



Connecting Canals: exercises in recombinant ecology

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Abstract

Canals have created grooves through the landscape of England and Wales for over 250 years, but they were dismissed by modernity, and narratives of disenchantment linger. Whilst visitor numbers grow as canals experience a 'Second Golden Age' and attempts are made to promote these waterways as ecological resources, they remain overlooked within conservation and their futures are precarious. The linearity of canals generates ecological connection and safe passage, whilst these environments also enable expressive territories and tranquil atmospheres. This research highlights the capacity for canals to enchant and support liveliness, and situates discussions of socio-ecological management within growing national concerns for connectivity as an effective response to climatic change and habitat fragmentation. The twin aims of this research were explored empirically through a case study of the Basingstoke Canal and sought to consider the position of such waterways within conservation and address a neglect of water within human geography. In accompanying practitioners and experimenting with creative methodologies this research begins by demonstrating the possibilities for wonder, surprise, and attachment after the ontological loss of Nature. Subsequent chapters draw upon fieldwork encounters, interdisciplinarity alliances, and a reworking of concepts within ecology and multinatural geography to exercise recombination as the central mode of address of this research. In inflecting the term's ecological salience with a materialist regard for multiplicity, repetition, and emergence this research challenges the position of canals and the presentation of corridors within conservation. The beguiling simplicity of connectivity has enabled its ready incorporation within conservation discourse, despite a paucity of empirical attention; whilst contributing to work addressing this lacuna this research also introduces a more nuanced notion of complexity into discussions of connectivity and interrogates the apparent separation of corridors and sites. Encounters with the ecologies and publics assembling and disassembling through the Basingstoke Canal demonstrate that linearity does not preclude interested gatherings or absolve management of the obligation to respond, and highlights the need for biosecurity practices which are more articulate and attuned to difference. Recombinant ecologies invite and demand response, but conservation remains spatially cautious and this is further foregrounded as the challenges of incorporating the watery, connective, environments of canals are traced.

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¹ All figures taken by author, unless otherwise stated

Chapter One

Canals and Connective Conservation

Tales are told of canals in England and Wales, and 'facts' are circulated:

91% of people think the waterways are an important part of the nation's heritage

13 million people regularly visit their local waterway

100's of designated wildlife sites

Canal & River Trust (2011:2)

Canals emerged as part of the fabric of Britain's Industrial Revolution, forged through water and coal (e.g. Hadfield, 1979). An Act of Parliament, dated 1759, proposing the cutting of the Bridgewater Canal between the coal mines of Worsley and the factories of Manchester, initiated a craze for canal construction that continued until the mid-19th Century. During these years Britain was endowed with a legacy of nearly 2000 miles of canal (Hadfield, 1979). Such rapid network growth was not seen again until the beginning of the 21st Century, when over 200 miles of new and restored canal opened between 2000 and 2010 (Canal & River Trust, 2011). Between these two 'Golden Ages' lay a period of neglect, abandonment, and dereliction as freight moved onto the railways, structures crumbled, and water seeped away. Faster travel, a changing economy, and the end of wartime activity led to a final decline in trade; the canals were nationalised in 1948, to be maintained as drainage ditches or replaced by roads, shopping centres, and car parks. However, against these designs, new kinds of activity appeared as unregulated ecologies emerged, and unlicensed craft made passage. Together they began to recombine the form and spirit of these waterways. The energy of plants and the movements of animals created novel ecosystems and generated feral spaces, which went largely unnoticed. But there were those who did notice, and they did not all keep quiet. A nascent Inland Waterways Association grew from its foundation in 1946 to organise volunteer restoration groups, and

campaign for the reopening of the canal network. Dedicated individuals sought to prevent the official abandonment of canals by repeating the lines of the waterways in a variety of craft, and generating visible grooves through the channel. Across the country, from the 1960s onwards, the members of myriad local and national voluntary organisations spent their weekends reforming the canals for navigation and recreation. A different canal network re-emerged, as industrial transport was eclipsed by leisure activities and an ecological atmosphere of advanced tree lines, marginal vegetation, and protected species.

Canals are achievements generated between energetic ecologies and the resolve of volunteers. The success of those more-than-human pioneers has been celebrated, as demonstrated in the ‘facts’ quoted at the start of this chapter. This information was produced and circulated by the new guardians of the canals, the Canal & River Trust, following their 2012 move from public ownership (as British Waterways) to the charitable sector (Canal & River Trust, 2011: 2). Attention is now actively being drawn to the canals and they are regularly presented as a valuable resource. Together with rivers, reservoirs, and docks they form the UK’s largest green infrastructure network and generate £500m in public benefit in England and Wales annually (Canal & River Trust, 2011: 2). The future of these waterways appears secure, but canal environments are never settled and there remains considerable debate regarding appropriate management strategies, whilst shifting funding priorities generate uncertainty. The achievements of the second ‘Golden Age’ of canals are therefore precarious.

A new Natural Environment White Paper (NEWP) was published in June 2011 as “a bold and ambitious statement outlining the Government’s vision for the natural environment

over the next 50 years”². The executive summary calls for greater socio-economic appreciation of the environment, highlights the need for recovery and a ‘better quality’ ecology, and places emphasis upon overcoming habitat fragmentation, whilst ensuring the ‘reconnection’ of people and nature (HMSO, 2011). Can canals contribute to these goals, could they benefit from this integrative and peopled approach to conservation? This research responds by ‘connecting canals’, exploring both their position within UK conservation policy, and tracing the potential for such environments to generate connectivity. Through the empirical chapters of this thesis one canal, the Basingstoke Canal, emerges through: threads of enchantment (Chapter Four); discouraged connectivity (Chapter Five); lines of movement and expressive territories (Chapter Six); national ecological policy frameworks (Chapter Seven); and exercised publics (Chapter Eight). This first chapter introduces canals as environmental spaces, and begins to consider why the ecologies inhabiting their waters may attract our attention. The image of a green network emerges, together with the potential canals offer as standing water refuges; these opportunities, combined with the social intimacy of the canal network, have led to their promotion within connectivity rhetoric. A brief discussion of the relationship between structural and functional connectivity is then offered, before a more detailed introduction to the research questions and thesis is presented.

Canals as Ecological Environments

Canals forge watery networks that entangle Sites of Special Scientific Interest (SSSIs) with UNESCO World Heritage Sites, and thread together disparate social neighbourhoods. These are watery edgelands (Farley and Symmons Roberts, 2011) through the English midlands; occasionally grand, but mostly ordinary. Canals have been identified and protected as

² Crown Copyright (2013) *Natural Environment White Paper: implementation updates*. Available at: <https://www.gov.uk/government/publications/natural-environment-white-paper-implementation-updates>. Accessed 11th June 2013

conservation spaces, whilst simultaneously experiencing neglect in ecological research and conservation policy (see Neal et al., 2006). This is contributing to calls from canal practitioners to pay closer attention to their potential (*pers. com.*). Of particular relevance within these discussions is the increasingly prominent position afforded to connectivity within conservation policy. The structural linearity of canals enables interaction with other water systems, and permits both the transfer of species and the movement of individuals, thus enhancing wider ecological connectivity. This is identified as one of the most valuable contributions canals can make to conservation objectives in England and Wales:

It makes us unique; I mean there is no other organisation in this country that has a *green* infrastructure network. The only other *networks* like us are the railway; the motorway; the road network - so from that point of view we are unique. There are other organisations with the heritage, and they have the water element, but I think it is that connectivity, that green infrastructure...

Interview with National Ecologist (Canal & River Trust) (June 2011)

The watery connectivity of canals is therefore highlighted, and the possibility of movement is placed at the centre of their conservation potential. Attempts are subsequently made to communicate the connective opportunities offered by canals. In 2011, for example, bats were designated the 'stars' of the annual 'British Waterways Wildlife Survey', which encourages members of the public to visit canals and record their ecological encounters. The survey has been running for eight years, with a different species or ecological group identified as the focus each year. When asked why bats were chosen in 2011, the co-ordinator replied:

...the reason we chose them this year is because we're highlighting the connectivity, the habitat network, so it *is* about bats, but we're highlighting the network and the bats are a good example of how that network can be beneficial to wildlife so, yes...they are the 'stars' but it's more about how they use the canal.

Interview with National Ecologist (Canal & River Trust) (June, 2011)

This example is reflective of a desire to position canals to speak to wider connectivity debates and present these waterways as valuable conservation concerns. Within the UK, research into the aquatic ecologies and water quality of canals has been relatively limited, and it is argued by Neal et al. (2006) that this oversight may be contributing to a neglect of their potential. Canals are not artificial rivers, and differ from rivers both in terms of the ecological exchanges they enable and their watery characteristics. In their disregard for watershed dynamics and politics, canals facilitate ecological transgressions and demonstrate a different kind of connectivity to that of rivers.

...the thing about canals and it can be a good thing or it can be a bad thing is that they cut across catchments. Something I've been involved in quite a lot is the beaver reintroduction in Scotland and...we've always maintained that they shouldn't put them on, or anywhere where there's a canal, in a catchment where there's a canal, as a trial because it's not a closed catchment. Because once they get onto the canals they can travel. You can travel from London to Birmingham on canals, and up to Manchester, without going out of the water.

Interview with National Ecologist (Canal & River Trust) (June, 2011)

As canals cut across catchments, and intersect with river systems so they enable unexpected movements, neither wholly natural nor wholly conforming to human design. Despite their linear appearance and resemblance to the river network, canals also often exhibit ecologies that more closely approximate standing water³. These habitats are generated through low rates of flow, heightened sedimentation, and warmer water temperatures. Canals subsequently increase the diversity of water typologies within conservation, and can act as remnant aquatic spaces and ecological refuges (e.g. Neal et al., 2006). This is clearly demonstrated by the example of Floating Water Plantain (*Luronium natans*), a European protected species, the wild extent of which has diminished to such a point that canals have become a stronghold for its survival and reconnection (*pers. com.*).

³ See, for example the SSSI citation for the Basingstoke Canal. English Nature (1995) *Sites of Special Scientific Interest*. Available at http://www.sssi.naturalengland.org.uk/Special/sssi/unitlist.cfm?sssi_id=1006588. Accessed 5th October 2012.

Canals have also been known to provide temporary relief from the extreme fluctuations of river systems; otters, for example, were spotted on canals connected with the River Severn when it was in flood in 2002 (*pers. com.*). This performance of canals as secure spaces is entangled with their connective potential and was further highlighted in the same interview with the National Ecologist for the Canal & River Trust:

...the thing about canals is that they provide this corridor, but it's not just this connectivity, you've also got safe passage. And it is a classic example here [Slough Arm] because you had the bridge of the M25, the traffic was roaring over and we had kingfishers flying up and down...and then a bit later on we had two species of bat...

Interview with National Ecologist (Canal & River Trust) (June, 2011)

Canals are neither fast flowing rivers, nor stagnant ponds; their waters enable different kinds of habitat and different sorts of movement. Through the mingling of millions of lives a canal environment emerges, together with an opportunity for connecting fragmented habitats. Canals are worthy of consideration, and present a valuable opportunity to explore the conservation of an infrastructure network, where interest and energies are of both human and nonhuman kinds.

The Emergence of a Connective Conservation

The second 'Golden Age' of canals and an emerging desire to situate these waterways within conservation debates may be particularly timely. The interrelated pressures of climate change and habitat fragmentation, together with growing concern for processes of mobility, dynamism, and temporality are contributing to a reassessment of conservation areas.

Climate change scenarios indicate that future environments may be profoundly different to those currently in existence. Changes in abiotic conditions and the timing of seasonal

events, together with variations such as those in habitat productivity, are predicted to induce biotic range shifts and novel ecosystem assemblages (IPCC, 2007). The frequencies of extreme events and large scale disturbances are also likely to increase in a warming world, which raises further concerns regarding ecological resilience, and the capacity for fragmented environments to recover from high magnitude events (IPCC, 2007). Climatic variations, combined with significant declines in urban green space, the impact of changing agricultural practices, and the pressures of population growth through transport and housing provision since the 1950s (UK National Ecosystem Assessment, 2011; Lawton et al., 2010) have further contributed to significant habitat loss and fragmentation (Hodgson, et al., 2009). This fragmentation impacts upon landscape connectivity (Lindenmayer and Fischer, 2006) and is associated with declines in species richness and disruption to ecosystem structures and trophic interactions, together with increased instances of inbreeding and localised extinctions (Hoffmeister et al., 2005). The Lawton report, for example, highlights losses of over 50% for a number of once common species, an 80% decline in farmland birds since the 1960s, together with the recording of 25% of 'best-known groups' at historic lows (Lawton et al., 2010). The Lawton report, together with other commentaries (e.g. Hodgson et al., 2009; Bengtsson et al., 2003), concludes that a reliance upon existing protected areas and a focus upon 'core populations' in 'current strongholds' is unlikely to meet biodiversity commitments, or ensure the functioning of ecosystem services.

The dynamics of climatic change and concerns regarding habitat fragmentation challenge the conceptual foundations of conservation. Established theories of island biogeography, the conventional basis for population ecology, have been central within conservation biology and identify "suitable habitat patches embedded in a matrix...of unsuitable habitat" (Franklin and Lindenmayer, 2009: 349). Recent studies, however, have indicated that

“patch size and isolation are poor predictors of patch occupancy” for a large proportion of species and undervalue the ecological importance of the matrix, whilst failing to recognise tolerance levels and preference variations between species (Franklin and Lindenmayer, 2009: 349). Alternative meta-population models highlight the dynamism of species distributions, with individual populations connected through dispersal and movement (Lawton et al., 2010: 48). Reserves may provide short term amelioration for residual systems but, it is argued, they need to be complemented by more dynamic approaches that enable range shift and adaptation, whilst promoting ecological memory. Ecological memory is here defined as the “network of species, their dynamic interactions...and the combination of structures that make reorganisation after disturbance possible”, and can be located within disturbed environments as well as reserves (Bengtsson et al., 2003:389). Protecting dynamic rather than bounded systems, together with buffer zones, ‘dispersal filters’ and ‘ecological fallows’, may therefore enhance resilience by increasing opportunities for re-colonisation. Such approaches further disrupt the managed ‘synchronicity’ of ecosystems (Bengtsson et al., 2003) and question the binary of habitat/matrix. Mobility is therefore increasingly recognised as a central ecological process, one that is insufficiently contained within existing reserve geography and is threatened by continued habitat ‘improvement’, landscape fragmentation, and intensifying climate change pressures (Lindenmayer et al., 2008).

...more, bigger, better, joined...

Connectivity has emerged as the “most favoured option” (Hodgson et al., 2009: 964) for achieving contemporary conservation goals. Its language of dynamism, resilience, and flux questions the spatialities and temporalities of both ecosystems and species, dispelling the image of “a simply natural climate” (Hulme, 2010: 269) and recognising that setting species and habitats “in aspic” is neither viable nor desirable (Lawton et al., 2010: 2). A call for

corridors has emerged despite longstanding apprehensions regarding the impact of linear features within the landscape, including the capacity for roads, railways, and pipelines to disturb habitat, pose a bodily risk, and separate populations (S. Jones and Mean, 2010; Chetkiewicz and Boyce, 2009; Coffin, 2007; A. Bennett, 2003; Trombulak and Frissell, 2000). Spatial and inter-species connectivity are increasingly regarded as essential for the promotion of biodiversity, climate change adaptation, and social health. Translating this concern for promoting ecological mobility and interaction into relevant policy instruments requires integrating such ideas within established frameworks, and exploring new approaches to the practice of conservation. A number of different approaches have been explored as attempts have been made to develop connectivity at a variety of spatial scales, from 'green bridges' for individual species (e.g. Boitani et al., 2007) to landscape scale projects such as the Pan-European Ecological Network.

Historically, the spatial foundations for the creation of ecological corridors centred upon classifications of major vegetation types and they were considered restricted paths that permitted channelised movement and encouraged biotic flow (see Boitani et al., 2007; Puth and Wilson, 2001). These wildlife corridors permit individual faunal movement between isolated habitats, they are principally structural and may target particular species (Worboys et al., 2010: xxxii). The 'archetypal' corridor therefore emerges as "linear...spatially continuous...terrestrial, and comprised of forest vegetation", and is primarily regarded as a facilitator "of vertebrate dispersal and gene exchange" (Puth and Wilson, 2001: 22). More recent engagements with connectivity, however, have sought to consider the ecological needs of target and indicator species (Boitani et al., 2007). These corridors seek a wider connectivity, incorporating both structure and function, thus acting as 'spatial catalysts' and surrogates for ecological processes and species movement. At the landscape scale, these corridors contribute to ecological networks, referring to "systems of

nature reserves and their interconnections that make a fragmented natural system coherent” (Worboys et al., 2010: xxxii). These networks can be composed from naturally occurring linear habitat, such as river systems, remnant or restored environments, or specifically engineered structures (A. Bennett, 2003) and incorporate linear corridors alongside ‘core areas’, ‘buffer zones’, ‘restoration areas’, and ‘sustainable use areas’ (Lawton et al., 2010: 16).

The UK’s first Natural Environment White Paper for over 20 years placed connectivity and the need for a “resilient ecological network” at the heart of national policy:

Past action has often taken place on too small a scale. We want to promote an ambitious, integrated approach, creating a resilient ecological network across England. We will move from net biodiversity loss to net gain, by supporting healthy, well-functioning ecosystems and coherent ecological networks.

Natural Environment White Paper (HMSO 2011: 3)

This is the latest step in significant legislative concern for national environmental protection, which began with the passing of the Wildlife and Countryside Act (1981). This has been strengthened in the last 30 years by both national policies, such as the Countryside and Rights of Way Act (2000), and international impulses such as the EU Birds Directive (1979) and EU Habitats Directive (1992), together with conventions to which the UK is signatory, including the UN Convention on Biological Diversity (1992) (Lawton et al., 2010). An emerging desire to promote connectivity can also be traced through international policy, most notably within the EU through the Natura 2000 programme, which required the establishment of Special Protection Areas (SPA) for birds and Special Areas of Conservation (SAC) for other species and habitats. The new Natural Environment White Paper (NEWP) is situated within this tradition, whilst also drawing heavily on the ‘Making Space for Nature’ report to Defra chaired by Sir John Lawton, which is emblematic of recent conceptual moves towards an integrated and networked approach to

environmental management. The report calls for a fundamental shift in our spatial attitudes within ecological policy, from attempts to ‘hang-on’ to existing wildlife sites toward a larger-scale focus on “habitat restoration and recreation”, underpinned by “a more coherent and resilient wildlife network” (Lawton et al., 2010: ii). The report concludes that the UK’s current statutory and non-statutory tiers of conservation provision, including Sites of Special Scientific Interest (SSSI), National Parks, Areas of Outstanding Natural Beauty (AONB) and National and Local Nature Reserves, together with SPAs and SACs do not compose a coherent network (Lawton et al., 2010). The summary of this report, a call for ‘*more, bigger, better, joined*’, forms one of the foundations of the NEWP and conveys the direction of national ecological policy. The NEWP additionally includes the development of ‘Nature Improvement Areas’ (NIA) to enhance connectivity, increased provision for ‘Environmental Stewardship’ schemes to promote the permeability of landscapes, and the development of urban green infrastructure. Furthermore, an ‘Ecosystems Knowledge Network’ is proposed with a view to increasing social connectivities, thus enhancing human well-being and developing ecosystem services, as promoted by the UK National Ecosystem Assessment (2011).

Urban connectivity

Achieving an integrated and flourishing ecological connectivity has been placed at the centre of UK conservation’s response to biodiversity losses associated with habitat fragmentation and climatic pressures (e.g. HMSO, 2011; Lawton et al., 2010; S. Jones and Mean, 2010). Whilst a conservation tradition predicated on national parks and scientific value (explored further in Chapter Two) retains considerable influence, the possibilities for conservation approaches that are neither conventionally rural nor green are also generating interest. Canals have been included within these discussions, and their potential highlighted, despite their murky bluish-brown appearance (Lawton et al., 2010; S. Jones

and Mean, 2010). Repeatedly referred to as ‘green infrastructure’, ‘linear parks’, and ‘green lungs’, the ecological position of canals is complemented by their intimate flows through human lives (e.g. S. Jones and Mean, 2011). Ideas of ecological connectivity and networking fragmented environments complement a growing recognition that the permeation of ‘green space’ within local, particularly urban, areas is “a necessity rather than a luxury” (Farinha-Marques et al., 2011: 254) enabling the reconnection, wellbeing, and mobility of people and ecologies. This is particularly timely, for it is estimated that the proportion of Europe’s population living in urban areas will reach 80% by 2020; it is clear that, for many people, these spaces will form the centre of their environment and outdoor experiences (Farinha-Marques et al., 2011: 248). Urban environmental diversity will therefore be particularly important in encouraging social involvement, as strong connections are identified between rate of use of a conservation area and distance to dwellings, with sharp declines when distance exceeds 100m (Farinha-Marques et al., 2011). Networks of intimate spacings may therefore be both socially and ecologically valuable. Innovative and integrative approaches to the provision of public urban environments are subsequently emerging. The 2010 DEMOS report on ‘Resilient Places’, for example, opens with a vignette from New York’s High Line Park, this one mile repurposed freight railway has been re-imagined from ‘Death Avenue’ into one of the city’s most celebrated attractions (S. Jones and Mean, 2010). The report argues that the “High Line stands for a shift in focus in how we think about places: it represents a move from focusing on individual sites and buildings, to thinking about the foundational infrastructure and skeletons that hold them together and bring them alive” (S. Jones and Mean, 2010: 9). Similar schemes are emerging in other major cities; 2012 saw London launch a competition through the Landscape Institute, Mayor of London, and Garden Museum to “find new ideas for green space in the city”⁴. The

⁴ Landscape Institute (2012) *Competition press release*. Available at: <http://www.landscapeinstitute.org/PDF/Contribute/HighLineforLondonSHORTLISTPRESSRELEASE.pdf> Accessed 30th December 2012.

judges identified two themes emerging from the 170 entries, the first being the “significance of journeys, links and transport infrastructure” and the second, “the power of water”⁵. These were reflected in the shortlisted entries, which included converting part of the Regent’s Canal into a lido, transforming flyovers into ‘green arteries’, creating mobile gardens on bus roofs, and in the winning entry, a design for an urban mushroom garden in old ‘Mail Rail’ tunnels below Oxford Street. These examples highlight the creativity increasingly encouraged in designing spaces of socio-environmental interaction, and whilst many of the ideas emanating from such competitions are impractical, the ethos they convey could inspire experimentation within policy formation. The Lawton report, ‘Making Space for Nature’ (2010: 85) notes, for example:

There are...linear features that already exist which are well suited to enhancing connectivity across our countryside. These include both natural and man-made corridors such as rivers, canals...road verges, hedges, cycle routes and railway embankments...Managing these in wildlife-friendly ways can both improve ecological connectivity and also, for some, increase access to nature for people.

The report subsequently recommends that: “Public bodies and other authorities responsible for canals, railways, roads, cycle ways, and other linear features in the landscape should ensure that they better achieve their potential to be wildlife corridors, thereby enhancing the connectivity of ecological networks, and improving opportunities for people to enjoy wildlife” (Lawton et al., 2010: 85). More creative approaches to conservation are emerging, and they are more closely integrating social and ecological connectivity. Following the NEWP, Defra announced in February 2012 the 12 Nature Improvement Areas that would initially receive government funding. The environments selected vary considerably but, it is argued, they all include “opportunities to deliver ecological networks, both in terms of large area scale and valuable benefits accruing to

⁵ *Ibid*

wildlife and people”⁶. Of particular note in relation to the themes developed here is the Birmingham and Black Country NIA, where considerable emphasis has been placed upon suburban projects, and the importance of engaging with peopled landscapes. Corridors are listed as one of the NIA’s eight key activities, and it is noted that, of “significant importance are our canals and rivers, with strong links to overall water management”⁷. Urban landscapes, innovative approaches to pre-existing structures, and a broad concern for connectivity are receiving increasing attention within both conservation policy and practical projects.

Research Aims

This introduction has drawn a desire to connect canals to conservation debates into conversation with recommendations for an increased focus upon connectivity within national policy. A concern for canals responds to the need for climate change adaptation, but also introduces the possibility that such goals may be generative of social relations and benefits. The image of canals as valuable connections has been further echoed as the waterways have been defended in light of the coalition Government’s 2010 review of non-departmental public bodies and British Waterway’s subsequent relocation to the charitable sector, and reincarnation as the Canal & River Trust (CRT). The new Chairman of the CRT, Tony Hales, declared in October 2011:

Our canals and rivers have been part of the fabric of the country’s landscape for 250 years and putting them in trust for the nation in perpetuity is the start of a new chapter in the renaissance of the waterways. People have told us that the waterways are important to them as a local haven, for themselves and for nature.⁸

⁶ Defra (2012) *Nature Improvement Areas*. Available at: <http://www.defra.gov.uk/environment/natural/whitepaper/nia/>. Accessed 8th October 2012

⁷ Natural England (2012) *Birmingham and Black Country NIA*. Available at: <http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/funding/nia/projects/birmingham.aspx> Accessed 8th October 2012

⁸ British Waterways (2012) *New name for Britain’s new waterways charity*. Available at: <http://www.waterscape.com/features-and-articles/news/3200/new-name-for-britains-new-waterways-charity>. Accessed May 2012.

Canals increase the diversity of urban green spaces and connective infrastructures, thus contributing to an enhancement of the overall network, whilst improving local environmental quality. A desire to promote canals, socially and ecologically, may therefore be successfully aligned with a wider push for a connective conservation. This thesis begins in the middle of these debates, amidst the socio-ecological entanglement generated by canals, and is motivated by two aims.

- The **first aim of this research** is to inflect ideas of connectivity with a material concern for ‘recombination’ and consider whether this presents an appropriate focus for the conservation of canal environments.
- The **second aim of this research** is to develop a concern for water within human geography and to approach watery environments in ways that attend to their (im)material agencies and heterogeneity.

The Relationship between Corridors and Connectivity

A long tradition of linear connections and corridors, valued for both their aesthetics and function, permeates human history, from Roman roads to Baroque boulevards. These developments, combined with a legacy of urban open spaces and gardens have, Ignatieva et al. (2011) argue, enabled the easy adoption of corridors and networks, and the identification of possible components and sites, “often with little relation to the current uses of them or the meanings given to them”. Are we too quick to promote and generate corridors, to see connectivity where we desire it and believe it will work? What kind of connectivity emerges through this research?

The Lawton Report (2010: 2) confidently states that “[e]stablishing ecological networks is increasingly regarded as an effective response to a fragmented natural environment”, and yet considerable debate exists within the scientific literature regarding the value of ecological corridors in fulfilling the goals of policymakers. Almost any strip of land can be

portrayed as a corridor structure (Goldman, 2009). In evaluating the strength of ecological networks and corridors it is therefore necessary to consider their functional performance, and ask whether they permit movement which would not have occurred within that environment in their absence. Beier and Noss (1998), in their review of 32 studies relating to ecological corridors, concluded that fewer than half provided “persuasive data” regarding their utility, whilst a number were inconclusive. These less than convincing results have echoes elsewhere, with Boitani et al. (2007: 1415) suggesting that the theory of ecological networks “fails to provide sufficient practical information on how to build them”, whilst their transit through policy arenas results in oversimplifications, such that none have been convincingly validated in practice. In particular, there are concerns regarding the use of proxy measures for connectivity. For example, reliance upon focal, and often charismatic, species engenders heavy assumptions regarding species co-existence and fails to fully account for divergent landscape use patterns between species, whilst structural connectedness ignores the flexibilities of individual nonhuman activity, and often fails to match the scale of ecological processes (Goldman, 2009; Hodgson et al., 2009; Boitani et al., 2007; Chetkiewicz et al., 2006).

More recently, however, Gilbert-Norton et al. (2010: 660) analysed 78 experiments and found “a highly significant result that corridors increase movement between habitat patches by approximately 50% compared to patches that are not connected with corridors”. Additionally, they concluded that ‘natural corridors’ exhibited increased movement compared to ‘manipulated’ corridors, but cautioned against assumptions that ‘all’ species will use a corridor, or that they are a relevant concept for landowners (Gilbert-Norton et al., 2010). The difficulties of verifying and replicating studies, together with a legacy of poorly designed approaches, may be partially responsible for the lack of empirical validation, or dismissal, of corridor theory (Beier and Noss, 1998). Furthermore,

Chetkiewicz et al. (2006) argue that the limited evaluation and publication of corridor applications has hindered evaluations of their success and potentially prevents further debate surrounding their efficacy. There is work still to be done, and it is here that this research seeks to contribute to a practical debate.

This research explores the relevance of the corridor concept within canal management, whilst offering suggestions for the adaptation of existing policy and tracing the socio-ecological contribution of such waterways. Canals are linear structures, but this does not necessarily make them connective. This research's approach to connectivity began to emerge during a conversation with a Biodiversity Specialist with the Environment Agency. As we discussed whether ecological corridors actually worked, a two-fold concern regarding connectivity developed: the ability of such environments to enable species mobility and interaction, and their potential to increase resilience. Connectivity generates ecological complexity that moves beyond the functionality of linear habitats, and whilst corridors often provide continuity of habitat, their particular value lies in their ability to transmit and foster complexity within the landscape. This complexity does not always conform to the established National Vegetation Classification (NVC), a common standard within UK conservancy, but it enhances the permeability of a landscape by generating diversity. This is important, for even in the face of elevated climate change it is likely that species will continue to disperse through evolved, yet random, mechanisms of diffuse movement. Engineered habitat corridors cannot always be made to align with these behaviours, nor are they ecologically universal (*pers. com.*). Facilitating complexity is therefore central to ideas of connectivity, and must be incorporated into management aimed at climate change adaptation and the mitigation of habitat fragmentation.

...the idea of green paths, of green ways that species will just walk down, I'm not terribly sure about. But in terms of creating, it's about creating pockets of

complexity within the landscape....corridors, potentially have, they're just one very long ecotone – so in terms of complexity they can be disproportionately valuable because they are long and thin, and have a relatively large surface area.

Interview with Biodiversity Specialist (Environment Agency) (July, 2011)

Linear environments such as rivers, railway embankments and canals can therefore be re-assembled as conduits of ecological complexity; ecosystems that enable longitudinal, lateral, and vertical linkages (see Jongman et al., 2004) and facilitate the transfer and exchange of “energy, matter and nutrients” (Jongman et al., 2004: 310). The spatiality of these sites contributes to this complexity as their linearity positions them as transitional ecotones between ecosystems, areas where different environments are brought into contact and connect. In derivation from variants of the Greek *tonus* these are also taut places, where ecologies are stretched and held in tension, creating diversity. Complexity in these spaces emerges from the performance of ecologies, both as tense assemblages and enablers of biological movement and exchange. Connectivity is not, therefore, inherent within linear structures, but is generated by ecological processes which encourage tension and diversity. In researching the connectivity of canal environments it is therefore not enough to establish a spatial connection, attention must be paid towards ecological complexity.

Introductions

This chapter established current approaches to the ecological potential of canals and brought this into conversation with debates surrounding connectivity. The growing concern for ecological networks and corridors within UK policy makes this discussion particularly relevant, and this is an exchange which will be sustained through this thesis. Canals do not straightforwardly conform to the established categories of conservation, they have undergone reinvention and their current configuration is precarious.

The chapters of this thesis draw upon these tensions and the convergences and divergences of ecologies, publics, and waters to approach debates within canal conservation differently. This research travelled with diverse partners as they endeavoured to live alongside a waterway, generate ecological flourishing, and negotiate the interests of the Basingstoke Canal. Through this case study a wider conversation concerning canal conservation, the relevance of ideas of connectivity, and the management of unconventional environments is conducted. The remainder of this section introduces the chapters of this thesis, highlighting how each draws differently upon the canal's watery tensions between liveliness and mobility.

Chapter Two develops the concept of recombination as this research's mode of address, inflecting geographical discussions of the material natures of conservation with the term's ecological resonance. A recombinant ethos invites consideration of creativity, movement, and relationality, and assists in addressing the neglect of particular environments within both conservation and human geography. A concern for water is subsequently introduced and its history, multiplicity, and capabilities are traced. Water has been silenced, and concealed, but waters are energetic and enabling and must be thought of as more than spatial containers. The twin aims of this research are further developed within this literature review chapter and related to the accidental biodiversity of canals, and the neglect of these waterways within emerging policy concerned for connectivity. Natures are no longer silent, and this literature review chapter establishes this research as an exercise in composing an appropriate response to the liveliness of canals.

Chapter Three is an introduction; of methods and a case study. The Basingstoke Canal, and nine months spent regularly shadowing conservation rangers formed the methodological foundation of this research, and the materials generated through fieldwork are central to

each of the chapters of this thesis, disrupting and giving momentum to their flow. This chapter outlines in more detail the shape of these ethnographic and participatory encounters, putting forward a case for the Basingstoke Canal as a matter of concern and addressing the five research threads that directed this empirical work: following, questioning, experimenting, considering and responding. Central to these encounters were attempts to take seriously the capabilities of bodies, and become 'embroiled' in the site (Dewsbury, 2010), participating in conservation activities, attempting to learn to detect nonhuman liveliness, and witnessing performances. This chapter discusses these approaches together with more established methodologies and experimental exercises that activated space through movement, enrolled artefacts, and stimulated the matter of the canal.

Chapter Four narrates four enchanting threads emerging from the Basingstoke Canal. Tales of water, stillness, wildness, and friendship dispel a lingering atmosphere of disenchantment surrounding canals. People are drawn to the Basingstoke Canal, and this chapter traces what is about these environments which holds their gaze, for meaningful connections are possible with places that are nearby. Watery change, and flow, is ongoing and creative, but not necessarily incompatible with atmospheres of tranquillity and stillness. Tales of enchantment compose the Basingstoke Canal through its abilities and what it can enable in others, not its structures. This emphasis on the emergent possibilities of canals is presented as a particularly appropriate way of considering them within conservation, whilst also highlighting the ways in which inhabitation is not faithful to design. Connectivity is subsequently inflected with a sense of wildness, movement, and the creativity of recombinant ecologies.

Chapter Five opens with an encounter, and considers the consequences of meeting with something we are not fully prepared to engage with. It is the first of a pair of chapters that proceed through the following of different nonhuman kinds whose liveliness is of concern to the management of the Basingstoke Canal. This chapter addresses trepidation regarding the promotion of connectivity in conservation management, and traces how concepts of nativity and invasion are translated, and performed, within a corridor environment. An initial empirical concern with plant species provides an opportunity to follow attempts to separate native and non-native species and debate how closely such differentiations relate to invasive behaviours. The interaction between ideas of legitimate geographies of species presence and concerns regarding ecological behaviours that stifle wider liveliness is then developed through a focus upon a single kind to be killed, the American mink. As statutory policies and local actions are traced in relation to these individuals so we falter. Reaction is no longer enough face to face with a condemned animal. Ecologies continually recombine as individuals move through environments and this chapter challenges the spatial and temporal dissonances exhibited within current biosecurity practices, and suggests alternative responses that foreground apprehension and intensive difference.

Chapter Six further challenges the relationship between species and individuals, and in directing this research's concern for neglected environments towards the dark this chapter assembles the Basingstoke Canal through lines of flight. Foraging, swarming, and hibernating bats inflect connectivity with a sense of movement and refuge, whilst challenging the accommodation of ephemeral, expressive, territories within conservation policies. In considering the ways in which movement is generative of subjectivity this chapter also explores the *capacity* for response and the importance of attunement and articulation within conservation. The narrative of this chapter emerges from, and is sustained by, an interdisciplinary impulse to explore ideas of difference and diversity as

considered within both geography and conservation biology. Read together, Chapters Five and Six assemble the Basingstoke Canal through a particular focus upon a number of species of concern whose movement is differentially encouraged and curtailed, and where detecting the presence of individuals demands response.

Chapter Seven considers the relationship between lines and connectivity more closely, highlighting the importance of ‘living along’, and not just ‘joining up’ (following Ingold, 2007), ecological corridors. Canals are not fine on their own, and this chapter works with lines and lives to trace an attempt to promote the ecological flourishing of the Basingstoke Canal by securing EU funds through an application to the Higher Level Stewardship scheme. The ineligibility of water and the challenges of mapping a canal highlight a continued emphasis upon the terrestrial and the territorial within funding applications. Whilst the canal’s management as a ‘site’ is lamented by Natural England, so this chapter demonstrates that connectivity is not dependent upon the structure of a corridor. Canal environments are not sufficiently regarded within current funding opportunities within the UK, and this is stifling their ecological liveliness and reducing their capacity to contribute to a complex national ecological network. This chapter therefore argues that the specific challenges of linear environments must be given greater attention within conservation policy, whilst demonstrating that neither a retreat into isolated sections, nor a preoccupation with ‘joining up’, are appropriate responses or impressions of connectivity.

Chapter Eight begins with a concern that the Basingstoke Canal’s linearity precludes the possibility of interested groups developing to support, promote, and defend the waterway. This chapter draws upon growing geographical attention towards the capacity for generative events to ignite gatherings to ask whether canals can ‘spark’ publics. Whilst encounters with the formal spaces of debate raise concerns, empirical journeys through the

active spaces of management, volunteer working parties, and experimental focus groups demonstrate that sociable, and productive, associations can emerge around an interest in a waterway. This chapter's subsequent account of exercising canal publics broadens geographical debate and emphasises the importance of disassembling, repetition, and material enchantment. The exercising of publics here becomes more literal as walking, travelling, holding, and working are foregrounded. There is no single public surrounding the Basingstoke Canal, but interested groups gather, recombine, and disassemble in response to this environment.

Chapter Nine identifies the contributions of this research to the formulation of a different kind of environmentalism, more capable of effectively responding to the challenges of the Anthropocene. This concluding chapter presents the observations, recommendations, and questions that emerged through the empirical chapters of this thesis, and resonate within both conservation policy and geographical theory. In addressing the two research aims presented in Chapter One this chapter argues that the capacity for canals to enable movement and generate situated flourishing renders them important connective environments.

Chapter Two

Possibilities for Recombination

This research is a response to the challenges of connectivity and the tentative positioning of canals within conservation policies. As highlighted in the previous chapter, canals offer both socio-ecological complexity and refuge, and these waterways could benefit from, and form part of, a growing interest in connectivity. This chapter develops this interest, and introduces the theoretical resources that guide the empirical encounters of this research and mobilise the opportunities and challenges offered by canals to conservation. This review of literatures will further introduce the term recombinant and inflect geographical discussions of the material natures of conservation with the term's ecological resonance. A concern for recombinant ecologies directs attention towards creativity, movement, and relationality and does not rely upon the authority of preformed and stable sites, such as Nature and Society. As such it may assist in addressing the neglect of particular environments within conservation policy and practice, including watery spaces and those, such as canals, that perform both as human infrastructure and ecological habitat.

Responding to canals requires consideration of the relationship between conservation and philosophies of nature. This is explored in the first section of this chapter, and given particular direction through a focus upon spatiality and agency. Living without a stable and singular Nature to inspire attachment and provide a reassuring continuity, however, unsettles both geography and conservation. Therefore, whilst introducing vitalist and multinatural approaches this chapter gives particular consideration to the generation of affective relations and the material endurance of assemblages. The second half of this literature review develops a concern for water, considers its position within human

geography, and explores the opportunities offered by an empirical focus upon such environments for addressing a neglect within human geography and meeting conservation objectives. The two aims of this research contribute to these experiments and will be elaborated upon in the conclusion to this chapter:

- The **first aim of this research** is to inflect ideas of connectivity with a material concern for 'recombination' and consider whether this presents an appropriate focus for the conservation of canal environments.
- The **second aim of this research** is to develop a concern for water within human geography, and approach watery environments in ways that attend to their (im)material agencies and heterogeneity.

The Relationship between Nature, Natures, and Conservation

"Ever since we have considered ourselves modern", Bingham and Hinchliffe (2008: 83) argue, "nature has meant a good deal", both in terms of the depths of human attachment, and through the complexity of the term. Ideas of nature have compelled ecological protection and informed its focus, but despite the strength of feeling towards nature, conservation has been labelled a 'crisis discipline' as expanding resources and increased allocations of land have generated mounting concern, not ecological amelioration (see J. Lorimer, 2012). Nature, Bingham and Hinchliffe argue, has 'stopped working', and is no longer able to serve society as a stable site, source of facts, or external arbiter (Bingham and Hinchliffe, 2008: 83). This shattering of nature has been aided by the growing acceptance and usage of the term 'Anthropocene' which, J. Lorimer (2012: 593) argues, "represents a very public challenge to the modern understanding of Nature as a pure, singular and stable domain removed from, and defined in relation to, urban, industrial society". As nature is rethought, so conservation is challenged.

Conservation is defined by Adams (1997: 278) as “embracing a complex range of social practices relating to the human use of non-human nature”; the term was introduced to the UK from the Indian Forest Service to indicate a guardian or conservator, and its practices range from preservation and protection, to enhancement. A concern for the loss of ‘nature’ emerged largely in reaction to, but was also enabled by, the urbanisation and industrialisation of the Victorian age, and informed the direction of subsequent conservation efforts (Adams, 1997). Nature conservation was rationalising and “engaged in controlling nature and in organising the relations between humans and nature primarily (although not exclusively) within the specific bounds of nature reserves” (Adams, 1997: 278). This rationalisation was dependent upon the development of science and technological advances, with particular importance accorded to ecological theory and methods of classifying and predicting environmental change. The vista of UK post-war conservation was subsequently an “idiosyncratic institutional framework, with a somewhat perverse organisational divide between the conservation of species and ecosystems...and the conservation of natural beauty and open countryside” (Adams, 1997: 279). The spatial separation of nature from society was enacted through conservation practices, whilst scientific endeavours focussed upon taxonomical classification and the accumulation of knowledge concerning representative ecologies. Whilst in the UK this distinction between landscape aesthetics and scientific value has increasingly overlapped, the environmental movement in the USA has retained stronger connections to romanticised visions of wilderness as a pure space, where humans are absent (Cronon, 1996). This myth of a pristine nature, spatially and essentially distinct from human society found expression in the USA’s geography of conservation, the pinnacle of which was the vast, sublime, national park. The damaging consequences, both ecologically and socially, of such a conception of Nature have been widely explored, and extend beyond the USA, influencing western perceptions of authentic and worthwhile nature (see Adams, 1997;

Whatmore, 2002; Cronon, 1996; Fairhead and Leach, 1996). Sustained critique of nature, and its legacy within conservation, raises the question of whether continued use of this concept remains appropriate. Bingham and Hinchliffe (2008: 85) conclude positively, but argue that replacing a singular and stable nature with a “sense of natures as active outcomes” and as an ethos, may be enriching. An understanding of natures as multiple widens the spatial attentions of conservation and raises the profile of environments which did not previously fit within conservation’s rubrics of value.

Conservation can no longer be confined to national parks, or sites of sublime natural experience. Harrison and Davies (2002: 95) highlight the launch of The London Biodiversity Action Plan as clear confirmation that “nature conservation is no longer just a countryside concern”. This testimony is echoed elsewhere as geographers publish accounts of ecological attention towards ecologies previously regarded as “out of place, out of sync and in the wrong form” (J. Lorimer, 2008a: 2046). Urban ecologies, brownfield sites, and experimental spaces for natures are receiving increased attention within both geography and policy circles (Francis and J. Lorimer, 2011; Pickett et al., 2011; Angold et al., 2006; Hinchliffe et al., 2005). This has generated what J. Lorimer (2008a: 2043) terms a more “fluid biogeography of wildlife conservation”. This fluidity draws upon non-equilibrium ecologies and develops an ontology of natures which, J. Lorimer (2008a: 2052) notes, “creates space for multiple and diverse becomings”. These processual ideas have also informed considerations of landscapes, as the ebbs, flows, and volatile histories of ecologies are highlighted by writers such as Clark (2011) and Massey (2006). Spaces for natures are not stable and eternal; they have histories, possibilities, and futures. Farley and Symmons Roberts (2011: 6-10) subsequently call for humans to “put aside our nostalgia for places we’ve never really known”, and never really existed, and “explore...unobserved parts of our shared landscape as places of possibility, mystery, beauty”, which are

“constantly reinventing themselves”. And yet, as J. Lorimer (2008a: 2053) relates through the example of brownfield conservation, such a fluid biogeography is “never totally open-ended or equally negotiated” as some forms of management are required, and there remain considerable obstacles to its practice. This is echoed by Harrison and Davies (2002: 96), who argue that development pressures within urban environments, combined with the “ambiguous aesthetic appeal of wasteland sites and their association with socially undesirable uses”, have generated renewed tension between the social and scientific aspirations of conservation. Everyday spaces, local and familiar, often continue to be displaced by images of distant ecologies, more closely resembling ideals of nature. Head and Muir (2006: 505) remark, for example, that whilst dualistic conceptions of nature/society have been critiqued and refined within academic geography, “separatist paradigms of environmental management have great resilience and vernacular appeal”. This tension was further revealed in the differing assessments of particular urban sites given within Harrison and Davies’s (2002) study by professional ecologists and members of the voluntary sector, with the former relying more heavily upon criterion of biodiversity in their reports, whilst the latter emphasised recreation and community appeal. The practice of nature conservation, Harrison and Davies (2002: 106) argue, “has been dominated by the rationality of science”, thus reinforcing the impression that scientific facts are the only legitimate accounts of natures. Whilst the idea of facts, and the immutability of scientific practices, is challenged, for example by Hinchliffe (2008) who notes that conservation practices often involve more complex relations and the ‘co-production’ of natures, it is clearly necessary to remain cautious about extending this experience to all examples, or sites, of conservation activity. Despite attempts to rework nature as natures the concept’s close association with a particular impression of scientific authenticity and a wild aesthetic stifle the aspirations of multinatural conservation geography.

Introducing Canals to the Conversation

Canals do not resemble the cathedrals of nature envisaged at the birth of the conservation movement, appearing instead as dangerous, contagious, and artificial conduits. Constructed as trade networks 200 years ago, canals did not anticipate a future of climatic change and habitat fragmentation, and were not designed with ecological flourishing in mind. These are accidental ecologies and whilst the biodiversity of these waterways, together with their potential as ecological refuges and connective environments, has been recorded, they remain intimately tied to human presence. Despite research documents such as the Lawton Report (2010), and the DEMOS review of 'Resilient Places' (S. Jones and Mean, 2010) identifying the potential offered by the canal network, there remain challenges within the translation to policy. Canals are not mentioned within the Natural Environment White Paper, despite its emphasis upon connectivity and the social importance of 'reconnecting' people and the environment (HMSO, 2011). The omission of these spaces, despite growing public attachment and reports of their ecological opportunities, draws attention towards a wider concern within conservation related to the targeting of funds and evaluation of opportunities for ecological 'improvement'. Practitioner interviews with the Environment Agency and Natural England demonstrated the growing integration of ecological projects with socio-economic concerns, and the provision of ecosystem services. This should benefit canals, as they are incorporated into ecological networks, urban drainage systems, and the lives of neighbouring communities, but the manner of adoption raises concerns regarding the spatiality of such decision making.

There are almost two kinds of approaches you can take in terms of habitat improvement. Do you make the best places better...or do you make the worst places better. If you're purely looking at amount of biodiversity...then by and large you get better value for money and often greater biodiversity by...making good places better....The problem is, there is a kind of social justice potential, and also in

terms of ecosystem services and this is quite controversial. Actually, you get more ecosystem services where people live...so there is this kind of tension...

Interview with Biodiversity Specialist (Environment Agency) (July, 2011)

Certainly the most ecologically valuable sites tend to be the larger ones, and because of the problems of urban encroachment and fragmentation and so on, I suspect the better use of money for restoration would be the larger sites and the least urbanised. However, with putting a value on things it's going to be where people are...And I just hope that there isn't a huge push towards taking money away from our last remaining wild areas and putting them into urban parks.

Interview with Natural England Officer (July 2011)

Conservation may no longer be confined to the countryside, but a spatial distinction continues to be enacted as the promotion of biodiversity is divorced from the potential for social justice, and mapped onto a separation between rural and urban natures. The value of these environments appears almost mutually exclusive, and they are evaluated against different criteria. Canals are both linear infrastructures and ecological habitats, whilst their flows regularly transgress the boundaries of cities and countryside. These waterways resemble neither 'wild areas' nor 'urban parks', and may be overlooked through the privileging of either social or ecological variables. Upon canals, these categories are expressed as tendencies, held in tension by the connective potential of watery movements:

...the rich one [canal] in a rich setting might be the Montgomery which is a SAC [Special Area of Conservation], which undoubtedly is very special, but then on the Slough Arm canal...you park in an industrial estate next to the roaring M25, you drop down into this idyllic canal setting and you could be in Berkshire or Buckinghamshire...We do have some urban canals which aren't sort of the nicest of places, but they are getting better, so it's a very difficult question because it depends what you're looking for. In the urban setting it's more valuable I suppose if it's your route to work, or it's where you sit and have your picnic to get out the office.

Interview with National Ecologist (Canal & River Trust) (June, 2011)

Canals are not homogeneous, rather they generate different kinds of appreciation and express multiple tendencies. The fluidity of such environments combines with lingering spatial evaluations of nature to generate a wider challenge within attempts to promote

ecological networks and connectivity. Corridors are beguiling and their attractive simplicity has encouraged the adoption of connectivity rhetoric. And yet they remain undefined, and whilst such flexibility is central to their ecological potential and invites consideration of environments such as canals, the 'storyline' of corridors has perhaps been too straightforwardly adopted (Goldman, 2009; Evans, 2007). Whilst promoting a new way of thinking that engages with communities and ecological dynamism, connectivity also enables the continuation of historical policies predicated on static reserves and the 'fortress conservation' of national parks. Rather than challenging conservation geographies, corridors have become fashionable add-ons that are often regarded as the weakest link in a wider network of reserves. Connectivity has been seemingly unproblematically integrated into existing patterns of conservation. Valued and existing largely only in relation to the sites that they connect, corridors are presented as ecological bolt-holes, traversing non-habitat. Movement contains dangers and generates a concerning imagery within conservation as corridors become potential conduits of disease and invasive species, whilst the opportunities they offer may lure biodiversity towards population sinks (Chetkiewicz et al., 2006). Handbooks such as the IUCN's 'Linkages in the Landscape' further risk reproducing a binary habitat/non-habitat distinction through the use of performative language, such as 'inhospitable', to describe the environment through which a corridor runs, together with references to 'mending' fragmented habitats (A. Bennett, 2003). The simplicity of the corridor image can mask the challenge connectivity, and associated fluid environments, pose to established conservation practice.

Conservation is a cautious spatial practice, within which the legacy of a singular nature and the attachments it inspired remain influential. Whilst considerable moves have been made towards promoting a multiplicity of spaces for natures, there remain tendencies within both policy and practice to categorise environments spatially, and evaluate them against

different criteria. Whilst the natures of conservation are no longer singular, neither are they truly multiple and this creates challenges for the protection of environments such as canals. Modernity's construction of nature also informed the allocation of agency in relations between humans and environments, and the relationships between social forces and the material world have increasingly drawn the attention of geographers.

The Agency of Natures

Nature was long silent within geography, but by the late 1980s its absence was increasingly commented upon, most notably by Fitzsimmons (1989). Marxist geographers subsequently drew upon ideas of nature and contradictions between the environment and the capitalist system to develop a more geographical, historical materialism (Smith, 2007). Neoliberalism was explored as an environmental project as geographers demonstrated how the materialist properties of nonhuman natures enter the capitalist system, and become integrated into commodity circuits (e.g. McCarthy and Prudham, 2004; Peet and Watts, 1996). Within such accounts an essentialised first nature was transformed through interaction with capitalist forces, ultimately producing a socialised second nature (e.g. Smith, 2007; Harvey, 1996). This second nature is presented as endlessly constructed, dissolved, and remade through the dialectical relationships of nature and society. The history of capitalism is thus portrayed as an attempt to obtain domination over nature, and secure its subsumption to capital (Smith, 2007; Katz, 1998). Marxist inspired materialist and political ecology approaches have subsequently explored environmental issues as accumulation strategies, whilst other work has demonstrated the tensions between capitalist economic logics and the biophysical materiality of intended commodities (e.g. Bumpus and Liverman, 2008; Bakker, 2005). Material nature is therefore explored through metaphors of circulation and metabolism, as a marketable commodity and socially

produced artefact of dialectical relationships, whilst capitalism is seen moving from simply harnessing natural properties to modifying and transforming their materiality. Whilst a material political economy approach provided the foundations for geographical re-engagement with natures, this approach has a tendency to reproduce an essentialised binary distinction between nature and society, and emphasise human and capital agency at the expense of material energies.

In recognition of these critiques, 'new dialectics' approaches (Castree, 2002) have sought to demonstrate how more subtle fusions of natural and social, material, and symbolic processes have produced distinctly cyborg socio-environmental milieus, thus drawing together a historical geographical materialism with Haraway's cyborg manifesto (Swyngedouw, 2006; Haraway, 1991). These approaches seek to make visible a networked world, emergent from the "dense knottings of myriad entities whose material capacities cannot be separated from the knottings but, equally, are not reducible to them" (Castree, 2003: 9), whilst additionally recognising how these processes are infused with unequal relations of power (see Massey, 2006). A more relational approach to the emergence of agency is therefore presented, whilst the capacity to enter into relations is not limited to the human realm. However, the practices of enrolment contained within these approaches are often not satisfactorily addressed, for whilst there is recognition that causality does not lie entirely within the human realm, there remains reluctance to afford agency to the non-human or non-organic. Power is therefore often too easily returned to capitalist forces, whilst the multiple bodies and relations through which the image of capitalism and commodity networks are emergent too often goes unexplored.

Actor-Network Theory (ANT) approaches developed through the work of Bruno Latour, Michel Callon, John Law, and others within Science and Technology Studies, have attended

more closely to these ideas of agency. A relational, or distributed, sense of agency confined to neither the human realm nor individual bodies is mobilised through these works. Latour (2005) deploys Leibniz's idea of the monad, or actant, to problematise the distinction between the human and nonhuman and describe the ways in which agency is generated through the forging of relationships, of actor-networks. The social in this reading is neither a material, nor an explanatory force, but "a trail of *associations* between heterogeneous elements", or a type of connection (Latour, 2005: 5). Whilst modernity created the illusion that Nature could only become knowable through the instruments of science, Latour (2004a) argues that such practices do not resemble a mirror held up to the world. Just as nature has become plural, and the social is rethought as a trace, so the sciences are multiplied (Latour, 2004a). The twin houses of Science, dealing with facts, and Politics, concerned with values, cannot be sustained and associations are the focus of concern within approaches inflected by ANT, as agency is conceptualised as relational and emergent from more-than-human networks. As Latour (2004a: 41) argues, "by abandoning the notion of nature, we are leaving intact the two elements that matter the most to us: the multiplicity of non-humans and the enigma of their association". Anthropologies of scientific practice have subsequently questioned the separation of facts and values, and interrogated established sites of knowledge production. Attention towards the composition of science, and questioning of scientists' privileged access to truth, have widened notions of expertise and generated debate surrounding the authority to speak on behalf of natures (e.g. J. Lorimer, 2010a; Goedeke and Rikoon, 2008; Hinchliffe et al., 2005; Latour, 2004a). However, ANT has received sustained critique and it is necessary to be cautious in its strict application. Law (1999: 3-8), for example, identifies ANT as the "ruthless application of semiotics", both linguistically and materially, which in many ways has been so successful that "its own topological assumptions have been naturalised" and we "have lost the capacity to apprehend complexity". The flattening of agency that has arguably followed the

celebration of ANT, together with a call for more descriptive works has potentially contributed to the slight loss of a critical dimension within this relational materialism. This literature review chapter will return to these critiques and consider the contribution of a Deleuzian creative materialism, inflected with ecological resonance, in developing a more critical, relational approach.

Natures are no longer silent within geography, and since the 1980s encounters with the agencies and spatialities of nonhuman environments, and bodies, have challenged the impression of an inert and separate realm of nature. Geography is increasingly multinatural as accounts seek to describe “both the multiple trajectories along which any ecology might evolve and the various ways in which they can be sensed, valued and contested” (J. Lorimer, 2012: 594). Emerging from a sustained critique of modernity’s essentialised binaries this multinaturalism embraces a more-than-human, or posthumanist, tradition that explores the multiplicity of nature and gives space to ecological inhabitation and processes that go against the grain of human design and intent (Hinchliffe et al., 2005; Whatmore, 2002). This recognition of lively processes and impure forms (J. Lorimer, 2012: 596) connects ecological work with more-than-human geographies, and is part of a wider shift in concern “from the diversity of essential, existing beings to the processes of becoming”. This move has encouraged a re-examination of what constitutes the authentic bodies and spaces of conservation attention (see J. Lorimer, 2008a; Hinchliffe et al., 2005) and follows Haraway (2008), who argues for recognition that we are all hybrids of nature and culture, “knots of species, coshaping one another”. The veil of Nature is thus dismantled, replaced with “actual animals and people looking back at each other, sticky with all their muddled histories” (Haraway, 2008: 42).

Recombination as a Response to the Anthropocene

In exploring the reconstitution of natures this literature review has remained attentive to the practices of conservation. The debates and vocabularies of geography cannot, and should not, be divorced from this practical and policy driven sphere; in composing the aims of this research it was therefore important to consider their resonance in both geographical and practical conversations. The concept of recombination inflects multinatural approaches within geography with an ecological significance to develop a more interdisciplinary response to the challenges of the Anthropocene that also contributes to the ongoing development of relational thinking. The introduction of this term is not an attempt to abstract and redeploy a single word, endowed with inflated significance, but to consider what may be enabled through attending to the possibilities of recombination.

