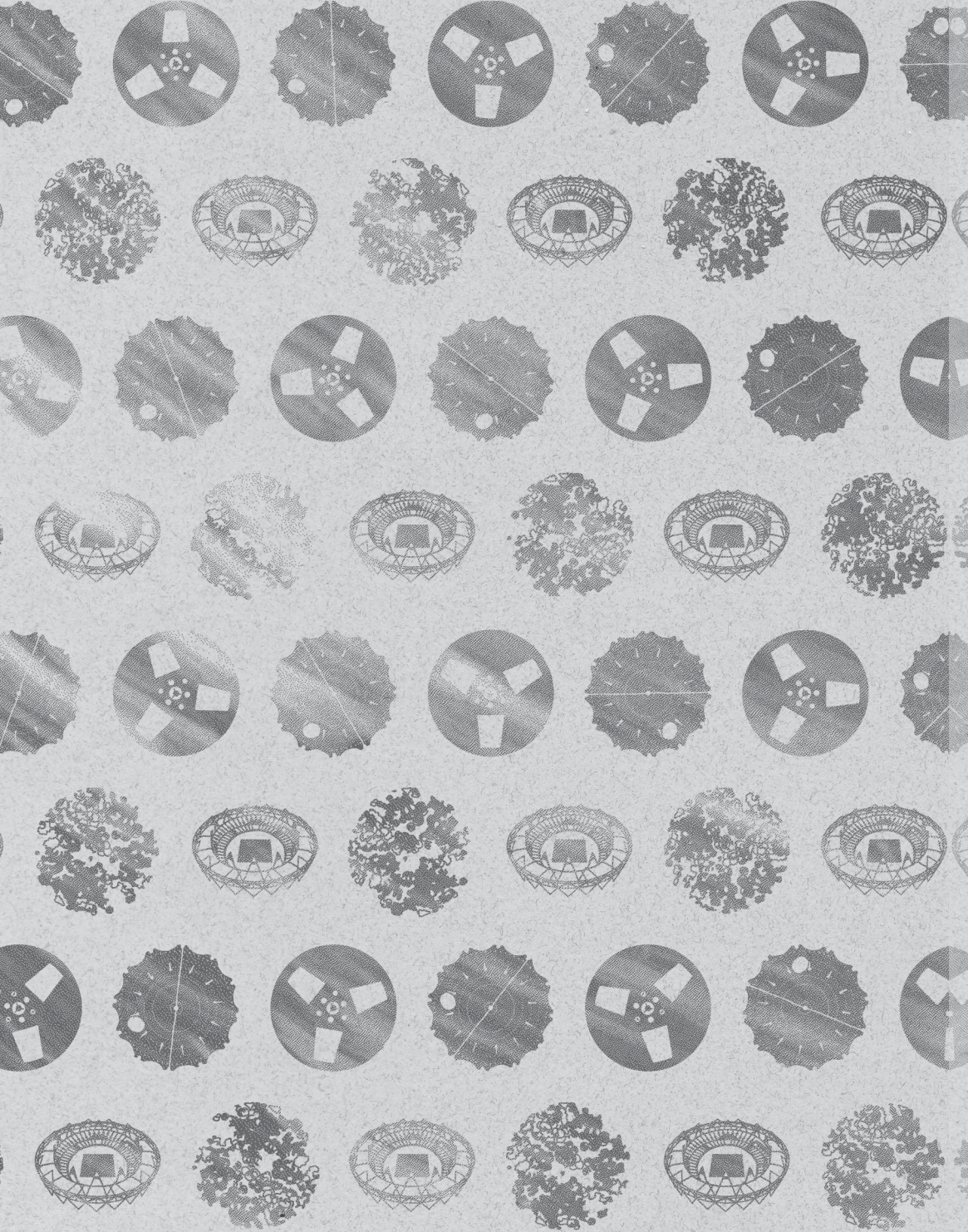




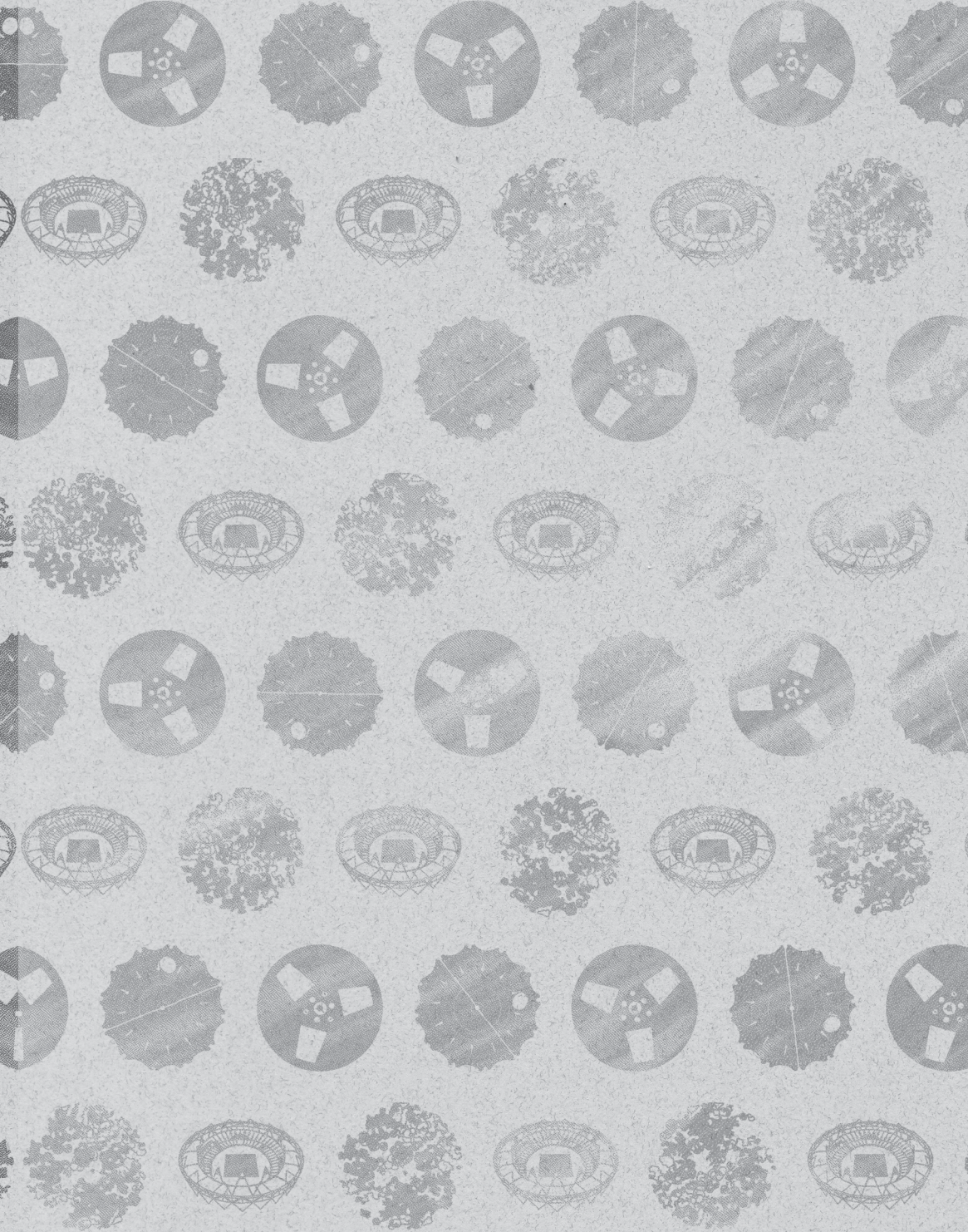
**S U R F A C E**  
**T E N S I O N**

Rob St John











Project website and sound map: [surfacetension.org.uk](http://surfacetension.org.uk)

Commissioned by Ben Fenton for the Thames21 Love the Lea project in 2014.

Designed by Tommy Perman: [surfacepressure.net](http://surfacepressure.net)

All photographs taken by Rob St John on digital, 35mm and 120 film except microscopic images of blue-green algae (*Aphanizomenon flos-aqua*) courtesy of Lauren Billington at the Environment Agency.

