2020-06-01

Auto-rewilding in post-industrial cities: the case of inland cormorants in urban Britain

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Abstract

The last forty years have seen a dramatic increase in the number of great cormorants (*Phalacrocorax carbo*) moving inland away from British coastlines. Britain's largest inland colony currently reside at Walthamstow Wetlands, a nature reserve and functional reservoir system in northeast London, recently branded 'Europe's largest urban wetland'. Here, great cormorants are embroiled in contested ideas of nature. Celebrated by conservationists for their resilience and adaptability, yet hounded by anglers for launching ecological chaos on rivers and reservoirs and disrupting the balance that is imagined for urban recreational spaces. This paper argues for a more nuanced version of rewilding that acknowledges the biogeographical complexity and mobility of nonhumans in relation to radically altered ecologies and post-industrial urban environments. It uses the conceptual frame of *more-than-human* to examine the increased presence, mobility, and agency of great cormorants at Walthamstow Wetlands in terms of *nonhuman autonomy* and *auto-rewilding*. The findings demonstrate that the self-relocation and autonomous occupation of inland cormorants in Walthamstow are intimately entangled with human histories and activities, and that they are active alongside humans in creating novel ecosystems.

Key words: rewilding, more-than-human geographies, conservation, great cormorants, urban ecology, auto-rewilding, Walthamstow Wetlands, invasive species

Introduction

Rewilding has emerged as an 'innovative' and 'hopeful' approach to ecosystem restoration in recent decades (Lorimer et al., 2015; Svenning et al., 2016; Jepson, 2018). Lorimer et al. (2015) describe rewilding as 'an ambitious and optimistic agenda for conservation' centred on the (re)establishment of ecological processes with a less controlling or coercive management approach by humans. Studies are now emerging which examine the practice(s) of rewilding across a range of scales and sites, with a variety of rewilded species (e.g. Tosi et al., 2015; Drenthen, 2015; Beschta and Ripple, 2016; Vasile, 2018; DeSilvey and Bartolini, 2018).

Until recently, however, there has been little interest among rewilding scholars and advocates in species that have actively responded to their own predicament and auto-rewilded (with the exception of some, e.g., Crowley et al., 2017 on escapee beavers in Devon) and O'Mahony (forthcoming) on feral boar in the forest of Dean). In this paper, we use the concept of auto-rewilding to refer to the autonomous activities of nonhuman species that insert themselves into landscapes where they were previously absent - doing so in surprising and unexpected ways such that they may be considered 'out of place' or as 'invasive'. 'Auto-rewilding' - a phrase owed to Tsing (2015) - refers to the movement and relocation 'activities of animals themselves' (Tsing, 2017, p 6). We argue that rewilding agendas need to better acknowledge the reality of nonhuman mobility and biogeographical complexity, such as various animal, bird, and plant species moving in response to human activities and becoming in/out of place in complex and fluid ways (Pettorelli et al., 2019). We illustrate this argument through an empirical study of inland great cormorants (*Phalacrocorax carbo*) that have colonised the Walthamstow Wetlands in post-industrial London. We expand the current ideas and debates regarding rewilding by showing how the boundary crossing and colonising activities of great

cormorants should not be seen as 'invasive tendencies' of the species, but more productively rethought in terms of nonhuman autonomy and auto-rewilding.

Rewilding in human-altered landscapes

The majority of rewilding studies focus on the ecosystem functions and services provided by rewilded nonhuman species. Such animals are often valorised as keystone, flagship, indicator or umbrella species (Barua, 2011; Lorimer, 2007; Jepson and Barua, 2015) and described in terms of the 'benefits' they bring (to humans/species/landscapes) through their ecological engineering efforts or cascade effects (Overend and Lorimer, 2018). Very few studies describe species on their own terms, as beings with worlds, 'with their own familial, social, and ecological networks, their own lookouts, agendas and needs' (Collard et al., 2014, p 328; see also Despret, 2016). Several rewilding scholars have argued that rewilding is a process that should be grounded in nonhuman autonomy (Brady and Prior 2015; Prior and Ward 2016, Pettorelli et al. 2019) so as to reduce human intervention and allow for 'self-willed' nature-led rewilded environments (Fisher, 2004; Fisher and Parfitt, 2016). Nonhuman autonomy may be defined as the ability of more-than-humans to live a 'wild life': i.e. the ability to breed, move, socialise freely without human-imposed controls (Collard et al., 2014, Prior and Brady, 2017).

The argument for recognising nonhuman autonomy is linked to the concept of a 'more-than-human' approach for rethinking the social construction of the natural world. Articulated by the geographer Sarah Whatmore (2006), it has its conceptual roots in posthumanism and the 'animal turn' in the social sciences (Ritvo, 2007). These ideas developed during the 1980s and 1990s to challenge the conventional divide between human and nonhuman species, and to present nonhuman animals in new terms and under new premises. A more-than-human

approach attends to 'an understanding of bodies, including "human" bodies, as already an effect of their composition in and through their relations with the world' (Braun, 2004, p 1354). In other words, taking a more-than-human approach to rewilding involves decentring the human from conservation narrative and practice and attending to *all* bodies.