Recombining boundaries

Within ecological science an emerging concern for dynamism and non-equilibrium landscapes has challenged those conservation approaches that seek to 'render the present eternal' (Bowker, 2005), both in terms of landscape structures and species/ecosystem boundaries. This mirrors Donna Haraway's (2008) concern that the word 'species', as a central category within conservation history, has structured ecological discourse in ways likely to cause indigestion. Haraway (2008: 18) subsequently argues that "where and when species meet, that heritage must be untied and better knots of companion species attempted within and across differences", she further cautions that it "would be a mistake to assume much about species in advance of encounter". An openness towards, and curiosity regarding, the meetings of individuals is thus encouraged. In returning to ecology, similar sentiments have appeared. Mooney and Cleland (2001), for example, suggest that

whilst hybridisations emerging from the mobility of organisms may pose a threat to those species present, it may also be a source of new variation and speciation, which could promote ecological health and resilience. Such recomposed systems can present biodiversity levels exceeding 'native' systems (Hobbs et al., 2006), whilst it has been suggested that instead of embarking upon the costly, and often futile, eradication of 'out-of-place' species we recognise "a new area of ecological science with a name such as 'recombinant ecology' or 'mixoecology'", that accepts diversity and explores the productivity of transgressions (O'Brien, 2006: 74).

The term recombinant is derived from Soulé (1990) and was central to the Urban Forum of the UK Man and the Biosphere Committee hosted jointly in 2000 by the forum, English Nature, and the Centre for Ecology and Hydrology. Recombination ecology is defined in the workshop proceedings, compiled by George Barker, as "the ecology of communities of plants and animals, the constituent members of which are drawn from a wide range of global biogeographic zones" (G. Barker, 2000: 3). Ideas of recombination challenge the spatiality of conservation practices, including the boundaries of categories such as ecosystems and species, and give greater attention to the agency of nonhumans and the possibilities for change within seemingly established ecosystems. A concern for recombination cannot be a clean break from the history of conservation, or from the legacy of a modernist nature within geography. Despite recent ontological debates, considerable power remains invested in the image of a singular nature, and it is important to remember that the concept did a lot of positive work in fostering environmental appreciation and initiating a social concern for conservation (J. Bennett, 2001). This is echoed by Davison (2008: 1285) who, whilst 'broadly supportive' of posthumanist and multinatural approaches, does caution against viewing "the persistence of ideas about pure, a-social nature as an example of bad theory awaiting correction by scholars armed with a non-

dualistic lexicon". It is necessary to retain sensitivity towards those transformative experiences which can arise through encounters with nonhuman processes, bodies and environments and consider how these may influence, and be harnessed by, conservation work. In further developing the first aim of this research, recombination is inflected with Jane Bennett's ideas of vital materialism, which introduces a more sustained concern for temporality and affectivity into relational geographies.

Temporalities

Environments can endure *and* exhibit temporalities, rhythms, and transformative capacities. The sense of novel arrangements enabled by ecological recombination is here extended beyond the formation of unexpected combinations, to encompass their ongoing relations and encounters, which may generate further differences. Ecologies are continually recombining as their composition changes and relations ebb and flow; these processes are a *renegotiation* and *response* to the dynamism now acknowledged within the Anthropocene. This follows Jane Bennett's (2001: 38-39) discussion of Deleuze and Guattari's *Difference and Repetition*, where the system of relations, repetitions, "is more spiral than cyclical", as changes and mutations may be introduced as "things repeat but with a twist". These twists "make possible new formations...and from the twists and swerves of spiral repetitions are born new molecules and new viruses but also new images, new identities, and new social movements" (J. Bennett, 2001: 39). These mutations resonate with Haraway's (2008) disavowal of genes as code and her support for an alternative bio-philosophy of symbiogenesis through which to explore the promiscuities of becoming, and ultimately understand companion species as "the feeling realisations of material 'pastpresents'" (J. Lorimer, 2010b: 40). Spiral repetition further operates intensively, not extensively, such that, much like linguistic refrains, it invokes "increasingly intense versions" and may create an effect through which "its meaning eventually dissolves

and realigns” (J. Bennett, 2001: 40). That which repeats, may therefore transform. The repetition of recombination does not produce a return to a prior state, but the return of difference and transformation. Momentary deterritorialisations within relations and assemblages create the possibility for new forms of association and sensation; these are lively places, where unexpected things can happen, and this poses a challenge for conservation.

This sense of recombination as both the coming together of unexpected combinations and difference in repetition, has some resonance with ideas of resilience, widely used and promoted within policy literatures and connected to the concept of ‘ecological memory’ introduced in the previous chapter. A concern for these ideas has contributed to the promotion of connectivity, and potentially offers an opportunity for areas such as canals, for they can be equally applied and discussed in relation to both disturbed and reserve environments. S. Jones and Mean (2010: 14) note that common perceptions of resilience incorporate notions of ‘bouncing back’, but they also caution that, however “comforting it may sound, the idea of restoring any system to a past state of existence following a crises or trauma is misleading”. Instead, they draw upon ecological ideas, particularly the work of the Swedish ‘Resilience Alliance’ to highlight ideas of ‘self-organisation’ and the ‘capacity for learning and adaptation’ within the term resilience (S. Jones and Mean, 2010: 14). The concept of resilience recognises the possibility that ecosystems may exist in multiple, stable, forms and suggests that managers should resist focussing on optimising systems to one particular scenario or set of conditions (see Evans, 2011). A different conception of the temporality of environments is therefore presented and has become increasingly influential within both ecological management and research concerned with urban development. Within the latter, ‘quality of place’ which, S. Jones and Mean (2010: 15) argue, “suggests a fixed idea of what a place should and could be” is increasingly being rethought

as 'resilience of place', which "recognises that places are not static, but instead are dynamic and change over time". The DEMOS report, 'Resilient Places' (S. Jones and Mean, 2010) identifies canals, along with other heritage and infrastructural connections, as potentially 'resilient places', worthy of greater attention. The capacity of particular places to forge relations and exercise publics draws attention towards the energy of environments and the importance of encounters. Different 'orders of time' and conflicting rhythms may be expressed in such places (Lambert et al., 2006), thus setting in motion debates regarding the temporality of matter. The rhythms of ecologies, however, have arguably been underappreciated. O. Jones (2011: 2286) argues that we live within "rich temporal ecologies (combining forms of time)" and geographers such as Hinchliffe (2001) highlight the importance of recognising temporal difference in relation to environmental governance, for example during the UK's BSE outbreak where a desire to obtain immutable representations potentially contributed to a prolonging of the crisis. The term resilience, however, does not fully capture the unpredictable direction of the creativity of change, potentially over-emphasises the unity of the 'resilient environment' and, Evans (2011) argues, is overly passive in accepting change, thus naturalising crises. 'Resilient' environments therefore appear unnecessarily static, and this chapter subsequently returns to ideas of recombination but inflects the term with an ecological concern for responding to different rhythms within environments and a Deleuzian sense of the creative temporality of matter.

Jane Bennett's (2010) exploration of vibrant matter, 'thing-power' affect, and a Deleuzian 'vagabond' materiality offer fertile avenues for new enquiries, permitting closer attention to the impact of lively matter within the broader tradition of vital posthumanism (J. Lorimer, 2009). Jane Bennett has developed the notion of 'thing-power materialism' which "figures materiality as a protean flow of matter-energy and the thing as a relatively

composed form of that flow”, such that ‘things’ exist in excess of their reference to humanity (J. Bennett, 2004: 349). This materialism ‘gestures’ toward those “traces of independence or aliveness” through which objects become “vibrant things” (J. Bennett, 2010: xvi). The subject-object distinction is subsequently exploded and people are placed “amidst the mix of beings, bodies and materials on earth” (K. Anderson and Braun, 2008: xi). Matter has therefore been reworked as energetic and enchanting, as things are no longer considered singularities, but perceived as shaped by their relations, emergent from multiple collectives. The material, the thing, is no longer synonymous with the inert and the solid, rather we must consider textures, densities, and entwined sensibilities (B. Anderson and Wylie, 2009). Mobilities and movement, connectivities and relations, therefore become central to understanding human-nonhuman-thing entanglements and the multiple spaces which subsequently emerge, for not only are we vital materiality, we are surrounded by it (J. Bennett, 2010). Roe (2009: 255) highlights how the vitalist philosophies of Gilles Deleuze and Felix Guattari, as worked through by Jane Bennett, offer an ontological mechanism through which to “grasp the processes that bind humans and nonhumans together”, as well as highlighting the “significance of spatiality and temporality to the mode of interaction that they conceptualize as becoming”. Work following this invitation demonstrates how the material world is no longer conceptualised as a purely human accomplishment, but recognised as multiple co-fabrications “between more-than-human bodies and a lively earth” as humans are always in composition with non-humanity in ecologies of matter (Whatmore, 2006: 603). Materialism, Jane Bennett (2004) argues, in this (re)imagining is no longer an anthropology, but seeks to demonstrate the agency of things and highlight the enchanting capacity of matter to engage in affective relations. As such, following Bear (2013: 24), whilst “the focus of ANT is often on ‘what is required’”, such a Deleuzian inspired vital materialism “is more likely to emphasise ‘what is possible’”. This approach therefore questions the separation of living bodies and inert matter, in

addition to the dualisms of Nature and Society, whilst addressing the critiques levelled at ANT by inviting the political question, how could “responses to public problems change were we to take seriously the vitality of (nonhuman) bodies” (J. Bennett, 2010: viii)?

The transformative potential of matter compels closer attention to those materials recombining. Relations between bodies and things are central to generating and encountering the temporalities of space, whilst interactions between the seemingly distinct materials of animal, human, technology are becoming more intense (J. Bennett, 2010). Nonhuman materialities are participants in worlding and Jane Bennett identifies a contemporary urgency to examine whether environmentalism is adequately equipped to respond. She notes:

A more materialist public would need to include more earthlings in the swarm of actants. If environmentalists are selves who live on earth, vital materialists are selves who live as earth, who are more alert to the capacities and limitations – the “jizz” – of the various materials that they are. If environmentalism leads to the call for the protection and wise management of an ecosystem that surrounds us, a vital materialism suggests that the task is to engage more strategically with a trenchant materiality that is us as it vies with us in agentic assemblages.

Jane Bennett (2010: 111)

A concern for recombination is a vibrant material response which, following Jane Bennett, regards matter as lively and energetic, and entangles human and nonhuman bodies. Approaching canals through an ethos of recombination enables this research to draw upon interdisciplinary works concerned with ecological resilience, thing-power and multinaturalism in ways that resonate within both geography and conservation. However, additional theoretical resources will also be required, for, as Anderson asks, following Negri: “How should we relate to the creation and composition of diverse ways of life?” (B. Anderson, 2012: 37). This chapter now introduces ideas of affect and assemblage which

will assist the exploration of logics of “connection and association, of difference and repetition” (H. Lorimer, 2008: 554).

Affect and assembling

Recombination generates intensity, and through the expressiveness of rhythms, territories are generated (Deleuze and Guattari, 2004: 347). These territories are compositions of distance, established through movements, poses, postures, voices. The capacities of bodies, of Jane Bennett’s ‘swarm of actants’ and ‘trenchant materiality’, are subsequently foregrounded within a recombinant environmentalism. Embodiment is integral to Massumi’s (2002: 15 original emphasis) reworking of the writings of the seventeenth century philosopher Spinoza, and he argues that when Spinoza defines the body “in terms of ‘relations of movement and rest’ [Spinoza] was referring to the body’s *capacity* to enter into relations of movement and rest...[this] capacity he spoke of as a *power* (or potential) to affect or be affected”. The ‘affective turn’, as Whatmore and Hinchliffe (2010: 447) present it, therefore “moves us outwards from the body-as-organism...toward considering bodily spaces as ‘lively co-fabrications’” forged through relations of speed and the dynamic capacity to affect (e.g. McCormack, 2008). Affect has potential and connects bodies by flowing between them, defining what they can do, and placing them at the locus of knowledge (Pile, 2010). This potential, Ben Anderson (2006: 735-6) argues, does not reside within a subject, rather it is emergent from relations between bodies as ‘being affected’ and ‘affecting’ are “two sides of the same dynamic shift, or change in the body”. Latour (2004b) subsequently argues that the differences between the mind and the body are of degree, rather than kind, and that embodied processes of sensation and learning are central to what it means to be alive. Following Despret, Latour (2004b: 205) argues that “to have a body *is to learn to be affected*...moved, put in motion by other entities, humans or non-humans”. Bodies cannot be defined through their composition of matter, McCormack

(2003: 494) argues, but rather through consideration of their capabilities, for a body is a “surface of movements and forces”; such that it may be possible to consider seemingly immaterial compositions of energy as bodies. McCormack (2008: 419) demonstrates this in his parallel affective and meteorological readings of balloon flight, in which the atmosphere is considered “a field of virtual movement from which certain bodies, including wind, are always in the process of actualising”. As bodies become attuned and engage in affective relations so the ‘subject/object’ distinction is replaced with a “turbulence of articulation” (J. Lorimer and Whatmore 2009). And yet, whilst Massumi argues that “there are no boundaries, only dynamic thresholds” (1996: 231), geographers must heed the cautionary words of Braun (2008: 836) and avoid revelling “in the earth’s potentiality, as if all that is required for radical politics is to note the open-ended, dynamic nature of being”. It is necessary to consider why relations develop, and are sustained, in particular places, thus enabling the endurance of affective states.

Assemblage thinking encourages consideration of the ways different bodies may become entangled, and generate difference, whilst not being exhausted by their relations (see B. Anderson et al., 2012; B. Anderson and McFarlane, 2011). Assemblages are emergent from material recombination and the forging and unravelling of relations, and are thus “characterised by concurrent processes of territorialisation and deterritorialisation” (Bear, 2013: 25). Whilst territorialisation seeks to achieve exclusivity, deterritorialising processes destabilise boundaries, heterogeneity and identity, such that these assemblages “might be characterised by processes of ‘gathering, coherence and dispersion’” (Bear, 2013: 25). Processes of composition are therefore foregrounded, and by not prescribing a “particular spatial imaginary” (B. Anderson et al., 2012: 172-3) such an approach allows understanding of “how spatial forms and processes are held together, often with degrees of internal tension, and might have been assembled otherwise”. To approach nonhuman

groupings as assemblages prevents their representation as stable, known, and fixed and therefore encourages sensitivity “to emergence, multiplicity and indeterminacy” (B. Anderson and McFarlane, 2011: 124). Deleuze and Guattari (2004: 367) further argue that the “territorial assemblage is inseparable from lines or coefficients of deterritorialization, passages, and relays toward other assemblages”. An attention to lines is promoted by Tim Ingold (2011: 1) who, after drawing the line of leaping salmon within a waterfall, notes “In this line, movement, observation, and description become one. And this unity, I contend, is nothing less than that of life itself”. Lines are generated everywhere, Ingold (2007) argues, and life is lived along lines. It is in the conversion of lines into boundaries and the reformulation of ‘living along’ as ‘joining up’ that these lines become static. Assemblages and lines are not mutually exclusive and more sustained consideration of their interdependencies may assist consideration of the relationship between sites and corridors in conservation policy and practice. This discussion of affect and assemblage has brought us to lines, and so returns this literature review to considerations of connectivity.

A recombinant ecology does not rely upon the philosophical authority of a spatially distinct nature, incapable of exerting agency, but attends to the ebbs and flows of matter, and the affective atmospheres of relations which may be generated between more-than-human bodies. This is an environmentalism concerned with vital materialism, whilst the exercises of this research are refrains and responses to the dynamic challenges of the Anthropocene. Through the theoretical resources mobilised in this chapter this research explores the connectivities of canals, and contributes to discussions within both geography and conservation. A focus upon watery environments assists this aim, for such places cannot be straightforwardly categorised as either sites or corridors, and aid the development of this research’s emergent concerns for movement, affect and liveliness. The materiality of water “creates spaces which fascinate and affect people” and “become places in which identities

can slip, reform and evolve” (Bull, 2009: 454-455). The Earth is forged through watery relations and this enchanting liquid pervades living bodies, social associations, and literatures. It is also neglected, and this chapter now moves to expand the second aim of this research and develop a concern for water.

Hydrating Human Geography

Humans encounter water both as an eternally mundane flow, a familiar and consistent presence, and as an unpredictable and unknowable force carrying the enigma of life, and the potentiality of death. The elusive character of water has contributed to human fascination with this common fluid and it is frequently deployed in literature, poetry, and eulogy as simultaneously a symbol of change and renewal, a repository of history, and “perhaps the oldest thing upon the earth” (Ackroyd, 2007: 113). Western relations with water and the ocean have been characterised by oscillations between celebration and concealment, and Connery (2006: 495) notes that there has been “a certain antagonism” within our historical attitudes towards a substance that covers the majority of the planet. In particular, Connery (2006) argues that the Judaeo-Christian Sea, which dominates Western watery imaginations, is primarily one of annihilation and suppression, as its geophysicality has been dismissed amidst the difficulties it presents to conceptual terrain. Water has therefore long been conceptualised as a barrier, or boundary, within geographical thinking, impeding both physical and theoretical exploration. Despite this apparent suppression of water there has been an established interest in watery materialities throughout the history of geography (e.g. Sneddon, 2007; Bakker, 2005; Kaika, 2005; Mansfield, 2003).

Watery matters

The philosophical impulse toward a more geographical, historical materialism, which developed in the latter twentieth century, generated interest in water as a medium through which to explore the circulations of urban metabolism and the social construction of nature and capitalism. In exploring the city as a space of flow, for example, Kaika (2005) travels with watery movements to expose nature and the urban as hybrid categories, forged through dialectical relationships. The city is subsequently presented as a dense network and intermingling of material and symbolic things, through which water is tamed, domesticated, and hidden (Kaika, 2005). Water, Kaika (2005) argues, has been constructed as both external to society and a resource requiring socio-technical management as H₂O is fetishised as clean, translucent, water. Water is silenced and concealed within subterranean networks as the flow from the tap is severed from its origin and the processes of its transformation are hidden (Kaika and Swyngedouw, 2000). Water has also provided geographers with an opportunity to explore capitalist commodification and identify the tensions which often play out between economic logic and resource materiality (e.g. Sneddon, 2007; Bakker, 2005). Theoretical engagements with notions of the subsumption and transformation of nature through capitalism have therefore been frequently illustrated with watery empirical examples. However, the reflections on the surface of water have been of society. Within literary writings in particular, water is seen to carry the history of humanity, to be polluted by the presence of human greed, industry, and excess, whilst nevertheless cleansing sin. Rivers such as the Thames have been deployed as metaphors for morality and emblems of human society (e.g. Ackroyd, 2007). Water in these accounts is singular and homogeneous, whilst the ability to generate difference lies with social forces. This presentation and use of water stifles its capacities. A consideration of water that draws upon the recombinant ethos discussed above may generate a more

enabling account and introduce water as a more active participant and energy within environments.

Containing water

In exploring the history of water, Hamlin (2000: 313) notes that “premodern understandings of water emphasized the diverse characteristics of many waters”. The singularity of ‘water’ is therefore of recent origin; water has been H₂O for only two centuries. Historically, water was expected to vary and was differentiated by factors reminiscent of the Chinese encyclopaedia that opens Foucault’s (2002) *Order of Things*, including temperature, speed of movement, and the sounds made when pouring between vessels (see Hamlin, 2000). The creation of water as an unchanging compound not only reduced its capacity to enchant, but additionally permitted its deployment as an historical repository and eternal presence. Ackroyd (2007), for example, describes the Thames as containing ‘all times’, and being that which “changes not at all” (12) for “[t]he seas were formed in the depths of pre-Cambrian time, and there is not one drop more or less than at that inconceivable beginning” (119). Lambert et al. (2006: 482) argue that this “makes for a curiously static and empty conception” of waters and ignores their “lively and energetic materiality”, which goes beyond the endurance of a chemical structure.

The multiplicity of water must also be extended to those bodies that inhabit these environments and move with, and against, its flows. The composition of water, emergent from characteristics including rates of flow, turbidity, inorganic components, and temperature can shape encounters with these environments. Lien and Law (2011: 73), for example, show that in Norwegian salmon farming the fish themselves are elusive and largely unseen; instead they are encountered through numbers, statistics, and history as quantification enacts the fish as “manageable, tractable, knowable”. Different techniques

and technologies are therefore required to make the fish talk, to render their bodies visible and knowable. Bear (2006) traces the processes of inscription necessary to translate the individual fish caught by an angler into a catch statistic and examines the technologies of power deployed within various 'centres of calculation'. These accounts look at the performative ways in which watery bodies become known to us, and yet the waters in which these fish live remain surprisingly mute as fjords and rivers are presented as containers of these bodies rather than active agents capable of entering into relations. Furthermore, there is a danger in these accounts of erasing the individual bodies of fish, along with their capacity to transgress managerial intentions. It is necessary both to re-focus upon the individual body and the specificity of relationships, as called for by Lien, Law and Bear, but also more critically examine water as a spatial container.

The idea of 'envelopment' as developed by McCormack (2009a: 29), in considering the process of a balloon becoming 'lighter than air', provides an interesting entry point into such a discussion; envelopment is here considered "more than choosing the right kind of fabric", and rather as a process and relation of what Deleuze termed 'the fold'. This fold of materiality is more than "a certain kind of material becom[ing] a container for another, but in the sense that envelopment is generative of a distinctive way in which materiality relates to the process of its own becoming..." (McCormack, 2009a: 30). Water is not a passive container of bodies, but rather is capable of entering into dynamic relations with the bodies it encircles, inducing transformations and agency. Ideas of envelopment further challenge the precarious divide between water and land. The difficulties of delimiting such a separation are demonstrated by Blomley (2008) in relation to property law and boundary drawing, for the movement of water and the ephemerality of sediment deposition and erosion ensure transgression of such boundaries. Land and water pass into and through each other; elements such as carbon, nitrogen and sulphur are transported by water and

sustain life on land, whilst geological processes and the formation of the continents could not have taken place without large quantities of water (Harding and Margulis, 2009). As demonstrated by Bear (2013) in relation to the scallops of Cardigan Bay, the changing movements of water, the pattern of tides and deposits further challenges the collection of scientific data, and often requires the specific modelling and investigation of the area of concern.

Whilst a clear divide between water and land cannot be drawn, the notion of being 'on the margins' in encounters with water is a useful one, and permits consideration of the transformative potential of watery materiality. O. Jones (2010: 190), for example, explores intertidal zones as "spaces of extraordinary richness for entangled human and nonhuman becomings", as seemingly stable identities and ecologies "all meet transformative moments at the water's edge". In encountering these times and spaces attention is drawn to the rhythms and transience of materialities and O. Jones (2010) argues that tidal landscapes heighten affective charges. Engaging with water can therefore permit a reformulation of bodies and an attentiveness to connections and interdependencies, as Clarke (2010: 155) demonstrates in the context of *La miroir de l'eau* installation in Bordeaux, where in the reflective surface "you see yourself rippling and your ripples merge with other ripples" whilst "[b]odies shimmer in the vapour, dissolve and then reappear". Water interacts with the light and colours of its surroundings, as its form and quality emerges from these relationships, rather than being determined solely in advance (Strang, 2004). In contrast to the qualities of many other components water possesses contagious properties as wetness and coldness are conductive, influencing those bodies or objects they come into contact with (Hamlin, 2000). Water therefore possesses a transformative capacity which has both conceptual and methodological potential as it overtly disrupts the stability of things and categories, generating a space within which to explore affective and energetic materialities.

It is argued by O. Jones (2011: 2300) that “all materiality is fluid in the end; even if some materials flow at slow speeds and run through rhythms...The *looseness* of the materiality of water means that its flows are dynamic, forceful, and obvious”. This may, paradoxically, also be a limitation within empirical studies for it can be more challenging to discuss stability, endurance, and stillness when water is flowing past. Concepts of fluidity do not fully capture ideas of composition, and it is therefore necessary to inflect explorations of water with the ideas of assemblage, endurance, and territory developed above in the context of recombination. A concern for coalescence or temporary stabilisation has been explored in studies relating to, for example, aviation (Adey et al., 2007), social mobilities (Cresswell, 2010), technologies (DeLaet and Mol, 2000) and materials (Barry, 2010). Despite this growing emphasis on relations of speed, very little work has explored water explicitly. This terrestrial dominance may be beginning to change as researchers have started to test its frontiers, most notably taking to the air (e.g. McCormack, 2009a; MacDonald, 2007). These accounts have sought to counter what Irigaray terms the ‘forgetting of air’, which constrained conventional metaphysics and “always supposes, in some manner, a solid crust from which to raise a construction” (Irigaray, 1999: 2). Air is that which “does not show itself”, thus escaping “appearing as (a) being” (Irigaray, 1999: 14) and so allowing itself to be forgotten. These explorations of the affectivities, heterogeneity, and processes of politics and technologies through which the atmosphere emerges provide resources for a geography open to getting its feet wet and extending considerations of relational and affective materialities to more watery places.

This research develops sensitivity towards a particular water body, the Basingstoke Canal and encounters its processes, including erosion and transport, but also its affectivity, differences and envelopment. Water should not be forgotten or homogenised; moving beyond terrestrial concerns will further support multinatural geographies and vital

materialism. Water is intimately entangled with liveliness and its centrality to ideas of a healthy and living environment have contributed to its deployment as the “cardinal barometer, the essential indicator of the state of nature” and a regular testing ground for new ideas in ecology (Waley, 2000: 16). Water enables a recombinant ecology, forges relations with more-than-human liveliness, and is a valuable resource for the exercises of this research.

Lines of Research ~ Lines of Liveliness

Concepts are events in the making. An event in the making is a thought on the cusp of articulation – a prearticulated thought in motion.

Manning (2009: 5)

Life is lived along lines, incorporating ecological pathways, watery flows and the sentences of a thesis. This concluding section pulls the conceptual threads developed through this literature review to the cusp of articulation in the form of two distinct, but interested, research questions. The lively lines of the Basingstoke Canal focus this research, and emerge from processes of recombination that may be creative, initiate assemblages, generate affective atmospheres, and engender more-than-human connectivity.

The previous chapter established that canals are worthy of consideration within conservation, presenting a valuable opportunity to explore the socio-ecological potential of an infrastructure network where interest and energies are of both human and nonhuman kinds. Currently experiencing a ‘Second Golden Age’; there is growing recognition of the potential social and ecological value of Britain’s nineteenth century waterways, and attempts are being made to situate these canals within connectivity debates. As connectivity and an ethos of ‘more, bigger, better, joined’ are placed at the centre of national environmental policy, ‘edgelands’ are receiving renewed attention. This is good

news for canals, which are presented as both an ecological infrastructure, through which movement and climatic adaptation can be promoted, and as standing water refuges for remnant species and human recreation. However, despite considerable attention, and the dedication of resources, the twin concerns of climate change and habitat fragmentation are continuing to cause alarm within conservation, whilst the opportunities offered by canals are not being fully explored through policy. This chapter subsequently examined the relationship between conservation and philosophies of nature and argued that renderings of the agency and spatiality of nonhuman environments have contributed to the continued privileging of particular forms of nature, and the stifling of ecological creativity. Growing concerns for relational agency within geography, and for dynamic systems within biological conservation were brought into conversation through ideas of recombination. This concept was mobilised as an interdisciplinary response to the challenges of the Anthropocene, and sits at the heart of the first aim of this research:

- To inflect ideas of connectivity with a material concern for ‘recombination’, and consider whether this presents an appropriate focus for the conservation of canal environments.

This aim opens up discussion surrounding the conservation of canals, and their capacity to engender social relations. This research’s focus on recombination enables a different approach to the challenges of the Anthropocene, one which is more attentive to temporalities, and does not subscribe to the categories of modernity. However, by incorporating a concern for affective relations and assemblage this research remains sensitive to the transformative experiences and notions of endurance which did a lot of work for nature and conservation.

The waters of canal environments present a further challenge to conservation activities, requiring different approaches to those taken on land, whilst their capacity to enter into

affective relations and sustain assemblages are central to their human appeal. Ideas of the enchanting capacity of water provide this research with an empirical entry into discussions of canal management, whilst the lively materiality of water and a focus upon relations enable consideration of local and national concerns, human and nonhuman assemblages, movement and stillness. A particular focus upon the watery complexity and connectivity of canals therefore supports the first aim of this research, and guides the second:

- To develop a concern for water within human geography, and approach watery environments in ways that attend to their (im)material agencies and heterogeneity.

Water challenges conservation and has been neglected within human geography; this aim addresses these lacunae, whilst furthering considerations of connectivity. In particular, a focus upon the watery connections of canals enables explorations of particular concerns within the literature regarding the utility of corridors, namely that their 'beguiling simplicity' (Evans, 2007) is masking an in-effectiveness, whilst their representation as narrow lines on a map distracts from their social impact (Goldman, 2009). This research explores this by considering a structural corridor not just as an enabler of movement, but as itself a place which can be enchanting, different, and still. Canals are particularly relevant sites for such consideration, for the potential for the visible stagnation of a canal's water precludes the fetishisation of movement. Furthermore, the overlooking of canals within emerging policy and their failure to conform to conventional ideas of the natural may also be of assistance, removing some of the pressure for success, and beginning from an entanglement of agency which precludes any separation of the natural and cultural. This research therefore contributes to studies concerned with potential corridors, considering them as a possible model for canal conservation, whilst generating space for a particular canal to intervene. The applicability of corridor or site-based methods is therefore considered together with the potential of approaches more open to complexity and

ecological tension. A concern for watery complexity further focuses attention on transfers, energy, and the sustaining of relations. In foregrounding a concern for recombinant processes it is possible to challenge the image of water as an inert and homogenous container and place greater emphasis upon the possibility for transformation generated by water and the role watery corridors may play in enabling connectivity in conservation.

It is no longer enough to identify and present hybrid forms, whilst celebrating difference. There is a need to consider the politics of multinaturalism, to evaluate different forms and trajectories, and explore the ways human publics can, and might, encounter and respond to unconventional liveliness (J. Lorimer, 2012). The twin aims of this research, explored empirically through the Basingstoke Canal, develop a response to the challenges facing canal environments and situate this within wider interdisciplinary debates. Taking water as its guide, this research deliberately seeks to work against the grain of structure and design and each chapter rearranges one particular canal as its assemblages, ecologies, and management are traced in different ways.

Chapter Three

Generating Research

Data is not something a researcher stumbles upon and hastily collects during an intense period of adventurous fieldwork in a remote and hostile location. At least, it certainly wasn't in the case of this project; for nine months I regularly caught the 07:33 train from Oxford to Reading and then, providing I arrived on time or was able to quickly navigate the crowds (not always possible when wearing wellies), the 08:04 connection to North Camp. Calling at Wokingham; Crowthorne; Sandhurst; Blackwater; Farnborough North; and North Camp. These excursions were far from intrepid, and I was certainly not isolated. The success of this research depended upon the forging of productive relationships, the generation of interesting materials, and walks that exceeded the boundaries of the field. This chapter explores these activities and considers how the recasting of the epistemological question 'how do we know?' as the ontological question 'how does the world make itself known?' (Whatmore, 2003) has informed geographical practices of generating research. Should we allow, and maybe even encourage, the world to intrude upon neat research questions and fieldwork plans? How could such openness affect the position of the researcher? This chapter considers these questions before putting forward a case for the Basingstoke Canal and interrogating the relationship between the 'field' and the 'study' within this research. The remainder of this methodology chapter addresses the five research threads that directed this empirical work: following, questioning, experimenting, considering and responding.

Research is always an intervention in the world; data is not simply mined and the field is co-fabricated by more than just the researcher (Whatmore, 2003). Renewed attention

towards qualitative methods following the cultural turn within geography has focussed attention upon the conduct of empirical research. Dewsbury (2010: 324), for example, highlights that “every methodological choice we make has an implication for the management of meaning that we are making”, we must therefore remain “acutely aware that making meaning is precisely what we are doing, and that this takes place through a whole number of interconnected empirical encounters”. Research is a creative process, and the researcher does not enter ‘the field’ alone. Whatmore (2003) deploys the term ‘generating materials’ to highlight this distributed agency and emphasise the creativity guiding the seemingly straightforward practice previously termed ‘data collection’. Openness to the unexpected, and a relinquishing of control over the making of meaning, is at stake if, instead of pursuing “certainty in generating representations of the world, there is recognition that the world is so textured as to exceed our capacity to understand it” (Davies and Dwyer, 2007: 258). Methodologies must therefore “be characterised as much by openness, reflexivity and recursivity as by categorisation, conclusion and closure” (Davies and Dwyer, 2007: 258). The agency of the researcher and the authentic site of fieldwork have subsequently been challenged.

As multinatural approaches have dismantled the divisions of nature and culture, together with the professional separation of science and politics, so geographers, along with sociologists and anthropologists, have increasingly engaged with nonhuman liveliness and practices. The empirical focus of these approaches has increasingly expanded from the “centralised sites and sights of nature organized through the hide, natural history museum or zoo to the mobile practices and technologies of engaging with nature in the field” (Davies and Dwyer, 2007: 261). As Whatmore (2003: 91) argues, following Stengers, the entities “assembled in the event of research affect its conduct” and “exceed their mobilisation as compliant data”. Work following such impulses thus endeavours to heed

Whatmore (2003: 67) and “allow non-human and material worlds into the research process from the outset”; it is through this that fieldwork becomes a practice of ‘co-fabrication’. Researchers have thus listened to the calls of corncrakes (J. Lorimer, 2008b), worked in city allotments (Hinchliffe, 2010), and forged companionable relationships with mushrooms (Tsing, 2012). As the scope of research has been widened and its more-than-human partners acknowledged, so the boundaries of the site have been worn down through frequent transgressions. The relationship between words and the world, the study and the field, is not, Latour (1999) argues, one of gaps and correspondences, there is no boundary, only ‘circulating references’ emergent through translation and interaction. It is not just data and fieldwork that are cofabricated and generated, but all the practices of research. In conducting this research I sought to follow those circulating references created through conservation practices, whilst generating my own translations. The threads followed and forged during this research entangle and exceed both the ‘field’ of the Basingstoke Canal and the ‘study’ of Oxford.

As the sanctity of the fieldsite and the privileging of particular actors are questioned so geographers are further challenging “the categorical delimitation of the human and animal boundary” (Davies and Dwyer, 2007: 260) and recasting the role of the researcher. Greenhough (2010: 50) subsequently argues that the fieldworker should seek to harness their own ‘infectious agency’, recognising that their role “is not so much to extract information...from a research event, but to incite response in those (human or otherwise) with whom the researcher is engaged”. Researching, encountering the world, is generative and, as Erin Manning remarks, “When I take a step, how that step moves me is key to where I can go. Gravity acts on the step such that the time span of the step’s creativity is relatively short-lived” but the “step *can* become a spiral” (Manning, 2009: 6 (original emphasis)). It may not be extensive, or revolutionary, but things can change through the process of

researching and we should both recognise and cultivate space for the unexpected and the creative. This evokes a recombinant ethos that highlights the transformative potential of repetition and intensity, together with the generative potential of unusual combinations. Repeated visits, asking the same questions and experimenting with methodological practice may have unexpected results. Furthermore, the recording of empirical data, and organisation of specific encounters, should be regarded as a connective process, through which research “grow[s] and acquire[s] a coherence of its own” (Dewsbury, 2010: 329). Dewsbury (2010: 327) subsequently encourages geographers to “get embroiled in the site”, and “infected by the effort, investment, and craze of the particular practice or experience being investigated”. This thesis was inspired by the energy and attitude of recent multinatural accounts and assembled a mixed-methods, or ‘make-do’ methodology (see Bull, 2011; H. Lorimer, 2006) that was open to the creative experience of research.

Making a Case for the Basingstoke Canal

Flowing for 32 miles through southern England, flirting with the M3, passing through Woking, Farnborough, and Fleet, and connecting myriad SSSIs, the Basingstoke Canal is a short walk from North Camp train station and the 08:04 service from Reading (see Figure 1). As the canal encounters both the densely populated London commuter belt and rural locations from its terminus in Greywell, Hampshire, to its entry into the River Wey in Surrey so it transgresses geographical boundaries and attempts at classification.

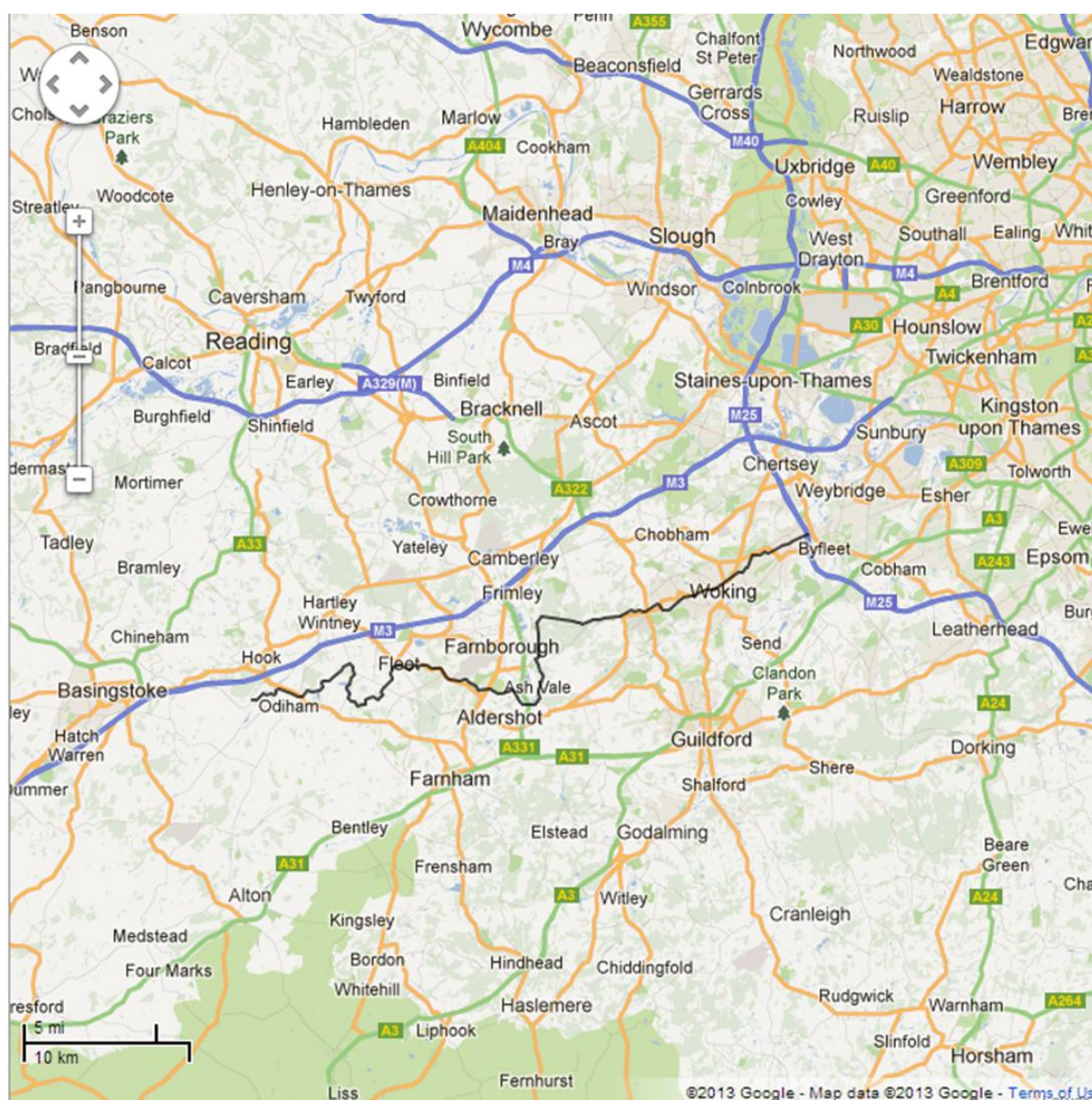


Figure 1 Map showing course of Basingstoke Canal (black line). Created in GoogleMaps March, 2013. See also Appendix I and for an interactive map visit <https://maps.google.com/maps/ms?ie=UTF&mmsa=0&msid=208179529594550101433.0004d72b655eebda9ae85>

Opened in 1794 to facilitate the transport of agricultural goods, commercial traffic ceased in 1949 and the canal was increasingly regarded as derelict and abandoned wasteland (Vine, 1994). Ecological invasions following this period contributed to a recombinate biodiversity that was maintained and continued to flourish during the canal's restoration, which began in the 1970s and culminated in the re-opening of the canal to navigation in 1991 (Vine, 1994). This ecological inheritance was evaluated and categorised, such that 11

separate SSSI designations currently overlay the length of the canal, excepting a short stretch through Woking town centre (see Figure 2).

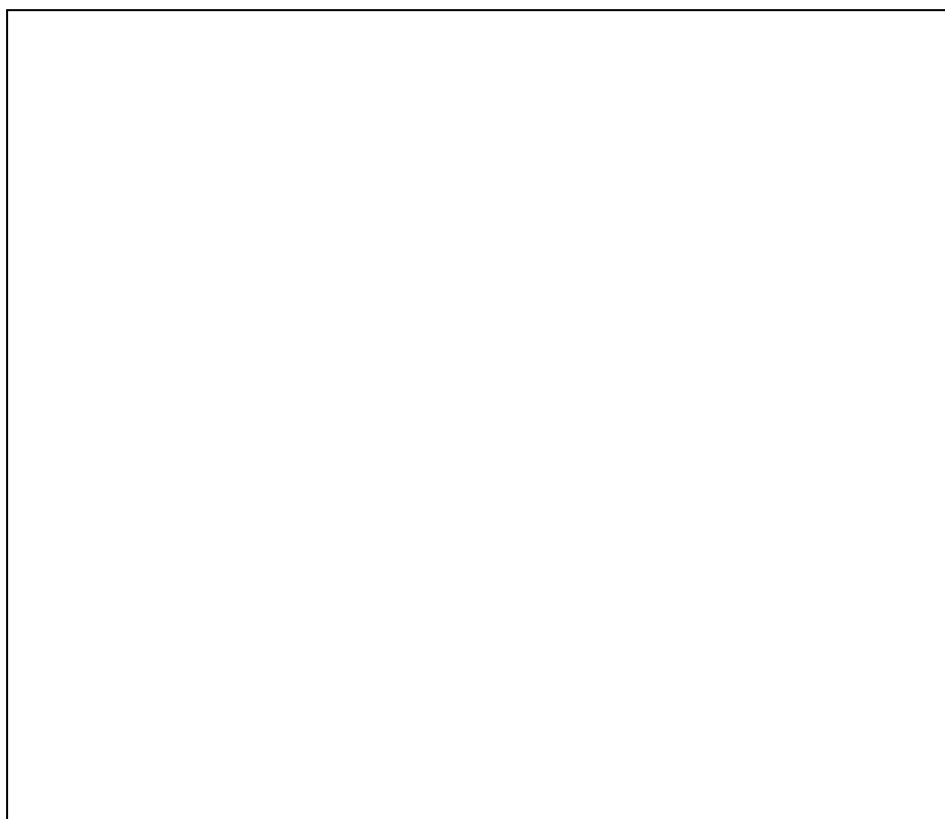


Figure 2 Reproduced table of SSSI units for the Basingstoke Canal⁹

The canal's identification as "botanically the most species-rich aquatic system in England" (English Nature, 1995) and its linear passage through urban environments are central to its promotion as a potential site of socio-ecological connectivity. However, of the 11 designated SSSIs, 8 are classified by Natural England as 'unfavourable', with only 3 (units 3, 7 and 9) achieving a 'favourable' status¹⁰. The canal is therefore both celebrated and concerning.

⁹ Natural England (2013) *SSSI units for the Basingstoke Canal*. Available at: http://www.sssi.naturalengland.org.uk/Special/sssi/unitlist.cfm?sssi_id=1006588. Accessed 2nd April 2013.

¹⁰ Ibid.

The Basingstoke Canal intruded upon this research from my initial application for DPhil study, frequently appearing in web searches through which I was tentatively beginning to trace the ecological possibilities of canals. Repeatedly identified as an ecologically important waterway, with significant constituencies of humans and nonhumans, it drew my attention, whilst proximity to Oxford provided an additional advantage. Much like Derrida regarded his cat (Derrida, 2002) the Basingstoke Canal is not here presented as a figure, or allegory, for all canals (unlike Derrida, however, curiosity will not be kept at bay (see Haraway, 2008)). This research is concerned with a real canal; neither representative nor an exception, it is muddy, lively, and important. This work does not, therefore, attempt to authentically portray the 'Basingstoke Canal', for, following Hinchliffe (2010: 306), there is always more than one canal in the making, and the case never stands alone. Instead, this research tells tales of the canal, and discusses some of the lessons that can be learnt by being attentive to the comings and goings through which this waterway is assembled, encountered, and concerning.

Instead of imagining the case study as a neatly bounded location, I sought to encounter, align, and work with its creative energies and those bodies that pass through. I thus envisaged the environment of this canal, following Ingold (2006: 14), as "a domain of entanglement" where bodies and characteristics grow from within "a tangle of interlaced trails, continually ravelling here and unravelling there". This research was tethered by the case of the Basingstoke Canal, but it was not constrained by it and I took opportunities to further trace lively pathways. This flexibility enabled visits to bat ecology laboratories at Queen Mary, University of London, and Bristol University, together with walks along Oxford's frozen canals and around Gloucester museums. The proximity of Oxford to the Basingstoke Canal helped to further confuse the boundaries of 'field' and 'study', both spatially and temporally (see Massey, 2003). Retaining a desk in the School of Geography

and working there on those days not occupied by empirical research, whilst contributing to undergraduate and postgraduate teaching, enabled me to transcribe interviews and prepare for fieldwork in the midst of theoretical resources and conversations.

The case study approach has a long history within geography, but has recently become somewhat less fashionable in favour of multi-sited or 'un-sited' approaches, that claim to more effectively speak to broader processes or structures (see Cook et al., 2009). Critiques of case based work successfully liberated geographical research "not so much from a bounded site, as from the idea that the field of ethnographic research could ever be coterminous with, or the same thing as, a geographically bounded location or area" (Cook et al., 2009: 58). However, such critiques, Candea (2007) argues, risk generating a parallel danger by supporting an implicit holism within multi-sited research. All fieldwork is multiplicity, Candea (2007) continues, for incompleteness and a sense of missing out remains whether the research is conducted in a single place, or a range of locations. The decision to focus on a single site could therefore be productively rethought as "an explicitly 'partial' and incomplete window onto complexity" (Candea, 2007: 167). The site is not a 'found object', nor should case study research be curtailed by perceived geographical boundaries, but similarly there is value in recognising empirical limitations, for holism will always be beyond our grasp (Candea, 2007). Difference, through a site ontology, Woodward et al. (2010: 275) argue, is not something to be "controlled in order to arrive at general and reproducible results", but a "productive and active component of the site itself and of any account corresponding to it". Further support for approaches that focus on intensive situations, rather than alluding to extensive representativeness is offered by Latour (2005) who advises researchers to slow things down, to take the time to register difference and allow things to be remade by the case at hand. This research was therefore focussed, but not constrained, by the Basingstoke Canal and the empirical encounters

through which it proceeded can be grouped under the threads: following, questioning, experimenting, considering and responding.

Following

Conservation is emergent from multiple, embodied, practices that spread across human and nonhuman spacings, and human geography is increasingly taking this multiplicity of bodies and processes seriously (following Thrift, 2008). Walking, moving, following, formed the central methodological approach of this research as I traced the efforts and practices of conservation activities. Inflected by ethological sensibilities this research considered the “practical negotiations” (J. Lorimer, 2008b: 379) which must take place between humans, nonhumans, and material things in endeavours to determine ‘likely presence’ (Hinchliffe et al., 2005), combined with likely *behaviour*, and the imagined futures that together inform the management of environments.

The Basingstoke Canal is under the joint ownership of Surrey and Hampshire County Councils, and the Basingstoke Canal Authority (BCA) was established upon the re-opening of the canal as the councils’ ‘maintaining agent’¹¹. Forging a relationship and exploring the possibility of spending time with the BCA’s ten canal rangers¹² was a fieldwork priority. An exploratory email, and subsequent meeting in May 2010, established a foundation for the research and I gained permission to accompany the rangers on daily activities, and observe management meetings. Between August 2010 and May 2011 I was in continual contact with the canal rangers and regularly travelled to the canal to spend the day with one, or more, of them as they carried out a range of activities including surveying, monitoring, and

¹¹ Hampshire County Council (2012) The Basingstoke Canal Authority. Available at: <http://www3.hants.gov.uk/basingstoke-canal/canal-authority.htm>. Accessed 22nd November 2012.

¹² Over the course of fieldwork a programme of voluntary redundancy was enacted, and the ranger force subsequently decreased to six.

maintenance work, together with more substantial engineering projects. The logistics of travel along the canal, the limited space within vans and the more dangerous nature of some of the rangers' work placed restrictions on my visits; however, I would usually spend around 3 days each week in their company. The BCA and the canal rangers are based at the Canal Centre in Mytchett, at the midpoint of the canal, straddling the Surrey/Hampshire border. The length of the waterway and the varied work undertaken by the rangers often results in considerable travel time over the course of each day. During nine months of fieldwork I subsequently spent many hours in the passenger seat of one of the BCA's vans (see Figure 3). This time was filled with conversation, listening to the radio, discussing those things which passed by the windows, and reflecting upon earlier experiences.



Figure 3 Two vans belonging to the Basingstoke Canal Authority, adjacent to the canal at Deepcut Locks

Laurier et al. (2008) note that despite the long periods of time we spend travelling in vehicles, what happens beyond driving is often overlooked, yet when passengers are included there is rarely silence. Relationships can be “re-assembled and re-organised in the small-scale spaces that are car interiors” (Laurier et al., 2008: 1). I developed this within my research through the space of the van, thus drawing upon this research’s wider concern for those movements and assemblages that prevent the stabilisation of knowledge. During these journeys the space of the van became a “*shared* accomplishment” (Laurier et al., 2008: 6 (original emphasis)); these travels gave me a chance to ask questions, seek more information regarding issues and explore different ranger’s opinions on particular concerns.

In the conduct of research the ‘where’ of interviewing poses considerable challenges and Elwood and Martin (2000) identify two central considerations: pragmatic constraints, and concerns regarding power relations. Careful consideration of the placing of interviews can therefore both enhance the richness of the materials generated, and form part of the wider cultivation of good ethical judgement within research. As I talked and travelled in the vans with the rangers our conversations regularly shifted following glimpses of the canal or interesting sites, whilst the familiar setting provided fewer constraints upon the conversation, and hopefully prevented the relationship between us taking the shape of questioner/subject. Additionally, being mobile whilst talking provided an opening to change, slightly, the day’s planned activities and the rangers would frequently take detours to parts of the canal they found interesting or were related to the topics we had been discussing. I believe that these ‘on the job’ dialogues allowed the rangers to be confident in their own expertise, whilst ensuring that the power to determine the direction of conversation was not always within my control (following Elwood and Martin, 2000).

When the van stopped, conversation would continue, but our activities changed. Latour (2005) encourages sociologists of the social to engage in the ‘tracing of associations’, to actively consider the connections through which assemblages cohere and endure; this generates a collaborative methodology of keeping company, learning, and being involved. This research was not concerned with passive observation and shadowing, but followed those non-representational theorists who have sought to flip the established methodology of participant observation into ‘observant participant’ (see Dewsbury, 2010). Actively being present and involved with the rangers’ activities further enabled consideration of what Wood and Smith (2004: 535) term “those ‘tacit knowledges’ that subjects can enact but not necessarily articulate verbally or even consciously”. The importance of these learned, subconscious, knowledges became particularly evident when I tried, and regularly struggled, to contribute to activities; this frequent failure further provided an entry point into wider discussions of practices that may otherwise have gone unnoticed, including the identification of species from tracks, the cutting of bankside vegetation, and water quality testing. Particular attentiveness was therefore cultivated towards the procedures, skills, and technologies that must be acquired in the practices of canal management, taking “seriously...embodied practices, landscapes and material histories” (J. Lorimer and Whatmore, 2009: 677). I sought to activate my own body through this research, for our bodies are the ‘original prosthesis’ that we all ‘learn to manipulate’ through our lives (Hayles, 1999: 3). I subsequently explored my own skills and competencies, recognising that the experience of fieldwork would influence my capabilities and in being attentive to those practices, keeping diaries of such experiences and endeavouring to ‘learn to be affected’ (Latour, 2004b) I entangled myself with the canal, and was sensitive towards those technological mediators that enable conservation activity (see Figure 4).



Figure 4 Examples of the technologies of conservation. Clockwise from top left: Bat monitoring station inside Greywell Tunnel; Wood Chipper; Water monitoring equipment; Bat hibernation survey lighting; Gate installed to discourage badger activity

Human bodies and practices were not the only concern of this research and I followed J. Lorimer and Whatmore's (2009: 676) encouragement to widen the scope of this consideration to include nonhuman activities. They call for researchers to explore ways to "evoke the embodied experience" (J. Lorimer and Whatmore, 2009: 676) of nonhuman others, and I subsequently immersed myself in nonhuman liveliness; encountering bat swarms, attempting to monitor the presence of bats, and developing a concern for the lifecycles and behaviours of particular plant and animal groups. As such I also followed Wood and Smith (2004) and engaged in practices of 'observant listening' and 'participant sensing', that more actively involved a range of bodily registers, not solely the visual, in the generation of data. This approach responded to Ingold's (2006) suggestion that within our research we should seek methodologies that enable us to treat the 'names of animals' as

verbs, rather than nouns, and thus consider how individuals possess the “potential to challenge and change networks” (Goedeke and Rikoon, 2008: 111). This precludes presentations of singular, human, narratives of places, and by tracing the practices of detecting and trapping mink and bats (both groups of ecological concern), whilst following their representations in policy, I sought to develop sensitivity to nonhuman agency within conservation.

A particular concern for those bats inhabiting and passing through the canal emerged during fieldwork as one of the rangers with whom I regularly spent time was himself a PhD student researching the hibernal ecology of those bats hibernating in Greywell Tunnel, which forms the canal’s western terminus. This contributed to an unexpected remapping of the research, as I encountered and became interested in the tunnel’s annual bat swarm. Encountering the limits of ecological knowledge amidst the swarm generated space for enchantment, together with an opportunity to consider the transformative potential of ecological assemblages. This concern for swarming bats also heeded Ingold’s (2006: 9) argument that in order to successfully reanimate our work we must recover “the sense of astonishment banished from official science”. Remaining open to difference through encounters with the swarm brings ideas of endurance and repetition into debates surrounding connectivity and movement, for bats travel considerable distances in order to swarm and are subsequently presented as indicators of wider environmental health. Bats were unexpected partners within this research, but the cultivation of an ethos of cofabrication ensured their intrusion was welcomed and they directly participated in the generation of materials. Seymour and Wolch (2010: 306) argue that the “standard toolkit of qualitative methods in human geography...clearly privileges the human side of the animal-human relationship”, and in this research I therefore sought to actively proceed on a more equal footing and keep company with both human and non-human difference.

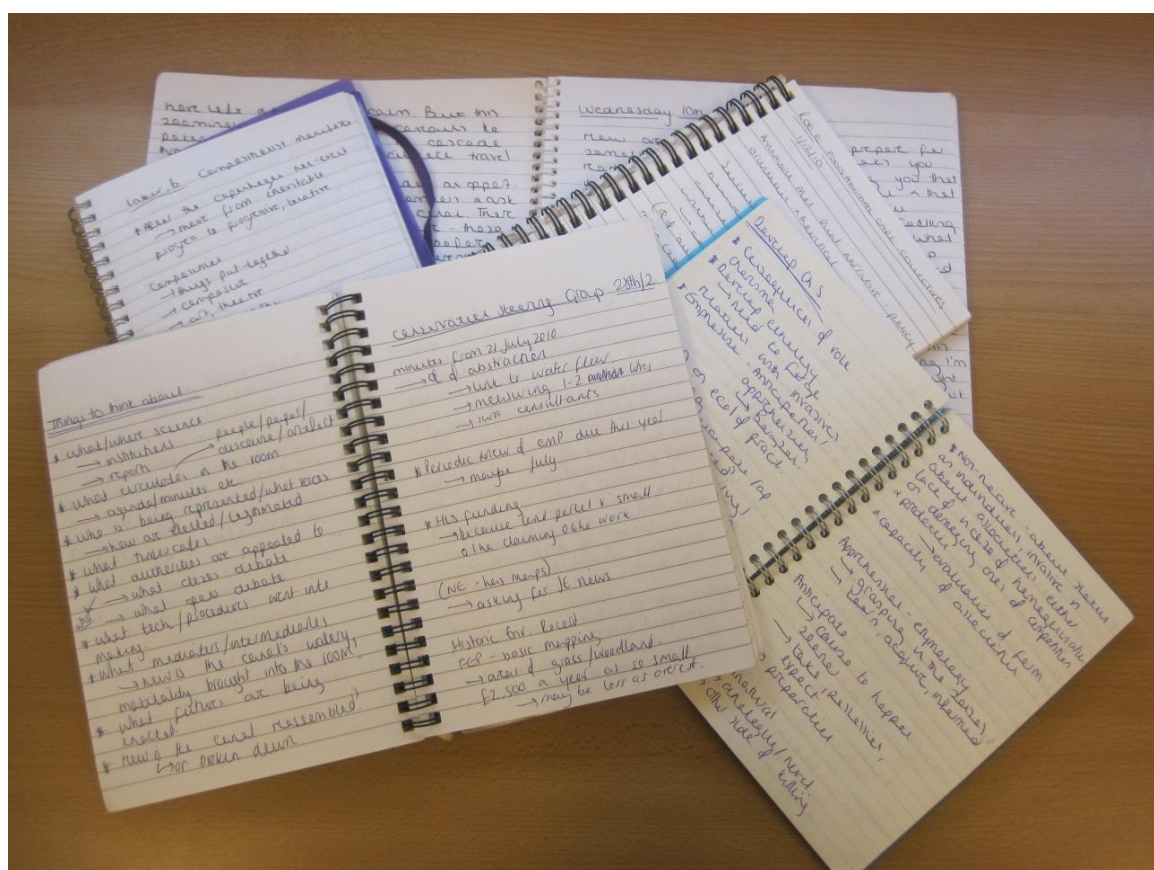


Figure 5 Field diaries and notebooks

Whilst travelling back to Oxford after spending the day on, or around, the canal, I recorded my experiences, conversations, and the practices I had witnessed into diaries (see Figure 5). These writings included verbatim extracts of discussions and specific details regarding the day's activities, together with wider thoughts on canal conservation, questions I wanted to remember to ask, and connections with other geographical research. I would on occasion record information in the presence of rangers, to guarantee recollection, but I generally sought to avoid interrupting activities with the retrieval of a notebook. I also kept diaries which reflected upon the direction of particular chapters of the thesis, recorded lectures I had attended, and through which I explored the themes of my research (see Figure 5). These diaries are a partial translation of the world into words, but were not the only 'circulating references' of this research; devices (such those in Figure 4) regularly

intrude and are made visible through the thesis, whilst photographs, maps, and quantitative data sustain and divert the narratives of research.

