

London's Soap Industry and the Development of Global Ghost Acres in the Nineteenth Century

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John Knight won a prize medal at the Great Exhibition in 1851 for his soaps, which included an 'excellent Primrose or Pale-yellow-soap, made with tallow, American rosin, and soda'.¹ In the decades that followed the prize, John Knight's Royal Primrose Soap emerged as one of the United Kingdom's leading laundry soap brands. In 1880, the firm moved down the Thames from Wapping in East London to a significantly larger factory in West Ham's Silvertown district.² The new soap works was capable of producing between two hundred and three hundred tons of soap per week, along with a considerable number of candles, and extracting oil from four hundred tons of cotton seeds.³ To put this quantity of soap into context, the factory could manufacture more soap in a year than the whole of London produced in 1832.⁴ The prize and relocation together represented the industrial and commercial triumph of this nineteenth-century family business. A complimentary article from 1888, argued the firm's success rested on John Knights' commitment 'to make nothing but the very best articles, to sell them at the very lowest possible prices, and on no account to trade beyond his means'.⁵ The publication further explained that before the 1830s, soap 'was dark in colour, and the consumption small' after which Knight 'revolutionized the trade by

¹ Charles Wentworth Dilke, *Exhibition of the Works of Industry of All Nations, 1851: Catalogue of a Collection of Works On, Or Having Reference To, the Exhibition of 1851*, 1852, 614.

² Silvertown was the strip of land located between Victoria Dock and the Thames in the south of West Ham, which became a centre of heavy industry in the late nineteenth century. Jim Clifford, *West Ham and the River Lea: A Social and Environmental History of London's Industrialized Marshland, 1839-1914* (Vancouver: University of British Columbia Press, 2017), 26, 29, 31.

³ *Wyman's Commercial Encyclopædia of Leading Manufacturers of Great Britain* (London: Wyman and Sons, 1888), 449.

⁴ United Kingdom, House of Commons, 'Account of Quantity of Soap made in each Town in Great Britain; Soap exported and imported from Great Britain and Ireland, 1832,' Nineteenth Century House of Commons Sessional Papers, 1833, ProQuest UK Parliamentary Papers (1833-014621): 3.

⁵ *Wyman's Commercial Encyclopædia*, 449.

manufacturing a pale yellow soap of the finest quality... and ever since that time 'John Knight's Primrose Soap' has been a household word wherever soap is used.'⁶ Industrial innovation and honesty, in this account, set Knight ahead of the competition.

Knight, the son of a farmer, entered the soap manufacturing trade at a fortuitous point in 1834.⁷ Technological advancements allowed Knight and other large-scale soap producers to make increasing quantities of high-quality soap. They serviced an expanding market in a society that began to equate cleanliness with advances in their 'civilization'.⁸ The jurors of the 1851 World Exhibition, argued that soap consumption was the key measure of human progress: 'The quantity of soap consumed by a nation would be no inaccurate measure whereby to estimate its wealth and civilization,' and when looking at 'two countries with an equal amount of population, we may declare with positive certainty that the wealthiest and most highly civilized is that which consumes the greatest weight of soap'.⁹ Of course, by this logic, the jurors argued the British were the most civilized people. Soap makers in England, Scotland and Wales, produced 203,420,826 pounds of soap in 1850. By subtracting the exports and soap used in by industry, the authors calculated that the British used eight pounds one ounce of soap, per person, per year. This pinnacle of 'civilization' came before the end of

⁶ *Wyman's Commercial Encyclopædia*, 448.

⁷ The Unilever Archive suggests Knight founded the business in 1817. *The Wyman's Commercial Encyclopedia* confirms he 'established himself in the year 1834 as a soap and candle maker, and oil merchant' in Wapping. Given the encyclopedia's extensive knowledge of the operations of the business, it seems likely they interviewed Knight's sons or grandsons and probably had the correct information. "John Knight Limited," Unilever Art, Archives & Records Management, accessed July 26, 2018, <http://unilever-archives.com/Record.aspx?src=CalmView.Catalog&id=GB1752.LBL%2FJK&action=983e26e4>; *Wyman's Commercial Encyclopædia*, 448.

⁸ Dilke, *Exhibition of the Works of Industry of All Nations, 1851*, 605; Anne McClintock, *Imperial Leather: Race, Gender, and Sexuality in the Colonial Contest* (Routledge, 1995), 207.

⁹ Brian Lewis, *So Clean: Lord Leverhulme, Soap and Civilization* (Manchester University Press, 2008); Dilke, *Exhibition of the Works of Industry of All Nations, 1851*, 605.

the excise tax in 1853 and the new advertising campaigns that helped create an even larger mass market for soap in the second half of the nineteenth century.¹⁰

Growing consumer demand, technological progress, and business acumen helped explain the success of Knight's Primrose brand, but this emphasis concealed another crucial factor in its growth between the 1830s and the 1880s. Knight, his sons and grandsons, relied on an expanding global trade network that brought tallow, rosin, and cotton seeds to their factories in Wapping and Silvertown. Domestic sources of tallow, the fat used to make soap at the start of the nineteenth century, were already insufficient to meet the demands of the industry.¹¹ Increasing domestic tallow production would have required significantly more pasture at the expense of the grain supply. To sustain growth, the British soap industry required coal and new global supplies of raw materials to abolish the 'land constraint'. At the turn of the nineteenth century, Britain's leading economists held pessimistic views about the future of economic growth as they believed the finite supply of land, which limited the production of most pre-industrial commodities, would lead to economic stagnation.¹² Global trade and an abundant supply of coal meant John Knight & Sons, A. & F. Pears, Joseph Crosfield & Sons, the Lever Brothers, and other large nineteenth-century British soap makers

¹⁰ McClintock, *Imperial Leather*, 210.

¹¹ There are no good long-running records of the domestic supply of tallow. Members of Parliament debating an increase in the duty on tallow claim domestic production was 70,000 imperial tons in 1822 and then 100,000 tons in 1836. In 1924, Bolton and Pelly referenced an estimate that the United Kingdom produced about 100,000 tons in 1900. Given the relative stability of the sheep and cattle herds from 1867-1900, domestic tallow production remaining at about 100,000 tons is plausible. 'Motion Respecting the Duties on Tallow and Candles,' (Hansard, March 20, 1822), vol. 6, cc1206-15, <https://api.parliament.uk/historic-hansard/commons/1822/mar/20/motion-respecting-tue-duties-on-tallow>; 'Excise Duty on Soap,' (Hansard, March 15, 1836), vol. 32, cc361-82, <https://api.parliament.uk/historic-hansard/commons/1836/mar/15/excise-duty-on-soap>; B. R. Mitchell, *British Historical Statistics* (Cambridge: Cambridge University Press, 1988), 202–6; Richard Bolton and Russell Pelly, *Oils, Fats, Waxes, and Resins*, vol. IX, The Resources of the Empire Series (London: Ernest Benn Limited, 1924), 100.

¹² Edward Anthony Wrigley, *Energy and the English Industrial Revolution* (Cambridge; New York: Cambridge University Press, 2010), 10–13; Dimitrios Theodoridis, Paul Warde, and Astrid Kander, "Trade and Overcoming Land Constraints in British Industrialization: An Empirical Assessment," *Journal of Global History* 13, no. 3 (November 2018): 329, <https://doi.org/10.1017/S1740022818000189>.

did not face ecological limits on the growth of their businesses.¹³ They were not constrained by the quantities of fat supplied by the cattle and sheep raised in British pastures or local firewood to supply fuel for the heat-intensive process. Instead, they developed an ecological dependency on overseas “ghost acres” and British coal mines.¹⁴

Georg Borgström first introduced “ghost acreage” in 1953 as the amount of foreign land required to supply a nation with imported raw materials.¹⁵ Kenneth Pomeranz expanded on Borgström and Eric Jones, arguing ghost acres in the Americas played an essential role, along with coal, in allowing the British economy to break free from the land constraint that limited economic growth in other advanced economies including Holland and the Yangtze Delta region in China.¹⁶ Building on Pomeranz, it makes sense to think of ghost acres as the domestic land the British did not need to convert to a particular form of production to supply an expanding industry. Overseas trade meant the British soap industry could grow without the country adding millions of animals to the domestic herd of sheep and cattle and converting much of the cultivated land to pasture to meet this growing demand. In soap

¹³ Kenneth Pomeranz, *The Great Divergence: China, Europe, and the Making of the Modern World Economy.*, Revised (Princeton University Press, 2001); Wrigley, *Energy and the English Industrial Revolution*; Edward Anthony Wrigley, “The Quest for the Industrial Revolution,” in *Proceedings of the British Academy, Volume 121, 2002 Lectures* (Oxford University Press, 2003), 147–70; Jawad Daheur, “La Sylviculture Allemande et Ses «hectares Fantômes» Au Tournant Des XIXe et XXe Siècles,” *Histoire et Territoires*, 2017; Paul Warde, “Trees, Trade and Textiles: Potash Imports and Ecological Dependency in British Industry, c.1550–1770,” *Past & Present* 240, no. 1 (August 1, 2018): 47–82; Theodoridis, Warde, and Kander, “Trade and Overcoming Land Constraints in British Industrialization”; Edward B. Barbier, *Scarcity and Frontiers: How Economies Have Developed Through Natural Resource Exploitation* (Cambridge: Cambridge University Press, 2011).

¹⁴ Warde, “Trees, Trade and Textiles,” 76.

¹⁵ Georg Borgström, “Ghost Acreage,” in *The Future of Nature: Documents of Global Change*, ed. Libby Robin, Sverker Sorlin, and Paul Warde (NewHaven: Yale University Press, 2013), 40–50.

¹⁶ Pomeranz, *The Great Divergence*, 264–97; E. L. Jones, *The European Miracle: Environments, Economies, and Geopolitics in the History of Europe and Asia*, 3rd ed (Cambridge: Cambridge University Press, 2003), 70–84. Rolf Peter Sieferle outlined a similar idea without using Borgström’s phrase in the early 1980s (translated to English and revised with references to Jones in 2001) *The Subterranean Forest*, trans. Michael Osmann, 2nd revised (Cambridge: White Horse Press, 2010), 95–98. Pomeranz does not cite Sieferle.

manufacturing and many other nineteenth-century industries, trade and coal eliminated the local ecological limits on industrial growth.

