University of Alberta

Forest in the City

by

Trifon Heney

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Abstract

Forest in the City is a soundscape composition for string orchestra (5/4/3/2/2),
divided into two concentric circles consisting of inner and outer groups, and electronics.
Spatialization of string orchestra, loudspeakers, and audience is a major focus of *Forest
in the City*, as essential as dynamics and orchestration. The electronics are controlled by a
laptop performer via software created in Max 5, a real-time graphical object
programming environment for music, that allows the computer to function as a musical
instrument under the guidance of the conductor.

The first chapter deals with the overview of acoustic ecology and soundscape, and
how *Forest in the City* is situated within the rubric of soundscape composition. I also
discuss the importance of the aurage, or sound-image, as the psychological imprint of a
soundscape on the listener and its role in *Forest in the City*.

The second chapter covers methodology, from the initial field recordings, to the
sound documents, to the choice of final soundscapes to be used in *Forest in the City*. The
entire process is a condensing of twenty-four hours of continuous soundscape material
traversing the entire length of the Edmonton River Valley from the northeast to the
southwest down to twenty-five representative samples of the Valley.

The third chapter is about the electronic Max 5 software that is responsible for the
performance and spatialization of the River Valley samples to recreate the soundscape
from both a physiological and psychological standpoint. The background textures (what
R. Murray Schafer would call keynote sounds) form each individual section; within these
are context-dependent foreground sounds sorted into pinpoint sounds, sounds that stay in

one place, and panpoint sounds, sounds that can be freely panned over the course of their duration.

The fourth chapter covers the form, vocabulary, and analysis of *Forest in the City*. The piece's form is based around the recurrence of sounds over the course of the journey through the River Valley; in particular, there is a storm drain at both ends of the valley and in the centre of Capilano Park, forming a rondo framework. Each of the five sections is assigned a season and a time of day as well, further distinguishing its identity. The overall texture of the piece consists of sustained tones, repeated aleatory cells, and isolated events, much in the manner one would experience a typical soundscape.

Dedication

To Allan Gordon Bell, who showed me the inherent musical beauty in everything that I listened to, and for introducing me to the idea of the sound-image very early on in my composition studies.

Acknowledgements

First of all, I wish to thank the University of Alberta, the Faculty of Graduate Studies and Research, and the Department of Music for their generous assistance with *Forest and the City*. I also wish to thank the Academy Strings for their wonderful premiere performance of this work. Lastly, I wish to thank my family who have given me the support and encouragement needed during the tough times.

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Epigraph

"Notice this moment, this place: be aware of it. Locate yourself within its remoteness or let go and lose all bearings so that you become remoteness itself. Now: what do you hear? And now?"

- Allan Gordon Bell

1: OVERVIEW

1.1 What is *Forest in the City*?

Forest in the City is a soundscape composition for sixteen string players and electronics set up in such a manner that the audience experiences sound from all around them so that each audience member will have a different spatial experience of the event.

The eight loudspeakers and the larger portion of the string orchestra combine together to form the outer ring of the ensemble. A quartet, consisting of one of each stringed instrument, is placed in an inner circle around the conductor. The audience is seated in a concentric circle between these inner and outer rings.[1]

1.2 Soundscape Music

What is Soundscape?

A sound environment refers to the sum total of perceivable sounds, the medium in which they are situated, their locations and facings, their interactions with one another and the listener, and the circumstances of the listener. R. Murray Schafer defines soundscape as:

> The sound environment. Technically, any portion of the sonic environment regarded as a field for study. The term may refer to actual environments, or to abstract constructions such as musical compositions and tape montages, particularly when considered as an environment." (Schafer 1994, 274-275)

Because it doesn't limit the definition to the naturally occurring, his definition is open-ended, allowing for a great deal of interpretation for what constitutes a soundscape. Barry Truax clarifies this definition in the *Handbook for Acoustic Ecology:*

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[1] See Appendix A: *Forest in the City* Stage Setup for a pictorial representation.

"An environment of SOUND (or sonic environment) with emphasis on the way it is perceived and understood by the individual, or by a society. It thus depends on the relationship between the individual and any such environment." (Truax, *Soundscape*) Thus, a soundscape is a sound environment, a sum total of all perceivable events and their interactions that one can pay attention to and derive an understanding of. While the soundscape exists whether or not one chooses to perceive it, i.e. it is omnipresent, its experience depends on the frame of reference of the listener.

What is a Soundscape Composition?

A soundscape composition is a composition based on such a sound environment. The context of the soundscape used as the source of the composition is important; in fact, it is precisely the context of the sounds within the chosen soundscape that is preserved and exploited by the composer. A soundscape composition differs from a soundscape in that a soundscape always exists whether one wants to be creative with it or not. One can simply choose to listen to it as if it were a composition; there is no shaping or ultimate intent with the soundscape other than that which the listener can contribute. Thus, the soundscape composition is the manifestation of the intent to be creative with a soundscape, but not to such an extent that the context is lost akin to, for example, an acousmatic composition, whose objective is the obscuring of any potential reference by treating recorded sound as a sonorous object, where the sound is examined for its own sonic characteristics apart from any source. (Cox and Warner 2007) [2]

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[2] In particular, "A Sonorous Object is not the state of the mind." The exact opposite will be seen in the *aurage* later.

Schafer defines soundscape composition as a composition meant to manifest a sound environment of some sort. In addition, Schafer emphasizes the importance of compositions set in the sound environment itself in his writings, most evident in his magnum opus, the *Patria* cycle.

Schafer used both acoustic and electronic means to project environments. *Train* is a youth orchestra composition which is based on the characteristic E flat minor chord of the Canadian train; each choir of the orchestra was given a role to recreate the environment:

> The string instruments provided the altitude, soaring from sea level up the Pacific mountains at first, then leveling off across the Prairies, becoming bumpy over the Canadian Shield before descending again to sea level at Montreal.
> The brass and woodwind are offstage performing the distinctive Canadian train whistle, tuned to sound an E-flat minor triad with a fundamental of 311 Hertz. (Schafer, *Program Notes*, 40)

This idea would be taken further in Barry Truax's mixed-media composition, *Dominion:*

> In each region it is 12 noon, starting with the noon gun in St, John's harbour, Newfoundland, followed by various foghorns and other whistles. In the middle section depicting the vast expanse of central Canada and its founding Anglophone and Francophone cultures, the noon chimes and hour bell of the Peace Tower in Ottawa are played out in counterpart against the bells of the Basilica in Quebec City. The ubiquitous E-flat minor triad of the CPR train horn connects the various sections, just as the transcontinental railway was instrumental in unifying the country. In the Prairies we hear the noon siren from a small town in Alberta, along with various typical ambient sounds such as wind in a wheat field and a humming power line. Another set of horns and whistles announces the arrival in British Columbia, and the work ends at noon in Vancouver with the daily sounding of the O Canada Horn. (Truax, *Dominion (1991)*)

In contrast to *Train*, Schafer's *Okeanos* is a quadraphonic soundscape of the ocean combined with recitation of texts by several authors. The quadraphonic nature of the work was accomplished by dividing the four channels of the work into two stereo pairs, each played on a different station. People would then tune in to both stations on

two different radios. (Schafer, *Program Notes*, 39) This idea of soundscape with recited

text became central to many of Hildegard Westerkamp's compositions, such as

Cordillera, a compositional realization of Norbert Ruebsaat's poem of the same name;

the poem is recited over a soundscape from the chain of mountains comprising the west

edge of the Americas. (Westerkamp, *Cordillera*)

Schafer also believed strongly in the idea of bringing the music to the

environment itself, letting the environment play a role in the work. In *Music for*

Wilderness Lake, several trombones are scattered around a lake, depending on a cue from

a central point to play cells. The ensuing musical moments reverberate from the lake

acting upon the sound waves; in addition, depending on where the listener is standing,

each trombone will arrive at a different point in time because of the difference in speed

between sight recognition and sound travel. (Schafer, *Program Notes*, 48) Schafer's

music drama cycle, *Patria*, also relies on such interaction: in addition to bringing the

experience to the environment, using the environment itself as part of the setting, he also

desired to create a full experience enveloping all of the arts and senses instead of just one.

He dubbed this style of work the "theatre of confluence." (Schafer 2002)[3] For example,

Prologue: Princess of the Stars takes place at a lake in a forest introducing the Wolf and

the Princess, (Schafer 1981) while *The Greatest Show* is the Ariadne-Wolf mythos cast as

an experience of the country fair. (Schafer 1987)

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[3] "Ideally what I want is a kind of theatre in which all the arts may meet, court and make love. Love implies a sharing experience; it should never mean the negation of personalities. This is the first task: to fashion a theatre in which all the arts are fused together, but without negating the strong and healthy character of each." p. 14.

Schafer also wrote many chamber, orchestral, and choral works. Some of these pieces, such as String Quartet #2 *"Waves"*, use aspects of soundscape, such as the timing of the waves, to influence the design of the composition, but the primary expression of the phenomenon is still evocation, much like Debussy's *La Mer*. (Schafer 1976) This idea of an evocative expression of soundscape is closely related to Allan Gordon Bell's concept of *aurage*: "Aurages are the composer's vocabulary, analogous to the words of a language, shaped by the grammar of a composer's craft into a process Bell describes as 'aural memory transformed,' the conscious use of technique to move from perception to expression." (Felske and Rasporich 2004, 333) Allan Gordon Bell uses such musicalizations, not just of literal transcriptions, but also of remembrances of events, as a primary technique in his compositional work. He terms these musicalizations *aurages*, musical idioms that represent a heard event, analogous to the image for the seen event. "An aurage is to the mind's ear what an image is to the mind's eye." (Bell 1994, ii) An aurage is an evocation of a certain place in a certain time via sound. The task of the composer with an aurage is "that of evocation, inducing in the listener the same sensations and emotions engendered by an actual place." (Felske and Rasporich 2004, 341)

Barry Truax addressed the topic of soundscape composition in his main treatise, *Acoustic Communication,* as well as several papers addressed to the subject.[4] "The essential difference between an electroacoustic composition that uses prerecorded

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[4] Examples include *Sound, Listening and Place: The Aesthetic Dilemma*, *Composing with Time-Shifted Environmental Sound*, *Soundscape Composition as Global Music: Electronic Music as Soundscape*, and *Discovering Inner Complexity: Time-Shifting and Transposition with a Real-Time Granulation Technique.*

environmental sound as its source material, and a work that can be called a soundscape

composition, is that in the former, the sound loses all or most of its environmental

context. … In soundscape composition, on the other hand, it is precisely the

environmental context that is preserved, enhanced, and exploited by the composer.”

(Truax 2001, 237) He then demonstrates this principle by explaining the compositional

processes of early soundscape compositions such as Jack Body's *Musik Dari Jalan*

(1976) which uses the technique of isolating a particular sound, in this case the cries of

street vendors in Indonesia, and gradually bringing the environment back into the

composition. Recording methods are also discussed, such as the twenty-four hour

method, in which several minutes of each hour in a specific location are captured over the

course of a twenty-four hour period, then mixed down to the most indicative two minutes

of each hour spliced together in chronological order to create a forty-eight minute sound

document. (Truax 2001)

Truax also pioneered several composition techniques within soundscape music.

One such technique is the use of granular synthesis using real-time audio input as a

source for the grains, rather than pre-recorded sound. Curtis Roads credits Truax with

important advances in real-time granular synthesis on incoming sound sources, allowing

him to create such compositions as *Riverrun*, a composition named after a term in James

Joyce's *Finnegan's Wake*; this piece is created exclusively using this process. (Truax,

Granular Synthesis) Roads notes: “Since the mid-1980s, (Truax) has applied granular

synthesis as a central technique in his oeuvre. His primary emphasis is on the real-time

granulation of sampled sounds, where he introduced many innovations.” (Roads 2001,

208) Such innovations include adapting granular synthesis to digital signal processing

using the PODX system and the incorporation of the technique in an interactive

environment.

Granular synthesis is a process that creates textures out of grains, small samples

of sound with a duration of 1-100 milliseconds that are then treated as the basic building

blocks of the composition, to be spliced, layered, altered with a waveform, or otherwise

treated as sound objects capable of manipulation. Curtis Roads defines granular synthesis

as an accumulation of such processes; "Granular synthesis builds up acoustic events from

thousands of sound grains. A sound grain lasts a brief moment (typically 1 to 100 ms),

which approaches the minimum perceivable event time for duration, frequency, and

amplitude discrimination." (Roads 1995, 168) These textures combine to form cloud-like

textures of molecular sound phenomena coalescing together: "A granular composition is

a flow of multiple overlapping clouds. To create such textures, the most flexible strategy

is first to generate each individual cloud, then to mix the clouds to precisely order and

balance their flow in time. To create a polychrome cloud texture, for example, several

monochrome clouds, each with a different grain waveform, are superimposed in a mixing

program." (Roads 2001, 108)

One of Truax's specific uses of granular synthesis is to create time-shifted

environmental sound. In *Dominion*, "The attack portion of each sound is kept largely

intact, in order for it to be easily recognized, while the main body of the sound is

prolonged, often 30 times or more. The harmonics inside these dramatic and unique

sound signals on tape are matched by pitches produced by a group of 12 performers

(string and woodwind quintets, plus trumpet and percussion-all amplified) spread out on

stage in a configuration similar to the geographic arrangement of Canada's 10 provinces

and two territories." (Truax 1992) In later compositions Truax uses the technique of convolution, which involves processing two sounds together, most typically a dry signal with a reverberation envelope. (Truax, *Convolution*) In *Chalice Well*, he adapts this approach to different types of textures. (Truax, *Sound, Listening and Place*)

Truax also tackles the issue of what a good soundscape composition should accomplish: 1) listener recognizability of the source material is maintained; 2) listener's knowledge of the environmental and psychological context is invoked; 3) the composer's knowledge of these contexts influences the shape of the composition at every level; and 4) the work enhances the listener's understanding of the world and its influence carries over into everyday perceptual habits. (Truax, *Soundscape Composition*) Continua are established to organize soundscape compositions, such as the level of abstraction of the sounds, from no abstraction at all in the 'found sound' composition to a heavy abstraction in an imaginary soundscape, or the type of perpective the sound is presented in, presenting a locale through fixed sound, a journey through a moving perspective, or mixing the two to create a disjointed effect for symbolic purpose.

