

The Wooded Weald:
Private Woodland Management and England's 'Timber Famine', 1680-1790.

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Submitted in partial fulfillment of the requirements for the degree of
Master of Arts

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Abstract

Early modern England was a world of wood. Everyone from laity to elite had a vested interest in woodland resources because it was a necessity for all aspects of life from warmth, fuel, shelter, transportation, and industry. Starting in the late fifteenth century and lasting through the early modern period, anxieties about timber scarcity spread as the Royal Navy complained of shortages. Since the Royal Navy was responsible for the protection of the Kingdom and was an integral part of England's colonial exploits abroad, the possibility that the maintenance of the fleet was at risk was cause for grave concern.

Through the late seventeenth and eighteenth centuries, the Royal Navy accused merchant ship builders, agriculturalists, woodland industrialists, and private woodland owners of fomenting shortages through careless destruction of woodlands for profit, leading to a "timber famine". Although most naval timber that furnished the Royal Navy came from private estates, historians have focussed on management in the Royal Forests. This thesis investigates how private woodland owners in the Weald, who owned most of the wood and timber reserves in southeast England managed their most essential resource. Private landowners' interests directly conflicted with the interests of the Royal Navy, yet ultimately it was not the landowners who were responsible for perceived timber shortages. However, an inability to reconcile these competing interests contribute to historic myths about the state of England's woodlands in the early modern period.

Through an in-depth HGIS (Historical Geographic Information System) study, this thesis argues that private landowners in the Weald were motivated by profit to sustainably maintain their woodlands. They chose to manage their woodlands with a preference for local underwood economies rather than timber because they were the most lucrative and thriving markets, much to the behest of the Royal Navy. I argue that the Royal Navy's inability to procure timber during this period was due to lack of funds, disorganization within the Navy Board, and poor Royal Forest management which ultimately left them unable to keep up with the competitive timber market and provided more motivation for landowners to give preference to local underwood economies. Additionally, this thesis argues that timber scarcity in the Weald did not result in woodland destruction. In fact, the case study on Glassenbury demonstrates that Wealden landowners' sustainable management was largely responsible for the maintenance of Wealden woods to this day.

Keywords: Historical GIS, Early Modern England, Timber Famine, Resource Management, Royal Navy.

Acknowledgements

Living in a period of climate and natural resource crisis has completely shaped the way I think about the past, present, and future. At a time when it seems easier to have little hope, I am eternally grateful for people who work every day to build resiliency, cooperation, and hope while navigating climate change and sustainability challenges. So, first and foremost, I'd like to acknowledge all of those working towards a more sustainable and equitable present and future.

I would like to acknowledge the Brock University History Department, which has provided me with significant opportunity to build my research skills and historical inquiry in a welcoming, supportive, and intellectually stimulating environment. I'd like to thank my supervisor Dr. Colin Rose, who has guided and supported me through every step of my MA. His mentorship and insight have shaped my approach to research in more ways than I can count. I have been challenged and pushed to be the best scholar I can because of his supervision. I also would like to acknowledge Dr. Daniel Samson, who also mentored me, challenged my ideas, and spent hours discussing historical and contemporary issues with me throughout my MA. I cannot overstate how influential Dr. Rose and Dr. Samson's mentorship has been.

I would also like to thank my external examiner, Dr. Jim Clifford from the University of Saskatchewan for his thorough review and feedback. Additionally, thank you to Shannon Gosse and Steven Hamelin, my peers who have thoughtful feedback on drafts of my thesis. I would like to thank the Cranbrook Museum and Mike Huxley for the research support and introducing me to the rich history of Cranbrook and Glassenbury, and Marcus Sutcliffe who allowed me to use the *Wood Book* in my research. I also thank the archivists at the Kent Archives in Maidstone who taught me how to best navigate the British archives, and Sally Marsh, Co-Director of the High Weald AONB who taught me about the unique ecology of the Wealden landscape and first introduced me to the Wealden woodlands.

This research was funded in part by the Social Sciences and Humanities Research Council of Canada, the Ontario Graduate Scholarship, the Grand Lodge of Ancient, Free and Accepted Masons of Canada in the Province of Ontario, and Environments of Change. The funding provided by these generous organizations fuelled my studies and allowed me dedicated time to focus on my research.

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Maps and GIS

This study is fuelled by a spatial-temporal investigation using ArcGIS. Maps are essential to understanding the essence of the argument. The best way to follow along is to use the interactive map here: [Interactive Web Map](#). Bolded footnotes throughout the paper will guide readers on how to best interact with the map. This guide is also available in the appendix. The interactive map has various layers to interact with located in the upper right-hand corner. The legend should appear below each layer when selected. Readers can hide features and see others by changing the visibility of each layer. Readers can select features using your cursor to see more data. There are also several maps throughout the body of this thesis for readers who do not use the accompanying interactive map. Please note: the web map may take a few moments to load due to its size. All digital maps were designed by the author using ArcGIS Pro, unless otherwise stated.

Primary Archives Consulted

CM – Cranbrook Museum, Cranbrook, Kent, United Kingdom.

BL – The British Library, London, United Kingdom.

KA – Kent Archives, Maidstone, Kent, United Kingdom.

TNA – The National Archives, London, United Kingdom.

Introduction

Early modern England was a world of wood. From merchant ships to the Royal Navy, household and industrial fuel, heat, furnishing, farming implements, and more, wood was a natural resource that all people from laity to elite relied on for survival. Extensive use of wood and timber for individual livelihood and nation-building resulted in the development of conscious practices to manage and conserve woodland resources for continued and future use. Everyone in England had a vested interest in these resources, and woodlands served a significant economic and socio-cultural purpose. Thus, dialogue and conflicting ideas about how to manage woodland resources and anxieties regarding perceived scarcity became a high-profile issue throughout the nation. There was near-constant concern amongst select interest groups about dwindling timber supplies throughout the late medieval and early modern period. Royal Acts designed to protect timber for the Royal Navy's use and punish woodland "wasters" dominated any discussion of forestry practices from the sixteenth century onwards. Anxieties from the Royal Navy and polemicists of the Navy's "timber famine" hit a peak in the seventeenth and eighteenth centuries. Primary concerns came from the Royal Navy's Admiralty and Navy Board, who accused various other interest groups including the iron-makers, glassmakers, cloth producers, agriculturalists, private woodland owners, and merchant ship companies of fomenting shortages. Well documented and wide-spread polemics of timber shortages, most powerfully Arthur Standish (1611) and John Evelyn's (1664) work confounded ideas about the Royal Navy's perceived shortages through alarmist warning of how alleged destruction of woodlands would lead to the decline of the Kingdom.¹ Despite these consistent concerns, research shows

¹ John Evelyn, *Sylva*, (London: Royal Society, 1667), Epistle to the Reader. Arthur Standish, *Commons Complaint*, (London: William Stansby, 1611), 1.

that much of England's timber furnishing woodlands, which were predominantly made up of privately held estates, had been deliberately managed to ensure sustainable regrowth of trees for wood and timber products throughout the early modern period.

This thesis investigates the practices and motivations of private woodland management in the Weald in Southeast England, and the obstacles faced by the Royal Navy in their search for timber from 1690-1790, through historical geographic information systems (HGIS). By following the story of woodland management and timber scarcity through the life of managed trees, from their growth and woodland management to selling and use, I offer a dynamic perspective on the reality of perceived timber scarcity through three primary arguments. The first is that private woodlands served as essential woodland reserves for contrasting woodland interest groups including the Royal Navy, rural communities, and woodland industries. Although contemporaries of the perceived timber famine recognized that private woodlands were better managed and made up most of the domestic timber that furnished the Royal Navy, studies have overwhelmingly been focused on Royal woods. Attention must be given to private woodlands to develop a deeper understanding of the relationship between early modern English people and their most valuable natural resource.

Second, through an HGIS study of Glassenbury Estate in the Wealden parish of Cranbrook, Kent, one of England's most wooded landscapes, I argue that private woodlands were intensively and sustainably managed for profit. The estate keepers kept detailed records of cost and income related to the felling and selling of trees and management of rental properties from the late seventeenth century into the nineteenth century. As one of the largest Kentish Wealden estates, Glassenbury owned thousands of acres of woodland which were systematically managed and carefully maintained to ensure maximum sustained income from trees as one of

their primary modes of income. In fact, the intensive management of private Wealden woodlands and the local woodland communities they served are responsible for the maintenance of those ancient woodlands today.

Third, through archival material from the Royal Navy and Parliament, I argue that the Royal Navy's perceived timber scarcity was not a problem of woodland destruction and exhaustion by interest groups targeted by the Navy and polemicists. Rather, it was due to a problem of management that stemmed from a combination of contrasting woodland interests of private estate owners, underwood economies, poor Royal woodland practices, and the poor financial, shipbuilding, and timber storage practices of the Royal Navy. By investigating archival material including letters from the Commissioners at Chatham and Sheerness, two of Kent's primary Royal dockyards furnished by Wealden timber, and late eighteenth-century Parliamentary reports on concerns of the perceived scarcity of naval timber, important aspects of the complicated reality of the Royal Navy's concerns about timber emerge.

Gentry landlords came to have full control of woodlands through enclosures granted by the Crown. This allowed them to drastically change woodland ecosystems as they worked diligently to maintain their manipulated woodland ecosystems and control any outside interference to ensure sustained resource renewal. This allowed landowners to monopolize local woodland economies and manage woodlands in response buyer's needs in the most lucrative markets, which were undoubtedly not timber. The Royal Navy's proposed timber famine was not due to a lack of timber, but rather, a lack of funds and proper management which was intensified by the contrasting and conflicting ways private and Royal woodlands were managed.

Historiography

Confusion about the reality of timber scarcity in early modern England is rooted in the widely differing and competing perspectives of the time. Vastly different experiences shaped contrasting arguments about the severity of possible timber scarcity, its causes, and possible solutions. Polemicists circulated their ideas widely and Parliament disagreed about possible solutions to perceived shortages of naval timber. The only thing all writers in the early modern period seemed to agree on is that the perceived timber famine risked possible catastrophe for the Royal Navy. The lack of other consensus during the early modern period has meant that historians have been left more or less on their own to investigate the realities of the timber problem and woodland management.