Following Questioning

The canal emerges from encounters between bodies, knowledge, technologies and other materials (Whatmore, 2003). These relations exceed the site of the Basingstoke Canal, and methodologies of following did not therefore halt upon reaching some pre-determined spatial limit. Things do not always neatly obey methodological expectations, nor do they necessarily “begin and end ‘in the field’” (Whatmore, 2003: 96). Conservation cannot be understood “outside of the assemblage (Deleuze and Guattari, 1987) of people, practices, technologies and other non-humans through which it is ‘realised’ (Latour, 1999) to us” (J. Lorimer, 2006a: 540). The practices of conservation therefore possess a ‘topological multiplicity’ that enables different spaces and movements to interact and coexist (Law and Mol, 1994). Those species, populations, and processes encountered by the rangers along the canal are translated and communicated through networks of conservation and may circulate back to the canal in the form of management plans, shifting funding priorities, and new directives. I subsequently followed translations of numbers, distributions, and range shifts from the canal, into the meeting room, through the pages of official documents, and on to the offices of national environmental organisations. I was able to sit in on the weekly meeting between rangers and the canal manager, and attend both the quarterly Joint Management Committee meetings and the less regular Conservation Steering Group Meetings (both of which I continued to attend after my period of sustained fieldwork had ended). These meetings were composed of representatives of national and international organisations, as well as individuals from the two County Councils and numerous riparian

districts. These gatherings afforded me with an opportunity for informal discussions with these individuals, and provided insight into the negotiated management of the canal.

In the latter stages of my involvement with the BCA I also asked the Canal Manager and rangers for their advice regarding contacts in national organisations, with whom I may be able to discuss both the Basingstoke Canal and its interactions with wider environmental legislation and policies. I subsequently arranged in-depth interviews with a National Ecologist, bat specialist, and Wildlife Survey national spokesperson for the Canal & River Trust (formerly British Waterways); a Technical Specialist for Biodiversity within the Environment Agency and Chair of the London Biodiversity Partnership and the Rivers and Streams Habitat Action Plan, and Project Manager for the London Rivers' Restoration Project. In addition, I conducted in-depth interviews with the two Natural England Officers with particular responsibilities for the Basingstoke Canal. These lengthy and detailed discussions enabled me to explore the national performance and ecological characteristics of canals, and other water corridors, within ecological policy (see Appendix II). They were also opportunities to consider the practices of biodiversity management (with specific reference to invasive species), the particular institutional relationships of the Basingstoke Canal, and how this site, and those similar to it, are situated and managed through national and international policy frameworks. These interviews were focussed, and whilst they clearly do not form a statistically significant or representative number, these people were all interested in corridor ecologies, possessed particular expertise concerning canals, and were heavily involved in attempts to manage such environments in ecologically and socially productive ways. They also had extensive understanding of the position of the Basingstoke Canal. As such, they were a relevant selection of individuals. Each meeting was recorded, and lasted between 1.5 and 2 hours. In conducting these specialised, in-depth, discussions I followed the advice of McDowell (2010: 162) and regarded the exchange as

“more of a collaboration than an interrogation”. This was in part achieved through careful consideration of the timing of these interviews. The interviews were deliberately scheduled towards the end of the fieldwork period and occurred following sustained involvement with both the canal and the BCA, through which I had gained a more comprehensive and nuanced understanding of the theories and policies of conservation. I was therefore better informed and more effectively able to contribute to, and develop, the discussions. Following the interviews I also remained in contact with each interviewee and sent them a verbatim transcript of our discussion for their comments, together with any corrections or supplementary information.

These circulations were not the first to take me beyond the immediate company of the canal rangers, for I also sought to explore those sociable interactions which took place with the canal, but outside the official management of the BCA. Of particular interest was the Surrey and Hampshire Canal Society (SHCS); formed in 1966 this volunteer organisation was central to the successful restoration of the Basingstoke Canal, and remains a vocal and influential pressure group. The SHCS identify themselves as the ‘Guardians of the Basingstoke Canal’ and through campaigning and the organisation of myriad volunteer working parties they ensured that the waterway was purchased by the two County Councils in the 1970s, and facilitated its reopening as a functional waterway in 1991¹³. The membership of this society exceeds 1,000 (*pers. com.*) and this further suggested that they were a relevant focus for researching the human connectivities of the canal and the affective relations that may emerge between and around people, water, and nonhuman liveliness. I approached the SHCS in May 2010, at the same time as the BCA, and was able to arrange an introductory meeting with three of their committee members. During this I discussed the direction of my research and my desire to involve the canal society in

¹³ Surrey and Hampshire Canal Society (2011) The Basingstoke Canal. Available at: <http://www.basingstoke-canal.org.uk/>. Accessed 26th November 2011.

fieldwork; we spent the remainder of the meeting exploring the activities of the SHCS and discussing those issues which these members felt were particularly pressing for the future of the waterway. From this introduction the society Secretary agreed to compile a list of members who he felt would be happy to take part in a number of focus groups, whilst I also completed forms to become a member of the society. This allowed me to attend the society's meetings, and also included me in the insurance for the Tuesday evening members' boat excursions.

Engagements with the SHCS involved tracing relationships and becoming sensitive to the canal from a different direction; I attended an illuminated boats parade, participated in boat trips, and listened at meetings. My principal involvement with the SHCS centred on the convening of three focus 'events', which took place in September 2010, November 2010 and May 2011. Those taking part in these sessions were members of the SHCS, although they did not all have the same backgrounds, involvement in the organisation, or opinions regarding the issues discussed. Prior to each event I emailed all members with details of the format, together with any particular requests or questions to consider and both a 'Participant Information Sheet' and consent form. Following discussion with those present at each event, these sessions were voice recorded, and where verbatim excerpts are included in the thesis text pseudonyms have been ascribed. Whilst I believe that ethical considerations warranted the use of pseudonyms, as a number of focus group participants sit on canal management groups, the names ascribed to each individual remain the same throughout the thesis. This was a deliberate attempt to retain a sense of the character of those involved, and allow the tone of their voices to emerge.

Considerable literature exists regarding the conduct of focus groups, the 'fundamentals' of which are identified as "a preference for intra-group homogeneity, for medium sized

groups, and for styles of moderation that are focused but also flexible” (Bosco and Herman, 2010: 198). The events convened for this research were composed of the same individuals, but took a different form: a conventional discussion group, a discussion walk, and an object based discussion. In introducing these differences into my approach to focus groups I sought to follow Bosco and Herman (2010: 193) who highlight the potential for fluidity within the focus group method and suggest that they be approached more actively as ‘research performances’ that possess a “participatory and collaborative potential”. Therefore, whilst the second two focus events particularly challenged the fundamentals of moderation, the first session remained more faithful.

The first of these focus events is introduced in this section, as it falls under the thread of ‘Questioning’, whilst the second two will be attended to in the subsequent section, for they formed a central component of the ‘Experimenting’ thread. The first event, referred to through the thesis as the Discussion Group, sought to consider why those participating were drawn to the canal, how they experienced it, and what role they saw for the SHCS in its future. The Discussion Group took place in the meeting room of the Canal Centre at Mytchett (see Appendix III). This room was primarily known to those attending for the frequent, and occasionally heated, debates of the Joint Management Committee, on which two of the focus group members sit as the SHCS representatives. The position of the Canal Centre as the primary information point for the Basingstoke Canal, and its situation at the mid-point of the canal’s length, made it convenient for all attending. The room’s association with the adjacent BCA offices was potentially a disadvantage, for the SHCS are frequently critical of the formal canal management, but I felt that the advantages offered by its accessibility, familiarity as a site of debate, together with its proximity to the canal itself – visible from the window – outweighed this concern. The individuals present at this, and subsequent, focus groups were indicative of the membership of the SHCS: eight of the nine

attendees were male, all participants were white British and the majority were of, or approaching, retirement age. Whilst this 'intra-group homogeneity', and the familiarity of the members with each other, generated a relaxed and open environment I endeavoured to counter its directionality by attending, and engaging in conversations at, two canal-based festivals, together with public events organised by the BCA including 'Santa Cruises' and Nature Walks and, more informally, with 'passers-by' along the towpath.

Following Questioning Experimenting

Whilst geographers have increasingly become "attuned to the emotional and embodied practices of...research encounters" (Davies and Dwyer, 2007: 258) there remains a lingering reluctance to actively engage and experiment with them. This was highlighted by Crang (2003) in the second of his progress reports on the condition of qualitative methods, where he raised the concern that "methods often derided for being somehow soft and 'touchy-feely' have in fact been rather limited in touching and feeling". Since this remark, an emerging interest in more performative and haptic methodologies has become established. Geographers, Davies and Dwyer (2007: 261) argue, are now increasingly attempting to capture the "ephemeral, the fleeting, the immanence of place, as well as pay attention to the interrelatedness of place".

Walking

Performative research within geography initially emerged through engagement with the writings of Judith Butler, although ideas of the performative have increasingly been decoupled from representation and aligned with the philosophy of Gilles Deleuze (McCormack, 2009b). These approaches argue that difference can be continually generated without representation, such that the "event of performativity is always excessive of

attempts to capture it in representative form" (McCormack, 2009b: 135). Performative accounts therefore widen the scope of practices under consideration and challenge established methodologies. An influential example of this work is McCormack's (2002) account of Dance Movement Therapy, which explores the potential for rhythm to catalyse movement and expression. McCormack (2002) animates his account by personally participating and experimenting with techniques of writing. A concern for movement explores new ways of relating within research and remains open to its creative potential, whilst dissolving the subject/object distinction. Wylie (2005) further explores this creativity of performance, attending to 'incidents and experiences' encountered in walking the South West Coast Path, whilst critically discussing the emergence of self and landscape. These are just two examples of a burgeoning tradition of performative approaches that develop an understanding of space as "a set of generative processes rather than a container within which such processes happen" (McCormack, 2009b: 133). A concern for the performative corresponds with the aims of this research, but it is also necessary to heed Latham (2003: 2000) who cautions against the wholesale abandonment of "the methodological skills that human geography has so painfully accumulated". He suggests that we instead experiment with ways of imbuing them with creativity, and a concern for practice and bodies; there is no reason, he argues, "why these methods cannot be made to dance a little". Such an ethos of experimentation is important for research, which Dewsbury (2010: 321) argues, has always been about "ever trying and ever failing". A more performative approach attends to the possibility of failure with greater anticipation, both of its occurrence and the opportunities it may offer to try again, differently. This section therefore evaluates the more experimental and performative approaches developed in this research which attempted to make established methodologies dance a little.

In reflecting upon regular travel and conversation with the rangers I developed an interest in movement, which I experimented further with during the second focus group event, the 'Discussion Walk', and in my own walks, both alone and with invited companions. This approach was also influenced by Manning's (2009: ix-xiii (original emphasis)) suggestion that "*What moves as a body, returns as the movement of thought*" and observation that to "speak about bodies is first and foremost to explore the ways in which bodies *move*"; this is not simply a philosophical injunction, but a methodological impulse. Walking is imbued with performative norms, rituals, and values, and geographers are beginning to consider walking as an onto-methodology through which to encounter the openness of the body, and invite the risky promiscuity of environments into the research process. Concerns within non-representational geography, inflected by the subversive traditions of urban walking, permit a re-examination of the subjectivity of the walker and have disrupted Romantic notions of the passivity of landscape (see Wylie, 2005). Geographers such as John Wylie (2002: 441) have challenged both the distinction between the self and landscape, and the location of agency within a detached human observer, subsequently re-energising walking and "reconfiguring...subjectivity through embodiment, performance and practice". Walking is a more-than-human affair of multiplicity, for our bodies are "always already the product of chance encounters of heterogeneous materials: entities and elements that have been subject to an extended sourcing for as long as travelling bodies have met at crossroads" (Clark, 2000: 15). The embodiment of the walker, and the emergence of self and landscape, are therefore never complete for, as Wylie (2002: 446) argues, the subject is "assembled and performed" through the processes of walking. In his work 'An essay on ascending Glastonbury Tor' Wylie (2002) examines how, through walking, the landscape uncoils and it is possible to sense the connections and disconnects through which the Tor endures, whilst retaining the possibility for it to be otherwise. These rhythms of the body and space are foregrounded through walking. The walk, therefore, does not "re-enact a

story that is already finished, but rather keeps it doing” (Ingold and Vergunst, 2008: 9), engaging with the becoming of the world rather than seeking to fix and silence it. During my engagement with the canal I therefore sought to regularly mobilise my own body and walk sections of towpath, reflecting upon any subsequent encounters and the sensation of moving with, and against, this waterway. Diaries, photographs, and conversations were generated over the course of these walks and sparked questions and impressions that inform the narratives of this research.

The concern for walking mobilised in this research was not restricted to solitary pursuits, for, as Hein et al. (2008) note, the act of collective walking can generate interesting relationships between the walker and researcher. This type of walk is often guided by the participant (see J. Anderson, 2004; Hein et al., 2008) and therefore introduces greater potential for spontaneity, as well as involving the ‘background noises’ of everyday life. Jon Anderson’s (2004) account of ‘bimbling’ with activists, for example, demonstrates how walking activates a space for recollection, of past action and events, permitting these to interact with present entanglements. Walking here serves to open a new space for dialogue and, Anderson (2004: 260) notes, is “also useful as it produces, not a conventional interrogative encounter, but a collage of collaboration: an unstructured dialogue where all actors participate in a conversational, geographical and informational pathway creation”. In developing the second focus group, I sought to engage further with the potentials of “cooperative knowledge formation” offered by a collective methodology (Bosco and Herman, 2010: 193). For the ‘Discussion Walk’, I asked those who had agreed to take part to meet again at the Canal Centre, but instead of entering the meeting room we turned the other way and walked along the canal for around an hour and a half before returning to the café at the Canal Centre, where discussion continued for another hour. In the invitation I included five, very broad, questions to act as prompts for conversation surrounding the

health and environment of the Basingstoke Canal (see Appendix IV). Whilst I asked the walkers to assemble at the Canal Centre I did not plan the route of the walk and left the decision of whether to turn north or south up to the group. As we travelled so the conversation of the group was relaxed, and in comparison to the previous focus event the dialogue was shorter, and with more interaction, whilst voices blurred and topics waxed and waned. The canal, in combination with the previously emailed questions, directed the conversation, whilst the shared experiences of the walk created commonality, and continued to inform discussion over coffee in the café. The lack of a formal setting also generated a greater evenness between those walking and opened space for an interest in, and questioning of, my DPhil topic and the progress of research. The greater familiarity between the society members and the canal further prevented my becoming established as an 'expert', and introduced a desire amongst a number of walkers to demonstrate particular features of the canal to me. The Discussion Walk remained a contrived setting, but, despite this, as Hein et al. (2008) argue, it recognised that social life happens somewhere, through performances and embodied practice. All walks, Sinclair (2003: 38-44) argues, "contradict the lie of the land", and engaging in walking provided further opportunities for the canal and research companions to challenge geographical and conservation theories.

Artefacts

Encouraging "other-than-human agencies to participate in the telling of stories about particular places" (DeSilvey, 2006: 318) generates methodologies that are open to a performative sense of space. As she explores an abandoned homestead, DeSilvey (2006), for example, creates space in her writing for odours, rodents, and debris. Repulsion, curiosity, and attraction are encouraged, and through attentiveness to the performativity of the site's materialities DeSilvey demonstrates how matter can rearrange categories of

apparent order, and possess a social life. Artefacts subsequently become processes, and may trigger remembrance. A growing interest in developing a multinatural response to the Anthropocene has encouraged a concern for such ‘thing power’ agency (J. Bennett, 2001) amongst objects as they “help constitute the common worlds we share” (Braun and Whatmore, 2010: ix).

In convening the third focus event I encouraged objects into the midst of discussion and allowed space for them to direct and inform exchanges, thus building upon the generative intrusions of the material canal seen through the previous focus group. In preparing for this Artefact Discussion I asked those attending to bring an object, or several, with them that related to the canal, and that they found interesting, to prompt wider discussions regarding the future of the Basingstoke Canal. As things assembled on the table so conversation was easy and engaging, circulating through and around objects, connecting the focus group and bringing a sense of the canal’s materiality into discussion. This approach followed J. Lorimer and Whatmore (2009) who sought to touch and feel the weight of objects associated with the elephant hunting that formed the empirical focus of their historical geography, and enabled them to develop a ‘richer feeling’ for past activities and how they continue to inform the present environment. I also contributed a number of photographs to the discussion, and with only gentle reminders of the ‘futures’ theme the conversation diverged and reassembled around the no-longer so inanimate things that kept us company in the room. This focus group therefore sought to access archives of feeling (Dwyer and Davies, 2010), by bringing contemporary issues and future concern more closely into conversation with historical materials. This work was inspired by DeSilvey (2007, 2006), who endeavoured to ‘move associatively’ amongst material things and so activate ‘re-collection’ of objects in ways that spark new connections. It is possible that those things assembled only become legible in relation to other objects; DeSilvey

(2007: 416) therefore cautions that this connectivity also “requires a process of manipulation, description, displacement”. The Artefact Discussion was a contrived and distorted situation, but it was not controlled or disciplined, and because of its manipulation it was able to draw together things that would not otherwise fit in the room.

Failing

Not all experiments are successful, and in the course of this research I explored several methodological approaches that did not gain momentum. I here cultivated the attitude that I should change course and reassess practices when things were no longer generative, when they didn’t provoke new ideas, and stopped being interesting in the Stengerian sense of *interesse*, of forging linkages (Stengers, 2000). Heeding Dewsbury’s (2010: 321) injunction, following Beckett, to ‘try again, fail again, fail better’ I entertained the possibility that whilst these experiments did not produce what was expected, they may have opened other avenues. Of particular note was my experience with a time-lapse camera, which I had purchased in an attempt to capture difference and deployed on a number of occasions to record changes over a day’s work. I had the idea that the camera could also be left for longer periods of time; the rangers, however, were concerned that it would likely be vandalised, whilst the images captured during those periods I did erect it did not spark comments or point in new directions regarding the management of difference around the canal. One aspect of these images did, however, capture my interest, namely their occasional and uneven blurring. I experimented further with this, and these images are discussed in Chapter Four. A further challenge to the ethos of experimenting relates to how far we should travel and how long we can take. Latour (2005: 122) highlights this challenge when noting “How ridiculous is it to claim that inquirers should ‘follow the actors themselves’, when the actors to be followed swarm in all directions like a bee’s nest disturbed by a wayward child? Which actor should be chosen? Which one should be

followed and for how long? And if each actor is made of another bee's nest swarming in all directions and it goes on indefinitely, then when the hell are we supposed to stop?" A valid question, and one that can be answered in a number of ways, not least through considerations of financial concerns and the time-constraints of the DPhil process. *Fieldworking* can be difficult, trails can wind in circles and at times it seems that the only one labouring and forging connections is the researcher; it was at these times that I reassessed the direction of research, and considered switching paths.

Following Questioning Experimenting Considering

The previous section explored the challenge of knowing when fieldwork activities are no longer generating interesting materials. This leads to the equally important, and perhaps more daunting, decision of when to scale back engagement with the field and focus more intently on crafting an argument, and a thesis. "Write early and write often" Bingham (2003: 147) notes and in blurring the separation between the field and the study, fieldwork and writing up, the transition from one to the other felt neither blunt nor irreversible.

Writing began with initial accounts of each day of fieldwork. I started to write in a notebook on the train and these hasty entries were an attempt to document what had happened, record conversations, and consider my immediate reflections on the activities of the day. These notes included tentative links to more general themes of research, and these were developed more fully upon my return to Oxford. At my desk in the School of Geography I would re-write my accounts. As I revisited each day of fieldwork (usually after only a few days) I was able to develop my notes and add to my recollections, whilst creating a secondary layer of discussion which would connect this single day to other fieldwork activities and to theoretical ideas. This translation was superimposed upon the

descriptive account through the comments feature of Microsoft Word. Continual analysis in this form enabled a tentative outline of the chapters of the thesis to take shape. As more data was generated and connections emerged between ideas, so further thoughts were triggered which informed my activities when I next returned to the canal. Combining writing and field working were therefore vitally important and whilst many of the mediations through which this thesis travelled have been erased, or fallen to one side, they were crucial in shaping what it has become. This approach enabled me to develop a sense of what could be considered specific to this particular canal, and what spoke to more general concerns within conservation and canal management. As arguments became more convincing I began to focus more intently on writing, and communicating my research. When the repetition of questions to new audiences began to overwhelmingly return the same answer, and when participants in focus groups began to repeat their stories I knew it was time to move on from fieldwork.

The gap between the word and the world is not “a tiny footbridge” constructed to allow the unproblematic representation of reality through text (Latour, 1999: 24). Instead there are circulating references; some things may be lost in the journey to the study, but others are preserved and these translations can be brought together and considered side by side, even though they were neither spatially nor temporally adjacent (Latour, 1999). Through the analysis of these contemporaneous materials ideas and patterns emerge, and words can be written.

I began writing this thesis on the same day I first travelled to the Basingstoke Canal and I did not begin at the beginning; rather the thesis began to take its shape through the writing and re-writing of the empirical chapters. Each of these chapters was initiated by an empirical moment: something someone said, a story that was told, or an activity I

participated in that enabled me to view the canal differently. In developing these moments and bringing them into conversation with other field experiences I was able to craft chapters which both describe the particular ecologies of the Basingstoke Canal and raise questions which resonate more widely and contribute to discussions surrounding connectivity. In arranging and reviewing the materials of fieldwork I chose not to use programmes such as NVivo, which did not appear appropriate given the diversity of materials generated. Instead, I read, and re-read, the transcriptions of interviews and focus group events, and highlighted those phrases or comments which were particularly striking or developed those arguments which were tentatively forming. I also listened again to the recordings themselves, and without the distraction of transcribing was able to identify moments of tension, and points where agreement amongst individuals contributed to an intensity. This approach to the analysis of fieldwork materials enabled me to develop a plan for the empirical chapters of my thesis. Each time I began to write a new chapter I would revisit my field diaries, and other generated materials to develop a detailed plan, thus ensuring it was empirically driven. The process of writing generates thoughts and these plans subsequently evolved and theoretical ideas were sparked, prompting renewed literature searches. As the substantive sections of the thesis began to take shape I revised each chapter several times, drawing on advice received from more experienced researchers, questions at conferences where I presented my ideas and the comments received through anonymous peer review. The reworking of these chapters strengthened the threads that link them together and enable the thesis to build a challenge to the research questions presented in Chapter Two whilst reworking a number of theoretical concepts.

As the activity of writing up is increasingly questioned within social science, so this creates an opportunity to experiment a little more with processes of writing and to engage more

effectively with literary styles within geographical accounts. I tried to retain the sensations of fieldwork as I began to write the chapters of this thesis and this is reflected in the formatting of quotations and the inclusion of photographs and diary extracts which sought not just to describe the voices of the canal, but something of its movement and its light. I further endeavoured to follow Kathleen Stewart and “write theory through stories” embarking upon “descriptive detours” through which I sought to convey a particular ‘becoming sentient’ with the world (Stewart, 2011: 445). This geography of ‘what happens’ (following Thrift 2007 in Stewart 2011) is not expressed through the straightforward succession of words upon a page but through a narrative which employs the voices of others, excerpts from field diaries and photographs. These are woven through the thesis and intersperse the text; neither are capable of standing alone. Such an approach follows DeSilvey (2012: 34) and enables attentiveness to how the inscription of place and managerial approaches can be “accomplished through the promotion of particular ‘story lines’”. These narratives may be challenged by material artefacts or alternative historical accounts and through the literary style of this thesis I ensured that these contestations and tales of the Basingstoke Canal were foregrounded. I gave particular consideration to the formatting of specific conversations and to the duration of excerpts. It is inevitable that a degree of abstraction will occur when quotes are extracted from interviews or from wider conversations but I sought to ensure as best as possible that the context of what was being said remained. I also attempted to build sustained engagement with a number of individuals, particularly those with whom I conducted in-depth interviews. Their voices permeate the whole thesis and they are invited to comment on a range of issues, thus building a sense of their wider position. In addition I was keen to present arguments through participants ‘own words’ and thus included lengthy quotes in which people told stories, became distracted or even changed their minds. I feel that this captured a sense of the precariousness within conservation, the moments of contradiction and the possibility

that research does not leave ‘the field’ unchanged. When a group of people are discussing an issue it is inevitable that they will interrupt and talk over each other, or be influenced by changes in their environment (such as a cyclist trying to pass by on a narrow towpath). I tried to retain a sense of the ebb and flow of conversation by not isolating single voices and by including gestures and events, thus endeavouring to retain something of the liveliness of fieldwork.

The account presented here is one particular interpretation, and the path it follows can feel intense, serendipitous and, perhaps occasionally, contrived. Another geographer may have done things differently and there are translations of the Basingstoke Canal which do not appear in the following chapters. These include a number of photographs taken by the rangers themselves on days when I was not present. The method of self-photography was one which I’d hoped would generate a different view of the canal, and spark some interesting comments as well as highlighting those activities which particularly drew the eye of the rangers, and subsequently the camera. The rangers, however, invariably forgot that they’d been given cameras. Whilst these photos do not appear in the following chapters, this thesis remains an assortment of found objects, of stories and generated materials which have combined in interesting and unexpected ways, whilst also restlessly encouraging the reader to take off in a different direction.

Following Questioning Experimenting Considering Responding

This research proceeded through the methodological threads of following, questioning, experimenting and considering. Permeating all of these was a concern for responding; both in terms of an ethical responsibility and in relation to how this research could form a response to encounters with the ravelling and unravelling of the case of the Basingstoke

Canal. The co-fabrication of research and materials through fieldwork, and an active recognition that the researcher cannot unproblematically 'mine' the field for data, generates ethical issues and encourages increased humility (Whatmore, 2003). In addition to the necessary codes of conduct for research as prescribed in the University's ethics forms, which required the drawing up of informed consent documents and a Participant Information Sheet, I endeavoured, following Thrift (2003), to cultivate good judgement and remain sensitive to the ethics of encounters. As argued by Thrift (2003), 'ethics as code' requires the researcher to know, to a certain degree, the direction of the fieldwork and the form of its output. This was not something I could achieve and I therefore sought to reclaim responsibility for ethical practice and retain an openness in research methodologies, through which a 'space of thoughtfulness' could be cultivated that allowed for difference and ethical sensitivity. One particular event during fieldwork serves to illustrate this attitude. In mid-December 2010 I spent several days assisting the rangers and BCA staff in conducting 'Santa Cruises', hugely popular events that see several thousand local people visit the waterway and the Canal Centre (discussed further in Chapter Eight). I made tea, served mince pies, and helped organise activities at the centre, a role which gained additional significance when several staff members were taken ill. Being involved with such an event was a chance to consider the social life of canals, but it also helped forge wider relationships that informed future research and gave me an opportunity to help the BCA out, albeit in a small way. These encounters, in the midst of the bustle of Santa's grotto, were ethical; not add-ons to the activities of research but central to its conduct.

Whatmore (2003) encourages us to evaluate research through a number of lenses, including that of Stengers' principle of 'being at risk' whereby the questions being asked, and the research itself, are 'at risk' of being challenged and redefined by the phenomena being mobilised. In the methodological discussions outlined above I demonstrated how this

research's approach to fieldwork endeavoured to keep things open and created opportunities for those I encountered to object and change the course of the work. This 'objectivity' (Latour, 2000) was not confined to 'the field', but was also a feature of both the materials generated, and some of the writings that I subsequently composed. I gave those I interviewed the opportunity to comment and change the content of verbatim transcripts and also sought to publish a collaborative account of fieldwork encounters with bats, written with the canal ranger whose research intervened with mine and led me to Greywell Tunnel as bats swarmed and hibernated (see Mason and Hope, 2013). I also tried to retain a sense of performances whilst writing, allowing the frustrations and enjoyments of the practices and employments to remain in the text. As J. Lorimer (2008b: 398) notes, those engaged in conservation or volunteering practices often "do it because they enjoy it" and I sought to retain the enthusiasm of their voices through the thesis. Narratives, personal diaries, reflections, and photographs are woven through this thesis. Their presence is not explained by the accompanying text, nor do the words which surround them exist separately for, as Latour (2005: 135) notes, if "a description remains in need of an explanation, it means that it is a bad description".

This thesis exists, as Crang (2003: 497) notes, as an 'unstable entity', a particular version of a research process that is also communicated through collaborative writing, conversations, and reports to those I encountered over the last three years; it is no more, or less true, than those other forms. Research is creative, generative, and interesting and, as McCormack (2004: 219) notes in reflecting upon fieldwork, "there is no great revolution. Nothing turned on its head. No subversion, resistance, rupture...What remains are subtle shifts, twists and turns in the cultivation of geographical sensibility". When I caught the train that spring day to first meet some of those individuals who would be so important to this

research it was Latour's (2010:25) advice that rang most clearly: "pack as little as possible, don't forget to pay your ticket, and prepare for delays".

Chapter Four

Tales of Enchantment from a Canal

...I had an interesting conversation with Prince Phillip he, he'd come to the docks and I asked him if he'd enjoyed his trip to the docks and he couldn't remember coming here, it was about 6 months previous, and I said 'the canals, you came to visit', and he said 'full of shopping trolleys aren't they' and I said 'no, there's been a huge renaissance, lovely, lovely places', and he leaned over and said 'alright if you want to commit suicide I suppose'.

(pers. com.)

Narratives are performative, they help shape the world we live in and condition expectations (J. Bennett, 2001). Long periods of dereliction, an association with industrial landscapes and the artistic licence of soap-operas have perpetuated an image of canals as ditches, filled with "shopping trolleys, nettles and syringes" (*Alice, Canal Walk*). Canals have a reputation as less appealing places, part of a watery underworld:

...if you're going to get rid of your shotgun you go and dump it in the canal, and you talk about people being dumped in the canal, but...I think those days are gone. In fact I found a gun on one of our dredging trips, I mean it was just a barrel and it was that rusty that there wasn't even a hole for the bullet, it was obviously a very old gun. But, no, I don't see that as an image of canals these days and I think that's more, the place you're likely to see that image is in films and soaps.

Interview with a National Ecologist (Canal & River Trust) (June, 2011)

Despite the endeavours of environmental managers, canals continue to be presented within popular culture as dangerous wastelands, epitomising the failed hopes of industrial progress. This positioning of humanity as a disenchanting force began in the Enlightenment, and was continued through the political project of modernity (J. Bennett, 2001). Various disenchantment tales have been presented, but Jane Bennett (2001: 8) suggests that they all feature "some kind of absence or loss", as wonder is eclipsed by rationality, technology, and controlling forces. The perpetuation of such negative sentiments, Jane Bennett (2001: 3) argues, potentially "ignores and then discourages

affective attachment to the world". This double force has consequences for the way we consider relationships between humans and the environment, and informs ideas of what places of wildness and natural value should look like; for if humans are inherently polluting and destructive, then nature can only be pure in the absence of human presence (see Cronon, 1996).

A different sense of canals emerges, however, if we allow ourselves to become entangled within their myriad 'comings and goings':

John: ...when the brickworks had gone at Up Nately they disposed of their boats – two of them were called Maudie and Ada...they were bought by a man from Richmond who collected them with his family - his wife and children - started bow-hauling them down the canal and they got to this point and they found the lock was closed for repairs so they moored in the flash just off to the right here to wait for it to open and while they were there the children contracted diphtheria, this was about 1912, something like that...and they were taken off to the isolation hospital in Guildford, the parents went with them and none of them ever came back....The boats just sat there and when we restored it we removed them....It's haunted me that story, what happened to them? Perhaps the First World War intervened, the children died, I don't know...

Artefact Discussion

The suggestion that we can be moved by a story about social interaction with the material world sits uncomfortably within the narrative of a disenchanted modernity, but it is the beginning of an enchantment tale. Jane Bennett argues that "the contemporary world retains the power to enchant humans and...humans can cultivate themselves so as to experience more of that effect" (J. Bennett, 2001: 4). To be enchanted is to be "struck and shaken by the extraordinary that lives amid the familiar and the everyday" (J. Bennett, 2001: 4). Bennett subsequently calls on us to tell stories that accentuate moments of enchantment, and attend to those "magical sites already here", within which we may be "simultaneously transfixed in wonder and transported by sense, to be both caught up and carried away" (2001: 5-8). Canals were left behind as people were encouraged to dismiss attachments made on their doorsteps in favour of more 'worthy' experiences, and a more

authentic Nature. In presenting four tales of enchantment this chapter therefore follows Bennett (2001: 8) in attempting to “dust off and shine up” that which has been discarded by narratives promoting disenchantment. Relations of enchantment are here considered a particular kind of affective engagement, emergent from the encounters between, and sensory capabilities of, individuals, things, and elements (following Whatmore and Hinchliffe, 2010).

This chapter seeks sensitivity to enchantment, and as such contributes to human geography’s growing curiosity for those places excluded from modernity’s categorisations of value. This curiosity incorporates recognition that continued subscription to an inert, distant, and untouched nature may silence other flourishing ecological spaces (e.g. Hinchliffe et al., 2005). Geographers are therefore increasingly encouraging relational approaches that regard bodies and environments as emergent and are more aware of, and open to, non-equilibrium systems, surprising associations, and non-representational identities. The separate realms of the natural and cultural cannot be sustained; enchantment can be found in all corners.

As demonstrated in the opening to this thesis, people are drawn to canals¹⁴, and this chapter traces how such environments might hold their gaze and spark enchantment. Jane Bennett (2001: 4) argues that “the world has become neither inert nor devoid of surprise but continues to inspire deep and powerful attachments”. In asking what draws people to the canal, and keeps them on its path, it is necessary to be sensitive to the calling capacity of vital things and attend to the potential within ‘minor experiences’ (J. Bennett, 2001). This chapter is concerned with the sociable relationships which thread through, and create a particular texture around, the canal; in tracing these threads this chapter explores how

¹⁴ The Canal & River Trust (2011:2) claim that 13 million people regularly visit their local waterway.

connections are forged between people and a local waterway and considers how interest is generated and sustained. This may assist wider endeavours to promote overlooked and urban areas, whilst further establishing the potential offered by canal environments and providing one possible method through which they could be approached. In this way this chapter responds to the first aim of the research, whilst also beginning to consider the second by looking differently at water and tracing the ways it captivates and actively forges relationships through multiple temporalities. The interactions between flow and stillness, risk and stability are explored more explicitly in relation both to the attraction of such environments, and their management.

Each of the four threads now presented recombines the energy of the canal and considers how relations are forged between people and this environment in ways that do not rely upon, or reproduce, an essential and preformed Society or Nature. This chapter is instead concerned with the generative capacity of enchantment and in this it does not seek to distil the components through which the canal can be assembled. Rather, it draws upon this research's approach to connectivity and proceeds not through a concern for structure, but by considering the potential for complexity. The threads of enchantment guiding this discussion were developed by taking the time to engage with dedicated conservation rangers and those interested people who walk, rest, boat, and promote this canal. Water, stillness, wildness, and friendship subsequently begin to establish a response to the Basingstoke Canal, whilst empirically introducing this research.

Thread of Water

Open both paddles on an empty lock. An unmistakeable rumble and roar; the water, previously still and calm, is now foaming and white, generating currents and dangerous



Figure 6 Leaking lock on the Basingstoke Canal

eddies. The illusion of stable and singular water is shattered. As the lock fills, so the waters gradually slow, retrieving their tranquillity (see Figure 6).

Canals began as transport arteries to speed human industrialisation and ingenuity, but today their waters transgress human design and it is their own flow, and not that of the trade they once carried, which is foregrounded.

I think, undoubtedly, water is the most fascinating of the elements - because of its variety, we can think of water from storms in Cornwall to tranquil days here, but water is also attractive, the bit of water out there leads up to North Yorkshire and there are 2000 miles of it out there, so I think the fact that you are part of something out there as well, that it leads somewhere...there is an awful lot of the stressful lives we lead being relieved by water.

Discussion Walk

There is something about water levels rising and falling and the mechanics, it's another primeval thing. It's also the power of water, when it's being released. It is amazing watching water move.

Discussion Walk

There is something attractive in the uncertainty surrounding water; its depth, its capacity to change and to transport holds our attention, and can make us pause. These characteristics also permeate interactions between the canal's structures as water seeps around, and against, managerial intentions. Within both official meetings and during informal ranger discussions it was frequently stated that the Basingstoke Canal poses the single greatest risk to its County Council owners, owing to the flooding and damage that would result from a significant breach. This threat, however, simultaneously contributes to the canal's endurance, for the prospect of a major leak, and concomitant riparian flooding, ensures continued funding for the maintenance of the canal's embankments and general structure. Water can be both attractive and concerning, and its apparent tranquillity can often create a sense of disquiet.

It comes back to the power of water...Even though it looks benign and static it's actually doing things all the time.

Discussion Walk

The movement of boats, the draw and release of water at locks, together with a long history of sedimentation, have led to the compaction of the fine-grained silt lining the canal bed and banks. Despite this, leaks are common, and the risk of a breach is concerning. Structural weaknesses, including tree root cavities and animal burrows, combined with the erosive capacities of water are deemed largely responsible. Specific circumstances also cause apprehension amongst the rangers. The legacy of decomposing roots from the Great Storm of 1987 and wariness regarding the continued integrity of an aeroplane fuselage hastily used to stem a breach in the canal adjacent to Farnborough Air Field are indicative

of this concern. These risks must be monitored and controlled; the endurance of the canal must be repeatedly confirmed and certified.

Each week, the duty ranger carries out a survey of designated high-risk embankments. A large-scale assessment of the entire canal was conducted to detect those sections of particular concern, and weekly inspections now occur in those areas flagged. These locations were identified owing to the presence of risky words within their evaluations, including 'steep' and 'unstable', together with their recorded gradient and historical experiences of slumping. The stability of these embankments cannot be guaranteed, and in these areas the distinction between land and water becomes concerning. Attempts are therefore made to detect, and trace, shifts in their interaction. This is challenging, for water does not pass directly through and beyond the bank, rather it seeks the most permeable route and this can lead to difficulties in identifying the initial point of inflow for any leaks. Dyes and the deliberate disruption of sediment can help trace these watery pathways. Changes in the interactions between land and water are therefore not straightforwardly detectable and the rangers employ indicators and proxies to discern transgressions. One ranger remarked, for example, as we approached a flagged embankment, that she paid close attention to the surrounding area and had become attuned to the sound of seeping water, together with the particular sensation of water moving through an embankment under her feet.

Tracing the endurance of canals invites a temporal concern as the rangers seek indicators of change, such as the presence of running water, the saturation levels of the ground, slumping, and the angles of trees and vegetation. To aid the monitoring of leaks on those embankments where they have already been identified the rangers place stakes to mark

the extent of the saturated areas; this assists both in terms of identifying where on an embankment a leak emerges and in detecting any variation in its extent (Figure 7).

The detection of change is challenging, and it was suggested by one ranger that the regular inspections may be an impediment, noting; “you perhaps see them too often to notice the difference”. Water captivates through its tranquillity and inspiring flow, but the possibilities of movement also generate risk.



Figure 7 Stakes marking the changing extent of an embankment leak (note muddy area to left of stake)

Thread of Stillness

I walked along the canal on a dank Tuesday in December, and was captivated by stillness.



Figure 8 A December walk

Movement seemed to come only from within my own walking. The canal was icy and still, whilst the air contained just the memory of a breeze as branches and leaves were rendered eternal through the dull light trapped within the mist. Despite this, there was no absence of change; the ice on the canal was not uniform, it showed signs of melt and its thickness varied. Leaf fall carpeted the towpath, whilst the hedges seemed bare. The seasons were progressing, and the 'big freeze' was waning. Walking continued, and I reached the

abandoned 'western end' where the trees loomed further over the canal, the ice was thicker, and the silence heavier. Rain began to fall, and a scent of decomposition pervaded the air. Fallen trees crossed the canal, and the muddy ice of the footpath impeded walking and caked my boots. Footprints were visible across the snow and ice; I saw no movement, but there was a sense of life and decay, transition and endurance, together with a slight unease. The darkening of the day, hastened by the rain and the shadows, curtailed the walk.



Peaceful

Tranquil

Calm

These words return again and again in conversations about canals and carry with them a sense of stillness. The waters of the previous thread, with latent potentials and lively movements, are here shown to possess cadence. They can also become ice.

The enchantment generated through this walk mirrors an observation made by Bissell and Fuller (2011: 2) that there appears to be “a public desire for something that seems

increasingly elusive and perplexing: a pause, a stilling in the ineluctable activity of daily life". They continue, and note that such stillness is often regarded as a problem, a moment of missed productivity. It is this notion of stillness as absence and inertia that is often deployed and contrasted with productive activity. Harrison subsequently notes (2011: 2-3) that, within much work, "repose, drift and stillness are...defined by their *absence* of significance". Stillness is boredom, waiting, and lethargy. Repeatedly "condemned for its lack of ambition, its failure to amount to anything, its lack of engagement" (Harrison, 2011: 3) stillness is an affront to the human obligation to flourish.

There is more to being still, however, than the breakdown of mobility and this thread considers the possibility that stillness reflects attentiveness to endurance and, as such, cannot be viewed as a wasted moment, but rather as a particular kind of relationship. This aligns with the view of Conradson (2011: 72) who, in the context of places of retreat, argues that "stillness is ... a subjectively experienced state of consciousness characterised by calmer mental rhythms and a shift in attention from other places and times...towards the present moment". Stillness can be a disposition, a cultivated opening towards the possibility of forging relations with what is around us. The moments of stillness enabled by the canal may be escapes from a hectic lifestyle, they may be the main activity of a person's day, or they may be something else. We could consider them not as withdrawal, but as a captivated attentiveness to the immediate. Stillness is not necessarily about isolation or silence, it is a "focused state of consciousness" (Conradson, 2011: 72) that can be generated through movement as much as stasis, association as well as solitude.

Stillness is also how we account for the particular qualities of an intensive atmosphere through which, and in which, we are in motion.

Everyone sways. You may think you're standing still, but actually you're drifting, shifting slightly to the left, your ankle twitching as your weight moves to the ball of your foot, your knee bending slightly as you take in a breath.

Manning (2009: 43)

Movement, Manning (2009) argues, is inevitable, whilst consciousness is a technique of describing the particular intensity of movement we have experienced. An atmosphere of stillness may therefore be generated through movement, as the rhythms and refrains of mobile practices create shared experiences (e.g. Ingold and Vergunst, 2008). Activities such as walking can open a new space for dialogue and are “also useful as [they produce] not a conventional interrogative encounter, but a collage of collaboration: an unstructured dialogue where all actors participate in a conversational, geographical and informational pathway creation” (J. Anderson, 2004: 260). Such mobile practices enable us to retain sensitivity towards a more creative notion of change as they activate spaces for recollection, of past action and events, and permit these to interact with present entanglements. Through particular practices and sensuous experiences it is possible to align our bodies with the rhythms and harmonies of things, becoming enchanted, and generating an atmosphere of stillness.

I think I'd say just what a special place it is. Mostly I would say that it is attractive but there are some people who just regard it as 'that ditch out the back' and they presumably don't find it attractive. But they're not the people who walk along it; if you walk along it you do begin to appreciate it.

Discussion Walk

This quote presents an interesting claim, namely that people do not only frequent the canal environment because they enjoy it, but rather they enjoy it *because* they walk along the towpath. The suggestion that movement can be generative of appreciation is of particular relevance in the context of the canal's promotion as a socio-ecological connection rather than a static destination in its own right, and may benefit both conservation and social well-being. Walking, moving along the flows of the canal, can open a space for connectivity

and encourage new relations. This potential was foregrounded in the 'Discussion Walk' focus group. Walking here took the form of 'streaming' (Clarke, 2010: 116) and as we moved alone and as a group, so conversation faltered, sped up, and stalled. There was a rhythm to the walk and cadence to the conversation as the canal informed and disrupted, challenging established views and enabling relations of differing duration to emerge amongst group members. An example, formatted to reflect the tenor and mobility of the conversation, is shown below:

Victoria, come and see this, it's quite an interesting feature. There used to be a plank that went across here. So that if there was a bank breach the water would pull it up... You've got this particular stone... It was sort of a safety feature, in case there was a breach in the canal, it was like a dam. How we repaired these bridges was much debated, I mean heritage was not a word that was used as widely as it is now when we are going back to the 70s. There's a bike coming. Oh, he's waiting for us. That's not something you usually see. The Deepcut barracks, there are 1200 new homes there and that will really intensify the pleasure usage of the canal...

Discussion Walk

Voices echoed as we came to stand under the bridge and moved impatiently on as walking resumed, talk was collective with little pause between the different speakers, whilst topics switched rapidly and overlapped. These conversations were not definitive and particular subjects were frequently reactivated, prompted by the canal or the coalescing of different groups of walkers. Alignments between the rhythms of walking, the timbre of voices, and the lively flows of the canal can create a sense of stillness, within which appreciation can germinate, expectations may be challenged, and productive discussions can take place. The precarious endurance of the canal is at risk in these moments, but they also enable its continuation and could be experimented with further both in developing relations with local communities, and in more innovative approaches to management meetings.

I explored one particular response to the atmosphere of stillness generated when walking beside and above the waters of the Basingstoke Canal, and took a time lapse camera for a walk. Fixing the camera to my body and experimenting with interval rates enabled engagement with the creative vibrancies of the canal's materiality. Time is slowed through the lapse rate of the camera shutter; different rhythms emerge and are foregrounded in the viewer's attention (see Figure 9). Bodily boundaries and those between earth and water are transgressed, running into each other, and creating new shapes and colours. Conventional perceptions of what should be still and what should move are challenged, whilst their boundaries blur, preventing things being assigned to one category or the other. Motion and stasis are not separate states, rather they are tendencies, and bodies are composed through multiple speeds. The momentum of the human walker is out of sync with other movement. The jogger becomes stationary. The trees blur.



Figure 9 Collage of time-lapse images

When these images are combined to form a video the canal becomes fast, differences in light and the frequency and speed of users are concentrated and exaggerated. The time lapse camera amplifies the 'in-between' of self and landscape, highlighting the creativities and vibrations pervading the apparent stillness of the canal environment. At different speeds these bodies change shape, dissolve, and solidify. Walking, alone or with others, can create a sense of calm and tranquillity and through this enchanting and bodily feeling so we may encounter that "transpersonal sense of *life* that animates or dampens space-times of experience" (B. Anderson, 2006: 736). Stillness and movement are not antitheses, and as they entwine they may compel enchantment.

A consistent theme emerging from engagements with canals is a concern not just for examples of movement, but for its *possibility*. The paradox of movement upon the canal labyrinth is aptly captured in the phrase 'a speed of idleness' (Rolt, 1994 [1944]: 54), as the potential or sensation of mobility is generated without the necessity of actually going anywhere.

Patrick: I think if you break the thread you lose the whole purpose of the canal...If you stop the canal here, put a wall across it, you can't use that end of the canal, you can't get onto it from the main system, it ceases to be a canal. And it ceases to interest us actually [general agreement], we would not be interested in a series of separate waterways...

Discussion Group

Albert: ...the navigation is the golden thread that goes through it all. Once you've not got boats, once you've [replaced locks with weirs], once you've made it into a series of pounds...

Richard: ...then it's finished...

Albert: ...people will lose interest...

Discussion Group

The canal attracts people; they forge relations with its capacity for tranquillity, and the opportunities it offers for escape elsewhere. This became even more apparent during

fieldwork when I asked people to try and define a ‘canal’, and a number of voices echoed the following:

A piece of navigable water... together with all the potential this embodies

Interview with Canal Society Member (July, 2010)

Potential for movement, for change, for liveliness is embodied by ‘a canal’ and generates interest and response towards these environments. This notion of liveliness, however, does not always correspond to ideas of ‘being alive’. After hearing numerous references to a ‘living canal’ I sought, in a focus group, to ask those present to expand upon this phrase and it was suggested:

Well, it’s a navigation and it’s got to have boats on it, and then, and wildlife as well. It’s movement isn’t it, movement in whatever form that brings it to life. Even if you don’t actually see boats on it, there’s a potential there...

Discussion Walk

Boats and wildlife are brought together in the same breath, central to ideas of a lively canal. The narrowboat sits at the heart of many entanglements with canals, facilitating travel for boaters and providing moments of interest and excitement to those on the towpath. A diary extract from the Woking Illuminated Boats’ Parade (Figure 10) provides an example:

I arrived early. People were not lingering, the canal was enabling movement but not wonder. As darkness fell and the illuminated boats arrived so this changed. The canal banks and bridge swarmed with people – taking pictures and expressing surprise. The boats had appeared from out of the darkness.

Field Diary (27 November 2010)



Figure 10 Woking Canal Festival, November 2010

The appearance of these boats generated liveliness upon the canal, it became something more than the sum of individual trajectories for movement and a material link. Enchantment intruded. Attachment to the seemingly inert objects of the canal particularly resonates with Jane Bennett's (2011) accounts of hoarding behaviours. Listening to the narratives of those who hoard, she notes that in its frequent association with loss, or uncontrollable change, elsewhere in a person's life or wider society, the endurance of materials often capable of lasting longer than human lives can provide reassurance, familiarity, and stillness. The enchantment induced by materials and things becomes seen "as a power of slowness; its efficacy is in part a function of its patient endurance" (J. Bennett, 2011: n.p.). Endurance and stillness therefore do not mean a lack of associations, or the inability to forge relations. Associations and complexity can still emerge amidst tranquillity, and through the enchantment of enduring stillness. Watery and connective environments do not necessarily have to be fast.

Thread of Wildness

Associations and enchantment are not all human, and it is the possibility of glimpsing something wild that draws many people to the canal and holds their interest. Canals flout the spatial separation of the rural and the urban, and in this they can surprise us. The canal rangers, for example, would frequently comment that despite their familiarity with the canal's transgressive flows, they still occasionally struggled to believe that beyond their immediate sight lay dense suburbs and town centres. Canals often skirt the edges of communities, or pass unnoticed through their centres. Narrow and concealed they flow in the corner of your eye, just out of sight; one happens-upon them somewhat accidentally.

When we were walking along certain stretches it felt like we were walking through woodland. You only realise how close other people and buildings are when a train goes past or you see someone's garden...I think it was funny how cut off it felt from the areas we passed through. Even when we got to Woking and there were more people around, when you're on the canal you sort of feel separate from the town.

Alice, Canal Walk (November, 2010)

These waterways transgress our attempts to separate the wild from the human and fail to conform to the labels of rural and urban; in contravening our expectations and distorting spatial norms canals can generate considerable social appeal. This was identified by the Canal & River Trust as central to the attraction of these waterways, for visitors:

...see them as their local bit of canal, their local bit of escape

Interview with a National Ecologist (Canal & River Trust) (June, 2011)

The Canal & River Trust website is further headlined with the claim that their “cherished network of 2,000 miles of canal and rivers flow through the most beautiful countryside and vibrant cities that England and Wales have to offer”¹⁵. Canals are presented as a way of connecting with the aesthetic rural within urban areas, as they “bring the countryside into

¹⁵ Canal & River Trust (2012) *Canals and rivers*. Available at: <http://canalrivertrust.org.uk/canals-and-rivers>. Accessed 24th September 2012.

the hearts of our towns and cities” (**National Ecologist, Canal & River Trust**). Canals weave a watery web dissecting cities and conurbations, and yet for all of this they are often unobserved, frequently celebrated as hidden or forgotten connections, ‘a secret network’ (Gogarty, 2003: 7). As such they can generate “a surprising encounter, a meeting with something you did not expect and are not fully prepared to engage” (J. Bennett, 2001: 5). Canals retain a certain distinction, or distance:

Patrick: Well, I think one of the things is that they are a quiet haven, they are a separate world and that’s what people really like. And if you go to Birmingham, you know, biggest industrial city in the country, the canals are still a sort of a secret world, really, round the back, round the back of buildings, round the corner somewhere, behind a wall...

Discussion Group

Canals create a sense of the countryside within built-up areas, close to where people live and work, and this multiplies the possibilities for connections to wildness.

Joan: I like the nature and the wildlife, that’s what interests me. ... You can feel as though you’re out in the country even if you’re in a fairly urban area...you walk along there and you’re in the country.

Discussion Walk

Patrick: Well it’s often described as a ‘green lung’. I mean, where we’re sitting here [see Figure 11], we’re in quite an urban area and yet you look out the window and there’s trees everywhere and right along the canal you’ve got that corridor, which I think is a very important feature of the canal and it’s why we do try and either resist development or try and make development compatible with the canal corridor...

Discussion Group



Figure 11 Canal adjacent to Canal Centre, the meeting room for the focus group is visible in the right of the image

The environment of canals attracts people and can result in greater appreciation and support for local waterways. This interest in liveliness resembles a concern for wildness, not just rarity. This was emphasised in the interview with a National Ecologist from the Canal & River Trust, during discussion of the aims and benefits of the organisation's Wildlife Survey:

...every year we focus on something. Partially as a media hook just to get the public interested and engaged and to take part, and also because it's something that we want to know more about...we don't ask people to do anything special, we just say come out, have a day on the canal, bring the family down, have a picnic...it's not complicated, just have a good time, enjoy yourself and let us know what you've seen, whether it's a duck, an otter or kingfisher, we're interested in the common just as much as the rare and we get about 42,000 records every year, so it's very simple to do, there's nothing scientific about it, it's basically just a dot on a map. And a lot of the records, you get donkeys and all sorts of stuff, and you get records sometimes for things found in Canada. So you have to filter them, but at the core of it, it's some really good information and it goes onto our GIS system...it's the best media campaign British Waterways has ever had.

Interview with a National Ecologist (Canal & River Trust) (June, 2011)

Since British Waterways' transition to the third sector, and restructuring as the Canal & River Trust, the Wildlife Survey has been supplemented with a mobile phone application that allows users "to tell us about the wildlife you can see on and around the water, directly from the towpath...as long as it's wild, we want to hear about it"¹⁶. The nonhuman liveliness of canals is celebrated and promoted by those organisations seeking to manage the waterways.

Canals' transgressions complicate attempts to draw a boundary between the natural and the cultural, the rural and the urban, the wild and the domestic. Canals are compositions and have performed in multiple guises through their history. As such, they can be difficult to describe:

You've got, I mean, what a wonderful feature, 32 miles of it and *it's entirely natural* and you can see what a lovely place it is...but the other important thing about it is, we saw a canoe going along. That's a good use of the canal. It is a navigation and, *after all it is a man-made feature*, it wasn't out there until 1794/5, so *it is a man-made feature but it's part of the landscape now*.

Discussion Walk [emphasis added]

Canals are inhabited against the grain of historical design and form impressions on the lives of those who live nearby and move along its paths and waters. These impressions do not always conform to our expectations and we become enchanted by canals' capacity for liveliness, and drawn to their atmospheres of wildness.

Thread of Friendship

Lives are composed as the canal endures, for time spent within the stilled atmosphere of the canal is not wasted; rather it may be generative of strong associations.

¹⁶ Canal & River Trust (2012) *Canal & River Trust Great Nature Watch*. Available at: <http://canalrivertrust.org.uk/news-and-views/features/canal-and-river-trust-great-nature-watch> Accessed 24th September 2012

Victoria: ... what do you bring with you when you go to the canal, and what do you take away?

Richard: ...Mud and grime...

Charles: Litter...Wear and tear...

John: Mostly memories...Friendships...

Tom: It's friendships and that sort of thing which last.