Truax cautions against simply recording the sounds for a soundscape composition, which can result in "sonic tourism", instead emphasizing a self-reflexive process by first acquiring an understanding of the soundscape environment via conducting soundwalks for a period of time to establish the correct context in which to place the recordings of that soundscape which follow. He also cautions against subordinating artistic values in order to convey a social message. (Truax, *Sound, Listening and Place*)

Thus, a major goal of soundscape composition involves awakening the listener to the soundscape, causing him or her to ask questions about it and explore it further: 1) the listener can easily recognize the source material; 2) the listener's sense of place is triggered through the composition; 3) the composer knows these contexts as well and they play a key role in the composition; moreover, the listener's understanding of that soundscape is broadened by his/her experience of the composition.

*Beyond the Context: Musicalization and Aurage*

We come now to the problem of treating the source material compositionally for acoustic instruments. The pitch, dynamic and duration can both be transcribed literally from the recording; timbre and other characteristics are more difficult to emulate. The composer is thus faced with the question: how true should the acoustic material be to the original recording? Should it be faithful in every respect, or is freedom allowed to treat the material in a more conventional matter, taking one or two aspects of the sound and transforming it?

In Truax's *Dominion,* numerous sounds are transcribed by pitch and elongated to form the acoustic portion; the E-flat minor train horn, the bells of the church in Québec, and the *O Canada* horn in Vancouver receive this treatment. However, the *O Canada* horn is also metamorphosed into a metaphorical battle between the provinces that is resolved to the E flat major tonality of the horn at the end of the piece. This is an example of the musicalization of a sound signal for the purposes of exploring something beyond itself; the bell becomes the symbol of the tension between the provinces. The psychological symbolism of the tune representing Canadian unity is invoked.

Allan Gordon Bell uses the aurage (p. 5) to convey soundscape via acoustic instruments. As an example of concentrated aurage, Bell's *Aurages: 7 Ephemera* offers a collection of short yet powerful aurages for flute and string quartet. Each movement represents a phenomenon found in Alberta, such as the primordial moon, a mountain lake, a scree slope of a mountain, or a clear mountain lake mirroring its surroundings through a quiet reflection.

The movement *Sundogs* represents two images of the sun forming on either side of the actual sun as a result of ice crystals refracting the sunlight on a very cold winter day. This refraction is represented by two wave-like lines intersecting one another while one note holds constant, all in harmonics. (Figure 1-1: First System of *Sundogs*)

Figure 1-1: First System of *Sundogs*
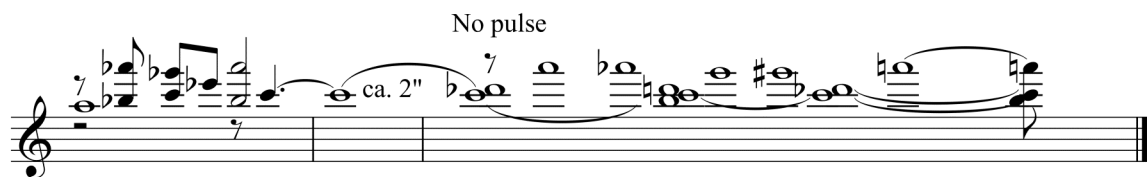
What Kind of Composition is Forest in the City*?*

In drawing from Schafer, Truax, and Bell, I created an electroacoustic composition for eight channels in a ring formation around the audience and string orchestra. Everything is spatially organized. Sound processes are minimal, closer to 'found sound' soundscape compositions. The main process that occurs with the soundscape material is the spatialization of the various background and foreground sounds to re-imagine in an octophonic format the stereo files into soundscape of what I heard as I went through the river valley.

I wish to immerse the audience into the soundscape and make them aware of my experiences in the valley. To preserve the relationship between the sounds and their sources, I also kept sound documents and field notes of my experiences of the area and panning guidelines that I used to create the spatialization attributes of the soundscapes. The environmental context is a central part of the piece; between the title, the minimal editing, and the inclusion of fieldnotes in the concert program notes, it is clear that *Forest in the City* is not an abstract composition, nor is it intended to be one. Rather, it is much closer to a *sonic journey* much like Westerkamp's *Into India* soundscape compositions.

The ultimate goal I had in creating *Forest in the City* was to introduce the Edmonton River Valley to the audience in two ways: the real experience via the soundscape recordings; and my subjective experiences via the string orchestra through both transcription of the soundscape and the aurage. In both ensembles, spatialization is a critical aspect of the composition. Merged together, these represent the River Valley that I went through. The interaction between them allows for them to become a unified representation rather than two separate, disjoint tracks.

When the work premiered on 20 November 2011, several members of the audience asked about the sounds and where and how they were recorded. Some of them even shared their own experiences of the Edmonton River Valley with me, inspired by the experience of *Forest in the City*. From this feedback I believe that *Forest in the City* achieved its status as a soundscape composition; it reached the audience on the aurage level and elicited a visceral response. It spoke to them and their experiences of the Edmonton River Valley.

While I do not have a social or political outcome to instigate through this piece (c.f. p. 9), I believe that by preserving the relationships between the sounds as I heard them in the soundscape, shaping the experience through the orchestra to add my personal experience, and establishing a context of the valley prior to engaging it for my composition, in addition to engaging and provoking thought from the listeners that attended the concert, *Forest and the City* succeeds in its stated aim of expressing the soundscapes of the Edmonton River Valley.

1.4 Context of Forest in the City - Influences

Compositions within the Doctorate

The motive has always been the focal point of my writing. My compositions focus on how a motive develops; the composition is a journey of the motive through the sound world it occupies. It is only in the doctoral program that I started to explore outside of this status quo to try and gain a deeper understanding of some other methods of composing music which ultimately resulted in a multifaceted approach towards writing *Forest in the City.*

Three Movements for String Quartet

A textural approach was further developed in the outer movements of *Three Movements for String Quartet*. The first movement, "Into Glare Beyond"*,* is a battle between two textures representing the foreboding structure of the building and the piercing glare from the window based on a platinum print by Alfred Stieglitz, *From the Back Window*. The development of the interaction between these two textures represents the viewer trying to focus on the glare, trying to see beyond it to what is inside the building. The last movement, "Photons"*,* begins with a static triad of major seconds

before evolving gradually via vibration into a wild frenzy over the course of two-thirds of the movement.

In an attempt to reconcile the texture-based and motive-based approaches of composition, I returned to motivic writing for the middle movement, *The Truth About Sausage,* inspired by a quote by John Godfrey Saxe, "If you like laws and sausages, you should never see one being made. The less you know about how laws and sausages are made, the better you'll sleep at night." (Shapiro 2008) The focus of this movement is the treatment of a motive presented in the first four measures of this movement by chopping it into pieces until only single notes remain suspended in space, then compressed into a sound mass resembling the textures in the outer two movements, like meat chopped into a fine paste and compressed into sausage. The overall intent of this movement was to see whether a movement solely based on a motive would be compatible with a sound mass texture.

Forest and the City borrows a few elements from this piece. The general fanning out of a single note as in the case of section A of *Forest in the City* comes from the idea explored in "Photons". In both cases the fanning out was a result of time delay of each instrument entering before starting its glissando downward. (Figure 1-2: From Single Note to Chord Complex). The idea of the aurage sound mass such as the stark winter chord in section H originated in the chord complexes representing the stark, oppressive building and the harsh, unrelenting glare in *Into Glare Beyond* (Figure 1-3: Aurage Comparisons). Finally, the chiding squirrel motive's breaking up is inspired by the same process used in *The Truth About Sausage* (Figure 1-4: Motive Breakup in *The Truth About Sausage).*

Figure 1-2: From Single Note to Chord Complex

E to Drain Complex
(Forest in the City, Section A)

E to Final Chord
(Photons, mm. 39-47)

Figure 1-3: Aurage Comparisons

Winter Chord
(Forest in the City, section F)

Oppressive Darkness Chord
(Into Glare Beyond, mm.1-6)

Blinding Glare Chord
(Into Glare Beyond, mm. 13-14)

Figure 1-4: Motive Breakup in *The Truth About Sausage*

mm. 1-2

mm. 100-101

Drei Waldesgedichte für Musiker und Schallschaften

This synthesis of motivic writing (i.e. *The Truth about Sausage*) and texture-

based writing (i.e. *Photons*) resulted in the creation of *Drei Waldesgedichte für Musiker*

und Schallschaften, a mixed work for soprano, viola, piano, bass clarinet, and eight

speakers controlled by Max/MSP. The primary goal of *Drei Waldesgedichte* was to

experiment in various ways with how a soundscape can be treated in relation to acoustic

instruments. In the first movement, *Ruh*, a disjointed, texture-centric acoustic part is combined with a background soundscape, close in spirit to *Into Glare Beyond*. In the second movement, *Waldkonzert*, sound signals were separated and used as instruments on command, much like the keys on a piano. In the final movement, *Waldandacht*, the soundscape is treated as its own instrument by taking a single sound and creating music that fit within the context of the movement; a chorale.

The concert setup for *Forest in the City* is an extension of the concert setup used in *Drei Waldesgedichte*. The audience is seated in a ring; there are sounds originating from both sides of the ring; each person has his own experience of the performance. In addition, the Max software that controls the electronics of *Forest in the City* is an extension of the soundscape-as-instrument idea introduced in *Drei Waldesgedichte*: the conductor instructs when the laptop performer cues in various sounds. The sound-mass composition, texture writing, and motivic development of all of these compositions are factors in the compositional development of *Forest in the City*; thus, *Forest in the City* represents a logical outgrowth of these compositions.[5]

Outside Influences

There are also a number of influences on *Forest in the City* both from general philosophies and specific compositions alike. One of the most prominent influences on *Forest in the City* is the compositional philosophy of Allan Gordon Bell, who supervised me while I undertook my Masters at the University of Calgary. He has written numerous acoustic compositions dealing with natural Albertan phenomena, such as *Aurages: 7*

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[5] See Appendix B: *Drei Waldesgedichte* Stage Setup.

Ephemera (1994), *Coriolis* (2003) and *Symphony of Earth and Sky* (2009). His most profound teaching in relation to soundscape was the concept of the aurage mentioned earlier.

In *Forest and the City*, many of my mental impressions are given musical form in the same manner via the strings; for instance, in section F, the high quartal chord represents the stark winter conditions I faced as I was going through Hermitage Park.

To contrast this imagining, I also wanted to listen to soundscape in a more literal sense. It is not altogether surprising that the next logical step would be towards listening to soundscape in an orchestral manner, similar to what Schafer exhorts in *Soundscape: Our Sonic Environment and the Tuning of the World*. The keynote layer of the soundscape refers to the noise floor of the soundscape, and is analogous to the background of the orchestral texture. Sound signals are analogous to foreground motives, and soundmarks, those sound signals that define a place, are analogous to orchestral solos. This philosophy of soundscape organization influenced how I conceived the software environment: as a background keynote layer controlled by time, with user-controllable foreground sound signal events.

Specific Compositions

In addition to the aurage, there were some specific works that I drew upon for inspiration, In Penderecki's *Kanon*, the string quartet and electronic parts imitated one another. (Penderecki 1974) *Forest in the City* works in a similar manner with the foreground material, particularly with fragments of the chiding squirrel motive in sections K and V and with bird calls in section E.

Another of Penderecki's works, *Threnody (for the victims of Hiroshima)*

juxtaposed static chromatic clusters and animated textures. (Penderecki 1985)[6] These two

works were an influence on *Forest and the City's* texture and its development: alternating

aleatoric cells and static sound masses that developed between the strings and electronics

in call and response imitation. (Figure 1-5: Developing Textures in *Threnody* and *Forest

in the City*)

Figure 1-5: Developing Textures in *Threnody* and *Forest in the City*

The last work that influenced me, John Corigliano's *Symphony No. 3: Circus

Maximus*, cemented my desire to use spatialization precisely because I experienced

acoustic spatialization used effectively to realize a program of an aural overload. In the

front, the horns blared out their main theme; up in one of the balconies on the right, there

was a saxophone quartet with double bass playing smooth jazz-like seductive music; and

moving from behind the audience, around the perimeter of the audience, and exiting out,

was a marching band. The live performance of this work therefore was a much more

profound experience than the recording since members of the audience were constantly

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[6] On the first page, all instruments are playing the highest note possible; each instrument takes turns
alternating between no vibrato and quarter-tone vibrato. On the last page is a static chromatic cluster chord
concentrated around middle C.

looking around to see where the sound would come from next. The live performance, through spatialization, engaged the audience in active listening.

When *Circus Maximus* used spatialization, the audience was genuinely engaged in a way that other elements of music engaged their respective audiences upon their inception, such as dynamics from the eighteenth century and orchestration in the nineteenth. I wanted *Forest and the City* to impart much the same experience to audiences that listened to it. In order to do this effectively, I had to find a reliable method of accurately noting the soundscape: the source recordings and their associated fieldnotes, which will be discussed in the next chapter.

2: METHODOLOGY

2.1: From Soundscape to Composition

This chapter details the process of acquiring, selecting, transcribing, and adapting the soundscape to various roles in *Forest in the City*. Minimal sound processing was used throughout, in the spirit of keeping the soundscape used in the composition as close to the original hearing as possible.

The Recording Sessions

The first step in this process was the recording of the soundscape material itself. I initially started with the idea of Truax's twenty-four hour method mentioned earlier. What I ultimately did was to record a walk through the Edmonton River Valley in the span of a day, divided into sessions roughly based on what I thought the overall form of the work would be at the time.

