (2004). 348.

⁶³ Bennett, "The Force of Things: Steps Toward an Ecology of Matter." 353-54.

⁶⁴ Tsing, *The Mushroom at the End of the World*. 23.

assemblage as a specific way to describe and detail aspects of Anthropocene.⁶⁵ Lim describes *Extinction Events and Dawn Chorus* as a work:

stuffed with an assemblage of materials: found objects, imagined objects, damaged objects, and things subject to faulty transcription, double exposure, glitches, and other discrepancies.⁶⁶

Lim details how these objects interact within this assemblage, often in ways that create friction and accentuate difference, including through the bringing together of objects and bodies. This is something particularly apparent in the fourth movement duo between violin and prepared snare drum, where the snare attempts to imitate a highly technical violin line, bringing their disparate musical bodies closer together, a communicative process that is enhanced by the enacting of the duo in intimate proximity.⁶⁷

3.2.1 Aspects of assemblage in *drawing together, apart*

The works *drawing together, apart*, and *Detritus* show my attempts to work with large orchestral forces by fostering and forging aspects of polyphonic or ecological assemblage. In the case of *drawing together, apart* the work itself is conceived as an assemblage of material based around the idea of drawing. The word drawing can be used to describe the drawing of lines on a page, the drawing of a bow across a string, of breath, of a line in the dirt or sand (literally or metaphorically), of an object across a membrane, and so on.

⁶⁵ Liza Lim, "An Ecology of Time Traces in Extinction Events and Dawn Chorus," *Contemporary Music Review* 39, no. 5 (2020). 548.

⁶⁶ Lim, "An Ecology of Time Traces in Extinction Events and Dawn Chorus." 560.

⁶⁷ Lim, "An Ecology of Time Traces in Extinction Events and Dawn Chorus." 557-558.

It is a concept both defined and ambiguous and I was particularly intrigued by the potential for conceptual flow between these diverse understandings of drawing at any given moment. Assemblage as an organisational tool works perfectly to highlight this as it allows for all these conceptions of drawing to be simultaneously drawn together into a single work, but it also serves to draw apart these same ideas through the highlighting of their difference.

The string writing in *drawing together, apart* demonstrates this in action through a focus on the specifics of the drawing of bow. Over the course of the piece, this focus, rather than narrowing the scope of the string writing, instead demonstrates the breadth of sound that can be achieved just by altering aspects of bow action. When bowed normally, sound on a string instrument is generated through a stick and slip motion; the rosined bow hair sticks to the string and pulls it, before the string slips, and in this release, produces sound.⁶⁸ This happens very quickly in the context of regular playing, with the speed of this motion corresponding closely to the speed at which the string vibrates, but in *drawing together, apart* I was interested in exploring how I could subvert aspects of this action and, as a result, draw the listener's attention to the granular detail of this process.

The first way this is done is in the opening (Figure 6) with the extensive use of *col legno tratto* (c.l.t.) bowing, which alters the stick and slip interaction between bow and string by removing the fundamental component of the bow hair. The action in this section is highlighted by the static nature of the muted strings, as it means our attention is specifically drawn to the action of bowing and not any changes that might occur in pitch.

⁶⁸ Neville Fletcher and Thomas Rossing, "Continuous Systems in One Dimension: Strings and Bars," in *The Physics of Musical Instruments* (Springer New York, 1998). 47.

Stick and slip motion is not entirely eliminated in this section, the wood of the bow still undertakes it to a degree, but the effectiveness of this motion is reduced to the point where the bow position on the string becomes much more malleable and able to be moved about between the bridge and the muting left hand quickly, something visible in the exploration of markings from s.p. (*sul pont*) to m.s.t. (*molto sul tasto*).

Figure 6 *drawing together, apart*: Strings, Bars 1-8

The musical score for strings (Violin I, Violin II, Viola, Violoncello, Double Bass) for bars 1-8 is marked "Deliberate" with a tempo of quarter note = 55. The score is written in 4/4 time and features complex bowing techniques and dynamic markings. The dynamics range from *ff* (fortissimo) to *pp* (pianissimo), with *mf* (mezzo-forte) and *mp* (mezzo-piano) also present. The bowing techniques include *s.p.* (*sul pont*), *m.s.t.* (*molto sul tasto*), *n.* (*no*), and *g.* (*grace*). The score is divided into two systems of four bars each. The first system shows the strings playing a rhythmic pattern of eighth notes, with dynamics starting at *ff* and *pp*, moving to *mf*. The second system shows the strings playing a similar pattern, with dynamics starting at *ff* and *pp*, moving to *mp* and *pp*. The bowing techniques are indicated by arrows and labels above the notes.

This contrasts with the bowing actions of the viola and 'cello sections at the end of the work (Figure 7) which features an intense focus on stick and slip action. This is achieved through an overpressure bowing that slows the process to the point where this usually background action comes to the foreground of our perception. The focus on this action means that we hear, see and feel the tension that exists in the player-instrument-string-bow system as it is executed. The grainy, distorted texture this type of bowing produces underpins the closing of this work and it is contrasted against other material in a final, decaying assemblage that includes grainy multiphonics, unstable string textures and both pitched and unpitched resonances in the brass and percussion parts.

Figure 7 drawing together, apart: Full Score, 102-111

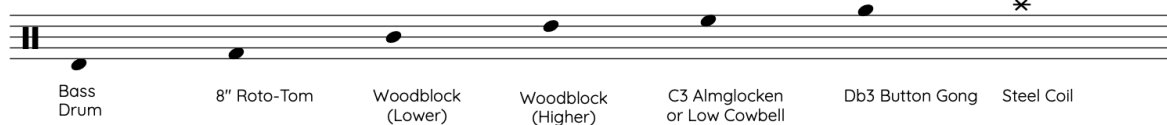
This musical score page, labeled Figure 7, covers measures 102 to 111. It is a full score for a symphony, featuring a variety of instruments. The woodwind section includes Flute 1 & 2 (Fl. 1-2), Bassoon 1 & 2 (Bsn. 1-2), Horns 1-4 (Hh. 1-4), Trumpets 1-3 (Tpt. 1-3), Trombones 1-2 (Tbn. 1-2), Baritone Trombone (B. Tbn.), and Tuba (Tba.). The percussion section includes Percussion 1 (Perc. 1) with a crotale (crotales) and Harp (Hp.). The string section consists of Violin I (Vln. I), Violin II (Vln. II), Viola (Vla.), Violoncello (Vc.), and Double Bass (Db.). The score is marked with various dynamics such as *mf*, *f*, *pp*, *ppp*, and *p*. Performance instructions include 'longue ram' (long breath), 'air', 'con sord' (with mutes), and 'Crotales' (crotales). The tempo is marked 'Allegretto' at the beginning of measure 102. The score shows complex phrasing with many notes beamed together and dynamic markings changing frequently.