Until the late twentieth century, historians preferred to study well-circulated published materials on the timber famine to frame their understanding of perceived shortages. Such works include John Manwood's *A Treatise of the Lawes of the Forest* (1598), Arthur Standish's *Commons Complaint* (1611), and John Evelyn's famous *Sylva* (1677). Historians also turned to Royal Acts intended to preserve timber from the fifteenth century onwards and documents from the Royal Navy which highlight concerns of scarcity and reinforced a sense of impending catastrophe. As the loudest voices of the timber famine, these sources have often been taken at their word without much additional primary evidence. As a result, many historians happily promoted the historical narrative that England all but ran out of wood due to exploitative practices by woodland industries (primarily iron production) at the behest of Royal attempts to control and regulate waste, most severely at the cost of the Royal Navy.

Although there are plenty examples of such narratives promoted by historians, Mark Antony Lower and Mary Cecilia Delany's work provide powerful examples directly to the

history of the Weald. Lower's 1849 work "Historical and Archaeological Notices of the Iron Works of the County of Sussex" took Evelyn's *Sylva* as the foremost authority on the causes of possible timber famine. Lower argued that "the great extent which the manufacture had now reached threatened an evil which had to be warded off by legislative enactments - I mean the annihilation of timber in the Weald".² Delany echoed a similar argument in her 1921 book *The Historical Geography of the Wealden Iron Industry*, a text widely cited throughout the twentieth century, where she argued "rapid and systematic destruction of the forest dates from the reign of Henry VIII., when the extensive development of the Wealden iron industry began, and legislative action for the protection of the woodland frequently became necessary."³ These works created a neat narrative of greedy iron-mongers and State attempts to control their excessive exploitation.

Works like these are largely responsible for informing larger survey histories of England which fed incomplete and now debunked narratives into larger bodies of historical work. Take Hugh Prince's chapter "The Changing Rural Landscape, 1750-1850" from the Cambridge *Agrarian History of England and Wales VI*, in which he argued "throughout the period from 1750-1850 the English Countryside was bare of trees."⁴ This is a statement that the case of Glassenbury alone proves to be an oversimplification, and a particularly false narrative in the Wealden countryside, where dense woodlands were highly managed through the period, and general deforestation had indeed slowed down since the medieval period.⁵

² Mark Antony Lower, "Historical and Archaeological Notices of the Iron Works of the County of Sussex" in *Sussex Archaeological Collections*, vol. 2, (1849), 190.

³ Mary Cecilia Delany, *The Historical Geography of the Wealden Iron Industry*, (London: Benn Brothers Ltd., 1921), 19.

⁴ Hugh Prince, "The Changing Rural Landscape, 1750-1850", *Agrarian History of England and Wales VI*, Ed., G.E. Mingay, (Cambridge: Cambridge University Press, 1989), 64.

⁵ Forestry Commission England, *Government Forestry and Woodlands Policy Statement: Incorporating the Government's Response to the Independent Panel on Forestry's Final Report*, Department of Environment Food & Rural Affairs, (2013), 21.

Oliver Rackham, historical ecologist, and influential scholar of England's woodland history characterized this misrepresentation of the "timber famine" in his influential 1976 book

Trees and Woodland in the British Landscape:

The reader will doubtless be aware that woods were destroyed by people felling trees to build houses and ships, that medieval England was still very wooded, that forests were preserved for hunting by severe laws and barbarous penalties, that there was a timber famine in the Tudor period, that iron was smelted with coke because there was no wood left, that there was no conservation, that replanting was taken in hand after Evelyn wrote *Sylva*, and that the last remnants of the old woodland perished when cut down in the First or Second World War. All this (and much more) forms a consistent, logical, and widely accepted story- which, however, cannot be sustained from the records of actual woods or Forests. It is a pseudo-history which has no connexion [sic] with the real world, and is made up of factoids.⁶

Rackham argues that historians tend to forget that trees are living beings, and that the history of woodlands cannot solely be understood from the archives. He states that when studying this history, authors tend to parrot each other, and that "plagiarism often goes back to a first statement by Evelyn",⁷ which we can see regurgitated in works like Lower's, Delany's, and Prince's. To set the record straight, Rackham provides a framework for studying woodlands which heed the following advice: woodlands in the British Isles are all different, thus histories of them should be done from particular to general.⁸ This point is important, as any geologist, geographer, or landscape ecologist of Great Britain will be quick to note the vastly different soils, local climates, waterways, and woods of the early modern English countryside. For example, the geology of the Weald, largely comprising of sedimentary rock and iron-rich clay,

⁶ Oliver Rackham, *Trees and Woodland in the British Landscape*, (London: Dent, 1976), 23.

⁷ *Ibid*, 23.

⁸ *Ibid*, 25.

made it an ideal environment for broadleaf trees like oak which thrive in clayey soils, while being unattractive for mass-agriculture.⁹

Since the mid-to-late twentieth century, new studies have largely debunked the popular “story of unrelieved decline, neglect, and destruction”¹⁰ of England’s woodlands in the early modern period. Much of this is due to late twentieth and early twenty-first century efforts to work across disciplines and incorporate historical and ecological methodologies to create more informed and nuanced studies. Additionally, historians’ attention to a wider range of sources from archives and historical landscapes has deepened our understanding of the complicated history of England’s relationship with woodland resources. Many historians have reaffirmed that the reality of England’s “timber famine” has been overexaggerated and requires a more nuanced approach to better understand it. Approaches which look at the relationship between England, its people, and woodland resources are found most often in histories of the English countryside, histories of state power and politics, and most significantly, works of environmental history.

Histories of the English countryside look at perceived timber famine and woodland management from the perspective of the people and communities that worked on and with the landscape. Rather than political histories, these works tend to focus more on the intricacies of local economies, ways of life, and landscape changes, while often still providing significant insight into woodland management, since woods and their resources were such essential features of the medieval and early modern English countryside and every-day life. In his book on the history of the English countryside, Leonard Cantor argues that although possible timber famines had likely been exaggerated, there was a “great reduction” of woodland in the English

⁹ Roland B. Harris, “The Making of the High Weald: Informing the High Weald AONB Management Plan 2004”, *High Weald AONB Joint Advisory Committee*, (2003), 12.

¹⁰ Oliver Rackham, *Ancient Woodland: Its History, Vegetation and Uses in England*, (London: E. Arnold, 1980), 1.

Countryside by 1700 due to growing population, rising standards of living, the Royal Navy's increased size, and an increase in wood as an industrial fuel.¹¹ His argument, although generalized to the entirety of England's countryside, demonstrates the close relationship between English society, culture, economy, and the natural environment. Like Rackham, in his book *The Kent and Sussex Weald*, Peter Brandon concludes that most ironworks in the Southeast sustainably harvested wood-fuel from carefully managed woodlands through coppicing to ensure consistent access to fuel.¹² He argues that the industrial use of coppicing for wood-fuel for industry likely impacted the availability of timber and other wood resources, but is not responsible for any perceived decline in woodlands.¹³ Brandon's work provides a strong foundation for understanding Wealden industries, social life, politics, and culture.

Cantor's book, *The Changing English Countryside*, heavily revolves around how agricultural changes between 1400 and 1700 drastically reshaped rural England. He provides some close insight on woodlands, chases, and forests and suggests that the agricultural, political, social, and cultural changes in these 300 years dramatically altered the landscape of the English countryside, including its woodland.¹⁴ Cantor identifies the significance of woodlands to the English rural communities, citing woodlands as an important diagnostic feature of the landscape that was "in most areas 'farmed' and managed as carefully as the cultivated lands and the pasture".¹⁵ It is generally the case that changes in population, quality of life, and agricultural advancements deeply reshaped much of the English countryside, as Cantor posits, however,

¹¹ Leonard Cantor, *The Changing English Countryside, 1400-1700*, (London: Routledge & Kegan Paul, 1987), 96-97.

¹² Peter Brandon, *The Kent & Sussex Weald*, (Chichester, West Sussex: Phillimore, 2003), 160.

¹³ *Ibid*, 154.

¹⁴ Cantor, 96.

¹⁵ *Ibid*, 13.

localized studies on regions like the Weald reveal that some regional or local communities resisted changing their landscapes.

Brandon's history of the Weald uses a combination of archival and environmental evidence to study continuities in the Wealden landscape and its growing, yet stable communities. Like Cantor, woodlands are not his primary focus but feature heavily in his work as an important component of rural life and the Wealden countryside. In contrast to Cantor, Brandon highlights the resistance to change in the Weald compared to that of much of rural England. He argues that "the Wealden landscape is a product of traditional systems of farming management never rashly abandoned for new fashions and one in which farmers worked with nature, accepting inevitable limits imposed on production, rather than against it, with a too masterful hand."¹⁶ Although this may be too sentimental, and an overtly positive perception of Wealden communities, other scholars like Barbara Hanawalt also draw significant connections between rural communities, particularly peasant families, and their deep connection to the landscape. Hanawalt argues that woodlands made up an integral and distinct region of village communities as both managed and unmanaged woodlands.¹⁷ Common woodlands, which became increasingly scarce due to enclosures by the period of this study, provided fuelwood and construction, food sources such as berries, greens, mushroom, and nuts, and other important resources to rural communities.¹⁸ Thus, the significance of the landscape, particularly woodlands as described by Hanawalt, provide some support for Brandon's assessment of the "masterful hand[s]" of Wealden communities.¹⁹

¹⁶ Brandon, 7.

¹⁷ Barbara Hanawalt, *The Ties that Bound: Peasant Families in Medieval England*, (Oxford: Oxford University Press, 1989), 21.

¹⁸ *Ibid*, 23.

¹⁹ Brandon, 7.

These significant histories of the countryside provide essential insight into how rural people and the environment interfaced in the early modern period to shape the landscape. They describe cohesive use of the environment in a thoughtful way, from peasant relationships with the land to woodland management for iron foundries, in contrast to the destructive and unrelenting narratives presented by Lower and Delany based largely on the works of John Evelyn and other polemicists.

Keith Pluymers' *No Wood, No Kingdom* is perhaps the only major work on the significant intersection of English politics, state power, woodland management, and the "timber famine". As a work of political ecology, Pluymers weaves together different intricate elements of the politics of forest management in Parliament. He argues that "scarcity emerges at the intersection of the material world and human systems of use, distribution, and value".²⁰ His work is largely focused on state-owned Forests and parks rather than privately-owned wooded estates, but his argument is essential to understanding polemic texts like Evelyn's and Standish's. On this matter, he argued that various politicians, such as Sir Dudley Digges, member of the Virginia Company, or Evelyn, sponsored by the Royal Society, deployed language and themes of scarcity to justify their own interests.²¹ Approaching scarcity as a political issue, Pluymers argues that "wood-scarcity fears, although purportedly grounded in material conditions, were always entangled with the ideas, concerns, and ambitions of those articulating them".²² Thus, political and economic interests of the crown and individual members of parliament play significant roles in state attempts to manage woodlands in the late seventeenth and eighteenth centuries.