Table 2-1: Recording Sessions

	Recording Date	Recording Time
Kennedale - Hermitage	28 September 2010	4:16 pm – 7:40 pm
Hermitage - Capilano	18 November 2010	7:30 pm – 11:00 pm
Capilano – Groat Road	8-9 April 2011	11:00 pm – 6:30 am
Groat Rd - Whitemud	15 September 2010	6:45 am – 10:45 am
Whitemud - Terwillegar	28 October 2010	11:00 am – 3:00 pm

For each of these recording sessions I followed a route, starting at the south edge of Sifton Park going into Kennedale Park, and ending at Terwillegar Park (see Appendix: River Valley Route). I made several stops along this route for the purpose of capturing

the soundscape of the area; for instance, in the Kennedale-Hermitage recording, I stopped

to record in the open park west of 40 Street, over a creek bridge, near a large storm drain,

underneath the Victoria Trail freeway, and in Hermitage Park itself.[7]

2.2: Fieldnotes

Accompanying these recordings are fieldnotes that contain data about the

weather, date and time of day, and experiences as I was recording the area. The primary

purpose of the fieldnotes is to account for the psychological impact of the soundscapes

that I listened to while recording them, to better express these sensations through music,

for example as an aurage. For example, the storm drain at Kennedale Ravine drowned out

all of the remaining sounds in the area with its churning and roiling; these aspects of the

soundscape make their way into the storm drain complex (see Ch.4). Another aurage is

the starkness of the winter night which I felt in the journey from Hermitage Park; this is

represented in *Forest in the City* by the use of a high quartal chord.

The fieldnotes are included in the program notes for any performance of the

composition. They are integral to the audience listening to the soundscape because they

document the conditions under which I heard the sounds; they detail the sounds that I

heard and the path I took while going through the River Valley, allowing others to retrace

my steps if they wish to do a comparison recording; and they show the perspective from

which I am listening; for example, my experiences as I followed the route in Kennedale

Ravine:

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[7] See Appendix C: Map and Soundwalk Layout.

I started recording upon reaching the west tip of the ravine. This park area is the furthest away from the river parkland along the valley goes. The first part is rather tame. It consists of rolling hills of cut grass with a paved path going to 40th Street. After crossing 40th Street, the wild part of the valley begins: a gravel path with several footbridges.

The air was warm, around 15 degrees C or so. The insects were out, but not registering in most cases. The most prominent feature of this soundwalk was the different sounds that water makes flowing through different areas of the ravine. The wind was much more prominent in this recording, in some cases overwhelming the microphone. The sound the wind made rushing through the autumn leaves is quite distinct.

The path winds around a creek that feeds into the river. I took the opportunity to record several snippets at each wooden footbridge that crossed the creek. There were also a couple of instances where the water was loud enough to be heard without going over such a bridge: first, where a storm drain was emptying into the creek; second, when the water was rushing beside the path just before entering Heritage Park.[8]

These fieldnotes for *Forest in the City* influenced a number of compositional choices; for instance, the call-and-response of the ducks at the EPCOR wastewater plant, spread out between strings and recording, reflects the same process that I experienced while I was recording the event. These fieldnotes also played a pivotal role in the next step of the methodological process: selection of material for the creation of sound documents depicting my journey through the Edmonton River Valley. While I listened to the raw material that I recorded, I depended on the fieldnotes to keep an ear out for the interesting sounds that I heard and considered important.

2.3: Sound Document Creation

The sound documents are collections of selected audio clips of the raw recording data from each area sewn together with short crossfades. These collections of soundscape

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[8] Complete fieldnotes can be found in Appendix D: Fieldnotes and Sound Document Edits.

material represent to me the essence of my recordings, and can be found online for listening as the research portion of the dissertation, along with the fieldnotes and sound document edit notes. (http://www.ualberta.ca/~heney)

There are some common criteria that I used to make these selections. I wanted each sound document to represent the soundscape I experienced distilled to its most iconic manifestations, without any technological interference. These selections also had to be compositionally interesting by including both recurring and unique foreground ideas as well as texturally different backgrounds.

2.4: From Sound Documents to Sound Banks

The audio selections comprising the sound documents are in turn further split into individual sound layers, which together form sound banks that would be used as material for each section in order to adapt the soundscape for performance. Each of these sound banks represents a section of the journey in the Edmonton River Valley, and is split up into three different categories of sound which are placed together simultaneously: 1) a background layer; 2) a set of pinpoint sounds, which are sounds in one place; 3) a set of panpoint sounds, which are freely movable by the laptop performer.[9]

Since I wanted to give the conductor some freedom to determine when the sections change, I decided that the files for the background layers would last for approximately one and a half times the duration of the section in which they appear. I also wanted to ensure that I could use a minimal interface for the performance of the software. Triggering a different background layer with the keyboard will also change the

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[9] See Appendix E: Sound Chart for a complete list of sounds.

foreground sounds that the laptop performer can trigger with the controller. The pinpoint and panpoint sounds are context-specific to the background layer.

I assigned each category of sound its own spatial characteristics. Spatial control of the background layer is automated; breakpoint graphs representing the co-ordinates of the background layer control the motion of the background layer spatially over time.[10] The pinpoint sounds are typically short, usually staying in one place. When triggered, the pinpoint sound is assigned fixed spatial co-ordinates. The panpoint sounds in contrast are generally longer and move around, requiring that the panpoint sound's spatial co-ordinates be freely controlled.

2.5: Transcription of Soundscape Motives

In addition to the content and spatial characteristics of the electronics, these sound documents are the source of several motives for the string orchestra. These motives were transcribed by ear using a quarter-tone tempered scale.

Like the sound documents and the sound banks, similar criteria exist for the selection of motives. If a sound was heard more often, it was identified as an overall sound of the River Valley, and was transcribed as a recurring motive that can be developed over time. Unique sounds were also transcribed into their own motives since they can accentuate each section of the composition as its own distinct entity. Several categories of motives emerged, based on their sources; birds, squirrels, storm drains, bridges, and traffic are some of the categories of sounds that play a major role in *Forest in the City*. In general, when a sound was only heard in one area of the River Valley, its

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[10] See Appendix F: Background Panning Choices.

transcription is only heard within that section as these were most often repeating ostinati cells.

In contrast to these ostinati, there are also sounds that simply appealed to the ear and stand out for motivic treatment. One such sound was a chiding squirrel that I chanced across walking along the horse trail circling Hawreluk Park parallel to the river (Figure 2-1). This motive became the basis for numerous developments, such as a melodic version (Figure 2-2) or an aleatoric cell version (Figure 2-3).

Figure 2-1: Chiding Squirrel Motive (as transcribed)

Figure 2-2: Melodic Version of Chiding Squirrel (section H)

Figure 2-3: Aleatoric Version of Chiding Squirrel (section M)

Figure 2-4: Cross-Comparison of Storm Drain Chords (transcription)

A different approach was taken with regards to transcribing the background layers for strings. Since the background layer was playing constantly, the strings would focus on the most prominent notes, or activity level of the texture, and spin an *aurage* using these notes or the activity level as the foundation. The most prominent of these is the drain chord complex (Figure 2-4). This complex shows as the endpoint of the texture in the first storm drain section (B), in a much more subdued manner in the mid-city storm drain section (K), and as the loudest point of the composition in the Terwillegar Storm Drain section (X).

Between the motives, the chordal complexes, the sound banks, and the background layers, soundscape and its psychological impact are at the heart of every methodological decision made, from the initial planning stages for the route taken for the recording to the transcriptions. The motivic development however is from a primarily compositional perspective, but still kept recognizable to achieve a sense of development, which will be further discussed in the analysis chapter (see page 39).

3: SOFTWARE MECHANICS

3.1: Software Overview and Objectives

Accompanying *Forest and the City* is a piece of software created with Max 5. This software is controlled by a single laptop performer using a QWERTY keyboard and an XBOX 360 USB controller. The software outputs sound to eight loudspeakers spaced equidistant from one another around the outer perimeter of the audience between the members of the outer string ensemble.

I wanted to create a program that can interactively control various sounds as opposed to the more conventional strict time-based arrangement, allowing the electronics to be flexible enough to be subject to the conductor rather than vice versa. Another goal of the program is to build in enough context sensitivity such that a wide variety of sounds can be made available without complicating the control scheme.

The software's primary purpose is to serve as an interactive laptop instrument for controlling the soundscapes of the Edmonton River Valley. To achieve this purpose, the software interacts with the string orchestra in three different ways. First, the software constantly produces the soundscape background which serves as the context for the string orchestra. The spatial assignments of the string orchestra complement the spatial assignments of the background layer. As an example, in section G, the background plant drone is placed in the east, complemented by octaves below in the southwest contrabass and southeast viola.

The software also engages in foreground activity via its pinpoint and panpoint sounds, sometimes providing unique events that distinguish the soundscape as its own entity, sometimes engaging in call and response with the string orchestra. To continue the

example from section G, while the plant drone occurs, the owl sounds occur in the west

in both strings and electronics, and the train horn occurs in the north, since the bridge is

north of the plant. Finally, the laptop performer has some sections where it performs

alone in *Forest and the City*, most notably in section O, the horse trail, where the full

chiding squirrel motive is revealed, and section Y, the ending, where the quietness of the

southwest edge of the city prevails over the din that preceded it.

3.2: Software Philosophy

The initial inspiration for the software of *Forest and the City* came from R.

Murray Schafer's philosophy regarding the arrangement of the soundscape. In

Soundscape: Our Sonic Environment and the Tuning of the World, Schafer divides

sounds into three distinct categories. *Keynote sounds* comprise the background layer of

the soundscape, for instance many drones and the noise floor. *Sound signals* consist of

foreground sounds that draw the attention of the listener. The *soundmark* is a special kind

of sound signal**,** referring to a signature sound that defines the area aurally. (Schafer

1994)[11]

The ultimate manifestation of this philosophy in the software is through the

selection and assignment of sound samples into context-sensitive sound banks. Each

sound bank consists of: the background layer which will contain either simple keynote

sounds upon which the other sounds play, or the entire sound sample should all sounds

within the recording be pervasive enough (such as in section T: Under the Whitemud

Bridge); and up to two each of pinpoint and panpoint sounds.

The background layer is analogous to the keynote layer of the soundscape; thus it functions like the background layer of an orchestral composition. The pinpoint and panpoint sounds are the sound signals of the soundscape; in *Forest and the City*, they are treated as motives. In addition, most sections also have at least one signature sound that defines that section, whether it is the characteristic buzz made on the Walterdale Bridge as cars drive over in section M or the power plant drone in section G. Each sound bank corresponds with a section of the piece that lasts anywhere between just under a minute to a minute and a half. The sound bank consists of a background layer corresponding with the keynote sounds of the locale in question.[12]

3.3: User Interface

The purpose of the program's user interface is to aid the laptop performer by showing the results of controller and keyboard input.[13] This user interface consists mainly of diagnostic readouts, divided into an input box on the upper left, which contains the diagnostic controls for the Xbox 360 controller; the bank box, which contains the sound bank loader, sound bank readout, and master controls; and a piece of embedded external software called vbap8BP, found in UBCtools, [14] which contains the master volume/meter readouts and the individual sound spatial co-ordinates and levels.

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[11] "Soundmark: The term is derived from *landmark* to refer to a community sound which is unique or possesses qualities which make it specifically regarded or noticed by the people in the community."
[12] A full description of each sound bank is listed in Appendix E: Sound Chart
[13] A pictorial representation of the user interface is available in Appendix G: Top Layer of Max Program.
[14] Robert Pritchard and Keith Hamel. *UBCTools*. Freeware for Max 5 (Copyright 2011).

The foundation of the spatialization mechanics of the program, found in vbap8bp, is Ville Pulkki's vector-based amplitude panning (VBAP). This system calculates sound from a central point and assigns it a vector. The position of the loudspeakers are defined as a vector angle from this central point; for instance, the speaker setup for *Forest in the City* would be defined as 0, 45, 90, 135, 180, 225, 270, and 325. VBAP then calculates the virtual sound space of each sound by comparing the sound's location to the locations of the speakers. With this process, speakers can be placed anywhere. (Pulkki, *Generic Panning Tools for Max/MSP)*

3.4: Software Mechanics

The Max program is performed by using the keyboard and a controller. The keyboard changes the sound banks and triggers the background events associated with with the appropriate letter cue found on the score while the two analog joysticks control the spatial co-ordinates of the foreground sounds (pinpoint and panpoint sounds). The left analog joystick controls the pinpoint sound location, while the right analog joystick controls the location of the panpoint sounds. The four trigger buttons on the shoulders of the controller trigger the foreground sounds. The contents of these sounds are determined by the currently selected sound bank.[15] The dynamics of the sounds in these sound banks are generally unchanged from their sources; no dynamic manipulation is in the software itself.

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[15] See Appendix H: Form and Flowchart of *Forest in the City*.

3.5: The Score in Relation to the Electronics

For *Forest in the City*, the performance cues of the laptop performer are divided into two staves, pinpoint and panpoint. The rehearsal cue for each section also functions as the performance cue for that background event; for example, at rehearsal cue A, the laptop performer presses A, causing the background of Kennedale Park to come into being.

In each staff, the sound initiators are represented by boxed text with the appropriate button command inside (L1, L2, R1, R2); below this command is a pictorial representation of the appropriate analog joystick represented by a small circle inside a much larger circle; the smaller circle indicates the position on the joystick. In the panpoint sounds staff, some joystick configurations denote movement from one point to another over a set period of time; the time of this movement is denoted in the score by a dashed line with the indicated time.

Figure 3-1: Laptop Performer Commands

As an example, section O, the horse trail in Hawrelak Park, consists of seven such commands. As the background event is triggered, R1 (a short bird call) is triggered due east. After six seconds, a longer bird call, assigned to R2, is triggered, held northeast. Ten seconds in, the familiar squirrel machine-gun chatter, assigned to L1, is triggered twice, first from the south, then five seconds later from the southwest. The main sound event occurs twenty seconds in: a long, gregarious chiding squirrel assigned to L2, which starts to the west for 2 seconds before moving to the east over the course of twelve seconds, staying at that position until the conclusion of the sound.

Figure 3-1: *Forest in the City* **Legend**

LEGEND

L — Main Cue. The laptop performer triggers the associated sound bank by pressing the same letter on the keyboard.