Thanks variously for advice, critical eyes and ears, and walking companionship: Emma Cardwell, Tommy Perman, Rob Waters, Ben Fenton, Hayden Lorimer, David Chatton Barker, Jake Bee, Pete Harvey and Tom Turnbull.

Pattern + Process Press PPP001.

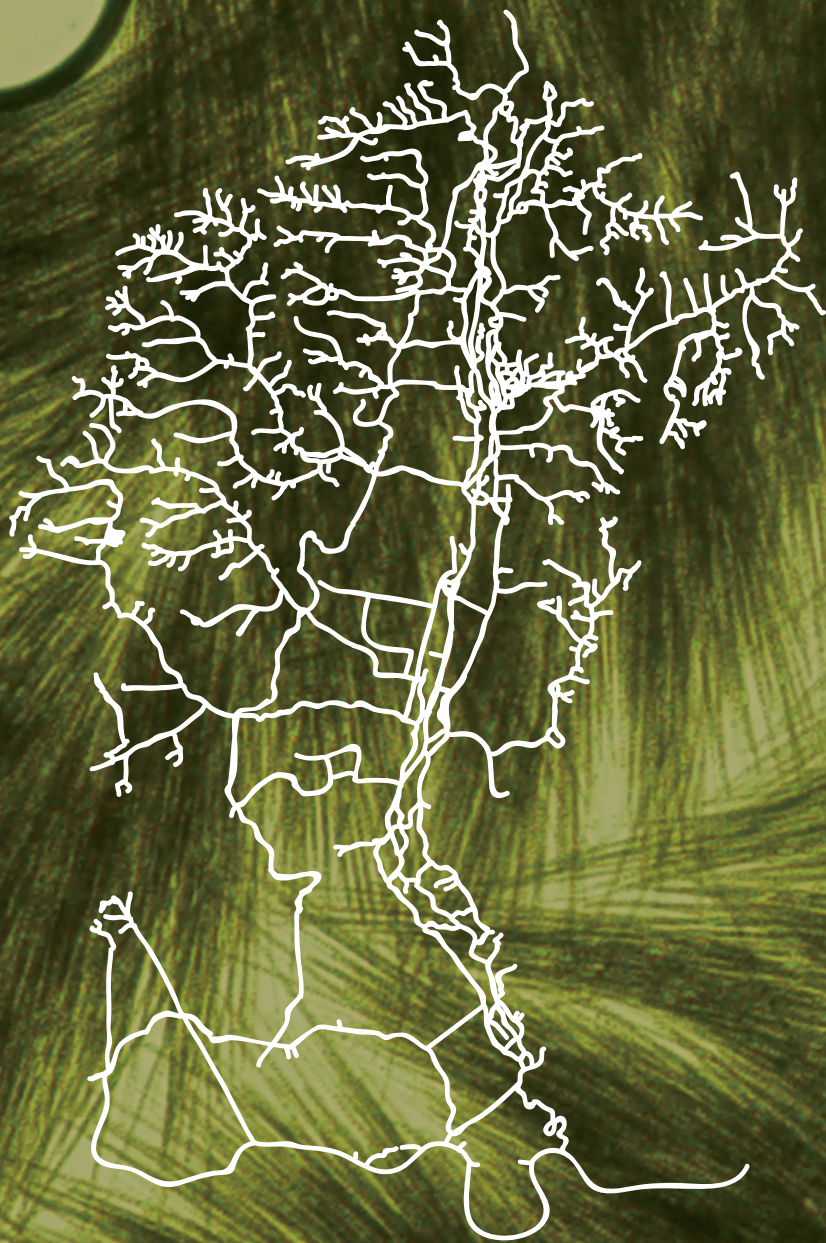
Published in 2015.