Pomerantz's central argument that British industrialization required commodities from overseas ghost acres to allow industries to grow beyond the local supply raises interesting questions about how the global supply of crucial raw materials developed and what local ecological consequences resulted from supplying these commodities.¹⁷ These questions are equally applicable to understanding rapid industrial growth in the mid-nineteenth century as they are for Pomerantz work on the start of industrialization and the great divergence between the English and Yangzi Delta economies at the end of the eighteenth century. Researching the rapid industrialization that started in the 1830s, also demands we look beyond Pomerantz's focus on sugar, cotton, and timber from the Caribbean and eastern North America to the growing array of global commodities that British industry required.

Animals were a significant source of fats for human consumption and industry. Wild animals, most notably whales and seals, were harvested for their blubber, while tallow and lard were a by-product of domestic animals bred for wool, milk and meat. Tallow, or fat processed from sheep and cattle, remained a significant source of industrial fat throughout the nineteenth century, with only cotton seeds challenging its dominance at the turn of the twentieth century.¹⁸ Some animal fat came from the local market. Cows and sheep both have suet, a hard cluster of fats found around the loins and kidneys, which was diverted by London's butchers to soap boilers and candle makers. Households would also keep unused

¹⁷ Pomerantz, *The Great Divergence*, 264–97; James Beattie, Edward Melillo, and Emily O'Gorman, *Eco-Cultural Networks and the British Empire: New Views on Environmental History* (Bloomsbury Publishing, 2014), 11.

¹⁸ Cottonseeds ranged from 16 to 20 percent oil, so the cotton-seed oil produced from the 437,140 tons imported in 1901 was probably slightly less than the 89,266 tons of tallow imported; but, the domestic cattle industry supplied another 100,000 tons of tallow, so tallow remained the most important industrial fat. 'British Imports Database,' William Theodore Brannt, *A Practical Treatise on Animal and Vegetable Fats and Oils* (London: Sampson Low, Marston, Searle & Rivington, 1888), 23.

animal fat separate to sell to waste collectors, who in turn sold it to soap and candle makers. Oversea tallow was processed by heating suet and other fatty tissue from sheep or cows to separate the fat from membranes and other impurities, and significantly slowed the process of decomposition. The long-distance trade in ungulate fats long predated the shipment of meat, as fats could be more easily preserved. In general, tallow still turned rancid, making it unfit for consumption, but suitable for making soap, candles, and lubricants.¹⁹

The history of tallow connects the production and consumption of soap in Greater London with the many millions of animals raised and slaughtered to meet the expanding demand for industrial fats during the nineteenth century. However, distance and commodification obscured the connections between the bars of soap consumed in British homes and the deaths of these animals.²⁰ Two stages of commodification transformed sheep and cattle fat into tallow and then into soap, created a significant disconnect between the final product and the animal bodies. The pastoralist, butchers, boilers, traders and soap makers probably took a typical European “instrumental view of animals”, but the sources consulted rarely provide much insight into what, if anything, the humans involved in this commodity chain thought about the sheep and cattle killed to make tallow.²¹ The long history of domesticating undulates to supply meat, fibre, skins and fat, and of their transfer from Europe to grasslands the world over, made the diversification of Britain’s tallow supply possible, but this history and the animals themselves, remained obscure after the boilers rendered the tallow from their bodies.²² The autonomous actions of animals are equally difficult to draw

¹⁹ Charles G. Warnford Lock, ed., *Spons’ Encyclopædia of the Industrial Arts, Manufactures, and Raw Commercial Products*, vol. 2 (London: E. & F.N. Spon, 1882), 1372–73.

²⁰ Edward W. Soja, *Postmodern Geographies: The Reassertion of Space in Critical Social Theory* (Verso, 1989), 22–23.

²¹ Richard White, “Animals and Enterprise,” in *The Oxford History of the American West*, ed. Clyde A. Milner, Carol A. O’Connor, and Martha A. Sandweiss (Oxford: Oxford University Press, 1994), 238.

²² Brett Walker describes the moment when wolves become intimate with humans visible in history. The ubiquity of sheep and cattle and the commodification of their fat made them largely culturally invisible as some as we move past the sheep station. Brett Walker, “Animals and the Intimacy of History,” in *The Oxford Handbook of Environmental History*,

out of the sources.²³ Frontier sheep and cattle reproduced with limited intervention from humans and in some cases their short-term success contributed to an overstocking crisis that resulted in a flood of tallow shipped British ports. Sources focused on the tallow and soap trade do not record the history of resistance and escape that must have frustrated shepherds and cowboys on the open plains of the Eurasian steppe, Great Plains and Pampas.

Commodification, distance and the scale of tallow imports during the nineteenth century make it difficult to meet the call of Harriet Ritvo to look beyond statistics to examine individual or small groups of sheep and cattle. The statistics still make it clear that soap makers like John Knight relied on an increasingly expansive commodity web that connected them with millions of animals located around the world.²⁴

Following commodities through the nineteenth century and trying to understand the environmental, economic and social factors that caused different regions of the world to supply these raw materials provides new insight to the relationship between industrialization, early globalization and distant interactions ‘among coupled human and natural systems’.²⁵ As Josh MacFadyen argues, historians need to examine how “agricultural commodities expanded

ed. Andrew Christian Isenberg (Oxford University Press, 2014), 53, 65–69; Alfred W. Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900-1900* (Cambridge: Cambridge University Press, 2004), 171–94.

²³ Joshua Specht, ““Animal History after Its Triumph: Unexpected Animals, Evolutionary Approaches, and the Animal Lens,”” *History Compass* 14, no. 7 (2016): 331, <https://doi.org/10.1111/hic3.12322>; Karen R. Jones, “Restor(y)ing the ‘Fierce Green Fire’: Animal Agency, Wolf Conservation and Environmental Memory in Yellowstone National Park,” *British Journal for the History of Science* 2 (April 10, 2017): 153–54.

²⁴ Harriet Ritvo, “Animal Planet,” *Environmental History* 9, no. 2 (2004): 205, <https://doi.org/10.2307/3986084>.

²⁵ Sustainability researchers have introduced the term telecoupling to describe this kind of long distant interconnections between human and ecological systems. Jianguo Liu et al., “Framing Sustainability in a Telecoupled World,” *Ecology and Society* 18, no. 2 (June 17, 2013): 3, <https://doi.org/10.5751/ES-05873-180226>. Historians have been studying this kind of relationship through global environmental and commodities histories. Gregory T. Cushman, *Guano and the Opening of the Pacific World: A Global Ecological History* (Cambridge University Press, 2013); Stuart McCook, “Global Rust Belt: Hemileia Vastatrix and the Ecological Integration of World Coffee Production Since 1850,” *Journal of Global History* 1, no. 02 (2006): 177–95; Rebecca J. H. Woods, *The Herds Shot Round the World: Native Breeds and the British Empire, 1800–1900* (Chapel Hill: The University of North Carolina Press, 2017); Warde, “Trees, Trade and Textiles.”

from local supply chains to interregional and global exchanges,” which he believes are better thought of as commodity webs instead of linear chains, as a means to contribute to the interdisciplinary research on telecoupling and commodity frontiers.²⁶ This paper seeks to understand why the tallow supply shifted from the Eurasian steppe in the early decades of the nineteenth century to pastoral frontiers in Alfred Crosby’s neo-Europes in North and South America and Australasia during the second half of the nineteenth century.²⁷ Focused attention on Russian decline in the 1860s and a surge of tallow exports from Australia in the 1890s demonstrate that market demand in London and Liverpool did not alone drive the rise and fall of different tallow supplying regions. Local economic, climatic and ecological factors in Russia and New South Wales and competition between different tallow producing grassland regions influenced the boom and bust cycles in the British tallow market. “Eco-cultural networks” interlinked rinderpest, droughts and rabbits with wars, financial panics, and new technologies to influence tallow production and export.²⁸

This paper relies on a database of official British import statistics to trace the growth of the soap industry’s ‘ghost acres’ during the nineteenth century, with a particular focus on the tallow supply.²⁹ The database includes the source locations, normally abstracted to the

²⁶ Joshua MacFadyen, *Flax Americana: A History of the Fibre and Oil That Covered a Continent* (Montreal: McGill-Queen’s Press, 2018), 16–18.

²⁷ Crosby, *Ecological Imperialism*; William Beinart and Lotte Hughes, *Environment and Empire*, 1st ed. (Oxford: Oxford University Press, 2007), 2.

²⁸ James Beattie, Edward Melillo, and Emily O’Gorman, “Rethinking the British Empire through Eco-Cultural Networks: Materialist-Cultural Environmental History, Relational Connections and Agency,” *Environment and History* 20, no. 4 (November 1, 2014): 573–74, <https://doi.org/10.3197/096734014X14091313617406>.

²⁹ The research database of British Imports (hereafter ‘British Imports Database’) is compiled from a number of sources. 1800 is from ‘Ledgers of Imports Under Articles, 1800’, Boards of Customs, Excise, and Customs and Excise, and HM Revenue and Customs, CUST 5/1B, British National Archives; 1802-1821 are from United Kingdom, House of Commons, ‘Account of Quantity of Tallow imported into Great Britain, 1800-24,’ Nineteenth Century House of Commons Sessional Papers, 1825, ProQuest UK Parliamentary Papers (1825-009633): 2-5; 1827-1828 are from United Kingdom, House of Commons, ‘Account of Quantity of Tallow, Flax, Hemp, Hides and Seeds imported, 1826-27,’ Nineteenth Century House of Commons Sessional Papers, 1828, ProQuest UK Parliamentary Papers (1828-011166): 10; 1831-1844 are from ‘Tables of Trade of United Kingdom with Foreign Countries and British Possessions, 1831-40’ and ‘Return of Quantities of Tallow, Palm Oil,

national or colony level, the quantities and in most cases, the value. The method is not to compute the number of overseas acres needed to supply John Knight & Sons or the whole of the soap industry a given year. While it is possible to roughly estimate that Britain would have needed to convert 3.4 million acres, or ten percent of England's total area, to pasture to supply all the imported tallow in 1901, all this tells us is the British were operating far beyond the domestic land constraint.³⁰ Tallow's contribution was relatively insignificant compared with the more than one hundred million net ghost acres calculated for British imports in the early twentieth century.³¹ Cattle and sheep ranged dramatically in size and they required different quantities of land depending on the local ecology and even the rainfall in a given year, making it impossible to estimate the actual overseas acres needed to support all the animals that supplied the tallow. This kind of calculation is further complicated when tallow is a by-product of wool or meat production. Instead of focusing on quantifying ghost acres, this paper starts with the British trade statistics to identify the changing geography and scale of the tallow trade. It then turns to qualitative material and a version of the "following methodology" deployed by Gregory Cushman to trace the tallow supply around the world, and develop a better understanding of how the trade that created the ghost acres developed and in some cases collapsed during the nineteenth century.³² The result is a multi-sited and multi-scale analysis that links local histories situated in East London, Orenburg, and Bourke

Hemp, Flax, Hides, Skins and Sheep's Wool imported into United Kingdom, 1844-53'; and the 1853 to 1901 data are from a series of documents in the Nineteenth Century and Twentieth Century House of Commons Sessional Papers, with titles that begin with 'Annual Statement of the Trade and Navigation of the United Kingdom' until 1870 and the 'Annual Statement of Trade of United Kingdom' through to the twentieth century. They were all accessed through the ProQuest UK Parliamentary Papers.