2 — Sub Cue. Used to co-ordinate the orchestra and foreground sounds. Make sure to use a different cue.

Analog stick position indicator. This particular symbol means that the stick should be held all the way up. The top row is for the left analog stick; the bottom row is for the right analog stick.

Movement indication. This particular example indicates movement of the analog stick from the left to the right clockwise taking 5 seconds doing so.

L1 — Foreground sound. These sounds are activated with the trigger buttons on the controller.

You may choose any of these positions. If the process is repeated, only choose each position once until all positions are used.

Figure 3-2: Section O Performance Cues

Horse trail circling Hawrelak Park on the west side.
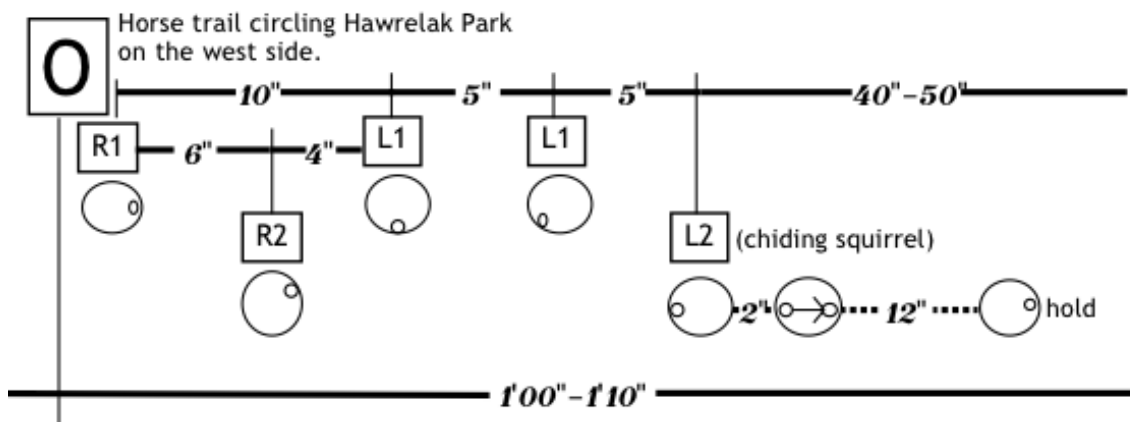
This section of *Forest in the City* is a showcase of the laptop performer as a

soloist as opposed to its usual roles as part of an antiphonal pair with the strings or as a

background provider, demonstrating the flexibility and versatility of the software as well

as its ease of use. The software is therefore able to function as a full partner to the string

orchestra, neither background filler nor inflexible dictator of time.

4: VOCABULARY AND ANALYSIS

The basis for most of the motivic, harmonic, dynamic, and spatial vocabulary is the soundscape recordings. From these soundscape recordings arise motives, aurages, and sound mass textures, all which mesh together to form a string counterpart to these soundscapes.

In the Edmonton River Valley, sound signals can generally be heard clearly above the noise floor in both natural and technological situations. The degree to which the forest and the city are present relative to one another are dependent on the time of day as the majority of city-based sounds, such as traffic and construction, are diurnal in nature. While many animal sounds are also diurnal, some are nocturnal, and weather-based sounds are not affected by the time of day.

The soundscape tends to be sparse at times, but can also become somewhat saturated, as in the case of the Valley Zoo recording. Each sound is easily distinguishable, both as its own entity and as part of the category of forest or city. Forest sounds are generally composed of short, rapid events, while city sounds resembled sound masses, each component masked by the whole, with gradual dynamic characteristics.

4.1: Root Motives

The motivic vocabulary in *Forest in the City* consists of various sound signals, focusing on motives based on recurring sound signals and sound signals that follow a melodic contour. The primary motives are derived from either animal cries or sounds of technology.

Animal-Based Sounds

The most commonly transcribed sound signals in *Forest in the City* are derived from animal sources. Patterns are set up by bird calls, goose honks, duck quacks, dog howls, owl hoots, crow caws, and squirrel chirps interacting with one another and the environment surrounding them.

The Chiding Squirrel

The most varied animal-based sound signal is the chiding squirrel occurring in section O of the piece, mentioned earlier. This sound is comprised of five different phrase groups which occur shortly after its recurrent machine-gun like squirrel call (Figure 4.1). The initial phrase group consists of a rapid, repeating tremolo that fluctuates between a minor third and a minor second.

The primary interval cell of the chiding squirrel motive is a minor second followed by a repeat. (group A). In the first phrase, this is repeated twice, followed by a drop of a tritone and the repeat. This phrase is truncated and repeated retrograde as phrase 2. In phrase 4, group A's interval is augmented to a major second and strung together in normal, retrograde inverse and retrograde forms consecutively. The final phrase is an extended inversion of phrase 1.

Figure 4.1: Chiding Squirrel Motive

While many cell fragments or melodic figures only occur within their respective sections, for example, the howling dog in section U, this chiding squirrel call and the primary motive fragment comprising its majority get extensive treatment. The initial squirrel call occurs in section C; this call is followed by the introduction of the first two phrases of the chiding squirrel by the strings. The first of these is reiterated as a two-voice ostinati.

The next occurrence of the squirrel call is in the strings. The first and second phrases are simplified and merged as a viola-to-violin inner quartet solo; in response, five violins in the outer ring concentrated around the southwest play the first half of the fourth phrase resolving to the pitch E6 that begins the second refrain.

The next appearance of the squirrel motive occurs as a repeat of the top voice of the ostinato first found in section C in section K in the west violin, assimilating itself within the quiet reprise of the storm drain complex. This ostinato is joined by the complete occurrence of the second chiding squirrel phrase presented as an ostinato in the northwest violin at section L3. Both of these are altered at the end to facilitate the transition to the unison A at section L5.

The full chiding squirrel motive finally appears in the electronics in section O, lasting about a minute. The movement of the squirrel, from the west to the east, reflects the spatial circumstances in which I experienced the actual event.

In section Q, the squirrel call is complemented by a new, short squirrel chide which only occurs in this section, both in the strings and the electronics.

The squirrel motives do not appear again until a more fragmented ostinato of the first chiding squirrel phrase comprising the inner, north, northeast, east, and south violins in section V is introduced to complement the squirrel alarm in the electronics. This staccato texture is shortly joined by a held D5 in the south violin and glissandi from A flat 5 to F5 in the southwest violin, followed by the opening of the fourth phrase in the west violin much like the repeating ostinato of the squirrel alarm occurring in the electronics before becoming absorbed by the final drain complex.

Ducks and Geese

Ducks and geese are the two recurring birds over the course of the recordings; this tendency is reflected in the composition. Their first appearance is in section E, where the duck and goose occur as ostinati along with another bird keening in the electronics; these sound signals convert to static notes in the strings to become the winter quartal chord.

Figure 4.2: Bird Motives and the Winter Quartal Chord

Goose Honk   Bird Keening   Duck Quack   Winter Chord

The ducks' next appearance behind the EPCOR wastewater treatment plant becomes the primary focus of section I. This motive is treated antiphonally; call-and-response activity occurs between the strings and the sound signals amongst a background of constant low quack-like chatter.

The duck and goose motives reunite in Hawrelak Park in section N. Both of these sounds, complemented by another different bird call, are once again imitated by the strings. These two bird sounds, the duck and the goose, combine with the squirrel motives to comprise the recurring animal motives in *Forest in the City.*

Singular Motives

The primary function of the singular motives in this work is not development, but rather characterization; these motives are generally signature sounds that cement the uniqueness of each soundscape. Various different bird calls occur, such as the crow at the creek, or the owl just south of Yellowhead trail on a winter night. Further to the west, dog sounds become more commonplace as the season is right for their outdoor exercise. The sounds of each bridge in this work, whether Yellowhead Trail, the Low-Level Bridge, or the footbridge connecting Hawrelak Park with Buena Vista Park, each has its own characteristics that allow the intent listener to discern where they are on the journey. With

regards to soundscape composition, these unique identifiers are just as important as the recurring, developing motives that give a common grounding to the journey.

Technology-Based Sounds

The next most commonly occurring sound signals are technologically based. Examples include traffic on a major road and train horns. Compared to animal sounds, which are typically short and clipped, the technological sounds form a continuous texture, evolving much more slowly than the animal interactions.

The most prevalent technology-based motive is the siren. It consists of a long glissando, starting around D6, moving up to A flat 6, before falling down to A flat 5. (Figure 4.3) This motive is initially introduced in section D in the electronics; this motive again occurs in section L now with string imitation. The siren sound reoccurs electronically in section W but does not appear in the strings again until section X where it becomes subsumed within the dominant drain complex texture as a natural development of the glissandi found in the animation of the storm drain complex in section B.

Figure 4.3: Siren Motives

Long Siren Motive   Short Siren Motive

4.2: Chordal Complexes

For many of the sections, I wrote a mental impression of the soundscape for strings in the form of a musical texture: a chordal complex. The primary influences for the development of these complexes come from the keynote layers of the river valley

soundscapes, particularly elements that emphasize themselves not only on account of the recordings that I have done, but also informed by my physiological and psychological experiences associated with the soundscape. Some of these complexes are borne from a poetic recollection of the area; these aurages are crystallizations of my subjective impressions of these recorded soundscapes. Other complexes are transcribed by pitch.

The Drain Complex

The most prominent complex in *Forest and the City* is the drain complex, a sound mass influenced by hearing the various storm drains in the River Valley. This complex is built via an overtone series based on the slight prominence of D4 in the recordings. (Figure 4.4) The drain complex typically begins as a solid chord based on this overtone series, transforming into an animated version of itself. The intensity of the animation is context-dependent. In the opening section, the drain complex is moderately animated with the foundation remaining static, whereas its reoccurrence at section K is subdued into the quiet aspect of nighttime. Its final iteration in section X incorporates elements from other motives to become the loudest, most animated manifestation thereof. The shift from a static sound mass to an animated complex represents how the individual elements come into focus as one approaches the source of the sound. The animated texture roils around the same chord, representing the flowing water.

Figure 4.4: The Drain Complex

Drain Complex Sections B and X   Quiet Drain Complex Section K

Other Manifestations of Water

The primary texture of section C is an aurage of the creek babbling, consisting primarily of pizzicato and jeté cells sounding asynchronously like the creek soundscape the texture is based upon, thus serving as a contrast between the thicker texture of the storm drain complex in the section before and the static traffic texture afterwards.

Drones

Another major source of chordal complexes is the constant presence of static drones of various pitches and timbres. These drones are the basis for many of the static textures in *Forest and the City*, ranging from a single note such as the D5 of the plant just south of Yellowhead Trail in section G, to octaves such as the B half flats in section J based on the resonating frequency of the EPCOR wastewater plant in Capilano Park, to the very loud, almost overbearing chord centering on G4 comprising section T based on the construction sounds I heard while I was going underneath Whitemud Drive on the bike path to Fort Edmonton. (Figure 4.5)

Figure 4.5: Drone Transcriptions

Plant south of Yellowhead Trail EPCOR Wastewater Plant   Under Whitemud Trail
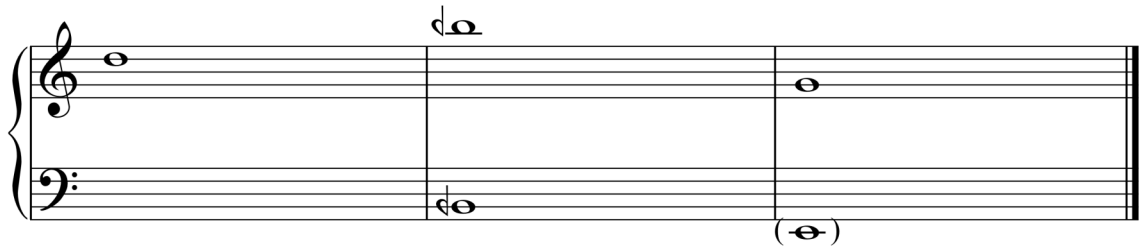
Seasons

The chordal complexes based on the seasons are much more vague, based on how I experienced them; as such, these are more aurage than transcription. An example of such a complex is a chord composed of quartals in section F which represents the starkness and solitude of winter in the late evening. Since the animal sounds from the preceding section comprise a similar chord, the transition between them is almost imperceptible. The goose provides D5 and G5, the duck provides A4, and the keening bird sound provides F6. Thus section F occurs by completing the quartal with a C5. (Figure 4.6)

Figure 4.6: Winter Chord Aurage

Goose Honk   Bird Keening   Duck Quack   Winter Chord

In contrast, the summer and autumn soundscapes are busier since they occur in the daytime. In a number of places the string orchestra is silent to allow the soundscape full aural impact; no aurage or string input of any kind is needed to complement their completeness. The first of these moments occur at the beginning of section E, the

marshlands; here, each sound allows the requisite string instrument to bring forth the corresponding static note which eventually transforms into the winter chord. The busiest soundscape, the horse trail around Hawrelak Park comprising section O, has no strings sounding for its entire duration, allowing that soundscape to take centre stage in the middle of the piece. The final occurrence of silence is sudden; after the strings and the soundscape reach the loudest peak in the piece, the strings drop out along with the Terwillegar drain soundscape, leaving in their place a soundscape so quiet that any string sound would obscure the soundscape's presence. This soundscape, depicting the southwest edge of Edmonton at the western edge of Terwillegar Park, is the end of the journey, thus the end of *Forest in the City*, lasting but a brief moment compared to the twenty-four preceding soundscapes.

4.3: Sectional Analysis

Forest in the City is organized from both harmonic and season-based points of view, each possessing the common unit of the individual soundscape.[16]

Macrostructure 1: Rondo Form

From the harmonic point of view, *Forest in the City* is arranged in a rondo-type form. The refrains consist of a unison E which develops into the drain complex.

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[16] See Appendix H: Form and Flowchart of *Forest and the City*

Figure 4-7: Form of *Forest and the City*

Rondo	A	B	A'	C	A
Section	A B C D E F G H I	J K L M N O P	Q R S	T U V	W X Y
Season	AUTUMN	WINTER	SPRING	SUMMER	AUTUMN

The first refrain, lasting from the beginning to the end of B, is a simple glissando from a single note to the drain complex. This drain complex gradually transforms into the pizzicato creek background beginning the first episode.