# S U R F A C E   T E N S I O N

Rob St John

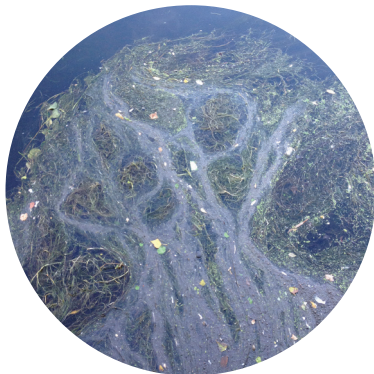




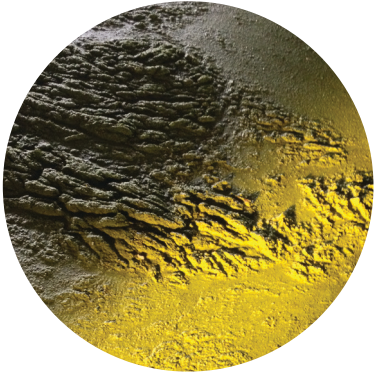




# PATTERN





















Surfaces can be both revealing and concealing. They bridge the spaces between one state and another – water, air and earth; past, present and future; human and non-human – layers of exchange that can form filters and catch imprints, traces and residues of what exists underneath and outside. But nothing – the natural and the unnatural; the native and the non-native; the clean and the polluted; the real and the imagined – can ever be cleanly cleaved in two. The space between states creates surface tension: the friction and turbulence of a boundary thick with remixing and hybridisation, where what seems static may be constantly in flux. Tension suggests resilience: the potential energy to stretch and cling; a tightly stretched layer between deep upwellings and surface pressures. Surfaces are mirrors for the imagination, our own image reflecting (or refracting) back at us, the water's surface a magnifying lens, an optic through which we're drawn to peer, to try and make sense of things. The river's surface as a clouded window onto constellations of underwater life: temporary equilibriums of nature after nature.

The Lea Valley is one of London's most storied and potentially contradictory landscapes: in places biodiverse and full of natural life; in others polluted and stagnant; in parts derelict and largely ignored, in others landscaped, (re) shaped and gentrified. It's a line of land and water – the name Lea is derived, or possibly divined, from the same root as ley (as in ley line) – that picks a corroded contour through the city: all neon duckweed greens, gloopy oil-slick rainbows, hydra-head tangles of weed and rope, yellow pollution booms trapping scree slopes of empty spray cans, fading factory bricks and rusting metal signs gradually replaced by a swell of redevelopment and gentrification projects and clean-ups. The River Lea (or 'Lee' for the man-made stretches) is one of Britain's most polluted and human-altered rivers. It rises near Luton and flows for forty miles or so to the Thames at Trinity Buoy Wharf. Large sections of its course were 'improved' by grand engineering works beginning in the 1760s, creating the navigable Lee Navigation canal, and a series of locks and marinas.

In Summer 2014 I was approached by Ben Fenton from the river conservation charity Thames21 with an unusual commission in mind: to design a project drawing from both art and science to creatively explore pollution on the River Lea.





This book and CD are the products of that project: the result of almost a year of field recording, photography, note-taking, research, and perhaps above all walking and noticing. The name Surface Tension comes from the variety of different 'surfaces' in the Lea Valley: the polluted river surface, overgrown with eutrophic flares of blanket weed, plastic bags and beer cans; the crumbling brick and rusting metal surfaces on old buildings colonised by lichen-like graffiti; and the boundless, shape-shifting role of sound in telling us about people, places and the environment. I thought of the Lea Valley landscape as an ongoing experiment: imaginative ruins and far less imaginative regeneration. The grand architectural circles of empty gasometers, the Olympic Park and (glimpsed from the Lea's 'estuary' at Trinity Buoy Wharf), the Millennium Dome, each, in a way echoing the structures of microscopic algae, plastics and diatoms in the river: shapes persisting between scales, bridging states.

London is increasingly a city obsessed with its water: the hidden channels and underground rivers that hint at forgotten histories and potentially reanimate the city. But this project is not about finding lost water, nor plotting alternative fluvial topographies. The Lea is almost always in plain sight, but perhaps shorn of its status as a river, its unerring stillness and occasional stagnation (coupled with the large house-boat communities) seem to blur the lines of its definition as a waterway. Its surface is held in a slowly turning suspension, with the marks of hidden changes only slowly becoming apparent. Perhaps this grand process of transformation and rewriting has already happened, given the construction of the Olympic Park and the repurposing of industrial buildings as galleries and cafes amongst other things. But where does the river sit in all of this: as a reflection of (and receptacle for) change?