³⁰ 199,955,840 lbs of tallow equals roughly 1723757.24 oxen which require about 2 acres each. Five sheep produce about the same amount of tallow as one oxen and require about the same amount of pasture. Dimitrios Theodoridis, "The Ecological Footprint of Early-Modern Commodities Coefficients of Land Use per Unit of Product," *Göteborg Papers in Economic History*, no. 21 (February 2017): 25–26, 32–33.

³¹ Thodoridis, Warde and Kander estimate 127 to 187 million net ghost acres in 1906, which they calculate by estimating the ghost acres from imports minus the ghost acres from exports (i.e. cotton or wool cloth). "Trade and Overcoming Land Constraints in British Industrialization," 345.

³² Cushman, *Guano and the Opening of the Pacific World*, xiii.

(New South Wales) with trade statistics recorded at the national level that together provide insight into tallow production and exchange at a global scale.³³ John Knight & Sons became dependent on a global network of grassland ecosystems and pastoral economies spread across Europe, Asia, the Americas and Australasia.

From 1834 through to the prize in 1851, Knight's primrose soap was made predominantly with animal fat from local butchers and Russian tallow sourced from the Eurasian steppe.³⁴ As the increased cultural value of cleanliness created a growing demand for soap in the British markets in the decades that followed, the interplay between environmental, agricultural and economic factors led to an increasingly diversified supply network.³⁵ Tallow from neo-European settler colonies, including Argentina, Uruguay, the United States, Australia, and New Zealand replaced Russian tallow. British soap makers showed little imperial preference for tallow from the formal empire and landscapes capable of supporting large herds of ungulates emerged as major supplies of this ubiquitous industrial fat. Ecological and economic dynamics created considerable instability in the sources of raw materials, but globalization allowed the soap producers to thrive. Following the tallow back to the source makes it clear that John Knight and the other large soap producers along the Thames and Mersey contributed to the transformed landscapes and colonial dispossession in numerous different regions of the world. Industrial demand for tallow during the long-

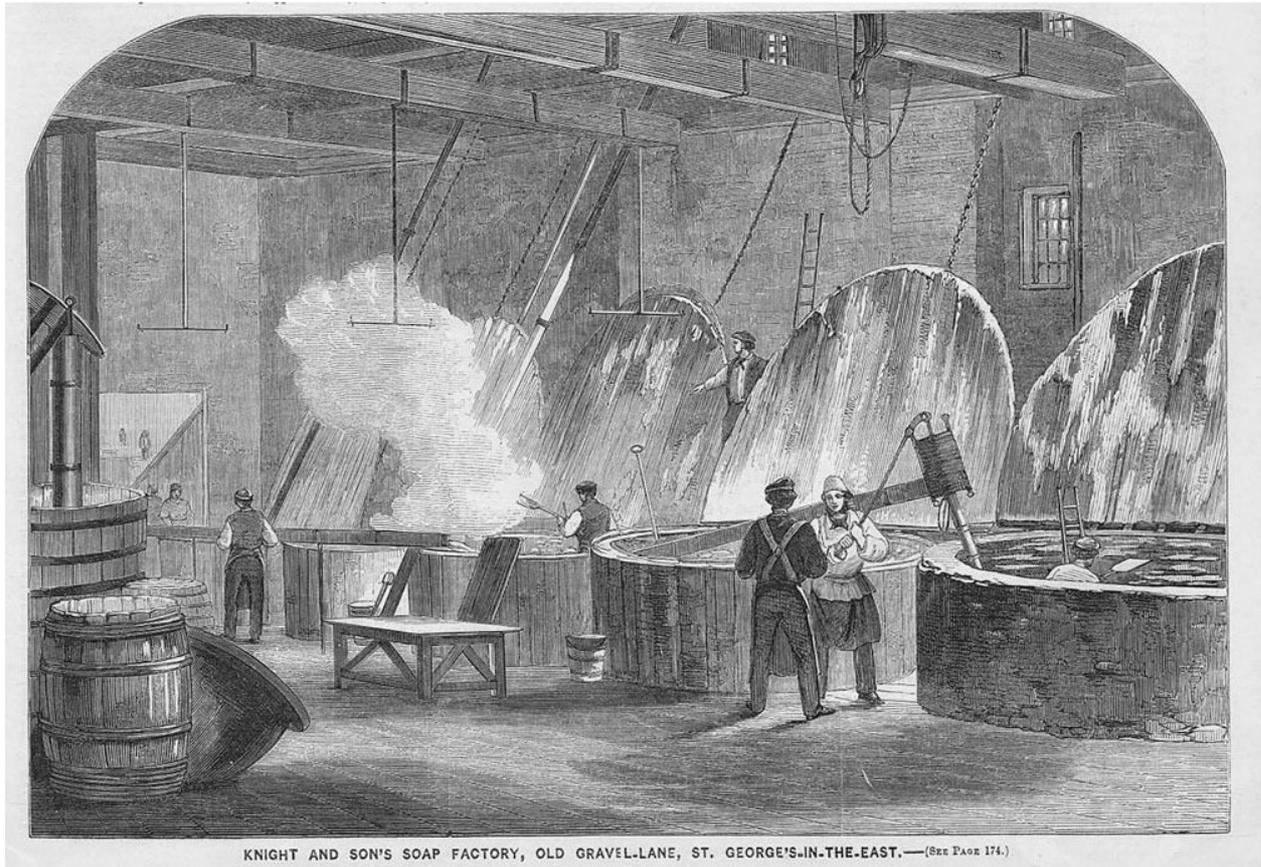
³³ Cushman's Guano book is an exceptional model of layering multiple scales of analysis and "multi-sited" analysis. Beattie, Melillo and O'Gorman make the case for looking beyond national or regional scales to consider "multi-sited, large-scale exchanges of ideas and biota". This builds on some earlier work by geographers and ethnographers who proposed translocal and multi-sited approaches. Cushman, *Guano and the Opening of the Pacific World*; Beattie, Melillo, and O'Gorman, "Rethinking the British Empire through Eco-Cultural Networks," 570; David Matless and Laura Cameron, "Translocal Ecologies: The Norfolk Broads, the 'Natural,' and the International Phytogeographical Excursion, 1911.," *Journal of the History of Biology* 44, no. 1 (2011): 15–41; George E. Marcus, "Ethnography in/of the World System: The Emergence of Multi-Sited Ethnography," *Annual Review of Anthropology* 24 (January 1, 1995): 95–117.

³⁴ We do not have ledgers from the company, so we intuit this from the tallow that was available in the London market. 'British Imports Database.'

³⁵ Beattie, Melillo, and O'Gorman, "Rethinking the British Empire through Eco-Cultural Networks," 566–69.

nineteenth century helped ushered in a new age of globally connected ecological and economic systems.

Greater London's Soap Industry:



[Possible additional image. I'm not sure if I'm already past my limit? I found this print of the Wapping Factory from 1859 from the *Illustrated News of the World*.]

The soap industry predates the advent of steam engines and large-scale factory production. London was a significant centre of soap production before the nineteenth century, as the capital's population supplied both a large market and a large quantity of refuse animal fats. London was also the site of early technological advances, including Andrew Pears 1807 invention of translucent soap in a small workshop near Oxford Street.³⁶ Soap makers continued to innovate, and they transformed from small-scale workshops to large-scale industry during the nineteenth century. Soap production in England rose from 28,536 tons in

³⁶ Francis Pears, *The Skin, Baths, Bathing, and Soap* (London: Self-published, 1859), iv.

1810 to 77,513 tons in 1851.³⁷ The government removed the tax on soap in 1853, which lowered its price, increased the market and led to further growth in the soap industry. Unfortunately, it also meant they stopped recording the quantity of soap produced each year.

There were two methods for making soap during the mid-nineteenth century: the smaller scale cold-process and the more difficult large-boiler-process. The cold-process was less efficient, due to the smaller workshop scale, and it produces a lower quality soap. This soap retained its glycerine, and because it was ‘difficult to obtain an exact neutralization of the fat or alkali, one or the other’ often remained in excess, reducing the quality of the lather.³⁸ The large-boiler-method allowed soap makers to boil hundreds of tons of fats at one time, significantly increasing the scale of production. In 1888, the Joseph Crosfield & Sons soap factory in Warrington, near Liverpool, had twenty-three boilers and in ‘any one of the pans more than a hundred tons of the boiling preparation’ were ‘worked by a single ‘hand’’.³⁹ As mentioned above, the new John Knight & Co. factory in Silvertown, completed in 1880, could produce up to three hundred tons per week.⁴⁰ The fire insurance plan (*figure 1*) records sixteen boilers in the factory.

³⁷ United Kingdom, House of Commons, ‘Account of Quantities of Hard and Soft Soap made in England, 1810-22,’ Nineteenth Century House of Commons Sessional Papers, 1823, ProQuest UK Parliamentary Papers (1823-008457): 1; United Kingdom, House of Commons, ‘Account of Quantity of Soap made in each Town in Great Britain; Soap exported and imported from Great Britain and Ireland, 1851,’ Nineteenth Century House of Commons Sessional Papers, 1852, ProQuest UK Parliamentary Papers (1852-028670): 1;

³⁸ Dilke, *Exhibition of the Works of Industry of All Nations, 1851*, 607.