The train chords in section G form the background against which snippets of squirrel melody play off one another to resolve to a unison E beginning the second refrain just before section I. This unison does not last long before it is quickly joined by the low duck quacking background and a drone based on the EPCOR wastewater plant nearby, which becomes the foundation note for the next drain complex. This drain complex eventually resolves to a unison A beginning the next episode at section M.

The final refrain arises from a context different from a resolution to a held unison pitch E6. Instead, there is a staccato texture comprised of fragments of the squirrel motive mostly consisting of that pitch. These squirrel fragments form a sparse texture which then gradually builds until beoming the final drain chord at section X, which swells to the loudest moment in the piece before being abruptly cut off to reveal the quietest soundscape of all, located at the southwest edge of the city.

Macrostructure 2: By Season

From the methodological point of view, *Forest in the City* is in five through-composed sections consisting of the sounds recorded during each of the five excursions in the Edmonton River Valley.

Each sound recording and some of the associated string material reflect unique circumstances. The Kennedale area in the autumn has the strongest water sounds, excluding the storm drain sections. The Hermitage area in the winter is a thinner texture reflecting the stark conditions therein. The Mid-City section in the dead of night in the spring is generally very quiet, reflecting the subdued nature of the city at that time. In the the Hawrelak-Quesnell section, the summer morning is very loud since the recording starts near a busy thoroughfare at the start of the morning rush hour. Finally, the Fort Edmonton-Terwillegar section is the most varied, beginning at a very loud construction zone near Whitemud Trail and ending at the quietest area of all, the large grassland area of Terwillegar Park at the southwest edge of the city. While the drain complex determines the formal aspect of *Forest in the City*, the seasons and times of day play a large role in determining the dynamics and instrumentation.

Sectional Structure

These different approaches towards the form of *Forest in the City*, rondo form and by season, are united by using the same sectional structure as their common denominator: twenty-five sections lasting anywhere from fifty to ninety seconds, each focusing on a soundscape. Each of these soundscapes has a unique character, even those soundscapes that seem similar. For example, the three storm drain sections B, K, and X, although containing the same cells, develop them differently. In addition, each storm drain sound

file is different because of its locale: in Kennedale, the water is flowing out copiously, drowning out the other sounds; in Capilano, the water is muted amongst a very quiet noise floor; and in Terwillegar, the water is amplified and made reverberant from the pipe it flows through; this drain sound was recorded from above rather than at a distance.

4.4: Harmonic Analysis

Since *Forest in the City* is a soundscape composition borrowing a number of techniques from sound mass writing, the harmonic analysis is primarily based on either pitch centres when the background layer is clear, or notes that distinguish themselves from within a tone cluster background layer of a particular soundscape if the background is dense. Occasionally, there are other harmonic processes, such as voice leading.

Pitch Centres

The prominent frequencies of drones and motives serve as the basis for many of the pitch centres in *Forest in the City*. For instance, the first drain complex of section B hovers and undulates around D4, against which the contrabass provides a foundation of D1. The stark quartal winter chord in section F is gradually pared down to a solitary D5 that matches the prevailing power plant drone just south of Yellowhead Trail. The B half flat drone in section J is imitated by the contrabass an octave below; this contrabass note resolves to an A in section M that is the primary note heard from the foreground sounds in this section, the sounds of the Walterdale bridge vibrating as cars drive over it. The E that begins each refrain is revealed in the final refrain to be the initial note of the chiding squirrel motive.

Sound Mass Emphasis

There are other sections lacking a definitive pitch centre; these instead have a prevailing note from the soundscape which the chord is built around. The background of the soundscape of section D, depicting the path underneath Victoria Trail, consists of a mass of traffic sound which emphasizes pitch D4. This sound mass is complemented by a sound mass in the strings concentrating around pitch F4. This soundmass stays static for the duration of the section, interrupted only by the sounds of traffic going over the bridge. The two train chords in section G, C4/E♭4/A♭4/B4 and D-E♭4/F♯4-G4/B♭4-B4, form the tremolo foundation in section H, which eventually is replaced by a unison E. Section N, depicting the soundscape of the north side of the paddleboat pond during morning rush hour in the summer, consists of a less well-defined cluster around the same area which is mimicked by the strings. In section P, the strings create a cluster of notes around B half sharp 4, C5, and D half flat 5, mimicking the sound of the hollow steel footbridge railing struck by a loose backpack strap as I was walking next to it. Section R's construction and traffic-based sound mass is much lower than all else; this lowness is emphasized by having only the contrabasses play the aurage that imprinted in my mind at that time. The loudest static soundmass is located at section T where the bridge underneath emphasized the G4 over a loud, low noise floor; the secondary emphasis is on an E2 dynamically augmented by the contrabasses.

Voice Leading

Two sections are important because of their function on the form of the overall piece. As such, they are given additional weight through the use of voice leading.

The major case of voice leading occurs in section L. The B half flat from section J, lowered to B flat, is joined with the siren's emphasized notes, D and A flat, forming an open dominant seventh chord. This chord is treated as an Italian sixth which resolves to the unison A that begins section M.

4.5: Spatial Designations

All of the sounds comprising the electronic instrument in *Forest in the City* have spatial attributes. The background sounds are determined by a preloaded envelope depicting in some fashion the journey taken while this soundscape occurred.[17] The pinpoint and panpoint sounds are controlled by their respective joysticks on the controller as per the directions on the score. These directions were determined by listening to the environment, keeping notes on the directions of the sounds relative to the listener,[18] and using these notes to determine placement of the sounds among the eight speakers. These placements become x-y co-ordinates which are fed into vbap8bp to spatialize the sound.

The strings themselves are also spatialized. They are separated into an inner quartet of four, consisting of violin, viola, cello and double bass, and a larger ensemble comprising the rest of the string orchestra, each with its individual part based on its position in the outer ring. To maximize the spatial aspect of the composition and to impart a unique experience on each listener, the audience is seated between the inner quartet and the outer ring in a concentric circle.[19]

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[17] Please see Appendix D: Fieldnotes for details concerning the point of view of each background file.
[18] Please see Appendix F: Background Panning Choices for details on each decision made.
[19] Please see Appendix A: *Forest in the City* Concert Stage Setup.

Directional Background

Each background sound in a soundbank, in addition to having a spatial envelope, also has a direction. The direction determines the offset of the stereo file spatially to diverge the left and right channels from a central point designated by the spatial envelope, imparting a greater depth to the soundscape presented. For the purposes of *Forest in the City,* north refers to the placement of the first speaker. For example, if the direction is northeast, the left channel would be offset towards the northwest, while the right channel would be offset towards the southeast.

4.6: In Conclusion

The soundscape is a complex natural sonic occurrence, yet one that is most easily understood to the intent listener. It encompasses timbre, dynamics, spatialization, pitch, texture, harmony, and rhythm, interweaving together in patterns and variances. *Forest in the City* is created with the intent of having the audience rediscover these patterns and variances, the complex interplay that occurs between sound signals, the subtle differences between soundscape backgrounds, the appreciation of the unique signals defining each soundscape and common signals uniting the area as a whole. Furthermore, *Forest in the City* is my personal journey through the Edmonton River Valley, realized as a composition through the use of aurages to evoke the experiences that I have had of the River Valley, and I invite those willing to listen to share in my experience.

REFERENCES

"Heilbrunn Timeline of Art History." , accessed January 20, 2012, http://www.metmuseum.org/toah/works-of-art/49.55.35.

Bell, Allan Gordon. *Aurages: 7 Ephemera*. Calgary: Canadian Music Centre, 1994.

———. *Coriolis*. Calgary: Canadian Music Centre, 2003.

Body, Jack. "Musik Dari Jalan." Accessed June 9, 2012, http://sounz.org.nz/works/show/10399.

Cox, Christopher and Daniel Werner, eds. *Audio Culture: Readings in Modern Music*. New York: Continuum, 2007.

Felske, Lorry and Beverley Rasporich, eds. *Challenging Frontiers: The Canadian West*. Calgary: University of Calgary Press, 2004.

Heney, Trifon. *Drei Waldesgedichte Für Musiker Und Schallschaften* (2009).

———. *Forest in the City* (2011).

———. *Three Movements for String Quartet* (2008).

Penderecki, Krzysztof. *Kanon*. Mainz: Schott, 1974.

———. *Threnos: Den Opfern Von Hiroschima*. New York: Alfred, 1985.

Pritchard, Robert and Keith Hamel. *UBCTools*. Vol. 5 2011.

Pulkki, Ville. "Generic Panning Tools for Max/MSP." Accessed August 11, 2012, http://cnmat.berkeley.edu/system/files/attachments/Generic+Planning+tools.pdf.

Roads, Curtis. *The Computer Music Tutorial*. Cambridge: MIT Press, 1995.

———. *Microsound*. Cambridge: MIT Press, 2001.

Schafer, R. Murray. *The Greatest show*. Indian River: Arcana, 1987.

———. *Patria: The Complete Cycle*. Toronto: Coach House Books, 2002.

———. "Program Notes." Accessed September 1, 2011, http://patria.org.arcana/Programnotes.pdf.

———. *Prologue: The Princess of the Stars*. Indian River: Arcana, 1981.

———. *Soundscape: Our Sonic Environment and the Tuning of the World*. Destiny Books: Rochester, 1994.

———. *String Quartet no. 2, "Waves"*. Indian River: Arcana, 1976.

Shapiro, Fred R. "Quote ... Misquote." *New York Times,* July 21, 2008.

Truax, Barry. *Acoustic Communication*. Second Edition. Westport: Ablex, 2001.

———. "Composing with Time-Shifted Environmental Sound." *Leonardo Music Journal* 2, no. 1 (1992): 37-40.

———. "Convolution." Accessed July 24, 2012, http://www.sfu.ca/~truax/conv.html.

———. "Dominion (1991)." Accessed May 22, 2012, http://www.sfu.ca/~truax/dominion.html.

———. "Riverrun (1996)." Accessed July 23, 2012, http://www.sfu.ca/~truax/river.html.

———. "Sound, Listening and Place: The Aesthetic Dilemma." Accessed July 24, 2012, http://www.sfu.ca/~truax/OS8.html.

———. "Soundscape Composition." Accessed July 24, 2012, http://www.sfu.ca/~truax/scomp.html.

Westerkamp, Hildegard. "Cordillera." Accessed May 22, 2012, http://www.sfu.ca/~westerka/installations/cordillera1.html.

APPENDIX A – *FOREST IN THE CITY* STAGE SETUP

Vln I

1   2

Vln. VIII
Vla II

Vln. II
Vlc.

8   3

Vln. VII

Vln. I   CB

Conductor

Vlc,   Vln. II

Vln. III

7   4

Vla. VI
CB

Vln. IV
Vla. I

6   5

Vln. V
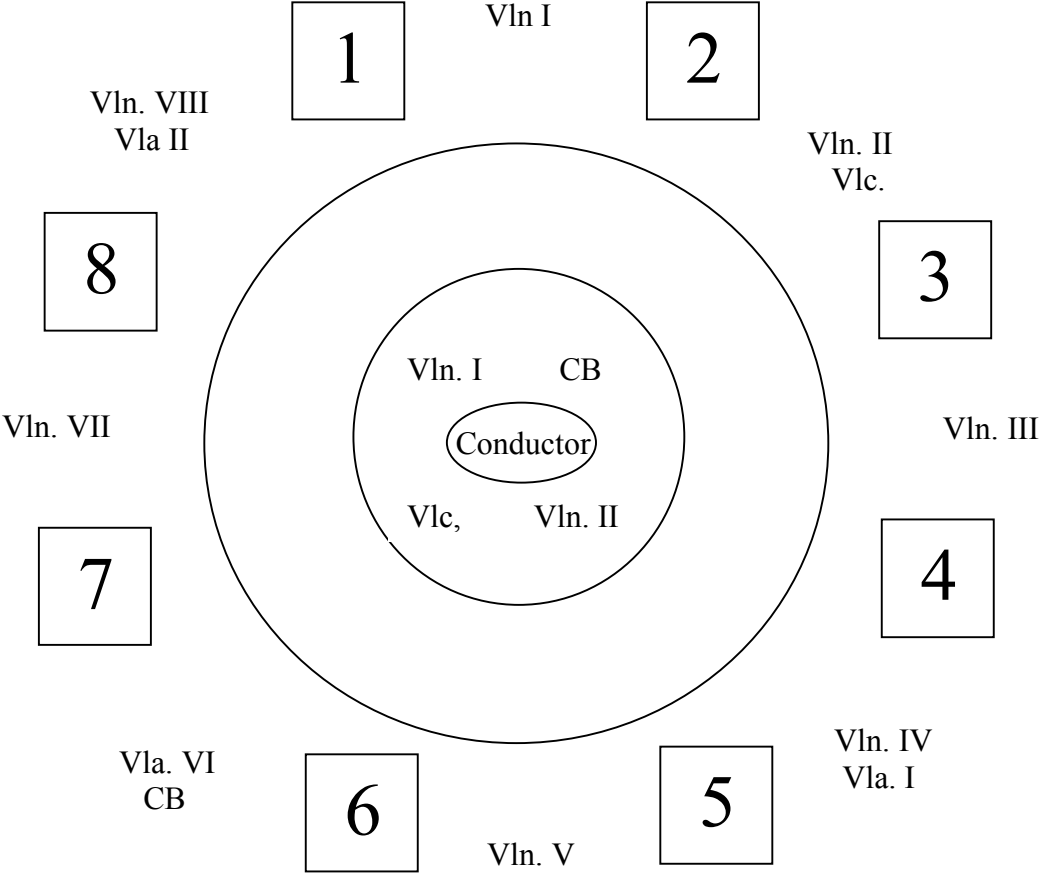
APPENDIX B - *DREI WALDESGEDICHTE* CONCERT SETUP

1 ☐

☐ 2

8 ☐

☐ 3

Pf.   Gtr.

MS

Vla. B.Cl.