The Lea Valley is thick with stories, many of them fully told elsewhere. The lower Lea Valley housed factories where the first light bulbs and plastics were developed; where chemicals, gunpowder, ships, buses and motorbikes were made; where the Lesney toy factory once thrived; and where early radio and television components were built. In many ways, this valley was an important cog in the technological invention of modern Britain. Before this, millers at the Three Mills – at the top of the Lea's tidal reach – used a series of water wheels to grind grain in huge quantities to keep, amongst other things, the city's gin palaces well stocked.

Upstream, past the Olympic Park and the converted artists studios in Hackney Wick, there are the Middlesex Filter Beds – built in the 1850s to provide London with cholera-free drinking water, now a beautifully overgrown ruin of Victorian engineering and wildlife-rich reed beds – and the Walthamstow Marshes, where an aviator named A.V. Roe took off for Britain's first (albeit very short) aeroplane flight in 1909. It is here that in 1892 that protestors repeatedly ripped up railway tracks laid (and relaid) by the East London Water Company, because the route of the rails crossed common (Lammas) land, used by the community to graze their cattle.

Over a hundred years later, this 'Great Riot' had an uncanny echo as communities were evicted from allotments when a corner of the marshes was claimed for the Olympic Park construction. Now, the marshes (whether Hackney, Walthamstow or Leyton) have a self-willed air: diverse sets of grass, scrub and woodland where birdwatchers stumble across free parties; where the swish of amateur grass scythers falls in and out of sync with rumbling overground trains, and belted Galloway cattle potter about just out of the shadow of tower blocks. Round the back of Hackney Marsh, the Lea picks up pace for a mile or so, flowing quickly through streamer weed where shoals of carp and bream flit back and forth: the river ghosting a brief flicker of its former self. Even higher up are the former Enfield rifle works, then you're out past the North Circular and M25 – roaring traffic over a silent stream – to the gradually unfurling green belt, where Izaak Walton, the 'father' of British angling, fished and wrote his most influential work in the 17th century. But, as fascinating as these histories are, they aren't the focus of Surface Tension. This is simply a nod towards the fact that the surrounding spaces of the river have always been gradually reshaped and remade, a human ecology of disturbance, colonisation and temporary equilibriums: new nature in a living landscape.


The Lea is an extension of the water networks that run through London's streets and buildings, a carrying stream of the city's dissolved waste, a litmus strip for life that does a remarkable job of buffering various pollutants and stresses, but is occasionally overwhelmed. In late 2014, a tower of foam a mile long and ten feet high moved slowly down the middle Lea like an eerie chemical procession, the wind whipping circular swirls of the white mass up into the air and out



across the surrounding area. In an odd way, this alteration of the river's surface echoed another ecological intervention, this time in the back rivers that braid through concrete channels in the Olympic Park. During the park's reopening in 2013, gallons of the – ostensibly ecologically safe – chemical fluorescein were tipped into the river, turning it fluorescent green under neon light, apparently to 'bring new vibrancy' to a landscape that was evidently seen as lacking aesthetic merit, or at least was ripe for messing with. This intervention was made even more odd by the fact that large yellow pollution booms had been installed at the boundaries of the Olympic Park, in part to keep out the mats of duckweed (also a shade of bright green) that layer the river elsewhere.

This example of theme-park nature – brought within aesthetic bounds and diametrically at odds with the self-willed sprawl of life springing through the cracks in the rest of the Lea Valley – had an additional tragicomic element. The fluorescein 'incident' took place a few days after thousands of fish were killed upstream when thunderstorms washed oils, heavy metals, dirt and dust into a river that was already low and starved of oxygen. Perhaps ironically, it is only at such times of extreme pollution that the diversity of life living beneath the surface of the Lea is revealed: the aquatic plants and animals that quietly regenerate against the odds as the Lea Valley is 'regenerated' above the sticky surface. Yellow nets stretched across the river at the park's boundary – like a miniature, aquatic version of artists Christo and Jeanne-Claude's Running Fence – trapped thousands of swollen bodies, flaking scales in amongst the tangle of sticks, ropes and cans, the decaying heaps oozing new surface sheens of oil.

