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Peter Coates

# The Muskrat's New Frontier: The Rise and Fall of an American Animal Empire in Britain

## Abstract

In the early 1930s, many British politicians, journalists, and scientists were greatly alarmed by the feral exploits of a recently introduced North American furbearer that readily escaped confinement. The uncontainable muskrat precipitated Britain's first legislation to combat non-native invasive species (NIS), triggering a campaign of extermination that was successful within five years, representing a rare instance of mission accomplished in the global history of efforts to eliminate NIS. The short, but intensive, British chapter in the muskrat's history has attracted just one historian to date. Thirty years ago, John Sheail foregrounded alarm-raising scientists' efforts to engender political action and provided a detailed account of the Destructive

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Imported Animals Act's passage and provisions. Yet many questions remain. How do we explain the acute level of anxiety over the muskrat? How do we account for the surprising ease with which the species was wiped out? And why was there such a spectacular difference between projected and actual numbers at large? These matters will all be touched on, but the novel vantage point adopted is that of the frontier, as understood in the United States and Europe. This requires a broader geographical context than Sheail's, embracing the muskrat's homeland and continental Europe as well as a wider source base that extends beyond government records to embrace parliamentary debates, press coverage, and the reports of Bavarian experts that the British government recruited. This approach, the wider spatial setting, and these additional records drive the argument that the muskrat found a new frontier in Britain, where it operated as an unusual kind of creature of empire.

## THE FORGOTTEN MUSKRAT "MENACE"

Speaking in Britain's House of Commons in 1933, Labour Member of Parliament Clement Attlee lambasted the Conservative government's policy of cutting defense spending by prioritizing air power over ground troops, despite warnings about the international buildup of aerial force. A "homely comparison" underscored his point: "It is as if [I] knew of the terrible dangers threatening the county of Worcester from the ravages of the musk-rat but said: 'I must keep musk-rats because then I shall manage to get a cheap fur coat for my wife.'" The feral activities of a recently introduced North American furbearer (*Ondatra zibethicus*) that had readily escaped confinement in Midland counties like Worcestershire—and whose numbers at large were an estimated million nationwide—cropped up unexpectedly elsewhere in parliamentary discussions. In a House of Lords debate on the enhancement of productivity of scientifically informed farming methods, Earl Stanhope brought up the marauding rodent's reproductive prowess. The application of these latest techniques, he quipped, could mean that "in future cows will breed like the musk rat." The muskrat also popped up more directly, to the bemusement of members of parliament with urban constituencies. Sir Harold Sutcliffe reflected on the diversity of topics discussed one day: "They started at the top with a tariff Debate and the wheat quota Debate, and getting nearer the bottom we had the discussion on the musk rat

and its evil effects.” For the Earl of Crawford, who represented a rural constituency and chaired the Council for the Preservation of Rural England, it was shortsighted to dismiss the muskrat as “the sort of subject that a crank Peer might raise.” He and Attlee were not alone in portraying a creature supposed to procreate “peacefully within a pen” as a hot biopolitical potato. The long list of “ravages” compiled by Earl De La Warr, parliamentary secretary for the Ministry of Agriculture and Fisheries (MAF), included gnawed crops and (despite being predominantly vegetarian) preying on fish, young poultry, rabbits, and even piglets. The semiaquatic animal’s main offense, though, was its inveterate burrowing that undermined the embankments of rivers, canals, ponds, dams, roads, and railways.<sup>1</sup>

Journalists echoed the politicians’ concerns. The punning verdict of rat expert Samuel Levy Bensusan (playing on its value as pelt) that the muskrat was “a rodent whose virtues are merely skin deep” was repeated from tabloids to broadsheets. Coverage conjured up a “nightmare of rats” tunneling the countryside and transforming grazing land into swamps. “Not one man in a thousand,” a newsman fretted, “realises the danger that threatens ‘this realm, this England’” from the “advance guards” of the “invading armies.”<sup>2</sup> In a typically alarmist piece, former war correspondent William Beach Thomas (author of books on how modern intrusions jeopardized things rural) tossed out extreme statistics: one million of the “American alien” at large in Shropshire and neighboring counties like Worcestershire; litters of at least eight produced nine or ten times a year. Elsewhere, a sketch of a giant, snarling, looming muskrat, above a bridge over the Severn at Shrewsbury (“the Ypres . . . of the musk rat front”), reinforced these wild claims.<sup>3</sup> A squatting muskrat superimposed onto a map obliterated most of England, Wales, and southern Scotland. Journalists whipped up an apocalyptic vision of dams and riverbanks bursting, city water supplies sabotaged, lowland tracts inundated, and villages swept away (figure 1).<sup>4</sup>

The substantial amount of parliamentary time devoted to the misdeeds of “another alien of questionable habits”—an allusion to the gray squirrel (*Sciurus carolinensis*), Britain’s original faunal import from North America in the 1870s—reflected the belief that Britain’s countryside faced an unparalleled animal-inflicted peril. Thomas identified England as “a singularly hospitable land” for faunal visitors where most “guests” did not “indulge in excesses.” But there were “exceptions.”<sup>5</sup> Once “abroad” in rural England, the live animal capital embodied by the muskrat lost its worth. Indeed, as a hospitality-abusing “free-roving guest,” the former “captive” acquired considerable negative value. “We cannot afford,” Thomas concluded, “to give this alien the freedom of our rivers and canals.”<sup>6</sup> The uncontrollable muskrat precipitated Britain’s first legislation to combat non-native invasive species. “Just before Easter [1932],” a journalist



Figure 1. Map showing the location of Shropshire, which was at the center of the “Muskrat Menace.”  
Credit: Wikimedia.

observed, it “enjoyed the dishonourable distinction of having a ‘Destructive Imported Animals Act’ passed all to itself.”<sup>7</sup> Muskrats could now only be kept under license and “subject to stringent conditions,” including a ban on their being held in “open colonies.” Prompted by an impending prosecution for non-compliance, the London College of Pestology’s director warned that, without enforcement, it would be the gray squirrel revisited, “but very much worse, for the musk rat . . . is vicious, destructive, and may be a serious carrier of disease.” So, whenever “met free he should be killed on sight.”<sup>8</sup> Such warnings notwithstanding, the new law failed to prevent further escapes.