3.2.2 Percussion as assemblage in *Detritus*

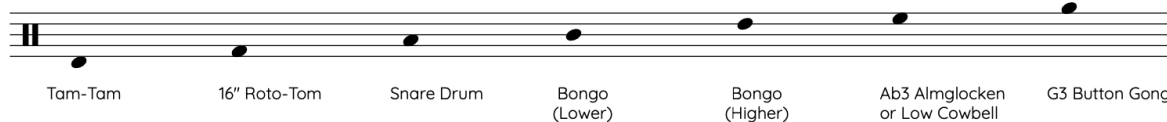
Further exploration of ideas of assemblage can be seen in the second orchestral piece of my portfolio *Detritus*, a piece in which, at any time, a variety of compositional threads are being worked out simultaneously. Percussion plays a key role in refining these threads. As a totality, the percussion in *Detritus* functions as an assemblage which itself consists of three smaller percussion assemblages each attended to by a single percussionist. This assemblage of assemblages provides continuity, initiates gesture, and sparks and carries energies that proliferate into other sections of the orchestra throughout the work. The percussion organisation for the work is as follows:

Figure 8 Percussion Arrangement in *Detritus*

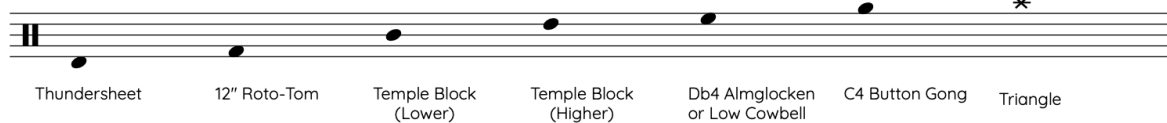
Percussion 1



Percussion 2



Percussion 3



Looking at this arrangement one can begin to see the variety of threads of connection that exist within the larger percussion assemblage. Each percussion station consists of a low, timbral instrument (bass drum, tam-tam, thundersheet), a roto-tom (size varies at each station), two high, dry instruments (woodblock, bongo, temple block), two resonant

pitched metallic instruments (button gong and almglocken) and one other instrument connected in some way to other instruments at the station.⁶⁹

The result of organising the percussion in this way is that it allows for the writing of dynamic, evolving percussion textures. The spreading of similar instruments (almglocken, gongs etc.) between stations also allowed me to compose the movement of sound in space in a way not possible if these instruments had been kept together. As the work was composed, changes of resonance and timbre became a core structural component of the piece, with the following timbral zones in particular being devised to guide my writing.

- Low, timbral resonance (bass drum, tam-tam, thundersheet, timpani, roto-tom)
- Resonant, metallic (almglocken, nipple gongs, triangle, steel coil)
- High, dry (woodblocks, temple blocks, bongos)

The table below (Figure 9) details how these percussion timbres are explored structurally. The table codifies the percussion focus for the whole piece, including sections of transition, with the only bars not listed being those where there is no percussion playing. There is also one section (bars 11-26) where timbral shifts and focus move quickly to the point where such structural demarcations dissolve and this section has accordingly been marked as a section of mixed percussion focus.

⁶⁹ Percussion 1 & 3 each have a third resonant metallic instrument (steel coil and triangle) and percussion 2 has the snare more closely connected to the roto-tom.

Figure 9 Percussion Timbral Zones in *Detritus*

Bar	Percussion Focus
1-7	Low timbral moving transitioning towards resonant metallic
11-26	Mix: throwing of resonances between players
29-39	Resonant, metallic
40-49	Transition towards low timbral resonance
50-52	Low timbral resonance
56-63	Sparse, one low timbral, two metallic percussive moments
71-76	Low timbral resonance
80-90	High, dry instrument focus (Woodblocks, Bongos, Temple Blocks)
91-97	Transition towards low timbral resonance
98-End	Low timbral resonance

In each of these sections the timbral focus of the percussion assemblage forms a lifeline that gets woven into the broader fabric of the work, interacting in a dynamic manner with the lifeways of other sections and instruments in polyphonic assemblage.

3.3 Orchestral Contingency

Much of the musical literature I have engaged with in this research is focussed on one to one performer-composer collaboration, finding emergent and unusual ways for an individual musician to interact with their instrument.⁷⁰ The vibrancy of these practices naturally leads to questions of how composers can foster similar aspects of contingency

⁷⁰ For example: McLaughlin, Kanga, and Benjamin, "Composing Technique, Performing Technique."; and Lim, "A Mycelial Model for Understanding Distributed Creativity."

in larger ensemble writing. Scott McLaughlin's *Natura Naturans* (2021) for solo clarinet and string orchestra is one work that explores such questions.⁷¹ In this work McLaughlin contrasts the individual contingency of a clarinet part predicated on the use of unstable and emergent fingerings, with group contingent practices in the string orchestra, particularly around harmonics and string preparations. This approach demonstrates the potential for contingent practices that exist within the orchestra.

While not as hyper-focussed on questions of contingency, the orchestral works in my portfolio do attempt to steer my writing towards sonic zones that are more unpredictable and emergent. This often includes leaving some degree of ambiguity within my notational practice, encouraging performers to explore emergent sound in collaboration with their instrument, section and the wider orchestra. These explorations also become an interesting examination of group dynamics, as the orchestra slowly finds an identity for the piece through their engagement with these vulnerable, unstable sounds. Encouraging these open practices thus fosters environments where unintentional happenings are allowed to occur, as the sounds produced in the performance of my works often differed from what I may originally have conceived in writing the works.

The aforementioned exploration of bow action in *drawing together, apart* is one example of this contingent sonic practice in my orchestral writing. The unpredictable sounds this exploration of bowing yields lends the piece an energy that is then taken up and extended by other emergent and fragile sounds including woodwind multiphonics, string half pressure harmonics, bowing at the harmonic node of string instruments, clarinet dyadic

⁷¹ McLaughlin, *Natura Naturans*.

playing, and harp pedal buzzes. These more unpredictable methods of sonic production sit in assemblage within the piece alongside more standard ways of playing in ways that highlight musical function: from the previously discussed focus on bowing mechanics to the function of harp pedal buzzes as musical punctuation that foreshadows shifts in texture and musical direction.

Contingent sonic material functions slightly differently in *Detritus*, a particularly interesting aspect of which concerns the use of multiphonics. While only used in one short section (Figure 10), multiphonics in this piece serve to highlight a particular specificity that occurs when a single multiphonic is passed between two seemingly identical instruments. When this happens one notices a slight timbral shift that occurs at the moment the multiphonic is passed from Clarinet/Oboe 1 to Clarinet/Oboe 2. These timbral flickers serve to highlight the material nature and specificity of multiphonics to the player-instrument. The slow pacing allows the players time to let them bloom on their instrument highlighting the unstable and reciprocal nature of the interaction.