A critical place to explore nonhuman autonomy from a more-than-human perspective is in post-industrial cities where a myriad of unexpected species have taken up residence. On the one hand, cities are characterised by the human footprint: human design is everywhere in cities, from transport infrastructure to office buildings to urban recreational spaces. On the other hand, cities have seen accelerated levels of change over the last century, with significant ecological, biogeographical and climatic consequences (Ramalho and Hobbs, 2012; Francis at al., 2012). Cities now represent some of the most altered landscapes on the planet. They are microcosms of a globalised world, filled with new species assemblages, genotypes, behaviours, and hybrids. The varied and fluctuating conditions of cities means that instances of auto-rewilding are all the more interesting. Paying attention to how different species respond to the city is a necessary part of developing an urban rewilding agenda that is open to 'surprising ecological futures' (Prior and Ward, 2016).

While interests in urban wildlife and urban nature are on the increase in contemporary Europe (Buller, 2014), the majority of debate and interest in rewilding centres on rural and peri-urban areas. Those who have sought an urban articulation of rewilding have generally tended to align it with practices of urban greening, emphasising landscape connectivity, ecological process and natural succession, as well as issues of environmental justice (e.g. Rutt and Gulsrud, 2016; Gould and Lewis, 2017; Bunce, 2018) and popular interests in human health and wellbeing – that is, in terms of the 'benefits' of nature to urban societies (e.g. Mills et al.,

2017; Danford et al., 2018; Threlfall and Kendal, 2018; Mahmoudi Farahani and Maller, 2019). Some scholars have incorporated rewilding discourse into discussions on urban land abandonment and the (unintentional) creation of so-called 'urban wildernesses.' Owens and Wolch (2019), for instance, draw attention to the political economic process of de-industrialisation that through the abandonment of land (i.e. derelict and brownfield sites), have produced spaces where nature has colonised (see also Mathey and Rink, 2010). Although they identify the 'spontaneous, autonomous occupation of [urban] space by nonhuman animals' as one of the three ways that urban rewilding (as an urban process) can take place, they do not provide empirically-based examples of how these occur.

Thus far, articulations of urban rewilding have not acknowledged the social and spatial practices of auto-rewilders in cities, whether they be characterised as nonhuman 'invasion', 'autonomy' or something else. Tsing (2017, p 9) describes auto-rewilders as "*weedy invaders, drawing agilities from both ancient and modern conquests. Auto-rewilders are survivors in non-rationalized edge spaces; an abandoned industrial site is an edge made large. Auto-rewilders make use of the acceleration of industrial use and abandonment.*" Auto-rewilding, then, does not require any direct human intervention and/or ongoing management. For this reason, auto-rewilding finds more synergies with the unpredictability of novel ecosystems in a post-industrial age.

The rapid rate of ecological change has led to the proliferation of so-called novel ecosystems (Hobbs et al., 2009) or emerging ecosystems (Milton, 2003). These unprecedented ecosystems mostly exist in places that have been radically altered by humans - with cities being the most obvious example. Although fundamental ecological process remain the same, the *characteristics* of these processes are markedly different in novel ecosystems (Hobbs et

al., 2009, 2013). They comprise of new species assemblages, genotypes, behaviours and hybrids. Indeed, researchers have argued that the many unknowns and uncertainties associated with novel ecosystems will undoubtedly hinder prediction, management and conservation (Francis and Goodman, 2009; Del Tredici, 2010).

Urban areas, particularly cities, offer many examples of plant and animal species that take full advantage of the food and refuge opportunities afforded to them (Francis and Chadwick, 2012). Take, for instance, the 'Haringey' knotweed (*Fallopia x conollyana*), a plant hybrid of the Russian vine (*Fallopia baldschuanica*) and Japanese knotweed (*Reynoutria japonica*) discovered along a disused railway in northeast London. Discoveries like these represent a geographical shift in the Earth's biota. Rewilding agendas, though, have not engaged much with these unexpected and unplanned natures, including their entanglements with human history and the practices of expansion, globalisation and ecological exchange (Crosby, 1972, 1986, 1994). This is because rewilding agendas are generally wedded to particular outcomes, whether they be functional (e.g. improved ecological processes) (Andriuzzi and Wall, 2018; Bump, 2018) or species focussed (e.g. biodiversity improvements) (van Klink and DeVries, 2018; Tree, 2017).

The presence of auto-rewilders in novel ecosystems raises important questions for conservation and other forms of environmental management. One of the fallouts from this has been a strict intolerance for species that are considered 'out of place'. Several scholars have recently called for a radical rethink on invasive species and the purification of nature prescribed through the native/non-native binary, including the ethical and normative underpinnings of these concepts and the conservation policies that have emerged around them (Holmes, 2015; Robbins and Moore, 2013; Ellis et al., 2012). Ecological studies frequently

utilise terms such as non-native, invasive, exotic and alien, which can re-inscribe (and possibly overinflate) ecological problems with particular species. Scholars have noted how terms such as invasive/non-native are far from being value-neutral even though they are often intended as such in scientific literature: "Invasiveness is a slippery category…since the resilience and spread of a species is influenced by anthropogenic and environmental factors and it is thus tricky to predict the lasting impacts of a species within an ecosystem over time (Richardson and Pyšek 2006)" (Jeffery, 2014, p 1005).