For Erna Mohr of Hamburg University's Zoological Museum, the muskrat's Europe-wide exploits epitomized the refusal of introduced species to "respect the boundaries intended for them."<sup>9</sup> "Problem" or "pest" species, a British reporter observed, are among the most palpable examples of how "man's dominion of the earth is still contested by other species," for countermeasures against injurious animals had proved largely ineffectual.<sup>10</sup> "Authority proposes [restrictions]," Bensusan rued, "and musquash [muskrat] disposes of authority."<sup>11</sup> Britain was not alone in finding it hard to curb what an American journalist called the "great nuisance" of the "adventurous" and "free" "native American."<sup>12</sup> Transplanted to mainland Europe a quarter of a century earlier, this unruly animal escaped its confines there just as effortlessly. As American muskrat specialist Paul Errington observed in the early 1960s, it had "demonstrated its ability to acquire and to hold a vast, racially new, geographic range."<sup>13</sup> Even today, despite sizeable and continuing expenditure on control, obdurate naturalized populations persist across northern mainland Europe.

At first, it looked as if Britain's muskrats would emulate their continental counterparts' success. By 1934, MAF-funded researcher Tom Warwick was already resigned to its remaining an "expensive member" of Britain's fauna "for several years." And, yet, the muskrat in Britain turned out to be resistible, and its colonization reversible. Decolonization (that is, local extirpation) was possible, not least because actual numbers, despite the alleged million or more, amounted to less than forty-five hundred. Exceptionally within Europe, human authority was reimposed unequivocally and, despite scientists' and journalists' complaints of government inaction, surprisingly swiftly and fairly cheaply.<sup>14</sup> It was an unambiguous case of mission accomplished because the campaign was initiated relatively early (areas of infestation were comparatively small and concentrated), was adequately funded, and was willing to harness German expertise. Moreover, eradication took place before animal rights emerged as a social and political force, which might have complicated the campaign's prosecution. The rapidity of the muskrat's self-directed colonization was matched by the pace of its forcible decolonization.

## THE MUSKRAT'S NEW FRONTIER

The muskrat is missing from studies of rural interwar Britain, and its chapter in British history has attracted just one historian—and that was thirty years ago. John Sheail foregrounded alarm-raising scientists' efforts to engender political action. Drawing almost exclusively on official records and the papers of Martin Hinton, deputy curator of zoology at the Natural History Museum, who spearheaded the "war on the muskrat" between late June 1932 and mid-February

1933, Sheail examined how the muskrat problem provided an opportunity for ecologists' involvement in policy-making.<sup>15</sup> Yet Britain's muskrat can be approached from many other angles. Some account, for instance, might be offered for the acute level of anxiety it prompted. Similarly, the unexpected ease with which the species was wiped out in Britain (an extremely rare instance of non-native invasive species eradication) also requires explanation. But perhaps the most promising insight might result by looking at the muskrat through a lens seldom, if ever, applied to Britain: that of the frontier. This requires a broader geographical context than Sheail's, embracing North America and continental Europe, as well as a wider source base extending to parliamentary debates, press coverage, and the reports of visiting Bavarian experts. Reframing the muskrat menace in such a way, however, underscores the degree to which the muskrat found a new frontier in Britain, where it operated as an unusual kind of creature of empire.

For historians and laypersons, the frontier is a phenomenon primarily associated with the muskrat's North American homeland and the Euro-American demographic takeover of territory from indigenes. This frontier was also a zone of contact and conflict between nonhuman nature in its resident and imported forms. According to the received wisdom on ecological colonialism, little traffic travelled the other way—faunal, floral, or pathogenic. This asymmetry was particularly striking for Alfred Crosby, particularly concerning “problem” animals. Eurasia received few troublesome species in exchange for the plethora of invasive non-natives accompanying Euro-American frontier incursion. In reality, the transatlantic flow of disruptive biota was much more reciprocal.<sup>16</sup> Crosby and those who adopted his approach focused mainly on the colonial era or did not extend their coverage beyond 1900. Include the twentieth century, however, and the exchange that now stretches over half a millennium looks more balanced, especially for the British Isles.

Since it came and went in under a decade (1929–37)—and, unlike its North American counterparts, the gray squirrel and the mink (*Mustela vison*), cannot be implicated in the declining fortunes of a native species—Britain's muskrat is easily overlooked as an example of faunal imperialism in reverse.<sup>17</sup> Its position as a “creature of empire,” admittedly, is unusual. For Virginia DeJohn Anderson, “creatures of empire” were livestock that remade the biophysical environment of colonial North America along familiar, European lines.<sup>18</sup> Though some cattle and pigs also evaded control, forming feral populations, Britain's muskrat constitutes a genuinely undomesticated creature of empire. It differs further from Anderson's livestock in that its arrival and spread were unconnected to a larger settlement process spearheaded by humans. Still, just as livestock fanned out across North America (mostly with human assistance), the muskrat

found the British countryside another fertile frontier. Rural Britain, to adopt (and adapt) Frederick Jackson Turner's phrase, offered a "new field of opportunity." Moreover, just as Turner believed that the European colonist was transformed into a "new product"—the American—in the crucible of the frontier, what was forged on this fresh muskrat frontier, some Europeans contended, was a new muskrat.<sup>19</sup>

During the early twentieth century, American visitors routinely juxtaposed American roominess against Britain's crowdedness.<sup>20</sup> At least in regard to muskrats, Britons agreed that a creature shaped by the "North American wilds" was incompatible with cramped British conditions.<sup>21</sup> At the height of Britain's "muskrat war," an American reporter quoted a British naturalist's recent warning that an animal beneficial or innocuous at home can become an "intolerable nuisance" when it settles overseas.<sup>22</sup> Such animals posed particular problems when their new country had a dense human population. In northern Canada, Bensusan explained, there was nothing to damage. By contrast, Europe's thick infrastructure of embankments and extensive croplands placed it at far greater risk. The "indefatigable digger," he reiterated, "behaves worst" abroad.<sup>23</sup>