Figure 10 *Detritus*: Oboe 1-2, Clarinet 1-2, Bars 54-63

The musical score for Oboe 1-2 and Clarinet 1-2, bars 54-63, is presented in a four-staff format. The top two staves are for Oboe 1-2, and the bottom two are for Clarinet 1-2. The time signature is 4/4, and the tempo is marked as quarter note = 48. The Oboe part begins with a rest in bar 54, followed by a series of notes in bars 55-63, with dynamic markings of *p* and *f*. The Clarinet part also begins with a rest in bar 54, followed by notes in bars 55-63, with dynamic markings of *p*, *f*, and *mp*. Fingerings are indicated by black and white circles above notes. The Clarinet part includes a trill in the final measure.

Other contingencies of note exist within string playing in the work. Here, as in *drawing together, apart*, the reduction of pitch in the muted strings reprioritises attention to unpredictable and unstable bowing techniques. The use of circular *col legno tratto* bowing (violins, bar 20) provides both unstable sonic material and a complex and vibrant visual image for the audience. In a similar vein to the way the multiphonics implicate individual players, the visual aspect of circular bowing highlights the nature of the orchestra as a collection of individual players, where each player is left to decide for themselves the relative speed and sizes of the circles. Similarly, bowing on the bridge (abbreviated in the score to o.b., see Figure 11) is a precarious balancing act that goes against the muscle memory of standard bowing techniques. This bowing technique often leaks sound as players ‘fall off’ the bridge, skidding momentarily into playing either behind the bridge or into a *molto sul pont* zone. The result of this slippage means that we do hear something of the pitch generated by the muted string, although the pitch is not

clear and can be thought of as a sort of echo. I explore this contingent element of ‘pitch echo’ by changing where the string is muted in bars 9-10 of Figure 11 and later in bar 28 as well as the section from bar 68-79.

Figure 11 *Detritus*: Strings, Bars 8-15

The musical score for Figure 11 shows five string staves (Vln. I, Vln. II, Vla., Vc., and Db.) from bar 8 to 15. The tempo is marked as ♩=42. A section labeled 'A' begins at bar 9 with a tempo change to ♩=56. The score features a variety of dynamics: *pp* (pianissimo), *p* (piano), *mp* (mezzo-piano), *mf* (mezzo-forte), and *f* (forte). Performance techniques include *pizz.* (pizzicato), *arco* (arco), and *jete.* (jete). The notation includes slurs, accents, and dynamic markings that change throughout the section, illustrating the 'pitch echo' and 'fragile sonic practice' discussed in the text.

The second half of Figure 11 (from bar 12) demonstrates another fragile sonic practice. Here we see alternations between pizzicato harmonics and muted string notes. This results in a texture where reciprocal, vulnerable engagement with the instrument is necessary for successful performance, as these harmonics speak inefficiently in a pizzicato context. This, in combination with the muted string iterations produces a highly effective texture, a section of pizzicato moments in which cautious, somewhat unclear harmonics occasionally pop out of the texture. These performance practices also are an attempt to resist some of the traditions and aesthetics within an orchestra by challenging players and sections to engage with unstable sonic happenings that vary in their execution and sonic outcome from player to player. Such sonic instability is a direct challenge to ideas of traditional orchestral composer-performer relations where the composer is trying to elicit a specific imagined sound from the orchestra at any given

moment. The engagement with such practices challenges players to more closely interact with their instrument, finding ways of producing sound that are inherently unauthoritative and harder if not impossible to reliably replicate, an engagement that I offer to performers in a bid to create greater vibrancy within my work.

3.4 Whale Fall

The chamber orchestra work *Whale Fall* exists in the space between the other orchestra pieces and the chamber works discussed in Chapter four. Structurally, the piece is focussed on building assemblages of individual instrumental vibrancy and exploring how elements that do not work in larger ensembles become viable in this medium. This included greater use of wind multiphonics within ensemble textures as they were less at risk of being swamped by the rest of the ensemble. It also involved string writing that is more individually focussed, with contingent and emergent sounds such as unstable harmonic sonorities more meaningfully integrated.

3.4.1 Uncanny Echo

Whale Fall is organised around two anchoring solos, for horn and for flute. The material that forms the opening horn solo emerged out of a workshop in 2021 which explored many possibilities and aspects of horn malleability. Of particular note was the exploration of sung multiphonics, where the player plays one note whilst simultaneously singing another. These multiphonics do not function as simple dyads but rather produce complex sonorities as the singing interferes with the natural harmonics of the horn. These complex

sonorities range from bolstered resonances, to beating patterns when close harmonies (such as semitones or quarter tones) are sung.

From this I began to write the opening of *Whale Fall* focussing on how the explored aspects of horn materiality could be integrated into an ensemble context. To do this I was drawn to Timothy Morton's ideas of the uncanny, the familiar yet strange.⁷² A 'whale fall' is an ecological happening that is itself uncanny. The familiar body of the whale becomes strange as its decomposing body becomes the centre of an isolated ecosystem at the bottom of the ocean. I wanted to capture aspects of musical strangeness and discomfort in response to this. The opening horn solo is a demonstration of some of these aspects of the uncanny, with the hand-stopped pitch bending that occurs a sonic happening more commonly associated with instruments such as the trombone, and the later multiphonic passages somewhat confounding our understanding of the horn as a monophonic and direct instrument. In a more long-term structural sense I was also interested in how returning to and reimagining this solo later using the flute, could contribute to this sense of the uncanny. Much of this flute solo (Figure 12) is a direct translation of the opening horn solo, complete with semitonal pitch bends and sonic alterations achieved by singing through the instrument. However, this solo quickly becomes something that is specific to the flute through its interaction with the acoustic qualities of the instrument. The sung moments have a very different sonic profile to the horn and the way the singing affects the embouchure means that the underlying played note is also not as stable as it was in the horn version, with the flute note in practice occasionally jumping unpredictably up to the octave harmonic before falling back down. Small ornamentations in bar 128, the sort

⁷² Morton, *Realist Magic*. 65.

very difficult to execute on the horn, also give this solo an identity unique to the affordances and materiality of the flute .

Figure 12 *Whale Fall*: Flute, Bars 122-142

The musical score for the flute solo in *Whale Fall* (bars 122-142) is presented in three systems. The tempo is marked as ♩ = 66. The score is written in treble clef with a 4/4 time signature. Dynamics and articulation are indicated by slurs and hairpins below the notes.