A recent study by Beever et al. (2019) identified a mismatch between the perceived ecological impact of a species and the ecological reality. They found that management decisions (e.g. to eradicate non-native invasive species) are often made on the basis of limited human perception and experience in accordance with human timescales rather than ecological ones. These 'socio-ecological mismatches' highlight a need to take a historical approach to questions of ecological impact and question how impact is being defined and according to what values (i.e. what kind of landscape is being imagined). The implicit negativity of the category 'invasive' serves to highlight the human insistence on where animals and plants should belong and in what density. When nonhumans display their autonomy by crossing boundaries and stepping 'out of place' they are often subjected to programmes of control and eradication (Head and Muir, 2004; Biermann and Mansfield, 2014; Biermann and Anderson, 2017; Hodgetts, 2017; Srinivasan, 2017).

In this paper, we seek a deeper discussion on the effects of an altered and globalised world that have 'scrambled established biogeographies of what might belong where' (Lorimer, 2016, p 126). We bring more-than-human scholarship into dialogue with rewilding literatures to develop an expanded sense of rewilding necessary to account for instances of auto-

rewilding in radically altered urban and post-industrial environments. We argue that instances of nonhuman autonomy and auto-rewilding can challenge conventional notions of the city as a human-controlled domain, for example, by subverting human design or the intended use-value of urban spaces. We pay particular attention to species that are not the focal point of rewilding experiments but, rather, unexpected 'fringe' actors that have (re)inserted themselves into landscapes without human intention or design. With this, we also acknowledge that in altered urban landscapes, nonhuman activities and relocations are never entirely autonomous; they are always entangled with the trajectory of humans, both historically and under present conditions. Consequently, we adopt a more nuanced version of auto-rewilding that acknowledges this implicit human-nonhuman entanglement in urban environments. Any sense of urban rewilding must recognise that human activities – past and present – are intimately entangled with nonhuman mobilities and the reasons why some species will move into (and away from) certain landscapes.

Figure 1. Cormorants at Walthamstow Reservoirs, May 2017 (Source: Walthamstow Wetlands)

To substantiate our argument, we present an empirically-grounded study of Britain's largest inland colony of great cormorants (*Phalacrocorax carbo*) (Fig. 1) at Walthamstow Wetlands, a 'non-rationalised edge space' in northeast London (Tsing, 2017, p 9) . Walthamstow Wetlands is a nature reserve and functional reservoir system recently branded 'Europe's largest urban wetland' (Boulter, 2017; BSG Ecology, 2017). Traditionally a coastal species, great cormorants have shifted their territories in recent years in response to depleting fish stocks at sea. They increasingly reside on inland waterways, attracted by the prospect of bountiful supplies of fish in fishing lakes, reservoirs and canals. At Walthamstow, the birds

have established an autonomous and self-sustaining population on the reservoir islands and now represent the largest inland colony in Britain.

While the great cormorants have successfully adapted to (and remade) conditions at Walthamstow Wetlands, the site is also home to London's largest fishery. This puts them in direct conflict with anglers on a daily basis as they compete for trout. Their colonisation of the site is framed as *invasion* by local anglers. Cormorants are regarded as living 'out of place' and have become embroiled in contested ideas of nature – celebrated by conservationists, on the one hand, for their resilience and adaptability and, on the other, hounded by anglers for launching 'ecological chaos' on rivers and reservoirs. It is within this awkward entanglement of mismatched activities, disrupted purposes, and 'out of place' creatures, that we investigate the auto-rewilding of inland great cormorants at Walthamstow.

Methods and materials

The empirical data in this paper is based on extensive ethnographic fieldwork conducted between October 2016 and November 2017 in London's Lea Valley. This includes observational material based on the authors' participation in guided walks and conservation activities on site, and noting how cormorants were understood and framed by site managers and the public. In addition to ethnographic research, more than twenty semi-structured interviews were conducted with decision-makers, field practitioners and site operators. (See Table 1 below). In addition, over fifty hours of purposeful conversations were undertaken with site users, including anglers, bird enthusiasts, and local residents.

Table 1.

Project decision-makers	**Field practitioners**	**Site users/local community**
Project managers – Waltham Forest Council) Operational managers – Thames Water Conservation managers – London Wildlife Trust Regional managers – Lea Valley Park Authority Fishing operators – Walthamstow Fisheries (Thames Water) Site architects – WW Mann	Site surveyors – BSG Ecology Conservationists – London Wildlife Trust Conservation volunteers – London Wildlife Trust Fishing operators – Walthamstow Fly-Fishing club	Regular anglers (coarse & fly-fishing) Walthamstow residents Local bird enthusiasts Community groups (Walthamstow arts) Naturalists & urban ecologists

All material was recorded (written notes and/or audio recordings) with the permission of participants - processes approved by the Ethics Committee at Plymouth University. Both documents and transcripts were qualitatively coded using NVIVO. The first stage of thematic analysis involved the identification of different topics that regularly appeared in the literature, ascribing fine-grade codes or 'topic codes' (Richards, 2005). The second stage involved working from topics to themes, systematically coding these themes while reflecting on meanings, positionality and any underlying agendas. The third stage involved situating the empirics in context, drawing on the academic literature, particularly that of rewilding and more-than-human geographies.