Yet early twentieth-century advocates of muskrat farming in North America were just as alert as Europeans to the potential for clashes with human interests. As wild supplies dwindled, US government biologists encouraged its "cultivation" in unsettled marshland "preserves" without "agricultural value," highlighting Maryland's coastal wetlands.<sup>24</sup> The muskrat was introduced in similar "open colony" (unfenced) style in Finland (1919) and the former Soviet Union's Kola Peninsula (1928). Ample, thinly populated wildlands akin to Maryland's marshes minimized risk of disruption.<sup>25</sup> The muskrat's misbehavior in a settled environment, whether that was Britain, continental Europe, or the United States, was not attributable to noxious habits newly acquired. The success of any introduced species is governed by a combination of invasiveness (its own attributes) and invasibility (its new locale's attributes).<sup>26</sup> In parts of Europe (and its homeland, once areas were developed), the muskrat "at liberty" collided with human interests simply by being a muskrat: breeding prolifically, living across a wide climatic and environmental spectrum, and eating a variety of foods.<sup>27</sup>

The muskrat was not the only semiaquatic animal digging into British soil. Another energetic burrower was the native water vole (*Arvicola amphibious*). Yet British commentators considered its discrete, dispersed tunnels in keeping with the densely occupied countryside. By contrast, the muskrat's sprawling colonies were ruled out of place. Its "power of escape, to migrate, to damage, and to breed at large" all but guaranteed friction as few locales were off-limits ecologically.<sup>28</sup> Nobody had explained to muskrats, joked Peter Chalmers



Mitchell, secretary of the Zoological Society of London, “that they were expected to settle down on the farms provided and comfortably propagate their species until . . . they were required for the fur coats.” Brought over for a specific task, muskrats had violated their terms of employment.<sup>29</sup>

North America, Mitchell underlined, was big and roomy. But that did not mean that a small and crowded island could not offer a frontier of opportunity for introduced animals. Like livestock in colonial New England, the muskrat was shipped over as animate property to be raised in human-regulated habitats. But it resisted husbandry. No fencing was ever likely to withstand gnawing by a creature with large, chisel-shaped incisors. No great imaginative, trans-species leap is required to see how, for muskrats that had broken out, the British outdoors resembled (quite literally) a Turnerian “gate of escape from the bondage of the past.”<sup>30</sup> Over in Britain, muskrats were reborn through self-release, producing an unpredicted, unsanctioned beastly place widely characterized as “muskrat country.”

In December 1932, Thomas descended the Severn in a canoe paddled by Canadian trappers, passing close to where muskrats were first raised in England and had “burrowed their way to freedom.” Muskrat lodges in the Severn catchment struck observers as grander than their homes on the Danube and Vistula and more opulent than their Alaskan residences. This epicenter of “infestation” was, a reporter noted, a veritable “rats’ paradise.”<sup>31</sup> As a MAF official explained to a Treasury colleague, “it appears that this animal finds Europe, and perhaps especially England, more congenial than North America.”<sup>32</sup> For Martin Hinton and co-worker E. C. Read, the MAF’s technical advisor for rat destruction, the muskrat not only took “kindly to British soil,” whose “splendid colonizing facilities” allowed it to “colonize the entire land,” but it had also found its ideal home: “Climate and food . . . are more favourable here than in any other country.”<sup>33</sup> A muskrat’s life was better in Shropshire than in Saskatchewan.

Fugitive muskrats thrived because they found an unlikely land of opportunity by actively exploiting a vacant niche. The human equivalent is Turnerian “free land,” a problematic concept for North America with its indigenous human occupancy, but accurate in a nonhuman British context given the availability of land and resources not already occupied or used by muskrats or comparable creatures. If a niche denotes the biophysical conditions required to grow, survive, and reproduce, then a vacant niche can be characterized as an unused, but potentially usable, living space; as Klaus Rhode explains, a vacant niche is “simply a concise way of saying that more species could exist in a habitat.”<sup>34</sup>

Over half a century ago, G. Evelyn Hutchinson observed that “the rapid spread of introduced species often gives evidence of empty niches.” He added that “such rapid spread” has frequently occurred

in “disturbed areas.” The kind of disturbance he (and others) had in mind—a lightning or storm-ripped gap in a rainforest—was inapplicable to Britain.<sup>35</sup> But if disturbance is understood as a longer-term process of slow violence, such as the elimination over centuries of most large predators, then the notion fits.<sup>36</sup> In addition to the dearth of “enemies,” Thomas identified three further optimizers: a mild-ish climate, abundant food, and profuse watery habitat. Underpinning the muskrat’s British success, though, was the extraordinary capacity for “rapid reproduction” that all rodents shared.<sup>37</sup>

American biologists had highlighted muskrat fecundity in the early 1900s. Maturing sexually at six months, females raised litters of between five and twelve babies two to three times a year. These initial studies identified population density as a key determinant of productivity. By the birth of the second or third litter in the fall, the first litter, born in the springtime, were sub-adults and ready to wander off to find mates. The fall-born litters overwintered with their mothers and branched out in early spring. Muskrats moved mainly along watercourses but could trek overland to reach under-occupied territory.<sup>38</sup>

Muskrats repeated their reproductive success, “pioneering thrusts,” and “footloose mass movements” in new areas contiguous to their native range.<sup>39</sup> Historically, various closely related subspecies covered much of eastern North America. Beyond the Mississippi, densities declined with the growing aridity. Muskrats were absent from California’s Pacific drainage before 1901, when the International Canal—a three-hundred-mile network moving water from the Colorado River in Lower California, via Mexico, up into California’s Imperial Valley—created an invasion corridor. By 1907, the canal network’s banks were extensively pockmarked, and irrigation districts were paying out bounties. Fur farm escapees soon joined these unscheduled arrivals.<sup>40</sup>

Though the muskrat’s British history replicated these aspects of its American history, the damage muskrats had inflicted closer to home served as the primary fuel for British fears.<sup>41</sup> The first documented arrival in Europe came in 1905 when a nobleman returned from an Alaskan hunting trip to his estate at Dobrisch, in the Czech province of Bohemia, with three females and two males. Hoping to boost estate income, he housed them in small ponds.<sup>42</sup> Reprising their North American ancestors’ migrations, the progeny of these five pioneers radiated out into what American biologists characterized as “superb” habitat.<sup>43</sup> In 1930, German researcher Johannes Ulbrich prepared a map documenting a quasi-circular expansion rate of four to thirty kilometers per annum across all “fruitful regions” of Bohemia between 1905 and 1913; by 1914, estimates placed Bohemia’s muskrat population at two million.<sup>44</sup>