³⁹ *Wyman’s Commercial Encyclopædia*, 445.

⁴⁰ *Wyman’s Commercial Encyclopædia*, 449.

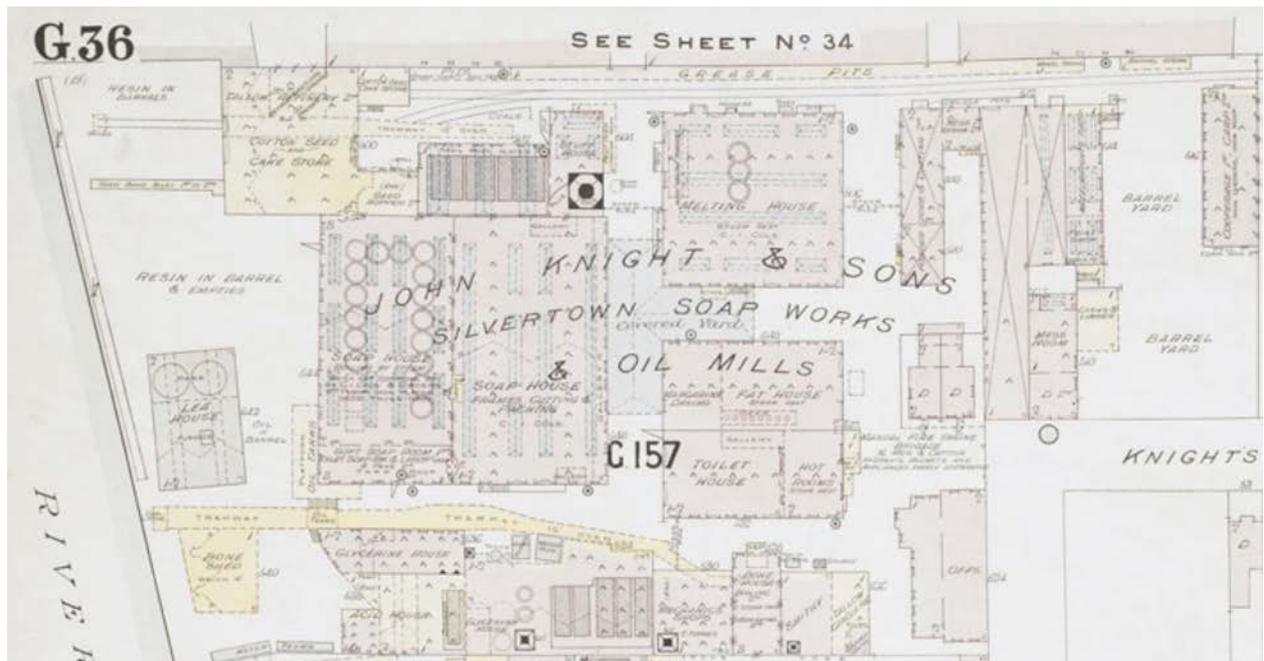


Figure 1: Chas E Goad Limited, Insurance Plan of London East District Vol. G: sheet 36-1
 Source: Fire insurance plans and maps, British Library,
<http://www.bl.uk/onlinegallery/onlineex/firemaps/england/london/dtog/mapsu145ubu23uguf036ru1.html>

Fats, heated by steam, were treated with successive batches of lye until they achieved complete soapification. During the 1850s, it took between six and seven days.⁴¹ The large-boiler-process could use extra lye and remove it at the end, producing a more chemically balanced soap. This process also extracted the glycerine out of the soap, a new by-product with significant strategic importance, as it was used to produce high-explosives and smokeless gunpowder.⁴² The resulting soaps were pale in colour, more useful for cleaning, and they even claimed to lighten ‘the toil of the user’, as they made ‘the clothes cleaner and save its own cost to the purchaser’ as there was no need add soda to the laundry.⁴³ Over time the large-boiler-method the soap manufacturers like John Knight & Sons, Wilkie & Soames, and A. & F. Pears, and their counterparts on the Mersey, dominated soap boiling in England. By the end of the nineteenth century, large soap factories were all located on major rivers,

⁴¹ Pears, *The Skin, Baths, Bathing, and Soap*, 83.

⁴² Dilke, *Exhibition of the Works of Industry of All Nations, 1851*, 607.

⁴³ *Wyman’s Commercial Encyclopædia*, 447.

reducing the cost of transporting large quantities of coal, fat and other raw materials. Britain supplied the fuel, caustic soda and some of the animal fat, but the rest arrived by boat from around the world.

British Tallow Imports, 1800-1864:

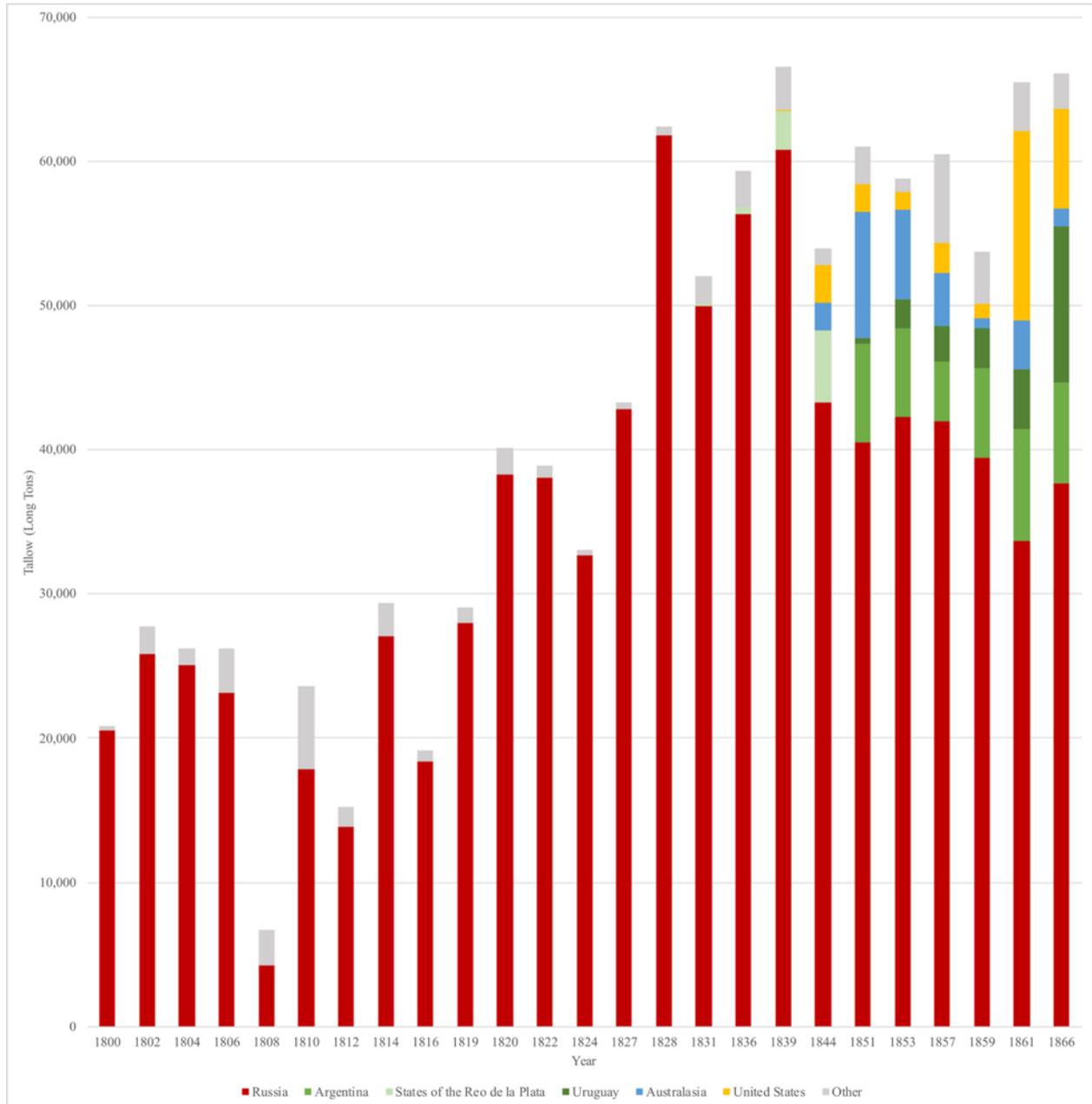


Figure 2: British Tallow Imports, 1800-1866 Source: ‘British Imports Database.’

Britain imported 20,796 long tons of tallow and 13,236 tuns of train oil (whale blubber) in 1800.⁴⁴ These two industrial fats stood alongside flax, hemp, cotton and iron bars as the primary industrial raw materials imported in large quantities at the start of the nineteenth century.⁴⁵ Most other British imports were high-value commodities such as thrown silk, cochineal, indigo, coffee, and rhubarb. Long-distance trade before the nineteenth century generally focused on compact and expensive products, labelled ‘preciosities’ by the world-systems theorist Immanuel Wallerstein, such as silver, furs, and spices.⁴⁶ This trend was not universal as the Romans relied on a relatively long-distance timber trade in the Mediterranean and the Dutch were already importing wood from the Baltic region during the sixteenth century.⁴⁷ The market for sugar developed during the eighteenth century as the price dropped and it transitioned from a preciousness to a mass market commodity; it was the single largest British import in 1800.⁴⁸ Tallow was another early example of long-distance trade in a lower value bulky commodity.

The early long-distance tallow trade developed between Russia and Western European centres, including Amsterdam and London. Muskavoy was already exporting tallow to England by the early seventeenth century, and this trade grew considerably by the eighteenth century.⁴⁹ In the year 1800, Russia exported 20,513 tons of tallow to the United

⁴⁴ This paper uses Imperial long tons which are equal to 2240 pounds. Tuns is a volume of whale oil that roughly equals a ton.

⁴⁵ ‘Ledgers of Imports Under Articles, 1800’, Boards of Customs, Excise, and Customs and Excise, and HM Revenue and Customs, CUST 5/1B, British National Archives.

⁴⁶ Immanuel Wallerstein, *The Modern World-System I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century* (Berkeley: University of California Press, 2011), 41–42; Alf Hornborg, John Robert McNeill, and Juan Martínez Alier, *Rethinking Environmental History: World-System History and Global Environmental Change* (Rowman Altamira, 2007), 5.