Unexpected arrivals to a post-industrial reservoir

Scholars have noted how understandings of nonhuman autonomy in the context of rewilding must be historically grounded, so that 'rewilding' does not become an abstract concept. More

complex notions of spatial history help us understand rewilding's 'dynamic future pasts' (Lorimer and Driessen, 2016, p647; see also DeSilvey and Bartolini, 2018). The arrival of inland cormorants at Walthamstow's reservoirs in the early 1990s was not the result of human planning and design; it was the unintended consequence of managing a site for recreational fishing and water production. The conditions created inadvertently lent themselves to the establishment of the largest colony of inland great cormorants in Britain.

Walthamstow Wetlands, a 211-hectare site within London's Lea Valley (Fig. 2), has a rich and varied history. Historic records reveal that the River Lea was an immense and fast-flowing river, perhaps reaching over a mile wide in places during Mesolithic times (Lewis, 2017). The river meandered through a vast primeval mosaic of forests and marshes, where wolves, beaver, ox, bison and boar once roamed (Corcoran et al, 2011; Vestry House Museum, 2016). As London's population expanded, the Lea Valley become an essential site for food production and, later, industrial development (Lewis, 2007). By the late nineteenth century, it was recognised that London needed a clean and regular supply of drinking water, especially after several lethal outbreaks of cholera had killed thousands of people (Vestry House Museum, 2016). The surrounding marshes were drained and a chain of reservoirs were established, many of which were dug by hand. Today, Walthamstow Reservoirs is a multifunctional site for water production, nature conservation, and fishing. It provides 3.5 million households (30% of London) with clean water and is home to London's largest fishery.

Figure 2. Aerial view of Walthamstow Reservoirs within the surrounding London boroughs of Hackney, Waltham Forest and Haringey (Source: Cara Clancy/Digimaps)

Walthamstow Reservoirs was not designed for the purposes of nature conservation. But over the years the site has attracted a number of rare and vulnerable bird species taking advantage of the relatively 'quiet location' within the wider Lea Valley landscape (Vestry House Museum, 2016). In 1986, the site was recognised nationally as a Site of Special Scientific Interest (SSSI), the citation for which states that 'Walthamstow supports the most notable variety and numbers of breeding wetland birds among all of London's drinking water reservoirs' (Natural England, 1986). The population of wintering great cormorants form part of the site's SSSI because they represent the largest inland colony in Britain. The site also makes up forty per cent of the Lea Valley's Special Protection Area.

For most of its existence, the site has been off limits to the general public, only accessible via a permit system for bird watching and fishing. However, in 2016 the London Wildlife Trust formed a partnership with the landowners, Thames Water, and the local authority, Waltham Forest Council, and began the task of transforming the site into a 'distinctive urban wetland reserve, with improved access to natural, industrial and social heritage' (Vestry House Museum, 2016). Various ecological alterations were made on site between 2016-2017 (Clancy, 2019). However, none of these were specifically designed to maintain the population of resident cormorants. The story of cormorant self-colonisation can instead be traced to fish stocks and recreational fishing.

Walthamstow Reservoirs would have presented an attractive site for fish-eating birds like cormorants during the 1990s. It has been used formally and informally as a fishery since the Second World War. At first, fish would have entered the reservoirs via the River Lea, but over the last thirty years the water has been regularly stocked with fish (common carp (*Cyprinus carpio*), rainbow trout (*Oncorhynchus mykiss*) and brown trout (*Salmo trutta*) for

commercial and recreational purposes. The regular supply of fish would been one of the main reasons that large colonies of great cormorants were attracted to the reservoirs – dating back to the 1980s (Ibbotson, 1996). Studies conducted at Walthamstow have shown that the number of cormorants increases dramatically in the immediate days after the stocking of trout, with numbers of up to 150-200 feeding birds estimated (Ibbotson, 1996). Today, three of the reservoirs (No 4, No 5, and East Warwick) are stocked with 11,000 trout a year, with each having a minimum weight of 1kg (Thames Water, accessed 01/07/18).

Cormorants began nesting at Walthamstow in 1991 and the colony rapidly grew to a peak of 360 nests in 2004 (Walthamstow Wetlands, accessed 18/10/18). Anglers who were familiar with the site noted this population shift and marked their fishing experience by it. Jerry, a prominent figure in the local fly-fishing group, had conducted his own five-year study on cormorants at the reservoirs and explained that:

> 'In the early days when we had the cormorants here first, they used to still go and nest in the West Country. They would've stayed here through winter and by about April most of them had left and gone to the West Country and then they came back with their young in about August so we had a bit of a reprieve over that – just a few non-breeding birds that stayed. But never enough to matter' (Jerry, 80s, fly-fisherman).