The German border (Bavaria) lay 140 kilometers from Dobrisch. A mountain barrier slowed progress, but, once this political frontier was reached in 1914, the muskrat population expanded southwestward along rivers and streams in the early 1920s at a rate of between fifty and seventy kilometers per year. Early experiments in the 1930s by Europe's leading muskrat expert, August Pustet, director of State Muskrat Control in Bavaria, suggested that a muskrat could travel fifty kilometers upriver and settle a previously uncolonized area within fifteen days.<sup>45</sup> Researchers also noted the explorative animal's willingness to traverse large tracts of unsuitable habitat (including western Bohemia's uplands) in search of a new home. By 1927, it had penetrated the Danube watershed.<sup>46</sup> A "middle-European calamity" had unfolded in under thirty years as the original five animals became an alleged one hundred million, spread over a 310,000-square-kilometer territory.<sup>47</sup> The catalogue of continental European damage that Britons invoked included the ruination of a large electrical works' dam; railroad disruption; burst reservoirs; road subsidence; and a mining disaster (tunneling under a riverbed released water that swamped mine workings). The middle European consensus mirrored North America's and, in turn, became Britain's: muskrats were tolerable only "in regions far from cultivation." British naturalist James Ritchie posed a question and answered it: "What is the danger, you ask, from this importation? The answer is 'Just look at what has happened in Central Europe.'"<sup>48</sup>

Scientists readily explained the muskrat's proclivity to escape: their intolerance for confinement and the open conditions they were kept in as a result. North American researchers who penned wild specimens quickly discovered they "require range, and when confined in small cages become restless and dissatisfied and spend most of their time trying to escape." Nor did they breed readily in enclosures. "To satisfy the biological requirements of this ungovernable rodent," a French biologist observed, "it was necessary to give it semi-freedom." Hinton and Read agreed. When kept in cramped conditions, they "seemed to be doing their best to get out."<sup>49</sup> And semi-free muskrats mimicked their continental and North American cousins. England's first farm was established at Shrawardine by fencing off an enclosure within a sixty-five-acre pool, where the muskrats pursued "a perfectly free and natural life," munching aquatic plants and building lodges (an "American habit"). They escaped almost immediately.<sup>50</sup>

From an animal welfare standpoint, the "natural conditions" at Shrawardine Pool were laudatory. Yet, for precisely this reason, Shrawardine was, as Hinton and Read would later note, "*very dangerous*." Despite enclosure by 1,646 meters of wire mesh fence rising one meter above the normal waterline and sunk one meter underground because the pool was liable to spill over, its residents could readily be swept into the nearby Severn. By the summer of 1932, muskrats

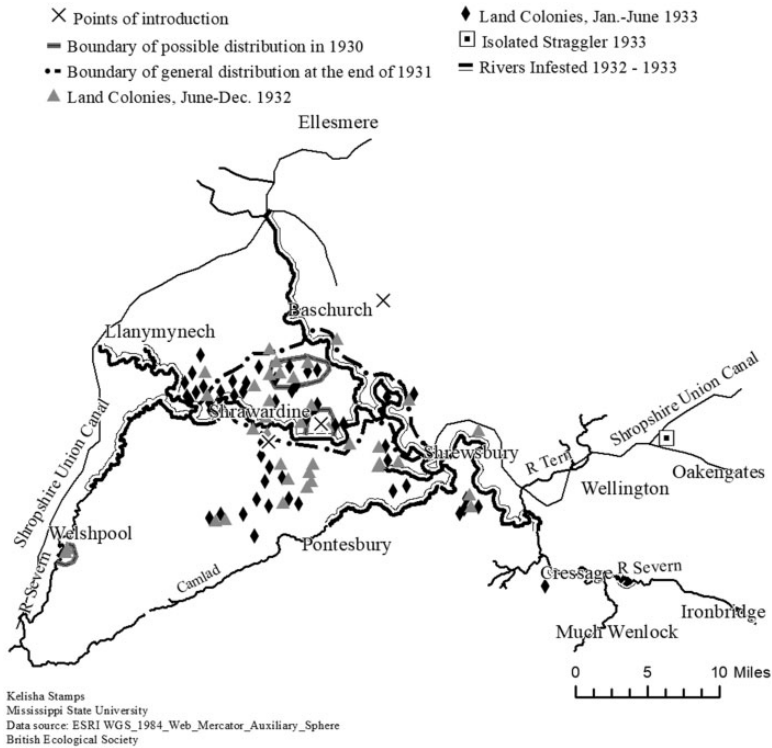


Figure 2. Map showing locations of muskrat introductions and their spread. Credit: Kelisha Stamps, from Tom Warwick, "The Distribution of the Muskrat (*Fiber zibethicus*) in the British Isles," *Journal of Animal Ecology* 3 (1934): 252.

"occupied" 250 square miles of the Severn catchment, including around 120 miles of riverbank (figure 2).<sup>51</sup> Population estimates varied enormously but were all spectacular. Newspapers routinely cited claims that numbers had rocketed from zero in 1929 to a million in the Severn catchment within five years.<sup>52</sup>

Though Shrawardine (dubbed the rat's "citadel") remained the epicenter of infestation, muskrats flourished elsewhere too.<sup>53</sup> Considerations of climate, predation, and competition shaped acclimatization success.<sup>54</sup> For animals "accustomed to the long severe Alaskan winters," mused Bensusan, "England appeared as mild as the South of France appears to an Englishman." North American studies identifying uninterrupted breeding during gentler winters in the more southerly reaches of its range seemed to fit Britain as well.<sup>55</sup>

Britain's muskrats also benefited from the limited range of "natural enemies." Back home, they faced seventeen significant predator species; only half of North America's juvenile muskrats survived to adulthood.<sup>56</sup> Invasion biologists still debate the enemy release hypothesis,

for predation losses can stimulate reproduction as well as depress net population. But the muskrat's British experience supports the view that lighter predatory pressure gave the non-native an advantage. "In clover," for want of predators, a British wildlife artist reckoned muskrats were set to reprise the territorial conquest of an earlier American transplant—the gray squirrel—which had become "lord of the woods."<sup>57</sup> The muskrat now threatened to lord it over Britain's waterways.