Artefact Discussion

John: Well, I remember at the time when the canal re-opened, there were television people interviewing [...] ...and I can remember that he said 'it's all about friends' and he was absolutely right actually, the people that hold it together.

Discussion Group

Human interactions permeate the space of the canal, and these relations do not always appear to be within the control of the people involved. The canal induces connections, and it is frequently remarked upon by individuals that they did not expressly decide to become more actively involved with the canal, or the associated society, but it's "like a quagmire, it sucks you in" (*pers. com.*). It is noted that these are human relations 'which last' and enduring engagements with the canal have generated a commitment to this waterway, which in part secured its restoration. Lives and relationships are composed with the canal. This entanglement also extends beyond the duration of living, as the waterway can become a place for recollection and remembering. In February 2011 the Chairman of the Canal Society, and contributor to this research, passed away. In recognition of his contribution to the canal a traditional boatman's funeral was arranged; the water was the most appropriate place to pay tribute. This public, respectful, and yet informal, boat ride was witnessed by many of the canal's inhabitants, passers-by, and those who had travelled considerable distance to say a fitting farewell to an individual who had long campaigned for the quiet survival of this waterway. In his lifetime the canal was transformed through the labour of volunteers, rangers, and ecological processes; these ongoing transformations will not cease with his passing. Those who stood on the towpath, or pulled the boat, had different motivations for attending and different relationships with the Chairman, but a shared affinity was generated in this moment, emergent from his commitment to this canal.

Impressive attachments can be forged with the seemingly ordinary, passing by in the corner of your eye.

The canal activates human liveliness and the attachments generated can stimulate recollection. Just as the canal transgresses modernity's spatial and ontological boundaries, so its history is also fluid and far from finalised. During one focus group, for example, there was discussion of the canal's incorporation into the GHQ defence line across southern England in the Second World War (see Figure 12):

John: Well, I mean thousands of pillboxes; it was one of the biggest civil engineering projects ever undertaken at the time.

Patrick: Well, it's now part of the canal's history and we're trying to get people more aware of that...

Artefact Discussion



Figure 12 Tank trap adjacent to the canal

The canal here is not regarded as a single historical site; once more its connective potential is highlighted, together with its ability to stimulate wider discussion and relations. This enabling capacity exceeds the canal's design and highlights the rhythmic multiplicity of its temporality as different timelines become foregrounded, temporarily coalescing, and enabling multiple relations. This absorptive history is in part enabled by the absence of relics upon the canal through which to tether and constrain memory.

Victoria: What sort of objects, does the society in general have, have you collected things over the years?

John: Not so much really...

Tom: ... there are no structures along the canal, we haven't got artefacts and we haven't got buildings much either...there's no structure around this sort of canal at all.

Artefact Discussion

A lack of formal 'structure' tying the canal to one particular purpose or historical period has potentially permitted a more open and contestable history, whilst disrupting notions of progress as the canal's temporal trajectory is often likened to a series of ups and downs, renaissances and restorations, ebbs and flows. The canal endures, but it is not certain.

John: I think we are very aware that it isn't eternal, it's really transient...

Discussion Group

Those engaged with the canal are largely receptive to opportunities for change, and this keeps open the possibility for creativity. When the term 'reinvention' was later raised in the same discussion group it provoked strong response:

John: I mean it got reinvented back in the 19th Century when people started using it for pleasure...

Richard: Reinvention of perception perhaps, where, again, more people use it more, and more people gain an interest from it. That probably is necessary, and something which the Society is trying to do.

Bill: And reinvention in management and financing it, that's another aspect isn't it.

There is no single history or purpose to the canal and its openness to reinvention and absorption also introduces it to forgetting. There is a real concern that the canal's dereliction, and the ease with which that state was reached, will no longer be remembered.

John: The message really is that the restoration of the canal is the easy part – it's keeping it going afterwards

Discussion Group

Threading the Canal

Giving prominent space to watery enchantment stories enabled this chapter to introduce the Basingstoke Canal and compose a narrative of this waterway that expressed its abilities, what it can do and enable in others. People talked not of what the canal 'is', but what it could do, what can be generated through its watery movements, and the relations and sensations it engenders. Read together, or individually, the threads explored through this chapter quietly recombined the distinctions between the natural and the social, the fluid and the fixed. The ontological transgressions of the canal's waters, and the failure of these spaces to conform to narratives of disenchantment, pose challenges for environmental management, and potentially contributed to the omission of canals from the 84 page Natural Environment White Paper. However, it is also through these transgressions, the capacity for canals to surprise us and carry us away, that enchantment is generated.

This chapter developed a sustained engagement with the work of Jane Bennett to approach the Basingstoke Canal in a way that did not rely upon, or reinforce, ideas of the spatial separation of nature and culture, or the polluting influence of human presence. Disenchantment narratives, such as those which opened this chapter, have endorsed a managerial fascination with rational behaviours, codes of conduct, and spatial discipline.

These approaches and attitudes, Jane Bennett argues (2001), are insufficient for responding to the world and enacting ethical generosity in the conduct of association. Effective response instead requires “bodily movements in space, mobilisations of heat and energy, a series of choreographed gestures, a distinctive assemblage of affective propulsions” (J. Bennett, 2001: 3). This chapter demonstrated that the Basingstoke Canal is composed of such forces and it is here suggested that these capacities, in addition to the material structure of the canal, could be incorporated into managerial activities. These activities may include more active engagement with the canal and experiments in harnessing its affective potential. A concern for enchantment, a disposition towards its energies, prepares us for the unexpected, the wondrous, and the precarious. Enchantment, as Jane Bennett notes, is a comportment that can be encouraged and in this chapter it was noted that engagement with the canal can foster appreciation. A concern for enchantment also permits the seemingly paradoxical, as we are no longer constrained by the boundaries of states of matter, or scale. The absorptive capacity of water holds multiple temporalities together, whilst a concern for speeds of flow and bodily rhythms allows the canal to be both tranquil and mobile, preparing us for the possibility of change, of a sudden breach, whilst enabling enjoyment and tranquillity. This emphasis upon the creative possibilities of canals prevents them becoming settled and known, and may be a particularly appropriate way of considering them within conservation. As was noted by a Biodiversity Specialist within the Environment Agency, “the biggest challenges are the things that you don’t know”. Attention to the possibilities for change in connective environments may assist in overcoming an on-going concern that too much management is:

...based on steady states, so with conservation you have quite specific management prescription for various types of habitats...This really brings this issue of should we be managing steady states or should we be managing for change.

Interview with Biodiversity Specialist (Environment Agency) (July, 2011)

The multiple forms and possibilities of movement upon, around, and through the canal exceed and undermine its initial purpose; inhabitation is not faithful to design. Canals combine an overriding impression of tranquillity with tempestuous possibilities and a liberating image of travel; these capacities are sustained through the processes and possibilities of water, which enable creativity around canals and inform the potential for change. Water inflects connectivity with a particular sense of change, one which is ongoing, creative and not necessarily at odds with tranquillity and stillness. This sense of the tranquil, the still, is not here akin to waiting or the absence of activity but is intimately connected to liveliness and the entangling of relations. The capacity for water to enable relations between people and nonhuman environments was central to this chapter, and of particular interest was the articulation of a relationship between use/movement and appreciation. This is important in considering ways to maintain and spark human attention and interest outside of National Parks and bounded Nature spaces. Connectivity, through its intimate entanglement with daily life, may be a social catalyst. Watery possibilities and spatial transgressions generate an enchanting atmosphere upon canals, and in the absence of nature this can be a powerful force for conservation, providing we overcome lingering suspicions regarding canals as disenchanting environments.

In developing a multinatural response to the environment of the Basingstoke Canal this chapter actively sought difference by exploring personal relations and the heterogeneity of water. Through the four threads of this chapter the waters of the canal emerged and can be seen to possess a simultaneous capacity for risky concern and enchanting tranquillity. This chapter moved further towards a sense of connectivity as the capacity for the proliferation of complex associations and explored this more explicitly through human relations, whilst highlighting the operation of a creative temporality that foregrounds the precariousness of remembrance and forgetting. As these threads come together, enchantment helps the

development of a more ‘multinatural’ response to the Basingstoke Canal, which will be sustained through the thesis. Wildness, movement, and the creativity of recombination emerge from this chapter and form the motivation for the following two chapters, which can be read as a pair. To be enchanted is to meet with something unexpected, something that we are not fully prepared to engage with; the following chapters consider ways of responding to such encounters within conservation, drawing upon the ideas of ethical generosity and embodied sensitivities raised by this chapter. This thesis therefore now moves to consider the case of invasive species in Chapter Five and the monitoring of ecological assemblages in Chapter Six.

Chapter Five

Responding to Liveliness: the case of invasion

The raft was floating innocuously on the low water of the canal, partially obscured by bankside vegetation. We'd been walking ten minutes or so to reach this point; conversation between us had been easy and often unrelated to the specifics of the day's task, but as we turned the corner we stopped talking. This was our fourth site visit, but first to a raft where a trap had been set. We were no longer monitoring, and now sought more than footprints. The practicalities of what would happen if the trap was successful had been discussed earlier in the day, but the silence and tension were unexpected. We continued to walk quietly, listening intently for any sign of presence. The canal's Conservation Management Plan and the official positions and advice of Natural England stimulated and encouraged our activities, and from an official ecological standpoint the presence of mink in our trap would be considered a success. The inevitable death of any we caught, we were told, would be for the greater good. However, an unspoken, and perhaps irrational, hope passed between us as we walked along the bank. The trap might be empty.

Field Diary (19 October 2010)

A life without the inspirational and regulatory force of a singular Nature can be confusing, for its organising power and cautionary narratives have done a lot of work for the conservation movement (J. Lorimer, 2012; J. Bennett, 2001). The enchanting tales of the previous chapter demonstrated that attachments, wonder, and care can be generated without recourse to, or authority from, the categories of modernity. But the work of Nature was not confined to encouraging appreciation. Ideas of Nature and authentic presence within an environment informed practices of conservation management, particularly in relation to evaluating protected areas. This chapter is paired with Chapter Six, and they together proceed through the following of different nonhuman kinds whose liveliness is of concern to the management of the Basingstoke Canal, and which have a wider agency within connectivity debates as invasive species, indicators, and phenomena. Ecologies continually recombine as individuals move through environments, and species' ranges expand or contract in reaction to climate change, habitat fragmentation, and human-

facilitated translocation. The following two chapters explore how particular nonhumans are detected and evaluated, and the ways in which presence is variously promoted and challenged. In the first of these paired chapters practices of biosecurity are traced as attempts are made to restrict the movement and liveliness of invasive species. Through engagement with the work of Isabelle Stengers and Donna Haraway this chapter foregrounds recombination and the inevitable return of difference, thus challenging existing biosecurity management on both ecological and ethical grounds, whilst suggesting alternative approaches.

A constant theme encountered at the Basingstoke Canal's Conservation Steering Group meetings concerned the continued 'unfavourable' status of the majority of the canal's SSSI units in reports from Natural England. This situation was primarily attributed to the presence of invasive species, in combination with increasing levels of over shading, a product of energetic bankside tree growth. The IUCN (2012¹⁷) has identified 'biological invasion' as a growing threat to biodiversity, and discussions with canal rangers highlighted invasive species, particularly aquatic, as the biggest ecological challenge facing both the Basingstoke Canal and the wider UK waterways network. This was substantiated through conversations with individuals from Natural England, the Environment Agency, and the Canal & River Trust. These concerns connect the management of canal ecologies with wider debates regarding biodiversity conservation, which are influenced by ambivalence towards the promotion of connectivity, owing to fears of invasion. This chapter opened by foregrounding killing, immediately challenging the association of connectivity with the promotion of liveliness and the dispersal of charismatic species. Whilst connectivity offers opportunities to mitigate the impact of habitat fragmentation

¹⁷IUCN (7th May 2012) *Biological invasions: a growing threat to biodiversity*. Available at: http://www.iucn.org/about/work/programmes/species/our_work/invasive_species/?9767/Biological-invasions-a-growing-threat-to-biodiversity. Accessed 22nd June 2012.

and facilitate ecological movements, such strategies are often presented as containing inherent trade-offs by enabling the movement of 'alien' species (Fausch, et al., 2009; A. Bennett, 2003; Poiani, 2000). The encouragement of movement therefore invites a related concern regarding the spread of unwelcome and invasive individuals, with killing presented as the regrettable consequence of unlooked for, and unacceptable, travel and inhabitation. Corridors are risky and the movement they encourage may be dangerous.

This chapter begins by introducing geography's engagement with biosecurity debates, before exploring techniques of distinguishing native, non-native, and invasive species. The lingering judgements of a singular, pure, Nature can be detected in the way these categories structure conservation practices; in coming face-to-face with acts of killing this chapter subsequently explores the spatial and temporal dissonances inherent within such evaluative classifications. An alternative concern for recombinant associations and behaviours emerges as the activities of the canal rangers are followed and the logics and values contained within policy prescriptions are questioned.

Geographies of Biosecurity

Canals are forged through invasion, and accidental flourishing.

Victoria: ...in a way, on canals, everything invaded?

MR: Everything invaded the space, well, you could say that about a brownfield site and some of our brownfield sites have very important species so I think that's what wildlife does and we shouldn't be comparing that with, say, American mink or Japanese Knotweed, because wildlife is successional and it does invade opportunistically. So, yeah, if our native wildlife moves into canals that's fine that's natural, it's an opportunistic thing that happens, but that doesn't mean that mink moving in is a good thing.

Interview with a National Ecologist (Canal & River Trust) (June 2011)

Not all movement is encouraged within canal environments, and the presence of invasive species along UK waterways highlights the importance of biosecurity debates for the management of these corridors. Whilst the term biosecurity encompasses numerous activities, and a range of politics, Hinchliffe and Bingham (2008) distinguish three principal areas of deployment: invasive species control, regulation of agricultural pests and diseases, and the prevention of biological terrorism. The management of these threats is often expressed spatially through the defence of territorial boundaries and regulation of the movement of “living and near living matters”, thus demonstrating that “biosecurity is more than a simple halting of movement” (Hinchliffe and Bingham, 2008: 1535). Ideas of ‘good’ and ‘bad’ flow are particularly pronounced, as attempts are made to prevent the establishment of invasive species and curtail the spread of disease.

As flows are regulated through inspection, quarantine, and restrictions of movement so boundaries are demarcated between pure and chaotic spaces, and a concomitant temporality is generated where emphasis is placed upon “fear of the unknown, preparedness, vigilance and alertness” (Hinchliffe and Bingham, 2008: 1537). Biosecurity practices are strategies for dealing with the dynamism of living matter (Hinchliffe and Bingham, 2008), which is often regarded as undesirable, and subversive. Using the example of bovine tuberculosis, Enticott (2008) traces attempts to standardise space and thus control the flow of the disease through badger culling, and demonstrates how strategies predicated upon the purification of space can generate unexpected ecological flows and spatial perturbations that may render biosecurity ineffective. Within biosecurity practice there is subsequently a need to acknowledge “that some barriers cannot always work” (Enticott, 2008: 1575). Biosecurity, Enticott (2008) cautions, needs to proceed in more multiple ways and engage in the negotiation of space. This follows Mol and Law (1994), who argue against ideas of singular spatial types, and instead propose different ‘kinds of

space'. The first two of their topologies - regions and networks - are largely familiar within social theory. However, it is not always the case that such boundaries or relations differentiate spaces. Sometimes, they suggest, "social space behaves like a *fluid*" (Mol and Law, 1994: 643, original emphasis). Within fluid spaces there are mixtures and gradients of difference, but no clear boundaries; attempts to sanitise space and apply categories can create delays and increase the likelihood of failure. Difference, within a fluid topology, Mol and Law (1994) argue, can change as entities are unstable and unpredictably interact.

Topological multiplicity is generated through recombination, and as these ideas are mobilised through this chapter so it is evident, as Barker (2008) states, that biosecurity is not always an 'event', more often it is an 'ongoing process'. Barker (2008: 1598) draws upon Mol and Law (1994) as she follows the case of 'accommodating' non-native gorse species in New Zealand to highlight the ways in which established theories of biosecurity focus attention on "borders, boundaries, and expert processes of categorisation". Such a presentation, she argues, is challenged in New Zealand where biosecurity practices "produce a complexity of semipermeable boundaries of control that are beginning to incorporate flexibility" (Barker, 2008: 1598). Continuous review of practices, community involvement, and sensitivity to interactions between gorse and other species, landscapes, and human actions ensures that the spatialities of biosecurity in New Zealand remain fluid, contested, and multiple. Barker (2008: 1611) subsequently cautions against mistrusting *a priori* all attempts to "manage and govern nature" and demonstrates that the enactment of biosecurity can be flexible and responsive to nonhuman 'indeterminacies'. She calls for a widening of social science engagement with biosecurity practices beyond the 'monstrous stories' of 'dramatic failures', such as BSE, FMD and SARS, to incorporate more mundane, ongoing, and successful activities. This chapter follows Barker in identifying the potential for flexibility within biosecurity regimes, and is particularly sensitive to the temporal

dimension of invasive species management, in addition to its spatialities. The account presented here, however, is not one of success and failure but a more subtle intersection of dissonance and response.

This chapter explores whether it is possible, in a canal environment, to be both biosecure and remain open to difference, and through this a wider consideration of nonhuman differentiation is initiated, which will be sustained through Chapter Six. An initial concern with plant species provides an opportunity to follow attempts to separate native and non-native species and debate how closely such differentiations relate to invasive behaviours; a concern for the difference between apprehension and anticipation is subsequently developed. Ideas of legitimate geographies of species presence and concerns regarding those ecological behaviours that stifle liveliness are then brought together and developed through a focus upon a single kind to be killed, the American mink. As statutory policies and local actions are traced in relation to these individuals so we falter. Reaction is not enough when we come face to face with a condemned animal. This chapter builds upon work exploring the multiplicity of spaces of biosecurity and develops a sustained engagement with the writings of Isabelle Stengers on ‘ecologies of practice’, together with Donna Haraway’s ethics of killing to develop an approach that recognises the inevitable recombining of ecologies, the temporality of difference, and the importance of response.

Determining Non-native and Invasive Species

Within Britain, a non-native species is commonly defined as “one introduced by human action since the last Ice Age, 10 000 years ago” (Smout, 2003: 11). Fluctuations in the range and composition of ecological assemblages have been common throughout history, however it is suggested that with the advent of the human ‘Age of Exploration’ the extent of

ecological redistribution now exceeds any previous movement (Henderson et al., 2006; Mooney and Cleland, 2001). The UK's recent National Ecosystem Assessment (2011: 30) recorded 3,473 non-native species within Great Britain; the corridors of trade, human mobility, and fashion have enabled, facilitated, and forced this movement. Whilst categorising a species as either native or non-native can be relatively straightforward, exceptions are made and transgressions occur (Preston, 2009). The black rat, the sweet chestnut, and the rabbit, for example, were all introduced to the UK 500-2000 years ago, but have since 'naturalised' (Smout, 2003). Ancient human transportation of cats, chickens, dogs, and cattle, together with cereal crops have also contributed to the establishment of viable populations, and resulted in significant environmental change. Despite this impact, these species have largely become socially, economically, and fashionably integrated across the world (Hughes, 2003). Others, such as *Rhododendron spp.*, landed on the wrong side of history, for whilst present in the area now the UK during a past interglacial they "did not happen to get here at the start of the present one", and are now deemed alien (Warren, 2007: 432). Non-native species are therefore determined "only with respect to a particular environment at a particular moment" (Warren, 2007: 431), whilst their status is informed by their relationship to, and use within, human activity. Nonhumans do not always conform to these spatial and behavioural boundaries; they remain in motion and their movements frequently transgress our expectations.

Categorising species as either native or non-native is predicated upon a knowable historical geography, human exemption from nature, and ideas of stable ecosystems and bounded species groupings. As attempts are made to differentiate biodiversity along lines of nativity, introduced or ambiguously-native species become, following Mary Douglas (2002), 'matter out of place'. The possibility that they may disrupt or engender the reorganisation of established ecosystems generates substantial concerns, for such

recombination can alter webs of predation, change abiotic conditions, and introduce the possibility of hybridisation between previously unrelated species (e.g. Mooney and Cleland, 2001). Ecological homogenisation and species extinctions are feared outcomes, with considerable precedent (e.g. Henderson et al., 2006; Fausch et al., 2009). Rhetorics of 'penetration' and 'purity', however, saturate both scientific and policy accounts (Groning and Wolschke-Bulmahn, 2003) and dangerous parallels with a wider politics of human nativism are not hard to see (e.g. O'Brien, 2006; Olwig, 2003). A significant differentiation is subsequently made between non-native species and invasive species. For example, the Director and CEO of BirdLife International, writing in *Science* with eight other senior conservation practitioners, identifies:

...an important distinction between alien species in general – which are introduced outside their natural range by humans, but which in many cases are harmless – and invasive species, which by definition are not only introduced outside their range but also cause substantial harm to biodiversity and human livelihood. Invasive species, not alien species, are indeed a major cause of biodiversity loss...

Lambertini et al. (2011: 404)

The Environment Agency (2012)¹⁸ notes that the impact of invasive species costs the UK economy a minimum of £1.7 billion a year, and this generates considerable concern. This is highlighted by Natural England, who state:

Most non-native species are benign and only a small proportion becomes invasive, although why some do and others do not is unclear. It is also not well understood why some introduced species, present for many years at low levels, subsequently expand rapidly and become invasive.

Natural England (2008: 207)¹⁹

This uncertainty combines with the precarious relationship between invasion and non-nativity to allow conflation of the two terms, and subsequently legitimise the removal of

¹⁸ Environment Agency (23rd August 2012) *Help track invasive plants during growing season with PlantTracker App*. Available at <http://www.environment-agency.gov.uk/news/142349.aspx>. Accessed 9th April 2013.

¹⁹ Natural England (2008) Section 5.3: Invasive species and diseases In *State of the Natural Environment 2008*. Available at: http://www.naturalengland.org.uk/Images/sone-section5.3_tcm6-4776.pdf. Accessed 22 June 2012.

non-native species through the precautionary principle; they might become invasive. The invasive agency of a species is often attributed to its non-native status and concerns surrounding their (potential) impact have ensured the enactment of policy intended to prevent the introduction and spread of such plants and animals across, and within, national borders. Article 22(b) of the Habitats Directive subsequently states that member states will:

...ensure that the deliberate introduction into the wild of any species which is not native to their territory is regulated so as not to prejudice natural habitats within their natural range or the wild native fauna and flora and, if they consider it necessary, prohibit such introduction.²⁰

Council Directive 92/43 EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

These requirements are fulfilled in the UK through Section 14 of the Wildlife and Countryside Act, 1981 (updated), which prohibits, in the words of Defra:

...the introduction into the wild of any animal of a kind which is not ordinarily resident in, and is not a regular visitor to Great Britain in a wild state, or any species or plant listed in Schedule 9 to the Act. In the main, Schedule 9 lists non-native species that are already established in the wild, but which continue to pose a conservation threat to native biodiversity and habitats, such that further releases should be regulated.

Defra (2010: 4)²¹

This restriction not only prevents the initial introduction of species, but prohibits the release of individuals inadvertently or deliberately trapped or captured, except under licence. These national and international policies are attempts to establish and regulate boundaries to prevent new and renewed invasion, and emerge from anxieties regarding ecological mobilities.

²⁰ Available online at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1992L0043:20070101:EN:PDF>, accessed 22 June 2012

²¹ Defra (first published 21 December 2009 amended 21 May 2010) *Guidance on section 14 of the Wildlife and Countryside Act, 1981*. Available at <http://archive.defra.gov.uk/wildlife-pets/wildlife/management/non-native/documents/section-14-guidance.pdf> Accessed 22 June 2012

Spatial and Temporal Dissonance and the Ethics of Response

Reacting to, and managing, biosecurity threats has increasingly involved the restriction, monitoring, and surveillance of movement and spaces, thus building upon established practices of “cleansing and disinfecting” (Donaldson and Wood, 2004: 373). This chapter, however, follows Barker (2008: 1600) who states that the “practice of biosecurity is not simply about emergency responses, but also about controlling the pervasive, mundane strangeness that is alien nature”. Canals are not neat places, rather their waters transgress and their ecologies may be unexpected and deviant. This brings them into conversation with Isabelle Stengers’ ‘ecology of practices’. This ecology is forged away from both the garden, arranged and pruned to please human aesthetics, and the vivarium “where different species are left on their own, some disappearing, others surviving, others proliferating” (Stengers, 2010a: 56). Stengers critiques approaches which seek to emulate either the garden or the vivarium, arguing that the temporal assumptions governing each side rely upon “a disconnect between the time of the human project and the time that characterises the way beings affected by such projects relate to their milieu” (Stengers, 2010a: 56). She calls instead for an ‘ecology of practices’, where the distinction between facts and values is abandoned and there is acceptance that “none of our knowledge, none of our convictions, none of our truths can succeed in transcending the status of a ‘construction’” (Stengers, 2010a: 38). Such an approach forces sensitivity towards historical immanence and encourages an interest in the ‘means and authorities’ through which the stability of these constructs is sustained. This section explores established biosecurity practices within a canal environment through the lens of Stengers’ critique, and in its circulation with the management of invasive plants contributes a geographical dimension to these ideas, for practices of conservation can display both spatial and temporal dissonance. The first concerns the conflation of the terms non-native and invasive

which fixes the materiality of species and finalises their geographical transgressions, whilst the second relates to the performance of apprehension and anticipation in relation to ecological behaviour.

These dissonances contribute to the maintenance of an ontological gap between humans and animals, reflected in the separation of facts from values, and this, Haraway argues (following Derrida), creates a logic of sacrifice “within which there is no responsibility toward the living world other than the human” (Haraway, 2008: 78). This distinction divides the world into those that can be killed and those that cannot; particular groups or categories of nonhuman are thus rendered killable in ways that do not always fully demand attention, response, or justification. The remainder of this section, and the second half of this chapter, subsequently explore ways an ‘ecology of practices’ may be encouraged within biosecurity, and draws heavily upon Haraway’s approach to the ethics of killing, and the importance of respect and responsibility in encounters with nonhuman liveliness.

Apprehending Homogeneity and Anticipating Invasion

The facilitation of movement is central to the ecological promotion of the canal, but there is a tension between managerial design and the processes of habitation, as ecological movements are regularly indifferent to human objectives, moving and flourishing against the grain and flow. The transgressions of invasive plants are particularly troubling, as a number have the potential to reduce biological diversity and induce considerable ecological change. Within the water channel of the Basingstoke Canal the principal species and groups of concern are²² *Hydrocotyle*²³ and *Crassula*²⁴, with Pickerel weed²⁵ and Parrot’s

²² The names used in the body of the text refer to those most commonly used by the rangers to identify species and therefore are neither consistently common nor botanical.

²³ *Hydrocotyle ranunculoides* or Floating Pennywort

²⁴ *Crassula helmsii* or New Zealand pigmyweed

Feather²⁶ also noted, whilst *Rhododendron*²⁷, Japanese Knotweed²⁸ and Himalayan Balsam²⁹ are the subject of bankside monitoring and control. The national spread and impact of these species, together with their invasive possibilities, informs the conservation practices of the Basingstoke Canal Authority (BCA).

The Conservation Management Plan for the Basingstoke Canal requires regularly updated maps of the location and coverage of invasive plant species, thus temporarily stabilising their inhabitation whilst tracking their mobility.

As we cycled the towpath mapping non-native species so we passed large areas of invasive species growth, which were clearly visible and occasionally dominated our sight. We also encountered smaller collections, initially missed by my untrained eyes, until we halted and their presence was demonstrated. Individual plants would also periodically attract a ranger's attention, seemingly growing innocuously against a garden fence or amongst the dense marginal vegetation. More than once we came to a rapid halt and had to retrace our steps as a glimpse of something different had been caught. All the while we added to our map, as the locations and extent of all these species were marked on a collection of pages pre-printed with the course of the waterway.

Field Diary (28 September 2010)

The canal's ecological connectivity facilitates much of this movement, both aquatic and riparian, and may enable invasive species to move between the canal and neighbouring sites and waterways. In particular, the rangers insist that *Hydrocotyle* was initially transported onto the canal from the Wey navigation and has subsequently moved upstream aided by boat transport and back-pumping schemes, which re-circulate water around locks. *Hydrocotyle* is therefore spreading against the expected direction of flow.

Invasive species constrict liveliness; without a need to forge productive associations with other local species and frequently isolated from webs of predation they can generate

²⁵ A group of the *Pontederia* genus

²⁶ *Myriophyllum aquaticum*

²⁷ A genus of over 1000 species

²⁸ *Fallopia japonica*

²⁹ *Impatiens glandulifera*

significant biotic change. In particular, the vigorous growth of *Hydrocotyle* (it can double its biomass in 4-7 days during the summer) can produce ecological homogeneity by outcompeting native aquatic species, whilst its extensive coverage alters the abiotic conditions of the channel and constrains navigation (*pers. com.*). There have been reports of hedgehogs walking across the canal in summer, supported by its weight. It is the possibility of monoculture, as composition is replaced by heterogeneity, together with the plant's capacity to restrict the liveliness and movement of other species that have made the rangers apprehensive about its presence upon the canal. Apprehension may be a useful approach as etymologically the term evokes a sensory grasping that is informed and learnt; action is compelled on the basis of acquired knowledge. Owing to the rangers' experiences of the impact of *Hydrocotyle* on the canal, and apprehension regarding its future impact, this plant is a regular presence in canal maintenance meetings, and in the rangers' daily timesheets. Attempts are frequently made to reduce its coverage of the water channel, and thus reinvigorate ecosystems and renew diversity (Figure 13):

Two of the rangers put on dry suits and ventured into the canal in order to push the plant towards the banks whilst another ranger and I used pitchfork rakes to haul the weed onto the towpath. The *Hydrocotyle* is not anchored to the bed but does entangle with itself, forming large mats of aquatic vegetation that, when combined with water saturation, other aquatic plants and the silt that deposits itself around the stems, contributes to a heavy weight that needs to be dragged from the canal. Additionally, the presence of marginal vegetation made it difficult to remove the *Hydrocotyle* from the canal once it was pushed to the bank. When the plant has been removed from the canal it is best practice to leave it on the bank to decompose, as this allows small invertebrates to escape. However, there were jokes that on the canal 'you know it grows legs and walks back in overnight' – there is a strong likelihood that at least some of it would quickly return to the canal...

Field Diary (7 March 2011)



Figure 13 Removing Hydrocotyle from the canal in Woking town centre

Managerial interactions with *Hydrocotyle* here follow Barker's (2008) assertion that practices of biosecurity can be ongoing interactions, but within this sustained engagement with invasive species there are often instances of biosecurity *events*. The ecological boundaries of the canal are regularly transgressed through the systematic (re)incursion of mobile invasive species along established pathways, such as from connected waterways, and through the expansion of existing populations. However, isolated intrusions also occur, often as a result of the localised 'escape' of species from adjacent properties (see Figure 14), or through deliberate planting:



Figure 14 Bamboo transgressing the boundary between garden and canal

The rangers had received a botanical report from an ecological consultant, within which a number of invasive species of reputed concern had been identified. Following on from this, two of the rangers had spent some time trying to locate one of the plants. This had involved identifying where the section in question was, for the divisions used in the report were unfamiliar, and then attempting to “track it down” – once they had sufficiently researched what it looked like. It was finally located adjacent to a bench that had just been installed, and speculation subsequently ensued about whether it had been deliberately planted – it was a very attractive plant. Its presence as a non-native was seen to outweigh its sentimental value and discussion was made about its removal, although the low likelihood of its rapid spread meant that this was acknowledged as a low priority.

Rangers’ Meeting (10 December 2010)

A number of invasive species exhibit considerable aesthetic appeal, and if managed within gardens they can contribute to lively diversity. Efforts to remove Himalayan balsam, for

example, with its bright purple flowers, from the canal banks often draws comments from those passing by concerned about the removal of important wild flowers (**Field Diary 30 September 2010**). Yet its woody stems provide little habitat and as it dies back in winter so the banks are exposed to the erosive capacity of the water; in combination with its prolific spread and energetic seed pods, this generates apprehension amongst rangers regarding its continued presence.

Whilst the isolated removal of single planted individuals is achievable, the canal rangers accept that the presence of invasive species is inevitable. *Hydrocotyle*, for example, is firmly established within the ecology of the Basingstoke Canal. It was remarked, as we attempted to clear some of the larger patches, that “you can’t have both marginal vegetation and a *Hydrocotyle* free canal” as some of its small propagules will always remain, protected from sight and extreme winter temperatures by bankside cover (see Figure 15). Complete eradication would require the chemical or physical removal of all aquatic vegetation, which would inevitably cause considerable ecological disruption, whilst failing to eliminate the possibility of invasive re-colonisation. The BCA’s relationship with these species groups becomes one of attempted control, not eradication and management focuses on restricting rigour not presence. Lack of resources, when combined with the growth and mobility of invasive aquatic species, can often result in managerial strategies aimed at sustaining a recombinant ecology that does not swerve into homogeneity. Interviews with ecological practitioners identified this as a potentially ‘appropriate’ approach for the management of a number of established non-native species. A Biodiversity Specialist with the Environment Agency, noted:



Figure 15 Small, green, Hydrocotyle leaves visible amongst the reed beds along the bank of the canal

What you would do would be control the population to a level where the ecosystem services are not affected, so in simple terms - for instance we have a lot, we have an issue with a plant called Floating Pennywort [*Hydrocotyle*], we have a lot of that on the Lower Mole ... If you do an ecosystems services approach on the River Mole you'd say that one of the services the river provides is that of environmental regulation, primarily to reduce flooding, and the Floating Pennywort is in such, there is so much of it, that the ability of the river to actually provide that service and reduce flood risk is affected so what you then do is put in control measures, not eradication, but control measures, which will then reduce the amount of Pennywort to the point at which it doesn't affect the flooding. The reason why I put it in ecosystem services, that's obvious you just manage it, the reason you put it into the ecosystem services approach is that there may be other services, it may be the case that in some instances it's reduction in biodiversity, you have a field with one or two bits of Himalayan balsam, to all intents and purposes that's not going to affect the ecological quality of that unit but if you let it then it would do.

Interview with Biodiversity Specialist (Environment Agency) (July 2011)

It is therefore seen as necessary to develop management approaches that correspond to the ecological impact of invasive species, reflect the likelihood of eradication, and are

sensitive to the specific processes of the location under invasion. It was noted by a Natural England officer:

Where it becomes a problem on sites, I suppose, is where it competes and smothers the species of interest. You can throw an awful lot of money at it and still not eradicate it and you know, you've still got – I'm thinking particularly on Yateley Country Park or Basingstoke Canal, where you've got lots of people accessing it, bringing their dogs in...and moving it around. So it's a question of just trying to retain the species of interest I think...otherwise we're just going to spend huge amounts of money and not get anywhere.

Interview with Natural England Officer (July 2011)

The mobility and dynamic interactions of invasive species are therefore acknowledged. In looking at ideas of 'appropriate' management, and exploring the consequences of financial constraints, flexibilities begin to emerge within biosecurity management regimes. Removing all traces of a particular species can be difficult, and in such circumstances there may be a greater willingness to 'give it a chance' and allow the plant the opportunity to naturalise, stabilise and potentially contribute ecologically. Such an approach was suggested in relation to *Cabomba*³⁰; currently present in low levels upon the canal this plant has a similar physical structure to some native aquatics and contributes to an aeration of the water.

Conservation practices predicated upon the removal of non-native species are further challenged by reports that highlight the possibility that novel and analogue systems may assist ecosystem survival, and the suggestion that invasives should be accepted as inevitable components of global ecology. Mooney and Cleland (2001) suggest that whilst hybridisation within re-assembled environments can pose a threat to those species present, it may also be a source of new variation, promoting ecological health and resilience. It is homogenisation that produces a badly composed environment, and such a situation may be traced to both native and non-native species. For example, during one of

³⁰ *Cabomba caroliniana* Green Cabomba

the days spent with the canal rangers cycling the towpath and mapping invasive species we encountered a large area of bracken and brambles, which was identified as an example of native monoculture. Nativity, however, precluded its inclusion on our maps. Attentiveness towards homogenisation, rather than a focus on nativity may enable these concerns to be translated and communicated. Such an approach may also provide a reprieve to species such as the Sycamore (*Acer pseudoplatanus*), generally considered non-native but recognised as providing important habitat for small birds and for being particularly tolerant of human-influenced environments (*pers. com.*). These approaches remain in the realm of apprehension, as the rangers seek to stay informed through monitoring, and evaluate their actions on the basis of an understanding of the local composition of ecologies. This is an important stance for, as was emphasised by an Environment Agency Biodiversity Specialist, in the absence of active monitoring, situations have arisen in relation to invasive species where “action has been too late, and once it is widespread within the environment it is very difficult to control it” (**Interview, July 2011**). Approaches promoting apprehension treat biosecurity as processual, ongoing, and continually negotiated. Whilst there is a clear need to be sensitive to the changing composition of ecosystems, there is also recognition that the presence of non-native species does not guarantee homogeneity, and that recombinant ecologies do not always cause harm.

Apprehension, however, can become confused with anticipation, where reactions serve to expect and pre-empt invasive behaviour. The creativity of recombination can subsequently be stifled by the expectation of ecological harm; attempts to temporally anticipate the presence and behaviour of species denies the possibility that the associations subsequently forged by these species could contribute to resilience and productivity. Through this temporal dissonance the classification of a group of organisms as non-native can make

them killable, even in the absence of associated invasive behaviour. This form of perception, following Connolly:

...does not mean merely that you anticipate a result and then test it against the effect of experience. It means that perception expresses a set of anticipatory expectations that help to constitute what it actually becomes.

Connolly (2010: 68)

Anticipation is generated through the expected trajectories of non-native species and the association of local populations with the behaviour of representatives of the same, or related, species elsewhere. Such trajectories cannot be determined in advance of the event of invasion and can exhibit considerable variation, Henderson et al. (2006:28), for example, note that the 'successful establishment' of a non-native species is closely correlated with 'propagule pressure', defined as "a combination of the number of times and locations that a species is introduced and the number of individuals in each introduction". The 'tens rule' further suggests that "only about 10% (with a confidence interval of 5-20%) of imported species appear in the wild, and of those species only about 10% go on to naturalise and only 10% of those penetrate intact habitats to become 'invaders'" (Henderson et al., 2006: 28). Invasiveness is therefore not an inherent characteristic of non-native species and does not pre-exist the recombination of an ecosystem in the presence of a novel component. Indeed Hoffmeister et al. (2005: 657) argue that in some cases "invasiveness *evolves after* colonisation" through increased genetic variance, hybridisation, epistasis, or genetic selection or shift. The structure and functioning of the landscape also shapes the possibility of a novel ecosystem developing, with Robbins (2004) noting that an 'invadable' landscape is necessary for invasion to take place. These landscapes are primarily identified as those where the resilience of the environment is compromised, potentially resulting in positive feedback processes that accelerate invasion (Robbins, 2004). Invasion does not pre-exist the meeting of species, and such anticipation of invasive behaviour moves conservation

from the necessity of local killing in apprehension of homogeneity, towards making species and populations inherently killable.

During one of the canal's Conservation Steering Group meetings, as invasive species were discussed, it was strongly argued by the certified ecologist in the group that it was a good idea to remove non-native plants, regardless of current local coverage, if they were reported to be increasing in other national sites:

...*Cabomba* and American Skunk Cabbage were identified as potential species of concern. At this point one of the canal rangers noted that the *Cabomba* seemed relatively stable, although it had spread slightly, and that in the absence of anything else was providing physical structure for vertebrates. The feeling from the ecologist, however, was that it should be removed.

Conservation Steering Group (28 February 2011)

An anticipated future of monoculture, increased erosion, and altered abiotic environments compels attempts to immediately remove potentially invasive non-natives. Whilst ideas of 'appropriate' management enable a form of managed invasion in situations where there is clear local evidence of rigorous growth constraining wider liveliness, invasive behaviours are here actualised. However, acting in anticipation engenders an undifferentiated approach to an entire species, rather than responding to local patterns of inhabitation.

Whilst apprehension encourages caution, anticipation may result in indiscriminate culling and often emerges from the conflation of the terms non-native and invasive, which connect ecological processes to species identity. The distinction between invasion and nativity is often highlighted, and clearly stated, but the slippage from 'alien' to 'invasive' remains common in both literature and practice, and the consequences often involve the ending of life, couched in terms that deny liveliness in the first place: eradication, culling, removal. It is the distinction between native and non-native, rather than invasive and non-invasive

that is frequently performed, and examples of this can be seen in the managerial practices of the Basingstoke Canal. The percentage tree cover of the canal's banks has increased considerably since its construction (*pers. com.*) and frequent attempts are made to reduce the associated over-shading of the canal's waters, an activity heavily conditioned by Natural England's perceptions of arboreal value. The canal rangers highlighted that it was often difficult to justify the removal of any trees as they continue to be regarded as the 'pinnacle' of conservation; felling often results in public complaints, whilst Natural England particularly encourages the retention, or replacement, of mature Oaks. Sensitivity to these principles informs the process of identifying those trees that will be felled to increase light levels:

As we walked the towpath we identified the species of trees lining its banks and a map was drawn, upon which those that had been selected for felling were isolated and plotted. This exercise refreshed my knowledge of these names and ability to identify them, through leaf shape and bark textures, whilst introducing me to more subtle distinctions – such as those between the native English Oak and the non-native Turkey Oak, with the latter exhibiting more 'pointed' leaves. The fate of the trees identified was not entirely determined by the extent to which they inhibited light but also, in part, by their existence as representatives of a particular species, together with their individual aesthetic appeal. A number of non-native species were present, including Turkey Oak and Maple, and this identity provided sufficient justification for their inclusion on the map, and separation from those species for which permission to fell would be more difficult to obtain and justify.

Field Diary (4 August 2010)

We had spent the day mapping a tree project close to Greywell Tunnel, at the western end of the canal, and at one point stopped on the towpath to discuss those trees on the opposite bank. Three English Oak trees, with extensive ivy coverage, stood right on the bank's edge. Paul explained that Natural England was strongly discouraging the removal of mature English Oaks such as these, and whilst they were causing significant shading of the canal, the ivy which encased them was providing good habitat. It might be possible to remove just one of the trees, or maybe two, or take out some of the lower limbs – which extended across the canal – but would this make any significant difference to the aquatic habitat, the health of which formed the focus of this project?

Field Diary (20 January 2011)

As we walked along the towpath and created the maps that would inform the tree projects, nativity was not the principal factor informing discussion. The rangers evaluated trees in



Figure 16 Image of tree project map [image removed from ORA version; please see Bodleian copy]

relation to the levels of light that would subsequently become available below the canopy, their association with other ecologies, such as ivy, and their structural integrity. The trees were assessed both individually and in relation to their interactions within the wider canal environment, whilst financial considerations further informed the extent of work. These factors combined to inform their opinion of the 'best' trees to fell, but these conversations were often lost as the maps were created and the ecological interactions visible on the towpath were distilled and transformed into individual points, labelled with a species name (see Figure 16).

Not all the trees labelled were condemned; occasionally the removal of lower limbs was suggested as a compromise. This was often proposed for English Oak trees where the rangers felt that their removal could have considerable benefits for the flourishing of the wider ecosystem but the challenge of gaining permission to fell and the negative publicity

made pruning a more attractive, but potentially ineffective, option. In the planning and execution of tree projects, the 'unfavourable' health of the aquatic SSSIs often came into conflict with the aesthetic appeal and status of tree species, particularly English Oaks. In balancing these concerns, non-native species become increasingly killable. These species are not considered legitimate presences upon the canal and labelling them non-native makes their absence acceptable, for they should not have been there to begin with.

It was argued above that invasion requires an 'invadable landscape', suggesting that one way to limit the impact of invasive species, and prevent the homogeneity of ecosystems, is to increase the resilience of environments. The success of such an approach may be threatened by the continued separation and differential treatment of native and non-native species. The example of tree felling discussed here demonstrates one way in which the local health of an ecosystem could be jeopardised by the national privileging of particular species. It is also necessary to consider the consequences for those nonhumans whose bodies are elevated and sacred, is the prohibition of all killing always the most appropriate approach? This warrants further exploration, for the fixed lines between those that can and those that cannot be legitimately be killed may also impact upon conservation's ability to acquire knowledge and develop appropriate responses to those they seek to protect. A field diary excerpt from some time spent in the Bat Research Laboratory of Queen Mary (University of London) provides one example:

One of the researchers, whose work focuses on mate selection, was checking her emails and pointed out an alert for the latest issue of *Nature* which included an article concerned with reproductive proteins in squid populations. She then said that she could never conduct such work, and that research into bat ecology is constrained as live samples cannot be taken from bats, nor is it permitted to kill a bat. This is owing to regulations enacted to protect bat populations, and whilst this researcher in no way condoned the excessive collection of samples she did lament that there were a number of procedures that are virtually impossible to carry out, sometimes making it difficult to verify the work of others or advance our understanding at the pace shown in other areas of ecology. Whilst the lab did

receive, and made considerable use of, naturally deceased bats (and I was shown the storage freezer) they were not usually 'fresh' and much potential data had been lost.

Field Diary (24 February 2011)

Protecting a species, or ensuring resilience within ecosystems, requires a more subtle approach to killing than that enabled through the separation of those that can be killed from those that cannot. The separation of native and non-native species abstracts individuals from their particular ecological relationships, and fixes their behaviour through an evaluation of the historical geography of the species they apparently represent, thus denying them the capacity to object to their classification and surprise us. Spatial and temporal dissonances linger within conservation practice, and are expressed through assumptions regarding the stability of species associations, spatial classifications of nativity and the anticipation of nonhuman behaviour. These intersect to generate biosecurity approaches that stifle difference and nonhuman creativity, and may even inhibit the ecological health of ecosystems. A sense of biosecurity as an ongoing, and frustrating, process emerges in discussions with practitioners, but this can be eroded as ecologies are translated away from the canal, into the meeting room, and through conservation protocols. The first half of this chapter has sought to consider the management of invasive and non-native plants within canal conservation and inflected Stengers' notion of dissonance with a more spatial concern. The following section further develops this chapter's critique of the relationship between the categories of 'non-native' and 'invasive', challenges established policy and, through sustained engagement with the philosophy of Donna Haraway, explores the possibility for response.

Attempting a Move from Reaction to Response: the case of mink

***Mustela vison*. American mink.** Scientific naming isolates and pronounces, determining an animal largely by “morphological comparison” and fixing its ecological relations; species become ‘mobilised’ as they are depicted “as organic machines, disassembled and mapped anatomically” (Whatmore, 2002: 21). A focus upon established bodily form and character leaves little room for recognising the fluidity of behaviours, or entertaining the possibility of new and differing interactions, and enables the separation of those species that can be killed from those that cannot. The existence of lists such as the IUCN’s “100 World’s Worst Invasive Alien Species”³¹, forms one example of such a separation as species are named and shamed, spatially abstracted, and presented as potentially universally damaging and globally alien. ***Mustela vison*. American mink. Invasive species.** As geographical accounts of biosecurity practices question whether the behaviours and ‘indeterminacies’ (Hinchliffe, 2001) of energetic and lively natures can really be contained by such lists and the policing of boundaries and territories so there have been calls for greater consideration of process and relations, over static classifications of species and ecosystems. J. Lorimer (2012) states that such an approach to environmental governance would stress:

...that what matters are not actual, existing extensive differences (species, genes, habitats etc) but the heterogeneity of intensive differences that are generative of them. Organisms, species, genes and habitats offer a redoubt – strategic essentialisms in the face of destructive fluidity – but we should not let them fix the generative processes that give inhabited ecologies their resilience, vitality and health...

J. Lorimer (2012: 11)

Geographers have subsequently been urged to attend to the flourishing possibilities of the feral, the novel, and the multinatural. Even here, however, we see doubt and possible retreat; J. Lorimer (2010b), for example, questions whether writers such as Donna

³¹ Invasive Species Specialist Group (2008) *View 100 of the World’s Worst Invasive Alien Species*. Available at http://www.issg.org/worst100_species.html. Accessed 9th April 2013.

Haraway, despite her clear intent for an ethics of flourishing, somewhat forgets the promise of monsters and demonstrates too great a concern for the purity of breeds. But J. Lorimer perhaps also falters when he notes:

...we might find more fluid companion species in urban seagulls, razorback pigs, or even certain invasive combinations – like the inventive ruddy/white tail duck hybrids while disagreeing with the fascist, homogenising influences of mink or knotweed.

J. Lorimer (2010b: 41)

***Mustela vison*. American mink. Invasive species. Fascist.** The threat of ecological homogenisation posed by invasive species warrants attention and apprehension, but is ‘fascist’ really appropriate? What are the consequences of labelling a species that was introduced by human indulgence and negligence and is seeking to flourish, fascist? Mink are denied the opportunity to participate in ecological invention, but in opening up space for invasive combinations within biosecurity we also invite the return of difference and commit ourselves to the possibility of renegotiation. There is scope to challenge established categorisation, and this potential is explored in the remainder of this chapter in relation to the behaviour and management of American mink around the Basingstoke Canal.

Conservation’s engagement with mink begins with a suspicion, which develops into likely presence through the reliable identification of traces. The term ‘likely presence’ here attends to the fluidities and ‘flickerings’ of nonhuman inhabitation, and the challenges of achieving an encounter or accurately classifying traces (e.g. Hinchliffe and Whatmore, 2006). Such identification requires particular abilities, and in following nonhumans H. Lorimer (2010: 57) highlights the skills of the ethological tradition, through which attempts are made to recognise the liveliness of others and to “sense and find attunements and synchronicities with another”. These themes of sensory attunement and learning to be

affected by nonhuman presence are developed further in the following chapter, but traces of their importance can be seen in encounters with mink.

Guidance notes for mink trapping are produced by the Rural Development Service (now part of Natural England³²) and the canal rangers additionally follow the advice and procedures of the Game and Wildlife Conservation Trust³³, complemented by their own experiences. This was explained to me as we travelled by boat along the canal in Hampshire, setting monitoring trays on floating rafts.

The mink rafts were built the previous day, and are composed of a buoyant plywood and polystyrene base onto which an enclosed tunnel run is fitted [see Figure 17]. When the trap is monitoring a container with a mix of sand and clay is placed within a large depression inside the tunnel, complete with an oasis mix that sits just into the water and ensures the mix remains saturated.

Field Diary (12 October 2010)

Studies and experience of mink behaviour suggest that they frequently traverse the banks of water bodies; half running, half swimming along the irregular boundary between earth and water. The rafts are placed in line with this movement and record traces of presence. Mink are inquisitive and this trait is harnessed by those seeking to trap them. Natural England notes that trapping is most effective during the mating season (February-March) when females (often pregnant) are prospecting for a den, and again when the young are naïve and dispersing (August-November)³⁴. Once installed, the rafts are checked regularly for the presence of mink tracks, which can be reliably identified by the shape of the paw and slight visibility of the claw (see Figure 18).

³² Rural Development Service (2005) *Technical Advice Note 02: Mink* (3rd Ed) Available at: <http://publications.naturalengland.org.uk/publication/809095?category=41002>. Accessed 22 June 2012.

³³ Game and Wildlife Conservation Trust (v. 2.2) (March 2007) *The GCT Mink Raft*. Available at: http://www.gwct.org.uk/documents/gct_mink_raft_guidelineslr.pdf. Accessed 22 June 2012.

³⁴ Rural Development Service (2005) *Technical Advice Note 02: Mink* (3rd Ed) Available at: <http://publications.naturalengland.org.uk/publication/809095?category=41002>. Accessed 22 June 2012.



Figure 17 Mink raft, with trap in place



Figure 18 Mink tracks in oasis tray

A trap retrieved from a raft on the Basingstoke Canal is pictured in Figure 18, clearly showing an overlay and confusion of paw prints, which, I was told, may have been made by a number of mink or through return visits; we encounter presence, but it is not fixed or attributed to a single or known body. Once the likely presence of mink has been established the oasis impressions are replaced with a sprung cage trap (visible in Figure 17). These are live traps, and are now visited every twelve hours. If a trap is activated, it is almost certainly a mink that will be present within. Following the Wildlife and Countryside Act (1981) it is illegal to release any successfully trapped mink; after the cage door springs the trapped mink, in the vocabulary of conservation, is 'despatched'. Within the literature produced by Natural England, and other concerned agencies, the death of the individual mink is a necessary and inevitable consequence of the trapping process. Formal ethics focus on the method, and timing of death:

As summer progresses you start to run into a welfare dilemma. If you kill adult females that have dependent young, those young will die of starvation and cold (mink dens are difficult to locate). If you want to avoid this scenario, you must suspend trapping until the young are free-ranging, have already eaten a lot of prey and are to be trapped one at a time. There is no easy solution to this dilemma.

Game and Wildlife Conservation Trust (2007: 9)³⁵

Emphasis is placed not on whether trapping should occur, as this is seen to logically follow from confirmation of their likely presence, but on when it should be enacted and how, for as Natural England further note:

...all mink caught must be killed humanely. This is best done by shooting the mink with a powerful airgun or .410 shotgun whilst it is still in the trap. Mink must not be drowned and there are no chemicals approved for use as despatch methods.

Natural England (2005:3)³⁶

³⁵ Game and Wildlife Conservation Trust (v. 2.2) (March 2007) *The GCT Mink Raft*. Available at: http://www.gwct.org.uk/documents/gct_mink_raft_guidelinesr.pdf. Accessed 22 June 2012.

³⁶ Rural Development Service (2005) *Technical Advice Note 02: Mink* (3rd Ed) Available at: <http://publications.naturalengland.org.uk/publication/809095?category=41002>. Accessed 22 June 2012.

Natural England calls for the enactment of a 'humane' death, but whilst welfare dilemmas inform the timing and mechanism of death, they do not alter the outcome of the exchange that takes place when a ranger comes face to face with a mink. This interaction is effaced within the literature as attention is diverted away from the act of ending a life towards practicalities and optimum technologies. Mink do not die as individuals, they are despatched as representatives of an ecological threat; as their subjectivity is denied so we should struggle to consider our reactions 'humane'. Labelled an invasive species, their deaths are straightforward in reaction to an anticipated, but not necessarily actualised, threat; mink are firmly differentiated as 'those we can kill'. And yet, killing isn't something we like to talk about. A Canal & River Trust ecologist, for example, noted "we do do mink trapping, it's not something we shout about for obvious reasons and there's no clear guidance or policy on when or where you do it" (**Interview, June 2011**). This section therefore sought a deliberate discomfort and began with the practice of killing, before now beginning to explore in more detail the motivations behind these deaths.

Death is often presented as the exception in conservation, an unfortunate consequence of the wider promotion of liveliness and care. But what if we were instead to follow Davies (2012: 10) and "universalise the exception", accepting that all attempts at animal experimentation, whether in the laboratory or the conservation arena, will, in principle, cause some pain and suffering, such that the "critical corollary is that the consequences of any such suffering can never be ignored" (Davies, 2012: 10)? Haraway (2008: 77-78) argues, following Derrida, that the history of western philosophy has sought to establish humans as the only species that can be murdered, all other animals can only be killed; for whilst humans are able to respond and demand response, the nonhuman can only react. It remains a "misstep to pretend to live outside killing" (Haraway, 2008: 80); accepting this, and no longer considering death as the exception within conservation immediately

challenges managerial approaches to potentially-invasive species. Whilst mink and aquatic species are classified, known, and killed as members of a condemned species we remain in the realm of reaction.

At the moment of death, of despatch, amongst the overgrown vegetation of the canal bank the face of the mink is inescapable. Making things visible is the first step to making them responsible, but it can also make us uncomfortable. This sense of disquiet can lead us to pause, and reconsider:

We had begun the day at the canal centre, and as we moved to leave one of the other rangers commented 'ah, you're off to murder mink'. It was intended as a joke, perhaps even a distraction from the realities of the day's work. But it generated silence. It made us uncomfortable. The emphasis had been placed on the word 'murder' and it was a deliberate choice, said with a smile but with an awareness of the apparent contradiction. In the vocabulary of conservation, mink can't be murdered.

Field Diary (19 October 2010)

The bodily discomfort generated through this exchange creates an opening, an uncertainty in the practice of killing and a possible opportunity for questioning. Leaving animals within the realm of reaction and presenting their deaths as necessary sacrifice ensures that only humans can be murdered, but as we follow Haraway's reading of Derrida so we change the terms of our commandments; no longer do we subscribe to 'thou shalt not kill', but 'thou shalt not make killable'. As we universalise the exception and accept the inevitability of suffering so response is demanded of us.

This chapter has traced the ways in which non-native species are made killable, and as we establish the inevitability of death so we can begin, following Haraway (2008), to get better at facing dying. Violence is "a constitutive part of our relation to the diversity and dynamism of life on earth" (Yusoff, 2012: 578) but for us to begin to recognise and

acknowledge its place, the associated absence needs to make its mark. It must be possible for the relation forged on the canal bank to be recognised and heeded, for this is how we may become 'response-able', outlined by Haraway as "a relationship crafted in intra-action through which entities, subjects and objects, come into being" for if this "structure of material-semiotic relating breaks down or is not permitted to be born, then nothing but objectification and oppression remain" (Haraway, 2008: 71). Haraway (2008: 82) argues that we should not be looking to refine our discussions of where to place collectives of nonhumans within the divide of to kill/not to kill but instead be "paying attention and making sure that the suffering is minimal, necessary and consequential". However, as Haraway (2008: 77) also reminds us, following Derrida, there is "no formula for response" rather we must seek to forge "the sort of engagement that keeps the inequality [of suffering] from being commonsensical or taken as obviously okay" (Haraway, 2008: 77). To achieve this we must account for, and make visible, our presence on the overgrown bank of the canal.