- Bar 122:** Starts with a *p* dynamic, followed by a *mf* dynamic with an accent (>), then a *p* dynamic, a *f* dynamic with an accent (>), and ends with a *p* dynamic.
- Bar 123:** Features a *mf* dynamic with an accent (>), a *p* dynamic, and a *mf* dynamic with an accent (>). A triplet of eighth notes is marked with a '3' and a slur.
- Bar 124:** Includes a *p* dynamic, a *mf* dynamic with an accent (>), and a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 125:** Starts with a *p* dynamic, followed by a *mf* dynamic with an accent (>), and ends with a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 126:** Features a *mf* dynamic with an accent (>), a *p* dynamic, and a *mf* dynamic with an accent (>). A triplet of eighth notes is marked with a '3' and a slur.
- Bar 127:** Includes a *p* dynamic, a *mf* dynamic with an accent (>), and a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 128:** Starts with a *p* dynamic, followed by a *mf* dynamic with an accent (>), and ends with a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 129:** Features a *p* dynamic, a *mf* dynamic with an accent (>), and a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 130:** Includes a *p* dynamic, a *mf* dynamic with an accent (>), and a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 131:** Starts with a *p* dynamic, followed by a *mf* dynamic with an accent (>), and ends with a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 132:** Features a *p* dynamic, a *mf* dynamic with an accent (>), and a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 133:** Includes a *p* dynamic, a *mf* dynamic with an accent (>), and a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 134:** Starts with a *p* dynamic, followed by a *mf* dynamic with an accent (>), and ends with a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 135:** Features a *p* dynamic, a *mf* dynamic with an accent (>), and a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 136:** Includes a *p* dynamic, a *mf* dynamic with an accent (>), and a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 137:** Starts with a *p* dynamic, followed by a *mf* dynamic with an accent (>), and ends with a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 138:** Features a *p* dynamic, a *mf* dynamic with an accent (>), and a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 139:** Includes a *p* dynamic, a *mf* dynamic with an accent (>), and a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 140:** Starts with a *p* dynamic, followed by a *mf* dynamic with an accent (>), and ends with a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 141:** Features a *p* dynamic, a *mf* dynamic with an accent (>), and a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.
- Bar 142:** Includes a *p* dynamic, a *mf* dynamic with an accent (>), and a *p* dynamic. A triplet of eighth notes is marked with a '3' and a slur.

3.4.2 Opening Up

Following this flute solo, the end of the work is also notable in that it opens up into a lively quasi-improvisational deterioration undertaken by the bass drum, 'cello and double bass (Figure 12). Emerging from a period where the entire ensemble gradually descends in pitch the three low instruments suddenly find themselves prominent, exploring glissandi in a system with each other. It was conceived in a way where each of the three instruments can both lead and follow simultaneously in a dynamic process. This section has a clear sense of finality: rhythmic structure has been lost, the 'cello becomes irreversibly detuned,⁷³ and the rest of the orchestra has dropped out completely leaving only these three lower instruments to find some semblance of an ending to the work. Metaphorically, the body of the whale has been consumed through previous vibrant

⁷³ At least not without a significant pause to specifically do so.

ecological processes and this section serves both as a final echo of the whale's life and life sustaining force, and as an illumination of the last ecological processes coming to an end.

Figure 13 *Whale Fall*: Percussion, 'Cello, Double Bass, Bar 166

30" approx.

continue contouring melodies using superball mallet varying their length and intensity while gradually dying away (finish before the double bass)
written contours are just an optional guide

166

Perc. *f* *pp*

using the peg, create a single sustained line imitating the bass drum, gradually descending until the string loses pitch and becomes a rumble, fading to nothing after aprox. 20"
written contour just an optional guide

Vc. *mf*

imitate the Bass Drum creating glissandi melodies, trending downward in pitch, finish following your imitation of the final bass drum iteration
written contours just an optional guide

Db. *f* *pp*

4 Physicality in Chamber Ensemble Writing

4.1 Background

A finely tuned attention to the physical capacities and material properties of instruments and performers has been at the crux of my ecological compositional practice, acting as the compositional key in translating notions of ecological interconnection, openness and materiality. This chapter elaborates on these ideas in more detail, examining, through specific case studies, how close engagement with instruments and musicians has led to a greater understanding of instrumental technique. In examining the string writing across *Etchings of Light* (2021) & *Marine Snow* (2022) and the flute writing across *Marine Snow*, *Phytoplankton* (2022) and *Mycelium* (2022) I discuss how an ecological interrogation of my compositional writing practices fostered curiosity for engaging with more vulnerable and unpredictable methods of sound creation.

4.2 Materiality and Physicality

Concerns with ecological materiality have run right through this project. In this chapter I look more closely at how small chamber works have afforded the opportunity to focus on specificities of individual instrumental writing. Doing so has allowed me to engage with ways of playing that specifically encourage unpredictable and emergent results. Through working closely with both instruments and performers I have attempted to cultivate non-

human solidarity through highlighting the distribution of agency within the performer-instrument intra-active process.

This approach draws from Tim Ingold's anti-hylomorphic ideas of working with materials in a process of creation.⁷⁴ In the compositional process of these works much time was spent trying to find ways to work with the inherent tendencies and sonic potentialities of instruments, finding ways to follow the material in order to create vibrant, collaborative, sound worlds. This way of working through experimentation resulted in a greater focus on sonic happenings that are unpredictable and theatrical in their performance, a focus stemming from Ingold's description of the artisanal nature of making as a co-creative relationship, joining movement and gesture with the materials being worked with.

In the act of making the artisan couples his own movements and gestures – indeed his very life – with the becoming of his materials, joining with and following the forces and flows that bring his work to fruition.⁷⁵

The techniques that are discussed in this chapter thus draw our attention to the physical interactions that arise in the playing of an instrument, be they large, gestural arm and body movements, or more micro level finger and mouth articulations. When these techniques are brought together into assemblage they create works that demonstrate the

⁷⁴ Ingold, "The Textility of Making." 94.

⁷⁵ Ingold, *Making*. 31.

potential of material affordance by showing ways performer and instrumental agency is bound up in systems of material engagement and intra-action.