Hinton was more upbeat about the curbing potential of predators "native" to the invaded community and so wanted to remove the "unnatural security" predator persecution gave the muskrat. The MAF advised gamekeepers and landowners that "our ally," the stoat, deserved protection because it hunted assorted rats, including today's real "super-pest." By all means, it advised, kill stoats (and its fellow mustelid, the weasel) frequenting places of poultry. But, along streams, ditches and ponds, where they might seize the "foreign" rodent's youngsters, leave them alone. In the absence of a notable predatory threat and in light of Britain's other advantages, however, Pustet believed that England's muskrats had become almost a "different breed" (*andere Rasse*).<sup>58</sup> Larger and heavier than their continental cousins, he insisted they dug bigger burrows, bringing greater disruption.<sup>59</sup> When the editor of *Country Life* received a photo of a large muskrat, he forwarded it to Frances Pitt, author of animal stories and pioneer of wildlife photography, who appraised it as "a good example of the exceptional stature that creatures will attain when they 'get going' in a new and favourable environment."<sup>60</sup>

The absence of native competitors further boosted the muskrat's cause. The water vole shared many of its qualities: rapid multiplication; proclivity for burrowing; nocturnal and crepuscular behavior; capacity to travel by land and water; and generalist diet. And so Britons frequently confused them. Yet there was an obvious difference: the creature whose "proper home" was North America was significantly bigger and at least three times as heavy.<sup>61</sup> Given this disparity, and their shared habitat and diet, Britons identified "our own" water vole as a likely casualty, seeing the gray squirrel's displacement of its smaller "native brown" counterpart as a kind of prologue.<sup>62</sup>

This fear was misplaced. The near-demise of water voles by the 1990s was attributable to habitat loss and four decades of predation by mink, another fur farm escapee. As an American biologist had observed, the muskrat—like the prairie dog, skunk, possum, hummingbird, and wild turkey—was one of those "conspicuous" North American animals without an "old world" counterpart.<sup>63</sup> As such, the most familiar storyline in the transnational narrative of non-native invasive species is absent from the muskrat's British history: a newcomer's deleterious impact on an indigenous counterpart through

competition (and/or communication of disease) and on other natives through predation. The muskrat's settlement of Britain reinforces the vacant niche theory's assumption that new territorial acquisition entails costless colonization.

Pustet's explanation for the swift conversion of swathes of Britain into "muskrat country" focused precisely on vacant niche opportunity. Although he did not use the term "frontier," he was alive to the colonization potential in a frontier environment. In early modern mainland Europe, frontier (derived from the Late Latin *fronteria* and Old French *frontière*) essentially meant border, as in the boundary or limits of a country. This meaning traveled to England. Samuel Johnson defined it as "the marches; the limit; the utmost verge of any territory; the border; properly that which terminates not at the sea, but fronts another country." Transplanted to the North American colonies, a new meaning emerged. As Frederick Jackson Turner explained, "the American frontier is sharply distinguished from the European frontier—a fortified boundary line running through dense populations."<sup>64</sup> The frontier denoted the dividing line between territory as yet unsettled by Euro-Americans and territory they had already occupied, an understanding that federal census officials adopted in 1874, which identified the frontier as the ever-shifting line between land with fewer and more than two settlers per square mile. (In European usage, population density either side of a border was irrelevant.) Early twentieth-century American usage also incorporated an areal dimension, as in "frontier belt," "advance region of settlement," and "portion of a country between a civilized and an unsettled region."<sup>65</sup> By the early 1930s, the frontier was also treated as a "zone" that hosted a distinctive process of occupation whose driving force was an unstoppable "stream of migration" and whose hallmark was the struggle for control.<sup>66</sup>

The frontier as political border informed an American mammologist's sardonic observation that muskrats migrating into California's Imperial Valley in the early 1920s via Mexico "do not need passports in crossing the International Boundary." Hinton's remark that British muskrats were "no respecters of county or other boundaries" echoed this sentiment. By contrast, Pustet's reflections on his two-month secondment to the MAF in the winter of 1933–34 drew heavily on the idea of the frontier as habitat for incomers. Since the German word for frontier is *Grenze* (border), the German equivalent to this Americanized understanding of the frontier as new living space was *Lebensraum*. For the German zoologist-turned-geographer Friedrich Ratzel, the notion of *Lebensraum* (1901) foregrounded the biogeographical dynamic between a habitat and a species by highlighting the natural mobility of life forms.<sup>67</sup> Ratzel was strongly influenced by zoologist Moritz Wagner's "migration theory" (1868), which posited the physical migration (*Auswanderung*) of a species ("the behavioral

consequence of the need to expand Lebensraum") as inherent to its existence.<sup>68</sup>

Scholars of Lebensraum—mostly interested in its appropriation by pseudo-scientific Nazi geography—have overlooked that Ratzel based his contention that the struggle for existence was invariably a struggle for physical space mainly on nonhuman examples: the migration of weedy plants; creatures whose patterns of conquest mapped closely onto human distribution; and the parasites and seeds that hitched a ride on larger animal “hosts.” His more extended case was the “Europeanization” of the human, floral, and faunal populations of the Americas, whose grasslands were now “aswarm with horses and cattle of European ancestry” and where the “retreat” of native fauna went hand in hand with the “retreat” of indigenous peoples.<sup>69</sup>

Nonetheless, the newcomer’s victory in the “claim for space” was not guaranteed. (Ratzel’s example was the failure, despite repeated bouts of introduction in the late nineteenth century for sporting purposes [coursing], to naturalize the European “brown” hare in Ireland.) “The difficulty,” he explained, “lies in holding on to the new ground attained by movement.” Colonization, for Ratzel, entailed the successful “mastery” or “occupation” of “new space,” whether by floral, faunal, or human organisms. For Ratzel, however, colonization was not synonymous with conquest. Despite examples such as cattle’s displacement of bison, “we should not presume that every immigrating species must necessarily displace an indigenous one ... to take root.”<sup>70</sup> The muskrat’s victimless expansion across Europe supported this distinction between colonization and conquest.