7 ☐

☐ 4

6 ☐

☐ 5
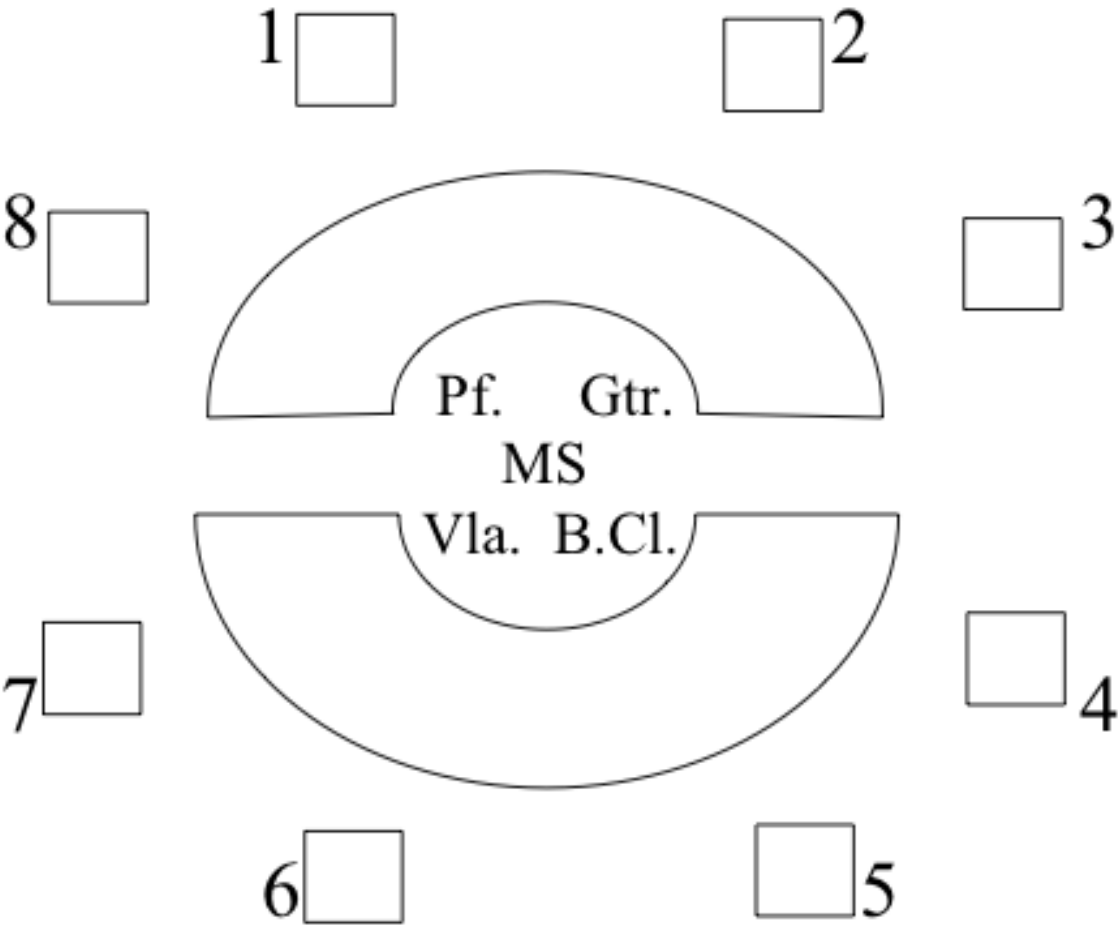
APPENDIX C – MAP AND SOUNDWALK LAYOUT
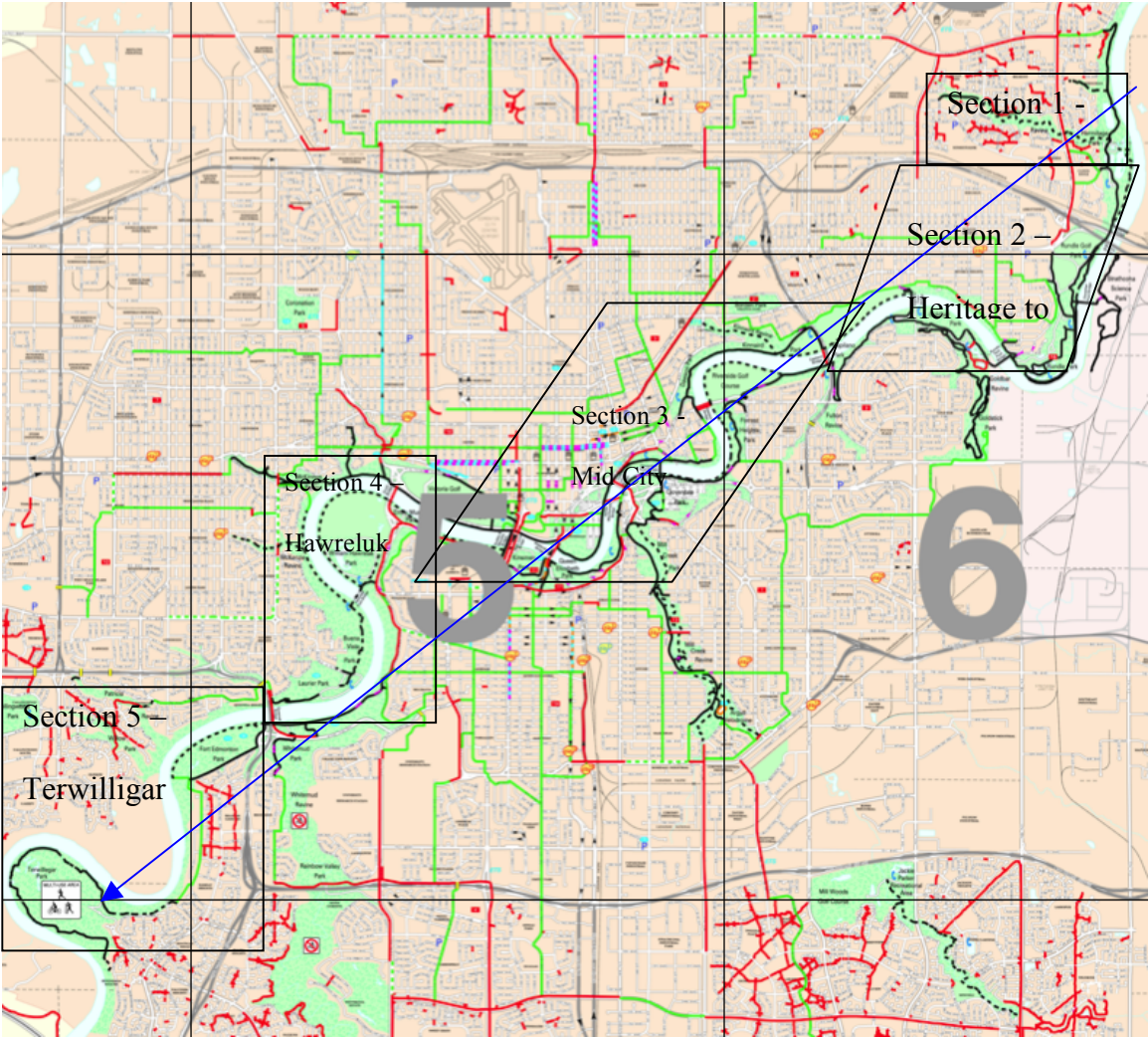
APPENDIX D - FIELDNOTES AND SOUND DOCUMENT EDITS

Kennedale Ravine Fieldnotes

Date recorded: 28 September 2010
Time recorded: 4:16 pm to 7:40 pm

Route: Started at the west end just bordering Sifton Park, proceeding eastward to the
North Saskatchewan River.

Notes:

I started recording upon reaching the west tip of the ravine. This park area is the furthest
away from the river parkland along the valley goes. The first part is rather tame. It
consists of rolling hills of cut grass with a paved path going to 40th Street. After crossing
40th street, the wild part of the valley begins: a gravel path with several footbridges.

The air was warm, around 15 degrees C or so. The insects were out, but not registering in
most cases. The most prominent feature of this soundwalk was the different sounds that
water makes flowing through different areas of the ravine. The wind was much more
prominent in this recording, in some cases overwhelming the microphone. The sound the
wind made rushing through the autumn leaves is quite distinct.

The path winds around a creek that feeds into the river. I took the opportunity to record
several snippets at each wooden footbridge that crossed the creek. There were also a
couple of instances where the water was loud enough to be heard without going over such
a bridge: first, where a storm drain was emptying into the creek; second, when the water
was rushing beside the path just before entering Heritage Park.

As far as creature sounds go, a few stood out:

1) call-and-response squirrel.
2) A lone cricket.
3) Several geese in one of the 'manufactured wetlands' mini-lakes near the river.
4) Ducks near the same.
5) Dogs! The river valley as a whole seems to be a favourite spot for dogwalkers.

Another spot of note is under Victoria Trail. The valley path goes underneath a freeway
bridge; the sounds of traffic overhead change when directly underneath the bridge
because said bridge acts as a sort of sonic baffle and conduit.

Kennedale Ravine Sound Document Edits:

1) 0:00-9:58 Wind rushing through the trees in the Kennedale Ravine east of 40 ST. Traffic can be heard from the major thoroughfare. (5PM)
2) 9:58-15:00 Water gushing from a storm collector into the creek in the ravine.
3) 15:00-20:00 The creek flowing underneath a footbridge in the valley
4) 20:00-21:00 Further down the creek.
5) 21:00-23:45 The ravine goes underneath a large freeway before opening up into Heritage Park beside the river.
6) 23:45-25:15 The marshes in Heritage Park. Migrating waterfowl gather here.

Metadata: Hermitage → Capilano

Date: November 18, 2010
Time: 7:30pm to 11:00pm
Conditions: very cold (-20 C), 8-10 cm of snow on the ground

7:30pm

Started recording. Here, I am at the south end, and it is pretty quiet so far. Down the hill from the bus stop there is a trail close to the river.

7:45pm

I am just about to go under Yellowhead Trail. A giant railroad track looms above the trail just before the highway. In the distance flares and other flashing orange lights play along the smoke like will-o-wisps.

8:00pm

Underneath the eastbound bridge of Yellowhead. The vehicles going across the bridge make a distinct sound as they go across. Clunk-clunk. Usually this is because there are two sets of wheels. The first of many trains to cross tonight approach.

8:10pm

Just south of the bridges. Several sounds combine together to create an interesting soundscape: an owl hooting, the D5 drone of the plant area, and the train horns sounding different chords: E flat minor, C4-Eb4-Ab4-B4, minor thirds, and so on. I don't think there will be any other birds tonight. This section of recording sounds like it could be a piece of music by itself.

8:40pm

I am approaching the Ainsworth-Dyer Bridge. The valley can no longer be traversed westward on the north bank. Once across, I'll be at Gold Bar Park. Just before said bridge are signs depicting various birds, such as the mountain bluebird, Franklin's Gull, and so on.

At the middle of the bridge is the best place to record the river in this area. The ice floes breaking up in the river have a distinct sound. Train horns can still be heard in the distance, as can the D5 whine from the plants.

9:10pm

The river trail leads to the back side of a large waste water treatment plant owned by Epcor.

10:00 pm

I witnessed something I could not believe. A winter evening at -20C, and there were hundreds of ducks gathered together. There was a constant low quacky texture, among which call-and-response high quacks would rise from everywhere along this area of the river.

10:30 pm

I've just about reached the western edge of the plant, and we are in Capilano! Time to stop recording.

Sound Document Edits:

Hermitage Park (0:00-1:00)

The air is still and very cold (-20 C). The soundscape here is rather quiet. Odd chordal juxtapositions are heard from different sound sources.

Approaching Yellowhead Trail (1:00-3:15)

Footsteps sound different when they pack down snow rather than gravel. I can hear traffic from the highway. Even this late at night, the highway is still busy.

Hearing traffic from below is an odd experience. Some of the vehicles' harshness is dampened by the intervening concrete barrier; this effect becomes more pronounced in the next section.

Underneath the Eastbound Bridge (3:15-6:55)

The bridge makes an interesting sound as vehicles pass over it. This kind of sound exists only in winter because of the way the temperature acts with the bridge. The sound comes from the vehicles passing over a safeguard that compensates for the material of the bridge shrinking in colder climes.

Just south of the Eastbound Bridge (6:55-10:45)

A train passes by on the railroad bridge north of the highway, sounding its C4-Eb4-Ab4-B4 horn at times. From the east, the plant emanates a constant D5 whine. An owl joins in on F#4 in a characteristic rhythm (♪.♪♪♪). In places, a D2 drone phases in and out. The traffic adds some midrange white noise to the mix. Near the beginning is something that sounds like a constant low quack-like texture.

Further south (10:45-12:30), (12:30-13:10)

The D5 whine now dominates the soundscape.

Near Rundle Park (13:10-14:05)

The train horn now sounds like a diminished chord (D4-F#4-A#4). This chord would be a nice one to interpose against the previous train chord from the bridge. There is actually an instance of the horn doing a slight upward glissando as it is sounding, by as much as a semitone over five seconds.

At the riverbank of Rundle Park (14:05-14:35)

Here I heard the sound of not only water flowing, but floes breaking apart and floating down the river.
Ainsworth-Dyer Bridge (14:35-16:00)

Here is much better recording of the ice floes breaking on the bridge supports. A low bobbing sound is constantly sounding… I think it's from the water, but I have never heard such a sound from the water in my other recordings, making this unique as far as I know. It might be an aftereffect of the breaking ice floes…?

Behind the EPCOR Wastewater Plant (16:00-20:40)

Now that I think about it, the ice floes breaking sound very similar to glass breaking. Some of that is heard in this section; however, I was completely caught off guard by what I witnessed here. Over two hundred ducks conversing with one another. At ten o'clock in the evening. IN -20C. I could not believe my eyes or my ears.

The main background texture consists of the breaking ice floes and the low drone-quacks. Amidst this texture arises a series of call-and-response high-pitched quacks. This congregation of ducks lined the entire length of the wastewater treatment plant near the south bank of the river.