The face of the mink saturates the practice of mink trapping for those rangers involved and they are affected by their encounters and by the possibility of finding an animal in a trap. Presence at the death of an animal is one illustration of ethical response discussed by Haraway (2008) but it could also be the case that ensuring privacy in death, through preventing unnecessary witnessing, also recognises that killing is not a spectacle.

Until today I had been both welcome, and able, to participate in and observe all the activities carried out by the rangers. Today was different and this did seem to alter the dynamic of openness that had previously existed. It would be fine for me to accompany James as we travelled along the canal and checked the rafts, but if a mink was to be killed this was not something that would be shared. I do not believe that this decision derived from a sense of shame or embarrassment, but from an ethic of care. James told me that in about 90% of cases everything would go right and the mink would die from a single, clean, shot. But this was not always the case, and on those occasions where an additional shot was required the animal

experienced agony and distress. James believed that his responsibility was to ensure that its death was quick and calm; my presence may put this in jeopardy.

Field Diary (19 October 2010)

Mink have been identified as non-native and their presence within an ecosystem is determined invasive. It is necessary to look more closely at the suitability of these designations and consider them in relation to the spatial and temporal dissonances highlighted above. American mink became established within the countryside of England and Wales primarily following escape and release from commercial fur farms, now outlawed, and thus are designated non-native. These mink are also considered invasive as their patterns and behaviours of killing are deemed illegitimate (Marvin, 2000); often abstracted from the natural realm mink are cast as intruders, rogues, or villains. Natural England's Technical Advice Notes (2005: 1)³⁷ concerning mink state that "[c]ontrol is often necessary because of the damage that they can cause to wildlife, fisheries and game and domestic birds". Mink are therefore not trapped in isolation; discussion surrounding their ecological impact is nearly always conducted in relation to their activity as predators. Of particular note is the relationship between mink and native water vole populations, and it is noted by Barreto et al. (1998: 136) that in those areas where they are present "the American mink is the main factor determining the current distribution of water voles". Mink can be invasive, inducing considerable ecological change within environments and contributing to the significant decline of prey species. Conversation regarding mink therefore often travels in this direction:

*Victoria: Could you tell me about Natural England's policy regarding mink.
...control, keep populations low, until water voles recover.*

Interview with Natural England Officer (July 2011)

³⁷ Rural Development Service (2005) *Technical Advice Note 02: Mink* (3rd Ed) Available at: <http://publications.naturalengland.org.uk/publication/809095?category=41002>. Accessed 22 June 2012.

The aesthetic charisma (J. Lorimer, 2006b) of the water vole saturates human relations with mink. The water vole is a regularly deployed icon of conservation, despite considerable questions over its ability to perform as an indicator of either ecological diversity or health:

...many of the sites where water voles live are actually really horrible...the habitat requirements for water voles – they just need lots of vegetation, it can be nettle. They don't need diversity, they just need quantity and they need somewhere to plop in. So they're not brilliant indicators. They're also not very mobile...

Interview with Biodiversity Specialist (Environment Agency) (July 2011)

The lack of mobility demonstrated by water voles further complicates conservation management as their repopulation of areas is likely to be achieved only through designated programmes of re-introduction. Mink have therefore become killable in part due to the charisma of an often-absent prey species. It has further been suggested that mink have, to some degree, been “demonised” within public perception. I asked whether the Biodiversity Specialist believed that reaction to their presence is disproportionate:

I think by and large it is, with the exception of water voles. The reason why I think that is likely to be the case; often with invasive species you get an initial peak and then you get a reduction...with the mink, you did have big spread, quite intense populations of mink and I think they may just be settling down a little bit [a view supported by Bonesi et al., 2006]. But, I believe that actually during that period – during the 80s and 90s particularly when you had this, if you look at the water bird counts from the BTO it showed that a lot of the water bird populations were increasing. There is always this issue that they're eating all the water birds, clearly I think if you have a breeding female in an area and you've got a family of ducks then it's going to go, so locally the impact can be extreme but you look at a wider picture, it's not really having a massive impact.

Interview with Biodiversity Specialist (Environment Agency) (July 2011)

Mink have become killable because they predate upon water voles, and this activity is regarded as illegitimate, even if it is conducted in environments of improving ecological health and increasing biological diversity. The diet and behaviour of mink, however, are not static and are shaped by variations in their biotic environment. Mink are not solely aquatic predators and indeed tend to demonstrate a mixed diet, of which terrestrial

animals, particularly rabbits, form a significant component (*pers. com.*). Diet composition is additionally influenced by wider ecological interactions, and it is particularly noted that shifts towards terrestrial predation have been recorded following increased inter-specific competition with expanding otter populations (e.g. Bonesi et al., 2006). There are currently no water vole populations on the Basingstoke Canal and no plans for reintroduction, but otters have been sighted on waterways entangled with the canal's catchments and artificial holts have been installed at several points along the canal banks in an attempt to entice and ease their inhabitation of the canal's waters. This raises the question of whether attempts to control the local mink population are appropriate or necessary.

In conversations with those who carry out trapping frequent remarks were made suggesting that their efforts will not remove all traces of mink from the canal, and that they are acting without reliable information regarding the effectiveness of trapping, or the size of local mink populations. This is echoed in wider ecological literature, amongst suggestions that we have been too quick to elevate trapping as the appropriate response to the presence of mink:

...mink extermination has proven to be an impractical goal in every country where it has been attempted...so a different strategy for conserving water voles is needed. Our results provide a basis for this, by revealing the variables that characterise the habitats where water voles still occur. Submerged and emergent vegetation provide water voles with refuges from predators and undisturbed channels allow riparian vegetation to thrive. Indeed, several examples of sites where these features are present show that water voles can co-exist with mink and a range of other predators....

Barreto et al. (1998:136)

Increasingly we are seeing the composition of a body of ecological work that suggests that 'the complete absence' of mink is unlikely and that their ecological intrusion may have been inflated. As we take into account the ecological behaviours of mink and the effectiveness of control policies so the appropriateness of mink trapping programmes upon

the Basingstoke Canal becomes increasingly uncertain. Within current policy guidance, once the presence of mink is established we are rapidly directed towards trapping. The Environment Agency provides an example:

In situations where fish losses to otters are particularly high, or are likely to be a serious problem, steps should be taken to prevent otters gaining access to the fish, whilst still allowing otters to travel freely along watercourses. Before any steps are taken to stop predation, the identity of the culprit should be established. If losses are due to mink, for example, live cage trapping should be used, which allows other animals, including otters to be released.

Environment Agency (2012)³⁸

In many cases, however, such a generalised reaction is inappropriate, unnecessary, and often ineffective; we may perhaps do better to explore approaches that facilitate the co-presence of mink with prey species, encourage competition with other predators, and adapt those policies currently dealing with the consequences of otter predation. The divergent reaction of conservation towards the ‘culprits’ of predation once more returns us to a consideration of how the designation of a species as nationally non-native or elsewhere-invasive can close down debate, as the anticipation of ecological destruction forestalls discussion and it remains easier, and frequently cheaper, to ‘despatch’ non-native species. Subscribing to the divide between those we can kill and those we cannot denies the possibility for response and allows the unchallenged continuation of locally ineffective policies.

In establishing killing as the exception, rather than endeavouring to live with it responsibly and ensure that it is necessary and consequential, we curtail our abilities to care for nonhumans and share their suffering. There is a need to learn to respond and be more attentive to liveliness and behaviours, thus accepting the fluidity of ecologies and moving away from national prescriptions to attend to local, watery, activity. To react is to continue

³⁸ Environment Agency (2012) *What should I do?* Available at: <http://www.environment-agency.gov.uk/business/sectors/39873.aspx>. Accessed 3rd July 2012.

killing or to deny its necessity, but to respond is to consider the care of the rangers and to take account of the practises of killing, whilst continuing to debate their consequences and effects. At present, in its encounters with invasive species, conservation too quickly believes it has determined nonhuman behaviour, too often conflates non-native with invasive and, on the Basingstoke Canal, kills too many mink.

Moving from ‘Good’ and ‘Bad’ Connectivity to Recombination

Not enough attention is given to death in conservation. In tracing the practices and effectiveness of killing in relation to invasive species management this chapter sought to address a central concern stalling the promotion of ecological connectivity and develop emerging geographical ideas to consider the promotion of life and enactment of death within conservation. Corridors are risky spaces and are regarded with unease owing to their promotion of transgressive movements, but they can also be inventive, generative, and encouraging; they are good experimental spaces. This chapter subsequently explored how a concern for recombination, which embraced the ethos of Stengers’ ‘ecology of practice’ and Haraway’s ethics of response, may encourage managerial approaches to connective environments that are both biosecure and open to difference.

Conservation should not abandon environmental management, but should avoid rigid biosecurity regimes that fix materialities and deny the expressiveness of nonhuman behaviour. This chapter developed ideas of biosecurity practices explored on a national scale by geographers such as Barker (2008), Enticott (2008), and Hinchliffe and Bingham (2008), and considered ways of responding to the possibility and apprehension that biosecurity boundaries will be transgressed. Recombination requires us to think differently, for associations change when apparent borders are breached and we cannot

always predict the subsequent composition of an ecosystem. It is necessary to be more sensitive to the creativity of such crossings, for individuals may behave differently to species. In such an approach, this chapter was aided by the watery quality of the canal, which conjures images of flow and movement, celebrated facets of connectivity. Water can challenge managerial activities by enabling ecologies to circumvent prescribed directions of flow. The range of invasive plant species on the Basingstoke Canal, for example, appears to be expanding in the opposite direction to the water's flow, owing to the operation of back pumping at locks and transportation by boats. Water absorbs, transports, and encourages lively movements, whilst regularly contravening human intentions. Within managerial meetings concerning the Basingstoke Canal the health of aquatic ecologies is regularly discussed, together with the 'unfavourable' status of the canal's SSSI units, and focus often shifts to the presence and management of non-native and invasive species.

The ecological recombination generated through invasive species activity is a genuine concern within conservation for this can initiate biological homogeneity, stifle liveliness, and inhibit both human and nonhuman mobility and expressiveness. Neither the engineering of pure nature nor the adoption of an 'anything goes' philosophy will suffice, for these generate both spatial and temporal dissonances (following Stengers, 2010a). Established conservation policies often seek to chart a midway course, avoiding each extreme but continuing to divide the lively bodies it meets into those that can be killed and those that cannot. It is not killing, Haraway (2008) argues, that is troubling but those rigid differentiations through which nonhumans are labelled, evaluated, and thus made killable. Invasive species may be damaging, but not because of their alien status, nor are all invasives necessarily non-native. Invasive species inhibit the flourishing of ecosystems through their lack of productive connectivity and their capacity to stifle the creativity of other nonhumans. The behaviour of individuals cannot always be predetermined, for

invasion does not pre-exist the recombination of ecologies, and it is possible for individuals of the same species to be invasive in one environment, but not in another. This has implications for the connectivity debate and requires a greater degree of apprehension, without anticipation within conservation.

This chapter developed Stengers' (2010a) critique of the garden and vivarium to consider the temporal and spatial processes of anticipation and classification through which non-native species may be rendered killable. Too often, and too easily, individuals are condemned or removed owing to their classification as alien; this designation can inhibit the resilience of ecosystems and close down a more productive discussion. Such a debate may still result in attempts to restrict and control the activity of a species, but engaging in it allows space for alternative possibilities and forces consideration of ecological processes and association, rather than prematurely fixing materialities and behaviours. There is a need for coherence in approaches, but this should not be translated into attempts at generalisation. As was demonstrated in the case of mink, variations in the composition of ecologies can induce recombinations in behaviours and associations of predation, whilst the forced killing of individuals does not always achieve the goals of conservation. Distinguishing between 'good' and 'bad' movement stifles the promotion of connectivity, a more appropriate response may therefore focus upon evaluating recombination and promoting resilience in ways that do not require the distilling and categorisation of components, but which are sensitive to complexity and generative associations. Such an approach addresses concerns regarding homogeneity, but does not prohibit change and creativity within ecological assemblages. The precautionary principle is important, but it needs to remain in the realm of apprehension and avoid the anticipation of such trajectories and the immediate condemning of species on the basis of their non-native status. Apprehension encourages caution, monitoring, and precaution whilst anticipation

quickly takes us to killing. Recombination shifts focus away from preformed identities towards associations, resilience, and the wider consequences emerging from particular relations. This shift contributes to J. Lorimer's (2012) call for environmental governance to move from categories of extensive variation towards the generative potential of intensive difference. In this approach recombination differs from Latour's ideas of well and badly composed (Latour, 2010). Composition invokes ideas of authorship, or at least a conductor who regulates and governs; this does not fit the concerns of connective conservation where it is necessary to be open to the possibilities of the unexpected. This questioning of ideas of conductors, or 'leaders of the pack', is furthered in the following chapter, which traces nonhuman subjectivities, difference and more diffuse gatherings.

Nature lingers in our subscription to the division between native and non-native. When nature was treated as a single realm, J. Lorimer (2012: 5975) argues, things were much simpler as conservation could be "guided towards and audited by a set of transcendental archetypes – species, habitats, ecosystems". Such designations deny the fluidities of identity and ecosystem composition, whilst generalising the behaviours of individuals to that of the species. Stengers (2010b: 26), argues that the "identity of a species is only a first approximation of the ethos of those belonging to a species; what they need, how they relate with each other, and their environment have no biologically grounded specific definition". This chapter, together with Chapter Six, consider the ways in which movement generates identity and subjectivities and challenge human capacities to respond and manage. This chapter called for greater evaluation of ecological invasion and a concern not for 'good' or 'bad' connectivity, success or failure, but responses to recombination; mink and Hydrocotyle should be managed differently. The next chapter moves from considering non-native species to cultivate concern for a different character of alien, as it attempts to follow animals in the unfamiliar environment of the night.

Chapter Six

Flightlines: connecting movement and assembly³⁹

To stand on the bank of the Basingstoke Canal, near the entrance to Greywell Tunnel, late on an autumn evening, is to be entangled with swarming bats.

The Agreement on the Conservation of Populations of European Bats (EUROBATS) highlights the significant impact continued intensification and fragmentation of the European countryside has had upon bat populations through the loss of roost sites, restricted foraging areas, and general disturbance (Battersby (comp. EUROBATS), 2010). The threatened status of many European bats has led to calls for increased data regarding bat species and populations, together with range and abundance, which directly assist the establishment of national and international conservation policy (Battersby (comp. EUROBATS), 2010). Highly mobile and nomadic, bats are elevated within conservation as indicator species (BCT, 2012)⁴⁰. To participate in swarming activities, or hibernation, bats often travel considerable distances and the continuation of these events are seen as good indicators of the status of species over large areas, together with wider environmental conditions (Battersby (comp. EUROBATS), 2010). In commuting to such events and in nightly foraging bats make use of flightlines, recognisable linear features that enable easy movement and navigation. The Basingstoke Canal may resemble one such environment,

³⁹ A modified version of this chapter has been published as part of a special issue of the Journal of Rural Studies concerned with 'Animal-technology Co-productions' edited by Lewis Holloway, Chris Bear and Katy Wilkinson and available as:

Mason, V. & Hope, P.R. (2013) *Echoes in the dark: Technological encounters with bats*
DOI: <http://dx.doi.org/10.1016/j.jrurstud.2013.03.001>

⁴⁰ Bat Conservation Trust (2012) *Bats as Indicators of Biodiversity*. Available at:
http://www.bats.org.uk/pages/bats_as_indicators.html. Accessed 12th September 2012.

and in considering bats this waterway's connective potential is strongly foregrounded. A recent survey of the bat boxes lining the canal concluded:

The canal acts as a valuable corridor for the migration of species between different islands of suitable habitat. This is particularly important when considering very mobile species (like bats) that often need to cover great distances to meet their needs at different times of the year.

Hope (2011: 7)

Determining such movement, and enabling its continuation, is a matter of concern for the management of the Basingstoke Canal. This chapter is therefore the second of a pair concerned with responding to liveliness and movement around the Basingstoke Canal. The urge to respond cultivated in the previous chapter is continued here through attentiveness to human endeavours to detect and differentiate nonhumans. The canal is assembled through flightlines in the image of a corridor. A concern for the dark and the illusive movements of bats further enables discussion of nonhuman subjectivity and difference as particular sites, in combination with nonhuman choreographies, temporarily generate expressive territories. This chapter largely takes place at night and responds to Bear and Eden (2011), who note that despite the inclusive politics of posthumanism's new 'animal geographies', the field still includes some animals more than others. In their discussion of fish, they are further critical of the ways in which certain animals are presented as 'alien' to humans (Bear and Eden, 2011). Unusual and unfamiliar liveliness, together with their associated spaces of dwelling, deserve greater attention within conservation. This chapter therefore extends the watery aim of this research, which itself emerged from a concern for neglected atmospheres and environments, to encounter the dark and those species with whom it is a challenge for humans to become attuned to and which subsequently risk being labelled 'alien'. This chapter considers the mobility and expressive territories forged through the lines of flight of bats, whilst recognising that considering the inhabitation and

use of the canal by bats is central to establishing the importance of the canal as a line of conservation.

The narrative of this chapter emerged from, and is sustained by, an interdisciplinary impulse and desire to approach conservation biology from a different direction. It is built upon a ‘reasonable alliance’ (Lulka, 2009: 386) that developed over the course of fieldwork between myself and one of the Basingstoke Canal Authority’s (BCA) conservation rangers who was himself working towards a PhD, and researching the hibernal ecology of Natterer’s bats (*Myotis nattereri*). We sought to not just talk to each other and exchange concepts, but actively write a multinatural account (see Mason and Hope, 2013), thus developing those interdisciplinary conversations that frequently cease with the completion of fieldwork. The subsequent disruption of disciplinary boundaries results in previously “unexamined parts of the material fabric of our everyday lives (becoming) molten” (Whatmore and Landström, 2011: 583). This chapter therefore draws upon this interdisciplinary alliance, and its technologically mediated encounters with bats, to explore connectivity that transgresses the terrestrial and the aquatic, and consider how the detection of bats and our encounters with swarming may deepen understanding of nonhuman gatherings and assemblages.

Box 1. Bats and the Basingstoke Canal

Bats are both heavily protected and threatened within the UK. Determining bat numbers, diversity, and habitat is identified as a conservation priority, with a number of species listed as UK Biodiversity Action Plan ‘priority species’ and Annex II species under the Habitats Directive (BCT, 2011)⁴¹. All UK bats and their associated roosts are protected

⁴¹ Bat Conservation Trust (March 2011) *Bats and the Law* Available at: http://www.bats.org.uk/pages/bats_and_the_law.html. Accessed 8th January 2013.

under Regulation 41 of The Conservation of Habitats and Species Regulations (2010) and Section 9 of the Wildlife and Countryside Act (1981)⁴² that prohibit destruction and disturbance. The principal threats to bat species are identified by the Bat Conservation Trust as: building and development works which affect roosts, and the loss of feeding habitats and flightlines.⁴³ These pressures are similar to those exerted upon UK wildlife more widely and this is one reason why bats are promoted as useful indicators of general environmental health; the BCT (2012) further notes that bats “can tell us a lot about the state of the environment, as they are top predators of common nocturnal insects and are sensitive to changes in land use practices”⁴⁴. Bats are subsequently regarded as indicator species, and their population sizes and ranges are monitored.

Of the UK’s seventeen breeding species of bat, those most likely to be encountered upon the Basingstoke Canal are:

- Brown and Grey Long-eared bats *Plecotus auritus* and *Plecotus austriacus*
- Common Pipistrelle *Pipistrellus pipistrellus*
- Soprano Pipistrelle *Pipistrellus pygmaeus*
- Natterer’s *Myotis nattereri*
- Daubenton’s *Myotis daubentonii*
- Common Noctule *Nyctalus noctula*

Daubenton’s bats are particularly dependent upon aquatic corridors and their associated insect species, often foraging only a few centimetres from the water’s surface and travelling

⁴² See Natural England’s (2012) Guidance on Bats for more details:

<http://www.naturalengland.org.uk/ourwork/regulation/wildlife/species/bats.aspx> .Accessed 12th September 2012.

⁴³ Bat Conservation Trust (2012) *Threats to Bats* Available at: http://www.bats.org.uk/pages/threats_to_bats.html. Accessed 12th September 2012.

⁴⁴ Bat Conservation Trust (2012) *Bats as Indicators of Biodiversity*. Available at: http://www.bats.org.uk/pages/bats_as_indicators.html. Accessed 12th September 2012.

long distances in this manner (BCT, 2010)⁴⁵. Together with Natterer's bats they additionally compose the largest hibernating population on the Basingstoke Canal, centred on Greywell Tunnel. Swarming activity, prevalent amongst *Myotis* species in particular and emerging from a build-up in activity at hibernation sites through late summer and early autumn (Parsons et al., 2003) has also been observed at this site.

Attuning to, and Articulating, the Liveliness of Bats

Bats are of concern within conservation, but they also challenge human senses; as flying, nocturnal, animals they are not always easily encountered and we often require technological enhancements to reliably identify, track, and monitor their behaviour. These difficulties contribute to a wider tendency, outlined by Jane Bennett (2011: n.p.), to “overlook the creative contributions of nonhumans, or to underhear their calls”. This chapter gives space to sonorous creativities. It begins by considering the particular bodily affordances of bats, highlighting the importance of aural attunement to their distinctive echolocation calls and identifying the centrality of technological devices, particularly bat detectors, to the mediation of human-bat encounters. These technological relations are then situated within a wider body of literature exploring the practices through which lively nonhuman ecologies are rendered present within conservation science (e.g. J. Lorimer, 2008b; Hinchliffe et al., 2005; H. Lorimer, 2000). This chapter therefore contributes to the growing attention being paid within science and technology studies to the ways in which the practices of ecological detection “pack the world into words” (Latour, 1999), generating ‘circulating references’ that translate and communicate the field within wider networks of labs and policy. Work within this tradition has drawn attention to “the uncertainties,

⁴⁵ Bat Conservation Trust (February 2010) *Daubenton's bat* Available at: http://www.bats.org.uk/publications_detail.php/214/species_information_sheet_daubentons_bat. Accessed 12th September 2012.

fragilities and specificities of the field sciences and the skills and technologies” required to record and translate nonhuman presence (J. Lorimer, 2008b: 379). This chapter is therefore concerned with processes of bodily learning, together with the practices and material things of conservation ecology; the bat detectors, harp traps, and tracking devices that are assembled in different ways and are dependent upon particular practices of attunement in order to be useful. Attunement, following Stewart (2011: 445), is a becoming sentient to bodies and rhythm, where things “matter not because of how they are represented but because they have qualities, rhythms, forces, relations and movements”. Attunement is here considered an embodied sensitivity to particular nonhuman differences, and is closely related to the capacity to be articulate within conservation. Latour (2004b: 210) notes that an “inarticulate subject is someone who whatever the other says or acts always feels, acts and says the same thing”. Without attunement we remain inarticulate, for different behaviours and different bats elicit the same response. As we become attuned through our senses we gain a capacity to act; technologies are not simply intermediaries in this process, disappearing once a connection is made (Latour, 2004b), rather they are central to the processes of articulation within conservation.

This chapter narrates attempts to become attuned to the liveliness of bats, and considers the consequences both to conservation practice and multinatural geography of articulating the subjectivities of these apparently ‘alien’ animals. Discussion begins with initial engagements with individual bats, detected and tracked around Greywell Tunnel. The intensity of inhabitation and the bat’s choreographies of movement are made visible and the canal’s importance as a flight line and place of winter refuge emerges, together with the capacity of the canal’s waters and linear structure to aid the passage of bats and connect different populations. As bats assemble and swarm so the limit of our aural attunement is reached. Sensory excess and the failure of attunement generate space for this chapter to

explore the ecological opportunities offered by Jane Bennett's (2005) interpretation of assemblages as throbbing, uneven, and vital collectives. This concept is here inflected with Guattarian notions of transversal subjectivities to approach the swarm as an inter-species affective atmosphere and expressive territory; the swarm complicates representative notions of ecological collectives and demands flexibility from technological and bodily assemblages. The seemingly contradictory relationship between the canal as a conduit of movement and place of assembly is thus explored by following the flight lines of bats.

Attempting to Detect and Trace the Movement of Bats

Bats comprise around a quarter of the UK's mammal species; they are relatively small (ranging in weight from 4-40g), roost by day in secluded locations, and fly at night (Stebbins et al., 2007). Whilst these behavioural characteristics make them very difficult animals to study they are heavily protected within UK legislation and identified as indicator species (G. Jones et al., 2009). As Nagel (1974: 439) famously recognised, the 'sensory apparatus' of bats differs so greatly from our own that we cannot imagine being a bat, rather in endeavouring to relate better "the best evidence would come from the experience of bats"; we must become attuned to their presence. Attending to the experiences of nonhumans forces us to be attentive to their animation and challenges our understanding of the location of agency in the process of detection.

Detectability, a facet of what J. Lorimer (2006b: 549) terms 'nonhuman charisma', is shaped by the interactions and affordances of both the surveyor and surveyed; these are the bodily capacities and characteristics, including size and behaviour, that "determine the ease with which a species can be identified and differentiated". Detection therefore frequently requires humans to locate and recognise material and immaterial traces of

presence, such as the writing of water voles (Hinchliffe et al., 2005) or the calls of corncrakes (J. Lorimer, 2008b). Detection practices in conservation are thus closely aligned with the tradition of ethology as nonhumans and their territories are recognised as forged through habits, refrains and massings (H. Lorimer, 2006). Geographers have subsequently begun to deploy, following Haraway, 'new practices of witnessing' in attempts to "attend more closely to [the] multi-sensual business of becoming animal" (Whatmore, 2002: 37). These human differings are neither imitation nor kinship, but rather bodily alignments and attunements to the becoming of a lively other (e.g. Bear and Eden, 2011; J. Lorimer, 2008b; Lulka, 2004).

The 'stuff' of our ecological interactions is also lively and we must heed Braun and Whatmore's (2010) call to become better materialists, to attend more closely to those technologies performing within the hyphen of human-animal relations. These often overlooked and seemingly inert materials may exert force, a 'thing-power' (J. Bennett, 2010: 3), as they affect other bodies "enhancing or weakening their power". Human bodies are the 'original prosthesis' which we all 'learn to manipulate' through our lives and, through learning, they can become "seamlessly articulated" with technology (Hayles, 1999: 3). As we attune with technologies so our 'common-sensing' (Merriman et al., 2008: 197) is disrupted. The sensory opportunities and potential of this disruption have not yet been fully explored, for even as we've strived to explore the extra-sensory affectivities of human-nonhuman encounters things have remained reassuringly familiar; our eyes continued to see (Morris, 2011). Whilst Jane Bennett (2001: 6) reminds readers of the etymological connections between enchantment and the French verb 'to sing', *enchanter*, Haraway (2008:17) highlights the continued embeddedness of the visual within the biological sciences and conservation, noting that the Latin *specere* from which 'species' is derived evokes "tones of 'to look' and 'to behold'". Without the use of our eyes or the familiarity of

light humans struggle to adjust, for darkness challenges our “sense of bodily presence and boundary” (Morris, 2011: 317) whilst also opening up other ways of knowing as species identities and collective groups look less stable. As discussed by Schivelbusch (1995: 81), in many cultures and mythologies “night is chaos, the realm of dreams, teeming with ghosts and demons” as darkness dissolves boundaries and weakens state control; different kinds of freedom operate at night and fixed forms can disappear, along with established boundaries. Enchantment, however, does not cease with the coming of night or the development of sophisticated technologies. Light and dark are not clearly separate; as illumination dazzles or dusk creates shadows and distorts colour so uncanny environments and enchantment proliferate, captivating people, and enhancing their senses even as their eyes fail (Schivelbusch, 1995). Kathleen Jamie (2005: 3) calls for us “to enter into the dark for the love of its textures and wild intimacy”; this is what bat workers do, for traces of the intense flights of bats disappear soon after sunrise, leaving little evidence of their nocturnal collectives and companionship. The life world of the bat is one of an enchanting and threatened darkness; in order to see difference in the night, and aid the conservation of these nocturnal species, it is necessary to become attuned through technological relations.

Detecting

Keeping company with bats in the dark can be disconcerting and frustrating. We must unsettle our own bodies in an attempt to become attuned to theirs, developing additional skills and learning to be affected by their seemingly erratic motions and indistinguishable calls. Technological developments in recent decades have made it increasingly possible for us to consider this experience as they assist us in identifying species and reliably studying many aspects of bat behaviour. One of the most useful advances has been the widespread availability of a range of ultrasound detectors sensitive to the echolocation calls emitted by bats during commuting, foraging, and social communication. A bat’s wing beat frequency,

which varies between species and scales negatively with body size, determines the repetition rate of calls emitted whilst foraging (G. Jones, 1999). In flight, a bat's down-stroke muscles help to create pressure in the thoraco-abdominal cavity which assists with the production of these calls (Lancaster et al., 1995). The length of the call also varies between species from short to long, known to bat workers in ascending length as: Tick (2-3ms); Click (3-4ms); Slap (5-7ms); Chip (10ms); Tock (15ms); Chop (20ms). The form and frequency pattern of echolocation varies between species and is influenced by a number of factors, for example higher frequency echolocation calls are better suited to the detection of smaller prey, whilst a bat's foraging ecology may also influence the frequency range and amplitude of calls (G. Jones, 1999). Bats foraging in open habitat and hunting larger prey (e.g. Noctules) will usually use longer duration and lower frequency calls, whilst those tending to forage in edge habitats or cluttered environments (e.g. Natterer's) will emit shorter duration, frequency modulated, calls (G. Jones, 1999). The relationship between echolocation and species identity has therefore placed the interpretation of call patterns at the centre of bat detection. Technology is crucial to this process for whilst bats primarily echolocate between 11 and 212 kHz (G. Jones, 1999), the upper limit of human hearing is generally only around 20 kHz. Detecting and recording the presence of bats therefore often occurs without physical or visual contact. Bats become audible, but frequently remain effectively invisible.

Standing on the canal bank, holding a detector, it is possible to identify many bats to species level by recognising distinctive variations in echolocation call. The similarities in calls between some species can challenge their reliable separation, whilst the limited bandwidth of some detectors enables monitoring within only a small frequency range at any one time, potentially excluding bats echolocating beyond this audibility. However, a bat's echo may be retained and transformed beyond the canal bank by using the recording

function of a time-expansion detector. Once recorded, a call can be played back at a slower speed (usually x10) and lower frequency and saved for later analysis. Visualisation software is then used to generate a sonogram of the calls in a bat's pass, and through measuring factors such as call repetition rate, start/middle/end frequency, and power distribution identification can usually be made (e.g. Vaughan et al., 1997). Figure 19 provides an illustration of a time-expanded sonogram of the characteristic pass of a Natterer's bat: a series of very broadband, short duration, echolocation calls which rapidly sweep down from 135 kHz to 16 kHz (G. Jones and Holderied, 2007).

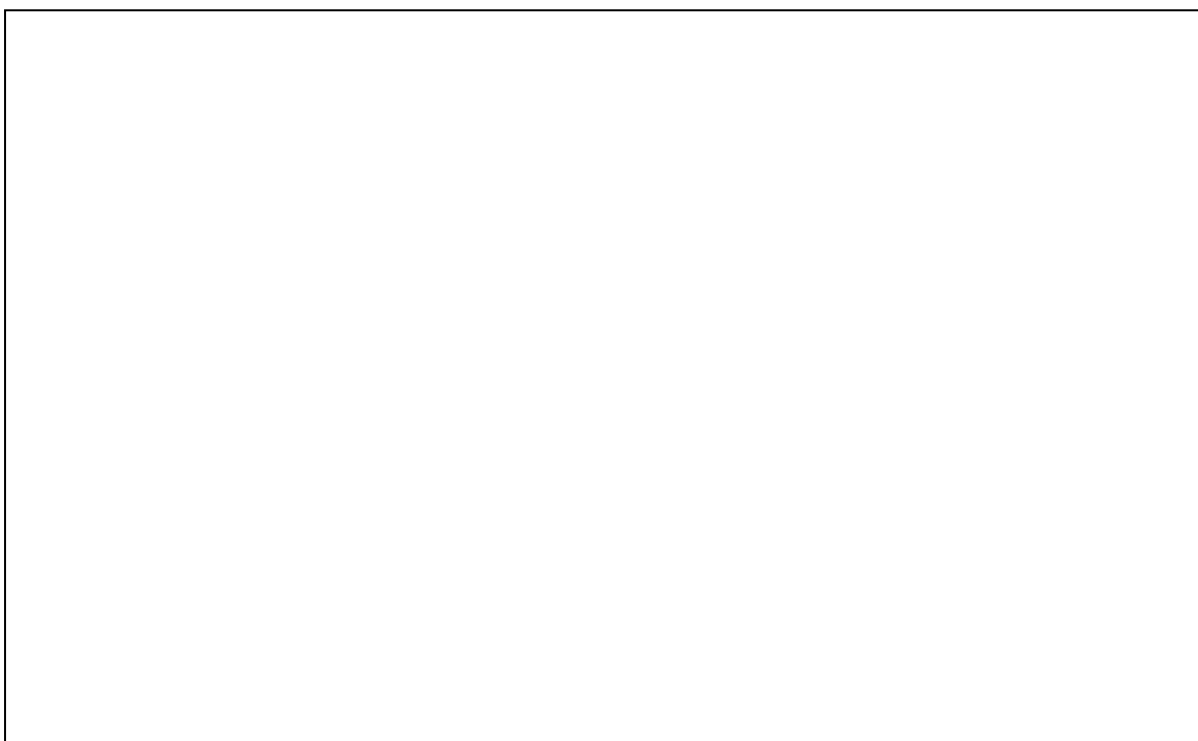


Figure 19 Frequency modulated pass of a Natterer's bat, (reproduced from Mason and Hope, 2013: 5) [Image removed from ORA version; please see Bodleian deposit for original image]

The UK's National Bat Monitoring Programme relies upon surveillance data to assess the status of bat populations. A particular example is the Waterway Survey of Daubenton's bats, for which it is noted: "Ultrasonic detectors using pre-defined sampling methods provide the most statistically-robust and repeatable surveillance" (Battersby (comp. EUROBAT), 2010: 24). Such extensive surveying relies upon volunteers, and encouraging

people to contribute and become effective surveyors is therefore essential. In the summer of 2010 I took part in a Daubenton's survey as part of this programme.

As the sun sets we switch on our detectors and wait, anticipating activity. Moments later the night awakes, and clicks and squeals pierce through my headphones. My eyes strain to fix the source of this noise, seeking a glimpse of flight. Too late; it had already passed by. The detector is quiet again and I am left waiting, and uncertain.

Several bursts of activity later and I began to recognise the approach and pass of bats; the swell and subsequent fading of regular clicks. The echolocation calls of bats, however, were not the only sounds rendered by the detectors. Crickets in the grass, mobile phone signals, and other noises unsettled the night; and this towpath in the Hampshire countryside, which I had walked several times in daylight, felt strangely unfamiliar. As the night grew, so did the level of activity, and whilst I had become sensitive to the sound of echolocation, I was unable to differentiate between the numerous species passing by.

Daubenton's Survey (5 August 2010)

During bat detector training the formal processes of identification are supplemented by more informal techniques, passed between bat workers and used to help beginners distinguish calls. For example, when heard on heterodyne bat detectors the echolocation call of the Natterer's bat is described as sounding like 'burning stubble', whilst the rapid increase in echolocation pulses heard as a bat homes in on a target, and known as a 'feeding buzz', is likened to someone 'blowing a raspberry' (*pers. com.*). Experience with bat detectors shows that we must work to become attuned. This process takes time, may be uncomfortable, and is not guaranteed. Repetition, practice, and a willingness to discover the potential of our senses are necessary to earn inclusion into the choreography of others. Whatmore and Hinchliffe (2010: 447) argue that 'learning to be affected' is a bodily "achievement *with others*, born of association and practice in which all those enjoined in it can, and do, modify each other". We can therefore see, following Spinoza, that bodies cannot be defined in terms of the 'kind of matter' they are composed of, or their organic function, rather "the question of *what a body is* can be considered equivalent to the ethological question of *what a body can do*" (McCormack, 2008: 418). Rendering energetic

nonhumans as ‘likely presence’ (Hinchliffe et al., 2005) is therefore far from straightforward, and involves both affective sensibilities and bodily skill.

Technologies cannot be considered simple sensory appendages, for we must align our bodies with their capabilities and the properties of their mediations. The detection of bats is a product of relationships between humans-technologies-bats, conditioned by the refrain of echolocation, and cannot be distilled to a single location. These relationships are not the same for all who attempt to enter into them, hence the importance of more affective and embodied training, in addition to the formal recognition of echolocation structure. Human difference becomes particularly apparent through these processes of learning, simply holding a bat detector will not enable one to become ‘seamlessly articulated’ with it (Hayles, 1999). A ‘becoming-detector’ is required as our bodily capabilities align with and complement detectors and bats, enabling relationships without seeking emulation or imitation. Encounters with technological detection demonstrate that there are more differences than species, more groupings than human and bat; attunement is not always greatest between those of the same species.

Whilst detectors alert us to presence and record calls, they do not attribute them to individuals, nor is this always the intention. The Waterways Survey of Daubenton’s activity is conducted annually, and whilst we sought to discern the presence of Daubenton’s bats, also known as the ‘water bat’, we did not attempt to know how many accompanied us in the dark; echolocation detectors here “provide an index of abundance rather than absolute density” (Battersby (comp. EUROBATS), 2010: 24).

Pipistrelle calls, the most common on the canal, had dominated the sounds from the detector but now we lowered the frequency to 35 kHz, thus reducing the volume of the Common and Soprano Pipistrelles [whose peak echolocations are recorded at 47 and 53 kHz respectively (Parsons and G. Jones, 2000)] and

capturing the lower end of the Daubenton's call which, I'm told, modulates between 35 and 88 kHz. The Pipistrelles faded as we sought new companions. We began to walk a 1km stretch of the canal towpath towards the tunnel, pausing every 100m and surveying for activity for 4 minutes during which time we recorded the passes made by Daubenton's bats. We sought to record the intensity of movement, not individuals.

Daubenton's Survey (5 August 2010)

The use of bat detectors to demonstrate the intensity of activity can also be seen in the methods deployed to determine whether Greywell Tunnel could be considered an autumnal bat swarming site. When large numbers of bats echolocate simultaneously it becomes impossible not only to discern individuals but to identify the species affiliation of

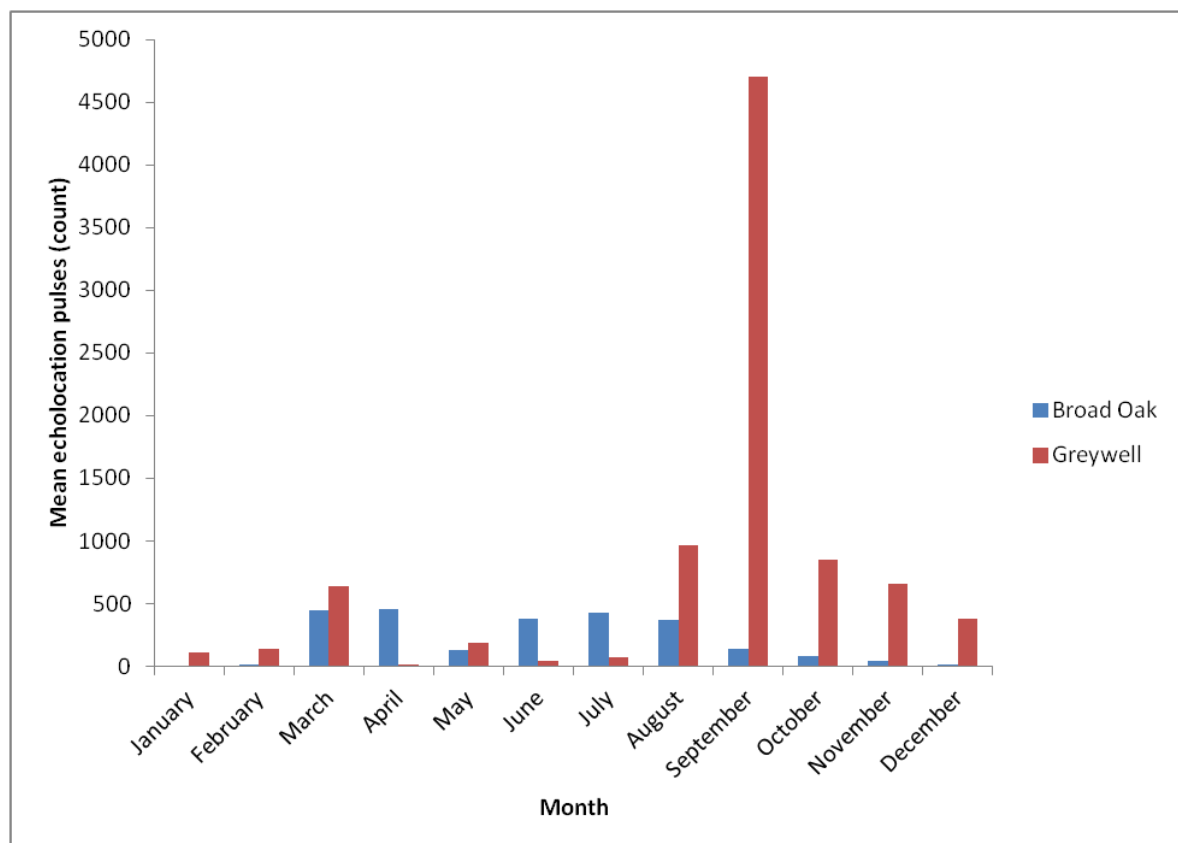


Figure 2019 Mean echolocation pulses recorded at Greywell and a control site at Broad Oak, 2002-2004.

those calls recorded, for the closely related swarming *Myotis* species generate very similar patterns of calls that often cannot be distilled. An index of *activity* was subsequently created by counting individual pulses during peak activity, which was then compared to a control site, approximately 3 miles to the east of Greywell and also adjacent to the canal

(Broad Oak) (see Figure 20). Encounters with technological detection demonstrate that there are more differences than species diversity. The embodied experience of becoming detector blurs bodily boundaries and cannot be represented through a clear separation along the lines of humans, technologies, and bats.

Tracking

Bats inhabit different areas of the Basingstoke Canal differently, and exhibit different temporal patterns. Whilst many bat surveys record not the number of bats present but the intensity of inhabitation, there are occasions where the individual behaviour of particular bats becomes the focus of interest. Greywell Tunnel was recently central to a study of hibernation ecology, during which attempts were made to track the movement of bats leaving the tunnel during the hibernation period. When individual bats are tracked it is necessary to attend to the choreography of a single body and trace its journey, thus combining a 'becoming-detector' with an ethology of flight. I asked the principal ecologist involved in this study to explain his experience of tracking in more detail:

On some winter nights I monitor at the tunnel entrance with headphones, a separate antenna, and a receiver. Pre-calibrated temperature sensitive radio transmitter tags are fixed between the scapulae of 24 hibernating bats; pulse rates range from 30 to 50 pulses per minute, according to the temperature of the individual and therefore detect any individual emergence from a torpid state. Whilst listening from outside the tunnel you get some warning when a bat starts to arouse as the transmitter tag's pulse rate slowly begins to speed up; an active night looms. I stand quietly outside, just back from the tunnel's portal. If the bat has chosen to move then the volume of the pulse starts to fluctuate as the bat flies back and forth within the tunnel. The signal disappears as the bat reaches the furthest point from the entrance and I pause until the sound, very faintly, reappears and builds again in volume as the bat flies toward the portal. This trip is repeated a number of times, back and forth. If the bat chooses to leave the tunnel I am suddenly almost deafened by the intensity of the transmitter's pulse and scramble to reduce the gain control on the receiver as the bat flies directly over my head and into the darkness. The pulse quickly begins to fade whilst I hurriedly make a note of the emergence time and direction of travel, and move off following the strongest signal.

Sometimes bats don't leave the hibernation site at all.

Once tracking begins, it is necessary to become absorbed and aligned with the movements of one individual, remaining focussed on a bat until it re-enters the tunnel, or an alternative roost. Whilst occasional glimpses of its body may occur, sound is the primary trace. The practice of radio tracking bats is far from straightforward and challenges the human body; bats are agile, fast, and seemingly unconstrained.

As the bat commutes away from me it appears to navigate a route via linear features spread out across the landscape - hedgerows, woodland edge, watercourses - I imagine it following a mental map that has been formulated by interpretation of past returning echoes. The flight is certainly not haphazard, nor random; it is fast, determined, and appears full of purpose. My urge to stay with the bat feels more than scientific: it feels like a challenge, or a hunt. My attention becomes almost entirely tuned to the constant pulse of the transmitter. The bat appears to effortlessly cover the distance; obstructions on the ground, which I must somehow navigate, are no hindrance to it. In comparison to the bat my movement feels awkward, cumbersome and primitive as I move through my immediate surroundings using available moonlight or, where necessary, a narrow beam of torchlight. In an attempt to gain an edge I try to anticipate the bat's behaviour, relying on the past experiences of myself, and others, of the bat species being tracked. The night will be punctuated by periods of fast movement, either on foot or using a vehicle, as the bat commutes from its roost to a favoured feeding area or between foraging sites, and periods of relative calm as the bat lies dormant within a night roost, to rest or digest food, or moves slowly and repeatedly within a relatively small foraging area.

Discussion with P. Hope

The temptation to keep moving, following the bat, is great but there is a need to balance tracking with pauses to record data on its movements. Whilst the tracker must remain continually attuned to the movements of the bat there is additionally a necessary detachment as they distinguish between their own position and that of the animal in order to record the choreography of the evening. The tracker does not therefore seek to become a bat, or become *the* bat, but rather retains a sense of their personal bodily differentiation, whilst aligning their senses and bodily movements to the bat's flight. The sensed world of the bat, their inhabitation of the environment, is then rendered cartographically through co-ordinates and lines of movement.

The canal is enfolded within the flightlines of bats, offering a linear connection between foraging and roosting sites, and, for some, directly providing a feeding environment. It is only through attuning our bodies and conducting detection surveys that we become aware of their presence and can begin to respond. Tracking and bat detection surveys clearly require a bodily alignment with the capabilities of technologies, and a necessary human learning to enhance our sensory perceptions and navigate through the dark. As we encounter bats through our new technological organs we are, following Jane Bennett (2001: 52), ‘playing at the edge’ of our ‘species-configuration’. This playfulness involves a “kind of pleasure-danger, fun-reluctance” and enables the enchanting possibilities for becoming and conviviality that can emerge from human-animal encounters (J. Bennett, 2001). Enchantment can clearly be generative within conservation. As our bodies engage in a becoming detector we develop and refine our senses, whilst tracking bats requires a conditioning of movements, in addition to senses, in order to develop a choreography of flight. In the dark, species configurations are reassembled and connections forged through capabilities not identities; we encounter not the visible bodies of our companions but their habits, affordances, and intensities of movement. We cannot know what it is like to ‘be a bat’ and the becomings encountered here are not attempts to imitate or reproduce bat behaviour, but rather endeavours to become attuned to the possibilities of bats, sensitive to their liveliness, and capable of participating with them in the night. The canal begins to take a different shape, forged through the coming together of lively lines of flight.

Generating Territories: encountering hibernating and swarming bats

To encounter bats requires attunement, and this chapter has so far been largely concerned with the echolocation calls of bats, through which it is possible to identify species diversity and track individual movements. However, it is not always possible to align our capacities

of detection with these sonic echoes, nor do bats always experience the canal as emergent from lines; it is also a place of gathering, an expressive territory, and a site of refuge.

Box 2. Bats and Greywell Tunnel

Greywell Tunnel, Hampshire (Ordnance Survey Grid Reference SU707524), is a 1,124m canal tunnel constructed between 1788 and 1794; abandoned in the 1930s following a roof collapse it now forms the western terminus of the Basingstoke Canal (Vine, 1994). The tunnel has been known as an important winter bat hibernation site since the mid-1960s and was designated a Site of Special Scientific Interest (SSSI) in 1985. Large numbers of Natterer's bat (*Myotis nattereri*) hibernate at Greywell each winter (with a maximum recorded number of 629) and the tunnel is believed to be one of the most important sites in Europe for this species, with Daubenton's bats (*Myotis daubentonii*) also reliably recorded (maximum recorded number of 69) (*pers. com.*). In recent years Greywell has also been recognised as a swarming site for a number of bat species, not all of which have been recorded hibernating within the tunnel. Swarming, prevalent amongst bats of the *Myotis* genus, emerges from a build-up of activity at a hibernation site through late summer and autumn, peaking in September (Parsons et al., 2003). A swarm is usually characterised by a high male bias and will frequently consist of more than one species; the composition of the swarm tends to change throughout the season, with each species' numbers peaking at different times (Parsons et al., 2003).

Attuning to the quiet of hibernating bats

Darkness, lack of disturbance, and above ambient winter temperatures have contributed to the attractiveness of Greywell Tunnel to hibernating bats, and it is designated as nationally important. This assemblage endures, but it is not guaranteed as spring water saturates the tunnel walls threatening further earthy movements whilst plans proposing restoration for

through navigation (SHCS, 1989) are periodically refreshed (and were raised in focus group discussions during this research). Hibernation is a 'precarious achievement' (Whatmore, 2002) and whilst legal protection within the UK and the SSSI designation of the tunnel defend the individuals hibernating at Greywell, the annual count contributes to a long-term record of occupation and reaffirms the tunnel's national significance.

Each year at the end of January, and again at the end of February, a small electric boat travels into Greywell Tunnel to conduct a survey of hibernating bats; in 2011 I was a member of the January team. In preparation for the survey we loaded the boat with large lamps, head torches, a clipboard, cameras and a gas detector. As we travelled into the tunnel so the light faded. We encountered bats through the beam of torch light whilst remaining attentive to the distance markers on the wall indicating our position within the tunnel, and sensitive to the oxygen levels recorded by the gas detector. Each bat we individually identified was assigned a tally mark on the recording sheet and allocated both a species identity and location within the tunnel (see Figure 21). These bats are not always faithful allies in attempts to determine their presence.

Date: 28.01.11 Weather
 Start time 09:40
 Finish Time
 Surveyors Ray, Colleen, Helen, Victoria Comments
 Amb Temp 1.0°C

Dist (feet)	Natterer's	Daubenton's	Other	Dist (feet)	Natterer's	Daubenton's	Other
0-50				1600-1650			
50-100				1650-1700			
100-150				1700-1750			
150-200				1750-1800			
200-250				1800-1850			
250-300				1850-1900			
300-350				1900-1950			
350-400				1950-2000			
400-450				2000-2050			
450-500				2050-2100			
500-550				2100-2150			
550-600				2150-2200			
600-650				2200-2250			
650-700				2250-2300			
700-750				2300-2350			
750-800				2350-2400			
800-850				2400-2450			
850-900				2450-2500			
900-950				2500-2550			
950-1000				2550-2600			
1000-1050							
1050-1100							
1100-1150							
1150-1200							
1200-1250							
1250-1300							
1300-1350							
1350-1400							

Totals
 Natterer's
 Daubenton's
 Other

Figure 201 Hibernation recording sheet



Figure 212 Checking tunnel crevice for presence of bats



Figure 223 Cluster of bats in small tunnel crevice

Whilst we recorded a large number of bats roosting alone on the tunnel wall, the majority sought companions. A large number also favoured concealed cracks and crevices; on a number of occasions the boat was reversed back when someone caught a glimpse of something that may be a bat. Several bats were often revealed, and with no way of knowing how far back the crevice extended, or indeed whether it continued up behind the brickwork, it is highly likely that a large number of bats were not counted.

Over the course of a number of years those familiar with the survey have developed techniques for discovering and counting concealed bats. One particularly important mediator used in the surveying is a camera. Taking photographs of the bats in crevices and in larger roosting groups provided an opportunity to zoom in on the group and then analyse the image without disturbing the bats by shining a torch on them for prolonged periods of time. In one small inlet near the mouth of the tunnel, for example, a large number of bats were clustered together and from counting the number of feet visible in a

photograph it was possible to identify 75 bats. The darkness of the tunnel disguised some of those bats present, whilst additionally generating shadowy ‘false bats’ that occasionally confused survey members. Those with experience had learnt to recognise these distortions, generated through a combination of torch beams and the irregularity of the tunnel walls and ceiling, and were able to recognise the deception of these illusions. Those of us new to the tunnel remained distracted; false bats and absent bats kept us company.

We do not know how many bats spent all, or part, of that winter in Greywell Tunnel but it is unlikely that it was our recorded figure of 418, and those conducting the survey were fully aware of this. This figure has value, however, and is the translation that will leave and circulate within political debates surrounding the ecological importance of this site. A quantified record of the Greywell bat population generates a comparable measure of inhabitation that can enter into conversations surrounding nationally and internationally important sites for conservation, whilst readily circulating within conservation policy arenas. It was suggested in a survey conducted in 1992 on behalf of English Nature that:

A search of all records shows that only in eight sites around Britain has the number of bats recorded at one time exceeded a count of 100 animals in winter and for only a total of eleven sites has it exceeded 50 bats...These results [of the English Nature report] serve to show that in Great Britain as a whole, no site has ever recorded a greater number of bats on one occasion than in Greywell Tunnel.

Stebbings (1993: 20)

Annual counts at Greywell have served to demonstrate that the tunnel is reliably inhabited by bats during the winter; the 2013 count revealed 629 Natterer’s bats hibernating in the tunnel. These are not fixed records, and Stebbings (1993: 21) suggests that the number of bats counted may only be 5-10% of the total number of bats present. Uncertainty remains, despite our journey into the tunnel, and a count will be taken again next year.

Assembling the Swarm through Lines of Flight

Exploration of the relations between technology and humans within conservation, together with a concern for the importance of learning, can risk contributing further to what Lulka (2009) has termed the 'residual humanism' of multinatural approaches. Lulka (2009) argues that humanity has remained central to concepts of hybridity, thus preventing the development of depth within the term 'nonhuman'. Nonhumans can be hybrid without the involvement of humans, and Lulka (2009) calls for greater sensitivity to emergent theories within biological sciences, whilst arguing that to maintain a discussion of more-than-human relations requires revalidation of nonhuman hybridity. Posthumanism needs to regain "a sense of the earth's thickness, its obtuseness" (Lulka, 2009: 383) through an appreciation of what happens in the absence of humans. Wildness and nonhuman processes excel in the generation of impurity and thus the term 'hybridity', which has done so much work within geography, potentially offers little to interest the natural sciences (Lulka, 2009). A concern for the spatialities forged through performances, creative assemblies, and more mundane meetings that happen in the absence of humans may instead generate the complexities that add thickness to nonhuman difference.

Whilst hibernation is quiet, autumnal swarming emerges as a cacophony of flights, a territory forged through gregarious movement instead of torpor. The swarm assembles gradually, building its intensity whilst its composition incessantly recombines. It is only relatively recently that an ecological concern for bat swarming within the UK has developed, although internationally it has been described for 26 species, and is most prevalent amongst bats of the genus *Myotis* (Parsons et al., 2003). Swarming emerges through the flights of bats around the entrance to winter hibernacula during late summer and autumn, and has been linked to both mating and the reconnaissance of hibernation

sites (Parsons et al., 2003). The swarming assemblage frequently consists of multiple species, with most bats remaining at the site for only a couple of hours; few bats are therefore present during daylight and capture-mark-recapture surveys indicate low rates of return to the same site within the same year (Parsons et al., 2003). Whilst ecological assemblages have been increasingly recognised as “*dynamic populations* subject to changes over time and between different areas” (J. Lorimer, 2008b: 395), Haraway (2008: 16) continues to lament that “when people hear the term *companion species*, they tend to start talking about ‘companion animals’”. These well-defined individuals clearly matter, but there is a ‘richer web’ of ongoing becoming that is “less shapely and more rambunctious” (Haraway, 2008: 16), and perhaps also less companionable. Whilst our words have been enlivened by the potentialities and vitality of nonhuman processes and bodies as we have followed, and kept company, with them through conservation policy, biodiversity databases, zones of consumption, and beyond (e.g. Roe, 2010; J. Lorimer, 2006a) they have largely retained their established form. Whilst attempts have been made to highlight the fluidity of species identity (e.g. Hinchliffe et al., 2005) and address the neglect of individuals (e.g. Bear, 2011) the labels of species, population and nonhuman often continue to be deployed uncritically as established categories, endowed with representational power. The performance of the swarm is a nonhuman place of gathering, an expressive territory, and a site of refuge generated through the flights and relations of participating bats; it holds the attention of ecologists and enables a reworking of ideas of nonhuman hybridity through a concern for the processes of assembling.