Ratzel also cited the demographic bursts and spurts of territorial expansion enjoyed recently in Europe by North American species such as the phylloxera louse and the Colorado beetle that devastated vineyards and threatened potato crops respectively. Pustet was probably familiar with Ratzel’s exposition of Lebensraum, for its language permeated his final report. He explained how the “faunal stranger” (*fau-nistische Fremdling*) characterized by an inner restlessness (*inneren Unruhe*) behaved when released from the conditions governing existence in “its western home” (North America). Though more intensively developed and densely populated by humans, its strange new European world was awash with waterscapes furnishing “extraordinarily favourable conditions” for reproduction, shelter, and provisioning. And, within Europe, the unknown territory (*Neuland*) of Britain offered the richest array of waterbodies and the most attractive overall package. In Ratzel’s parlance, the muskrat had established a *Lebensgebiet* in Britain, a living area “beyond its old space.”<sup>71</sup>

Ratzel had devoted little attention to considerations of climate in historic times. Pustet thus echoed British commentators in

emphasizing climatological forces. Continental European terrain, like the muskrat's home ground, often froze to a considerable depth in winter, likewise the water in a burrow's lower entrance (freezing muskrats to death or forcing them out, risking exposure to predators); moreover, continental waterways often became thickly encrusted with ice. These conditions did not require formal hibernation but encouraged a "state of lazy somnolence." On the other hand, in maritime-influenced Britain's usually gentler winter conditions, muskrats remained active (and procreative) year-round. Mild temperatures also ensured an uninterrupted food supply. Pustet then reflected on the general boost that a "change of air" (*Luftveränderung*) gave to human migrants and animal pests (*Schädling*) alike: a "fresh and favourable climate" generated a sense of euphoria (*Euphorie*) expressed not just through increased vitality but also in a heightened overall health and sense of well-being. The effects of what Read's translation called a "a buckling up," especially concerning reproductivity ("increased virility")—a trait the muskrat's wanderlust embodied—were particularly noticeable in England.<sup>72</sup> Consequently, Pustet estimated the annual rate of increase as tenfold, at least, and predicted that the original Shropshire population would reach tens of thousands by 1934, number in the hundreds of thousands a year later, and break into millions by 1936.<sup>73</sup>

Those seeking to roll back the advance identified a further advantage that muskrats enjoyed: lack of physical barriers to northward expansion. For Hinton, Britain's geography constituted an unwitting ally for the muskrat insofar as it offered weak internal barriers until the upland topography of northern Scotland was reached. From Hinton's vantage point in 1932, this lent an air of unstoppableity—a manifest destiny of a sort—to the muskrat's takeover: "We have therefore to visualise the colonisation of the whole of Great Britain south of the Grampians [northern Scotland's Highlands] by this species in the course of the next three or four years. . . . No limits other than the coasts can now be put with certainty to the infested area." The muskrat's adaptability to various hydrological regimes, from sluggish lowland water bodies and brackish tidal waters to faster flowing streams, fuelled such dire speculations by eliminating the possibility of an insurmountable water frontier. "This boisterous movement," Pustet lamented, "will only be arrested when they arrive at the coasts."<sup>74</sup>

For a Scottish reporter imagining in 1932 what the muskrat's position might be in five to ten years' time, not even the Grampians offered a solid wall. It was hard to imagine that the enterprising creature, moving northward, would prove incapable of negotiating this physical frontier. And, even if the mountains did prove impassable, then muskrats, with their "natural cunning," would simply work their way around the coasts. If, for the moment, Scotland's



infestation was concentrated in its central, lowland belt, it seemed unlikely to remain that way. Indeed, for Hinton, whether a population currently amounted to six pairs or four hundred was immaterial: "The rats in either case will breed up to the full capacity of the country in a very short time." In fact, central Scotland's muskrats, moving south from Perthshire and Stirlingshire, could also "threaten" northern England.<sup>75</sup>

The England-Scotland border was porous, but the frontier surrounding Britain, though liquid, was solid. If the sea was irrelevant to muskrat migrations within Britain, the saltwater border ultimately worked against muskrats' longer-term interests, rendering Britain far better suited for muskrat control than continental Europe. In mainland Europe, a British journalist noted, the muskrat "laughs at frontiers."<sup>76</sup> Germany's position was the most unenviable. As the German "war" against the muskrat began shortly after the First World War broke out, German newspapers headlined: "Another Declaration of War on the Fatherland."<sup>77</sup> Bavaria's authorities attempted to arrest their westward expansion by enforcing a defensive line (*Sperrlinie*) from Regensburg to Munich in 1917. Bavaria remained at the forefront of continental control efforts, hiring trappers in vain efforts to protect Germany's eastern frontier against infiltrators and eliminate the muskrats' advance guard.<sup>78</sup> Reinforcements entered at will from Czechoslovakia, where little was being done. "As fast as they kill them in Germany," explained a British politician, "the rats pour back over the frontier."<sup>79</sup>

Hinton's argument for a united national strategy mirrored Germany's call for a transnational initiative. The underlying rationale was the porosity of frontiers. Pondering the challenge of "emancipation" from the muskrat, Hinton warned that "a decision to leave the task to the Local Authorities would be fatal and . . . we might just as well decide here and now to let the Musk Rat rip." Without central direction, Britain would "soon see . . . a repetition, on a small scale, of the state of affairs which now unfortunately obtain in Central Europe." "The 'good' counties," he exclaimed, "will be so many 'Bavarias,' each incurring considerable and continuous expense to protect [itself] from immigrants arriving from adjacent 'bad' counties—the 'Czecho-Slovakias' of Britain."<sup>80</sup>

British politicians were nonetheless confident that their muskrat problem would never match Germany's because Britain was "an island country." Earl De La Warr adopted this line of defense against the Archbishop of Canterbury, who, speaking as one of the Natural History Museum's three principal trustees, recommended a national survey to ascertain the full extent of muskrat "evil."<sup>81</sup> With a nod across the channel, the archbishop warned that small colonies could quickly expand and inflict "unmitigated mischief." De La Warr remained unperturbed; whereas Germany had virtually "given up

hope," Britain's sea frontier would prevent reinfestation once the creature was eliminated. In the language of "racial hygiene"—particularly that conflating human and nonhuman pests and pestilences, which was becoming increasingly routine at a time when the Nazi Party was tightening its grip on power—Pustet reassured Britons in a similar manner. Whereas "a constant stream of migrants flowing in" from uncleansed adjacent territory routinely reinfected Germany, "no neighbouring country can infect you."<sup>82</sup>