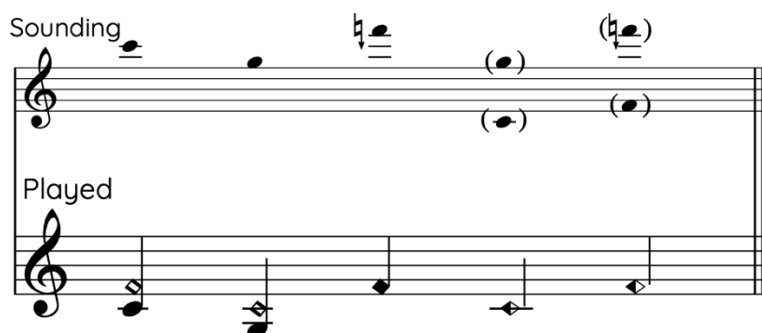
4.3 String Writing

The exploration of string players' physical engagement with their instrument is the primary material focus in the string quartet *Etchings of Light* and the string writing in *Marine Snow*. This focus grows out of the extramusical metaphors the pieces get their titles from, both of which are concerned with the physical interaction of light and other objects. This focus on spatial interaction has led me to explore modes of playing that fostered instrumental vibrancy through exploring both familiar and unfamiliar ways of physically engaging with these instruments.

4.3.1 Harmonics and Harmonic Adjacent Materials

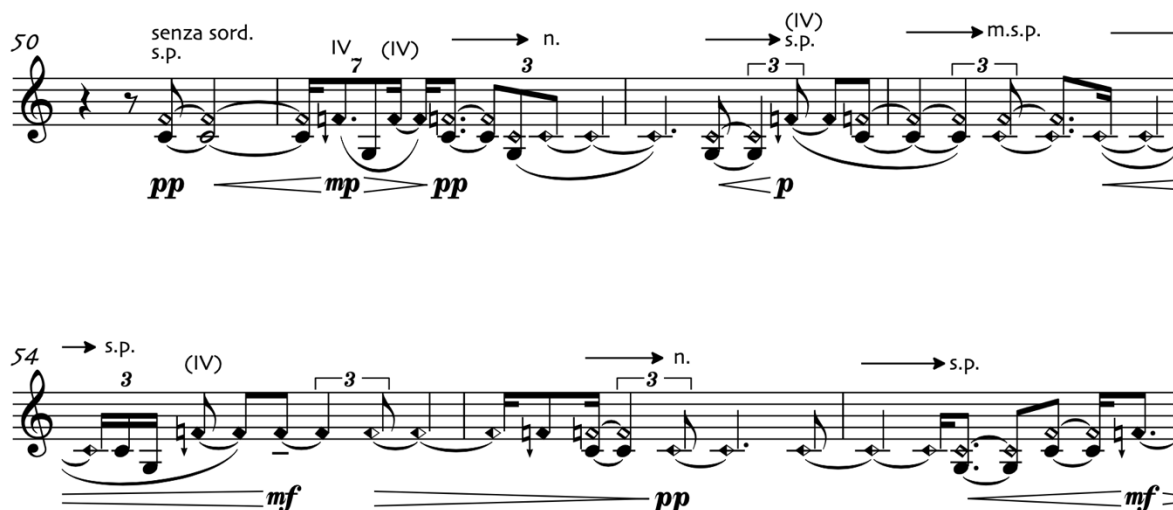
String harmonics are a spatial relation that requires the touching of a specific point on a string at a particular pressure. In my string quartet *Etchings of Light* much of the musical material begins at, transitions to, or focusses on harmonic physicalities and adjacent materials. In particular, the standard artificial touched fourth harmonic is often drawn out into extended passages by manipulating finger pressure in a way that allows for the generation of a variety of sonic happenings. Figure 14 details the sonic possibilities that grow out of a touched fourth harmonic in third position on the G string of the violin or viola, including two complex sonorities achieved by half depressing the string at a harmonic node.

Figure 14 Harmonic possibilities afforded by Violin C touch 4th



From this physicality, extended and vibrant musical lines can be developed that require the player to vulnerably engage with their instrument (Figure 15). These melodic lines require the paying of close attention to micro muscle movements and how these affect the sound generated through this complex manipulation of finger pressure.

Figure 15 *Etchings of Light*: Violin I, Bars 50-56



Diminished 5th multiphonics and half tone harmonics are harmonic adjacent materials that further embed the importance of harmonic physicalities into *Etchings of Light*. String

multiphonics are created by touching the string at a non-harmonic node, leaving the string vibrating in a complex way between several unstable harmonic possibilities that occur close to where the finger is placed. In *Etchings of Light*, diminished 5th multiphonics are often used as a physical adjacency to touched 4th harmonics, an example of which is shown in Figure 16.

Figure 16 *Etchings of Light*: 'Cello, Bars 4-7

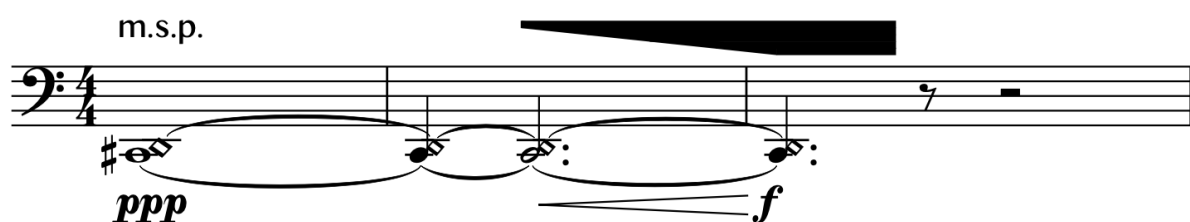


Semitone (half tone) harmonics by contrast are a more variable sonority. This technique, used extensively in Jürg Frey's second string quartet,⁷⁶ at low dynamic levels produces an unclear, murky dyad between the lower stopped note and the note at the position of the harmonic pressure finger.⁷⁷ In my own use of this technique I often explore the malleability of this sonority through manipulation of dynamic level, an interaction that turns these dyads into more complex oscillating multiphonic sonorities. An exploration of the malleability of these semitonal harmonics in *Etchings of Lights* occurs in Figure 17 where the 'cello begins with the quiet semitone harmonic before gradually transforming the sonority through the complex, louder multiphonic and into an overpressure crunch tone.

⁷⁶ Jürg Frey, *String Quartet No. 2* (2014).

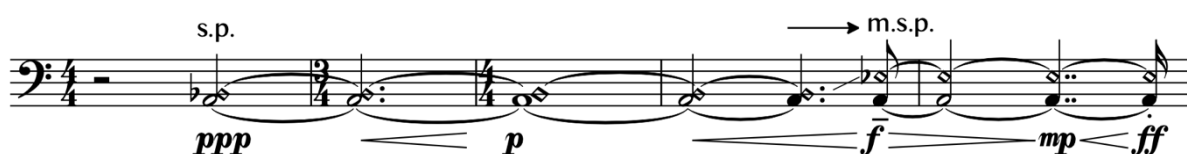
⁷⁷ See "Jürg Frey: Halftone Harmonics," accessed December 2nd 2022, <http://www.shakennotstuttered.com/frey>.