²⁰ Keith Pluymers, *No Wood, No Kingdom: Political Ecology in the English Atlantic*, (University of Pennsylvania Press, 2021), 4.

²¹ *Ibid*, 3, 237.

²² *Ibid*, 17.

Warde's *The Invention of Sustainability* compliments Pluymers' work by investigating how policy makers, industry leaders, manufacturers, consumers, and countryside laity thought of natural resources. Warde highlights the different interests woodland resource consumers had through the early modern period, from shipbuilders, hops growers, private landowners, and small-scale industrialists. He suggests that "wood was a highly differentiated product, and even firewood was put to many different uses. Historians must ask, as has increasingly been the case since the 1980s, whether fears of wood shortages reflected a general crisis, or the problems experienced by particular grounds of consumers."²³ Warde, in many ways echoing Rackham, concludes that concerns of woodland resource scarcity came from the ability or inability for certain interest groups to access resources, rather than an issue of overall timber and wood destruction and shortage. Warde argued that based on texts like Evelyn and Standish, the English state confused problems of mismanagement with problems of supply and demand, shaping how they understood timber scarcity and natural resources.²⁴

Warde highlights that English governments had consistent problems with Forest administration from the late fifteenth century onwards, as conflicts continued to erupt between the state and its people who resisted intensified Forest Law as "intrusions into traditional rights".²⁵ Warde argues that across the early modern European world, states attempted to control the distribution of wood, rather than control the woodland. He states that "legislators came to think at an early date that wood *supplies* required a different kind of management, exercising a more pervasive princely authority – or attempting to do so."²⁶ In the case of England, whose

²³ Paul Warde, *The Invention of Sustainability: Nature and Destiny, c. 1500-1870* (Cambridge, United Kingdom: Cambridge University Press, 2018), 72.

²⁴ *Ibid*, 94.

²⁵ *Ibid*, 85.

²⁶ *Ibid*, 60.

naval and colonial power was intrinsically tied to the strength of the Royal Navy, attempts to control wood supplies were of the utmost importance not only for economic interests, but because the maintenance of a strong naval fleet was essential to England's geopolitical dominance. As the Arthur Standish quote that Pluymers' book takes its title from, "no wood, no kingdom".²⁷

Pluymers and Warde both blame Parliamentary power as a part of the Crown's inability to find successful mechanisms of control over woodland resources in the early modern period. S. R. Epstein's *Freedom of Growth: The Rise of States and Markets in Europe, 1300-1750* articulates how this may have helped build such a strong market for woodland resources, stating that the governmental environment following the Glorious Revolution in 1688 provided opportunity for private and state economic success.²⁸ Parliamentary members were often land-holding elite who had their own personal economic interests in woodlands, and attempted to limit the Crown's ability to legislate woodland resources to the boundaries of Royal Forests, as depicted by Pluymers and Warde. As these historians suggest, state power and perceptions of timber famine largely intertwine at the intersection of economics and the Royal Navy. Pluymers and Warde present convincing arguments about the contrasting interests of Parliament and Crown, and how these differences shaped and limited legislation regarding woodland management in the early modern period.

Environmental historians have written at length about how English people interacted with, shaped, and were shaped by the environment in the early modern period. Environmental history has become a more popular approach for studying the past, as modern society grapples

²⁷ Standish, 2.

²⁸ S.R. Epstein, *Freedom and Growth: The Rise of States and Markets in Europe, 1300-1750*, (Florence: Taylor & Francis Group, 2000), 12.

with questions about our own relationship with the environment and the current climate crisis. Coinciding with the emergence of “green” activism in the 1970s, environmental historians have begun to take a closer look at humanity’s relationship with the environment in the past. I.G. Simmons describes the methodology well, stating that:

The discipline of environmental history attempts, therefore, to undertake the studies of environments in a way which highlights the interfaces between humans as agents, acting in the light of all their manifold human characteristics (both social and individual) and the non-human world in all its complexities and dynamics.²⁹

John Richards argues that the emergence of new historical schools of thought, like environmental history, are significant to increasing our historical understanding. He argues that “every new historical approach creates its own sources simply by asking new questions of familiar documents”.³⁰ Environmental historians have used the study of humans and the environment to reveal ideas about the intersections of power, energy, and the environment. In his edited collection with Sverker Sörlin *Nature’s End: History and the Environment*, Warde draws particular attention to how in the age of the commons before the enclosure of much of England’s wood and pasturelands, the movement of biomass was still restricted to regulations enforced by manorial governments.³¹ This suggests that access to natural resources and power have been intertwined much longer than may be suggested by political historians.

By focusing on the processes that English people used to intervene with their natural environment, John Richards argues that during the early modern period paths to power were

²⁹ I.G. Simmons, *An Environmental History of Great Britain*, (Edinburgh: Edinburgh University Press, 2001), 2.

³⁰ John Richards, *The Unending Frontier: An Environmental History of the Early Modern World*, (Los Angeles: University of California Press, 2003), 3.

³¹ Paul Warde, “The Environmental History of Pre-Industrial Agriculture in Europe”, *Nature’s End: History and the Environment*, eds. Sverker Sörlin & Paul Warde, (New York: Palgrave Macmillan, 2009), 75.

increasingly related, directly or indirectly, to controlling and exploiting natural resources.³² Simmons, Warde, and Richards all identify changes in the relationship between rural societies and woodlands as the transition from commons to enclosed lands also leads to the complete commodification of woodlands. Simmons argues that woodlands were managed for various types of organic produce, or as Warde identifies it, biomass.³³ From soil, to brush, trees, iron ore, marble, animals, mushrooms, and berries, most of the woodland ecosystem was used by English society in one way or another. Simmons argues that because of this, the use of England's early modern woodlands was a form of industrialization that started much before the Industrial Revolution.³⁴

Simmons employs energy as a lens to study the relationship and interface between humans and the non-human environment, and argues that access to energy and natural resources was used as a political tool and means of social control, which is vital to understanding woodland management.³⁵ He argues that the transition from medieval manors as the resource-allocator to profit-focused systems in the early modern period allowed for the state as a singular body to grow its interests in environmental resources, which he argues can be best demonstrated in the case of timber in the seventeenth century since it was a necessity to maintain the defense of England through its naval strength.³⁶ Richards, also employing energy as a lens to study England's environmental history, draws attention to perceived energy scarcity in core areas like London as a historical process which demonstrates the major changes in the early modern period.³⁷ As the rural areas of England continued to use wood as their preferred fuel-source,

³² Richards, 193.

³³ Simmons, 94.

³⁴ *Ibid*, 111.

³⁵ *Ibid*, 117.

³⁶ *Ibid*, 117-118.

³⁷ Richards, 4.

London was relying more and more on coal, having exhausted the woodland within close proximity. Richards argues that by the mid-eighteenth century, most people in England were using coal, a change that reflects both increased price of wood and possible growing scarcity in particular regions.³⁸

Despite the Royal Navy's central role in the question of perceived timber scarcity, few naval historians have pursued the theme in detail. One major exception is Robert Greenhalgh Albion's seminal 1926 work, *Forests and Sea Power: the Timber Problem and the Royal Navy*. Albion characterized the Royal Navy in this period by its conservatism and corruption.³⁹ He argued that shortfalls in the English Naval timber-purchasing system, and its ever-growing monumental debt as major causes of their inability to find timber. However, Albion held firm to the idea that woodland industries, especially in the Weald, were largely responsible for timber shortages. Particularly, Albion argued that the Weald, where the highest quality English Oak was grown, had been "well devoured" by industry by the Georgian period.⁴⁰ Albion's study of the Royal Navy's timber problem was written before the general narrative of the destruction of England's woods had been more or less debunked, and although he acknowledged the internal issues which caused trouble for the Navy's timber problem, he largely blames the "failure of the woodlands" whose primary function, according to him, was to supply naval timber.⁴¹

Few other Naval historians give the Royal Navy's timber problem much serious attention. Their interests lay elsewhere, in the investigation of great naval battles, the role of the

³⁸ Ibid, 194.

³⁹ Robert Greenhalgh Albion, *Forests and Sea Power: the Timber Problem of the Royal Navy, 1652-1862*, (Hamden: Archon Books, 1965), 37. This book was originally published in 1926, however all references relate to the 1965 reprint.

⁴⁰ Ibid, 117.

⁴¹ Ibid, 95.

Royal Navy abroad, and its internal affairs and the relationship between the Admiralty, Parliament, and the Monarchy. There are peripheral references to the Navy Board's problems procuring timber throughout, but little in-depth discussion. Some historians, like N.A.M. Rodger cite the growing debt of the Navy and costly and rare English compass oak as part of the cause of naval timber shortage.⁴² Jeremy Black all but ignores the timber problem, other than in his evaluation of the Navy's seventeenth-century building program which massively increased the need for naval timber and led to debt, and also an evaluation of the stress of warm waters on England's ships during Caribbean colonization.⁴³

England was certainly not the only nation facing mounting concerns about woodland scarcity in the early modern period. Karl Appuhn argues that by the eighteenth century, every single European maritime power had a fear of drastic domestic timber shortages.⁴⁴ Like England, much of the early modern world in Europe and beyond, including those without strong naval forces or merchant fleets, relied on timber and wood for life's necessities. Across the early modern world, wood and timber became valuable commodities and lucrative markets developed around its exploitation. Thus, there has been much scholarly attention to how other nations responded to their own perceived timber shortages. These studies provide important similarities and contrasts to the English historiography.

As Appuhn argued, historians have determined that many European nations had severe concerns regarding possible timber shortages in the early modern period. In the case of Venice

⁴² N.A.M. Rodger, *The Command of the Ocean, a Naval History of Britain 1649-1815*, (New York: W.W. Norton & Company Inc., 2005), 39.

⁴³ Jeremy Black, *The British Navy and the Use of Naval Power in the Eighteenth Century*, eds. Jeremy Black & Philip Woodfine, (Atlantic Highlands: Humanities Press International, 1989), 4.