## ROLLING BACK THE MUSKRAT FRONTIER

Members of parliament who were more perturbed than De La Warr urged the MAF to take charge.<sup>83</sup> Given the creature's characteristic flight response, sporadic, uncoordinated "local persecution" was worse than ineffective. It could prove counterproductive, inducing muskrats to move somewhere new. Flightiness combined with elusiveness made effective action difficult.<sup>84</sup> Six months after the MAF's trappers began work in June 1932, Hinton inspected rumored "infestations" in the lower Severn valley to establish how far south the frontier of colonization extended. Despite paw and claw imprints in mud exposed at low tide, he could not identify a "permanent settlement." Such findings were nonetheless useful. The MAF's trapping strategy was to work inward from the outer fringes of settlement instead of outward from the core, which risked scattering them "to all points of the compass."<sup>85</sup>

When the Destructive Imported Animals Act was amended to ban all importation and keeping (from April 1, 1933), a reporter rejoiced that muskrats were "officially exiled entirely from the land."<sup>86</sup> Yet, "to make an animal an illegal inhabitant of Britain," another journalist cautioned, "is not ... the same thing as to expel it." And so the MAF had launched an "official campaign of destruction."<sup>87</sup> Extracts from the field notes compiled to guide trappers impart the deep sense of unease: "Musk rats in Severn going up Pimley Brook towards dam. If they get into Sundorne pool they will take some shifting; if they damage the dam they would put mill out of action"; "Brig. Gen. Lloyd. Spent a lot of money damming the river back to preserve his estate. Very agitated about rats"; "Tern River and special drainage works. Railways. Musk rat will play havoc if it gets here."<sup>88</sup> The absence of readily available expertise compounded these challenges. No one in Britain knew how to trap muskrats.

The first outside expert that the MAF recruited was a seasoned Canadian. On arrival in Shropshire in late September 1932, Brendan Vallings reportedly brimmed with confidence, saying: "In effect, 'give me a gun and traps and I will clear the whole of England.'"<sup>89</sup> After eighteen months of trapping under Canadian command, with a haul



Figure 3. Trapped muskrat by lodge in the Severn catchment, near Shrewsbury (1932–37). Credit: Shropshire Archives, Shrewsbury, United Kingdom.

of three thousand animals, campaign manager Edric Druce insisted that complete elimination of Shropshire's erstwhile "hordes" was foreseeable within five to six years. Yet, by the time Bavarian experts replaced Vallings in late January 1933, the area of infestation in Shropshire and neighboring counties had apparently swollen to seven hundred square miles.<sup>90</sup>

The ineffectuality of the national campaign's first phase puzzled a Canadian ex-trapper. Vallings's so-called Canadian system consisted of smooth-jawed "jump" traps designed to drown captured muskrats. What the retired trapper (recently returned to his English homeland) failed to grasp is that, though this method killed millions a year back home, it was ill-suited both for eradication and British conditions.<sup>91</sup> Whereas snow and ice provided clues to nocturnal movements in Canada, trapping success in the English winter depended on what Hinton called "accurate observation of what in Canada would be called 'out-of-season conditions'—precisely the kind . . . least known in North America." Altered breeding habits on this balmy frontier brought further complications. In northern North America, mating did not begin until late February or early March. But "in this country with a summer so little distinguishable from winter (if you live in the water)," surmised Hinton and Read, there was no reason for breeding to cease. Trapping for pelts in wintry Canada was a far cry from trapping muskrats to extinction year-round in Shropshire (figures 3 and 4).<sup>92</sup>



Figure 4. Gassing muskrat runs on the River Severn, near Shrewsbury (1932–37). Before Bavarian master trapper Adam Roith arrived in January 1933, gassing was a familiar control method. Credit: Shropshire Archives, Shrewsbury, United Kingdom.

More relevant to British conditions and requirements was the Bavarian method that Hinton and Read had seen on a visit to Germany in 1930. The MAF enlisted Adam Roith, Bavaria's chief trapper since 1922, to spearhead troops at campaign headquarters in Shrewsbury (figure 5).<sup>93</sup> He arrived in January 1933 with Pustet and his "rat divining" stick. Roith's peerless "qualifications" included his capture of around ten thousand muskrats "under conditions with which no Canadian could be familiar."<sup>94</sup> Instead of placing traps in the water, Roith caught muskrats alive in their burrows (runs). Like De La Warr, the Bavarians figured that, despite the reproductivity boost of a year-round food supply, the prospects for reconquest were ultimately better than at home given Britain's "[sea] water barrier."<sup>95</sup> Just a year after the Bavarian method was instigated, the Treasury identified impending success. Just six muskrats were trapped in Shropshire and Sussex (one of two other focal areas of infestation in England) during the first quarter of 1935.<sup>96</sup> The last muskrat in Shropshire—also, allegedly, England's last—was captured in May 1935. A year later, a large male was killed in a garden in Cheshire, the county to the north. But it was a solitary specimen. "The Last of the Musk Rats," a civil servant recorded, "met its end in Cheshire in 1936."<sup>97</sup> Roth and Pustet deserve much credit. But, for all the near



Figure 5. Control staff gathered at the garage at Montford Bridge, River Severn, near Shrewsbury (1932–37). Credit: Shropshire Archives, Shrewsbury, United Kingdom.

hysteria (articulated through militarized vocabulary borrowed from the First World War and the postwar “soft” invasion of American commerce and popular culture), numbers confronted were never remotely comparable to those of their continental European counterparts.

## A Fleeting Animal Empire

In 1937, a leading American mammologist reduced the muskrat’s exploits in Europe to a single verdict: “Probably the most outstanding instance of successful acclimatization among mammals in the present century.”<sup>98</sup> The great exception to its expansion in Europe was Britain, where the campaign against the muskrat had been won not least because, despite the staggering estimates, there had never been all that many at large. The total body count of roughly 4,400 confirmed Britain’s modest muskrat population.<sup>99</sup> Taking continental lessons too literally and being unduly influenced by the gray squirrel’s unambiguous success, Hinton, Read and others had grossly overestimated the muskrat’s unruliness and expansionist vigor.

The long-term projections of population growth and territorial expansion in mainland Europe and Britain issued in the 1920s and early 1930s were based on rapid initial proliferation in central Europe during the invasion phase, which had peaked by the late 1930s. In the event, swift initial spread followed by a slowdown is a familiar pattern in non-native invasive species demography. In 1941, Tom Warwick was rightly convinced that the muskrat had “come to stay” on

mainland Europe, where they remain a substantial and often problematic presence in some areas.<sup>100</sup> Because human intervention decisively shut down the muskrat's frontier of opportunity in Britain, however, this particular, island-shaped instance of animal empire proved unexpectedly short-lived.