The term ‘assemblage’ is included within the vocabulary of a range of disciplines, and is mobilised in ways that are not easily unified and often focus on divergent “spatial and temporal registers” (Greenhough, 2011: 135). This diversity of usage is enabling; assemblage concepts are not constrained by clear definitions, and yet despite their

proliferation there remain commonalities, as divisions such as those between structure and agency, the material and the social, are blurred (B. Anderson and McFarlane, 2011). Assemblage is, therefore, a good interdisciplinary device. This chapter follows Jane Bennett's (2005: 445) identification of assemblages, as informed by her reading of Deleuze. She notes that they are: historical and circumstantial groupings; living and throbbing collectives; in possession of uneven topologies; not governed by a central power; and composed of a multiplicity of actants. These collectivities neither perform as rational structures, nor are they governed by a central organising principle, but nonetheless they are capable of coalescing around a seemingly unified performance. This presentation of assemblages draws attention both to the enduring achievement of the collective and its heterogeneous vibrancies, whilst highlighting the possibilities for change. Processes of composition are therefore foregrounded, and by not prescribing a "particular spatial imaginary" (B. Anderson et al., 2012: 172-3) such an approach allows understanding of "how spatial forms and processes are held together, often with degrees of internal tension, and might have been assembled otherwise". Assemblage thinking therefore encourages consideration of the ways different bodies may become entangled, and generate difference, whilst not being exhausted by their relations. To approach nonhuman groupings as assemblages prevents their representation as stable, known, and fixed and can therefore be considered an ethos that encourages sensitivity "to emergence, multiplicity and indeterminacy" (B. Anderson and McFarlane, 2011: 124). This may be an important disposition for conservation's encounters with bats, where uncertainty and ephemerality infuse attempts to shape protection and it is necessary to seek approaches to management and detection that 'resonate' effectively (see Dewsbury, 2011) with their swarming flight. As Greenhough (2011: 135) notes, following Haraway, it is also important in such situations to "engage with the responsibilities (such as those entailed by ties of affection) that might emerge from and be demanded by such relations". A concern for assemblages

therefore also invites examination of human responses, and may stimulate changes in behaviour.

We thus begin to articulate what Whatmore (2009: 593) terms ‘associative politics’, which consider the emergent capacities of bodies rather than focussing upon established categories of interest. Whatmore likens such associations to a swarm, and the dark flights and ephemeral swarming of bats are a good place to explore uncertain ecological associations, consider how we may productively encounter them and challenge our ideas of the shape our conservation spaces should, and do, take. The refrain of swarming has entered the lexicon of vital materialism, exemplifying ecological non-linearity, chaos, and the disturbing affectivity of incessant nonhuman movement. The appropriateness of the term ‘swarming’ in the case of bats derives from the “extensive chasing flights” that compose these large assemblages (Battersby (comp. EUROBAT), 2010: 36). The gregarious behaviour of bats whilst swarming prevents a return to the categories of an essentialised Nature. With many *Myotis* bats echolocating simultaneously it becomes impossible to separate the calls of one individual from another. In exhibiting curiosity regarding swarming we were in the company of Deleuze and Guattari (2004), who argue that we do not endeavour to become attuned to animals “without a fascination for the pack, for the multiplicity” (2004: 264). Deleuze and Guattari argue that whilst it is possible to “retain or extract” characteristics, such as species and form, from encounters with animals, an animal is not the sum of its characteristics. As well as potentially participating in collective behaviour “every animal is fundamentally a band, a pack...it has pack modes, rather than characteristics...[and it] is at this point that the human being encounters the animal” (2004: 264). Deleuze and Guattari (2004: 265) develop this idea of modes to identify three ‘kinds’ of animals: individuated and sentimentalised, classified, and “more demonic animals, pack or affect animals”. The same animals may be treated in all three ways, and

within the swarm they may all be encountered. The vibrations of the swarm sustain its difference, it is not composed of one type of animal or a shared flightline; this is not the territory of a single pack, or a knowable diversity of species, but the expression and performance of a multiplicity of difference. What are the relationships that give the swarm shape, enable it to act, and generate its energetic endurance? What kind of territory is forged through its vibrant flights? The entrance to Greywell Tunnel situates the swarm (Figure 24).



Figure 24 Greywell Tunnel, eastern portal

The first engagement is with those animals possessing attributes enabling their classification as species. As darkness falls a harp trap is placed at the centre of the swarm, extending in two rows across the tunnel portal. When erected, the trapping area is

approximately 2.5m high by 1.8m wide. A canvas bag is positioned at the bottom of the frame to collect bats that become trapped between the banks of line; this bag has a flap fixed at the top to provide a secure environment for captured bats, whilst preventing their escape. A large number will avoid the trap, pulling up short and passing around. Others are caught, entangled, the flight taken from their wings as they fall. Once captured, distilled from the swarm, these bats are 'processed' and their sex, weight and forearm length recorded; they become known individuals (Figure 25). The swarm is represented through particular measurements that reaffirm its significance as an internationally important hibernation site. For example, on September 21st 2011 the harp trap enabled the capture of 155 bats: 145 Natterer's (*Myotis nattereri*); 7 Daubenton's (*Myotis daubentonii*); 2 Whiskered/Brandt's, and 1 Bechstein's (*Myotis bechsteinii*). These bats and their recorded species diversity form the principal translation of the 2011 swarm. However, not all the bats collected from the harp trap were identified straightforwardly, as the labelling of 'Whiskered/Brandt's' reveals; morphological similarities between these genetically distinct species complicate classification and an individual's identity may fluctuate within this enlarged category. Furthermore, field studies have shown that when using a harp trap it is frequently the case that <4 % of encounters result in capture (Berry et al., 2004) so the number of individual bats at a swarming site is likely to be far higher than trapping data suggests, whilst the species diversity identified may not accurately resemble those differences within the swarm.



Figure 25 Measuring bat forearm length



Figure 236 Ringed *Myotis bechsteinii* bat

Within these numerical renderings it is possible to encounter the second of Deleuze and Guattari's kinds, the individual bat, a sentimentalised animal possessing a history and a future:

There was something different in the trap. Silence from Paul, and a pause. Then it was confirmed; a Bechstein's. This individual was not placed in the bags we had been using to carry the bats to the inspection site; he was separated from the others and personally carried by Paul. He drew attention, was shown around and photographed. One of Britain's rarest bats and a Priority Species in the UK Biodiversity Action Plan, this bat was the only one to be ringed. Then he was released, initially unbalanced by his metal addition and accompanied by a human chorus of 'come back and visit'.

Field Diary (21 September 2011)

These bats passed through the swarm to become individuated and classified, but the technologies we assemble in the form of bat detectors and harp traps do not fully enable us to distil the swarm and separate its components. Instead, at the excess of detection is an encounter with the third, affective, animal. Deleuze and Guattari (2004: 265) identify this animal as "the effectuation of a power of the pack that throws the self into upheaval and makes it reel".

I sat in a corner of the boat, switched on a bat detector, and put on the headphones. I wasn't expecting the intrusion and isolation this created. I hadn't seen any bats, or at least I hadn't realised I'd seen any, and yet the noise coming through the detector was deafening and intense. I was immediately disorientated and put on edge, clearly I had missed something. I felt uneasy; there was a sense of presence I could not locate.

It was the detector which first made me aware of the swarm, but neither it nor my ears could sustain the intensity. The relationship broke; I had to take off the headphones. I felt isolated from the other people in the boat, and being unable to connect the sound with what I could see, or perhaps couldn't, was too unsettling.

Field Diary (21 September 2011)

Movement permeates the shimmering quality of sound, preventing things being finally settled and enabling the possibility of flight. Engagement with the noise of the swarm leaves those present disturbed, but alert. As we are overwhelmed by sound so our visual capabilities are exhausted, the pulsing flights of bats are too quick and unpredictable.

Neither its location nor its composition can be fixed; rather it is territorialised through the refrains of echolocating flights. The territory of the refrain, forged through the sensory capabilities of repetitive sounds, is, following Jane Bennett (2001: 167), one of vibratory stability whilst containing a “slight twinge or tic of dissonance”. The swarm appears chaotic, and in the absence of order and certainty we were more open to its enchanting possibilities. Our increased attentiveness to sound is a particularly powerful means to induce a mood of enchantment, leaving us both “charmed and disturbed” (J. Bennett, 2001: 34), charmed by fascinating repetition and disturbed by the disappearance of our ‘background sense of order’.

I forced my eyes to be still. The vegetation and water contributed to the darkness, but if I looked up the slightly lighter dark of the sky and the stars helped me see the shadows passing all around. The longer I paused the more I saw. It was useless to follow their movement, darting and quick – there seemed no pattern, no route they were following. And yet there was a pulsing. Ebbs and flows of flight. As I sat in the silent dark so it became clear that the night was not quiet. The crickets in the grass, the wind in the trees and the audible social calls of the bats all intruded, but could not all be traced.

Swarming intensified. Shadows of movement seemed to encase us, flying across the boat, past our heads, darting in and out of the tunnel. I tried to bring my senses closer, to slow myself. I knew, through some incomplete composition of sight, sound and touch that there were bats always nearby, but not always the same bat. I shared the boat with James, a ranger on the canal, who, like me, struggled to articulate the sensation of swarming but concluded that this swarm “wasn’t *unique*, but seemed different, and somehow important”.

We held the flight of bats in our gaze only momentarily, a brief pause in their elusiveness. The swarm was caught in the corner of my eye, immediately dissolving if I sought to focus upon it, or attempted to hold it still.

Field Diary (21 September 2011)

The swarm remains caught in the corner of our eye. Neither its location nor its composition can be fixed; rather it is territorialised through the refrains of echolocating flights. We here begin to see what enchantment can enable, the relations it can engender and the role its encouragement can play in conservation. The sense of something important, generated

through the swarm, may help protect these bats and this is another reason to put on the headphones and try to articulate their presence; through numbers, species, and narratives.

Swarming is composed by many animals, and as human capabilities are enhanced through enchantment and technological prostheses so classified, individual, and affective kinds emerge from the swarm. Human encounters with the swarm are informed by these kinds, but swarming also generates difference beyond human–bat relationships. Filiation, contagion, and alliance create a different composition of the swarm.

The energy of the swarm initiates filiation, as swarming is believed to be central to the enactment of the ‘random promiscuous’ mating strategy pursued by some *Myotis* species (Parsons et al., 2003). Whilst the swarm may be the site of sexual contagion, conception is often absent as both males and females are able to store sperm over winter; gestation is therefore often initiated upon the arousal of females from hibernation in the spring (Racey and Entwistle, 2000). Further alliances are also forged through swarming as bats must distinguish their own echolocation calls from within the cacophony in order to avoid collision. How bats navigate through the midst of the swarm is still not fully understood. Perhaps they have different inflections to their echolocations, much like our own voices, which our technologies are not sufficiently attuned to recognise (Siemers and Kerth, 2006)? The territorial space of the swarm is generated through the performances, alliances and creative relations of bats, and it continues on those nights humans are not present to monitor. The existence of considerable uncertainty surrounding the motivations and practices of swarming demonstrates that there are more differences than those exhibited through detection technologies, or through human-bat encounters. These are differences beyond those of species diversity. Swarming generates affective energies, sensory enhancement, sexual reproduction, and circulations of data. The bodily relations and

spatial assemblage of the swarm are continually negotiated through the lines of flight generated by the bats, the refrains of echolocation, and tensions between the territorial endurance of the swarming site and the ephemeral presence of individual bodies. The concept of assemblage highlights the incessant processes of reassembling and compels a more performative account of the creative territories of nonhumans. The swarm gains momentum and vibration through individual flights, but whilst single bats may be distilled through trapping, the performance of swarming and its enchanting sensations cannot be reduced to these singularities. Assemblage thinking therefore offers the possibility of considering how heterogeneous formations can cohere without losing their multiplicity, or reducing relationships to a hierarchy (Allen, 2011: 154). It is not just species diversity, but eventful territories, performances, and differences that should be considered the focus of conservation endeavours.

Ecological science has sought ways to become attuned to the flights of bats, but this does not guarantee articulation within conservation. Greywell Tunnel attains its SSSI status as an important site for bat hibernation, and this is mainly due to the number of bats that have been encountered overwintering at the site, no mention is made within the citation regarding its value as a swarming site for bats. SSSI designation is rarely, if ever, awarded for swarming alone and sites where low numbers of common bat species are encountered during the hibernation period are often afforded little recognition beyond that given to bats in general. This may be concerning in those cases where rare bats, such as the Bechstein's, are only recorded at a site during swarming but, as yet, are not encountered during hibernation. By excluding the swarm, conservation potentially loses an opportunity to recognise and respond to the precariousness of ecological assemblages and the importance of difference within their composition. Swarming bats are more akin to impressions that, through relations and expressive flight, resemble an interested collective

emerging around the canal and sustained by an impulse to swarm. The swarm is not chaotic, but neither can it be distilled to singularities or elevated to a pack, it is a different kind of assembling.

Bats coalesce within the swarm as its movements offer opportunities for new behaviours and relations. Then they leave, perhaps to return next year. This ephemerality highlights the temporality of the swarm, it must be forged anew both each night and each season, its momentum is gradual and does not derive from an extreme and eruptive stimuli. The potential for swarming endures throughout the year, and yet whilst its occurrence is regular it remains precarious. This is perhaps the limit of theorising with Deleuze and Guattari (2004: 268), for their assertion that wherever we find a multiplicity we find a 'leader of the pack' falls short. Our becoming is not governed by a relationship with a single, stronger, or more charismatic, individual subject, but forged through the affective atmosphere of the swarm. The expressive territory of the swarm is overwhelming and does not easily fit the spatial logics of conservation; immediately challenging ecology's visual reliance, swarming further complicates attempts to assign lively individuals to representative categories.

Cultivating a Response to Liveliness

Species and individuals may come and go within conservation; such movements are both encouraged and feared where environments are managed for connective potential. This chapter developed an interest in one such transient assemblage and traced the ways in which movement is detected and translated around and over the Basingstoke Canal, and explored how reliable inhabitation is established. The lines of foraging, hibernation, and swarming intersected, and from within them the shape of the canal as a corridor for bat

movement and as an expressive territory emerged. Connectivity is not solely terrestrial or aquatic; it is also expressed through flightlines. The life world of the bat is one of an enchanting and threatened darkness; we must attune ourselves with technologies and become a little other than human to render audible and visible their materialities. In attuning with technologies, and following practices of detection, this chapter returned to the opening concern of this research and explored the position and conservation value of canals. Tracing the movements of bats reaffirmed the capacity of waterways to provide ecological refuge, flightlines, and safe passage, whilst this account also sought to develop a geographical concern for the practice of swarming.

This chapter was the second of a pair of chapters concerned with the relationship between liveliness and mobility. These chapters considered flows that subverted expected directions of travel, and harnessed the ethos of a watery concern to explore an environment that has been neglected within animal geographies and may challenge the norms of conservation. Swarming bats contravene the spatialities and temporalities of conservation, whilst their unstable subjectivities further widen attention from individuals and species to considerations of assemblages and phenomenon. This approach to liveliness did not therefore seek stabilisation or fixity, but instead highlighted creative difference, lending weight to Haraway's (2008: 70) assertion that in some cases "entities with fully secured boundaries called possessive individuals (imagined as human or animal) are the wrong units for considering what is going on". This chapter encountered nonhumans through their capabilities, thus building upon the previous chapter's focus on associations. Together these chapters challenge reliance upon categories such as species and native within conservation by highlighting those times and atmospheres where it is not possible to identify different species, and by demonstrating that the behaviour of an individual will not always correspond to expectations.

Affective relations, vibrancies, and generative relations may form across, and transgress, conservation's deceptively stable categories. The environment of Greywell Tunnel enables these relations and the activities and behaviours of nonhumans cannot be contained within a single species label; species diversity can wax and wane. This chapter therefore followed Bear and Eden (2011) in focussing on "becoming *with* across species divides" and sought to develop attentiveness to the capabilities of bodies, thus heeding Erin Manning (2009: 6) who proposes "that we move toward a notion of a becoming-body that is a sensing body in movement, a body that resists predefinition in terms of subjectivity or identity". In the dark, species configurations were reassembled and connections forged through relations not identities; we encountered not the visible bodies of our companions but their habits, affordances, and intensities of movement. In following bats the importance of sensory experiences in conservation were foregrounded, highlighting the generative capacity of enchanting relations and suggesting we should further seek ways to encounter and relate to those we claim to protect. This chapter highlighted the importance of Greywell Tunnel and the Basingstoke Canal to the UK's national conservation interests. However, the last UK mammalian extinction was a bat species (Greater mouse-eared bat *Myotis myotis*), and this chapter also raised concerns regarding current approaches to the management of bats, and highlighted a lingering concern for species and permanence within conservation policy even as the practice of ecological detection recognises and works with different subjectivities.

Whilst this chapter sought to demonstrate that geographical studies would benefit from a thicker notion of hybridity, informed by dynamic biological ideas, the successes of conservation may also be aided by a greater accommodation of difference. A heightened concern for performance and expressive territories could be one strategy through which conservation acknowledges difference as well as diversity, whilst an opening up of the

enchancing potential of encounters through technological relations may encourage both increased involvement of volunteers, and awareness of the flights of bats in the night. Autumnal bat walks currently take place around the canal, where the public are able to experiment with bat detectors and encounter foraging and commuting bats in the area around the canal centre. The popularity of these events currently exceeds capacity and highlights the potential of such engagements. For these walks headphones are not used and so the echolocation calls generated by the detectors are audible for all those walking the canal path, creating a rather ethereal environment and affective atmosphere which together stimulate engagement between humans and bats. Public reactions varied from surprise at the levels of activity and a desire to relate past encounters with bats to one boy's request for a bat detector as a birthday present. It may be beneficial to further develop, fund, and recognise these initiatives, for at present they are voluntarily organised by the rangers and the BCA, and have all but ceased following reductions in the ranger team.

In tandem with Chapter Five, this chapter considered strategies for detecting lively movement and discussed the ways in which conservation reacts and responds to the recombining of ecologies through connective movement. This second chapter moved into the dark, to encounter animals of considerable conservation importance that continue to be regarded as 'alien' and explore in more depth ideas of the *capacity* for response. Attending to the attunement and articulation of bat liveliness highlighted human capacities for learning and heightened sensory perception, demonstrating that response is embodied and relational. Following the movements of bats, and entangling with the swarm, also introduced the possibility that lines of flight can recombine, exhibit capacities, and create difference as they are forged through associations. This moved discussions of recombination away from more static notions of environments to consider expressive

territories and demonstrate their relevance within connectivity debates. This pair of chapters assembled the canal through a particular focus upon a number of species of concern around the waterway, where movement is both encouraged and curtailed, and where detecting the presence of individuals demands response. In following these animals and plants these chapters encouraged a closer look at the categories through which presence is evaluated and the ways in which conservation responds to, anticipates, and is apprehensive of presence. This thesis retains a sense of the emergence of gatherings and assemblages as it first considers how the line of the canal is inhabited and connected in wider policy circulations before exploring the possibilities for exercising effective publics in support of a linear waterway in times of financial constraint and uncertainty within national organisations.

Chapter Seven

Lines and Connectivity

Recombinant ecologies challenge the designations of conservation, whilst the Basingstoke Canal is increasingly taking shape as an enabler of movement, contested site of invasion, and expressive territory. The previous two chapters traced these processes and considered managerial reactions and responses to the 'likely presence' of particular nonhuman kinds. The messy liveliness of such an environment can create wariness, for the canal has neither a stable identity, nor guaranteed patterns of inhabitation. The creative associations of the canal were subsequently foregrounded, whilst the importance of sensory attunement, bodily difference, and the forging of generative relationships was highlighted. The image of the canal as a single, knowable, and controllable line was thus challenged. This critique is further developed within this chapter as the relationship between lines and connectivity is explored more closely. In asking whether a line can recombine, this chapter draws upon Ingold's (2007) lament that people are too quick to see straight, singular, lines even where none exist. Life emerges from movement and these lives are lived upon paths, which, Ingold (2007) argues, can be considered a sort of line. The previous chapters of this thesis, however, have also demonstrated how the lines of life are not always straight, and may undergo transformation and recombination as they entangle, unravel, and are lived. This chapter therefore explores the relationship between 'living along' and 'joining up' ecological lines in the context of corridors and connectivity.

The beguiling imagery and attractive simplicity of corridors is easily conveyed, requiring no explanation they are both intuitive whilst remaining undefined; they can be mapped and marked (Goldman, 2009; Evans, 2007). Joining up points and spatially representing

linearity, or connection, however, may not guarantee connectivity. This chapter follows lines and lives as it traces an attempt to promote the ecological flourishing and connectivity of the Basingstoke Canal by securing EU funds through an application to the 'Higher Level Stewardship' (HLS) scheme.

Sites vs. Corridors

In interviews with Natural England representatives it was lamented that at present the Basingstoke Canal is managed 'as a site' and they were subsequently encouraging attempts to promote its ecologies within an 'interconnected' and 'landscape scale' approach (**Interview, Natural England Officer, July 2011**) A distinction can easily become established in both spatial imagery, and in the ethos of managerial approaches, between a 'corridor' and a 'site', and such separations can become hierarchies. However, whilst we may be able to join the dots this does not mean that we should privilege the destination; interesting things may happen along the way, without necessarily reaching the points at either end (e.g. Ingold, 2007). This research assembles the canal not as a simple line, but through multiple, recombining, lines that generate unexpected connections between ecologies, people, and policies. The extent to which this is possible within conservation policy is the focus of this chapter as the relationship between movement/connectivity/corridors is explored and the position of water within HLS funding is challenged. The chapter begins by presenting a sequence of vignettes that render the canal's waters in different ways, through connectivity and difference, points and continuum. In attending to 'gradient', 'channel', and 'designation' this chapter opens by foregrounding the viscosities of the canal's visible permeability and the tensions through which the canal can be both joined up *and* lived along.

Gradient: pH

The Basingstoke Canal's citation by English Nature (1995) as "botanically the most species rich aquatic system in England" owes much to the continued performance of the waterway's pH gradient, which is threatened by the incorporation of the canal into expanding urban drainage systems with increasingly alkali run-off (*pers. com.*). The maintenance of a gradient decreasing from an alkalinity (defined as mg/l CaCO_3 at pH 4.5) of >200mg/l near the western terminus to <125mg/l along the eastern half of the canal is identified as a target in the conservation management plan. The water quality of the canal is subsequently monitored regularly at a number of sites (see Figure 27).



Figure 27 Equipment and processes of water quality measurement

The four testing locations currently used by the BCA were inherited from the canal's former use as a training site for an agricultural college and are all located along the eastern, Surrey, stretch of the canal. These positions all have some form of bridge from which to measure turbidity (using a Secchi disk, leftmost image of Figure 27) and accessible banks from which to measure temperature, conductivity, pH, and dissolved oxygen levels using a pre-calibrated sensor (rightmost image of Figure 27), and allow the collection of water samples for particulate/chemical analysis by the Environment Agency (middle images of Figure 27). Water quality information is therefore concentrated across half of the canal, and inferred from the points of these established monitoring stations.

Monthly monitoring proceeds irrespective of weather and flow conditions. This is the subject of a degree of debate, for whilst one ranger noted that such variations could be seen as an accurate reflection of the frequently erratic conditions on the canal, others highlighted the ways rain water and variations in flow caused by changes in runoff, ice cover, and temperature could influence assessments. Annual records of water quality emerge from these monthly assessments, whilst the ambient conditions are recorded and influence interpretation. A host of complex mediators collect and translate the water of the canal, regularly re-establishing and making visible a pH gradient through the drawing of lines between points. The rangers, however, display caution in extrapolating these reports, noting that the samples are only accurate for a particular moment at a single site and they are reluctant to make assumptions about what is happening in-between, both spatially and temporally. There are therefore concerns regarding the extent to which such isolated moments can illustrate connectivity and ionic gradient.

Channel: bats and otters

Flightlines were introduced in the previous chapter as indicators of connectivity and environmental health, and the capacity of the Basingstoke Canal to enable such movement is regularly highlighted. The clear flight line provided by the canal's water channel and largely uninterrupted bankside vegetation may encourage and 'funnel' bats towards Greywell Tunnel. These bats often travel considerable distances to reach this swarming and hibernation site each autumn (see Parsons et al., 2003), and it is believed that the presence of the waterway and its open environment may enable the convergence of flights, and thus contribute to the international importance of Greywell Tunnel as a hibernation site for *Myotis* bats (*pers. com.*). The canal's performance as a corridor also emerged during research, introduced in Chapter Six, conducted by one of the canal rangers, that involved tracking bats around Greywell Tunnel. As the bats were tracked leaving the western end of the tunnel during the hibernation period, so their locations were recorded and combined with a map of the area. As shown in Figure 28, the linear environment of the canal emerges as an attractive pathway and potentially serves as an important foraging area for those bats hibernating within the tunnel (see Hope and G. Jones, 2012). Figure 28 further indicates the importance of the canal's regular intersection with other linear features, including hedgerows and country lanes, in generating flightlines; bats do not fly the canal in isolation.

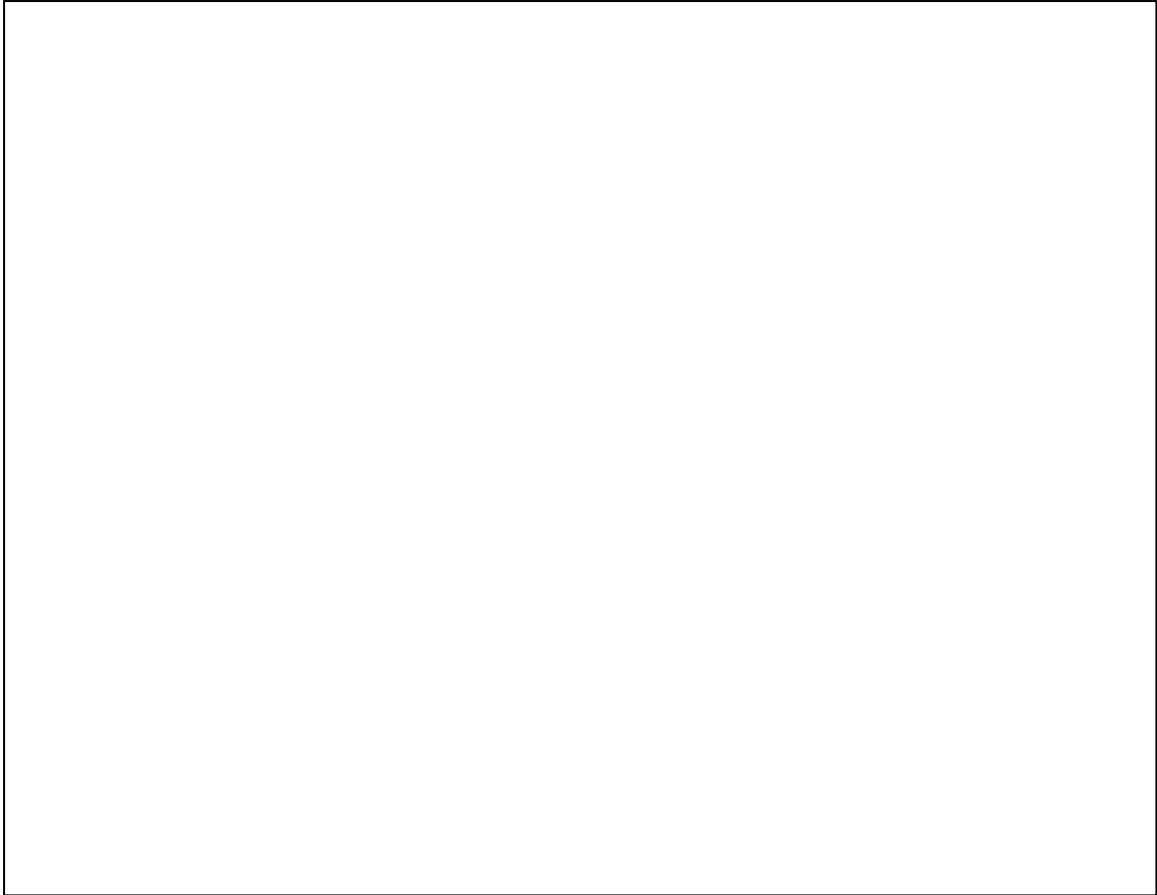


Figure 2248 Map indicating position of a single bat over the duration of one night, courtesy of P. Hope
[Image removed from ORA version; please see Bodleian deposit]

Opportunities are subsequently being explored to take more account of this movement through the erection and monitoring of bat boxes adjacent to the canal. In a couple of locations bats have even been encouraged to roost in converted WWII pill boxes, which remain as a relic of the canal's contribution to the GHQ line, a defensive barrier against an invading German army. This intended barricade may now be enabling movement; convenient pauses along a flight line. Bat boxes are checked each summer (see Figure 29) and the presence of bats and/or their droppings are recorded.



Figure 29 Checking bat boxes and recording the presence of bats and droppings (rightmost image)

I accompanied a canal ranger for the 2010 monitoring:

Having spent the morning checking boxes at Zebon Copse [Hampshire] we moved to inspect the 30 bat boxes installed at the Canal Centre [Mytchett, Surrey]. Paul had told me that he hoped to establish boxes down the length of the canal to sample the impact of different habitat on roost preference and to further consider the corridor functionality of the canal – he believed that those bats roosting adjacent to the water may regularly use the canal’s open flight path to move between nightly foraging sites. In one of the first boxes we checked we found a quantity of droppings; Paul identified them as produced by a bat as they were much drier than birds’ and when crumbled glittered in the sunlight owing to the prevalence of insects in the bat’s diet. Any bat droppings found were left in the box, to encourage bat usage, but any other material (including birds’ nests) was removed. We took measurements, sexed and weighed the bats we found [see Figure 30] and Paul had brought a ringing kit which would be used if we located any Natterer’s bats (the species focus of his PhD). This would enable identification of the bat if it was trapped elsewhere, including during the autumnal swarm at Greywell Tunnel. We did not encounter any Natterer’s bats today, but did record the presence of Noctules in four of the Canal Centre boxes and a lone Pipistrelle at Zebon Copse [see Figure 31].

Field Diary (7 October 2010)



Figure 30 Weighing and measuring the forearm length of a Pipistrelle bat at Zebon Copse



Figure 31 Clockwise from top right: Pipistrelle 'playing dead'; examining the wing of a Noctule; two Noctules inside a bat box

The rangers also seek opportunities to encourage ecological diversity and enhance the water channel's capacity to act as a connective link, and they are currently exploring ways to encourage the movement of otters. It is hoped that the installation of artificial holts, such as that in Figure 32, will facilitate the expansion of their range, and provide attractive passage along the canal and its interconnected waterways. A number of holts have been installed, although their exact locations are not publicised owing to fears of vandalism and disturbance. A member of Surrey Wildlife Trust, who designed the holts and has considerable experience of otter conservation, provides assistance to the Basingstoke Canal Authority and helps determine appropriate sites for installation. These do not always align with conventional perceptions of the canal's ecological aesthetics, nor are they necessarily the sites that the rangers would have chosen. Indeed, I was told that the otter holt pictured in Figure 32 was in "the last place" the rangers would have thought to put it, considering both its proximity to human activity and the composition of local vegetation. Chris (from Surrey Wildlife Trust), however, explained that otters like to leave spraints behind in areas where they are particularly visible, and likely to persist, in order to mark their territory. The area chosen for today's installation was therefore relatively open with only low-level vegetation, thus ensuring visibility, whilst a degree of protection was offered through proximity to a bridge. It is hoped that otters will investigate the canal and become curious about these tunnels, thus developing their inhabitation of the canal and encouraging their return. However, the illusive nature, solitary existence and large territories of otters will make it difficult to ascertain if this holt is in use. If regular inhabitation by an otter is suspected then the area becomes protected under UK law and cannot be inspected. Uncertainty remains over the occupation of this particular installation.



Figure 32 Installation of otter holt

Designation: SSSI

The flow of water, pH gradient, and atmospheres of stillness and refuge enable the ecological flourishing of the canal, whilst its linearity facilitates flight and enables movement. Superimposed upon these lively lines, the canal is divided into 11 separate SSSI units, ranging in size from 1 to 27ha. The main habitat of 10 units is identified as ‘standing open water and canals’, whilst 1 unit is listed as ‘dwarf shrub heath – lowland’. A total of 96ha is thus identified as SSSI, of which the latest records indicate that 15ha is considered ‘favourable’, the remainder (81ha) is classified as ‘unfavourable’⁴⁶. When I asked the Hampshire representative for Natural England about the condition of the canal she replied that, despite its classifications:

⁴⁶ Natural England (2012) *SSSI units for Basingstoke Canal* Available at: http://www.sssi.naturalengland.org.uk/Special/sssi/unitlist.cfm?sssi_id=1006588. Accessed 13th August 2012.

Basingstoke Canal is wonderful in that it does connect a huge number of SSSIs [both within the canal and through riparian linkages] and if we could get that connectivity going – I mean there isn't a huge amount of terrestrial area for terrestrial species to move along but if we could get aquatic species moving that would be nice.

Victoria: So you think there's potential for movement of aquatic species?

Yeah, I think there should be. It depends how – if we go back to sacrificial areas, my worry with that would be can we get the good bits to link up, because if we can't then they're going to be little isolated islands and they're going to need constant care rather than becoming a self-sustaining system.

Interview with Natural England Officer (July 2011)

Whilst this thesis has demonstrated that the Basingstoke Canal is a corridor environment with the potential to enable biological complexity and provide connective opportunities, the ecological performance of its certified SSSIs challenges this assessment and suggests that there is scope to enhance and promote its watery ecologies. The canal is subsequently lamented as an 'unfavourable' site. Whilst such evaluative designations ensure concerns are raised, they can also generate inflexibility within policy and management:

Victoria: ...is there potential for the citations to change, or are they quite fixed...?

Anything to do with changing the SSSI boundaries, citation, etc seems to be incredibly difficult to do, and I know Odiham Common [adjacent to the western end of the canal] is designated as wood pasture and I would probably agree that it's wood pasture, but there are a lot of people who say it's not wood pasture, it shouldn't be grazed, it's wood. And there doesn't seem to be any flexibility in doing it. I think it's one of those things that Natural England for some time have been saying, 'oh we'll look into the process for doing that', but it's just, there's nothing, no way that it seems to be able to be done.

Interview with Natural England Officer (July 2011)

The citations and boundaries of SSSIs inform their management and can lead to the inclusion/exclusion of areas, whilst opportunities for change and flexibility in these designations appear stifled. As the canal is divided and managed in sections, so lines of nonhuman lives persist in flouting these separations. Ecological behaviour transgresses the formal boundaries of sites of evaluated value, whilst a concern exists that focussing on "isolated islands" is unsustainable and may even prevent the canal achieving its connective potential. However, whilst lines of structural connectivity and ecological movements

enable the 'joining up' of populations, and the spatial representation of a corridor, they are not enough, for this does not guarantee that such environments are 'lived along'. It is helpful here to return to an earlier comment, highlighted in Chapter One, from the Biodiversity Specialist (Environment Agency) regarding the importance of complexity within the connectivity debate:

...the idea of green paths, of green ways that species will just walk down, I'm not terrible sure about. But in terms of creating, it's about creating pockets of complexity within the landscape...

Interview with Biodiversity Specialist (Environment Agency) (July 2011)

He continued to say that the real test of a waterway corridor is "the facilitation of species which aren't totally river related...corridors do work, but it doesn't have to be a corridor to improve that landscape permeability". It is easy to subscribe to the simplicity of the corridor image, and subsequently establish an opposition between sites and corridors. The previous chapters of this thesis and the opening vignettes presented here demonstrate that liveliness and enchantment can emerge from both movement and tranquillity, whilst recombination and complexity can be generated within a site. Despite critiquing the opposition between corridors and sites it is also clear from the sections above that establishing gradients and monitoring movement regularly requires the identification and evaluation of particular points. The difficulties this poses for the management of environments such as canals are explored in the remainder of this chapter, which also considers whether existing funding opportunities are appropriate for the promotion of canal connectivity.

Reworking Connectivity as Complexity and Tension

The Basingstoke Canal is a potentially important space for natures, both through its capacity to assist ecological behaviours and movements, and through the endurance of its

watery pH gradient, which enables the co-presence of diverse aquatic species. But not all movement, flight, or flow is connective, and the encouragement of connectivity is not simply a question of ensuring that a succession of points are effectively ‘joined up’, rather, as Ingold (2007) has argued, they must be lived along. How does such a position challenge the management of corridors within wider ecological networks? I posed a similar question to a Biodiversity Specialist at the Environment Agency:

Victoria: ... can you have a corridor on its own, does a corridor need to be a link between two sites?

It’s all to do with scale – I mean it’s very unlikely it doesn’t connect something. To get a diverse landscape you’ve got to restore physical and biological processes, by and large, so we had this debate about restoration/rehabilitation, I think, by and large, corridors provide some structural diversity but in their own right they might not necessarily be restored habitats in that sense, and I think if you have a corridor that doesn’t link to areas where natural processes have been restored then I don’t think they are going to be terribly effective. Actually, you know, I’m going to go back on that. I don’t think a corridor needs to be linked. It depends on the nature of the corridor, one of the things about linear habitats. I think they’re just looked at in the wrong way ... The greatest areas of complexity, and this is where rivers are important, is actually on the ecotones.

Interview with Biodiversity Specialist (Environment Agency) (July 2011)

There remain considerable uncertainties regarding the appropriate management for connectivity, and this excerpt highlights ideas of ecotones; of taut environments, where ecologies are in tension. The structure of a corridor can be important, and can facilitate travel and safe passage, but the goal of conservation should also be the promotion of complexity and simple liveliness. This may be achieved through the support and restoration of processes and the enhancement of permeability through stimulating biological activity. Such an approach may be particularly viable within urban and disturbed ecosystems where “unlikely recombinant communities” can generate ecological complexity and contribute to the provision of “a chain of different habitats permeating” the environment (Angold et al., 2006: 196). Angold et al. (2006) further argue, supporting the view of the Biodiversity Specialist, that such pockets of diverse habitat may “be important features for biodiversity both as stable and as transient habitats” (197), whilst concluding

that in many cases, particularly for plant species and invertebrates, “corridors do not increase connectivity” and that “the maintenance and even restoration/creating of good quality habitat is the key...rather than the more difficult task of increasing habitat connectivity” (203). To manage for connectivity may be a case of promoting habitat flourishing and improving permeability and flexibility within the environment; neither a retreat into isolated sections, nor a preoccupation with ‘joining up’, are appropriate responses.

The previous chapters have identified the main factors contributing to the ‘unfavourable-declining’ status of the majority of the canal’s SSSIs, namely: invasive species activity, over-shading, and water shortages. However, responses to these issues have largely remained reactive, and are limited by financial constraints. In recognition of this there have been suggestions that more proactive targeting of funding opportunities may improve the ecological standing of the canal, thus developing complexity for those ‘living along’ the waterway and addressing the ‘unfavourable’ status of the SSSI units. The remainder of this chapter follows recent endeavours by the canal rangers to enhance the canal’s ecological contribution by achieving certification under the Higher Level Stewardship (HLS) scheme.

Higher Level Stewardship (HLS)

HLS schemes are managed by Natural England on behalf of Defra and form the highest level of Environmental Stewardship, building upon three entry level elements: Entry Level Stewardship, Organic Entry Level Stewardship and Uplands Entry Level Stewardship. Together these ‘agri-environment’ projects offer “payments to farmers and other land

managers in England to deliver effective environmental management”⁴⁷. The HLS programme is summarised by Defra as:

...an environmentally targeted, competitive scheme with 10-year tailored agreements of high environmental value involving complex and specialised land management. In addition to objectives for biodiversity, landscape, historic features and resource protection, HLS offers opportunities for access to the countryside and organised educational visits to farms for schools and special interest groups.⁴⁸

Whilst nearly 60% of England’s agricultural land is part of Entry Level Stewardship (ELS) schemes, HLS is an advanced competitive process designed to:

...deliver significant environmental benefits in priority areas. It involves more complex environmental management requiring support and advice from our local advisers, to develop a comprehensive agreement that achieves a wide range of environmental benefits over a longer period of time...⁴⁹

Under ordinary conditions ELS is a pre-requisite for entry into the HLS scheme. However, the Basingstoke Canal was able to apply directly for HLS owing to both its high ecological value and the extensive prior involvement of Natural England with its existing environmental management plan. During the course of fieldwork I was able to follow the registration of the canal and development of projects.

“Any land to be entered into an Environmental Stewardship agreement needs to be registered on the Rural Land Registry (RLR) before an application pack can be generated.”⁵⁰

Environmental Stewardship is a land-based conservation tool and whilst ditches and ponds can be included within the total hectareage, and subsequently receive direct funding, this is

⁴⁷ Natural England (2013) *Environmental Stewardship* Available at:

www.naturalengland.gov.uk/ourwork/farming/funding/es/default.aspx Accessed 18th April 2013

⁴⁸ Natural England (2012) *Environmental Stewardship* Available at:

<http://www.defra.gov.uk/food-farm/land-manage/stewardship/> Accessed 17th August 2012

⁴⁹ Natural England (2012) *Higher Level Stewardship*. Available at:

<http://www.naturalengland.gov.uk/ourwork/farming/funding/es/hls/default.aspx>, Accessed 16th August 2012

⁵⁰ Natural England (2012) *3-Tier HLS Process – Frequently Asked Questions*. Available at:

<http://www.naturalengland.gov.uk/ourwork/farming/funding/es/hls/3-tierfaq.aspx>. Accessed 16th August 2012.

not the case for waterways. A particular representation of the canal was thus generated as the process of applying for HLS funding began, for it was necessary to map and register only the land; in tracing this, a tension emerged regarding the geographical separation of the canal's management between Hampshire and Surrey. The HLS process proceeded at different rates in each of these jurisdictions and enrolled different expert groups. I was introduced to HLS in September 2010, at which point the relevant maps were being drawn up for the Surrey section of the canal by the Surrey Wildlife Trust, whilst the process had not yet begun in Hampshire. Despite the strength of its connections, the canal was clearly separated. Practical reasons were cited by Natural England for this differentiation, namely that the process was first explored in Surrey, and thus it is further ahead, and the quicker it is registered the sooner it can start receiving annual payments. Secondly, HLS is designed for farmland, where the mapped area is composed from fields that are usually geographically concentrated, such that large acreages can be recorded on single maps. The Basingstoke Canal, however, flows through a large number of the standardised maps produced by the RLR, over 50 in Surrey alone (see Figure 33). The electronic process for uploading this data would not withstand many more, and thus the separation between Surrey and Hampshire eases the strain.

At the rangers' meeting immediately prior to the February 2011 Conservation Steering Group meeting it was announced that the maps drawn up to represent the canal in Surrey had been submitted to the RLR and rejected, for they failed to accurately represent the boundary between land and water. There was a general sense of exasperation around the table. It was proving incredibly difficult to mark the canal on the standardised maps that had been provided, for its scale was such that the canal appeared only as a relatively narrow line. To then draw the boundaries of the adjacent towpath and offside bank was extremely challenging. To conform to the initial mapping requirement and begin the

application process the canal's geography must be represented as parallel, elongated, farms each with a width of only a few metres. A significant proportion of the canal's eligible

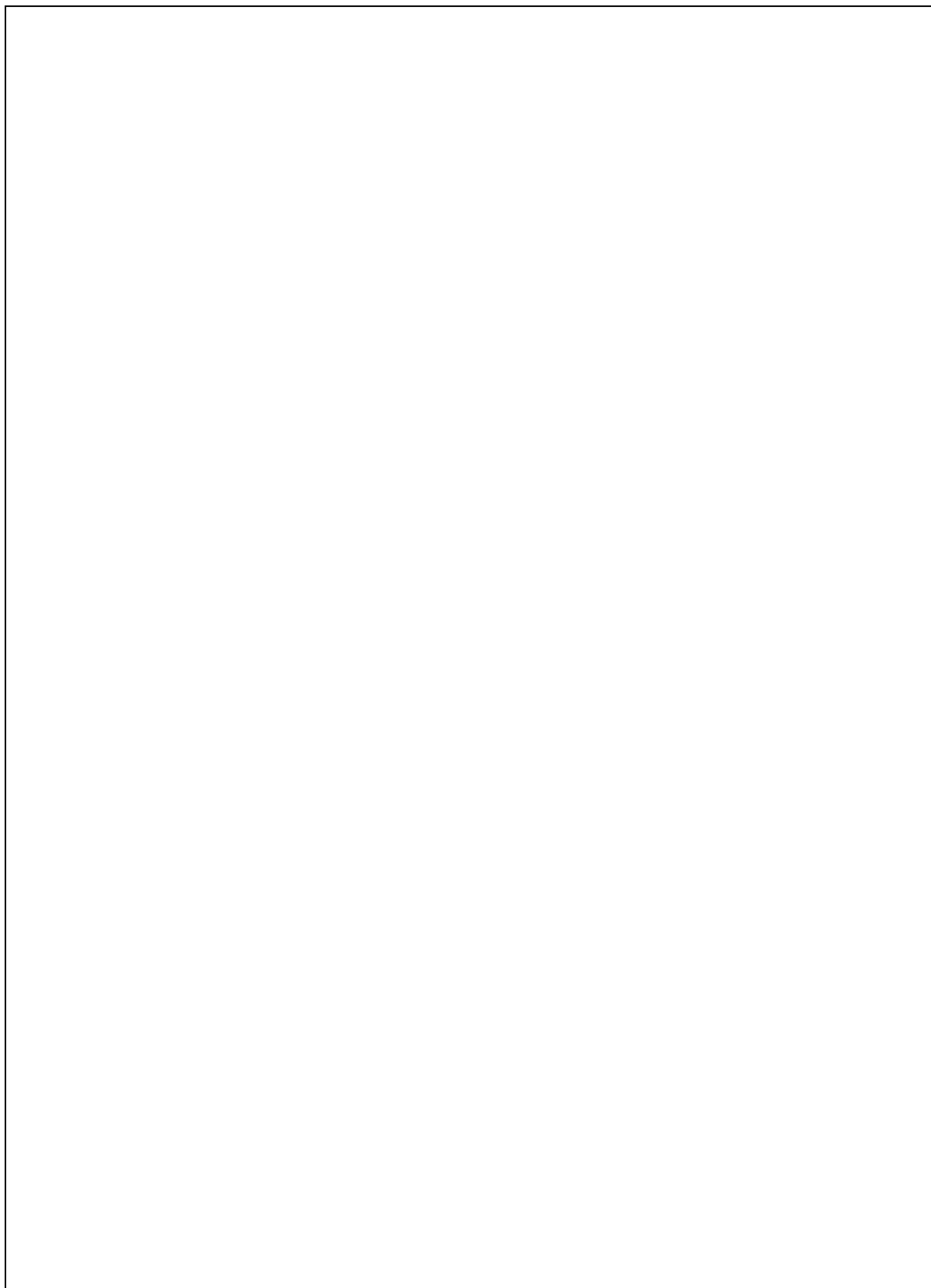


Figure 33 Example of HLS map (courtesy BCA) [Image removed from ORA version; please see Bodleian deposit]

hectarage could be obscured by a pencil line. A rangers' meeting in May 2011 saw the Hampshire conservation ranger request assistance from those with GPS experience, as they hoped to learn from the challenges faced in Surrey and achieve a higher degree of accuracy in the creation of these maps. Even with this enhancement it was stated as unlikely that the process would be completed within the financial year. This was largely due to the ongoing difficulties in identifying the boundaries of the canal which, it was acknowledged, had also presented problems for more conventional land owners, but were 'magnified' for the canal (*pers. com.*). An interview in July 2011 with the Natural England representative for Hampshire reaffirmed these concerns:

Victoria: How is the HLS process progressing?

Don't ask. It's been going on for more than a year now. What the problem is, is that because they are such small strips of land, so tiny, that it's at the limit of what the RLR mapping can achieve. And one of the problems, one of the sticking points at the moment, we have actually moved on and it is actually getting a bit better now but one of the problems is that there isn't a physical boundary on the ground where you can say, 'this is towpath and this is someone else's land', so in some sections we are going to have to ask the Basingstoke Canal just to stick posts in...they need to know 'OK where the posts are in, that's the bit I'm measuring'...But there are other areas which are just so tiny, so if there was a slight shift in, every now and then they do RLR refreshers where the land parcels get slightly jiggled around and if something changes by 0.01ha on something that is very long and thin that makes a huge difference...we're getting there, it's just that it's been such a long haul.

Mapping the Basingstoke Canal was far from straightforward, and its difficulty is disproportionate to its area:

Victoria: How does it [the canal] compare to the other HLS projects that you've been working on?

Much more tricky because we're not actually able to address the thing we want to address, we have to go round the houses in a way. Most of the other HLS schemes I've been involved in have had quite substantial chunks of land – in particular the Thames basin heaths...Basingstoke Canal has been, so far, very labour intensive and relatively – I think it's 27 hectares – so a relatively small area of land for such a huge input...

Interview with Natural England Officer (July 2011)

The canal's low mapped hectarage is in part a consequence of the ineligibility of water in the HLS process; the situation thus arises where ecological value, as defined through SSSI citations, is contained within the aquatic environment whilst stewardship funding is applied to the adjacent land. Hence the frustration from the Natural England Officer that *"...we're not actually able to address the thing we want to address..."*. The two banks of the canal are registered with the RLR, whilst the water continues to flow in-between. The maps generated to represent the canal within the application process thus create the impression of two parallel corridors, which are not always continuous (see Figure 33); connectivity and the SSSI units for the canal are obscured within HLS mapping.

The process of map creation had become increasingly difficult, and at one rangers' meeting in February 2011 the frustration felt by the ranger team was clear. Attempting to register for the funding was taking so long, one ranger remarked, and required such considerable resources, that they were beginning to wonder if it would all be worthwhile. How much money would be received, and would it assist the recovery of the canal?

***"A FEP is a pre-requisite for Higher Level Stewardship (HLS). It identifies and assesses the condition of features of historical, wildlife, resource protection, access and landscape interest."*⁵¹**

Is it all worthwhile? After hearing the concerns of the rangers I put this question to the Hampshire representative for Natural England, and she replied:

I hope so, I mean from Natural England's point of view as soon as it gets into HLS we have the funding in place, we have the management plan in place to remedy the problems and the issue, then that turns the unit into 'unfavourable, recovering' which ticks a box.

⁵¹ Natural England (2012) *Farm Environment Plan*. Available at: <http://www.naturalengland.org.uk/ourwork/farming/funding/es/hls/fep.aspx>. Accessed 16th August 2012.

When the Surrey maps were accepted into HLS, so the SSSI units on this section of canal were immediately classed as ‘recovering’ by Natural England. Before this could happen, however, and once the boundaries of the land were accepted it was necessary to draw up a Farm Environment Plan, and classify the land type being registered.

Victoria: How is the land itself classified, what’s the criteria, the category it fits into?
It’s just a footpath really. Yeah, we’ve been putting that in as, well ... as grassland for a target feature. So basically it is there to buffer rather than being particularly of interest in its own right...

Interview with Natural England Officer (July 2011)

The unmapped waters of the canal become a ‘target feature’, as attempts are made to compensate for their omission within the mapping. The maps produced for the RLR form the basis for the Farm Environment Plan (FEP); this determines the annual payment received by the canal and forms the template upon which projects are outlined. The FEP compiled for the Hampshire section of the Basingstoke Canal (see Figure 34) combines a number of feature groups including ‘Historical Environment and Landscape’, a category that encompasses built water features, together with ‘Wetland’, ‘Grassland’, and the species groups of: ‘Trees’, ‘Vascular Plants’, ‘Mammals’, ‘Birds’ and ‘Invertebrates’. In addition to these features of interest, the ‘Scrub and Bracken’ group incorporates the presence and cover of invasive species, and less regarded native groups. These lie adjacent to feature lists composed of ‘native’ vegetation. The FEP therefore disentangles species and structures from their associations and reproduces the evaluative distinction between native and invasive. However, the messier category of ‘scrub and bracken’ could potentially be regarded as an attempt to highlight the detrimental impact of homogeneity.

The composition of each land parcel is thus distilled, its hectareage quantified and represented through these categories, together with a report on its ‘quality’. A complex spreadsheet is generated (an excerpt can be seen in Figure 34) as the details of 127

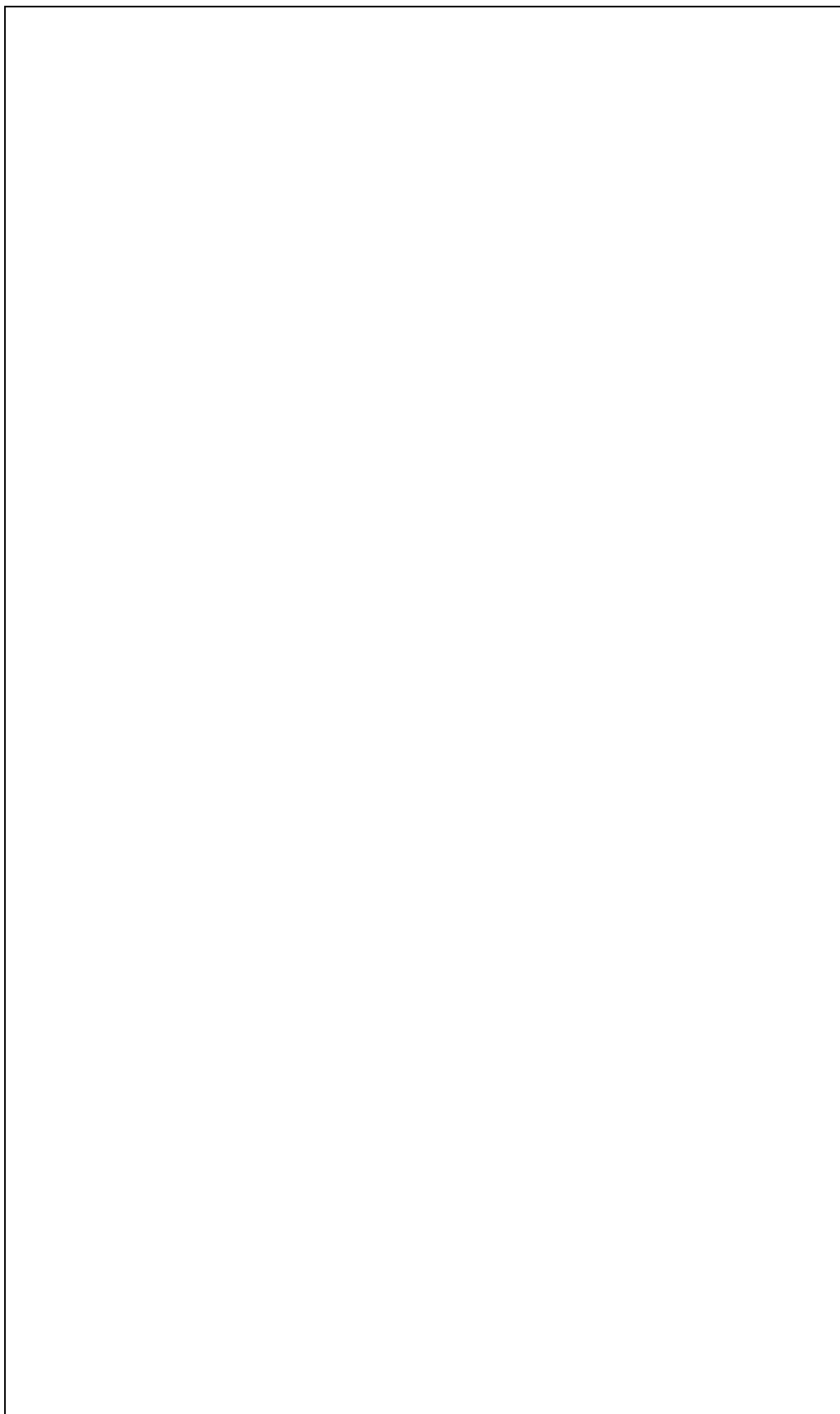


Figure 34 Excerpt of e-FEP, produced July 2012 [Image removed from ORA version; please see Bodleian deposit]

'Environmental Features' are listed. In identifying the canal's waters as a target feature it becomes possible to direct planned work towards its management, whilst the FEP identifies "the areas that need most immediate attention, and provides a framework on which future works and funding will be based" (*pers. com.*). The Basingstoke Canal's ecological relations are isolated, and separate land parcels of relatively small hectareage, together with individual species inhabitation are identified. Through this 'circulating reference' (Latour, 1999) something is lost as the processes and recombinations of the canal are stilled, but something is also gained as it is through the FEP, and the projects subsequently devised, that conservation investment can be awarded.

Receipt of the application pack through which to officially draw up the FEP for Hampshire was delayed, and not received until June 2012; this resulted from a series of difficulties relating to the initial mapping process and the number of land parcels requiring registration. Further negotiations with the RLR were also necessary when it was discovered that three of the areas the BCA rangers hoped to include in the FEP, and thus conduct conservation work within, had been omitted from the mapping. Furthermore, it transpired that one section of the offside bank of the canal had already been erroneously registered within the HLS scheme by another landowner, and it was necessary to seek its release back to the canal authority. These challenges, in combination with a computer system overhaul at Natural England, meant that it was not until late December 2012 that the Hampshire section of the Basingstoke Canal was fully registered into the HLS scheme and the FEP accepted.

“...unlike ELS [Entry Level Stewardship], the level of payments you receive depends on the number of options you are able to deliver...”⁵²

Despite the apparent rigidity of the mapping process and the need ‘to go round the houses’ (*pers. com.*) in achieving registration for the canal there is considerable scope within HLS to develop complexity and local liveliness that will assist wider ecological flourishing. This is achieved through two principal funding avenues: capital funding and option payments. Option payments are paid per hectare or per unit and require the ‘appropriate’ management (as determined by Natural England) of identified habitats or features, whilst capital works are one-off payments (dependent upon the presence of option management plans) designed to fund specific improvement projects.