Figure 17 *Etchings of Light*: 'Cello, Bars 131-133



A combination of the semitonal harmonics and diminished 5th multiphonics also occurs in the 'cello part of *Marine Snow* (Figure 18) where, after slowly bringing a semitone harmonic sonority into the room the 'cello gradually increases the dynamic level before executing a glissando to a diminished 5th multiphonic, drawing our attention to the similarities and differences that exist between these two sonorities, both of which require a high degree of attention to physical detail in a reciprocal, co-creative process between player, bow and instrument .

Figure 18 *Marine Snow*: 'Cello, Bars 55-59



4.3.2 Spatial Interactions

Other non-standard spatial interactions exist throughout *Etchings of Light* and *Marine Snow*. One such interaction is the bowing of the instrument at the 2nd partial (the 8^{ve} harmonic node), a focus on space that can be seen in the work of Helmut Lachenmann

and Liza Lim.⁷⁸ This technique results in a contingent sonority which ranges from a fairly clear octave harmonic, to more unstable and distorted complex sonorities depending on the precise location of, and pressure applied to, the bow. The malleability of this technique draws the players' attention to their physical movements and asks how slight changes such as that to dynamics will alter how this technique sounds and exists in sonic space.

This harmonic node bowing is an extreme example the more general explorations of bow position within the work. These explorations are present from the very beginning of *Etchings of Light*, with bow placement being the primary focus of the violin 2 part in bars 1-5 (Figure 19). Here variation between *sul pont* and *sul tasto* bow positions is combined with lateral shaking of the bow in an action that creates sound directly from this physical movement.

Figure 19 *Etchings of Light*: Violin II, Bars 1-5

EXPOSED, DELICATE ♩ = 54

ord. s.p. → 1/2 lg. m.s.t. → s.p.

c.l.t. II, III

m.s.t. n.

m.s.t.

pp < p > pp 3 mp < mp > p

As the piece progresses these sorts of bow placement adjustments become integrated into the fabric of the work, connected to particular techniques, dynamics, and textures. In addition, they often provide sonic development and opportunities to explore transitional

⁷⁸ These techniques have been developed and documented in works including Helmut Lachenmann, *Pression* (Breitkopf & Härtel, 1972, rev. 2010); Lim, *Cello Playing -as Meteorology*.

processes as occurs in bar 134-136 when the 'cello moves from playing open strings right next to the bridge down the instrument to playing at the harmonic node (Figure 20). More commonly, however, the importance of bow position is used to adjust clarity and tone. Half tone harmonics for example, speak best at sul pont, while col legno tratto tends to have greater pitch content sul tasto and so on.

Figure 20 *Etchings of Light*: 'Cello, Bars 134-136



Spatial relations are also important in the left hand action of string playing. The harmonic glissandi up the string first occurring in the viola part in bars 51-55 (Figure 21) is an instance where the specific physical nature of the glissandi requires close attention to the physical space the player exists in as it will, for the vast majority of players, be demanding to execute a glissandi that finishes above the fingerboard. It also requires subtle bow position changes, guided by an ear-brain-bow-string-sound, feedback loop, a reciprocal process of vulnerable engagement that echoes Malafouris' ruminations on the back and forth of agency that occurs at a potter's wheel.⁷⁹

⁷⁹ Malafouris, "At the Potter's Wheel: An Argument for Material Agency." 22

Figure 21 *Etchings of Light*: Viola, Bars 51-56

The image displays two staves of musical notation for the Viola part, covering bars 51 to 56. The first staff (bar 51) is in bass clef and begins with a dynamic marking of *pp* (pianissimo), which transitions to *p* (piano) by the end of the staff. Above the staff, the Roman numeral *IV* and the marking *s.p.* (sordando) are present. The second staff (bar 54) is in treble clef and features dynamic markings of *mp* (mezzo-piano), *pp* (pianissimo), *mp* (mezzo-piano), and *mf* (mezzo-forte). Above the staff, the Roman numeral *IV* and the marking *m.s.p.* (mezzo-sordando) are present. The notation includes various note values, rests, and articulation marks such as slurs and accents.

The moments of the work that occur in the stratosphere of the instruments, particularly of the violins and viola, have similar importance when it comes to examining the piece spatially. In these sections, which are designed to represent the changing, fluttering, flickering nature of a tree canopy the constantly moving, unstable nature of the pitch material is inextricably tied to fact that any sound produced in that register on those instruments will be strained, unstable and physically challenging to execute (Figure 22). This is a further way in which vulnerable engagement with the instruments is fostered in the work as these registers present greater physical challenges to the player in terms of achieving precision.

Figure 22 *Etchings of Light*: Full Score, Bars 125-129

The score for Figure 22 is for the section 'EXPOSED, DELICATE' in 4/4 time, starting at bar 125. It features four staves: Violin I (VLN. I), Violin II (VLN. II), Viola (VLA.), and Violoncello (VC.). The tempo is marked as 54. The score includes various performance instructions such as 'jete n.', 'ord. s.p.', 's.p.', 'GLISS.', 'p', 'pp', 'mp', and 'p>'. The Violin I part has a 'GLISS.' instruction at the beginning. The Viola part has 'GLISS.' instructions throughout. The Violoncello part has 'GLISS.' instructions and a 'p>' instruction at the beginning. The score is characterized by delicate, often tremolo-like textures and dynamic shifts.

In *Marine Snow* there are several similar spatial interactions undertaken to that in *Etchings*. Bow positionality remains important throughout this work too, as a method of altering timbre and encouraging the players to spatially interact with their instruments. Figure 23 provides us with an example of this with lateral shakes and constant movement between the fingerboard and bridge being the primary generator of sound in this section.

Figure 23 *Marine Snow*: Strings, Bars 24-27

The score for Figure 23 is for the section 'Marine Snow' in 5/4 time, featuring Violin I (Vln. 1), Viola (Vla.), and Violoncello (Vc.). The score includes various performance instructions such as 'cl.t. n.', 'st.', 'mf', 'p', 'pp', 'arco st.', and 'p'. The score is characterized by constant movement and lateral shakes, with dynamic shifts from *mf* to *p* to *pp*. The Violin I part has a 'p' instruction at the end. The Viola part has a 'mf' instruction at the end. The Violoncello part has a 'p' instruction at the end. The score is characterized by constant movement and lateral shakes, with dynamic shifts from *mf* to *p* to *pp*.

Figure 24 provides a different way that spatiality is interacted with across string instruments in *Marine Snow*. The flourishing string figures at the beginning of bar 74 require a large physical gesture to cross all the strings of each instrument. This gesture then trails off into more fragile stratospheric playing before the ‘cello descends down into its more comfortably inhabited register. The spatial gesture in this instance acts as a type of punctuation, as a way to loosen up the players movements in between the more physically constrained passages where higher more fragile playing is called for.