Querying the widespread conviction in the early 1930s that Britain's copious waterscapes were swiftly and thoroughly exploited for settlement, Warwick sifted through trapping data for 1933–34 from Shropshire, Scotland, and West Sussex to discover that most wetlands were "only lightly infested," with the creature absent from some "apparently very suitable" habitat.<sup>101</sup> Subsequent researchers would challenge another view strongly held in the early 1930s: that Britain's temperate maritime climate was the muskrat's idea of heaven. From a reproductive standpoint, their research contended, North America's and central Europe's continental climates were far more suitable. In their homeland, muskrats are thickest on the ground where the difference between summer and winter temperatures is most pronounced and thinner in more oceanic areas of introduction (such as Vancouver Island).<sup>102</sup> That Ireland's feral population never exceeded five hundred corroborates the view that wetter and milder locales make for less auspicious breeding conditions.<sup>103</sup>

Because muskrats were extirpated in Britain, we will never know whether Shropshire would indeed have provided a better long-term home than Saskatchewan. To be sure, had Britain's muskrat been left to its own devices, a locally shaped muskrat might well have evolved. But, despite fears about the effects a congenial British environment might have on the muskrat population, the British frontier did not produce, even fleetingly, a decidedly "British" muskrat. Read's summary of Pustet's report underscores the seriousness of those anxieties in its inclusion of an observation that Shropshire's muskrats "belong to a race which is larger and heavier and differs in some other characters [darker pelt] from the race found in Central Europe." Yet Warwick found no notable differences between muskrats in North America, Bavaria, and Britain. The hundred specimens that he examined from across Britain indicated they were in no way distinctive. Estimates of the larger number of litters proved similarly overstated; there was only "doubtful evidence" of three annual litters in Britain, which would have put them in line with the continental norm.<sup>104</sup>

What remains clear, though, is that many contemporaries regarded the muskrat's feral activities in Europe as a colonization exercise comprehensible within a human framework. Read's translation of Pustet's report rendered *Neuland* as "virgin country," while, in Pustet's original text, muskrat settlers and migrants (*Siedlern* and *Wandertiere*) consumed by an "indomitable wanderlust" (*unbezähmbare Wanderlust*) occupied a strange, but inviting, territory through "impetuous movement."<sup>105</sup> The unfettered muskrat was an exemplar of ungovernable

mobility whose “undesigned experiments” of self-release converted rural Britain into an unfamiliar frontier, complicating the idea of unsanctioned mobility, which was previously restricted to the subversive movements of transport animals harnessed for activities like smuggling and anti-imperial rebellion.<sup>106</sup>

By seizing what this land of watery opportunity offered, the muskrat created a nonhuman empire—permanently in mainland Europe and briefly in Britain. Historians have explored the notion of nonhuman empire through species including horses in Mughal India, dogs in Ottoman Cairo, and sheep in late nineteenth-century New Zealand.<sup>107</sup> The understanding of nonhuman empire that informs existing case studies is that of animals as an un-ignorable presence within the imperial domain and as one of its integral co-constitutive components. The proposition that nonhumans created their own, peculiar forms of empire is not part of this thinking. Moreover, the imperial setting is self-evidently extra-European. Interwar Britain’s muskrat represents nonhuman empire with a twist, challenging this customary distinction between nonhumans in empire-possessing Europe and nonhumans in extra-European, colonial contexts by examining how a creature from a formerly colonized region—North America—operated deep within the rural heartland of the era’s leading imperial force.

The muskrat’s rise and fall in Britain not only complicates these newer notions of creatures of empire and nonhuman empire, but it also rejuvenates the time-honored and closely related subjects of the frontier and *Lebensraum*. Additionally, the muskrat’s British story enriches our understanding of the multifaceted American “invasion” of Britain before the so-called “friendly invasion” of 1.5 million US troops during the Second World War.

Many Britons thought the muskrat empire was built to last. Three years after the first escapes, Hinton and Read had concluded that eradication “is not likely to be seen by anybody now living.” In March 1933, a journalist made the prognosis that its presence in the British countryside was “probably eternal.” “More than a pitchfork” would be required “to drive them out.”<sup>108</sup> As it turned out, steel rods, two Bavarians, the right kind of trap, a small army of trappers, and approximately twenty-seven thousand pounds Sterling of taxpayers’ money were what was required to decolonize the British countryside.<sup>109</sup>

Thirty years after muskrats were wiped out, as a new wave of animal-inspired anxiety occasioned by the mink’s exploits spread across rural Britain, a nature columnist recalled that in the mid-1930s muskrats had been “much in the news.” Yet “the muskrat scare” was now largely forgotten.<sup>110</sup> Mental erasure complements physical obliteration. The muskrat does not even haunt former muskrat country on the signboard of a village pub. And its bodily afterlife consists of a

few museum artifacts. Still, the question persists: without a timely and hard-hitting eradication, would the muskrat have occupied Britain's waterscapes as successfully as the still expanding and seemingly irresistible gray squirrel has colonized its wooded areas (urban and rural)?<sup>111</sup>

It seems unlikely. The muskrat's hold would probably have begun to loosen regardless around 1940. Charles Elton and Mary Nicholson's analysis of fur returns for 1821–1913 in the archive of the Hudson's Bay Company for the Middle West region of Canada indicate that, much like other furbearers, wild muskrat populations experienced ten-year cycles of abundance and scarcity.<sup>112</sup> So muskrat numbers in Britain might have crashed anyway. And even if the ten-year cycle had not applied beyond North America, the benefits that muskrats enjoyed by leaving their foes behind might have been time limited. Back home, the mink constituted its primary predator. Recent experience in central Poland as well as North American predation patterns provide some basis for speculation about the muskrat's future fortunes in Britain if no one had lifted a finger.<sup>113</sup> Had the muskrat still enjoyed a noteworthy presence in the 1960s, when the mink was opening up another new frontier in the old world, predation might have driven numbers down or even finished it off. This would have been a truly bizarre act of inadvertent decolonization, a by-product of the mink's establishment of an American animal empire that has proved much more durable than its prey's. Why? Because this most recent of American animal colonists in Britain possessed an even more potent nonhuman version of the "restless . . . energy" and lack of restraint that Turner identified as fundamental traits of frontier colonizers.<sup>114</sup>

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## Notes

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