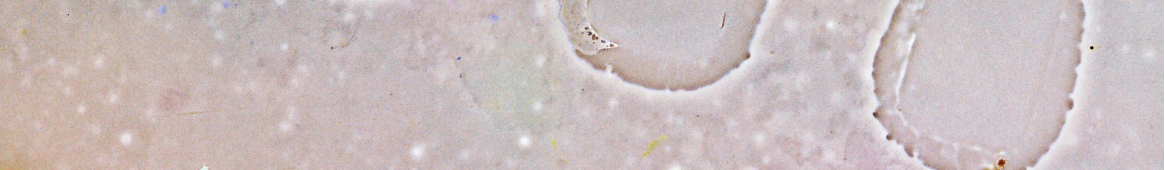
Perhaps it is because the Lea is taken for granted in many ways – more canal than river, but neither, really – that its ecological value and importance is overlooked and underestimated. Hence we tip gallons of fluorescent chemicals into the river as an artistic statement, or we continue to allow London's Victorian water network to remain pockmarked with gaps and misconnections, so that pollution – cooking oils and fats, dairy products, chemicals, engine oils, industrial waste, plastic particles and so on – can run straight into the river. The Lea's tributaries are largely part of this neglected network, streams like the Moselle, Salmon's Brook and Pymmes Brook channelled in concrete, winding largely unnoticed like carriers for pollution, buffered in part by reed beds and vegetation on the bankside.



So, with this in mind, this project became about noticing what was in plain sight in the Lea Valley: the patterns and processes of pollution; the life that swells up around the river; and the ways this landscape is being rewritten and reimagined; the surfaces upon which the tensions of change could be recorded and read.

Towards the end of the summer of 2014, I walked most of the length of the Lea, wearing holes into the soles of my shoes. In days and nights of rhythm and repetition, I made a set of field recordings with binaural microphones, underwater hydrophones and contact microphones. At the same time, I took film photographs on both an old 120 camera and a 35mm pinhole camera made from a Lesney toy matchbox. Walking with no fixed itinerary – save for gradually following the river – allowed time to stop and sit, to let the recorder run and open the camera lens to long exposures: to slowly try and make sense of things. I wonder sometimes whether we've developed the vocabulary to keep up with emerging self-willed spaces of tangled nature and culture like in the Lea Valley. Commonly (over)used words and phrases like edgeland and liminal space don't really seem to cut it, often seeming to deaden and flatten complex spaces. As a result, sound and photography became central to how I approached this project, seeking to catch enlivened traces of the various surfaces – both sonic and visual – along the river.

Sound is potentially boundless, limited only by volume, yet inevitably shaped by the goings-ons of a particular space. This tension between the value of various 'soundmarks' – birdsong, various overheard dialects and accents, church choirs, rattling trains and so on – and their ephemeral, short-lived and boundless nature became a focus for my sound work: particularly in experiments with smudging and layering different recordings together. What happens when recorded sound is abstracted from its source and replayed: what does it tell us, dislocated from its context? Binaural microphones allow for active, mobile recording, particularly because they let you set up and start recording quickly: potentially capturing a recording that is immersive and seemingly three-dimensional when you listen back on headphones. Recording binaurally is more immediate and more grounded in what your body hears and experiences of the world than when you record using more complicated kit. This inherently bodily approach brings its own problems though, not least in trying to stop yourself

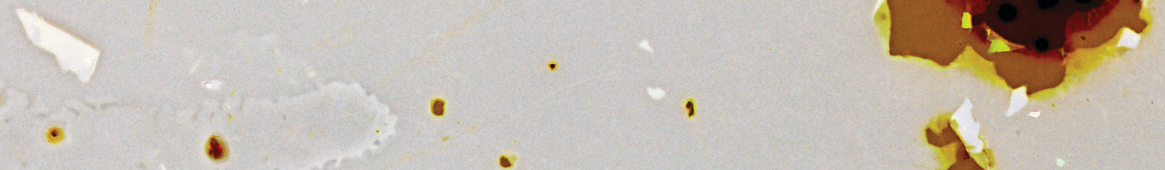
A close-up, microscopic view of a water surface, showing the intricate, circular patterns created by surface tension. The patterns are light-colored and set against a darker, textured background.

from swallowing, which is picked up as a definite 'glug' on the recording.