Figure 24 *Marine Snow*: Strings, Bars 74-77

The musical score for strings in *Marine Snow*, bars 74-77, is presented in three staves: Violin 1 (Vln. 1), Viola (Vla.), and Cello (Vc.). The time signature is 4/4. The Violin 1 part begins with a flourish marked '10' and 'mp', followed by a dynamic shift to 'pp' and then 'mp'. The Viola part starts with 'mf' and '9', moving to 'p'. The Cello part begins with 'mf', followed by 'pp', 'f', and 'p'. Performance instructions include 'arco s.p.' for the Violin 1 and Cello parts. The score features complex string figures with various dynamics and articulations.

4.3.3 Interactions of Complex Sonorities

I was also interested while writing these works to examine how I could weave the identities of complex sonorities together in assemblage. One approach I took to this can be seen in Figure 25 at the end of *Etchings of Light*, where four unique sonorities are drawn together in a final consolidation of sound that fosters a unique air of rest and stasis to end the piece despite the complex sounds at work (*molto sul pont* and a half depressed harmonic in the violins, harmonic node bowing in the viola and a semitone harmonic in the ‘cello). This convergence allows for a sense of closure to be created in a work that is otherwise focused on constantly evolving and unpredictable contingencies.

Figure 25 *Etchings of Light*: Full Score, Bars 144-46

The image displays a musical score for four instruments: Violin I (Vln. I), Violin II (Vln. II), Viola (Vla.), and Violoncello (Vc.). The score is set in 4/4 time and consists of three measures.
 - **Vln. I:** The first measure features a melodic line with a fermata and a dynamic marking of *ppp*. The second measure contains a triplet of eighth notes with a dynamic marking of *pp*. The third measure continues the melodic line with a dynamic marking of *ppp*.
 - **Vln. II:** The first measure has a dynamic marking of *ppp*. The second measure features a quintuplet of eighth notes with a dynamic marking of *ppp*.
 - **Vla.:** The first measure includes a triplet of eighth notes with a dynamic marking of *ppp*. The second measure has a dynamic marking of *ppp*.
 - **Vc.:** The first measure has a dynamic marking of *ppp*. The second measure has a dynamic marking of *p*.
 - **Tempo and Performance Markings:** The tempo is marked *m.s.p.* (moderato sostenuto). Other markings include *ord.* (ordinario), *8va* (ottava), *h.n.* (harmonica naturale), and various articulation marks like slurs and fermatas.

4.4 Flute Writing

With parts in seven of the eight works composed in this project, flute writing and engagement has emerged as a core vessel of my ecological compositional research. This research has taken place in several stages over the course of just over a year, a length of engagement that has allowed me to acquire a greater understanding both of how the flute works and how one might utilise it in ecologically minded research. The first work with a substantial flute part in this research is *Whale Fall*, the bulk of which was written between December 2021 and February 2022. In it I begin to explore flute vocalisations and singing in a part that also explores numerous multiphonic tendencies and possibilities (Figure 12).

Marine Snow, composed in February and March 2022, is the second work with an extensive flute part. In this work I attempted to delve deeper into vocalisation and articulative possibilities. This was followed in March and April 2022 by the composition of the flute and bass flute duo *Phytoplankton*, written for the ELISION Ensemble. The final work with flute, composed between April and August 2022 is *Mycelium*, a work which has an extensive and at times virtuosic flute part.

Important to the gradual modification of techniques over this research was the opportunity to work and consult with players, a process that began with the performance of *Marine Snow*. This opportunity to consult with a player and gauge the degree to which I could increase the intensity and specificity of techniques for later pieces was immensely valuable and led to more detailed levels of interactions in the later works *Phytoplankton* and *Mycelium*.

4.4.1 Contingent Sound

The *Whale Fall* solo examined in Chapter 3 is notable as it examines more emergent and variable flute timbres. This is a focus I carry over into the flute writing examined in this chapter, with both multiphonics and other variations in playing technique manipulated in order to find 'ecological' sonic zones, and other richly unpredictable sonic behaviours with unique identities. The use of multiphonics (predominantly in *Whale Fall* but also in other works) is a key way I went about trying to achieve unpredictable sonic results in my writing. Flute multiphonics exist in a particularly fragile sonic space, often existing in the gaps between two potential sounding notes for a given fingering and as such it takes a great deal of care in order to get them to speak effectively. Even with this care these multiphonics will still often be unpredictable for the player, requiring a constant process

of listening and adjustment for the player in interaction with their instrument, a back and forth, ecological flow of agency that again aligns itself with playful agential configurations discussed by Ingold and Malafouris. Figure 26 shows an example of a multiphonic emerging from a single sonority in *Phytoplankton*. Beginning from the Ab the player adjusts their embouchure to turn the single note into an unstable multiphonic sonority, with the notation here becoming merely a temporal guide for this interaction.

Figure 26 *Phytoplankton*: Full Score, Bars 86-92

Later in this figure there is another instance of how unpredictable sonic occurrence can be achieved in flute writing, this time through the decoupling of breath and finger action. The upper single line staves here indicate breath action through the instrument in closed position, i.e. with the mouth completely covering the embouchure hole. This action is independent from the fingering notated in the lower staff, where trills, runs, and ornaments add vibrancy to the rhythmically decoupled breath action. This is an example of the exploration of the finer aspects of movement and gesture and how they interact with material (in this case the flute); with the decoupling of breath and finger movement focussing attention on the interaction between these separated actions. This decoupling

of action draws on similar explorations of flute physicality in the work of Brian Ferneyhough, Salvatore Sciarrino and Liza Lim, with all these composers individually exploring the ways in which breath and tactile movement can be manipulated independently of each other.⁸⁰

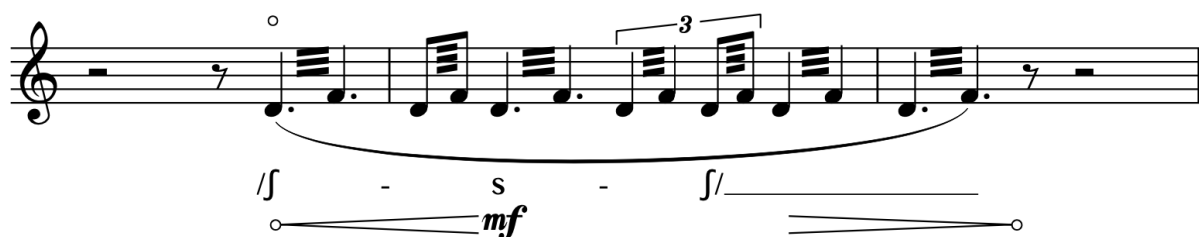
4.4.2 Vocalisations

The exploration of vocalisations also became important to my flute writing in this project. This interest in exploring specifics of vocalisation grew out of the composition of a choral piece (*as I wade through viscous mud*, Appendix 2) which focussed on using international phonetic alphabet (IPA) symbols to achieve a wide variety of non-textual vocal timbre. This was done both through moving between phonemes as well as shifting the underlying vowel that underpins a consonant at any given time.