As Jerry's comment suggests, cormorants were not deemed an issue when they existed in low numbers at the Reservoirs; they did not affect the quality of fishing, not in any way that 'mattered'. But by the mid-1990s, when the cormorants began to breed on the reservoir islands, anglers began to take note. Much of the blame for the perceived decline of Walthamstow Fishery during the late 1990s was placed on the presence of large numbers of cormorants (Ibbotson, 1996). The fishing behaviours of cormorants were sought to be curbed

in multiple ways. A number of non-lethal techniques to deter cormorants were trialled over the years to discourage new arrivals and force them to relocate elsewhere, including the use of laser devices, bird-scarers, alarms and regular boat patrols (Walthamstow Fly Fisher's Club, accessed 01/05/19). With none of these proving effective, the decision was made in 1997 to stock larger sized rainbow trout that exceeded 1kg, for it was thought that larger fish would ~~be~~ less prone to predation by cormorants.

Auto-rewilded species are not always accepted into their new landscapes, especially if they are seen to pose competition with other human or favoured nonhuman actors. This highlights one of the central challenges with urban auto-rewilders: they make themselves visible in urban landscapes and thus present as 'awkward others' (Ginn et al., 2014) or 'weedy invaders' (Tsing, 2017). Some auto-rewilders may indeed go under the radar but due to the way cormorants live in colonies, their site fidelity (Frederiksen et al., 2002), size and means of hunting, *they are extremely visible*. They have been accused of causing more 'damage' to fisheries in a shorter time than can any other fish-eating bird in European waters (Cowx, 2013). As the wintering populations of inland great cormorants grew in England during the 1990s, tensions over their (inland) presence escalated, with angling groups referring to the birds as 'black plague', a 'national problem' that 'must be killed' (Angling Times, 1996; cited in King, 2013).

Inland cormorants as 'boundary-crossing' nonhumans

There are two sub-species of great cormorant in Europe: the Atlantic sub-species (*Phalacrocorax carbo carbo*) and the continental sub-species (*Phalacrocorax carbo sinesis*). Both sub-species live and breed in Britain and are protected in Britain under the UK Wildlife and Countryside Act 1981. However, the Atlantic sub-species (*carbo*) are primarily coastal-

dwelling birds and generally considered to be more 'native' to Britain (Newson et al., 2013). Prior to 1981, the Atlantic great cormorants in Britain rarely attempted to breed away from coastal cliffs, stacks and offshore islands (Newson et al., 2007). But, since the establishment of a tree-nesting colony of great cormorants in 1981 at Abberton Reservoir in Essex, the breeding population in Britain has taken up residence in many inland areas to nest and feed on freshwater habitats such as wetlands, rivers and reservoirs. Here, they have met and bred with the continental sub-species (*sinesis*) that has historically used inland as well as coastal sites (Newson et al., 2007). While inland breeding in England has mostly been initiated by the *sinesis* sub-species from mainland Europe, many claim the Atlantic *carbo* sub-species from coastal colonies in Wales and England have contributed to this development (European Commission, 2016).

Great cormorants are a protected species in Britain and Europe. The EU Birds Directive (2009/147/EC) and the UK Wildlife and Countryside Act 1981 makes it illegal to kill them or to take or destroy their eggs and nests when in use or being built, except under [angling] licence. These distinctions may not matter to the birds themselves but they matter to fishing communities who see the shifting *Phalacrocorax* biogeographies as unnatural. The arrival of cormorants at inland sites represents a crossing of boundaries (Francis et al., 2011) that obscures the 'natural place' that is imagined for these creatures.

At Walthamstow, the great cormorants were framed as an ecological disaster for the site by anglers: 'they've just had a devastating effect on the general ecology... they wiped out the Coppermill [stream] completely and now lots of the reservoirs too' (Jerry, 80s, fly-fisherman). They were called an environmental hazard because of the way they had wiped out local rivers (Paddy, 70s, fly-fisherman). Anglers invoked ecological arguments,

equilibrium concepts and biogeographical norms which often rest upon the powerful (but contested) notion of 'nature in balance' (Cooper, 2001; Cuddington, 2001; Trudgill, 2008). The reason anglers drew upon these arguments was because they felt that the normal (natural) place of residence for great cormorants was on the coast, where they were seen to operate in an equilibrium state. This belief became a powerful means to frame inland cormorants as illegitimate creatures, 'out of place' invaders that disrupted the (imagined) harmony of the place. As Norman said: 'They're a seabird so really they shouldn't be here' (Norman, 70s, fly-fisherman). Similarly, Arnold argued that 'they're designed to catch thousands of little fish out in the sea, not this here….' (Arnold, 50s, fly-fisherman). Anglers reasoned that the ecological disaster wrought by cormorants on inland waterways is 'what you get when you get an outside predator coming in' (Jerry, 80s, fly-fisherman). In this way, the cormorant colonies at Walthamstow were seen as unnatural features that had invaded a finely-balanced ecological space.