The Higher Level Stewardship Handbook produced by Natural England notes that:

There are no management options aimed specifically at ‘the landscape’, but it is nevertheless very important that all of the chosen options respect the character of the area.

Natural England (2010:18)⁵³

The avoidance of water potentially derives from both the small-scale intent of the HLS process and the institutional separation of Natural England and the Environment Agency, with the latter being the statutory body concerned with the implementation of the EU Water Framework Directive and the former charged with awarding and regulating HLS funding. Such separations, however, can create managerial difficulties in those areas where interactions between water and land, and connectivity with other sites, are central to ecological processes. This is addressed by Natural England, who note:

Even though there are no specific options for the protection of rivers and sensitive waterbodies, there are many HLS options that can contribute to the protection and

⁵² Natural England (2012) *Higher Level Stewardship*. Available at: <http://www.naturalengland.gov.uk/ourwork/farming/funding/es/hls/default.aspx>. Accessed 16th August 2012.

⁵³ Natural England (2010) *Higher Level Stewardship: Environmental Stewardship Handbook*. 3rd ed. NE227 Available at: <http://publications.naturalengland.org.uk/publication/31047?category=45001>. Accessed 15th August 2012.

buffering of these sites from some intensive operations. For instance, the placement of resource protection or buffering options alongside or connected to, sensitive habitats may be important or necessary where the protection of that river or stream is specified in the targeting document.

Natural England (2010:18)⁵⁴

It was therefore possible for the BCA to incorporate the management of the canal channel into the HLS application by establishing it as a target feature. This indirect route is somewhat precarious and the continued exclusion of water means that the Basingstoke Canal's recorded hectareage is low. The funding received through option payments is therefore considered disproportionately small in relation to the ecological importance of the site and the effort necessary to achieve its designation. It was noted, for example, that nearby sites also seeking HLS funding were registering several hundred hectares, in comparison to the canal's 27, and would thus be supported by considerable annual option payments. The Conservation Steering Group was informed in February 2011 that the likely annual payment for the Surrey section of the canal was around £2,500. As a consequence, the bulk of the funding received for the canal will be achieved through capital works programmes, which could reach levels of £50,000 p.a., but this figure comes with a certain degree of unreliability regarding the receipt of investment. Reliance on capital funding was regarded as an 'exceptional circumstance' (*pers. com.*) by Natural England and the uniqueness of the situation is enhanced as the canal will be paid for its hectareage as 'grassland', yet the focus of capital funding will be on water quality and aquatic ecologies.

I attended a meeting between the two canal conservation rangers prior to the formal acceptance of the Surrey section of the canal into the HLS process during which they discussed those projects they would like to see initiated. This meeting resulted in the loose identification of: aquatic plant reintroduction; invasive species control; reduced tree

⁵⁴ Natural England (2010) *Higher Level Stewardship: Environmental Stewardship Handbook*. 3rd ed. NE227 Available at: <http://publications.naturalengland.org.uk/publication/31047?category=45001>. Accessed 15th August 2012.

shading and the installation of marginal shelves. Over the course of the mapping and registration processes, these tentative ideas were developed into firmer proposals, with a particular focus on tree projects and marginal shelf creation. It is hoped that the thinning of bankside tree growth will increase light levels and concomitant aquatic energy, which will promote the growth of submerged and marginal vegetation. The success of these works, however, depends upon sufficient levels of tree clearance being enacted to significantly increase light levels, and it was frequently noted that the narrowness of the land area owned by the BCA prevented this being possible in a number of desired locations (*pers. com.*). However, it is hoped that these tree projects can be assisted, and extended, through the installation of marginal shelving, which provides a raised, in-channel, bankside bed designed to encourage the presence of aquatic plants. These projects were not considered in isolation from each other and it was regularly noted that the ideal site for tree projects was downstream of areas currently exhibiting good levels of marginal or aquatic species growth, as these 'reservoirs' of propagules will aid the colonisation of new aquatic environments. The preferred location for marginal shelf installation was similarly downstream of tree project areas, further assisting the expansion of vegetated areas in the water channel.

A concerning temporal dissonance, however, emerges upon closer examination of the relationship between these projects and the ecologies of the canal, and generates unease amongst the rangers. Investment for capital projects is received via a one-off payment, yet the clearance of vegetation and reductions in tree-shading require levels of annual management and maintenance that cannot be achieved through the low level option payments. Therefore, whilst a consideration of spatial connectivity can be retained, despite the representational separation of the canal into different units, temporal connections are less well composed within the HLS process.

The designing of projects and mapping of land proceeded simultaneously, continually informing each other, and it was through the circulations of these endeavours that the canal's waters were able to emerge as a 'target feature', and the indirect focus of the HLS application. The challenges faced during the mapping process were also returned to as the projects were developed. During the Conservation Steering Group meeting of February 2011 it was noted that delays were being encountered in processing Surrey's application owing to inconsistencies between the area of registered land and the size of the projects, for example there were occasions where 0.6ha of work was being proposed for 0.1ha of canal. The challenge of spatially representing the canal within the HLS system was therefore ongoing, whilst the exclusion of water diminished the financial impact of the HLS funding and appeared counterintuitive given the hydrological focus of the canal's SSSI citations. Whilst measures have been taken, to a certain degree, to overcome these limitations through a focus upon capital projects and established the channel as a target feature, this reliance is precarious for the timeframes of human involvement are discordant with those of ecological processes.

***"An estimated 2,400 HLS applications, worth up to £40m, are expected to go live in the next financial year [2011/12] – around 700 more than the previous high point of 2009/10."*⁵⁵**

Whilst press releases issued on the Natural England website announce a minimum "80% increase in available funding for the projects over the next 3 years"⁵⁶ there are concerns amongst practitioners over the direction of this funding and its sustainability. HLS originates from within the EU's Common Agricultural Policy (CAP), Pillar 2 of which includes provisions for "the development of rural areas" and promotes "agriculture as a

⁵⁵ Natural England (2011) *Record numbers of HLS agreements to start in 2011/12*. Available at: http://www.naturalengland.org.uk/about_us/news/2011/290311.aspx, Accessed 22nd April 2013

⁵⁶ Natural England (2011) *Record numbers of HLS agreements to start in 2011/12*. Available at: http://www.naturalengland.org.uk/about_us/news/2011/290311.aspx, Accessed 22nd April 2013

provider of public goods”⁵⁷. This lineage directs money and administration towards large, site-based, landowners, namely farms, and places emphasis upon option payments, which protect habitats identified as ecologically valuable. Furthermore, there is a concern that Defra, as the statutory UK body responsible for delivery of the CAP, would prefer the scaling back of capital works schemes and a greater emphasis on option management. The canal has been able to proceed and register under HLS as an exception, and the biggest threat to the continued appropriateness of this revenue stream for the management of the canal comes from the 2013 review of the CAP and potential changes in the matched funding provided by the UK Government. Uncertainties regarding future funding opportunities have been described as ‘unsettling’ (*pers. com.*). These concerns are not unfounded, and the delays encountered in mapping the canal in Hampshire have already resulted in significant costs, for during this period EU funding shifts reduced Natural England’s real terms budget for all special projects across London, the South East and the East of England to £42,000 (*pers. com.*). The canal rangers have expressed considerable disappointment and frustration at this decision, given the amount of work that has already been put into their application. It was therefore suggested that they consider applying for a Conservation and Enhancement Scheme (CES) to complement their HLS bid. CES schemes are not open to all landowners; rather an approach from Natural England is required to initiate the process. The Natural England guidance notes for this scheme state:

The Conservation and Enhancement Scheme (CES) is a management agreement scheme that provides funding to land managers in England who deliver high environmental management on protected sites, particularly on sites of special scientific interest (SSSI)...It provides funding for more complex types of management on difficult sites, particularly for non-agricultural management outside the scope of Environmental Stewardship (ES) or England Woodland Grant

⁵⁷ UK Parliament (2005) *Chapter 2: Introducing the Common Agricultural Policy*. Available at: <http://www.parliament.the-stationery-office.co.uk/pa/ld200506/ldselect/lddeucom/007/706.htm>. Accessed 23rd October 2012.

Schemes (EWGS), where agreements must be tailored to the specific requirements of sites and/or for the wildlife conservation of specific species.

Natural England (2011: 5)⁵⁸

It is hoped that a one-year CES for 2012/2013 will enable the commissioning of a dredging management plan, whilst a second, longer, CES starting in 2013/14 will provide funding for selective dredging (with a focus on biodiversity gain) and contribute to “the special project elements of the HLS” (*pers. com.*). The hydrological focus of these plans will begin to address the high levels of siltation on the canal, currently contributing to its ecological underperformance, and thus both complement the HLS work and extend activity to the water channel. A new application process has been started, as the work of seeking the improvement of the canal’s SSSI status and guaranteeing funding for management work continues.

Promoting Permeability and Future Connectivity

The HLS capital work projects designed by the rangers have the potential to complement each other and existing projects on the canal. This was clear at the February 2011 Conservation Steering Group meeting where HLS work was discussed in relation to a wider structural project being undertaken on the canal and funded by Hampshire and Surrey County Councils.

The representative present from Natural England asked whether the areas where these works were being undertaken/were planned actually matched up geographically. Her question appeared a reluctant one, and there seemed an expectation that the answer would be no – which could generate complications regarding receiving HLS funding. The Canal Director, however, responded that they were and that really this wasn’t too surprising as those areas where significant tree shading was recorded were also likely to have increased numbers of potentially degrading root cavities, which, together with the associated reduction in bankside and marginal vegetation was likely to increase erosion and the structural

⁵⁸Natural England (2011) Conservation and Enhancement Scheme. Available at: http://www.naturalengland.org.uk/Images/CES-agreement-holders-note_tcm6-33728.pdf. Accessed 11th June 2013.

instability of the towpath and embankments, which forms the target of county based structural work.

Conservation Steering Group meeting (28 February 2011)

The narrowness of the canal, and the restricted hectareage that can receive funding under HLS, points towards the importance of an expanded notion of connectivity and the promotion of interaction between the BCA and its neighbours. The importance of considering the connective impact of the projects being undertaken was highlighted by the Biodiversity Specialist at the Environment Agency, who noted that on those waterways where it is not feasible to engage in whole-scale restoration:

...it's quite important also to be able to link those places up so in those areas where you can't do restoration you have your rehabilitation where what that does, it primarily, it's, you're creating a habitat which in its own right. It's, almost a habitat, so confined by its location that it cannot change whilst a natural, a restored habitat, can adapt to local changes and you will get a lot of natural regeneration.

Interview with Biodiversity Specialist (Environment Agency) (July 2011)

This was referred to as a 'string of pearls' approach to the management of rehabilitated waterways, and is central to projects such as the London Rivers Restoration Plan (*pers.com* and London Rivers Action Plan⁵⁹), and a similar approach is clearly envisaged in relation to the Basingstoke Canal. It was also frequently mentioned that conservation work upon the canal may both enhance, and benefit from, the Biodiversity Action Plans of riparian districts (*pers. com.*). It is clear that canals can contribute to the permeability and complexity of local environments, but it is often difficult to place them within existing policy frameworks; canal management must therefore also be more innovative to encourage involvement and investment, both physical and financial, from non-statutory sources. In an interview with a senior ecologist from the Canal & River Trust (CRT) I enquired about strategies to get people to focus on the canal:

⁵⁹The River Restoration Centre (2013) *London Rivers Action Plan*. Available at: <http://www.therrc.co.uk/lrap.php>. Accessed 11th January 2013.

Canals are part of the green infrastructure and I think it's tying in with local councils and other organisations, rather than saying 'yeah, we're the canal network, here we are and we're fine on our own', that needs to be tied in with other things...we've mapped publically accessible woodland which is adjacent to the canal network so that...people visiting the canals, visiting the woodland can also see that they can visit vice versa and travel between the two. So, that's only a small thing but it's trying to make the most of what's around, it's tying into the whole green infrastructure and not just looking in isolation at the canals.

Interview with a National Ecologist (Canal & River Trust) (June, 2011)

A conscious effort is being made to highlight the possibilities for connectivity around canals, and thus avoid any claims of their peripherality. The connective impact of projects is important, both in ensuring they complement a wider focus on improving the permeability of the watercourse and through generating, and making visible, riparian connections.

Related to this is an emerging focus on future institutional connectivities. During this research it was frequently stated by those closely involved in the management and promotion of the Basingstoke Canal that, long term, they would like to see the management of the canal incorporated into the wider administration of British Waterways. However, on the 2nd July 2012 this organisation ceased to exist. Following the coalition government's review of non-departmental public bodies, British Waterways began a transition to charitable status, under the revised name of the Canal & River Trust. This process has generated considerable speculation regarding the organisation's trajectory and possible shifts in funding priorities and accountability; its future, and relationship with the Basingstoke Canal's management are uncertain. In particular, ideas of responsibility and accountability are increasingly informed by a different audience. Conversation with a National Ecologist suggested:

Well, at the moment I think we are responsible to Defra. Defra funds us and we are part of Defra, but ultimately we are responsible to the people who actually use the canals. And I think as we move into the third sector, ultimately we will be responsible to the people out there who we are actually hoping to get money from

and if we don't behave how they would wish us to behave, then they won't give us any money.

Interview with a National Ecologist (Canal & River Trust) (June, 2011)

When I subsequently asked what facets of canals “need to be highlighted in order to present them as somewhere people should volunteer and should invest money in”, the National Ecologist replied:

One of the things we've tried to promote is that they are a national asset and our Chief Executive has always pushed the canals for everybody, irrespective of whether we get any money from them...to try and use public pressure, public understanding to increase our government grant in the past and show that they are important as a national asset and I think if we're going to survive as a charity, not really sure where our money's going to come from, but I suspect that what we are relying on is donations...For that to be successful, people need to appreciate the canals are valuable to the nation.

Interview with a National Ecologist (Canal & River Trust) (June, 2011)

The uncertainty surrounding the future management of the canal network in England and Wales may also be an opportunity, an opening for something different and a change in the envisaged future of these waterways. In conclusion to our interview, the National Ecologist remarked:

I just think it's very difficult times at the moment. It's also very exciting times and there's a lot of potential out there and I think we've got a rough road ahead as we become a charity and the environment is an area that is perhaps going to come off not particularly well. If we don't have the money it's not something. We just can't do anything about it. It is to the point where we're making people redundant...So it is difficult times, but I think, and it's going to be difficult for the next few years, but if things work out I think it could be quite exciting times as money starts to come in and we focus more on environmental issues.

Interview with National Ecologist (Canal & River Trust) (June, 2011)

There is no certainty regarding the position of canals in the future, it looks set to be difficult, but perhaps also creative. With the motto of the Canal and River Trust being 'keeping people, nature and history connected' there may be an opportunity to promote canals through a widened sense of connectivity, highlighting the associations between

ecological and social wellbeing, and encouraging them further as environments to be lived along.

Canals and Connectivity Policy: from joining up, to living along

Canals are not fine on their own; the previous chapters of this thesis have demonstrated that they are intimately entangled with wider ecological movements, whilst also being closely woven into social and hydrological processes. The Basingstoke Canal cannot emerge in isolation and this chapter further explored the ways its connectivity is composed through lines: of ecologies, people, and policies. This chapter opened with a concern for lines and traced some of the ways in which the canal is lived along, whilst also highlighting how they can be seen, measured and evaluated through points. It is often only through these points that the gradients and ecological movements central to the canal's complexity can be recognised and communicated. However, it does not necessarily follow that the canal must be managed as a sequence of 'joined up' points; the inflexibilities of SSSI designations and the automatic elevation of their condition upon entry into the HLS scheme do not necessarily reflect the ecological experience of living along the canal. Connectivity is not always contained within the corridor, for the canal entangles with other lines, and movement does not simply progress from one end to the other. A more nuanced consideration of 'living along', as compared to 'joining up', was subsequently developed, and harnessed the recombinant ethos generated through previous chapters to approach the tracing of HLS applications in a way that challenged established categories and considered the spatial and temporal dissonances of proposals. Whilst the canal's management as a 'site' is lamented by Natural England, so this chapter considered how the canal's waters emerged as the target feature of a conservation policy, despite remaining largely invisible. It seems appropriate to consider canals as connective environments, to

promote their complexity and the permeability of their structures and ecologies through proactive funding, and yet there is a paucity of opportunities open to managers such as those on the Basingstoke Canal. The challenges and translations necessary to register the canal within one such policy, Higher Level Stewardship, were traced by this chapter and highlighted an emphasis upon the terrestrial and the territorial, as represented by land and hectares. Whilst for the majority of landowners this system works and is efficient, it places linear environments and aquatic corridors back on the periphery. The registration process was significantly delayed owing to the difficulties of conforming to inflexible mapping requirements, whilst reliance upon capital funding generated a heightened precariousness. And all the time there was the nagging question; is it worth it?

HLS funding has assisted the canal, and offers opportunities for the recovery of the waterway's SSSI units, but it does not place ideas of complexity at the heart of its rationale. Current arrangements, particularly the separation of option and capital payment schemes, increase the insecurity of environments such as canals. The activity of conservation practitioners and the exploitation of flexibility within the HLS processes have, however, enabled the Basingstoke Canal Authority to address areas of particular concern and thus demonstrate that the experience of HLS funding will assist the promotion of connectivity. Central to the management efforts of the ranger team, for example, are attempts to promote the interactions between water, light, and land through tree project work and the encouragement of marginal vegetation. Interaction is clearly important, and the success of the HLS programme upon the canal relies upon this connectivity.

The experience of HLS funding demonstrated a spatial connectivity which appeared somewhat against the expectations and design of Natural England, whilst the temporal relations demonstrated within the funding process are reminiscent of Stengers' critique of

practices where the timeframe of human projects do not complement the temporalities of ecological processes. The narrowness of the canal, and the difficulties encountered in isolating its banks both from riparian connections and aquatic SSSIs in order to register it within HLS highlight the need for more integrative approaches to conservation management, that foreground complexity instead of attempting to distil it. Neither a retreat into isolated sections, nor a preoccupation with 'joining up', are appropriate responses or impressions of connectivity. At present canal environments are not sufficiently regarded within current UK funding opportunities and this is stifling their ecological liveliness, and reducing their capacity to contribute to a complex national ecological network.

The final empirical chapter of this thesis develops the concerns expressed in the close to this chapter regarding the uncertain position of the canal, and the need to engage more widely with stakeholders in promoting the use of waterways. The themes of anticipation and perception, as discussed in Chapter Five, are here returned to as analysis moves towards consideration of the possible futures of the canal and the ways in which publics might be more effectively exercised and assembled. Canals are lived along, not just joined up, and local support and involvement may assist in securing funding, cultivating appreciation, and generating new lines that transgress the presentation of canals as straightforward linear conduits.

Chapter Eight

Exercising Canal Publics

...it's a linear thing rather than something people can gather around. [People say] 'we're interested in that bit, that bit, that bit', as opposed to all of it...

Interview with Natural England Officer (July 2011)

The lament of site-based management encountered in the previous chapter is here reformed as a lament of linearity as concerns are expressed that people cannot gather around canals; lines, perhaps, cannot 'spark' publics (see Marres, 2005). This chapter traces different kinds of public association around the Basingstoke Canal, both established and emergent, and draws upon geographical accounts of publics as situated, multiple, and mobilised through generative events (see Whatmore, 2009). The line of the Basingstoke Canal is lived along, emergent from recombinant ecologies, expressive territories, and atmospheres of enchanting tranquillity. Can the Basingstoke Canal exercise publics? And is it necessary for any publics to be continuous, joined-up, and contain the canal?

This chapter considers how the seemingly mundane ecologies of the Basingstoke Canal can gather publics; exploring the way its energies can spark capacities in others, and how these emerge in the absence of clear controversy. The publics encountered upon the canal are multiple and interrelated, they are not one-off assemblages ignited by conflict, but ephemeral, enduring, and forged through a concerned enchantment. Discussion opens with a focus upon human connectivity and considers the possibility that canals may assist the stated aims of recent policy reports (e.g. HMSO, 2011) and the goal of the Canal & River Trust, by enabling the reconnection of people with each other and the environment. Official spaces of public engagement are then encountered, and it is argued that confining

debate and communication to the meeting room fails to conform to the liveliness of the canal and precludes the formation of connections. In drawing upon this research's concern for generative associations, movement, and surprise, this chapter travels beyond official spaces of engagement and explores the 'coming-together' of less conventional publics through the recombining of people, materials, and interests. The linearity of the canal, which poses challenges to management, is also the focus of appreciation and through engaging with the work of Isabelle Stengers, Sarah Whatmore, and Catharina Landström this chapter explores the possibilities for 'exercising' canal publics. The emergence of publics through exertion during working parties, amidst enchanting experiences, and in material encounters is thus presented. This exploration is important, for the view that a linear environment precludes a concerned public potentially absolves the canal's official management of their democratic responsibility, jeopardises attempts to promote social reconnection, and may impede ecological flourishing.

The Social Connectivity Offered by Canals

To pause on the canal towpath in Woking town centre on a busy Saturday is to be surrounded by movement as families, cyclists, and busy shoppers pass by. Enjoying the walk. Feeding the ducks. On their way somewhere else. A similar flow, but with a different purpose, can be seen early on weekday mornings. These journeys seem straightforward, but for some they can be life changing. One of the rangers, as we walked the towpath conducting an embankment survey, related an encounter with a woman on a mobility scooter who told her that the canal had given her back her independence. She could now easily travel between her home and the shops in Woking; previously she had relied upon other people as she was unable to drive and both public transport and the pavements were full of obstacles. The canal connects as it flows through the streets and behind the houses

and businesses of towns such as Woking, Fleet, and Aldershot, whilst ease of movement and enjoyment are enhanced by the quiet activity of the BCA and related working parties. The Basingstoke Canal has therefore come to the attention of those seeking to promote social (re)connections.

The social connectivity opportunities offered by the Basingstoke Canal resemble those corridors promoted within literature concerned with 'greenways'. Emerging from American landscape architecture, 'greenways' have been defined as "linear open space established along either a natural corridor, such as a riverfront, stream valley, or ridgeline, or overland along a railroad right-of-way converted to recreational use, a canal, a scenic road, or other route" (Jongman et al., 2004). Through promoting such environmentally friendly routes a network of accessible spaces can be created that enable multiple uses and promote recreation, social connectivity, and visual diversity (Turner, 2006). Green networks and linear parks have long played a role in urban planning (Jongman et al., 2004) and encouraging the canal's performance as a greenway further supports the aim of the Natural Environment White Paper (NEWP) (HMSO, 2011) to "strengthen the connections between people and nature". The NEWP and a myriad of other literatures highlight the health benefits associated with access to the environment, and such spaces are subsequently celebrated for their 'natural beauty', and atmospheres of peacefulness, solitude, and relaxation (e.g. Gobster and Westphal, 2004).

In areas where urban parks are sparse, or reserved as weekend destinations, a convenient and permeable transport connection, managed equally for its ecological contribution, can combine social connectivity and accessibility with the 'reconnection of people and nature' (the slogan of the Canal & River Trust). Ideas of sociable ecological networks were prominent at the beginning of this century, and greenways were promoted from within The

Countryside Agency (2003), and through The Urban Green Spaces Taskforce (DTLR, 2002). A new trend seemed to be developing, and Turner (2006: 250) was able to report that, in relation to the term 'greenways', 75% of local authority respondents "expect it to be significant during the next decade". Today the Canal & River Trust operates a 'Greenway Code' for towpath use⁶⁰, and canals have been integrated into Transport for London's⁶¹ 'Leisure Routes'. However, the expression appears to have faded from the vocabulary of the Countryside Agency's national successors, and it has been argued that the organisation responsible, until January 2012, for English parks and green spaces, the Commission for Architecture and the Built Environment (CABE), was concerned more with "static parks than dynamic greenways" (Turner, 2006: 244). CABE's responsibilities have now been disbanded, the Natural Environment White Paper was not discussed on the bank of the Basingstoke Canal, and neither the term 'greenway' nor the recent high profile 'Highline for London' competition (see Chapter One) were raised when exploring opportunities for use. Nonetheless, things are happening as people connect and assemble. Of particular note is the inclusion of a significant section of the canal within a Sustrans National Route, designated the Saturn Trail:

This is a very pleasant and easy to follow walking and cycling route along a hard-surfaced towpath. Along its length, the canal is lined with verdant banks and mature, often overhanging, trees through which can be seen vast stretches of woodland and views into suburban gardens.⁶²

This canal-side path runs from Pirbright Bridge through Woking town centre and along to the canal's junction with the River Wey. Significant investment in levelling and improving the towpath along this route have strengthened the path's capacity to enable a variety of

⁶⁰ Canal & River Trust (2012) *Share the Space, Drop your Pace*. Available at <http://canalrivertrust.org.uk/see-and-do/cycling/share-the-space-drop-your-pace>. Accessed 3rd September 2012.

⁶¹ Transport for London (2012) *Leisure Routes*. Available at <http://www.tfl.gov.uk/roadusers/cycling/11673.aspx>. Accessed 3rd September 2012.

⁶² Sustrans (2012) *Route Maps*. Available at <http://www.sustrans.org.uk/map?key=South%20East&type=RG>. Accessed 3rd September 2012.

movement, increasing its use, and more closely integrating it into people's regular recreation and transport lines. Sustrans aim to make "smarter travel choices possible, desirable and inevitable"⁶³ and through harnessing linear structures, making connections, and improving the permeability of existing routes they hope to ease and encourage movement.

The Basingstoke Canal is lived along, offering opportunities for safe, convenient, and sociable movement. The canal in this rendering does not need to be something separate, around which a public can form, but rather something it becomes difficult to disentangle from. The challenges of managing the canal both within a wider connective ecology and as a community resource were acknowledged by a National Ecologist of the Canal & River Trust, who, in an interview, continually placed emphasis on the 'local feel' of the waterways. He remarked that whilst the Canal & River Trust faces the challenges of managing a national network of 2,200 miles, these canals 'are full of people'; people who are interested and whose sociability forms connections, and contributes to the continual recombination of the environment. The opinion of these people, and the degree to which it is perceived that they value the canal, can generate investment and inform the direction of management activities. The Basingstoke Canal is capable of generating appreciation and social connectivity, and this chapter now explores the ways in which this sense of the canal as 'lived along' rather than 'gathered around' challenges relations between canal management and public concerns, and encourages different approaches to theories of public formation.

⁶³ Sustrans (2012) *Mayor of London's Roads Task Force: Response from Sustrans*. Available at http://www.sustrans.org.uk/sites/default/files/images/files/migratedpdfs/1409_Roads%20Task%20Force_Sustrans%20response-final.pdf. Accessed 8th May 2013.

Public Participation in Canal Management

The Basingstoke Canal is formally governed by the Joint Management Committee (JMC), which meets three times yearly as the waterway's principal decision-making and reporting body. Whilst the Chair of the JMC alternates between Hampshire and Surrey County Councils, the remainder of the committee also fluctuates, but it is currently composed of 3 council officers and 27 co-opted members, including local councillors and representatives from Natural England, riparian businesses, and voluntary organisations⁶⁴.

The conference room at the canal centre formed the setting for the meeting. A large rectangle of tables and chairs was set up, with a perimeter of seating for the public audience. A host of small name signs, identifying individuals and affiliations, adorned a table by the entrance...When the meeting began there were twenty people sat around the table, the majority white men over the age of 50...several names had not been claimed...

JMC Meeting (11 February 2011)

The discursive production of the Basingstoke Canal makes repeated reference to 'the public', implying a knowable and bounded group that is identified as an important stakeholder. The JMC meetings are therefore officially conducted 'in public'. This public, however, is only permitted to speak during the first 5 minutes, and at the meetings I attended a sustained silence occupied this period; the meeting quickly moved on, and its remainder was conducted around the central table. Despite the presence of a large number of individuals, this space is often passive as reports from members are listened to in, and followed by, silence:

The meeting today was scheduled to last for two and a half hours; it finished after one. The principal topics for discussion were financial - last year's accounts were presented and the forthcoming year's debated. The failure of riparian councils to meet their financial commitments to the funding of the BCA was evident as a number of members reported reductions in their contributions, whilst reminding the meeting that they were not personally responsible for district budgets. The financial report for the canal outlined the seriousness of the economic situation,

⁶⁴ Surrey County Council (2013) *Committee details: Basingstoke Canal Joint Management Committee*. Available at: <http://mycouncil.surreycc.gov.uk/mgCommitteeDetails.aspx?ID=204>. Accessed 10th May 2013.

most notably the significant depletion of the reserve fund, which is forecasted to be £4,000 by the end of the 2011/2012 financial year, down from £100,000 in 2007. Following the reading of this report it was suggested by the Chair that the meeting move on, which elicited a strong response from one member from a charitable association who remarked that this amounted to a declaration that the canal was 12 months from insolvency, a matter that warranted discussion. The Chair announced that this would be addressed in June, and the meeting was closed.

JMC Meeting (11 February 2011)

The JMC performs canal management in public but discussion, energy, and engagement are often lacking. These meetings are regularly short and occur infrequently, despite the precariousness of the canal's financial position and the likely damage that would occur if its structures failed and concerns were realised. Furthermore, for a number of members the canal may compare unfavourably with other energies and pressures, as was suggested in an interview with one of the Natural England representatives:

...getting there is an issue and affording the time to get there is an issue, so I think in future we are going to be scrutinised for 'what are you actually getting out of this meeting', 'why is this essential for Natural England', not 'why is this essential for Basingstoke Canal in particular', so it's a question of justifying all of our meetings.

Interview with Natural England Officer (July 2011)

It is not necessarily the canal that assembles the JMC, nor is it necessarily the central concern of those who gather in the room and are allowed to speak and make decisions in its name. The demarcation and isolation of public interest can stifle action and contribute to reduced confidence in the capabilities of its institutional bodies. Such a situation is not uncommon and has been remarked upon by geographers and political theorists; Marres and Lezaun (2011: 496), for example, argue that it is often the case that even where there is an expressed concern for more engaging public consultation there is a tendency to "revert to an ideal of public participation premised on processes of disembedding and disentanglement from material practice". The JMC is separated from both the water of the Basingstoke Canal and the interested people that surround and move along it. In the absence of productive disagreement, albeit capable of resolution, a situation is generated

where decisions may be imposed without transparency or consultation, thus prolonging unproductive conflict and inhibiting action.

The JMC does not conform to the image of the 'hybrid forum', theorised by Callon as a productive space of action and discussion generated through the arguments, overflows, and unexpected connections that permeate controversies (Callon et al., 2009). Hybrid forums are not only generated through socio-technological uncertainties and controversial events, they are appropriate responses to them, characterised by unpredictability, where the forging of alliances and the arrival of social groups cannot always be foreseen and the terms of the controversy are renegotiated. Hybrid forums are thus productive mechanisms through which to engage with interested publics, and in foregrounding ideas of debate this approach challenges presentations of the 'public' as homogeneous and uninformed. Work within geography and social studies of knowledge have highlighted the capacity for interested, and multiple, publics to coalesce around controversies, or 'matters of concern'. Such events arise when "the rationales and reassurances of environmental science and policy fail to convince those affected by what is at issue...or to allay their concerns" (Whatmore, 2009: 589). The disorder and uncertainty surrounding such events creates opportunities for things to 'slow down', new connections to emerge and conditions of expertise to reform. Rendering publics as eventful gatherings aligns with a pragmatist approach, in which they are regarded, following Dewey, as 'the emergent effect of a problem' (J. Bennett, 2010: xviii). Jane Bennett (2010: xviii) further develops this into a notion of publics "as human-nonhuman collectives that are provoked into existence by a shared experience of harm". The image of a fixed 'public' requiring remedial attention to address a deficit of knowledge and appreciation has thus received sustained critique. Callon (1999) argues that such presentations regularly derive from flawed conceptualisations of the relationship between expert and lay knowledges. The public is

frequently excluded from knowledge-making as scientific and decision making processes are isolated from sites of vernacular knowledge creation, and any consultation occurs after the closure of 'expert' discussion (Callon, 1999). Such approaches continue to be seen within environmental research, where an appreciation of the environment is associated with familiarity with terms such as 'biodiversity', and the engagement of experts to instil "a better understanding of the importance of conservation" within a wider citizenry is encouraged (Schindler et al., 2011: 380), and labelled Public Communication or Engagement. Latour (2005), however, argues that our relations to matters of concern are not fixed or knowable in advance, but take the form of attachments forged through the generative event. He argues, following Dewey, that such attachments derive "from the entanglements of everyday life", thus publics as interested groups emerge around an issue (Marres, 2010: 190). The distinction between public and private, expert and lay, is subsequently erased (Marres, 2010), and concern shifts to the identification of engaged bodies capable of acting, forging attachments, and generating debate. Publics are performed (Marres and Lezaun, 2011); they are not fixed and contained bodies, but can be contagious, proliferating, and exhausted.

Co-opted or Interested?

One of the central weaknesses of the JMC as a forum for management and public participation around the Basingstoke Canal is that the individuals seated around the table are co-opted not interested.

Patrick: ...some of the officers sit there and some of them don't say anything, some of them have an interesting little discussion about crayfish or something like that, but sometimes you come out of these meetings really quite annoyed. There are elephants in the room, we need to get the canal reopened, we need to tackle the water issues, and they've just had a nice morning talking about some pretty low level issues...

Discussion Group

The members of the JMC are ‘co-opted’ and this diverts attention from questions of how they come together, for their presence is always already established. Once the impulse of statutory obligation is removed, the coming together of people around the canal becomes a much more relevant and interesting concern. This follows Whatmore and Landström (2011: 584) who identify an elliptical tendency within a number of accounts related to the formation of publics, for the “energetic business of ‘arousing’, ‘triggering’, ‘sparking’ connections between knowledge controversies and emergent publics is sometimes glossed over by their being treated as always already implicated”. This chapter therefore seeks to look more closely at the question “of *how* knowledge controversies generate new forms of public” (Whatmore and Landström, 2011: 584). As such it considers the energy, associations, and capabilities necessary for the generation and maintenance of such associations and traces the empirical spaces of assemblies, their boundaries and places of animation, diffusion, and interaction.

To achieve a more engaged and democratic public assembly the convened bodies must be open, lively, and interested, and the space of meeting needs to be invested with capability. This may be possible within a meeting room, and the forum of the Conservation Steering Group (CSG) demonstrates promising tendencies. The CSG is a sub-group of the JMC and meets twice a year to discuss monitoring, recent ecological developments, and updates to the conservation management plan. In February 2011, two weeks after the JMC, 14 spokespeople gathered at the Canal Centre and formed the CSG. This meeting is a composition of interests; its members are not co-opted, rather they are invited or request inclusion. They seek to speak and their interests are tied to, if not necessarily aligned with, the canal. This meeting did not begin with the allocation of name badges, rather its members (most of who have met before) were asked to provide their own introduction. The choice of identification was not standardised and varied from institutional

representation, to expertise and declared interests: Canal Society members; waterways groups; Natural England in Surrey; engineer; ecologist; Oxford DPhil student. In recent years it has also been considered important for the canal conservation rangers to attend and participate in the discussion; their inclusion is one notable contrast with the space of the JMC, where no rangers are present. Membership of the CSG overlaps with the JMC and the same meeting room is used, yet the tone and progress of this meeting sharply contrasts; a different environment is generated. As issues are explored and concerns raised so the authority to speak fluctuates, with different members' voices gaining and waning in legitimacy as various individuals are appealed to; from the watery knowledge of the Environment Agency, to the national botanical experiences of the certified ecologist, to the local entanglements of the canal rangers.

...you've got the Conservation Steering Group which I think is quite useful. Mainly because it's got a very good academic who can give his views on the management plan which, as you know, the purpose of the CSG is to view the management plan and the actions and I think it's very good at that...

Discussion Group (SHCS Representative to both the JMC and CSG)

Knowledge formation within the CSG is on-going, and the space for discussion generated by the coming together of these individuals is one of respect for the views and expertise of its members, subsequently enabling productive interdisciplinary discussion.

'There's no energy there'

Publics are 'triggered' and 'sparked' by connections (Whatmore and Landström, 2011); they are energetic assemblies. The coming together of such groups warrants attention, and this concern should be further extended to considerations of what is generated within the space of these gatherings, and the extent to which things may remain energetic even after the close of the meeting. The members of the JMC who gather at the canal centre twice a

year are co-opted and not necessarily interested, and this initial inertia can have more enduring repercussions.

Patrick: ...it's just going through the motions.

Tom: Trouble is they don't take things back...

Patrick: ...there's no energy there...

Tom: The officers might do something, but...

Patrick: Yeah, but they need to have their arms twisted...if the members are not saying to the officers, 'you must put a higher priority on the canal and look at ways of getting', you know, then they're not going to do it and I suspect they don't do, and well the evidence is that they don't...

Artefact Discussion

The JMC is contained and the absence of generative energies ensures that things are closed down when the meeting ends; whilst the same individuals gather around the table a number of times over the course of the year, this is a repetition without creative difference. Previously agreed reports are presented, and there is little opening for discussion or surprise. Greater debate, I was told, could be seen in the private meetings held between members prior to the JMC, but this energy was not sustained. This approach to engagement imagines a passive and uninformed public, and the manner through which this meeting assembles constrains activity afterwards. The CSG is not a repetition of previously agreed consensus. Uncertainty amongst the expertise around the table opens the possibility that the canal, in the form of questions, can travel beyond the space of the meeting as the input of individuals not present is frequently sought. Wider discussion with the canal rangers regarding the agenda is additionally conducted prior to each meeting, with the possibility that any points raised would be taken to the CSG. Furthermore, particular developments and conversations from the CSG travel back to the ranger force both through the formal distribution of the meeting minutes and informal discussions with the canal manager and conservation rangers. Whilst taking place in the Canal Centre, the CSG is not confined to the meeting room.

The CSG cultivates interdisciplinary discussions that are founded upon respectful connections between people who speak through their own mouths, rather than as co-opted representatives. Despite this, there is a lingering fixity to the CSG and it can be difficult to get sufficient energy from the internal relations of the group to take issues beyond the immediate space of the meeting. An example of this inertia is provided by the case of water supply and unease surrounding the provision of continued and reliable water inflow to the canal. This issue was raised at both the February and July meetings of 2011, and initiated informed discussion between volunteer individuals from the boating community, ecologists, and the canal rangers. However, the discussion did not appear to proceed between the two meetings, whilst the opinion of the Hampshire representative from Natural England, whose consent would ultimately be required, was not sought. This swerve towards confinement and delimitation threatens continued attendance at meetings, and risks the CSG being perceived as ineffective. Creative debate is necessary to ensure the meeting remains generative and to allow assumptions to be put at risk. However, there were times within the CSG when the discussion was closed down and the canal was silent and fixed; funding shortfalls and budgetary constraints stifled action, whilst formal ecological expertise ended dialogue surrounding invasive species management plans. This tendency to defer to the certified expertise of an academic who speaks on behalf of a representative ecology, not the ecologies of the canal, further precludes energetic intrusions. Successful assembling requires the opportunity for escape, for lines of flight to exceed the defined space of meeting, for the generation of difference through repetition. When this possibility closes down, the CSG is in danger of collapse. Whilst often identified as the most effective and productive of the canal's management forums, its responsiveness and energy often remains isolated from other debates. Despite the overlap in membership between the CSG and JMC, disputes and concerns rarely transgress their boundaries.

Too often the meeting room is separated from the canal, it is held at bay. As waters, boats and people pass by outside the window, those within seemingly look the other way. However, the canal may be provocative and is capable of generating energy within meetings. Indications of this were visible in the way its waters circulated within the space of the CSG through various translations, including maps drawn up to secure HLS funding, invasive species records, and water quality reports. As the canal was reassembled in the space of the meeting, so its future was recomposed: favourable, sustainable, uncertain, and dormant. These renderings of the canal's future and present materiality infused and informed debate, but they were infrequent. The isolation of public interest from lively debate, the detachment of meetings from each other, and a lack of watery engagement highlight the need to increase the sociability of gatherings around the Basingstoke Canal.

To return to the opening quote of this chapter, it is clear that the institutional framework of the canal's governance exhibits a tendency toward disconnection as the canal is divided between meetings, and public interest is isolated. This is not a natural consequence of its linearity. Publics can also be assembled through 'talk' and 'action' beyond formalised spaces of engagement, and in these situations the canal is more than a line on a map. In moving to explore such assemblings this chapter follows the recent work of Eden and Bear (2012) who, in the context of angling, highlight those environmental publics engaged in directly reshaping those ecologies with which they interact. Waterways and publics are not incompatible, but they perhaps take a different form to that envisaged within conventional democratic theory.

It is necessary to disassociate the formation of publics from the institutions of representative government, and widen the distribution of agency beyond the human realm (Whatmore and Landström, 2011). As the image of a singular, stable, and knowable public

is challenged so attention is drawn to relations of expertise, technologies, and knowledge. Within the force-field of controversy these become “the subject of intense public interrogation” (Whatmore and Landström, 2011: 583) and subsequently contribute to the emergence and endurance of new publics, forged through more-than-human activities (e.g. Whatmore and Landström, 2011; Callon et al., 2009; Latour, 2004a). Expertise is here redistributed amongst a host of informed materials and interested bodies, which collectively map the controversial event and its consequences. These are publics-in-the-making, concerned groups that form around an issue and ‘co-produce’ knowledge about it (Callon, 1999). Geographers have thus developed a more material conception of publics, recognising that the capacity to act politically is not confined to human bodies, but instead emergent through networks of relations. A concern with controversies has enabled those working on increasingly visible socio-technological uncertainties to widen the scope of what gets taken ‘into account’ in consideration of the ‘stuff’ of, in this case, publics (Braun and Whatmore, 2010). However, accounts of generative publics are often saturated with a dramatic and emotive vocabulary concerned with molten environments. The focus of attention is often on the ways in which ontological disturbances generated around large-scale charged events, such as the BSE crisis (Hinchliffe, 2001) or flooding (Lane et al., 2011), can produce knowledge, enable interests to coalesce, and spark the formation of publics. The Basingstoke Canal, as traced through the previous chapters of this thesis, does not resemble such an event. However, this research argues that material publics may emerge and endure through more than crisis events, and this chapter now moves to consider the ways in which the endurance and varying intensity of public gathering can be sustained through artefacts, enchantment, and repeated exercise. The impulses towards recombination explored previously in this thesis have resonance within this context and as the focus of this chapter shifts from co-option to publics so the endurance of the swarm, whose lines of flight saturated Chapter Six, may offer guidance. The swarm is triggered but

it does not erupt, it draws its energy from the repeated flight of bats and its endurance can be considered an event. As it assembles gradually and as its composition changes daily we cannot distinguish between those energies that bring the bats together and those enabling the continuation of swarming. The swarm is therefore not stable, rather it is precarious and must be regularly renewed; its uncertainty, diffuse spatiality, and emergent composition do not weaken it, but instead enable interaction between bodies and enhance capabilities. The environment of the swarm is thus 'invested' with the capacity to forge new relations and those energies that bring together the swarm are also necessary for its continuation. This emphasis on participation and lack of spatial constraint offers lessons for the exercising of human publics. The following sections consider those more precarious, participatory, and potentially less visible human publics which, through repetitions and recombining, may be exercised in the name of the Basingstoke Canal. This chapter cultivates attentiveness to the membership of those groups and seeks to recognise how their assembly creates new spaces of exchange, whilst also experimenting with ways of generating interested engagement. The Basingstoke Canal can spark enchantment, but can it enable enduring publics?

Assembling around Material Concern

The canal rangers clearly demonstrate that the linearity of the Basingstoke Canal does not intrinsically preclude assembly. They meet every Friday at the Canal Centre, with the Canal Director, to discuss ongoing and future work, together with emerging concerns upon the canal and within the BCA, Surrey and Hampshire County Councils, and nationally. The rangers' meeting enables a coming together of individuals who, owing to the length of the canal and diversity of work undertaken, will not always meet during the course of a week. The canal is enfolded into these meetings, transmitted by the rangers' notes, weekly

activity sheets, and the concerns raised and discussed. Connections are made between different sections of the canal, and this folding enables a transfer of experience, the connection of management activities, and active communication between BCA employees.

The canal rangers have an interest in the canal, and this is shared by many others who engage with this environment. Canals are full of people, and there is endurance to groups such as the Surrey and Hampshire Canal Society (SHCS). This society has been a constant presence in this thesis; formed in 1966 it has continually campaigned and invested in the restoration and promotion of the Basingstoke Canal. This resilience was noted by one member who remarked:

Tom: ...one thing I think the history tells us is that we don't go away, [we're] a grassroots movement upwards, not a top down one. The top down ones fail...

Artefact Discussion

The enduring influence and energy of the canal society emerges from the interest of its members, a willingness to respond to changing circumstances and, occasionally, loud voices. Interest is central to the generative capacity of these groups, and this can be expanded through engagement with the work of Isabelle Stengers. The etymology of 'interest', Stengers (2000: 48) argues, is 'to be situated in-between', thus reforming our understanding of the question 'Is something interesting?' as "Does it have the power to create a new link between us which nobody could reduce to a matter of belief or of interpretation? In other words, does it have the power to situate itself between us?" Whilst a variety of issues may be discussed by the rangers in their weekly meeting, the morning begins with an account of water levels. Water on the canal is actively managed through the operation of weirs and restrictions on navigation; unexpected fluctuations generate concern and uncertainty, whilst planned changes prompt continued discussion. The connectivity of water thus returns as a central enabler, facilitating linkages, establishing

the endurance of the canal, and stimulating this meeting of rangers. Water both sparks and sustains, a common theme holding together both the canal and this meeting. The canal is invited into the meeting, and situates itself within discussion, forging connections between the rangers and provoking interesting questions.

Material and immaterial artefacts may further spark connections and be generative of action, for not all the agency of publics emerges from their human members. In outlining her ideas on thing-power Jane Bennett (2010: 3-4) argues that things possess a 'moment of independence' from subjectivity and "do in fact affect other bodies, enhancing or weakening their power" such that "human being and thinghood overlap...the us and the it slide into each other". Following Stengers' concern for the connective intrusion of the world, and Jane Bennett's call for attentiveness towards the capacity for things to enchant and hold our gaze I sought to explore the possibility that objects could bring together human discussion, and potentially generate interest. I asked a number of earlier focus group members to return to the meeting room and bring along an object (or many) relating to the canal; something that interested them, was important in shaping their relationship with it, or had simply caught their eye. A variety of things subsequently collected on the table at the canal centre, including: a bag of litter collected that morning, a painting of a canal bridge gifted to a member, photographs of vandalism, a book illustrating the canal's restoration, and a windlass for operating locks. Conversation circulated through and around these things, connecting the humans who had transported them and situating the materiality of the canal within discussion. The stories told and prompted by these items directed a discussion that continually diverged and reassembled around no longer inanimate things. A material public emerged.

As litter travelled around the table so the presence and absence of rubbish bins, the issue of responsibility for canal maintenance, and the relationship between the BCA and riparian authorities was debated. Crisp packets, sweet papers, and food wrapping enabled lively talk of service-level agreements, the challenges of corridor management, and questions of responsible behaviour. This debate was not only informed, it was interesting and through this it developed generative potential:

Charles: there was a lengthsmen's approach which Bill ran.

Patrick: Well, it's still in existence really...

Charles: ...effectively I do it for this bit. Where people volunteer to look after...

Richard: Try to revitalise it...

Patrick: I think it's a good idea...

Tom: ...all of these things we talk about we have no difficulty...in saying 'they must do something about this', now we are in a situation now when resources are very tight...I wonder what part we might play in it, what the volunteer lengthsmen might play...because it's all right us saying *they* ought to do something, the BCA, they're losing staff...we ought to also parallel these things with coming up with maybe what we can do about it...

Since this discussion, attempts have been made by the society to re-establish a 'lengthsperson' scheme, within which volunteers identify a section of canal that they then regularly walk, actively clearing litter and notifying the BCA of any potential concerns. A call for volunteers has been made in the Society's newsletters and bulletins and it is hoped that, through the allocation of sections to local members, the whole canal will be covered.

Other members present at this discussion had interpreted my request to bring objects more unexpectedly, and were accompanied by seemingly immaterial things:

Tom: I'm going to start with a date, which is the 15th August 1989, and it was just after...

Richard: Yes, yes let me think, I remember it (!)

Tom: ... I was Chairman of the Canal Society ... I just got married ... in July and the canal society, extremely generous, they would mark this. There was an event, a boat trip ... and they very kindly commissioned a picture from an artist ... It combines all sorts of things, obviously, the bottom of the Deepcut flight at Brookwood, lock 15, railway in the background...

As conversation began from memories of that day, and the painting was passed around, so new thoughts and associations began: ownership of the adjacent lock cottage; the fate of a boat later abandoned at this site (discussed in the opening to Chapter Four); artists upon the canal. The objects we handled, spoke to, and talked of were not passive, some actively performed. The windlass, for example, sat – apparently inert – upon the table but as it was co-opted into conversation its vitality became more apparent:

Patrick: The only other thing I brought...I mean you probably know what it is.

Victoria: It's a windlass.

Patrick: Yes, which really makes the point that I think the locks on the Basingstoke are not the same key as the British Waterways and Thames are they? Everything about the canal is a bit different, and I think that's one thing.

John: They have actually sorted it out slightly, I think.

Patrick: Anyway...it doesn't get much use.

Victoria: How long have you had it? How often do you use it?

Patrick: I've never used it and as I say not many people will have used it over the past few years as there haven't been many boats coming through the locks.

These things assembled people and conversation, highlighting the “curious ability of inanimate things to animate” (J. Bennett, 2010: 6). Material and immaterial objects can generate connections, initiate activity and revitalise forgotten enchantments; these affective things and informed materials can make a difference (Barry, 2005), as they “help constitute the common worlds we share” (Braun and Whatmore, 2010: ix). If we are to develop a more materialist politics, we must recognise the capabilities of things and nonhuman agency, acknowledging their interested role in bringing publics into action. It is possible, through experimental approaches, to create means of engendering publics, of facilitating and encouraging the active coming together of interested bodies in ways which are then generative. The form of these publics is not determined in advance, and their creativity may enable further activity, as evidenced by discussion of the ‘lengthsmen’ scheme above.

Enchantment and Uncertainty

Who possesses the right to be interested? This is a question posed by Stengers (2000: 50), who argues that a public does not need to be informed, or persuaded, but instead “have their interest stimulated”. This approach resonates with the activities of the Canal Society, who do not seek to passively transmit information between the spheres of the public and private, but actively entangle them. The expertise of Canal Society members, both certified and experiential, is combined with that of the canal rangers and interested local individuals to contribute to both practical and managerial activities. The Canal Society organises regular work parties on the canal, based on a range of activities from litter picking, to offside bank vegetation clearance, and major construction work. These events target areas of particular concern and complement the activity of rangers and contractors. It is recorded by the Society, for example, that in the period from March to May 2010 inclusive a total of 103 volunteer days (including regular Society involvement and the hosting of visiting waterways groups) were conducted, generating a contribution in kind of £5150⁶⁵. The Canal Society clearly performs as something more than a means of public communication and directly shapes the environment of the canal.

The Canal Society and the BCA resist any presentation of the canal as isolated from the communities through which it flows and seek to actively stimulate the interest of those encountering the waterway.

For two weeks every winter, often whilst the canal is covered with ice and snow, it is possible to catch a glimpse of Santa Claus. The water and land around the Canal Centre at Mytchett are transformed. Mince pies are offered and parents travel along the canal with their children in a decorated boat, before alighting onto a pontoon. As they follow a tinsel trail lit by lanterns through the wood so they reach the entrance to a large yurt, once inside there is a faint smell of hay and yak, and the sight of a sleeping figure dressed in red.

Field Diary (8 December 2010)

⁶⁵ Calculated as ‘Volunteer Days’ at £50 a day and presented in the SHCS’s report to the JMC, June 2010

Each year around 2000 people take part in the Santa Cruises, and these Christmas trips are fully booked by the end of the preceding October. They are clearly popular, with many parents remarking that they have become a tradition within their family, whilst the comment cards left at the end of the visit regularly commend the BCA for a ‘magical experience’. Such enchanting experiences forge connections with the canal, allow it surprise, and sustain the latent energy of publics. The Canal Society additionally runs numerous events that regularly mobilise and strengthen attachment; including boat trips, rallies, and the annual illuminated boat rally in Woking.

...our biggest PR vehicle is the boat, which over the years, thousands and thousands of people have seen what a lovely canal it is from the boat and that is really our main publicity vehicle.

The illuminated boats...well that’s an example of how the canal could be used a bit more, and it always attracts interest, you always have a lot of people coming out to see the boats...

Artefact Discussion

The “coincidence of controversies and new publics”, Whatmore and Landström (2011: 603-604) argue, can be distracting and through the example of flooding they trace the “laborious business” through which publics become connected, emphasising that these are “situated achievements that are neither automatic nor guaranteed”. They subsequently highlight the importance of approaches to the formation of publics that endeavour to “redress the endemic humanism of political theory by recognizing that such emergent publics are not exclusively human achievements” (Whatmore and Landström, 2011: 584). The Basingstoke Canal can intrude, generate enchantment, and situate itself in-between relations. It cannot be excluded, and becomes one of what Stengers terms, those ‘things which force thought’ (Whatmore and Landström, 2011). However, a further risk of distraction emerges through a focus within the literature on eruptive events and highly-charged controversies. The Basingstoke Canal resembles an on-going concern and

ephemeral publics, such as those discussed above, are triggered and sustained by enchantment, not danger. These publics require exercising to reaffirm attachments and strengthen connections in ways that do not generate fatigue.

Interested Publics

The possibility of public formation around the canal is always present, and the Canal Society considers its role to be one of harnessing this potential and facilitating the development of relevant, interested, groups rather than structurally engineering a single 'public'.

Patrick: [A] recent example...where there has been a lot of publicity was when Surrey were proposing to cut their contribution [to the funding of the canal] quite significantly, in half I think it was, and that produced a lot of interest and TV and press coverage...I went down to Southampton to do an interview with South Today and...we got a lot of publicity over that and that brought home to me that underneath there is this big support for the canal but it doesn't often pop up to the surface but you really propose something really significant...and it does bring them out. And I think we can always rely on that, but you can't keep on doing that, you can't keep the momentum up, you've got to pick your moments.

Artefact Discussion

Tom: Generally the public out there love the canal, and if they think there is a big serious threat then they will support us but we have to galvanise them.

Artefact Discussion

The Canal Society can act as a condensation nucleus for wider public assembly, as groups emerge around issues and concerns regarding the future of the canal. These publics are not permanent, and indeed the Canal Society is nervous that demanding long-term, active, participation may ultimately weaken their effectiveness. There is no eternal, fixed, public around the Basingstoke Canal, but the capacity for activation endures. This potential is regularly exercised, and these assemblies are entangled with the generation of enchanting relations.

Collaborative work parties are increasingly being explored as a way of involving local residents in canal management and are jointly organised by a BCA ranger and SHCS volunteer. This particular form of work party remains in its infancy (formed only in the winter of 2011), but has developed into a regular Tuesday meeting along the Brookwood stretch of the canal and has largely involved *Hydrocotyle* clearance, litter picking, and 'shrub bashing'. These initiatives have been specifically presented as endeavours to involve regular local users in caring for the canal, thus building upon, and encouraging, affinity with the waterway as it flows through a neighbourhood. It was noted during a rangers' meeting that such an approach generates a sense of community 'ownership', albeit very informal, that encourages a more active and engaged relationship between local people and the canal. A sense of appreciation through involvement is thus cultivated once more, as the exercising of publics here emerges from physical exercise and exertion. During the course of each week, and through directed efforts groups gather and diffuse, each bringing together different experiences and acquired knowledge that cannot be delimited through the categories of expert/lay or professional/amateur. These gatherings assist the ecological management of the canal but they are also sociable, and it was regularly remarked during fieldwork that engagement with the canal had the seemingly indirect consequence of forging friendships and greater social wellbeing. One of the rangers remarked that he particularly enjoyed the human mixings which emerged from meetings on the canal. Involvement with the canal enables individual lines of liveliness to briefly travel together, as the flow of the canal sustains groups despite seemingly dissecting potential communities.

The success of such projects and the rangers' conviction that encounters with the material canal can generate more energetic and productive relations inform the Basingstoke Canal's established management framework. It was regularly expressed to me during fieldwork

that the canal rangers would like to take the JMC members onto the canal, to remind them what is at stake and encourage them to personally invest in it and communicate more effectively with those within the councils and institutions to which they report (*pers. com.*). In summer 2012, a group that included the current Chair of the JMC together with Hampshire County Council's Director of Culture, Communities, and Business Services travelled a stretch of the canal in Hampshire in the SHCS trip boat⁶⁶. It was hoped that this excursion would renew enthusiasm in the Basingstoke Canal and widen the perspectives of those participating. In encouraging movement along the canal and its towpath the linearity of the waterway no longer inhibits associations, as was suggested in this chapter's opening statement, but may enable the formation of new groups and assist the exercising of publics.

The movement of the rangers around the canal and their active engagement with it frequently initiates a space, a pause or opening, within which rangers can meet each other and canal users. The canal engages here as an active member, prompting discussion, intruding, and drawing attention. Whilst cycling along the towpath with the conservation rangers in a three-day exercise of mapping invasive species, for example, the canal informed conversation and enabled connections between different concerns:

...*Cabomba*; invertebrates; moorhen numbers; dredging....