When I started writing the flute chamber works in this portfolio it made sense to explore the ways in which this exploration of phonemes could be translated into flute writing. The first instances of this can be seen in the work *Marine Snow* where shifting consonants are used to create shades of timbral variation, largely in the context of air noise. One example of this occurs at Figure 27, with the Alto Flute circling from the rounder “sh” (ʃ) vocalisation to the sharper and more direct “s” vocalisation before returning to the original “sh”. This change is aided by the dynamic envelope that highlights the natural profiles of the two phonemes.

⁸⁰ Brian Ferneyhough, *Unity Capsule* (Edition Peters, 1976); Salvatore Sciarrino, *Canzona di Ringraziamento* (Ricordi, 1985). and Liza Lim, *Sex Magic* (Ricordi, 2020).

Figure 27 *Marine Snow*: Alto Flute, Bars 38-40



More elaborate vocalisations are explored in *Phytoplankton*. Figure 28 illustrates an exploration of the plosive “t” consonant, intertwining unpitched vocalisations with staccato playing, creating a texture in which focus quickly shifts ordinary and vocalised methods of sound production. In this section we also see differing vowels used to underpin these consonants, creating timbral variety.

Figure 28 *Phytoplankton*: Full Score, Bars 15-17

The ending of *Phytoplankton* (Figure 29) also explores the potentiality of underpinning consonants with changing vowels. This time it is done with a sung “v” consonant, the voiced equivalent of the fricative “f” consonant, specifically chosen as it is a vocalisation that expends air that a player can direct over the embouchure hole of the flute, an act that will allow the trilled fingerings underpinning the vocalisations to sound in some capacity. The changing in the underpinning vowel of the “v” consonant subtly but noticeably alters

the timbre of the vocalisation, leading to an interwoven, complex and varied sonority to end the work.

Figure 29 *Phytoplankton*: Full Score, Bars 133-36

The image shows a musical score for Flute (Fl.) and Bass Flute (B. Fl.) from bars 133 to 36. The score is written in 5/4 time. The Flute part is marked with a dynamic of *p* and includes a vocalisation of *-o/)*. The Bass Flute part is marked with a dynamic of *p* and includes a vocalisation of *(/i - u/)*. Both parts feature a series of notes with dynamic markings of *pp* and *mf*. The score includes a section titled "Without measure, slowly moving through vowel set." with the instruction "(breath when necessary)". The vowel set is *(/v/ - o - i - ε - a/)*. The score also includes a section titled "Vocalisation" with the instruction "(breath when necessary)". The vowel set is *(/i - ε - a - ε - a/)*.

A combination of all the vocalisation types detailed above can be seen in the bass flute part in *Mycelium*. Figure 30 demonstrates a passage where the combination of a variety of vocalisation techniques are used. The section for the most part is a similar exploration of simple consonant and vowel vocalisations, including the use of the “sh” fricative with a changing underpinning vowel that is designed to highlight the rising nature of the flute fingering at this time. The flute part here is dynamic, vibrant and interacts with the other instruments, with the fricative consonants tied into the pizzicato of the strings and legato vocalisations existing in a similar sonic space to the brushes on the bass drum.

4.5 Conclusion

The interaction of instrumental materiality and physical gesture opens up many zones for vulnerable engagement between player and instrument as these interactions foster practices of close listening and paying attention to instruments and sound. These zones of interaction, when placed together in assemblage, create works that draw the attention of composer, performer, and audience to both standard and more unusual affordances that these instruments provide. This chapter has demonstrated how attention to the details of physical interaction through vulnerable engagement has enabled the development of my compositional writing across both string and flute works. Through the fostering of environments where players are empowered to explore the minutiae of these physical actions, sound worlds emerge where instrumental materiality and the physical gesture of players are inseparably interwoven.

Conclusion: An Open Ending

Ideas of ecological thinking are now embedded in the fabric of my compositional practice. This research project has seen the interconnectivity within my compositional practice explored and expanded, both in a general sense and specifically through my conscious attempts to engage with ideas of polyphonic assemblage and mycelia. This project has also resulted in an increased awareness of how performer and instrumental agency function in, and are crucial to my practice, with this approach resonating with an ethos of solidarity between the human and non-human that is vital to ecological thought. My understanding of these material relations and broader interconnectivity is underpinned by an approach of openness in which fragmented and at times conflicting ideas are allowed to sit in assemblage with one another, opening up the ability to notice patterns of coordination and difference.

In engaging with these broader concepts, my compositional practice has moved away from environmental consciousness towards one of ecological awareness. In practice, this has taken the form of engaging with more ambiguous, fertile, extramusical ideas, with the works *drawing together, apart* and *Detritus* showing the ways in which ecological thinking can be engaged in works that are not explicitly environmental in focus. Even within the works of this portfolio that do have a natural world focus, ecological engagement has challenged me to seek out the more unusual, ambiguous, and uncanny

aspects of ecosystems to explore, with the works *Whale Fall*, *Etchings of Light*, and *Marine Snow* all demonstrating aspects of this vibrant conception of engagement with the wider world.

Despite the completion of this project, there are still many areas of my ecological thinking to continue to develop and explore going forward. In particular, I am interested in enhancing my collaborative practice through fostering environments for more improvisatory and open-ended practice, encouraging players to use their own artistic judgement to influence the fabric of a compositional work. More open-ended notational practices will be key to this approach, with more sections like the one that ended *Whale Fall* (Figure 13) providing new ways of thinking about emergent form, temporality, compositional control, and other such pertinent ecological issues.

This project, rather than being the end or culmination of a process, is thus better viewed as the documentation of a correspondence with ideas of ecological thinking, a correspondence that is open ended, ever evolving, and deeply connected to ideas of the artisanal process of making. As Tim Ingold writes:

Making, then, is a process of correspondence: not the imposition of preconceived form on raw material substance, but the drawing out or bringing forth of potentials immanent in a world of becoming. In the phenomenal world, every material is such a becoming, one path or trajectory through a maze of trajectories.⁸¹

⁸¹ Ingold, *Making*. 31.

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**Appendix 1: *as I wade through viscous mud* (2021) for
SATB choir**

Score can be accessed using the following link:

<http://bit.ly/3vdwADE>