⁴⁷ Michael Williams, *Deforesting the Earth: From Prehistory to Global Crisis* (University of Chicago Press, 2003), 77; J. W Moore, “‘Amsterdam Is Standing on Norway’ Part II: The Global North Atlantic in the Ecological Revolution of the Long Seventeenth Century,” *Journal of Agrarian Change* 10, no. 2 (2010): 188–227.

⁴⁸ ‘Ledgers of Imports Under Articles, 1800’

⁴⁹ Jarmo Kotilaine, *Russia’s Foreign Trade and Economic Expansion in the Seventeenth Century: Windows on the World* (Leiden: Brill Academic Publishers, 2005), 255, 265.

Kingdom, and this amounted to 98.5 percent of the total tallow imports. Ireland was a distant second with 140 tons and the whole of the Americas only contributed 27 tons. This Russian-Britain tallow trade was a remarkable early case of large quantities of a bulky raw material travelling thousands of kilometres over land and sea, long before soap and candle makers fully industrialized and adopted the large-scale factory system in the nineteenth century. It is hard to imagine the growth of these industries without this elastic source of overseas fat.

The tallow supply extended to the frontier of the Russian Empire. Nomadic shepherders from the steppe brought their animal to markets and rendering facilities a few miles outside of Orenburg. In 1810, Thomas Mortimer published a description of the trade: ‘Tallow, which is an important branch of Russian commerce, is brought from Kalumna and Tula, small towns in the government of Moscow, but the greatest part comes from Orenburg.’⁵⁰ Mortimer explained that the animals brought to Orenburg were raised for raw materials, not for food: ‘This town is bordering upon a country inhabited by several hordes of wandering people, who rear large flocks of sheep, the flesh of which they set no value upon, regarding only the skins, tails, and tallow, as capable of yielding them a profit.’⁵¹ Thousands of tons of tallow were shipped overland from the steppe to Archangel and St. Petersburg before being sent to Western Europe.⁵² The growth of Russian tallow exports recorded in the British trade statistics in *figure 2* confirms that the value of tallow and hides were incentive enough to expand a long distance supply chain between Western Europe and Orenburg, decades before the railway reached this region of the Russian Empire in the 1880s.

The Russian tallow exports to Britain increased to between forty and sixty thousand tons between 1827 and 1839 (see *figure 2*). Even with this significant growth, the Russian share of

⁵⁰ Thomas Mortimer, “Europe - Russia - Productions,” in *A General Dictionary of Commerce, Trade, and Manufactures: Exhibiting Their Present State in Every Part of the World; and Carefully Compiled from the Latest and Best Authorities* (London: R. Phillips, 1810).

⁵¹ Mortimer.

⁵² Mortimer.

the total marked began to slip in the late 1830s. In 1839, they contributed 91 percent of Britain's total imports. Argentina and Uruguay were together the second major source with 2,781 tons, up from 135 in 1831. The United States, who emerged as major exporters in the second half of the nineteenth century, only sent 45 tons and Britain's settler colonies remained minor exporters. In 1851, the year John Knight won a prize for his high-quality tallow and rosin soap, Russian tallow exports to Britain dropped to 40,522 tons, and their share of British imports fell to 66 percent. Knight and Sons might have sourced some of their supply from Argentina and Australia, which contributed 11 and 14 percent as they emerged as major competitors. The United States sent 1,954 tons and made up 4 percent of the total. The diversifying supply network helped offset the disruption of the Crimean War in the mid-1850s, and this spurred further investment in the tallow industry in the Americas and Australia, which in turn helped drive prices down in the second half of the century.⁵³

Robert Sears, an American author and publisher, described Russia tallow industry in 1854 during the final decade of their dominance in the British market. He explained cattle herds raised on the steppe supplied both Moscow and St. Petersburg with the vast majority of their beef. Sears claimed these same herds provided the rest of the world with one hundred and fifty thousand tons of tallow each year.⁵⁴ This number might be a little high, but as mentioned above, United Kingdom alone imported 40,522 long tons in 1851. Sears compared the steppe to the American Great Plains and explained that they 'extend from the borders of Hungary to those of China. They constitute an almost uninterrupted plain, covered in spring and autumn by a luxuriant herbage; in winter by drifting snows, heaped up in some places, and leaving the ground bare in other; and in summer by clouds of dust so excessively fine,

⁵³ United Kingdom, House of Commons, Thomas Mitchell, 'Report by Attaché to H.M. Embassy at St. Petersburg on State of Trade between Great Britain and Russia,' Nineteenth Century House of Commons Sessional Papers, 1868, ProQuest UK Parliamentary Papers (1866-042725): 1.

⁵⁴ Robert Sears, *An Illustrated Description of the Russian Empire*, 2nd ed. (New York: Robert Sears, 1856), 242.

that even on the calmest day they hang suspended in the air.⁵⁵ On the steppe, cattle herders kept from one to eight hundred oxen and sold their animals to ‘the commissioners of the St. Petersburg and Moscow cattle-dealers, or the great tallow-boiling establishments.’⁵⁶ Sears explains that tallow exports from the steppe were an ancient trade and that at the time ‘the larger tallow-manufactories’ were ‘in the hands of the natives of Great Russia’ who had ‘establishments in all parts of the steppe’.⁵⁷

Sears confirms Mortimer claim that many of the cattle were raised and slaughtered only for their tallow and hides. He described the tallow melting *sagans* in great detail: ‘There are large shambles in which to slaughter the oxen, and houses containing enormous boilers, in which to boil down their meat.’ A *sagan* generally had four to six boilers, and each one could hold between ten and fifteen oxen. The butchering process was brutal, small groups of animals were brought down with axes, killed and then stripped of their skins and chopped into pieces. The leanest cuts of meat were sold cheaply for human consumption, but the majority of the carcasses were boiled down. Pigs ate some of the scraps. As the animals boiled, the fat began to ‘collect at the top’ of the vessels it was ‘skimmed of with large ladles’ and packed into barrels for shipment.⁵⁸

While Sears focused on the *sagans* that processed cattle on the Pontic-Caspian steppe, he also mentioned the continued importance of sheep tallow from the Orenburg region:

The trade with the Kirghiz, and other inhabitants of the interior, is very extensive. It is not, however, carried on within the town, but about two miles from it, to the east of the left bank of the Ural, where the caravans from Bokhara and Khiva stop; and a caravansary, usually called the *tauschhof* (exchange court), or *menovoi-dvor*, has been erected, the whole being protected by a camp of Cossacks. In the vicinity of the *tauschhof* are the immense smelting-houses referred to above, in which, in the course of a summer, the tallow of more than fifty thousand sheep is melted down.⁵⁹

⁵⁵ Sears, 208.

⁵⁶ Sears, 242.

⁵⁷ Sears, 242.

⁵⁸ Sears, 243–44.

⁵⁹ Sears, 254.

British tallow imports from the Eurasian steppe began a steep decline in the decades after Sears published this book. The global tallow trade continued to rely on large herds of cattle and sheep raised on vast frontiers, but there was a shift from the steppe, to new colonial frontiers in the Americas and Australasia. During the nineteenth century, European settlers reproduced the economies of the steppe, raising large numbers of animals on deceptively abundant grasslands and exporting the wool, hides, bones, tallow and eventually the meat to European markets.

Neo-European Tallow, 1865-1901:

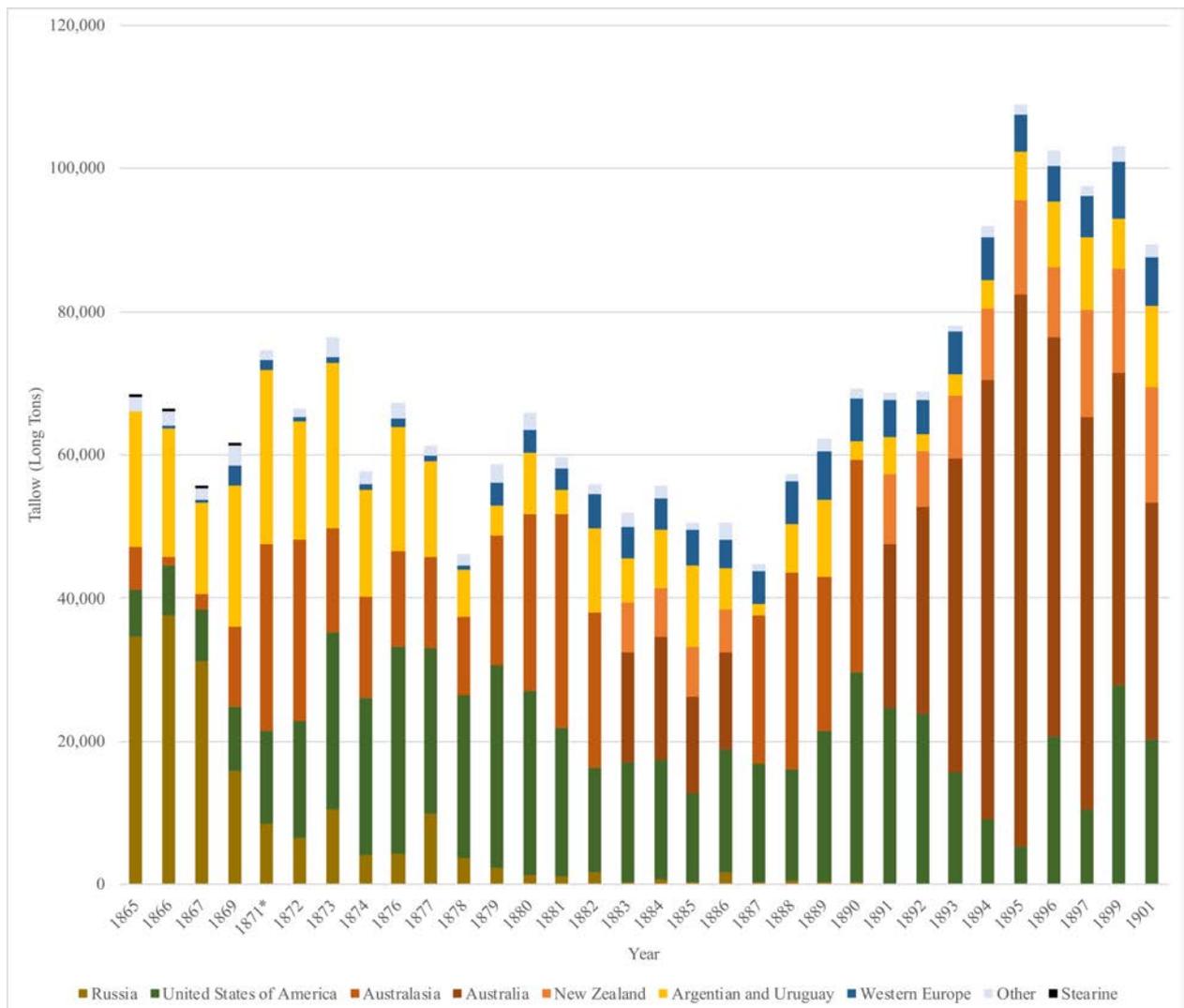


Figure 3: British Tallow Imports 1865-1901, Note: The category changed in 1871 from 'Tallow' to 'Tallow and Stearine'. Adding the total imports of Stearine for 1865-1869 confirms this was an insignificant change. Source: 'British Imports Database.'