Field Diary (28 September 2010)

Opportunities for movement and assimilation with the flow of the canal are not confined to the towpath. In October 2010 I joined three of the canal rangers to move a work boat. Over the course of several hours the rear deck of the boat became a forum for assembly as artefacts of knowledge, past experiences, and emerging concerns flowed and interacted. Conversation was active, not governed by agendas or policy it was more immediate and

⁶⁶ Surrey and Hampshire Canal Society (Summer 2012) *Basingstoke Canal News*. Available at <http://www.basingstoke-canal.org.uk/>. Accessed 8th May 2013.

enabling. The canal frequently objected and intruded upon discussion, engaging as an active member. Temporarily an interested group coalesced, aided by the dynamics of movement and shifting relations between people, the boat, and the rhythms of a lively canal. The rangers recognise and emphasise the importance of frequently travelling along the canal in enabling them to engage with different perspectives, re-familiarise themselves with sections of the waterway they visit less often, monitor change, and map future management work. The experiences and connections forged with the canal during the week are conveyed to the weekly rangers' meeting where they inform discussion, intersect with the lines forged by the other rangers and prompt future activity.

Formal weekly meetings, happenings upon the canal, and discursive contributions generate connected and continually reassembling publics around the canal. Accounts of public engagement often prioritise discursive participation over evidence of practical involvement, with contributions to consultancy reports and attendance at formal meetings presumably more visible to the official gaze, and easier to record. Eden and Bear (2012: 1201) subsequently argue that established practices of engagement possess a tendency to ignore the mundane and every-day, choosing instead to focus "on what publics *know*, neglecting what they *do*". This section has sought to consider the active practices of volunteer groups and the assembling of collaborative working parties upon the canal, through which a variety of individuals, deploying a range of skills, engage in environmental 'comanagement'. This involvement further strengthens social attachments with and through the canal and contributes to the continued endurance and position of the SHCS for, as Eden and Bear (2012: 1201) demonstrate in the case of anglers, such individuals "are powerful in terms of (re)shaping and (re)designing water environments through practices they might consider to be mundane, but that generate power relationally through nature-culture associations". Interested individuals, not all under the auspices of the BCA, coalesce

around the canal in ways that are not always structured or predetermined; litter picking and weeding may be ordinary, but they are also enabling and possibly enchanting.

Embodied practices are important in establishing geographical knowledge, and making sense of the world (Eden and Bear, 2011: 309). Publics may emerge through such practices and through mundane encounters with environments so movement, collaboration, and enchanting moments may enable the exercising of publics. The notion of 'exercising' publics thus both captures the activity of publics and the importance of repetition in strengthening attachment, whilst avoiding exhaustion.

Conflict and Collaboration within Management Frameworks

An emphasis upon practice and embodied relations highlights the heterogeneity of spatial experiences and understandings (Macnaughten and Urry, 1998). Just as there is no single canal, nor is there a single public, or perception of this environment; recognising such alternative positions and geographical knowledge can challenge established frameworks of management, whilst also presenting an opportunity for more creative approaches.

The position of the Surrey and Hampshire Canal Society is particularly interesting in this respect. The society is securely integrated into the management of the canal and represented within formal decision making bodies, whilst continuing to perform as a vocal pressure group.

Patrick: ...we are the people that will say to the people next door [BCA], we don't think you're doing it properly...we are here to shivvy them, to persuade them, to sometimes have a bit of a confrontation with them because sometimes they do silly things, you know, who else is going to do it. I mean, we see ourselves as being the people, we're the Jack Russell's nipping at their ankles...

Discussion Group

The relationship between the Basingstoke Canal Authority, SHCS, and other groups is continually renegotiated and the resulting interactions can be energetic, heated, and productive. In recent months attempts have been made to build upon these exchanges and develop more effective dialogue:

It has been quite difficult in the past to find out what the BCA staff have been doing, which ran the danger of giving the impression that there was no activity apart from the volunteer effort. This clearly isn't the case and it's nice to be able to publicise their activities.

SHCS Newsletter (2011)⁶⁷

Attempts have been made to strengthen the conduits of exchange between the BCA and canal users. The Canal Society newsletter, for example, now contains a regular article written directly by a canal ranger, discussing the recent activities of the BCA. Open letters between the BCA and Canal Society have additionally been published in this forum, highlighting repeated communication and negotiation. The spaces of the newsletter and monthly e-bulletins are open to comment and have a wide readership, including the BCA, and therefore introduce the possibility of change and different approaches to management, whilst effectively communicating to over 1,000 Canal Society members.

Circulating between inclusion and opposition, the canal society takes on multiple forms and thus corresponds to Eden and Bear's (2012: 1205) assertion that "environmental publics are not fixed, but continually (re)imagine and (re)perform their roles, shifting between different constructs". This capacity to reassemble can, however, generate concern, with Eden and Bear (2012: 1205) further noting that there is a problematic 'politics of the public' in situations where organisations "both claim to be 'the public' and also imagine (and address) 'the public'". In the case of the SHCS, however, this flexibility has enabled longevity and action both within official spaces and beyond. Whilst the society is not a

⁶⁷ Surrey and Hampshire Canal Society (Winter 2011) *Basingstoke Canal News*. Available at <http://www.basingstoke-canal.org.uk/>. Accessed 10th May 2013.

legally recognised component of the management and ownership structure of the Basingstoke Canal its members continue to fight for and reaffirm their recognition and involvement, and have subsequently achieved membership of committees such as the JMC and CSG, contributing to meetings and submitting reports. In addition to the society's role in enabling more voices to be heard within these spaces they frequently promote new initiatives, for example:

Recognising that the canal has always suffered from water shortages, especially in dry months, we have established a Water Resources Group to examine the various options for improving the water supply.

SHCS Newsletter⁶⁸

Attempts are regularly made by the society to convene what it terms 'professional volunteers', including planning specialists, engineers, and lawyers. These campaigns particularly target recently retired individuals, bringing together the professional skills and interests of these individuals and blurring the divide between work and hobby. The Canal Society is active within managerial spaces, is prepared to challenge the assumptions and proposals of the canal's officers, and generates additional spaces of interaction, discussion, and knowledge creation. Differences in geographical knowledges and embodied experiences of the canal may, when combined with a willingness to explore collaboration and engage in debate, generate creative environmental management. These debates, the energy of collaborative working parties, and the capacity for the canal and its ecologies to situate itself in-between assumptions and relations bear little resemblance to the silenced official spaces of public communication, such as the JMC.

Associations similar to the Surrey and Hampshire Canal Society may not always be viable solutions to concerns regarding environmental engagement as individuals have invested

⁶⁸ Surrey and Hampshire Canal Society (Winter 2011) *Basingstoke Canal News*. Available at <http://www.basingstoke-canal.org.uk/>. Accessed 10th May 2013.

years in their creation (see also Eden and Bear, 2012: 1216). The centrality of personalities and the long time-frame necessary for establishing a reputation prevent the SHCS being held up as a model or short-term public engagement fix, but its successes do highlight the need to fully explore the potential of interested groups and encourage their growth and involvement. This chapter has moved from ideas of a single public, brought in to witness management and be informed, onto encounters with multiple publics which ebb, flow, and recombine in response to embodied experiences. People may not gather ‘around’ the canal, but they certainly gather and the publics which are subsequently generated emerge through more-than-human relations.

Exercising Canal Publics

This chapter sought to challenge concerns that the Basingstoke Canal’s apparent linearity precludes the presence of interested and engaged public associations. However, formal spaces of public debate and questioning, most notably the JMC, appeared to confirm the lament of the opening quote. The meeting room did not encourage participation and the ensuing silence and absence of discussion created an impression of disinterest, whilst the co-option of representatives reduced the energy of their association. Although the absence of shared concern, weak connections between members, and lack of activity between meetings stifles both the CSG and JMC, a focus solely upon these official spaces of management conceals the coalescing of other groups upon and around the canal. Isabelle Stengers (2000) argues that publics need to have their interest stimulated, and in the case of the Basingstoke Canal this is achieved both through concerns regarding the waterway’s future, and a wider exercising of enchantment. This sensibility to the canal, together with the encouragement of active participation, enables the recombining of relations between people and the material ecologies of the canal in ways that ensure the return of difference,

and sustain both interest and appreciation. This chapter's account of exercising canal publics broadens geographical debate, and in considering how these groups are sparked, endure, and reassemble, three qualities emerge: temporality, material connectivity, and enchantment.

Temporality: the endurance of publics

The publics emerging around the canal continually diffuse and coalesce. The 'laborious business' of the 'coming-together' of publics was highlighted by Whatmore and Landström (2011), and this was extended within this chapter to considerations of what happens after the closing of a meeting, the end of an event, or departure from the towpath. The possibility for coalescence is continually exercised by both the BCA and organisations such as the SHCS, who seek ways to strengthen and build associations with the canal, but often stop short of actualising a fully-fledged public. The 'sparking' of publics (following Marres, 2005) requires both a match and receptive material, and it was suggested by members of the Canal Society that a latent potential for public emergence exists around the canal. Publics are not stable and inert, and the relations through which they are composed must be renewed to ensure that when concerning events, such as funding threats, occur it is possible to trigger a more formal and visible actualisation of an interested public. It was stressed that attempts to sustain heightened public engagement with the canal run the risk of creating a form of fatigue, and ultimately weakening attachment to this space. The waning of proclaimed public support for the canal may not therefore be a weakness, and may even enhance the energy of future public assembly. This contrasts slightly with Dewey's argument that publics must be stimulated and publicised to be recognised, knowable, and energetic (Marres, 2010). However, the energy generated through the coming together of individuals in response to the canal is retained as they disassemble, keeping people interested as they are encouraged to regularly return to the waterway.

Public support for the canal endures through repetitions, but these are not repetitions of the same as new initiatives are developed, the canal's ecologies recombine, and the composition of groups changes. The human potential of the Basingstoke Canal may not always be visible, but it remains energetic and there is an appreciation of its flammability amongst those responsible for its funding and management. The publics of the Basingstoke Canal emerge in multiple forms and ebb and flow around its waters, enduring whilst remaining responsive to emerging concerns.

Material connectivity

The importance of local support in the development of effective environmental management has been noted within conservation (e.g. Harrison and Burgess, 1994). However, the successful associations of the Basingstoke Canal demonstrate that it is not only *sites* where such groups emerge and matter, corridors and linear structures can also generate appreciation and activity. Canals can have well established, regularly exercised publics, and whilst not always regarded as 'spaces for natures', they are capable of sparking interest and stimulating campaigns. These publics do not function as linear conduits or gather evenly and neatly around the canal's boundaries, rather they are threaded together and composed of more than just human intentions as the material environment intrudes and situates itself within relations. These connections generate interest, in the Stengerian sense, and open the possibility for different types of generative assemblies. Organisations such as the canal society seek to perform multiple tasks; bringing together 'professional amateurs' to contribute to management meetings whilst simultaneously encouraging local community participation in the management of small sections. This flexibility, and the permeability of the organisation, allows it to respond to the needs of the canal environment and seek innovative approaches to public engagement; this contrasts to the fixity that seems to stifle the effectiveness of the JMC and, occasionally, the CSG. The publics of the

canal, following Hinchliffe's (2010: 316) thinking on assemblage, are therefore not exhausted by their relations; these multiples are "made up of things that are making other things, and that are therefore elsewhere too". This impression of publics corresponds to the social connectivity and permeability of the canal as it allows various movements, encourages multiple connections, and enables travel elsewhere. These publics overlap and exhibit continually shifting membership; some may function more regularly at certain locations – the meeting room, or particular projects along the canal – but they remain connected through the intruding materiality of the canal. Different kinds of public therefore engage with the canal, following Eden and Bear's (2012) assertion that whilst "specialised publics may take centre stage in political struggles, such as public inquiries or protest rallies, performative publics are often active behind the scenes of public life". These performative gatherings widen the scope of environmental publics to include practice as much as discourse. Whilst we must be concerned with the possibility of reform within existing spaces of recognised public participation, the sustainable future of the canal may further be enhanced through multiplying the spaces of engagement and establishing more generative connections between formal management and people on the towpath. The conduit should not be one way, and it should not be limited to the meeting room.

Active enchantment

Enchantment actively compels associations that enable effective publics, and a focus upon this sensation widens consideration of how publics may be 'sparked' to include forces beyond controversy, danger, and harm. The exercising of publics here becomes more literal as the importance of walking, travelling, holding, and working are foregrounded. Jane Bennett (2001: 27) argues that the "ethical value of enchantment resides in its ability to persuade without compelling"; those publics that emerge through liveliness, activity, and appreciation do not rely upon co-opted representatives but encourage interested speakers.

Spontaneous, experimental, and hybrid publics of rangers, the Canal Society, and volunteers were frequently active, contested and fluid. Human assemblies ebb and flow as they assemble around issues, water, and regular meetings, and are sustained through enchantment. The Canal Society is capable of activating spaces of discussion and disagreement whilst performing as an energetic nucleus for wider social engagement with the materiality of the canal. These publics are precarious collectives, they take a different shape and temporality to formally delimited publics but they are active, enabling, and immediate. The canal and its watery, affective atmosphere nourish these connections, and whilst it is not always controversial it is enchanting and often concerning. The formal space of the JMC will remain the official managerial space of the canal, but it may benefit from increased sociability.

The environmental publics that were encountered, and emerged, through this research were “achievements of practice, of activity, and of association across diverse time-spaces and interactions” (Eden and Bear, 2012:1216). This work drew attention to the endurance of publics, highlighting their uncertainty and continual recombination. Publics are not effortless, they require work and exercising, particularly in those environments where things are not always controversial, but remain concerning. This chapter opened with a claim that there is no public around the Basingstoke Canal and it closes with the assertion that there are many, forged through enchanting attachments.

Chapter Nine

Connecting Canals: exercises in recombination

Recombinant ecologies generate lines and stillness, territories and flight. However, 'joining up' these spaces and arranging energetic trajectories will not automatically create connectivity, which has increasingly been posited as the 'most favoured option' within national and international policy discourse (see HMSO, 2011; Lawton et al., 2010). Connectivity is lived complexity, and emerges not from structural linearity but from the ebbs and flows of matter, the affective atmospheres of relations, and the capabilities of assemblages. These ecologies bear no relation to the inert and isolated realm of Nature, and through its sustained engagement with the lively matter of the Basingstoke Canal this research contributes to the formulation of a different kind of environmentalism, one which is more capable of effectively responding to the challenges posed by the Anthropocene.

Theoretical rejection of the separation between Nature and Society underlies the Anthropocene concept, and has provided resources for debate within the emerging fields of posthuman and multinatural geography (see J. Lorimer, 2012; J. Lorimer, 2009). However, philosophical concepts do not end disputes. Ontological proclamations are not the final word, and may even become shortcuts that encourage researchers to avoid the work of connecting practices, or engaging with practitioners in developing appropriate modes of response (Goffey, 2013). This concluding chapter draws again on the work of Isabelle Stengers to emphasise the importance of a practical ethos, and appropriate mode of address, within theoretical pursuits. Stengers argues that the relationship between theory and practice should not resemble the straightforward communication of information and

ideas. Such engagement should instead more actively encourage and catalyse the transformation of concepts and techniques (see Goffey, 2013). What practitioners do is therefore of vital importance. The manner in which problems are constructed, and the models and references which are created to aid their resolution, are central to Stengers' philosophy and were foregrounded in this research as an ecology of practices was crafted through the empirical chapters of this thesis. The vocabularies of ecological management, the technologies of canal conservation, and the voices of those on the towpath and waters of the Basingstoke Canal were infolded into this research and help challenge official practices, construct new proposals, and contribute to the gradual transformation of concepts within geography and conservation science. A concern for practices of recombination (a term with ecological salience), a methodological approach emphasising repetition, and a thesis structure that complicated the straightforward linearity of the Basingstoke Canal formed three of the ways in which this research can be considered an 'exercise in recombination'.

Following; Questioning; Experimenting; Considering; Responding. An interest in the methodological potential of these five terms guided fieldwork and enabled alliances to be forged with practitioners and interested individuals, through which it was possible to trace and challenge the assemblages, ecologies, and management of the Basingstoke Canal. As these traces entangled, circulated, and were transformed through fieldwork, so interesting materials were generated, aided by unexpected intrusions. Recombination emerges as the central mode of address of this work. As a term that resonates across disciplines, and emphasises energetic creativity, it sparked connections through this research and encouraged new conversations. Exercises in recombination require recurring, and often skilled, exertion, and this research does not claim the final word but presents suggestions, questions and new alliances.

Review of empirical chapters and conclusions

Canals are not disenchanted environments, and the four threads of water, stillness, wildness, and friendship articulated in Chapter Four demonstrate the possibilities for attachment and appreciation within an environment that did not qualify as Nature under the modernist settlement. Recombinant ecologies can be enchanting, and this positive sense of creativity is sustained through Chapters Five and Six, which together consider nonhuman subjectivities, expressive territories, and bodily difference within conservation. To be enchanted is to meet with the unexpected, and Chapter Five argues that it is possible to be both biosecure and attentive to difference, providing that recombinant ecologies are not stifled through spatial and temporal dissonances between policy and practice. Recombination invites and demands response, and Chapter Six explored this capacity through a focus on sonorous creativities and nocturnal ecologies, which have been somewhat overlooked within human geography. The difficulties associated with becoming attuned to nonhuman difference sustain the narrative of this chapter, which highlights how the lines of flight of bats generate expressive territories and assist the establishment of the Basingstoke Canal as an ecological corridor. Together, Chapters Five and Six challenge the absence of statutory recognition for bat swarming and question the appropriateness, and effectiveness, of current biosecurity practices in relation to invasive species. Unfamiliar liveliness, whether in the form of nocturnal assemblages, inventive invasive recombinations, or other emergent creativity, deserves greater attention within conservation. The separation of corridors and sites, along with terrestrial and aquatic environments, within existing policy, however, can stifle such attention and restrict conservation's capacity to respond. This was further demonstrated through the tracing of a Higher Level Stewardship (HLS) application in Chapter Seven. Lines can recombine and the connection of points does not always reflect the ecological experience of 'living along' a waterway. It is appropriate to regard canals as connective environments, but current

funding options increase their financial and ecological insecurity. The experience of the Basingstoke Canal highlights the need for approaches to ecological management that foreground complexity, but do not seek to render it coterminous with a linear structure. This theme extends through Chapter Eight, which demonstrates that linearity does not preclude the possibility for interested publics, or absolve management of their responsibilities for democratic experimentation. The temporality and endurance of those publics sparked into being by the experience of the canal highlights how repetition can strengthen attachment, and develops the notion of exercising publics. Interest, not co-option, should be established as the energetic force for public formation, and multiple connections between management and the rhythms of gathering should be encouraged. A lack of exercise, the stifling of movement, and the categorical fixing of identity disempower ecologies and publics, and in the eyes of many such a structure would no longer resemble a canal. The possibility for escape is necessary for complexity, connectivity, recombining, and even canals.

Each of the empirical chapters that compose this thesis address the two aims of this research, first stated in the introduction:

- To inflect ideas of connectivity with a material concern for ‘recombination’ and consider whether this presents an appropriate focus for the conservation of canal environments.
- To develop a concern for water within human geography, and approach watery environments in ways that attend to their (im)material agencies.

This research was concerned with a real, and lively, canal and the suggestions and observations presented within the empirical chapters are not, therefore, representative. However, this final chapter tentatively presents conclusions in the form of observations, recommendations, and questions that resonate beyond the waters of the Basingstoke Canal,

and through both conservation policy and geographical theory. These emerge differentially from the thesis, but cannot be distilled from single chapters and relate to: the contribution of canals to conservation; complexity as an alternative reading of connectivity; the importance of surprise and difference in the absence of nature; the creative matter of canal assemblages; and the importance of waters.

The Contribution of Canals to Conservation

Canals have created grooves through the landscape of England and Wales for over 250 years, but they were dismissed by modernity. Technological advancements rendered their transport connectivity largely irrelevant and an impression of dank wildness, feral societies, and concealed danger contributed to their neglect and erasure. Such narratives of disenchantment linger, even as canals are experiencing a 'Second Golden Age' as miles of new and restored waterway are added to the network and recreational interest expands (Canal & River Trust, 2011). This research endeavoured to "dust off and shine up" (J. Bennett, 2001: 8) one such discarded environment, the Basingstoke Canal, and demonstrates how the energies of volunteers and invading ecologies can create novel assemblages, tranquil spaces, and socio-ecological potential.

Canals are achievements; their atmospheres can enchant and people are drawn to their waters in search of tranquillity, escape, and friendship. And these waters hold their gaze. These are not the same canals that were dug 250 years ago, too much has happened for that to be the case, but they remain an example of those "magical sites already here" (J. Bennett, 2001: 5-8), and highlight the potential for reinvention and creativity within established environments. Minor experiences, vital materials, and enchanting encounters draw people to canals and inspire attachments (following J. Bennett, 2001). These social

experiences and lively threads develop the texture of these waterways, and challenge narratives of urban and post-industrial disenchantment. This research presents a narrative of the Basingstoke Canal, accentuating its enchanting moments and the capabilities it subsequently enables in others, and so opens up the possibility that other feral, neglected, and unconventional places may be productively approached in a similar manner.

Crisis conservation and the aspirations of a more fluid biogeography

Conservation doesn't seem to be working. The field has been labelled by J. Lorimer (2012) a 'crisis discipline', as growing levels of investment and activity fail to generate significant ecological amelioration. Crisis and uncertainty within conservation have inspired inventive environmental planning, particularly within urban areas (see S. Jones and Mean, 2010), whilst the rise of more fluid approaches to biogeography encourage attentiveness towards networked ecologies and relational agencies (see J. Lorimer, 2008a; Mol and Law, 1994). New approaches are needed, for, as was stated in the Lawton Report, a continued reliance on existing protected areas and 'core populations' in 'current strongholds' will neither ensure resilience towards climate pressures, nor enable the UK to meet its biodiversity commitments (Lawton et al., 2010). As climatic change and habitat fragmentation challenge the conceptual and practical foundations of conservation so connectivity has emerged as the 'most favoured option' for mitigation. This research considered whether the Basingstoke Canal, and potentially canals more widely, could contribute to a more connective UK conservation. It argues that such waterways have both considerable socio-ecological potential and can support flourishing ecologies, but are currently stifled within policy owing to enduring spatial distinctions and caution.

Canals as movement and refuge

Canals cannot be defined through their structures but through what they enable and the impressions they form, including the potential for movement and capacity for tranquillity which emerged repeatedly from discussions during this research. Canals enable ecological connection and safe passage, but these environments also facilitate situated territories and tranquil atmospheres. The clear flightlines of the Basingstoke Canal enable the internationally significant, but ephemeral, inhabitation of Greywell Tunnel by hibernating bats, whilst the canal's slow rates of water flow generate an environment resembling standing water and provide remnant habitat and refuge (English Nature, 1995; Stebbings, 1993). Canals are spatially fluid and their resemblance varies between species and in response to changing conditions; through the assembling of flightlines canals become corridors, whilst for threatened aquatic plants the canal provides stability and retreat. Canals further offer attractive and convenient pathways for human commuting and recreation, promoting interaction with ecologies and social wellbeing. The socio-ecological potential of canals has been highlighted more widely (Lawton et al., 2010), and comes at a time when unconventional spaces, including urban areas, brownfield environments, and engineered structures have gained visibility and consideration within conservation debates (see Hinchliffe et al., 2005; Francis and J. Lorimer, 2011; S. Jones and Mean, 2010). Despite their socio-ecological capabilities canals were excluded from the Natural Environment White Paper (NEWP), and the Basingstoke Canal Authority (BCA) experienced considerable challenges and delays in securing conservation funding. Conservation remains spatially cautious, and the divisions erected under the modern constitution have not been fully dismantled. Even as ecological projects are increasingly integrated with socio-economic concerns and the provision of ecosystem services, so a spatial distinction between urban and rural natures lingers during discussions with practitioners. When evaluated against different criteria, their value can appear mutually exclusive.

Connectivity cannot always be contained within a linear structure, movement does not simply progress from one end to the other, and lives are lived along the way. And yet within policy discourse these processes are separated: corridors are for moving, sites for living. This distinction can create confusion and unnecessary laments within management, whilst the continued elevation of protected spaces and a lingering fear of corridor movements stifle canals. Canals have been overlooked and any attempt to redress this situation requires a closer examination of understandings of connectivity, and the relation between sites and corridors. Canals matter, they are of socio-ecological importance, and the ways they are talked about, encountered, and managed provide resources through which a challenge to their current position can be crafted. Complexity and unexpected difference are central to the capacities engendered through enchanting experiences, whilst recombinant ecologies and creative associations are enabling a 'Second Golden Age'. These ideas challenge established notions of the spatiality of conservation sites and through this research a more inclusive approach is suggested which creates space for canals and reformulates the concept of connectivity.

Complexity as an Alternative Reading of Connectivity

Connectivity possesses a 'beguiling simplicity' (Evan, 2007) which has contributed to its ready acceptance within conservation and its straightforward translation as structural corridors and networks, despite a paucity of empirical attention (see Ignatieva et al., 2011; Boitani et al., 2007). The waters of the Basingstoke Canal encourage movement and liveliness, which are central to the notion of connectivity, and yet they confound attempts to classify the waterway as a corridor. The distinction between sites and corridors continues to permeate conservation policies, where it appears necessary for protected environments to be classified as either refuge or connection, terrestrial or aquatic. Canals

entangle these categories, and their transgressions contribute to the ecological potential of their waters and towpaths. Lives are lived upon lines (following Ingold, 2007), but the enforced joining up of points artificially stabilises and smooths intensities of inhabitation and choreographies of movement, whilst concealing those technologies that enable the representation of such environments as corridors. This research challenges the spatial assumptions and effectiveness of policies for conservation managers and introduces the more nuanced notion of complexity into discussions of connectivity.

Canals are not fine on their own. This was the response from a National Ecologist with the Canal & River Trust, who, when asked about strategies to encourage public engagement with canals and ensure the security of their financial futures, highlighted the need for integrative and innovative approaches to their management. The Basingstoke Canal rangers express similar sentiments and are increasingly exploring opportunities to promote the canal and receive both additional funding, and protection, for conservation activities. However, the inflexibilities of SSSI designations and the continued privileging of conventional sites within conservation schemes do not reflect the ecological experience of living along the canal. Whilst HLS funding will provide financial support to the Basingstoke Canal, the exclusion of water and the need to fix its terrestrial boundaries, delayed the award and potentially enhances the waterway's financial insecurity. Current limitations and inflexibilities within policy processes may distort environments and stifle ecological potential. For example, the separation of the Basingstoke Canal between Hampshire and Surrey for the purposes of the HLS application created the impression of two canals, placed them out of sync with each other, and potentially disproportionately favoured the eastern end. Attempting to isolate corridors, or represent them as sites, may threaten such environments.

The waters of the Basingstoke Canal enable the transfer of energy, ions, and bodies thus aiding the expansion of species ranges and introducing ecological diversity, for example through enabling genetic exchanges within Greywell Tunnel's autumnal bat swarm. The canal therefore functions as an elongated ecotone, bringing myriad ecologies, waters, and people into contact. These processes foster complexity, whilst landscape resilience is enhanced by the diversity of relations and the canal's capacity to act as a refuge. An expanded notion of connectivity subsequently emerged through this research and incorporates both the enabling of species mobility and interaction, and the potential for environments to foster socio-ecological complexity. Associations, creative recombining, and resilience are thus included within connectivity, and this widening of focus from simple movement challenges the relationship between connectivity and corridors, for complexity accommodates refuge, as well as movement. Incorporating ideas of complexity within an expanded notion of connectivity demonstrates that sites and corridors do not need to be managed separately, and highlights how such a distinction may even prove ecologically damaging. There is therefore a need to experiment with the process of funding applications, and develop relationships between designated Natural England officers and conservation managers to include greater scope for fluidity in response to the specificities of applicant environments. This research demonstrates how strategies are already being enacted within applications to achieve connective outcomes, including; the assembling of an unmapped 'target feature' through the classification of adjacent land, compensating for low option payments by focussing heavily on capital funding (a balance not recommended by Defra), and forging informal links between different funding streams. At present these are precarious, and occasionally unofficial, but they work and could be productively incorporated into the formal process of application. The creation and maintenance of linear structures, and policies aligned to the needs of bounded sites, are insufficient managerial

responses which may threaten the complexity of environments, thus ultimately undermining the goals of connectivity.

This research presents an expanded notion of connectivity, which incorporates both movement and an environment's capacity to encourage and support the proliferation of complex associations. Whilst connectivity is woven through lines which are 'lived along', it cannot be secured by the drawing of a line, nor is it limited to linear environments; rather it emerges from their capacity to reassemble, to be provocative and to flourish. Connectivity is a precarious achievement and as the case of the Basingstoke Canal demonstrates, the ecological complexity and generative recombining of connective environments does not always conform to established classification systems or existing policy frameworks. Things are never quite settled within such environments; new relations are likely, together with the possibility of flight. Rather than ignoring this fluidity or forcing its categorisation it is necessary to reconsider difference and transgressive assemblages more widely within conservation and engage practically with their management. It is also necessary to explore approaches to management that are sensitive to concerns regarding ecological mobility, without stifling ecological complexity or excluding environments such as canals.

Surprise and Difference in the Absence of Nature

Life without Nature is confusing and dangerous (see J. Lorimer, 2012; Lambertini et al., 2011). This philosophical category has inspired attachments to particular environments and encouraged their protection, and whilst this research demonstrates the potential power of enchantment within environmental management, Nature continues to inform

conservation. Without Nature to aid the evaluation of species and protected areas we are lost, and overrun by weeds. Or so we have come to believe (see Lambertini et al., 2011).

Whilst connectivity has been promoted (see HMSO, 2011; Lawton et al., 2010), its restricted association with corridors and unrestrained movement has raised the spectre of unwelcome ecological spread, and the risk of invasion (A. Bennett, 2003). Emergent assemblages, and changes to the composition of environments, can initiate biological homogeneity, stifle liveliness, and inhibit both human and nonhuman mobilities, and expression. Biosecurity practices have subsequently been enacted to control movement and evaluate the organisation of ecologies. Managing and responding to difference is therefore a central concern within the governance of connectivity. However, this research argues that the continued privileging of species categorisations, and repetition of the related distinction between invasive and native, restricts conservation to the realm of reaction. It is possible to be both biosecure and attentive to difference, but to achieve this conservation needs to be more articulate and move away from the anticipation of harm.

Species categories are useful distinctions within conservation, but they remain a “first approximation” of belonging and relating (following Stengers, 2010b: 26). The imposition of categories, and the deducing of behaviours from identities, can result in inefficiencies, and create indigestion (following Barker, 2008; Haraway, 2008). This research traced how the categorical distinction between native and invasive species generates both spatial and temporal dissonances within conservation policy. Conflation of these terms further fixes the materiality of species and finalises their geographical transgressions, whilst the anticipation of harm enacts a particular vision of future ecologies. Biosecurity becomes necessary and relevant in the prevention of situations where recombination generates a damaging swerve towards homogeneity, and may be traced to the presence of particular

nonhumans whose associations (or lack of) stifle ecological creativity and productivity. However, not all invasion or ecological difference is destructive; indeed, those ecologies that are so celebrated upon the Basingstoke Canal invaded this environment, flourished, and created interest. It is not through entry into an environment that such harm is generated; homogeneity is not inevitable, and does not pre-exist the recombining of an ecosystem in the presence of a novel component. It is in the cessation of future recombination, achieved through the demise of complexity and the absence of enchantment, that ecological health is threatened.

Conversations with practitioners raised concerns regarding prescriptive policies for the management of particular species, and through the following of conservation practices it was clear that attempts were being made to introduce a sense of ecological relations, not just identity, into managerial decisions. However, these complexities were often lost within policy translations, whilst the absence of an appropriate space within which to discuss, and challenge, killing perpetuated ineffective policies and denied space for response within conservation. In continuing to differentiate nonhumans and enact a separation between those we can kill and those we cannot, conservation can only react (following Haraway, 2008), whilst distinctions between 'good' and 'bad' movement stifle the promotion of connectivity and ensure the continued perception of corridors as dangerous. Such rigid partitions leave no room for surprising complexity, and prematurely stifle the creativity of ecological tensions. Biosecurity should be concerned for difference, but it remains distracted by categories; it needs to become more articulate. A recombinant approach to ecology is one that is attuned to difference, promotes enchantment and does not anticipate harm prior to the recombining of environments.

This research demonstrates that not all forms of ecological difference can be distilled into taxonomic categories and highlights ways in which movement generates subjectivities

which are not solely individual. Attentiveness towards sonorous creativities and nocturnal ecologies, which have been somewhat overlooked within human geography, enabled emphasis on qualities, rhythms, and movement. Practices of becoming attuned disrupt the 'common sensing' (Merriman et al., 2008: 197) of humans and encourage us to flirt with our 'species-configuration' (J. Bennett, 2001: 52). We are not left unchanged by our environmental encounters and human bodies are themselves capable of transforming during the practices of conservation. Technological mediators and the acquiring of sensory prostheses facilitates the development of sensitivities toward difference, and subsequently assist in generating ecological data. Conservation therefore becomes articulate as practitioners attune to the movements and subjectivities of nonhuman bodies and assemblages. This is recognised within much conservation practice and attempts are made to regularly reaffirm, but not fix, the presence of individuals and the intensity of their inhabitation. Uncertainty cannot be eliminated, and is generative of surprise and difference, but through learning, reaffirmation, and apprehension it can be reduced and continually re-evaluated. Curiosity regarding ecological difference should be encouraged, for it is a mistake to "assume much about species in advance of encounter" (Haraway, 2008: 18). Nonhumans are creative partners within conservation, and we overlook their contributions when we do not attempt to become attuned to their presence, thus closing down the possibility for inventive hybridisations and ecological recombination. It is therefore necessary within a recombinant ecology to be attuned to intensive difference, and not rely upon extensive species diversity.

Once attuned, conservation can respond. The capacity for response requires learning and sensory perception, it is relational and embodied. The focus of biosecurity concerns on the Basingstoke Canal needs to shift from the penetration of external boundaries, towards the consequences of intensive recombining, this may also support practices of biosecurity, for

already-present entities can be unstable. It is neither possible, nor desirable, to prohibit all transgressions; such surprising encounters are central to the generation of enchantment and do not inevitably result in homogeneity. But through developing articulate responses, which draw upon apprehensions regarding associations, it is possible to be both biosecure and attentive to difference. Conservation needs to respond to the dangers of ecological recombination, but in ways which take account of the practises of killing and continue to debate their consequences, and appropriateness. It is necessary to accept recombinant ecologies and move away from national prescriptions to attend to local, watery, activity. This contributes to J. Lorimer's (2012) argument that conservation governance should shift its focus from the categories of extensive variation, towards the possibilities of intensive difference. A heightened concern for performance and expressive territories could be one strategy through which conservation acknowledges difference along with diversity, whilst an opening up of the enchanting potential of encounters and the sensory enhancements enabled through technological relations may encourage volunteer involvement and public support. However, whilst conservation may benefit from a greater attentiveness to difference, geographical research may also be enhanced by a thicker notion of hybridity, giving greater attention to the composition and processes of non-human assemblages and expressive territories.

The Creative Matter of Canal Assemblages

Conservation unduly concerns humans. Policies and designations often struggle to be articulate towards eventful territories, nonhuman assemblages, and ephemeral gatherings. A thicker notion of nonhuman hybridity, created in the absence of human presence and amongst assemblages that generate differences which are not fully known by conservation science is required. This research develops a concern for the spatialities and endurances

forged through performances, creative assemblies, and mundane meetings, and draws upon ideas of vital materialism to inflect the ecological concept of recombination with a Deleuzian sense of the creative temporality of matter (following J. Bennett, 2010; J. Lorimer, 2009; K. Anderson and Braun, 2008). The material world is not static and inert, but forged through textures, densities, and relations between bodies and things; it is through the endurance and speed of such associations that assemblages emerge and the temporalities of space are generated. The concept of assemblage is particularly appropriate for a reinvigorated connective and recombinant conservation, for it draws attention to the enduring achievement of collectives, whilst highlighting the possibility for change. Processes of composition and internal recombination are foregrounded, thus also reaffirming the importance of considering intensive difference, for that which repeats may transform and create new intensities of experience.

The autumnal bat swarm, which emerges nightly around the entrance of Greywell Tunnel, assembles through fleeting associations between members of different species, and with the material environment of the canal. Relations within swarming do not derive from a charismatic species or individual subject, for there is no 'leader of the pack' (Deleuze and Guattari, 2004: 268), rather it is the affective atmosphere generated through an intensity of flightlines that enables creative difference. The expressive territory of the swarm is overwhelming, challenging the visual comforts of conservation. Despite the generative and enchanting atmosphere that builds up each night through the autumn the swarm is invisible within Greywell Tunnel's SSSI classification, and occupies a precarious position within conservation. Lively difference and ephemerality pose managerial challenges, and suggest that conservation needs to more effectively consider associations and energetic assemblages where identity and inhabitation are not fixed.

Canals as 'things that force thought'

The inability to classify individuals and phenomena does not make them any less real to those who are entangled, disturbed, and enchanted. The materiality of canals, and their lively ecologies, cannot always be straightforwardly known or represented, but this does not preclude the formation of groups with an interest in, and appreciation of, a particular canal. Canals are full of people, and their more-than-human sociability forms connections that contribute to the re-forming of waterways; canals 'force thought' (Stengers, 2010b), and they are not left unchanged by the process. Publics emerging from the Basingstoke Canal are not sparked by eruptive stimuli or monstrous controversy; rather they are sustained by enchantment, exercise, and material artefacts. Those energies that bring people together also enable the endurance of these publics, and may persist as they disassemble, keeping people interested, and encouraging them to return. The spaces of such assemblages are invested with the capacity to forge new relations, whilst material objects can spark forgotten enchantments and bring publics into action.

The Basingstoke Canal forces both thought and gathering, but it does not fully resemble a 'hot situation' (Callon, 1998), and thus challenges the close association within geographical literatures between public formation and controversial stimuli. These publics are multiple, ephemeral, and threaded together; their materiality may be more appropriately approached through the ethos of recombination developed ecologically through this research. A recombinant ecology directs attention towards productive relations, novel connections, and the possibility for intrusion. These are interesting assemblages, following Stengers, for they are open to the risk of redefinition and the prospect of something becoming situated 'in-between'. As was demonstrated through the exercising of canal publics and the assembling of nonhuman collectives, there is a need to move from a reliance on co-option towards facilitating interest as an energetic force for public

formation. The openness of those canal publics and the energy emerging from their exercises in assembling and disassembling encourage sociable exchanges, latent appreciation, and practical conservation activities.

A lack of exercise, of exertion, fixes the canal, for confinement and delimitation stifle complexity; successful assembly requires opportunities for escape. A concern for exercising publics foregrounds the importance of movement and experience, whilst demonstrating that spontaneous, experimental, and hybrid gatherings can be productive catalysts for canal management. It is possible to organise events and encourage activities that mobilise and strengthen latent attachments. Public support endures through repetitions, but the membership of groups may alter and the focus of activity can change in response to canal ecologies. A fixed programme of public engagement is thus inappropriate, as are attempts to structurally engineer a singular 'public'. Attention should focus upon encouraging, and renegotiating, multiple connections between formal management and interested people whilst facilitating the development of relevant, active, groups. Supporting engagement between people and the canal's ecologies may both assist ecological management and generate sociable relations between people, that may further foster a deeper appreciation of the environment. Organisations such as the Surrey and Hampshire Canal Society should therefore be encouraged, for they can act as condensation nuclei for wider public assembly.

This research demonstrated that the vital materiality of canal environments can be creative within conservation, enabling nonhuman assembling and generating an atmosphere within which social relations can be forged. Despite the concerns of Natural England officials, the linearity of canals does not necessarily inhibit either associations, or the formation of publics. The material artefacts and affective atmospheres of canals actively encourage

sociability and should thus be more closely involved in the development of different approaches, which actively exercise publics and encourage individual lines of liveliness to travel together, however briefly. Canals should not be restricted to passing by the windows of meeting rooms as managers look the other way, for encouraging experiences within such environments may expand conservation's capacity to be articulate. It is necessary to be attentive to what people do in relation to the environment, and not solely consider evidence of formal public participation within management. Creating space for the enchanting sense of something 'important' created through encounters with nonhuman phenomena could, for example, make the activity of swarming at Greywell Tunnel as visible as hibernation.

The Importance of Waters

Canals can also intrude upon the direction of research, inducing a remapping of methodologies and challenging preconceptions of environments. The Basingstoke Canal was an active partner within this project and in reflecting upon the processes of fieldwork the importance of being open to such surprises and prepared to take risks were apparent. Experimenting with approaches that invited the matter of the canal into the research process generated important insights and new connections. This experience leads me to defend qualitative approaches to conservation biogeography and encourage others to more actively engage with movement, materials and unfamiliar practices. Multinatural geography could benefit from a little more exercise.

Thresholds, including those of water/earth, light/dark, geography/ecology are energetic places and encourage new ways of thinking. The creativity of watery environments has been somewhat overlooked within human geography, whilst conservation policy has not

fully engaged with the transformative potential of water. A tendency to formally dismiss water, or isolate it from its relations, was encountered in this research, and as an experimental exercise this research sought transgressions and highlighted the capacity of the Basingstoke Canal's waters to enable connectivity, spark publics, and generate enchanting atmospheres. Inland waterways should be given greater consideration within land management policies in ways that attend to their specific materialities, and do not require them to resemble farms.

The connectivity of canal environments derives significantly from the heterogeneous composition and flow of waters as they dissect river catchments, offer ecological refuge, and encourage lively diversity. The continued neglect of water is ecologically damaging, places unnecessary burdens on policy applications, and misses opportunities to harness the capacity of this heterogeneous fluid to generate appreciation. Water enables actions and in the course of this research its transformative capacity was central to both the coming together of ecologies and publics, and in sustaining the latent endurance of such collectives, for it sparked relations and formed a focus for activity. The absorptive capacity of water and the multiple impressions it forms holds different temporalities together and enables the continual assembling and disassembling of groups. Water performs as a repository through which the changing intensity of repetitive action accumulates. Waters sustain and encourage promiscuous difference, and this contributes to an enchanting potential which may assist conservation in firmly eliminating the need for Nature as a means of stimulating social appreciation. These capabilities enable social connectivity, and can sustain the ephemeral endurance of public collectives, whilst also challenging the dichotomy of corridors and sites within conservation policy.

Water actively participates in ecologies, regularly transgressing and exerting influence across its apparent border with land. Energetic and erosive exchanges between land and water can shift towpath boundaries, the ionic composition of water creates diverse aquatic flora, and the movement of aquatic mammals, such as otters, can influence the terrestrial predation activities of mink. These transgressions are generative, but they are also often concerning, and whilst water is central to the identity and appreciation of canals it cannot be reliably contained. The Basingstoke Canal rangers were aware of these interactions and their centrality to processes of change upon the waterway; interactions between water and land were monitored, and informed practices of conservation. And yet water remained separated, and concealed within representations of the canal in funding applications. The ecologies of the Basingstoke Canal, as communicated through HLS funding documents, were divided and restricted to land, whilst its acreage was diminished. Establishing the canal's waters as a 'target feature' within this funding application necessitated the laborious disentangling of its ecologies, together with the silencing of any liveliness that was not terrestrially anchored. This approach was not faithful to the canal environment, and placed it in a financially precarious position, as its low hectarage created reliance upon option payments. Land and water are compositions that continually recombine through the movement of elements and the sustaining of relations; they are folds of materiality, following Deleuze, rather than containers or separate states.

Whilst water and land cannot be isolated, nor are they the same, and being 'on the margins' can render knowledge uncertain and incite transformative experiences. In refusing to isolate these states of matter I was forced to ask questions of movements and practices that could not be explored within a single, established, discipline. Practising a recombinant ecology therefore challenges the 'modern constitution' (Latour, 1993) and can "raise fundamental questions concerning the very distinction between the natural and the social"

(Barry et al., 2008: 8). In generating data for this research I encountered disruptive states, including both water and the night, which dissolved boundaries and enabled different kinds of freedom, activity, and stratification. In considering appropriate responses to such lively environments I sought different kinds of alliance and in the course of this research an interdisciplinary partnership emerged. The meeting between a geographer and an ecologist was serendipitous, but we actively sought to develop it and consider how we might make a contribution to the conservation of swarming bats within canal environments. Alliances such as these are inventive and should be more widely encouraged, and supported, within environmental research, for the challenges of the Anthropocene require managerial innovations which transcend disciplinary boundaries. We talked together, tracked the echolocations of bats, and actively wrote a multinatural account (see Mason and Hope, 2013), thus continuing those interdisciplinary conversations that frequently cease with the completion of fieldwork. Through this partnership an ecological account of swarming was enlivened with discussions and narratives of nonhuman expressions and subjectivity, which highlighted the fluidity of species identity and human capabilities. Together we sought to reinforce the importance of volunteers in the generation of data regarding the presence, and repeated gathering, of bats, and demonstrate the centrality of enchantment in encouraging appreciation and enhancing sensory capabilities. This unexpected partnership required negotiation and whilst presenting considerable opportunities it was far from straightforward. The experience was enriching and demonstrated to me the disciplinary assumptions which sustain concepts such as hybridity, highlighted the challenges posed to interdisciplinarity by the vocabulary and literary styles of relational geography and reinforced belief in the opportunities posed by intellectual curiosity and a willingness to allow oneself to be unsure.

Connecting Canals: responding to the research aims

Canals have been overlooked within conservation and this warrants redress, for their enchanting capacity to enable movement and generate situated flourishing renders them important connective environments. This research inflected ideas of connectivity with a more spatially nuanced notion of complexity, whilst a concern for complexity demonstrated that such a focus is appropriate for the management of canal environments. As the Basingstoke Canal forced thought and assembling through this research so recombination became the central mode of address, whilst simultaneously undergoing transformation through engagement with conservation practitioners and geographical literatures. Recombination does not imply return; rather its emphasis on repetition and resilience, together with its practical disavowal of Nature suggests that it may be a particularly useful concept in supporting restoration ecologies and developing urban environments. Furthermore, in actively challenging the spatialities of conservation, particularly the distinction between sites and corridors, a recombinant ecology does not require the spatial isolation of environments and provides an articulate and responsive means of encouraging the interaction of social and ecological concerns. Conservation environments are creative and invite experimentation within management in ways that are situated and do not reproduce seemingly representative categories uncritically. However, it is necessary for conservation to remain faithful to the resemblance of an environment and ensure that management activities are both situated, and do not threaten their generative atmospheres. The limits to recombination, the possibility that environments can become something else, and the consequences for this in relation to the formation of publics and receipt of funding therefore invite future research.

This research was concerned with water and in this it departs from much work within human geography, which has remained terrestrially focussed. The waters of the Basingstoke Canal encouraged methodological innovation and demonstrated the importance of actively involving the matters of conservation within research. In particular, the capacity for movement to encourage relations and the assembling of interested groups supported this research but also highlighted the potential for more creative managerial engagements and practices. Whilst harnessing flow, this research also demonstrated the importance of tranquillity and endurance in supporting the flourishing of canal environments, and emphasised apprehension as a more responsive approach to the risks engendered by watery movements. A recombinant ecology emerged within a watery environment, where movement and fluidity were often overt; the generative potential of this concept within geographies of the dark was tentatively explored and could be more productively developed, whilst the challenges posed by more earthy sites opens possibilities for future research.

Tom: Well, you know it's fun, I've spent a lot of time with this canal, with these things it gives us a lot back in the end and we put a lot in, but the more you put in the more you get out...

Artefact Discussion

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Appendix I

Map of course of Basingstoke Canal (black line). Reproduced from Google Maps. For an interactive map see <https://maps.google.com/maps/ms?ie=UTF&msa=0&msid=208179529594550101433.0004d72b655eebda9ae85>



Appendix II

These questions were circulated to individuals prior to interviews, and formed a foundation for discussion:

Discussion Points for interview with National Ecologist (Canal & River Trust)

The role of canals as ecological corridors:

- To what extent do canals provide opportunities for the connection of fragmented habitats, and for which species/ecosystems?
- Is connectivity a consideration when drawing up conservation management plans, and how is this subsequently implemented and measured?
- Do you perceive a distinction between rural and urban canal environments, and to what extent does this inform policy?

Ecological health of canals:

- How do you measure ecological value and what techniques do you use to assess the success/failure of conservation management plans?
- Do you perceive there to be synergies between ecological health, public health and heritage conservation?
- What would be your response to the suggestion that canals were built for boats, and any ecological value is purely incidental?
 - Can the environment of a canal ever be considered natural?
 - Following this, what is your attitude towards non-native and invasive species upon canals?
 - Is there space on the canal for new, accidental or 'recombinant' ecologies?
- Some of Britain's rarest biodiversity has been identified upon brownfield land, yet this land is often regarded as unsightly and dangerous. With canals frequently running through such post-industrial landscapes, how are these conflicting perceptions managed?
- What is the greatest contribution of canals to ecology, and which canals are particularly important?
- Bats are the 'stars' of this year's BW Wildlife Survey, what exactly does this mean and how useful are indicator species and charismatic species in assessing and promoting canal ecology?

Management:

- To whom do you consider yourself accountable in terms of promoting ecological management?
- Are there difficulties in terms of balancing ecological protection and the demands of navigation and recreation, and how do you negotiate this?
- What policies are in place to encourage public awareness of canal ecology?

Future:

- In terms of ecological management, what temporal frameworks do you operate within and what impacts do you believe climate change will bring?
- What opportunities do you believe canals can offer in attempts to 'make space for nature'?
- What do you consider the biggest ecological challenges facing Britain's canal network?
- What work needs to be done to ensure that canals remain ecologically 'resilient'?

Discussion Points for interview with Biodiversity Specialist, EA

The role of ecological corridors:

- In the light of climate change research and published documents concerning the need for the UK to develop and enhance its ecological network is increased attention being paid to the development of corridors, and if so what form do you see this taking?
 - What benefit do you see deriving from increasing attention to corridors, are corridors necessary for connectivity and can they be valuable habitat sites in their own right?
 - Is connectivity a consideration when drawing up conservation management plans, and how is this subsequently implemented and measured?
- At what scale should we be considering the impacts of climate change, wider ecological management and biodiversity assessment?
- At the moment it appears that the EA will continue to have responsibility for a number of waterways:
 - To what extent do these enable the connection of fragmented habitats, and for which species/ecosystems?
 - What are the principal biodiversity benefits, and challenges, generated by these habitats?

Practice

- How do you measure biodiversity, and what techniques and criteria do you use to assess the success/failure of conservation management plans?
- What relationship does the EA have with NGOs, and volunteer organisations?
- Do you believe that current legislation regarding biodiversity protection is sufficient, what areas do you think should be strengthened?
- Do you perceive there to be synergies between ecological health, public health and heritage conservation?
- What do you consider to be the biggest ecological challenge facing Britain?

Management/Legislation

- The Natural Environment White Paper identifies measuring and communicating the economic value of nature as central to its continued protection, what are your views on this?
 - One particular measure identified in the paper is that of Biodiversity Offsets, do you think this is an effective suggestion?

- How are policies developed within the EA, and how do you balance scientific advice, political concerns and social pressure?
- What is your attitude towards invasive species, and species re-introduction?
 - Can we practically, or perhaps morally, ever completely eradicate a species?
 - How can we distinguish between invasive species and species whose ecological envelopes are shifting as a result of climate change?
- Are there difficulties in terms of balancing ecological protection and the demands of navigation and recreation, and how do you negotiate this?
- What policies are in place to encourage public awareness of biodiversity, and how do you seek to communicate the work of the EA?
- What position do urban environments hold within the agency?

London Rivers Project:

- What ecological principles are guiding this restoration?
 - Urban biodiversity, and urban environmental conditions (e.g. temperature), are often quite different from rural equivalents – does this impact the project?
 - Do you see a role for ‘accidental’, ‘hybrid’ or ‘recombinant’ ecologies and how will the evolving biodiversity of these waterways be managed?
 - What biodiversity is valued and how ‘natural’ are restored systems?

Discussion Points for interview with two Natural England Officers

NE’s engagement with the Basingstoke Canal:

- What are the principal opportunities and challenges posed by NE’s engagement with the Basingstoke Canal?
- How does the canal fit in with other sites that NE is involved with – such as Greywell fens, the Whitewater and further afield. Are attempts made to promote ecological connection?
- What impact does the division of the canal between Surrey and Hampshire have in terms of Natural England’s involvement?
- Is the canal viewed and monitored as a single entity, or are the SSSI sections viewed separately?
 - Not all of the canal is SSSI, does this impact upon management?
 - The canal’s SSSIs are not in a favourable state; why is this? What are the consequences? And what solutions are being offered?

The role of ecological corridors:

- In the light of climate change research and published documents concerning the need for the UK to develop and enhance its ecological network is increased attention being paid to the development of corridors, and if so what form do you see this taking?
 - What benefit do you see deriving from increasing attention to corridors, are corridors necessary for connectivity and can they be valuable habitat sites in their own right?
 - Is connectivity a consideration when drawing up conservation management plans, and how is this subsequently implemented and measured?

- At what scale should we be considering the impacts of climate change, and wider ecological management and biodiversity assessment?

Practice

- How do you measure ecological, and what techniques and criteria do you use to assess the success/failure of conservation management plans?
- Do you believe that current legislation is sufficient, what areas do you think should be strengthened?
- Do you perceive there to be synergies between ecological health, public health and heritage conservation?
- What do you consider to be the biggest ecological challenge facing Natural England?

Management/Legislation

- The Environment White Paper identifies measuring and communicating the economic value of nature as central to its continued protection, what are your views on this?
 - One particular measure identified in the paper is that of Biodiversity Offsets, do you think this is an effective suggestion?
- How are policies and best-practice documents developed within NE, and how do you balance scientific advice, political concerns and social pressure?
- What is your attitude towards invasive species, and species re-introduction?
 - Can we practically, or perhaps morally, ever completely eradicate a species?
 - How can we distinguish between invasive species and species whose ecological envelopes are shifting as a result of climate change?
- Are there difficulties in terms of balancing ecological protection and the demands of navigation and recreation, and how do you negotiate this?
- What policies are in place to encourage public awareness, and how do you seek to communicate the work of Natural England?
- What position do urban environments hold within Natural England?

Appendix III

Preliminary topics circulated to members of Discussion Group

Dear all,

Thank you very much for agreeing to take part in the discussion group organised for the 25th September. I would like to take this opportunity to provide further details regarding the content of this meeting, during which I hope to focus upon the canal as a space of enjoyment, interest and recreation.

It is my hope, during this meeting, to explore why individuals such as yourself are passionate about the Basingstoke Canal, what role you see the SHCS fulfilling and what you think/hope the future will hold for this waterway. I therefore intend to open the discussion by exploring individual involvement with the canal, why you personally became involved in the Society and where you see this leading. As such, I hope to consider the following questions and discuss the wider position, and future, of canals.

- What motivations, personal or otherwise, led you to join the canal society?
- In what ways do you use, and experience the canal, and how regularly do you visit it?
- What role do you see the Canal society fulfilling?
- In what ways, if any, can canals contribute to recent ideas regarding social interaction, public space and 'Big Society'?
- What future do you envisage for the Basingstoke Canal?

I am very interested in personal recollections of the canal and am curious as to how you view the canal, what it means and what enjoyments/frustrations you derive from your engagement with it, and from your membership within the SHCS. Additionally, however, I would like to take advantage of this assembly of society members to initiate a wider debate regarding the Basingstoke Canal and explore some, potentially, more contentious issues. In order to stimulate discussion I therefore intend to tailor the second portion of the meeting around some, possibly controversial, statements which I hope will prompt interesting dialogue. I am therefore interested in your reaction to the following statements:

- The canal is a man-made structure and navigation is its primary purpose.
- The Basingstoke Canal is founded upon the control of water and exists as an example of humanity's mastery over Nature.
- History is irrelevant. The canal must be re-invented if it is to survive.
- It doesn't matter if the Basingstoke Canal closes as there are plenty of other waterways.

These statements are general, and possibly extreme, and are designed to provoke response and discussion during the meeting rather than inviting yes/no answers. I hope the subsequent debate will prove interesting and thought-provoking for all attendees.

Appendix IV

Email circulated to all participants in Discussion Walk

Thank you for agreeing to take part in the walk-discussion arranged for Wednesday 10th November, I have now been able to finalise a few details. I'm planning to go ahead whatever the weather decides to throw at us, although if things are really bad we may have to relocate to the café for our discussion. If we could meet in front of the canal centre at 10 am, ready to leave for a short walk along the canal by 10.15 that would be great. I hope that we will return to the canal centre by 11, and possibly spend another half an hour discussing things over coffee. In terms of preparation, I am hoping to use the canal itself as a prompt for discussion and therefore have not prepared an extensive list of questions. However, I would appreciate it if you could perhaps give some consideration to the following ideas:

- In what ways is the canal environment (un)attractive to visitors?
- What importance do you attach to ecology and does this differ along the length of the canal?
- Is the canal healthy?
- What relationship exists between the bank and the water?
- How do you normally 'walk' the canal?