⁴⁴ Karl Appuhn, *A Forest on the Sea: Environmental Expertise in Renaissance Venice*, (Baltimore: Johns Hopkins University Press, 2009), 2.

and France, historians have determined that these concerns were often premature and exaggerated, as in England. Paul Walden Bamford argues that alarmist concerns in France started as early as 1588 and escalated to a peak in the 1730s.⁴⁵ Bamford's analysis of scarcity concern reveals that these perceptions were premature and based on localized deforestation which he argued "produced noisy alarms with false overtones".⁴⁶ Appuhn's study of Venice reveals a similar story of an inability to understand local forest ecologies resulting in a perceived supply crisis in the fourteenth century, which led the ruling elite to conceive of temporary shortages stemming from local issues as larger and permanent conditions of declining woodland resources.⁴⁷

Conrad Totman and John Richards' studies of Tokugawa Japan reveal what seem to be very real dangers of scarcity and significant deforestation in the sixteenth and seventeenth centuries. Richards depicts these as Japanese concerns over "bald mountains" where lush forests once stood.⁴⁸ Totman argues that deforestation through the seventeenth century was largely due to the enormous construction of castles, mansions, palaces, shrines, and temples that took place by Japan's new rulers⁴⁹ and the drastic increase in Japan's population, which grew from 12 million in 1600 to 31 million by 1720.⁵⁰ Unlike England, France, and Venice, Totman argues that Japan's timber scarcity came hand in hand with general natural resource scarcity, particularly food scarcity due to rapid population growth and limited external trade.⁵¹

⁴⁵ Paul Walden Bamford, *Forests and French Seapower 1660-1798*, (Toronto: University of Toronto Press, 1956), 70.

⁴⁶ Ibid, 71.

⁴⁷ Appuhn, 25.

⁴⁸ Richards, 173.

⁴⁹ Conrad Totman, *The Green Archipelago: Forestry in Preindustrial Japan*, (Berkeley: University of California Press, 1989), 51.

⁵⁰ Ibid, 172.

⁵¹ Ibid, 129.

Much like historians of English woodland management, these historians credit the widespread concern of early modern timber scarcity, whether very real or perceived, to the development of various state practices to attempt to control and manage forests. Bamford draws attention to French governmental efforts to develop a forest management system, the *Ordonnance des eaux et forêts*, in the mid-seventeenth century, which unlike the English system had a strict and intricate set of rules governing both crown and private forests.⁵² Appuhn argues that early efforts at state regulation of forests were well-intentioned but misguided based on a poor initial understanding of local ecologies, but that in the seventeenth century Venetian rulers began developing an “expertise in forest bureaucracy”⁵³ through cadastral surveys that started in 1565 and campaigns to create topographical and narrative maps.⁵⁴ He argues that this expertise was unique in early modern Europe, and allowed the ruling elite significant power to control how timber reserves were managed through the seventeenth and eighteenth centuries.⁵⁵ Richards argues that Tokugawa Japan had a harsh and highly organized state power which the shogun was able to wield to implement intensive state forest management.⁵⁶ Totman describes state control of management as a tandem “negative regimen” and intensive and knowledgeable silviculture.⁵⁷ He argues that strict sumptuary and forest resource transportation regulations helped limit the most severe problems while the development of intensive tree planting and other silviculture techniques based on a “conservation ethic” allowed for generally successful reforestation in the eighteenth century.⁵⁸ While the success of these various state interventions and attempts at intensive forestry control differed, like historians have demonstrated in the case of England, state

⁵² Bamford, 20.

⁵³ Appuhn, 197.

⁵⁴ Ibid, 206, 242.

⁵⁵ Ibid, 198.

⁵⁶ Richards, 154, 156.

⁵⁷ Totman, 130.

⁵⁸ Ibid, 183, 189.

power and woodland resources became further intertwined across the early modern world due to perceived timber scarcity.

Although, like historians of England, those of France and Venice often view the study of woodland management through that of naval power and shipbuilding, since they were integral elements of their state power, there is also a growing investigation into the competing woodland interests of the state and its people, along with attention to how forestry regulations impacted laity during this period. Appuhn argues that social variables established limitations on Venetian access to forests on the mainland because residents often had different interests and needs than those of Venice, which if Venetian authorities were inattentive to forest holdings, led to management against their interest.⁵⁹ This is reflective of the English experience between Parliament, the Crown, and the people of England. Chandra Mukerji argues that historians like Bamford have described the seventeenth-century French forest managed as “a means of rationalizing the landscape to suppress peasant cultures and empower the state.”⁶⁰ Mukerji, on the other hand, suggests that the surveys resulting from the *Ordonnance des eaux et forêts* were aimed at disciplining exploitative practices of French rural nobility rather than peasant commons woods.⁶¹ Richards argues that sumptuary regulations in Japan were based on social status.⁶² Totman states that this meant that the poor were subject to the most restricted access to forests and were severely impacted as a result.⁶³

⁵⁹ Appuhn, 34.

⁶⁰ Chandra Mukerji, “The Great Forestry Survey of 1669-1671: The Use of Archives for Political Reform”, *Social Studies of Science*, vol. 37, no. 2 (2007), 227.

⁶¹ *Ibid*, 228.

⁶² Richards, 184.

⁶³ Totman, 190.

The historiography of timber scarcity and the complex nature of attempts to manage and control woodland resources is a growing field throughout histories of the early modern period. Appuhn states that, “the relationship between the emergence of market economies backed by strong centralized states and global environmental change is now widely recognized as one of the most distinctive and important developments of the seventeenth and eighteenth centuries.”⁶⁴ The varying degrees of scarcity, the differing levels of response to perceived crisis by the state, and the widely different climactic, geological, geographical, and ecological circumstances in different early modern nations require individual as well as comparative studies to develop a more intricate and nuanced understanding of the relationship between people and woodlands in the early modern world.

The nature of woodland management and timber famine in seventeenth- and eighteenth-century England is complicated. Historiographical focus on the sixteenth and early seventeenth centuries further complicate eighteenth-century studies. Historians now largely agree that timber famines have been overexaggerated, and that England was in fact not bare of trees. There were regional differences in timber shortages and deforestation, and one did not equal the other. There is little agreement on the exact nature of the timber famine; especially in terms of identifying the root causes of famine and to what extent it existed. The diverse nature of England’s landscape requires more regional studies on the realities of woodland resource shortages. Local socio-economic conditions and varying ecologies means that what may prove true for one region of England during this period is not representative of another.

⁶⁴ Appuhn, 9.

This study contributes to the existing body of literature on the realities of timber scarcity in the early modern period by addressing the significance of wealth as a motivator for sustainable private woodland management and the contrasting interests private landowners, rural communities, and the Royal Navy had in woodland products. By assessing private estate woodland management alongside the intricacies of timber shortages at the Royal dockyards in Southeast England, this study contributes to the discussion on the relationship between English society, environmental management, and the commodification of the natural resources by exploring the role sustainable private woodland management had in a significant wood-reserve region of seventeenth- and eighteenth-century England.

Methodology

The primary sources for this project can be broken up into three distinct groups. The first are documents from the Glassenbury Estate, in the Wealden parish of Cranbrook, Kent, from the seventeenth and eighteenth centuries. This is comprised of sources such as the *Wood Book*, an estate record that covered the felling and selling of the managed woodlands from 1686 to 1784; rental and estate profits; estate and timber audits; maps of various parts of the estate; and other miscellaneous estate documents such as timber agreements, title deeds, and correspondence. The second group is a series of letters to and from the Commissioners and Officers of the Navy Board at Sheerness and Chatham dockyards in Kent from 1690 to 1719. This series of correspondence cover business regarding the repair and constructions of ships, worker payments, naval stores, and most importantly timber procurement. The third group is comprised of parliamentary reports in 1771 and 1792 regarding the state of timber management in England and the concerns of the Royal Navy.

These sources provide a robust set of qualitative and quantitative data with which to analyze with the support of Historical Geographic Information Systems (HGIS). HGIS adds dimension to this study by allowing me to incorporate attribute data from quantitative primary sources like the *Wood Book* with various historical maps and qualitative sources to create a spatial-visual analysis of woodland management at Glassenbury. This helps produce a more nuanced understanding of how private landowners managed their woods, and how this contrasted with the interests of the Royal Navy. This also amplifies the spatial and visual contexts for the timber problems faced by the Royal Navy in Kent.

Before being adopted by humanities scholars, GIS largely existed as a methodology in disciplines which have access to scientific, data-rich environments which favour quantitative data.⁶⁵ The nature of historic sources, (in the case of this study: historic maps, written sources, and physical landscape features) are dependent on our ability to preserve the past. Historic sources can be altered, misplaced, and destroyed. The sources often do not adhere to the carefully collected and highly uniform datasets that GIS specialists prefer to use. Thus, HGIS rarely allows for complete datasets. However, by carefully combining historic data of both qualitative and quantitative nature, comprehensive HGIS studies can situate history within a geographical context that illuminates the past.⁶⁶ HGIS allows for the integration of spatial differentiation and temporal differentiation to study patterns of change over time,⁶⁷ or in the case of this study, as will become clear, obvious patterns of continuity.

⁶⁵ Ian Gregory and Paul Ell, *Historical GIS: Technologies, Methodologies and Scholarship*, (Cambridge: Cambridge University Press, 2007), 1.

⁶⁶ Anne Knowles, *Placing History: How Maps, Spatial Data, and GIS are Changing Historical Scholarship*, (Redlands, California: ESRI Press, 2008), 3.

⁶⁷ *Ibid*, 3.

Ian Gregory suggested that GIS should be considered a type of database management system, rather than simply a mapping system.⁶⁸ HGIS is best understood as more than just a way to *map* the past, but rather, as a system that allows for the analysis of historical data using a spatial or geographic lens. This is the approach towards HGIS that I have taken throughout this study. This methodology has three primary advantages: it structures data in explicitly spatial ways, it allows for better data visualization, and provides the ability to integrate otherwise incompatible sources.⁶⁹ Thus, by deploying HGIS, I can analyze and visualize evidence which suggests early modern sustainable woodland management on private estates was motivated by personal profit.