The western edge of the plant is at Capilano; thus this part of the recording ends the document.

Mid City Fieldnotes and Sound Document Edits

Date and Time: April 8th (11:00PM)-April 9th (6:30AM)
Temperature: 3C (dropping to -4C over the course of the recording)
Wind: Light wind coming from the east, tapering off to dead calm

General notes:

The mid city recordings turned out to be surprisingly the quietest of the five despite the recording session lasting almost twice that of any of the others. There were some nice soundscapes here and there, but for the most part the soundscape was simply a quiet background noise band of distant traffic. The second snippet is a typical example. With the exception of one very vocal goose that accompanied me throughout much of the recordings, the whole city was asleep. Even the traffic was at a minimum.

Specific recordings:

0:00-1:15 – West side of EPCOR Treatment Plant (11:00PM)

Electricity has a particular pitch associated with it in Canada (60Hz, B half flat). Here one can perceive several octaves that use that pitch as the fundamental frequency. The highest of these has a wavelike pattern.

1:15-3:18 – Capilano Park (11:12PM)

Other than the din of distant traffic, no other sound could be perceived from here.

3:18-4:33 – Capliano Storm Drain (11:16PM)

This drain is quieter than either Kennedale's or Terwillegar's, which is surprising considering it is springtime.

4:33-8:47 – Underneath the Capilano Bridge (11:55PM)

The pathway is ten feet at most under the bridge. Its character is similar to the Yellowhead Bridge near Hermitage Park, except there are no power plants nearby.

8:47-14:43 – Riverside Park (12:30AM)

This section is a verification of the adage "Good things come to those who wait." While the sound is uniform for the first while, a goose and siren add to the background about midway through.

14:43-20:31 – Rowland Bridge (1:20AM)

I walked across this bridge alongside car traffic. The metal bars of this bridge resonate a diminished C#E Bb chord. Before reaching the end of the bridge, several sirens started sounding, one after the other, each at a different starting point creating crosswaves.

20:31-36:07 – 105th Street Bridge (4:40AM)

This soundscape stood out head and shoulders above the rest of the recording. There was water dripping and flowing in different places from the snow melting. The bridge surface is a lattice iron framework with holes creating a buzzing sound whenever a car drove over it. The pitch of the buzz was entirely dependent on the car's speed. Oftentimes one car would start before another finished, creating a dyad, or even once a triad chord. I can only imagine what this bridge would sound like on a weekday rush hour.

Midway through, a goose added its voice to the ensemble. The acoustics of the small tunnel underneath the bridge added a slight reverberation to the entire soundscape.

36:07-41:22 – Under the LRT Bridge (5:10AM)

On Saturdays Edmonton's Light Rapid Transit is not active at this time, so the most prominent sound is that of the electrical lights illuminating the spiral pathway leading up to the footbridge that hangs underneath the LRT bridge. Another 60Hz (or 60×2^n) sound.

41:22-52:11 – Groat Road (6:10AM)

The animals, the traffic and the rest of the city in general is starting to wake up. It is a Saturday, though, so the traffic will not reach as much of a peak as it would on a weekday. In addition to our friend the goose, crows and ducks now join in.

Hawreluk-Quesnell Fieldnotes

Start Point: Groat Road Hawreluk Park Entrance
End Point: Quesnell Bridge
Conditions: misty, overcast, single digit temperatures.
Date: September 15, 2010
Start time: 6:45 am
Finish time: 10:45 am

In the beginning, I took the wrong entrance by accident. Just north of the Harweluk entrance on the turnoff of Groat Road is a roadway leading into a golf course and resort area. It didn't take long to realize I needed to head further south.

The entrance to Hawreluk is pretty straightforward. A small strip of grassy area to the right with a tree barrier (and later discovered reinforced by a barbed wire fence!), and a large central area to the left. The road loops counterclockwise around the park parallel to the river.

In the morning, many migratory birds were heard, particularly around the pond. Being this early in the morning, I was the only witness. Geese, ducks, and birds could clearly be heard at the lake near which a cabin resided where one can rent paddle boats. Unusual phenomena included leaves that fell from a tree nearby, straight as an arrow, at a 45 degree angle, straight into the ground; and the golf course trimmer which roared its engine through the entirety of this hour.

8:00am

After spending some time at the lake, I decided to go on the horse trail since it was closer to the river. Every so often, there is a trail branching off that goes to the riverbank. This area deserves a bit of further investigation.

The highlight of this hour was definitely the chiding squirrel. Although many squirrels have the typical machine-gun chitter, this little guy added several short, spaced, differently-pitched chirps reminiscent of scolding. On the recording, it's unmistakable.

Even this far out, a roiling band of noise permeates the background. This hour ends at an outpost, not far from the upcoming pedestrian bridge.

9:00 am

Now that I am at the bridge, it is a wide pedestrian bridge whose metal bars possess a distinctive ring as a strap on my backpack kept striking them. The dogwalkers have started showing up in droves, along with a few joggers.

Shortly after crossing and heading westward along the north bank, I discovered a wide expanse of sedge-like grassland. Despite the temperature, insects are numerous there.

9:45 am

I continued to walk westward. The birds are layering with each other in an expansive counterpoint. Mr. Chiding Squirrel makes a reappearance as well. The trail runs into the Valley Zoo parking lot before going into another open park like Hawreluk, then curving upward to a long staircase leading to a pair of bridges.

10:45 am

… which are both closed due to construction. Unfortunately, this cuts short the expedition that I had planned for today; nevertheless, I now have almost 4 hours of material to sift through.

Sound Document Edits

0:00 – 5:28   The paddle boat lake, 7:40 am.
5:28 – 11:10   The horse trail, 8:15 am.
11:10 – 16:20 The pedestrian bridge, 9:30 am.
16:20 – 22:30 Near the Valley Zoo, 10:20 am.

Fort Edmonton – Terwillegar Fieldnotes and Edits:

Date: October 28, 2010
Time: 11:00am-3:00pm
Condiitons: Sunny throughout, starting at -3C, improving to 4C over the course of the recording

1 – 11:01 am (0:00-3:00)

This cut is just east of the Whitemud drive bridge. There, a smaller river merges with the North Saskatchewan. The ducks are more vocal than in Hawreluk or Kennedale.

2 – 11:07 am (3:00-4:20)

The microphone is focusing on the maintenance work of the bridge as a focus on the human side of the environment here.

3 – 11:13 am (4:20-6:10)

A very vocal dog and some birds.

4 – 11:21 am (6:10-8:40)

I'm going underneath the bridge.

5 – 11:28 am (8:40-9:15)

I am now on the west side of the bridge. The hammering sounds seem to carry the farthest. They were overwhelmed when right next to the bridge.

6 – 11:32 am (9:15-10:15)

Relative quiet and calm prevails compared to before along the Fort Edmonton River Loop Trail.

7 – 11:45 am (10:15-11:45)

A strange sound that I have never heard before, sounding almost like a cross between a bird and a dog.

8 – 11:47 am (11:45-16:35)

The squirrel has returned. This time I think I was intruding upon its home territory because when I moved in to focus, the squirrel gave out some warning chirps, leaped onto a tree with what looked to be like nests built on its fork, then proceeded to alternate between chirping and suddenly changing poses -> really quick movements.

9 – 11:54 am (16:35-17:20) / 10 (17:20-18:10) / 11 (18:10-19:10)

Vocal waterfowl near the water.

12 – 12:25 pm (19:10-20:05) / 13 (20:05-22:35)

The sound of the frost melting caught my ears here. It sounds similar to wood crackling in a fire. The squirrel makes a re-appearance with the same kind of warning call. Near the end, a siren can be heard from a great distance away.

14 – 12:32 pm (22:35-24:00) / 15 (24:00-26:50)

Near the water, approaching Whitemud Road. A sailboat is parked in this area, to be accessed by Fort Edmonton people. A variety of sounds are heard here: squirrels, planes, construction, waterfowl, water, etc.

16 – 1:00 pm (26:50-27:25)

Whitemud Road. Surprise, surprise: further pedestrian access is blocked by construction.

Thankfully, a couple met me as I was about to head back and gave me a ride to the entrance of Terwilligar Park, which, as it turns out, was not far. En route, we passed by the site of a large riverbank collapse that claimed at least four mansions in Riverside. Others near the site have their foundations worn down: it seems inevitable that they too will collapse in the near future.

17 – 1:30 pm (27:25-27:40)

Well, here we are: the trail that leads into Terwilligar Park.

18 – 1:50 pm (27:40-28:30) / 19 (28:30-29:20)

I am now midway down a steep hill that goes from Riverside to the riverfront. The water sound is from a manhole cover at the bottom. They're doing construction around here too, it seems.

20 – 1:56 pm (29:20-30:55) / 21 (30:55-34:00)

I am now right above the manhole cover. This is a storm drain just before it dumps into the river.

22 – 2:05 pm (34:00-34:20)

This is the storm drain exit. The water crashes against several series of barriers before being deposited into a rock bed which further filters the water before it enters the river.

23 – 2:15 pm (34:20-35:00)

I am now at the river in Terwilligar Park. This place is not actually forest anymore, but a vast grassland park. Numerous dogs and their owners congregate in this giant off-leash park. The river bends almost 180 degrees creating a sort of peninsula. The echo chamber here is amazing (apologies for the mic interference; this part was too good to pass up)

24 – 2:30 pm (35:00-38:30) / 25 (38:30-40:00)

This is the furthest west the river goes before leaving the city. The silence is such that I cannot move at all without disturbing the delicate soundscape here. This is a perfect place for peace and quiet, construction crane nearby notwithstanding. I can only imagine how still it would be in winter.

APPENDIX E – SOUND BANK CHART

Background	Pinpoint 1	Pinpoint 2	Panpoint 1	Panpoint 2
Leaves Rushing	Sudden Chirp	Motorcycle Growl	Bird Chorus	Wind Gusts
Storm Drain				
Creek	Melodic Caw	Vehement Caw	Squirrel Call	
Under Freeway	Siren, Gravel			
Marshland	Goose Honk	Duck Quack	Bird Keening	Bird Call
Under Bridge				
Power Plant	Owl Hooting	CEbAbB Train	Moving Train	DF#Bb Horn
Floes Breaking				
Quack Drone	Short Quack		Loud Quack	
Plant Drone				
Capilano Drain				
Riverside			Double Siren	
Walterdale Bridge	Single Note	Chord	Ascending Scale 1	Ascending Scale 2
Pond @ Groat	Quack	Bird Call	Honk Session	Tweet Sequence
Horse Trail	Squirrel Call	Short Chiding	Chiding Squirrel	Bird Call
Footbridge	Bridge Ring	Caw and Ding		
Valley Zoo			Bird vs Squirrel	
Quesnell Bridge	Quack		Braking Vehicle	
River near Quesnell	Hammer		Dog and Hammer	Dog and Hammer2
Under Whitemud			Moving Car	
Fort Edmonton	Bird Call		Strange Howl	
Squirrel Alarm	Squirrel Cry	Slow Quack		
Frost Melting			Siren	
Outside Storm D			Inside Storm Dr	
Terwilligar End				

APPENDIX F – BACKGROUND PANNING CHOICES

Autumn, Early Evening

A – Kennedale Park, open paved path, **East**

I was pointing the microphone east to prevent the wind from overwhelming the microphone. I was also walking eastward from Sifton Avenue down through Kennedale Park.

B – Storm Drain, **South**.

The path and the drain were separated by about ten metres or so of water, so the panning reflects that. The storm drain is south from the path; as such, the sound is placed south.

C – Creek, **North**

Again the microphone was stationary, positioned directly above the creek.

D – Under the Victoria Trail Freeway, **North**

I was moving under the freeway eastward, so the panning choice reflects this circumstance. The panning for this section was done from a person's ear point of view.

E – Hermitage Park Marshland, **North**

The listener is stationary relative to the sounds in this recording. Various small lakes are scattered in Hermitage Park, many of them north of the path. Many of the bird sounds are placed there.

Winter, Late Evening

F – Under Yellowhead Bridge, **South**

This recording is done from from a person's ear point of view. I was moving under the bridge, pausing for a while, then continuing forward, thus the bridge starts from the south and gradually shifts north.

G – South of Yellowhead Bridge, **Southwest**

This recording is done from from a person's ear point of view.The power plant is located in the southeast, dominating the left channel. The path veers close to the plants then away in a U sort of shape. The power plant drone is east; the owl is west; the train is north.

H – Ainsworth – Dyer Bridge – Floes Breaking, **Southwest**

This is another stationary soundscape. The microphone is position directly above the river at its centre. There are no sound signals; the only sound is that of the water flowing against the bridge, the ice floes breaking against the concrete supports.

I – Behind the EPCOR Wastewater Plant, Duck Drone, **North**

This soundscape is stationary. Here, the microphone is situated north and the background layer reflects the river. All of the foreground sounds (duck quacks) are placed in the northern half of the audio space.

Spring, Night

J – West side of the EPCOR Wastewater Plant, **North**

This soundscape is also stationary. The location reflects the area from which I heard the drones of the plant, to the north.

K – Capilano Storm Drain, **North**

This is another stationary soundscape. The microphone is right above the storm drain, so the storm drain background layer is centred.

L – Riverside, **North**

The microphone is pointing north, in the direction of the river. Only the ambience is in the background. The background layer is centred.

M – Under 105 Street Bridge, **West**

I am directly under the bridge, so the focal point is centred. The foreground sounds are controlled by panpoint vectors since they reflect the cars going over the bridge from the southeast to the northwest.

Summer, Morning

N – Paddle Boat Pond in Hawreluk Park, **South**

The microphone direction south reflects the direction from which I was facing the pond. The water ambience is placed in the south; the golf cart is in the north; the traffic from nearby Groat Road is in the east. The background layer is centred.

O – Horse Trail, **West**

The focus of the background is on the river to the north. I was walking westward when the chiding squirrel event occurred.

P – Across the bridge, **Northwest**

Here, I wanted to give a stationary out-of-body focus to someone walking from the northeast to the southwest along this bridge. The sounds of the ringing bars of the bridge occur in several spaces; this sound's space is defined more by musical choice than by accurate space portrayal.