Another approach was to use a pair of waterproofed microphones (or hydrophones) dropped down into the largely invisible depths. At Trinity Buoy Wharf, where the Lea meets the Thames, the hydrophones picked up the underwater echoes of a dredger rumbling across the river mouth, its propeller and various mechanical clanks sounding alternatively like a snare drum rattle and a long exhaled human breath. Another unusual sound recorded – this time as part of a Love the Lea public workshop on Walthamstow Marsh – was that of pondweed in the river photosynthesising. Photosynthesis is the process where plants take in carbon dioxide from the water and expel thousands of bubbles of oxygen, in so doing keeping the river habitable for fish. The minute bubbles are recorded as a fizzing, crackling drone, a bit like minimal electronica. You also hear the scratch and scrape of insects flitting about amongst the vegetation, and who knows what else? That's the beauty of this method of recording: you're shorn of your sight to guide you in what's happening. All you have are the hydrophones and your ears, making the unseen and inaudible audible to you, venturing across states through the river's surface tension. And in many ways, this recording was important in solidifying some of my ideas for this project: particularly the imaginative potential of the diversity of life and sound that lies beneath the river's surface, at odds with its thick, neon surface layer.

Over the autumn and winter, I processed the recordings and photographs using methods designed to echo the pollution of the Lea to create the music and images in this book. Tape loops of field recordings and new music composed for the project were soaked in tubs of polluted Lea river water – duckweed, decaying leaves, oil slicks and all – for a month, the tapes flickering like elvers in the developing trays. When finally replayed, the loops slowly disintegrated, the river etching new channels and tributaries onto the tape, and the surface flaking off in tiny metallic shards reminiscent of a Lea oil slick. The negatives of the film photographs were given the same river water treatment: their prints developing odd new microscopic marks, layers and flares, as if they were viewed through a surface layer of dirty glass. On some negatives, the images became blurred and seemingly out of focus, whilst new highlights and patterns were picked out on others: the emergent properties of an experiment in abstraction.

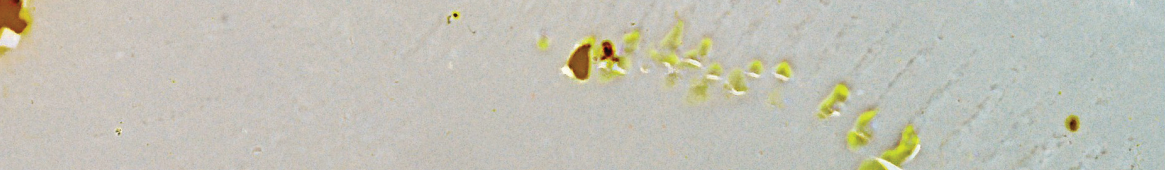




I also took a digital approach to letting the river guide the composition, through a process called sonification. In the same way that we might visually represent a set of data in a graph or diagram, sonification represents data through sound. Here I used a program called Granulator in Ableton Live to sonify seven pollution data taken by Thames21 ecological surveys along the river. Granulator scans back and forth through an audio sample taking multiple microsamples. By changing parameters like the grain or size of the microsample, and how fast the microsamples are scanned, you can create lush, ambient soundscapes, harsh glitchy noise and plenty in-between.

Given that a lot of the pollution in the Lea is dissolved and unseen below the surface, or in suspension as microscopic particles, using this software seemed a neat conceptual approach. The first step was to pick a sample to granulate. I used a pretty lo-fi piano recording I did as a demo for the project, recorded on a ship's piano in a kitchen in Bristol. Next, I had to pick a set of parameters, so that the pollution data would be able to control how the Granulator processed the sound. So, for example, the turbidity reading (basically the cloudiness of the river) became the grain size of the microsamples; water temperature mapped onto the FM value; nitrate levels controlled the hi-pass filter, whilst phosphate levels controlled the low-pass filter and so on.