This project combines aspects of political history, economic history, social history, and most importantly environmental history. There are elements of political ecology, the history of the countryside, and the economy of natural resources, but at the center of it I have tried to place the relationship between people and environments. Environmental history is the study of human and non-human interaction over time, it promotes questions about the impact humanity has on landscapes and environmental systems, and vice-versa, and the place of humanity and human-built systems within local and global ecosystems. Since woodlands are one of the primary focuses of this study, we must understand and acknowledge the geology and ecology of trees, woodlands, and the English landscape. Although human societies have major impacts on the environment, the environment (and here I mean non-human aspects: plants, animals, climate) do also exist outside of human interference. Trees especially, are historical actors themselves.

⁶⁸ Ian Gregory, “‘A Map is Just a Bad Graph’: Why Spatial Statistics are Important in Historical GIS” in *Placing History: How Maps, Spatial Data, and GIS are Changing Historical Scholarship*, (Redlands, California: ESRI Press, 2008), 124.

⁶⁹ Ian Gregory and Alistair Geddes, *Towards Spatial Humanities: Historical GIS & Spatial History*, (Indiana: Indiana University Press, 2014), xiv.

Woodlands grow, migrate, and die with and without human interference. Cutting down a woodland does not result in a woodless land. Rather, woodlands disappear through encroachment, by humans, or at times through other phenomena. As Oliver Rackham posited, “when a wood disappears one should not ask ‘why was it cut down?’ for all old woods have been cut down from time to time – but ‘why did it not grow again?’”⁷⁰

Geographic Context

This study focuses on South-Eastern England, primarily Kent, in a region known as the Weald.⁷¹ The Weald is a significant area of study because both historically and contemporarily, it represents some of the most densely wooded area in England. This area is made up of the High Weald and Low Weald geological areas which have unique soil composition and dense woods. An understanding of the ecology of the Weald, especially that of the Wealden woodlands, is an essential part of understanding the relationship between English woodland use and the environment. The name Weald comes from *Andredesweald*, the Jutish name for the region, which was adopted from the German word *Wald*, which meant forest.⁷² Palaeoecological evidence suggests that there was a rapid development of trees in the Weald by c.9400 BCE, and that these woodlands were likely characterized by a closed forest-system which dominated the Wealden landscape prior to human colonization.⁷³ Although permanent settlement in the Weald led to general deforestation, the geology of the landscape did not lend itself to productive large-scale farming and was therefore never deforested to the same extent as the rest of England. In fact, the High Weald in particular is characterized as a medieval landscape, having generally

⁷⁰ Oliver Rackham, *The History of the English Countryside: The Classical History of Britain's Landscape, Flora, and Fauna*, (London: Orion Publishing Group, 2000), 67.

⁷¹ **Select the button “Wealden Boundary”**

⁷² Brandon, 3.

⁷³ Harris, 14.

changed very little since the fifteenth century. Thus, for the extent of human settlement in the Weald, it has been a fluctuating yet generally densely wooded area. This makes it an ideal location for a regional study of woodland use because throughout history, especially during the period of this study, the Weald was exceptionally important as a source of timber and wood reserves used by all manners of people, especially private woodland owners, woodland industries, and the Royal Navy.

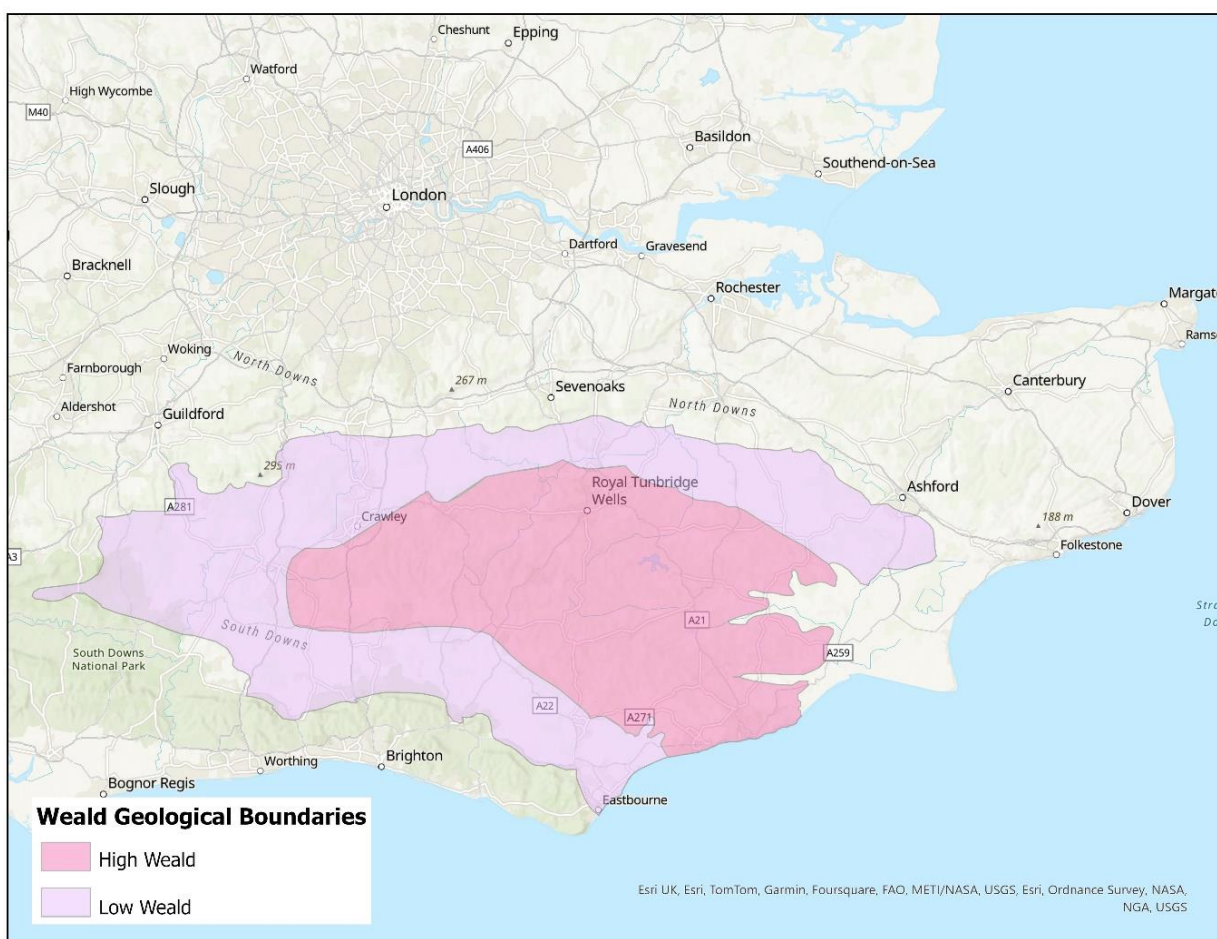


Figure 1: Location of the Weald based on data from the British Geological Survey and High Weald AONB.

Woodlands and the State: Historical Context

The period before and during this study can be generally characterized by various State attempts to balance the needs of the Royal Navy with Crown goals to increase revenue through varying forms of Forest Law. Legislation from Henry VIII's *Act for the Preservation of Woods* (1543) onwards attempted to control woodland use to benefit Royal Navy stores, but various monarchs, especially the Tudors and early Stuarts, had growing interests in using Forest woodlands to generate revenue for the Crown. Established following the Norman Conquest, Forests were crown-owned lands primarily meant to keep deer for hunting purposes.⁷⁴ Forests, in this context is a legal term rather than an ecological one. These lands were controlled via Forest Law, which had its own distinct courts and officials who regulated designated crown-owned lands for the purpose of hunting. The term Forest was adopted from the Latin word *foris*, this meant “outside, from outside” or in other words, “beyond ordinary law and the normal world of country people.”⁷⁵ Forests were not always wooded, although they often contained large swathes of woodlands. In addition to being protected hunting grounds for the Crown, Forests were also timber reserves for the Royal Navy, to varying degrees of success over the centuries. Forest woodlands also served as an opportunity to generate crown revenue, through selling permits to lease land or fell trees, primarily to woodland industries and charcoal makers.⁷⁶

Following the Norman Conquest, different monarchs had varied interests in hunting and other personal uses of Forests. The Tudors, for example, were more and more disinterested in

⁷⁴ To avoid confusion, when referencing Forests as understood during this period in England, it will be capitalized. Uncapitalized use of “forest” refers to our modern understanding of forest as a wooded area.

⁷⁵ Brian Short, *“Turbulent Foresters”: A Landscape Biography of Ashdown Forest*, (Suffolk: Boydell Press, 2022), 1.

⁷⁶ Richards, 226.

deer hunting and instead disafforested⁷⁷ and sold crown land regularly.⁷⁸ Disafforestation and manipulations of Forest Law to suit the benefit of Tudor Kings and Queens was common.

Elizabeth's Forest policy included selling timber felling licences throughout Forests, while also using medieval Forest Laws to recapture previously disafforested lands and then bring them back under Crown control.⁷⁹ She enacted and expanded timber and wood preservation laws to ensure wood-fuel for London and to prevent the felling of trees near waterways to benefit the Royal Navy.⁸⁰

In Elizabeth's time, iron, cloth, and glassmaking had reached new economic heights with their industries highly concentrated in southeast England. Iron was an essential woodland industry that the Crown relied on for production of construction and artillery. Elizabeth therefore ensured that iron-makers in the Weald, who had a monopoly on weapon production for the Crown, were exempt from new statutes that limited charcoal production for ironworks.⁸¹ Elizabeth also revamped surveys of Forests and crown-owned woodlands and reinvigorated the surveyor's job of marking trees to be preserved for use by the Royal Navy. In doing so, Elizabeth also gave additional power to surveyors, especially those acting under Crown authority like Roger and John Taverner, whose seminal Forest surveys from 1560 to 1590 "provided a vision of English forests, one that blended social, legal, economic, and environmental characteristics together."⁸² Surveyors came to be loved by landlords and detested by tenants, who often felt that their rents were raised or their rights cut following a surveyor's visit.⁸³

⁷⁷ A legal term under forest law which reduced that land's privileges as a "Forest", allowing Monarchs to sell the land privately for profit.

⁷⁸ Rackham, *Trees and Woodland*, 172.

⁷⁹ Richards, 226.

⁸⁰ Pluymers, 18-20.

⁸¹ *Ibid*, 18.

⁸² *Ibid*, 19.

⁸³ John Norden, *The Surveyors Dialogue*, (London: I.N., 1610), 2.