The Pampas, the Great Plains, and large sections of Australia and New Zealand, the grasslands of Alfred Crosby's neo-Europes, emerged as the exporters of tallow during the second half of the nineteenth century. Similar to the steppe, sheep and cattle thrived in these environments, at least during periods with steady rain and mild winters, making the cost of production very low and allowing long-distance trade in relatively low-value commodities to flourish. In the Americas, large feral herds developed starting in the sixteenth century, and these European animals often colonized grasslands before European settlers arrived. Crosby suggests most cattle in the Americas were feral until the nineteenth century.⁶⁰ During the second half of the nineteenth century, at the height of the global process of colonization John Weaver labelled the 'Great Land Rush', European settlers further displaced or marginalized Indigenous people on the Pampas, the Great Plains and the interior of New South Wales, Queensland, Victoria, and New Zealand. In most cases, pastoralists lead the colonization, arriving with sheep and cattle to take advantage of the existing grass.⁶¹

In North America, the environmental results were not as dramatic as the consequences for the Indigenous people of the Great Plains, as the cattle arrived in the aftermath of the destruction of the bison, and replacing one large grazer with another only contributed subtle transformations resulting from their different preferences for forage.⁶² In Australia, the vast herds of sheep, and invasive species like rabbits, prickly pear, burrweed, and Cape tulips, all grew too rapidly, transforming the grassland environment and decreasing the resilience of the

⁶⁰ Crosby, *Ecological Imperialism*, 177–82; Cushman, *Guano and the Opening of the Pacific World*, 342–43; Beinart and Hughes, *Environment and Empire*, 93–110.

⁶¹ John C. Weaver, *The Great Land Rush and the Making of the Modern World, 1650-1900* (Kingston and Montreal: McGill-Queen's University Press, 2006); James Belich, *Replenishing the Earth: The Settler Revolution and the Rise of the Angloworld, 1783-1939* (Oxford ; New York: Oxford University Press, 2009).

⁶² Geoff Cunfer, *On the Great Plains: Agriculture and Environment* (College Station: Texas A&M University Press, 2005), 38–46.

ecosystem.⁶³ The fragility became clear when the sheep population dropped from 100 million to 50 million during the dry 1890s, years before the severe El Niño drought arrived in 1902-03.⁶⁴ This disaster was recorded in British tallow import statistics, as Australia exported large quantities of this salvage commodity (see *figure 3*).

Unlike the earlier period, where cattle and sheep were raised on the steppe or Pampas to supply tallow and skins, tallow became a byproduct of wool and meat production during the second half of the nineteenth century. Their secondary role did not diminish their importance and byproducts often made up the profit or a means to reduce financial losses during a drought.⁶⁵ Over time the sophistication of the tallow processing plants increased and Chicago meat processors developed a method to preserve edible tallow to supply margarine producers in Holland.⁶⁶ The new demand for edible fats was significant, as the market for tallow candles declined, first with the introduction of brighter and cleaner burning coconut oil and paraffin, and eventually with the success of gas and electric light. Soap producers remained a significant consumer of the cheaper inedible tallow, and they benefited from the increased supply that came with the colonization of vast grasslands and the successive droughts that flooded the global market with cheap tallow.

In the second half of the nineteenth century, the global tallow market transformed and the commodity went through a series of boom and bust cycles that ended with its price significantly reduced. The notebooks of soap producer John Crosfield, from Warrington,

⁶³ Don Garden, “The Federation Drought of 1895-1903, El Niño and Society in Australia,” in *Common Ground: Integrating the Social and Environmental in History*, ed. Geneviève Massard-Guilbaud and Stephen Mosley (Cambridge: Cambridge Scholars Publishing, 2010), 273; Beinart and Hughes, *Environment and Empire*, 103–7; Michael Pearson and Jane Lennon, *Pastoral Australia: Fortunes, Failures and Hard Yakka : A Historical Overview 1788-1967* (Collingwood: Csiro Publishing, 2010), 113–32; Rebecca Jones, *Slow Catastrophes: Living with Drought in Australia* (Clayton: Monash University Publishing, 2017), 31–32.

⁶⁴ Jones, *Slow Catastrophes*, xxi, 31–32; Beinart and Hughes, *Environment and Empire*, 106.

⁶⁵ William Cronon, *Nature’s Metropolis: Chicago and the Great West* (New York: W. W. Norton, 1991), 250–53.

⁶⁶ ‘Australian Tallow Industry,’ *The Oil and Colourman’s Journal* (London), November 2, 1896, 1806-1807.

recorded the fluctuations over the second half of the nineteenth century. The early years of Crosfield's notebook marked the high prices resulting from the Crimean War, where the firm paid 63s. per hundredweight at the peak. The price dropped in the decades that followed, fluctuating between 50s. and 60s. in the 1850s and then between 40s. and 50s. in the 1860s and early 1870s. During the final decades of the century, the prices collapsed, reaching 21s. during the mid-1890s.⁶⁷ British trade statistics confirm the record in the notebook, with a high annual average price of imports reaching more than 55s. per hundredweight in 1855 and the lowest average yearly import price dropping under 16s per hundredweight in 1898. *Figure 3* records the quantities of tallow imported from 1865 to 1901 and shows the significant variability of the tallow supply during this period.

The mid-1860s were Russia's final years supplying the majority of imported tallow to the United Kingdom, but soon after tallow from the steppe declined and the settler colonies emerge as the major suppliers of tallow to British soap and candle makers. Russian tallow was not merely, as an initial reading of the chart might suggest, undercut by cheaper American or Australian tallow. There remained a significant premium price for high-quality Petersburg Yellow Candle (P.Y.C.) Tallow, preferred for some lubrication applications, through to the end of the nineteenth century. The cost of P.Y.C. in March 1896, for example, remained at 48s., while Australian Mutton tallow sold for a little more than 20s.⁶⁸ The British consular records are mixed in their assessment of the decline in Russian tallow exports starting in the 1860s. Some confirm the global competition and drop in price were a factor, with Russian tallow finding higher prices in France, Turkey, and Austria in 1868.⁶⁹ The drop

⁶⁷ Albert Edward Musson, *Enterprise in Soap and Chemicals: Joseph Crosfield & Sons, Limited 1815-1965* (Manchester: Manchester University Press, 1965), 91–92.

⁶⁸ 'Trade Reports: London,' *The Oil and Colourman's Journal*, March 2, 1896, 450.

⁶⁹ United Kingdom, House of Commons, 'Commercial Reports received at Foreign Office from H.M. Consuls, 1868-69,' Nineteenth Century House of Commons Sessional Papers, 1868-69, ProQuest UK Parliamentary Papers (1868-045720): 781.

in the global price made it less economically viable to export tallow from the steppe.⁷⁰ This was compounded by Russian tariff policies that reduced the quantity of British goods imported into Russia and as a result increased the cost of shipping Russian exports, as the ships needed to travel empty in one direction.⁷¹ On the other hand, a significant increase in tallow candle production in Russia and a considerable loss of cattle to rinderpest in the 1860s reduced the supply of tallow for export.⁷² By the end of the 1890s, United Kingdom reexported between eight and twenty-five thousand tons of tallow from Australia and the United States to Russia, which suggests reduced tallow production and increased domestic consumption were the leading factors in Russia's decline as an exporter.

Argentina was the first to challenge Russian dominance in the late 1860s and early 1870s. The United States, after the large-scale cattle drives onto the Great Plains began in 1867, became the largest supplier in 1873. This American ascendancy corresponded with a financial panic in the fall of 1873 that hit the western cattle industry hard and with the start of year-round meat packing in Chicago.⁷³ A journalist from Wichita described the situation, where ranchers were forced to sell their cattle at a loss to pay their debts as a period when 'sacrifices are made, and cattle men, as well as cattle, are slaughtered every day'.⁷⁴ The United States remained the largest exporter to Britain through the remainder of the 1870s.⁷⁵ In the 1880s, Australasia, including the Australian colonies and New Zealand, became the

⁷⁰ United Kingdom, House of Commons, 'No. 2169 Annual Series. Diplomatic and Consular Reports. Russia. Report for the year 1897 on the Trade, Commerce and Agriculture of St. Petersburg and district. Reference to previous report, Annual Series No. 1998.,' Nineteenth Century House of Commons Sessional Papers, 1898, ProQuest UK Parliamentary Papers (1898-076530_0150): 22-23.

⁷¹ 'Report by Attaché to H.M. Embassy at St. Petersburg.'

⁷² 'Report by Attaché to H.M. Embassy at St. Petersburg,' 60-61; United Kingdom, House of Commons, 'Reports from H.M. Diplomatic and Consular Officers Abroad on Trade and Finance [Full version],' Nineteenth Century House of Commons Sessional Papers, 1868-69, ProQuest UK Parliamentary Papers (1893-071122): 3568; David Moon, *The Plough That Broke the Steppes: Agriculture and Environment on Russia's Grasslands, 1700-1914* (Oxford: Oxford University Press, 2013), 16-21.

⁷³ Walter Prescott Webb, *The Great Frontier* (University of Nevada Press, 2003), 231-33; Cronon, *Nature's Metropolis*, 232-33; White, "Animals and Enterprise," 259-60.

⁷⁴ Robert R. Dykstra, *The Cattle Towns* (University of Nebraska Press, 1983), 77.