So what does it sound like when the river 'plays' the piano sample in the sonifications? Perhaps like the grains of something – sand, salt or chemicals – being spilled, underwater? Interesting, maybe, for a little while, if not necessarily musical. Maybe like a slightly unhinged knees-up round a pub piano. I chose the piano sample to be sonified (it sounded different, and much less musical when I tried a harmonium recording) then kept the translation of data to sound within bounds that I knew would produce something vaguely interesting and listenable. And what I got at the end were these submerged, twinkling minims of processed piano: interesting, and interspersed within the record I've made for the project, but perhaps they don't tell us a lot about the river and its ecology along its course. Sonification is certainly a technique with



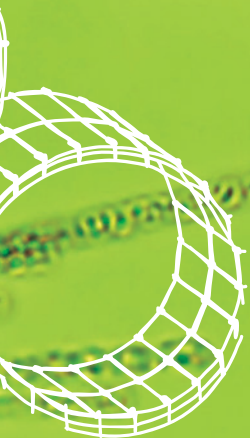
the potential for enlivening science through sound, but as people continue to experiment, there is always likely to be a tension between the aesthetic choices made and the actual datasets used, particularly when trying to make sense of messy datasets which don't fall into smooth, predictable patterns (much like the river itself).

The final 'sonic geography' technique I used in the project was convolution reverb. The idea here is that you can sonically map the reverb of a space, the results of which can then be applied to a recording made somewhere else, and in so doing impart a sonic trace of space. Ben Fenton went to the Three Mills buildings to record some impulses used to create the convolution reverbs. This involved getting into various spaces in the historic mill – storerooms, grain hoppers, and so on – and recording the sound made by a balloon being popped. These reverbs were then used to mix instruments and field recordings on the record: a digital reshuffling of different acoustic spaces along the Lea Valley. It made sense to create new reverbs in a space where water has historically been mixed up and given new life: water having a hand in everything in the project, however subtly.

This book and CD is the document of a few weekend's walking through a remarkable landscape in late summer, and a winter of processing it all. The end result can only scratch at the surface of the landscape: it is not a literal (sound) map or linear accompaniment to the river, instead a set of music and images inspired by the tangled, always changing web of natural and urban environments in the Lea Valley; produced, deteriorated and disintegrated by various river-led production techniques; and interwoven with a diverse set of field recordings – bikes, boat propellers, football matches, photosynthesing pondweed, parakeets, scrapyards, African church choirs, parties on the marshes, Olympic ceremonies, trains, lock gates, dredgers – and those twinkling sonifications whirring up from the murk. I wanted to venture off into experimental realms then bring back the results to create something accessible: hopefully I've got somewhere close, with this, my abstraction of the River Lea.







# PROCESS

















































































## **Surface Tension: a sonic exploration of the River Lea (30.58)**

Surface Tension was recorded by Rob St John at home in West Yorkshire and by Pete Harvey at Pumpkinfield studio in Perthshire, Scotland. It was produced by Rob and mastered by Reuben Taylor.

Rob used: guitars, piano, analogue synth, tube organ, harmonium, tape loops, binaural, contact microphone and hydrophone recordings made along the Lea.

Pete played: cello and piano.

Sound map of all the field recordings used to create the record:  
[surfacetension.org.uk/recordings-and-sound-map/](http://surfacetension.org.uk/recordings-and-sound-map/)

## **Thames21 | Love the Lea**

Surface Tension was commissioned in Summer 2014 by the river charity Thames21 as part of the Love the Lea Campaign.

The River Lea and its tributaries are some of the most polluted rivers in Britain, running with high levels of e-coli sewage bacteria, waste water from people's homes and poisonous oils and chemicals from our roads. This polluted water flows down the Lea Valley past the homes of thousands of people, reducing the quality of the rivers they enjoy, killing fish and destroying ecosystems.

The Love the Lea campaign works with local communities to improve these rivers, offering free river education for schools, and public engagement events to raise awareness. New reedbeds are being introduced into the rivers to break down pollutants and provide habitats for wildlife, and sustainable drainage solutions are being created to minimise pollution reaching the river.

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