Inland cormorants were, on their part, simply going about their lives, expending vital energy for their sustenance and taking advantage of the opportunities afforded to them. The birds utilize a variety of sites across London, not just Walthamstow Reservoirs. At sunset, we regularly witnessed flocks of cormorants returning to the reservoirs to roost together at night, after a day's fishing on the River Thames (field observations, 2016-2017). Anglers recognised as much: 'They fly long distances. They've been registered flying a hundred miles out in the day to feed. We've had some flying from the reservoirs all the way to Morecombe Bay to feed.' (Jerry, 80s, fly-fisherman).

Both anglers and conservationists at Walthamstow agreed that the situation with inland cormorants was unusual. Yet, while anglers saw their presence as unnatural and framed them

as outside invaders, the conservationists at Walthamstow Wetlands saw it as a sign of their natural resilience and urban adaptability and welcomed their arrival. Great cormorants were celebrated as an urban success story, offsetting the (imagined) artificiality of the reservoirs and providing an antidote to the degraded urban environment. Cormorants were ascribed a wild aesthetic, described as 'sleek and skilful kings of the waterways… [that] wouldn't look out of place in the Camargue or the Serengeti' (London Wildlife Trust, accessed 01/07/18). On guided walks with the public, conservationists attributed positive value to their life-making practices at the reservoirs, referring to their 'unique and awe-inspiring' nests. Staff also commented on their unusual appearance, describing cormorants as 'regal' and 'prehistoric looking' with their wings held cruciform in a 'fun heraldic pose' (staff comments, London Wildlife Trust, 2016-2017).

The presence of large numbers of cormorants at the reservoirs helped cement Walthamstow Wetlands' self-image as an urban nature reserve, providing a vital home for wildlife in the city:

> '…over recent decades they've steadily colonised inland sites, favouring reservoirs and lakes. In most places this means a temporary presence, but at certain sites - where a combination of both nesting and feeding conditions are just right - cormorants have established their impressive, bustling breeding colonies. Walthamstow Reservoirs is one such special place; in fact, it's one of the largest and most important breeding sites in the UK.' (London Wildlife Trust, accessed 01/07/18).

By representing their presence at Walthamstow as the largest inland colony in Britain and in conservationist terms as successful examples of nonhuman resilience, adaptability and

survival in the urban metropolis, the cormorants were safeguarded from the animosity of anglers. The Walthamstow Reservoirs thus became a 'special place' that provided 'just the right' conditions for these birds. Local birders were also in favour of inland cormorants at Walthamstow. As one birder put it to the group during a guided walk: 'This is one of the few spots – it's the only spot I know of in London – where you can see cormorants really well' (Reggie, bird surveyor at Walthamstow Reservoirs since 1980s). Likewise, (urban) birders saw them as resilient and adaptable: 'it's a great example of wildlife utilising stuff' (Paul, local birder, Walthamstow area).

The co-production of synurbic species

Walthamstow's cormorants have responded to the bountiful supply of fish offered on recreational water bodies inland and, in doing so, have become part of the urban landscape. Scientists have given the name 'synurbanisation' to these biological and behavioural adjustments of wild animal populations to urban environments (Luniak, 2004). According to Francis and Chadwick (2012) a species can be considered a 'synurbic species' (that is, a species living in higher densities in urban areas than in rural areas) if it has adapted with (and even thrived on) the environmental modifications that accompany urbanisation such as changes in microclimate, resource abundance, disturbance and the creation of artificial ecosystems such as walls, roofs, pavement, parks and brownfield sites. Following this definition, inland cormorants could well be described as a synurbic species. Their self-relocation and self-engineering could equally be thought of as cormorants adapting to new conditions and urbanising themselves. As Woolfson (2013, insert page number for quote) notes:

> ‘Living in a city, we are all elements of a biological and ecological chain described by words that express the complex web of connection between us and hint of dependency and need – commensal, mutual, symbiotic, predatory, synanthropic. [...] In different degrees, we share our vulnerability’.

As the preceding sections show, the auto-rewilding and synurbic status of great cormorants at Walthamstow has been co-produced through a myriad of human, nonhuman and technological factors. Despite their aversion to cormorants, fly-fishermen at Walthamstow conceded that the supposed disequilibrium created by the birds on inland water bodies is, in part, a product of human activity. They actively made the connection between overfishing on British coastlines and the increasing availability of food on artificial water bodies, revealing the relationality of humans, birds and fish (Bear and Eden, 2011, p400). Mickey admitted that ‘…because the coast fishing is so poor, they come into the Thames, to places like Hanningfield and Abberton and here. And they stayed. We made them a bit comfortable unfortunately!’ (Mickey, 60s, fly-fisherman). Arnold agreed that ‘they [cormorants] usually catch sand eels and sardines on the coast but because there’s no sand eels left … that’s why they’ve come inland.’ (Arnold, 50s, fly-fisherman). Jerry acknowledged that ‘Cormorants just don’t do well out at sea anymore…’ (Jerry, 80s, fly-fisherman). After spending time on the Hebrides in Scotland, Jerry bore witness to the 80-foot trawlers that were stripping the seas: ‘I mean what a *disastrous* thing to do [original emphasis] …. That’s all the lifeblood of these inshore birds. And because they [cormorants] are persecuted a lot more on the continent, they’re wiping out fish farms and rivers here.’