⁷⁵ Cronon, *Nature's Metropolis*, 220-24; Cunfer, *On the Great Plains*, 48-51.

dominant tallow supplying region. Britain's total imports trended down during this decade, as the beef market recovered in the United States and their tallow exports to the United Kingdom declined.⁷⁶ Australia reversed this trend during the 1890s when the subcontinent flooded the British market with tallow and drove the prices down to a new low. In this example, we find an industrialized response to overstocking that mimics the older patterns from the Pontic-Caspian steppe and Orenburg, but added the efficiency of steam boilers, pumps, and railways. Oddly enough, much of the superfluous tallow shipped to Britain from Australia eventually ended up in Russia.⁷⁷

Boiling Down in Australia:

In 1892, Sydney's *Daily Telegraphy*, ran a headline with the question 'What Shall We Do with Our Sheep?' New South Wales sheep breeders had been lucky during the previous three years with regular rain, despite dire warnings of an imminent drought, allowing the sheep population to grow to a new height of sixty million. The newspaper calculated this was about eleven million too many sheep and to correct this situation after accounting for natural deaths and local consumption, they needed to 'boil down 5,500,000' into tallow, as 'every year most certainly brings us nearer to a severe drought,' which was even more concerning due to the damage caused by rabbits.⁷⁸ The newspaper suggests that this correction in the first year would still leave the colony vulnerable to drought, but after two years the sheep population could be reduced to 53 million, which they judged to be a more sustainable level in dry conditions. They went on to explain that 'nearly every squatter in the country' agreed that the surplus in sheep could only be solved 'by an export trade on a large scale in frozen

⁷⁶ White, "Animals and Enterprise," 260.

⁷⁷ United Kingdom, House of Commons, 'Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions. 1899 Compared with the Four Preceding Years.,' Nineteenth Century House of Commons Sessional Papers, 1900, ProQuest UK Parliamentary Papers (1900-078846): 686.

⁷⁸ 'What Shall We Do With Our Sheep?,' *Daily Telegraph* (Sydney, New South Wales), January 2, 1892, National Library of Australia Trove Newspapers (236053691).

mutton, tinned mutton, or tallow, or the three combined'.⁷⁹ There are numerous stories in newspapers from New South Wales and Queensland between 1892 and 1894 about the establishment of boiling down works and meat preservation works that included boiling down facilities.⁸⁰ There were also a few more articles focused on the negative consequences for people living close to these unpleasant large-scale animal butchering and processing works.⁸¹

The Bourke Meat-Preserving Company, located in the inland north of New South Wales, established a few miles outside of Bourke on a rail line, was a prime example of the new boiling down works built in the early 1890s. Boiling down made economic sense in remote locations like Bourke, as the rail journey to Sydney was about eight hundred kilometres and the cost of shipping live sheep this distance was prohibitive, while boiling down was cheap and allowed the owners to ship their sheep in 'the compact form of tallow and skins'.⁸² The capital was raised from local 'pastoralists and homestead lessees,' who did not expect 'large dividends to the shareholders' and instead were investing in a 'means of disposing of surplus stock in the most economical manner, and preventing loss in time of drought'.⁸³ The company started production at the start of April in 1893, and it took a few months to reach full capacity, as sheep breeders were at first reluctant to send sheep to be

⁷⁹ 'What Shall We Do With Our Sheep?'

⁸⁰ A sample of these articles include: 'Boiling Down Sheep,' *The Hay Standard* (Hay, New South Wales), May 4, 1892, National Library of Australia Trove Newspapers (144685235); 'Boiling-Down Works on the Murray,' *Daily Telegraph* (Sydney, New South Wales), February 13, 1893, National Library of Australia Trove Newspapers (235947459); 'The Boiling-Down Industry,' *Daily Telegraph* (Sydney, New South Wales), June 15, 1893, National Library of Australia Trove Newspapers (236027631); 'The Pastoral Industry,' *Western Star* (Toowoomba, Queensland), April 4, 1894, National Library of Australia Trove Newspapers (97526450); 'Boiling Down,' *Telegraph* (Brisbane, Queensland), December 11, 1894, National Library of Australia Trove Newspapers (171945068).

⁸¹ 'Boiling Down,' *The Riverine Grazier* (Hay, New South Wales), November 29, 1892, National Library of Australia Trove Newspapers (113733522); 'Boiling Down,' *Evening News* (Sydney, New South Wales), January 31, 1893, National Library of Australia Trove Newspapers (140470382).

⁸² 'The Pastoral Industry,' *Western Star*.

⁸³ 'The Bourke Meat-Preserving Company, Limited.,' *The Sydney Mail and New South Wales Advertiser*, March 24, 1894, National Library of Australia Trove Newspapers (163330340).

processed into tallow outside of a drought. This attitude started to change once the potential profits became clear and breeders began to cull the less productive sheep from their herds. By March 1894, the company had ‘boiled down 644,836 sheep and treated 2010 head of cattle’ which produced about 3,600 tons of tallow. Their facility also processed the tongues and had an output of 1,100 sheep tongues each day.⁸⁴

The works could process 30,000 sheep per week, and they had already killed 2,500 the morning of the reporter's visit. He explained the tallow shed was located alongside the railway siding and ‘filled with fifths, or casks, of 8cwt. each, five going into a ton’.⁸⁵ The process of killing the sheep and boiling them down for tallow was significantly more orderly than the *sagans* in the 1850s: ‘From the sheep yards the sheep are driven up the race into the enclosure on the killing floor, where there are forty butchers, with their boys. The mode of killing is cutting the throats.’ The butchers quickly removed the skins and tongues, before sending the rest of the animal into one of the five ‘digestors’ each of which could process 300 hundred large or up to 400 normal sized sheep at a time. The reporter noted that ‘seemed a pity to boil down for tallow such a lot of fine mutton’. The digestors, which were heated by steam, took between one and three quarter to two and three quarter hours to process the sheep, at which point water was ‘pumped in the digestors from beneath’ causing ‘the tallow to float on top of the digestor’ so it could be ‘drawn off by an overhand pipe flowing into the refiners’. Finally, they dumped ‘the useless refuse from the digestors’ into waste pits and prepared the tallow for shipping.⁸⁶

This clean and modern facility was probably not the standards of all of the boiling down works in New South Wales and Queensland during the mid-1890s, as the Australian tallow did not have a reputation for high quality in the London market. The *Oil and Colourman's Journal*, which mostly recorded the surging quantities of Australian tallow and

⁸⁴ ‘The Bourke Meat-Preserving Company, Limited.’

⁸⁵ ‘The Bourke Meat-Preserving Company, Limited.’

⁸⁶ ‘The Bourke Meat-Preserving Company, Limited.’

resulting market turmoil, with little comment, included one article in November of 1896 on the ‘Australian Tallow Industry’. They encouraged Australian tallow producers to learn from Chicago and produce high-quality tallow for the growing margarine industry, as the decline of the candle industry meant there was a limited market for their low-grade tallow. Producing ‘premier juice’ involved processing the suet with low heat in a clean environment to avoid contamination and prevent spoiling.⁸⁷

The construction of boiling down works across the interior of New South Wales and Queensland in the early 1890s help answer a question that arises in the timeline of Australian tallow exports: why did the surge in exports start two years before the Federation Drought that began in 1895?⁸⁸ In part, this can be explained by smaller regional droughts that put pressure on the pastoral economy in Queensland in 1893 and resulted in a million sheep being boiled down for tallow.⁸⁹ The annual rainfall was not exceptionally low, but the rains came at the wrong time of the year:

The strangest part of this dry spell is realised when it is found that water has abounded but grass has failed. Rain in winter brought up a fine growth of herbage, thistles, and such variety of feed. Upon this the stock thrived for a month or two, but with the first week of hot weather it mostly withered off and nothing remained.... Thus hundreds of thousands of sheep and a proportionate number of cattle have simply lain down to die.⁹⁰

This 1893 drought was made worse as it followed closely after a significant banking crisis in the colony. The newspaper's correspondent speculated that the losses in the drought would set off another round of banking failures: the year ‘proved too much for many who fought hard through depression and survived the financial catastrophes’ and ‘the banks have been terribly hit, if all reports be true,’ with a ‘list of stations owned by one in particular has enough in it to spell worry and anxiety for another half-century’. The combined economic and climatic crisis contributed to the increase tallow shipped to London in 1893, but a million sheep is only

⁸⁷ ‘Australian Tallow Industry.’

⁸⁸ Jones, *Slow Catastrophes*, xx–xxi.

⁸⁹ ‘Meat Industry,’ *The Week* (Brisbane, Queensland), June 8, 1894, National Library of Australia Trove Newspapers (181829136).

⁹⁰ ‘Queensland,’ *The Argus* (Melbourne, Victoria), March 10, 1894, National Library of Australia Trove Newspapers (8731276).

equal to about 10,000 tons of tallow and the vast majority of the increased in Australian tallow came from New South Wales.

Pastoralists were apprehensive about the possibility of a drought in New South Wales' Riverina region, and the boiling down works in Albury and on the Murrumbidgee river were already doing brisk business in February 1893, as other works under construction, including the Bourke works discussed above. Agriculture practice was changing and pastoralists were starting 'to cull heavily' as they made sure all their sheep would 'give a good return on the cost of producing him and providing him with board and residence'. This meant 'old ewes, instead of being kept for breeding until the succumb to senility' were 'fattened, while comparatively young, and turned into skins and tallow'.⁹¹ In 1894, the market for skins and tallow were strong enough that boiling down remained more profitable than freezing the meat of the surplus stock. Moreover, the frozen mutton of these wool producing breeds was not very appealing in the British market.⁹² Unfortunately, too many pastoralists adapted this new approach to farming, and the Federation Drought sent many more sheep and cattle to 'the pot' in the years that followed, causing warehouses in London to be stockpiled with unsold tallow until the price finally collapsed in 1898.⁹³

The tallow trade demonstrates the power of metropolitan demand to marshal the resources of distant environments and the diversity of local economic and environmental factors that led major cattle and sheep raising regions to engage with the tallow export trade. Millions of cattle and sheep were raised on the frontier of European settlement during the long global process of agricultural expansion and killed to supply one or two by-product

⁹¹ 'Barcaldine,' *Morning Bulletin* (Rockhampton, Queensland), October 15, 1894, National Library of Australia Trove Newspapers (52488434).