James I and Charles I took a greater interest in hunting and used Forests for their own personal use in addition to revenue generation. James I also ended Elizabeth's prohibition of new ironworks outside the Weald and leased several Forest woodlands to gentry for charcoal production.⁸⁴ James' Forest policy largely reflected his interest in maintaining consistent revenue through leases and wood sale at the behest of the Royal Navy and common rights to land use on Crown lands like the Forest of Dean. Charles I took a more dramatic approach, and continued to disafforest lands which were bought by gentry and ploughed for agricultural use. He also doubled down on woodland leases to iron makers while attempting to emphasize reserving timber trees for the Royal Navy. Charles I continued to cut common rights through enclosures and generated additional revenue through leases and fines for violating Forest Law.⁸⁵ In the case of the Forest of Dean, Charles I tried to balance naval and iron founders' interests, but it caused growing tensions between the competing uses of woodlands throughout his reign.

Forest policy largely took a backseat in the Interregnum, but Parliament continued to disafforest land with the goal of slowly selling it all.⁸⁶ Cromwell's ship-building campaign through the 1650s required massive amounts of timber. By 1660, the English naval fleet had grown to 76 ships of the line and 55 cruisers, from just 46 ships of the line and 26 cruisers a decade earlier.⁸⁷ The exponential growth of the Royal Navy under Cromwell also led to monumental debt for the Navy by 1654, which continued to grow following the Restoration, leading to near-depletion of timber stores at the Royal dockyards through the 1660s and 1670s.⁸⁸

⁸⁴ Albion, 124. Pluymers, 39.

⁸⁵ Pluymers, 42.

⁸⁶ Cantor, 104-5.

⁸⁷ N.A.M. Rodger, *The Command of the Ocean*, 607.

⁸⁸ TNA, ADM 106.

The Royal Navy had had a sustained timber problem since at least 1535.⁸⁹ One rated ton of a Navy warship used from 1.5 to 2 loads (2.1-2.8 cubic metres) of timber which meant that every ship consumed thousands of mature trees.⁹⁰ Royal Navy ships had a typical lifespan of eight to fifteen years depending on water conditions, which required consistent renewal or repairs of vessels to ensure a sufficiently sized fleet.⁹¹ Thus, constant attention was required to ensure Navy stores had sufficient timber to repair ageing vessels and construct new ships to maintain and grow the fleet. Although the typical amount of timber required at a dockyard at any one time was a difference of opinion, throughout the eighteenth century, the Navy's policy was to have three years timber supply at all dockyards at any time.⁹²

Shipbuilding required both straight standard and curved compass timber. Compass timber grew primarily in fields, wood-pastures, and hedgerows. Here, English oaks could spread their branches to grow into curved fashion because of exposure to the elements. Standard timber grew in woodlands, where trees had to compete for space and sunlight, and grew tall and straight rather than wide and curved. Although suitable fir trees for masts could be found in Scotland, superior quality was found in the Baltics and England had, for most of the early modern period, imported masts from that region to outfit its Navy ships.⁹³ Timber trees had to grow for 80 to 125 years to reach adequate sizes for shipbuilding. By the time timber trees had grown to this size, it was incredibly heavy and very difficult to transport, and usually was limited to

⁸⁹ Albion, 121.

⁹⁰ Richards, 224.

⁹¹ Black, 4.

⁹² "A Report from the Committee appointed to consider how His Majesty's Navy may be better supplied with Timber, 1771" in R.J.B. Knight's *Shipbuilding Timber for the British Navy: Parliamentary Papers, 1729-1792*, (Delmar: John Carter Brown Library by Scholars' Facsimiles & Reprints, 1993), 141. Further referred to as "The Report" (1771).

⁹³ Richards, 225.

approximately 20 miles distance by land.⁹⁴ Any land travel further than this came at a higher cost. All these particulars meant that at the best of times, maintaining and growing the Royal Navy was a major feat. The balance required between maintaining old ships and building new ones every 8-15 years, and the 80–125 year growth cycles for timber trees, coupled with the limitations of transporting timber, makes the general nature of the timber problem clear. Dedicated and consistent resources for the Royal Navy were necessary to ensure that there was always sufficient supply of timber for the upkeep of the fleet. Nevertheless, growing interest in colonial exploits, constant wars, and varying interests of Parliament and the Crown meandered away from, and closer to the needs of the Navy throughout the sixteenth to nineteenth centuries.

Although the story of the Royal Navy's timber shortage is usually focussed on the seventeenth century, the problem of debt, depletion of timber stores, and poor Forest management continued through the Georgian era. The War of Spanish Succession (1701-1714) and the Seven Years' War (1756-1763) put increased pressures on the Royal Navy, which continued to expand its fleet with limited funds and access to timber, increasingly stretching perceptions of the timber famine. Continued conflicts of interests between the Monarchy and Parliament exacerbated concerns throughout the eighteenth century. While various acts were designed to alleviate the pressure on the Royal Navy, a refusal to understand the root causes of the "timber famine" led to few effective solutions.

This period was also shaped by the growth of British economic dominance abroad and saw more and more private citizens and emerging corporations taking advantage of British colonization in the East Indies, Caribbean, and North America to increase their wealth through

⁹⁴ Albion, 103.

trade. The number of privately-owned merchant vessels in England grew exponentially as a result. The East India Company alone built 75 ships between 1759 and 1770.⁹⁵ Perceived shortages of domestic supplies, from timber to pitch and tar, to nails, and even beer, made the Royal Navy dependent on international trade and colonial exploits to furnish ships. The fleet generated a robust international demand for naval products, and was the “leading purchaser of imported timber, tar, pitch, and other naval stores in the British Isles.”⁹⁶

By the eighteenth century, Wealden ironmaking, Kentish broad-cloth production, and Wealden glassmaking had significantly declined. The decline in Wealden iron-making was multi-dimensional; a series of droughts in the early and mid-seventeenth century decreased the efficiency of watermills in the Weald, and competition from continental Europe had put economic pressures on Wealden iron mongers.⁹⁷ This should have allowed for regrowth of the “spoil of the goodly Forests, woods, and trees,”⁹⁸ and alleviated some of the stresses on the Royal Navy’s timber problem, if Standish, Evelyn, and the Royal Navy Commissioners were correct about the roots of the timber problem. However, this was not the case. Any lack of demand for coppice-wood from the iron, cloth, and glass industries was absorbed into the local woodland economics of Wealden towns. Kent’s hop industry in the late seventeenth century moved in quickly to replace iron, cloth, and glassmakers. The growth of hopped brewing required hundreds of thousands of twelve- to eighteen-foot poles to grow hops throughout the country. Private woodland owners saw no decrease in demand for their natural resources, despite

⁹⁵ “The Report” (1771), 35.

⁹⁶ Richards, 204.

⁹⁷ Cantor, 133.

⁹⁸ John Evelyn, epistle to the reader.

fluctuation between productivity of various woodland industries. At the same time, countryside villages and rural people continued to use wood and timber for various everyday necessities.

The exponential increase in merchant ships to satiate the appetite of profit-hungry colonial merchantmen added another powerful interest group to the timber problem. As we will see, very few, if any merchants reported any concern or complaints regarding inability to access timber to build their ships. Rather, the Admiralty and Navy Board accused merchant shipbuilders like the East India Company, and woodland industries like ironmaking, of fueling the Navy's "timber famine". This is the political and economic atmosphere that surrounded woodland management in the Weald. The Crown, which had never been very successful at implementing effective Forest or woodland policies found itself at odds with other interest groups about the control, management, and use of woodland resources. This was certainly the hay-day for private woodland owners, who could capitalize on the various demands for their products and respond accordingly. Nevertheless, the idea of possible dangerous and disastrous timber shortages continued to haunt polemic texts, Parliament assemblies, and the letters of Naval Commissioners.

Chapter I: Roots of Competing Interests

Early modern England's dependence on woodland resources meant that there were several interest groups with competing personal and economic stakes in who controlled woodlands and how they were managed. In the Weald, the biggest interest groups included private landowners, the Royal Navy, rural communities, timber merchants, merchant companies like the East India Company, and polemicists. This chapter introduces the leading actors of Wealden woodland management and the perceived timber famine from 1680-1790. This chapter also discusses the ways early modern English landowners conceived of the environment and natural resources, and ideas of nature, environment, and ecology that developed through the lens of improvement, productivity, and commodification. The commodification of woodlands and woodland resources based on how landowners conceived of these environments deeply shaped the wood and timber markets. This had drastic impacts on how different interest groups accessed woodland resources.

By 1680, most Wealden woodlands were privately owned by gentry landlords who held manorial power over local villages and communities. These estates held exceptional power in their communities, especially since they owned the local woodlands that the community needed for their livelihood. This study focuses on one such gentry family, the Roberts, owners of Glassenbury Estate, a powerful Wealden manorial force with ample woodlands. Glassenbury Estate was the largest and most influential manor in the parish of Cranbrook from the medieval period until the early twentieth century. The original Glassenbury house was established shortly following the Norman Conquest as a feudal manor with limited land.⁹⁹ However, Glassenbury as

⁹⁹ C.C.R. Pile, *Cranbrook: A Wealden Town*, (Cranbrook: Cranbrook and Sissinghurst Local History Society, 1955), 45.

it existed in the seventeenth and eighteenth centuries was the amalgamation of various denes originally owned by different manors, slowly collected by the owners, the Roberts family, over a period of roughly 250 years.¹⁰⁰

The parish of Cranbrook lies within what used to be the Hundred of Cranbrook in Southern Kent. It straddles the boundaries between the High and Low Weald, although the town itself and Glassenbury Manor are well within the High Weald, and inside the contemporary boundaries of the High Weald Area of Outstanding Natural Beauty (AONB). The Hundred of Cranbrook was large, encompassing the parishes of Cranbrook, Fritten, and Staplehurst in their entirety, along with portions of the parishes of Benenden, Biddenden, Frittenden, Goudhurst, Hawkhurst, and Hedcorne.¹⁰¹ The area was and remains very well wooded, holding the natural resources necessary to fuel productive woodland industries. In his 1798 *History and Topographical Survey of the County of Kent*, Hasted described the parish of Cranbrook as:

...exceeding healthy, and considering the deepness of the soil, and the frequency of the woods, far from being unpleasant; the oaks interspersed over it, like the adjoining country, are numerous and of a large size, the hedge-rows broad, and the inclosures small. The north and east parts especially are covered with woods, which consist mostly of oak. There are several rises of small hill and dale throughout it; the soil is in general, excepting in that part of it northward of the church, about Anglye, where it is a light sand, and the lands of course poor, a kindly fort of clay, which is rendered more fertile by its native rich marle, of which there is much throughout it; besides arable, there is much rich pasture and fatting land, and some hundred acres of good hop-ground.¹⁰²

¹⁰⁰ Ibid, 45.