Q – Valley Zoo Birds, **South**

The background layer is stationary. The birdsong is pervasive but masked by the traffic, making it impossible to spatialize apart from the microphone's direction.

Autumn – Midday / Afternoon

R – Whitemud Drive Construction, **Southwest**

The microphone direction reflects my listening position when I caught the construction. The background layer is situated due west, where the construction takes place.

S – Near River en route to underneath the Whitemud Drive Bridge, **North**

The microphone is stationary. The background layer is centred, reflecting the omnipresence of water sound at this location.

T – Crossing underneath the bridge, **West**

The recording is done from a listener's ear point of view, going westward underneath the bridge. The sharp pan at the 59-second mark is to pan the water spill from west to east to reflect my experience of going through the water spill exiting the bridge.

U – Fort Edmonton, **West**

I have chosen a quiet ambience to contrast the previous three areas. Here, animals can be clearly heard. This soundscape is stationary and centred.

V – Squirrel Alarm, Fort Edmonton, **East**

This little squirrel decided to squeak non-stop. I was facing east while he was in the north so the background layer reflects this by keeping him mostly in the left channel.

W – Melting Frost, Fort Edmonton, **East**

The recording is done from a listener's point of view, going westwards. The crackling sound of the melting frost, though everywhere, was most prominent in the south.

X – Storm Drain, Terwillegar Park, **North**

When I captured this storm drain, it was north of me. Later on I positioned the mic right above it; I decided to make this a panpoint sound so I could layer it over the initial recording for comparison; the sudden augmentation also fits well with the final string push.

Y – Open Field, Terwillegar Park, near the river at the west side, **West**

The piece ends with a nice echoing ambience from this location. This is stationary and offset to the north to reflect where the majority of sounds are heard.

APPENDIX G – TOP LAYER OF MAX PROGRAM

Forest in the City - by Trifon Heney

INPUT BOX

p xbox360USBinterface

Panpoint X Y: Left Analog Stick
Panpoint Triggers: L2 R2
Pinpoint Triggers: L1 R1
Bank Selector: Keys a-z
XBox Logo
Pinpoint X Y: Left Analog Stick
Panpoint X Y: Right Analog Stick

L2
L1
L Analog Press
Left Analog
Keyboard: ASCII Value
▶ 0
D Pad
p PatchGuts
back
start
X
Y
A
B
R1
R2
Right Analog
R Analog Press

BANK BOX

ON

Current Loaded Bank

Background   Not Valid
Pinpoint A   Not Valid
Pinpoint B   Not Valid
Panpoint A   Not Valid
Panpoint B   Not Valid

p loadbuffers   KILL SWITCH: z

dac~ 3 4 5 6 7 8 9 10

MULTIPAN VBAP - 8 CHANNEL

uBc

SIG 1 PAN 1 SIG 2 PAN 2 SIG 3 PAN 3 SIG 4 PAN 4 SIG 5 PAN 5 SIG 6 PAN 6 SIG 7 PAN 7 SIG 8 PAN 8

vbapPan8.abs   F<->B   0.   0.5   L<->R   vbapControl.abs

set speaker delays

MASTER   ON/OFF

This version is optimized for Mark of the Unicorn (MOTU) devices using the eight analog connections (e.g. Ultralite).

Legend:
Alphabetical characters (a-z or A-Z) correspond to their respective cues in the score. These cues trigger backgrounds and what sounds can be commanded by the controller.

L1, R1: Pinpoint sound triggers. The location of these sounds is controlled by the left joystick and is fixed when started.
L2, R2: Panpoint sound triggers. Their sound location is controlled by the right joystick and is movable throughout.

The Bank Box gives information on which sounds will be played. Left is A; Right is B.

Home 3 4 5 6 7 8 9 10 Away 3 8 4 9 5 10 6 7

APPENDIX H – FORM AND FLOWCHART OF *FOREST IN THE CITY*

Rondo	A	B	A'		C			A
Section	A B C D E F	G	H I J K L M	N	O P Q R	S T U V	W X Y	
Season	AUTUMN	WINTER	SPRING		SUMMER		AUTUMN	

INPUTS

Keyboard

L1 Front Triggers R1

L2 Back Triggers R2

triggers → triggers → triggers

SOUNDS

Backgrounds — define

Pinpoint Sounds

Panpoint Sounds

CO-ORDINATES

Preset + direction

Reads co-ordinates when sound triggered

Continuously reads co-ordinates

PROCESSES

Spatializer (UBCTools)

vbap8bp

OUTPUT

1 2 3 4 5 6 7 8
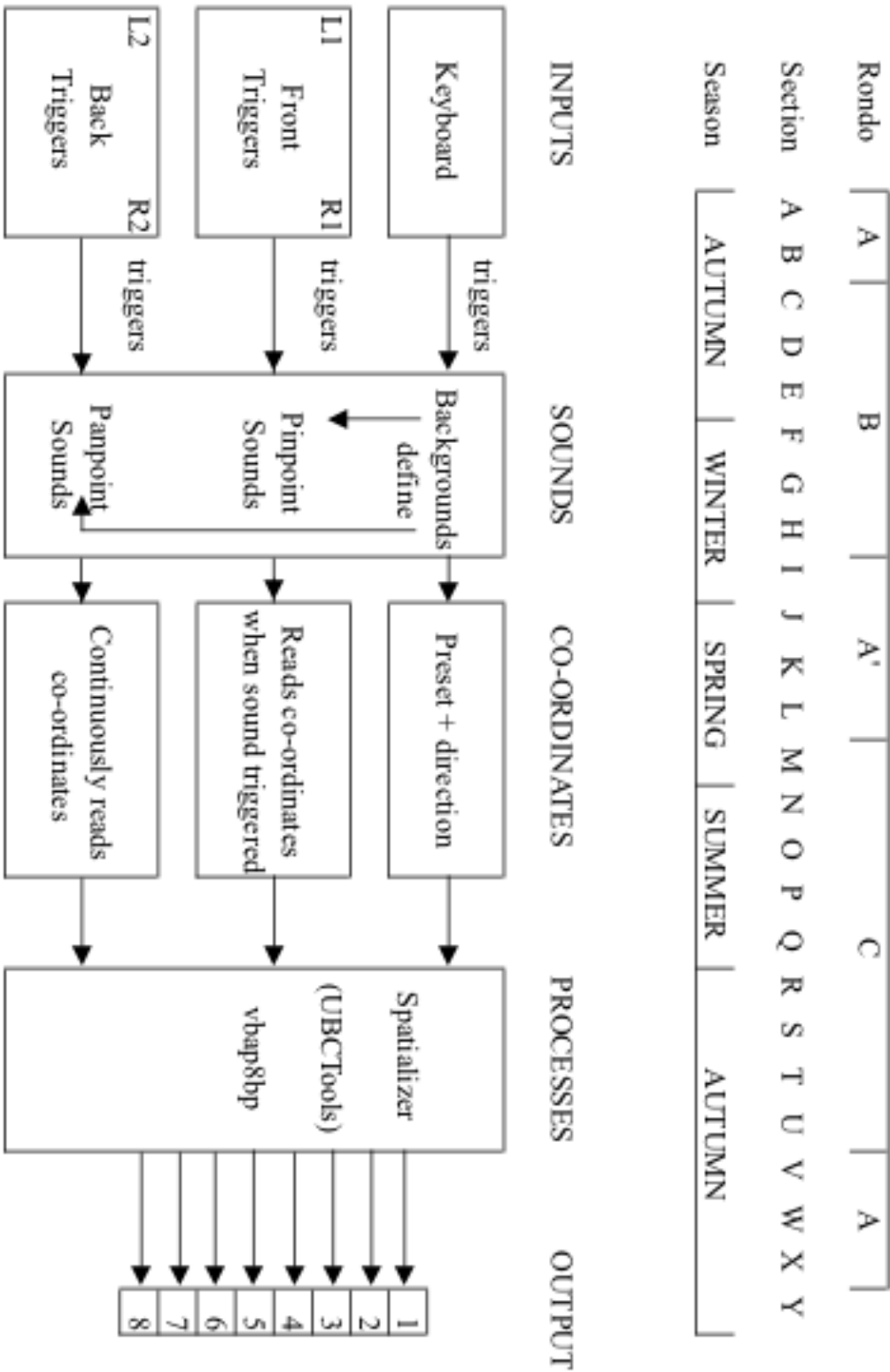
FOREST IN THE CITY

FOREST IN THE CITY

A Spatial Composition for String Orchestra and Eight Speakers controlled by
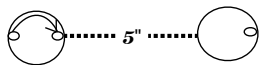
Max/MSP

By Trifon Heney

CONCERT STAGE SETUP

Vln I

1 2

Vln. VIII
Vla II

8 3

Vln. II
Vlc.

Vln. I   CB

Conductor

Vln. VII

Vln. III

Vlc,   Vln. II

7 4

Vla. VI
CB

6 5

Vln. IV
Vla. I

Vln. V

LEGEND

L Main Cue. The laptop performer triggers the associated sound bank by pressing the same letter on the keyboard.

2 Sub Cue. Used to co-ordinate the orchestra and foreground sounds. Make sure to use a different cue.

Analog stick position indicator. This particular symbol means that the stick should be held all the way up. The top row is for the left analog stick; the bottom row is for the right analog stick.

Movement indication. This particular example indicates movement of the analog stick from the left to the right clockwise taking 5 seconds doing so.

L1 Foreground sound. These sounds are activated with the trigger buttons on the controller.

You may choose any of these positions. If the process is repeated, only choose each position once until all positions are used.

FOREST IN THE CITY
AUTUMN - KENNEDALE

2

B Kennedale Ravine,
Storm Drain.

There are no foreground triggers in section B.

4

Pinpoint

Max/MSP

Panpoint

alternate these motives (you choose which to start with);
wait for the north violin to finish sounding, then trigger
your next caw. This lasts until the end of the page.

3"

20–22"

9"

♩=**90** ord., sul G

Violin

f   *fp* ——— *ff*

Viola   pizz.
p

Inner Ring

Violoncello   TACET   pizz.
p

Contrabass   pizz.
p

9"   *20–22"*
arco Listen to the foreground cawing in the electronics; alternate your motive with it.

Violin N   TACET
mf > *p mf* > *p mf* > *p*

3"
♩=**90** arco

Violin NE   TACET
p leggiero

♩=**90** arco

Violin E   TACET
p leggiero

Violin SE   TACET

Violin S   pizz.
p

* Start at the pitch indicated and bend up as
fast as possible while being able to return to
the same spot for the next pizzicato

Violin SW   pizz.
p

Outer Ring

Violin W   TACET

Violin NW   TACET

Viola SE   jeté
p

Viola NW   TACET

Violoncello NE   pizz.
p

Contrabass SW   TACET

6

E — Marshlands near Hermitage Park

1

2

3 L1 (duck) L1

Pinpoint

Max/MSP

Panpoint

6"   9"   6"   9"

L2 (bird keen) L2

hold   5"   hold

R2 (honk) R2

hold   5"   hold

-3"-
(upon ending
wait 3 seconds)

10"   15"   15"   18"

Violin

Viola

Inner Ring

Violoncello

Contrabass

10"   15"   15"   18"

Violin N — arco, ord. — pp

Violin NE — arco, ord. — pp

Violin E — arco, ord. — pp

Violin SE

Violin S

Violin SW

Outer Ring

Violin W

Violin NW

Viola SE — arco, ord. — pp

Viola NW

Violoncello NE

Contrabass SW

WINTER - HERMITAGE

Under the Yellowhead Trail
Bridge, south of Hermitage Park.

There are no foreground
triggers in this section.

8

G South of Yellowhead Trail
near the Power Plant.

Pinpoint

Max/MSP

Panpoint

1 L1 — *4–5"* —

(owl)

2

R1 (short train horn)

once only

7" — *10"* — *20–22"* — *10"*

Violin

Viola

Inner Ring

Violoncello

Contrabass

7" — *10"* — *20–22"* — *10"*

Violin N

pp

n

Violin NE

Violin E

Violin SE

Violin S

Violin SW

Outer Ring

Violin W

Violin NW

Viola SE

pp — *mp*

Viola NW

Violoncello NE

Contrabass SW

10

H Ice floes breaking apart on the
supports of the Ainsworth-Dyer
Bridge. (Gold Bar Park)

There are no foreground
triggers in this section.

Pinpoint

Max/MSP

Panpoint

Violin

Viola

Inner Ring

Violoncello

Contrabass

Violin N

Violin NE

Violin E

Violin SE

Violin S

Violin SW

Outer Ring

Violin W

Violin NW

Viola SE

Viola NW

Violoncello NE

Contrabass SW

Duck Congregation behind the Epcor wastewater treatment plant, Gold Bar Park

SPRING - MID-CITY

14

16

M   Under the Walterdale Bridge

SUMMER: Hawrelak-Quesnell

N — Hawrelak Park, north of the paddleboat pond. Rush hour traffic from Groat Road.

18

Horse trail circling Hawrelak Park on the west side.

20

Q Parking Lot of the Valley Zoo.

AUTUMN - WHITEMUD TO TERWILLEGAR

22

S At the river just before
going underneath the
Whitemud Bridge.

24

U Quiet Lull
Fort Edmonton

V Squirrel Alarm!

Pinpoint

Max/MSP

Panpoint

Violin

(time it such that you are between each of the recording's squirrel sounds)

Viola

Inner Ring

Violoncello

Contrabass

Violin N — TACET

Violin NE — TACET

Violin E

Violin SE

Violin S

Violin SW — arco

Outer Ring

Violin W — pp

Violin NW

Viola SE — TACET

Viola NW

Violoncello NE

Contrabass SW

28

Conductor's note: Increase in dynamic should be steady, relentless and inexorable, as if it is an inevitable product of the process. At Y, everyone immediately ceases playing. This is done as though someone "turned off" the orchestra.

West End of Terwillegar Park near the southwest city edge.

The piece is concluded once this final sound file ends. There are no triggerable sounds in section Y.