The global exploitation of fish stocks thus forms part of a key political ecological context for the auto-rewilding of inland cormorants. Since less than 1 percent of the world’s oceans and

coastlines are closed to fisheries, many seabirds are suffering from overfishing (Croxall et al., 2012; Hance, 2012). Recent research (Paleczny et al., 2015) indicates that seabird abundance has dropped almost 70 per cent in just 60 years as a result of overfishing and a litany of other human activities, including drowning in fishing lines or nets, plastic pollution, oil and gas development, toxic pollution, and climate change. It is thought that stocks of commercially fished bottom-living fish (most affected by trawlers) collapsed by 94% between 1889 and 2007 (Thurstan et al., 2010), and that this has had a profound effect on the organisation of seabed ecosystems. Auto-rewilding by inland cormorants must, therefore, be seen in light of broader ecological crises that are being propelled by human activity.

Cormorants are often described as ecological engineers that design and transform their environment over time (see Wires, 2014, p25). Through their nesting and roosting activities, ~~hey~~ exert a strong physical influence on the habitats they occupy. They are especially impressive nest builders, creating substantial nest structures both on the ground and in trees (Fig. 3). Nests can be maintained and added to over many years (King, 2013; Wires, 2014). While tree nests are generally not as large as ground nests (which can get up to heights of six feet or more), the landscapes changes that sometimes result from tree nests are no less dramatic. As Wires (2014) explains: ‘nest trees often die as a result of cormorant activities, and over time a forested island can become a bare, scrubby one’ (2014, p26). When cormorants occupy trees in dense numbers, they affect both the abiotic components and the biotic community on islands in numerous ways, from changing soil chemistry to causing changes in the plant canopy and types of plants that are able to persist under guano conditions (Rippey et al., 2002).

What is distinctive about cormorants is the extent and rapidity with which they can transform islands (Wires, 2014). To a large extent this is a function of the cormorants' ability to form dense colonies and roost quickly. At Walthamstow Reservoirs, in just twenty years, the cormorants had altered the islands beyond recognition, constructing a niche environment for themselves (Odling-Smee et al., 2003). Figures 3 and 4 reveal how cormorants have created a guano effect, turning the islands into something that represents their 'natural' coastal cliff territories.

Figure 3. 'Cormorant engineering' on Reservoir No 5, September 2014 (Source: Alan Denney/Flickr)

Figure 4. Aerial photograph of Walthamstow Reservoirs taken in 2017 (Source: Luke Massey/National Park City). The island known as Cormorant Island is circled.

The engineering feats of cormorants were met with a mixture of delight and concern by actors at Walthamstow. Some saw it as 'impressive' and admired their ability to refashion the islands into a home, while others saw it as 'ecologically hazardous' and unsustainable. On guided walks, members of the public (often birdwatchers) would make comments such as: 'it [the island] looks like a desert'; 'the island are as bare, bleak and spectral as they [the cormorants] are'; 'looks like they're ruined it'; 'Look at the white lime droppings on those other trees!' (public comments, Walthamstow Wetlands, 2016-2017). Anglers were particularly negative about the transformation of the islands: 'that [island] was thick bush years ago. Trees 10-15 foot over the water, you couldn't see the island. In another 10-15 years that one [points to a different island] is gonna be the same – killed off.' (Paddy, 70s, fly-fisherman). Some anglers were keen to emphasise the cormorants' ability to 'shit their

own island to death' (Jerry, 80s, fly-fisherman), implying that cormorants were not intelligent enough to secure their own futures.

There is no evidence to suggest that cormorant engineering is altering the natural ecological conditions of the islands. While there is a risk that cormorants may permanently eradicate or alter specific features or instigate a process of erosion, the islands were always starting from an artificial baseline dating to the 1800s. The islands at Walthamstow were never natural, in the sense of being unaltered by humans over time. They were formed from the mounds of soil and silt dug out to build reservoirs for providing London's booming economy with a steady supply of clean water. The islands were not intended to function as refugia for nonhuman life. The Victorian imaginations that built the reservoirs piled the sculpted leftovers of dugout reservoirs into shape for distant visual appreciations. Unforeseen by them and by the site managers a century later, the conditions at Walthamstow unwittingly provided alternative life-making possibilities for inland great cormorants. They have become both disruptors and facilitators this new urban wetland and actively co-produced the complexity of London's highly modified urbanscapes.