¹⁰¹ Ibid, 4.

¹⁰² Edward Hasted, *The History and Topographical Survey of the County of Kent: Volume 7*, (Canterbury: W. Bristow, 1798), 91.



Figure 2: Map of Kent by John Speed, 1627. Cranbrook is located to the south, close to the Sussex boarder.



Figure 3: Map of Kent by Willem and Jan Blaeu, c. 1650. Note how the map features trees densely populating the area of the Weald.

Cranbrook is a perfect example of a classic early modern Wealden town.¹⁰³ Its location allowed it to flourish as one of the centers of Wealden trade, since there were maintained roads to larger cities like London, Maidstone, and Tunbridge Wells. Although like most of the Weald, interior roads were poor and made with sand which proved for difficult transport in rainy and snowy seasons, there were several principal highways from Cranbrook out of the Weald which were more accessible and better maintained, making it an ideal location for a thriving market-economy based on woodland industries.¹⁰⁴ Small-scale iron manufacturing, glass production, and brick-firing existed in the area from the medieval period through the early modern period but Cranbrook's largest woodland industry was undoubtedly cloth production.

Wealden cloth production started in the early fourteenth century following the settlement of Flemish clothiers whose immigration was sponsored by King Edward III in hopes of challenging the cloth monopoly of the continent.¹⁰⁵ By the mid-fourteenth century, the Kentish Weald had a thriving broadcloth industry with Cranbrook at the epicenter. Broadcloth was a luxury, high-quality cloth which was highly regulated in size and weight, being a minimum of 28 yards long and at least 86 pounds heavy.¹⁰⁶ Its production required large amounts of wood fuel to heat the vats and coppers used to dye the fabric, and Cranbrook's well-wooded landscape and relative access to London and the Medway River made it ideal for a thriving cloth-centered economy. The broadcloth industry made Cranbrook an important center for industry and trade. By the early 1600s, 64% of England's broadcloth industry was concentrated in the parish of Cranbrook.¹⁰⁷ Industry peaked in the late sixteenth and early seventeenth centuries the late

¹⁰³ Select the button "Cranbrook" to zoom into the area of the town.

¹⁰⁴ Hasted, 91.

¹⁰⁵ Brandon, 148.

¹⁰⁶ Ibid, 148. James Preston, *Kent's Industrial Heritage*, (Gloucestershire: Amberley Publishing, 2016), 7.

¹⁰⁷ Preston, 7.

seventeenth century saw a steady decline in production because of foreign competition and the market favourability towards lighter-weight materials rather than heavy broadcloth.¹⁰⁸

The three hundred years of industrious cloth production led to lasting prosperity for Cranbrook. The population of the parish grew steadily while people flocked to the town for opportunities to work. Cranbrook's most influential families, like the Courthopes, Hendleys, Goodmans, and Bigges all had cloth production to thank for their rise in wealth and social station.¹⁰⁹ The Roberts, owners of Glassenbury Estate, were early benefitters of the Cranbrook broadcloth industry and rose to the level of Wealden gentry by the mid-fifteenth century.¹¹⁰

The Roberts, originally Rockhurst,¹¹¹ family immigrated to Goudhurst from Scotland in 1103. The family took possession of Glassenbury Manor in 1399 through marriage, and over the next 250 years the family grew the Estate through marriage and wealth derived from the cloth trade, bringing more and more land under their control. The family continued to use the name Rockhurst until Walter (1442-1522) officially changed the name to the anglicized Roberts to better suit their growing status as English gentry. Walter Roberts was an industrious man, interested primarily in growing the family's social and economic status. One of his major escapades was to move the original seat of Glassenbury into the valley south of Goudhurst and west of Cranbrook, where he built a new moated manor house surrounded by a park in 1473.¹¹² The construction of the new Glassenbury Manor represented the new era of social status for the Roberts who had risen to the rank of landed gentry. The new manor house and surrounding park was just over 28 acres and included a "nobles pond", a moat, various meadows, manicured

¹⁰⁸ Cantor, 123.

¹⁰⁹ Brandon, 151.

¹¹⁰ Ibid, 170.

¹¹¹ Also referred to as Rokehurst or Rookehurst.

¹¹² Hasted, 95.

gardens, stable yards, a bowling green, groves, and other ornamental landscape features.¹¹³ The architectural design of the manor, with a large moat surrounded by a wooded park represented a physical separation between the Roberts and the country-folk of Cranbrook, further establishing their position as powerful Wealden gentry.

Throughout the sixteenth and seventeenth centuries, the Roberts continued to grow the Estate and were granted a Baronetcy in 1620 by James I. Following this, several Roberts Baronets served at Glassenbury to varying effects. Some oversaw periods of growth while others nearly bankrupted the Estate.¹¹⁴ The period of this study saw several major changes in who controlled Glassenbury Estate and to what extent they were present to oversee daily management. From 1680 until the mid-1740s, the Baronet supervised the daily management of the Estate, including overseeing tenant agreements, woodland management, and other estate duties.¹¹⁵ For the rest of the period of this study, they often ruled as absent landlords, intrusting the day-to-day operations to Glassenbury Estate Manager Thomas Redford.¹¹⁶

Unfortunately for the family, an unhappy and short-lived marriage between Jane Roberts (1731-1778) and George Beauclerk, the Duke of St Albans (1730-1786) made the Duke a “tenant for life” at Glassenbury, allowing him to collect the income generated from woodlands and tenancy.¹¹⁷ Jane, leaving no heirs from her short marriage, bequeathed Glassenbury to a distant Irish branch of the family who took over the estate following the Duke’s death. Even during

¹¹³ KA, U410/E144.

¹¹⁴ See Penny Olsen, *The Story of Glassenbury 1272-1999*, (Kent: James & James, 2001) for details on the Roberts family through this period.

¹¹⁵ *Ibid*, 47, 53.

¹¹⁶ *Ibid*, 72.

¹¹⁷ *Ibid*, 63.

Beauclerk's absent "tenancy", Sir Thomas Roberts (1738-1814)¹¹⁸ of the Irish branch kept constant communication with estate manager Redford.¹¹⁹ Regardless of who was "in charge" at Glassenbury and the lack of permanent settlement of the Baronetcy at the manor through the second half of the eighteenth century, the Estate's natural resources were continuously and meticulously maintained. Redford's accounts demonstrate continued thorough management, following previous management techniques used by the early eighteenth-century Roberts who oversaw daily activities in person to ensure continued profit from the Estate's woodlands and leases.

The Roberts of Glassenbury were traditional manorial gentry. Aside from their early success in the cloth industry, their entire income was reliant on their land ownership. Land ownership was a popular investment for early modern gentry, since it had the principal economic advantage of being generally secure compared to other investment strategies.¹²⁰ Glassenbury had thousands of acres of wood, pasture, and farmlands which were managed to generate significant income through land rentals and selling woodland resources. For gentry, woodlands had the potential to provide substantial revenue if managed appropriately, and Glassenbury serves as an example of gentry being able to do so.¹²¹ Brandon described the type of landlord style the Roberts employed:

although Tudor members of the family held local government office and received knighthoods, later heirs seldom pursued ambition, or indeed a profession, and were

¹¹⁸ Olsen, 69. The relation between the Glassenbury Roberts and the Irish Roberts is contested, and Jane's choice of heir was highly controversial at the time. This resulted in a new Baronetcy following the establishment of the Irish branch.

¹¹⁹ Ibid, 72.

¹²⁰ Lawrence Stone & J.C. Fawtier Stone, *An Open Elite: England, 1560-1880*, (Oxford: Oxford University Press, 1986), 11.

¹²¹ Cantor, 98.

content instead to be gentlemen of leisure in their charming countryside in the ranks of the lesser gentry, intermarrying with Kentish and Sussex families.¹²²

Glassenbury serves a typical example of Wealden estates in the early modern period. The land was won through generations of marriage and enclosed as a reward from the Crown. Glassenbury Estate, which was made up of thousands of acres of farms, pastures, woodlands, and orchards provides an example of the wooded nature of Wealden estates. Some of the other Wealden estates of this size, such as Robertsbridge in East Sussex, made substantial money from sustained participation of woodland industries, like iron production. The Sidney Ironworks, owned by the seat at Robertsbridge, was in operation throughout the sixteenth century.¹²³ Unlike Robertsbridge and the Sidney family, the Roberts of Glassenbury wiped their hands of actual industry involvement by the seventeenth century and continued to climb the social and economic ladder as present or absent landlords who prioritized active woodland management which the local community came to depend on.

Glassenbury Estate had significant influence over the people of Cranbrook. As owners of the largest volume of woodland and significant farmland, the rural townsfolk of Cranbrook and the surrounding villages depended on the Roberts for woodland resources. They also were important clients of Glassenbury, since their purchases are what fuelled continued wealth for the Estate. Estate records demonstrate that Glassenbury sold wood to a diverse group of people in the parish. The Roberts sold to generations of local families, like John, Thomas, and Stephen Stringer, or William, Henry, and John Manwaring.¹²⁴ They sold to local labourers whose jobs required underwood; the local butchers, clothiers, thatchers, sawyers, smiths, sadlers, joiners,

¹²² Brandon, 171.

¹²³ D. W. Crossley, *Sidney Ironworks Accounts, 1541-1573*, (London: Royal Historical Society, 1975), 2.

¹²⁴ CM, *Wood Book*, 1686-1784.

braziers, shoemakers, and the apothecary owner. They also sold to gentleman from the local taverns and inns, like the Swan, the Eagle, the Kings Head, the Bull, and the Star and Crown.¹²⁵ Additionally, everyday folks from the nearby towns, especially Cranbrook bought their underwood for daily personal purposes like heating their houses. They sold to the bailiff, attorneys, weavers, clerks, market fold, and tailors.¹²⁶ The Roberts even sold to their own tenants and husbandmen who rented farmland from them, like John Vousden, Edward Ongley, Thomas Drawbridge, and William Manwaring.¹²⁷

The reliance of English society on wood meant that everyone was part of the woodland economy. The people of Cranbrook relied on Glassenbury to buy essential woodland materials since the weight of wood made it difficult and much more expensive to procure from a distance. For the Cranbrook peasantry and ordinary townsfolk, access to wood was not a matter of producing wealth, but rather one of survival and livelihood. The villagers, farmers, and countryfolk in the Cranbrook parish made up a productive and closed woodland economic system which was essential to the Roberts' financial success and the towns prosperity.