⁹² Woods, *The Herds Shot Round the World*, 120–39; Rebecca J. H. Woods, "From Colonial Animal to Imperial Edible: Building an Empire of Sheep in New Zealand, ca. 1880–1900," *Comparative Studies of South Asia, Africa and the Middle East* 35, no. 1 (May 10, 2015): 125–27.

⁹³ 'Trade Reports – London,' *Oil and Colourman's Journal* (London), June 2, 1896, 286; 'Trade Reports – London,' *Oil and Colourman's Journal* (London), September 1, 1896, 1486; 'Australian Tallow Industry.'

commodities. The processing facilities became more technologically sophisticated, and when railways, steamships, refrigeration, and a viable urban market came together, as they did to link Chicago with the New York in the 1880s, tallow became a by-product of the meat packing industry. In other locations, boiling down work remained an efficient way in the 1890s to make sheep and cattle bodies compact enough to ship to market. The scale of the Federation Drought and Australian pastoralists new enthusiasm for industrial scale boiling down works crashed the global market with an oversupply of mutton tallow as their sheep population dropped in half. Despite the challenges brought by the price drop in the 1890s, Australia remained a significant supplier of tallow to Britain in the first decade of the twentieth century, shipping an average of thirty-two thousand tons a year between 1906 and 1909, which was roughly a third of Britain's total imports.⁹⁴

Conclusion

At the end of the nineteenth century, John Knight's factory in Silvertown was one of five large soap, candle and tallow works in operation in Greater London. *Figure 4* uses Geographic Information Systems data digitized from the first revision of the Ordnance Survey of London (1893-1895), which records the five large factories and dozens more small soap, candle, tallow works, and oil mills. The smaller factories are concentrated in the older industrial districts in Southwark, while the larger factories were found on the river in Battersea and Brentford in the West and Greenwich and West Ham in the East. The scale of the industry, the increased diversity of products including soap, margarine, edible oils, candles and lubricants, and the large quantities of these consumer goods they produced for the local market and export, relied on vast quantities of tallow and other fats imported from all over the world.

⁹⁴ United Kingdom, House of Commons, 'Annual statement of the trade of the United Kingdom with foreign countries and British possessions, 1907 compared with the four preceding years.', Twentieth Century House of Commons Sessional Papers, 1908, ProQuest UK Parliamentary Papers (1908-009926): 257; United Kingdom, House of Commons, 'Annual statement of the trade of the United Kingdom with foreign countries and British possessions, 1909.', Twentieth Century House of Commons Sessional Papers, 1910, ProQuest UK Parliamentary Papers (1910-012563): 207.

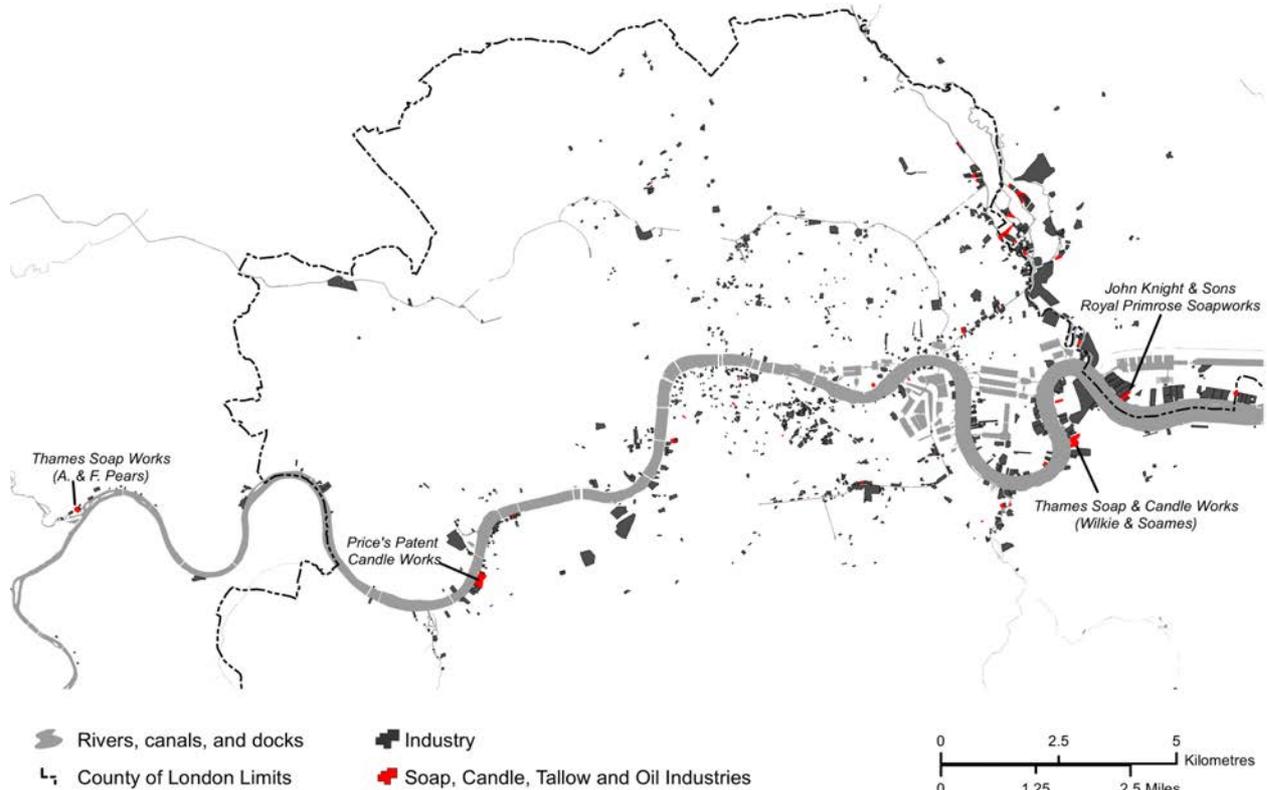


Figure 4: Soap, Candle, Tallow and Vegetable Oil Industries in Greater London, 1893-1895. Source: see Jim Clifford, *West Ham and the River Lea: A Social and Environmental History of London's Industrialized Marshland, 1839-1914* (Vancouver: University of British Columbia Press, 2017), 157-159, 202-206 for details on the methods and source material used to create this map.

John Knight's grandsons and their competitors had access to a significantly broader range of ghost acres producing a diversity of fats fit for making soap six decades after their grandfather entered the manufacturing business. The fat supply started the nineteenth century centred in a few locations, but diversified and connected soap makers and consumers to fat production on every continent, along with a good number of remote islands, by the end of the nineteenth century.⁹⁵ In 1800, British factories relied on domestic sources of tallow augmented by imports of 226 tons of palm oil, 20,796 tons of tallow and 13,236 tuns of train (whale and seal) oil.⁹⁶ In 1901, the British imported 23,907 tons of coconut oil, 60,606 tons of palm oil, 89,266 tons of tallow, 24,384 tuns of train oil, along with 437,140 tons of cotton

⁹⁵ 'British Imports Database;' Cushman, *Guano and the Opening of the Pacific World*, 99–108.

⁹⁶ Tuns are a measure of volume that are roughly equivalent to a ton of train oil.

seeds, 1,684,822 quarters of flaxseeds and 50,090 tons of other nuts and kernels for expressing oil. They reexported some of these commodities to other industrial nations, but soap makers in London and Liverpool had the advantage of being located close to the ports where much of the global fat supply arrived in Europe. The geographic range of the ghost acres that supplied these fats expanded from Russia, the whale and seal fisheries and some palm groves in West Africa in 1800, to thirteen sources of at least five thousand tons of fats in 1901: Argentina, the Australian colonies, Brazil, British West Africa, British India, Ceylon, Egypt, Germany, New Zealand, Newfoundland, Norway, Sierra Leone, and the United States.⁹⁷ The diversity of other fats, including palm oil, coconut oil and cotton seeds, all have histories that connect London consumers with more regions of the world in Africa and Asia that are worthy of further investigation.⁹⁸

Britain imported a growing diversity and increasing quantities of raw materials from around the world during the nineteenth century. It developed ecological dependencies on ghost acres to provide wheat, sugar and other foods; cinchona and other drugs; guano and bones for fertilizer; rubber and gutta-percha; gambier and other tanning agents; jute and other fibres; hides and skins; timber; cochineal and other dyes. Many of these commodities had significant social and environmental consequences, but distance and the process of transforming the imported raw material into finished consumer products obscured the deforestation, soil erosion, species annihilation, habitat loss, famines, colonization, and continued slavery. John Knight & Sons primrose soap, for example, required a second ingredient with an unambiguously environmentally and socially devastating supply chain. The British imported growing quantities of rosin, a by-product of turpentine production, from North Carolina and other southern states, starting with 166 tons in 1800 and increasing to

⁹⁷ 'British Imports Database;' the German fats were palm kernel oil, where German industry pressed kernels imported mostly from British colonies in West Africa.

⁹⁸ Palm oil has been the focus of environmental, economic and social historians, but coconut production in Ceylon and Egyptian cotton seeds remain understudied. Martin Lynn, *Commerce and Economic Change in West Africa: The Palm Oil Trade in the Nineteenth Century* (Cambridge: Cambridge University Press, 2002); Lewis, *So Clean*.

90,624 tons in 1901. Robert Outland explores the destructive consequences of the naval stores industry, which used slave labour through to the Civil War to produce rosin, turpentine and tar from the sap of long-leaf pines, and destroyed the forests in the process.⁹⁹

British consumers had little opportunity to consider the mass slaughter of animals outside Orenburg or Bourke or the slavery in North Carolina that made it possible for Britain to climb to the top of the soap civilization index. Environments the world over were transformed into plantations, farms, and massive ranches and sheep stations, all tied together by markets centred in London and Liverpool and driven by the demand created for greater and greater quantities of soap and related consumer goods. Distance and commodification obscured these consequences just as most people today pay little attention to the links between their laundry detergent or margarine and the fires and habitat loss that come with wide-scale palm oil production in Malaysia and Indonesia.

⁹⁹ Robert B. Outland, "Suicidal Harvest: The Self-Destruction of North Carolina's Naval Stores Industry," *The North Carolina Historical Review* 78, no. 3 (2001): 309–44; Robert B. Outland, *Tapping the Pines: The Naval Stores Industry in the American South* (Baton Rouge: Louisiana State University Press, 2004).