Auto-rewilding, conservation and novel ecological futures

> *"Auto-rewilding offers ambivalent futures. On the one hand, we owe the richness of our feral landscapes to auto-rewilding. On the other hand, auto-rewilders often kill the chances of other, less aggressive and disturbance-loving species. Auto-rewilders are bold. They are weedy. Like us, they do not play well with others. They help us make the Anthropocene, the proposed epoch of outsized human disturbance." (Tsing 2017, p 6)*

Conservation practice rarely acknowledges the unique political historical conditions that enable flourishing for some species and catastrophe for others (Lorimer 2015, Holmes 2015, Biermann and Anderson 2017). The popular focus on species reintroductions in rewilding debates (to aid ecosystem services or to enhance biodiversity) can oversimplify ecological crises and isolate political economic issues from environmental ones. The presence of inland great cormorants at Walthamstow demonstrates the need to expand the notion of 'reintroduction' beyond the human, to acknowledge instances of self-introduction and self-relocation and how these instances may themselves be the unintended consequence of everyday human practices, e.g. the repeated restocking of fish on an urban reservoir. The cormorants are responding to specific conditions generated by people – the birds are clearly operating both *with* and *against* these trajectories in complex ways, co-producing new inland conditions. This interplay is distinctly marked at Walthamstow, where the birds have dramatically altered the islands they have colonised.

As Tsing suggests in the passage above, we can think of cormorants at Walthamstow Reservoirs as 'weedy' beings that have co-produced a 'weedy configuration' (Tsing 2017: 7), an uncertain ecological space in which nonhuman and human histories of industrial capitalism have combined to create a novel landscape assemblage. Acknowledging Cormorant islands - initially instigated by humans – at Walthamstow as co-produced by weedy beings highlights cormorant agency and demonstrates that these are spaces designed and articulated beyond the human. Although all animals may be said to undertake some 'engineering' through their living, the feats of some species are more prominently profiled than others in rewilding circles. This may happen because their engineering feats display disproportionate effects relative to their numbers/population size, or perhaps (and more

likely) because they are able to transform a landscape or ecosystem into something that is more desirable – either functionally better (e.g. beavers improvements to water quality, Crowley et al., 2017) or more aesthetically 'wild' (Prior and Brady, 2016). And while some cases of rewilding are open to ecological surprises (see Sandom and Wynne-Jones, 2019, for examples), for the majority of rewilding projects certain species are attributed with arguably simplistic labels such as 'ecosystem engineer' and 'keystone species' (Soulé and Noss, 1998; Monbiot, 2014). Attributing such prominent ecological values to species can overinflate their role and overlook the multiplicity of interactions taking place (Jepson and Barua, 2015). In other words, they may denote or create (new) hierarchies of life by unwittingly framing other species as 'ecologically ineffective' or 'redundant' (von Essen and Allen, 2016).

Conclusion

The case of Great cormorants at Walthamstow Reservoirs serves as a reminder that some species can respond to human pressures in unpredictable ways. Their inland migration and subsequent life-making practices at an urban industrial reservoir could never have been predicted by conservationists.

Auto-rewilding is a legitimate form of rewilding that needs to be better integrated into the discourse and scientific studies on rewilding. Von Essen and Allen (2016) bring this point to light in their examination of cases of animals that have rewilded themselves – 'inasmuch as they colonize the wrong areas at the wrong times' (2016, p89) – and found that rewilders often have double standards, where the animals that are intentionally rewilded have more legitimacy and protection (e.g. freedom from culling regimes) than animals that rewild themselves into landscapes. As a result:

> ‘a lack of planned human intentionality can deprive a species of the right to exist in an area even if the animals established themselves autonomously at a site. At the same time, meticulously planned rewilding schemes where species are paternalistically placed and maintained at another location, attain more legitimacy with what appears to be less of the sovereignty and wildness sounded in its rhetoric (Swales, 2014).’ (von Essen and Allen, 2016, p89).

In other words, rewilders often seek a particular (human imposed) version of wildness – ‘wild but not too wild’ – and this undermines their claims about rewilding as an open, flexible and future-oriented approach to environmental management (Lorimer et al., 2015).

The implications of having auto-rewilded species in cities needs to go beyond the (often negative) sense of invasion and damage. There is a need to locate a more nuanced understanding of rewilding, one that speaks to the complex challenges brought by an increasingly human dominated world and to species that operate on their own terms (Whitehouse, 2015). In this paper, we have utilised and expanded the term auto-rewilding and offered an empirical example of it in an urban context. We have also demonstrated that the autonomous activities of cormorants – nonhuman occupation and self-relocation – at Walthamstow are intimately entangled with human histories and activities**.** While it is important to acknowledge the ongoing unequal power dynamics that affect species on the move, the case study highlights that nonhumans are not just passive actors in the creation of novel ecosystems.

More research is needed to better understand instances of auto-rewilding and not just from a single-species perspective. There are now emerging efforts to reconceptualise species that

have rewilded themselves (see Wallach et al. 2019). While inland cormorants may be a celebration of nonhuman agency in cities, it is important to be attuned to *all* more-than-humans within weedy landscapes.

The Great Cormorants at Walthamstow are an example of auto-rewilding insofar as they have both moved away from, and oddly into, the conditions created by human activity – from declining fish stocks at sea to amply supplied inland fishing waters. Their story highlights 'the paradoxical relationship between entanglement and autonomy' (DeSilvey and Bartolini, 2018, p 6) insofar as they demonstrate how nonhumans can work both *with* and *against* the grain of an increasingly human-dominated world, both exploiting and suffering under the conditions they find themselves in.

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