Timber merchants, the East India Company, and the Royal Navy also had vested interests in Wealden woodlands. As part of the larger timber market, these groups were not a big part of the local woodland economy in Cranbrook, but big figures in the timber industry which Glassenbury also played a role in. Timber merchants served as the intermediary between private timber owners and merchant ship companies like the East India Company and the Royal Navy.¹²⁸ Timber merchants had intrinsic economic interests in private woodland management and

¹²⁵ CM, *Wood Book*.

¹²⁶ *Ibid.*

¹²⁷ *Ibid.*

¹²⁸ TNA, ADM 106/397 & 433.

perceived timber scarcity. They sought out private woodland owners, purchased their timber and transported it to buyers where they could sell it for a profit.

William Collins was a timber merchant from Brenchley.¹²⁹ He is the only timber merchant named in Glassenbury records of timber sales and was known as a prominent merchant to the Royal Navy.¹³⁰ He was one of the nine timber merchants questioned by the Commissioners of the Land Revenue in 1791 for the *Eleventh Report of the Commissioners appointed to enquire into the State and Condition of the Woods, Forests, and Land Revenues of the Crown, and to sell or alienate Fee Farm and other Unimprovable Rents* (1792). Records suggest he worked primarily in the Sussex and Kentish Weald, selling to the Royal Navy and merchant shipbuilding companies.¹³¹

Increased global trade built on the foundation of colonization, forced subjugation, and slavery, generated swathes of personal and state wealth throughout the eighteenth century. Maritime shipping was essential to England's growing wealth and global dominance, and merchant shipbuilding increased along with trade. The East India Company was the largest and most influential English trading corporation of the period, and one of the largest consumers of naval timber. The East India Company had a large fleet and efficient shipbuilding program, between 1759 and 1770, the East India Company built 75 ships in England alone.¹³² They also

¹²⁹ KA, U410/E145.

¹³⁰ "The Eleventh Report of the Commissioners appointed to enquire into the State and Condition of the Woods, Forests, and Land Revenues of the Crown, and to sell or alienate Fee Farm and other Unimprovable rents", 1792 in R.J.B. Knight's *Shipbuilding Timber for the British Navy: Parliamentary Papers, 1729-1792*, (Delmar, N.Y.: John Carter Brown Library by Scholar's Facsimiles & Reprints, 1993), 57. Further called "The Eleventh Report" (1792).

¹³¹ *Ibid*, 58.

¹³² "The Report" (1771), 16.

owned an additional had a “European built” fleet in their service, which grew substantially from 55 ships in 1740 to 87 by 1770.¹³³

The Royal Navy saw the East India Company as one of its largest competitors for domestic naval timber.¹³⁴ Although merchant shipping had increased across England, the East India Company’s fleet was certainly the largest in the size of the fleet and average ship size compared to other merchant fleets.¹³⁵ By the mid eighteenth century, the East India Company had grown to be a significant force. Although the Company continued to preach that it was interested in trade alone, its expansion and power in India had transformed it from an economic power to an imperial one.¹³⁶ At the center of its power was the intricate maritime trade organization that relied on efficient and reliable ships to move goods, people, and money. The East India Company was a large domestic timber consumer and had significant interest in perceptions of timber scarcity.

The Royal Navy was undoubtedly the largest consumer of domestic timber in England. England’s maritime dominance of the late seventeenth and eighteenth century was firmly in the hands of the Navy’s ability to maintain and grow its fleet. Britain depended on the Navy to ensure its interests were supported abroad, in naval battles between the French, Spanish, and American forces, and as the primary defense mechanism – the “wooden walls” of the British Isles. The Royal Navy was highly organized and had several levels of high-functioning bureaucracy to help with daily operations. However, from 1680 to 1790, albeit also much before and long after, the Royal Navy was characterized by its conservatism, corruption, and

¹³³ Ibid, 37.

¹³⁴ Ibid, 16. “The Eleventh Report” (1792), 11.

¹³⁵ H. V. co, *The Business of Empire: The East India Company and Imperial Britain, 1756-1833*, (Cambridge: Cambridge University Press, 2006), 283.

¹³⁶ Ibid, 7.

mismanagement of resources.¹³⁷ This had drastic impacts on the Royal Navy's perceived timber famine in the 1690s and the later eighteenth century.

The Royal Navy was heavily segregated into various offices with particular roles. The Admiralty, led by the Lord Admiral of England, oversaw general naval policy, discipline, and fleet command.¹³⁸ The Navy Board, a group of permanent officials, were responsible for the building and maintenance of the fleet, and therefore also responsible for supplying naval stores and operating the dockyards, while the Royal Navy's finances were controlled by the Navy Treasurer.¹³⁹ Although all branches of the Navy had a vested interest in the smooth operation and continued dominance of the English Navy, their different priorities meant that there was conflict between these groups, especially as it related to finances.

Through the Interregnum, Cromwell had significantly grown the fleet, but in that time had also accumulated massive debt. By 1660, the Royal Navy's debt sat at roughly £1,048,447.¹⁴⁰ England's interests abroad had reoriented its primary diplomatic goal towards growing its global trade network and resource extraction, which necessitated the continued growth of the fleet while balancing the accumulated debt. During the Restoration, the Royal Navy continued to accumulate debt while generally increasing the size of the fleet. Additionally, continued contests between Parliament and Monarchy for control of the fleet meant legislation for the Royal Navy was often driven to a stand-still. Thus, at the start of the period of study in 1680, the Royal Navy can be characterized by its massive shortage of ready money and growing

¹³⁷ See Albion chapter II for ideas on conservatism and corruption.

¹³⁸ Rodger, *The Command of the Ocean*, 34.

¹³⁹ *Ibid*, 33.

¹⁴⁰ *Ibid*, 640.

debt, and the tug-of-war between Parliament, with its interest both in governmental power and individual interests, and the King's interests, all during the crucial Nine Years War.

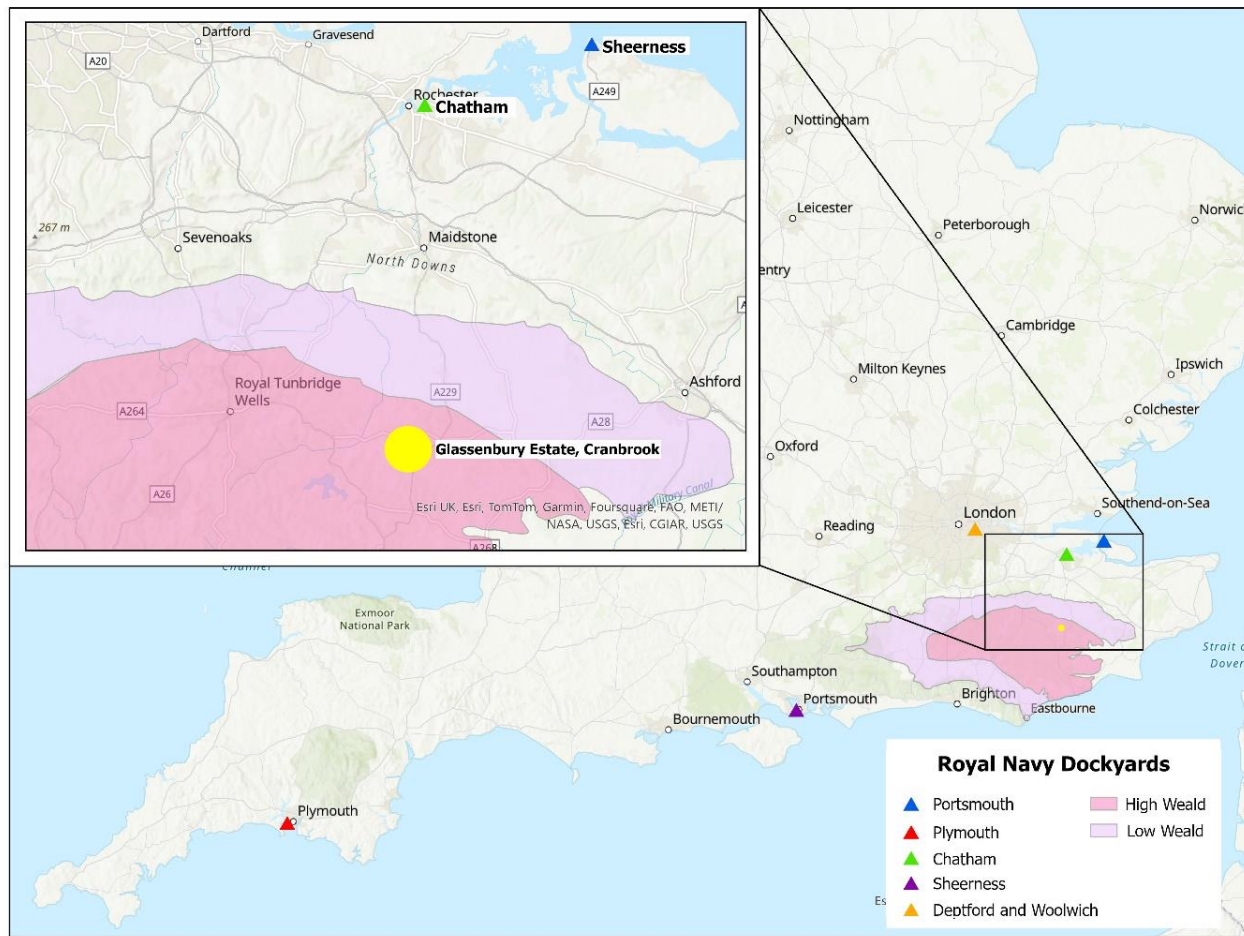


Figure 4: Location of active Royal dockyards during the period of study. General location of Glassenbury's Cranbrook & Goudhurst Estate and the Wealden boundaries for reference.

Domestic Royal Navy dockyards were where possible timber scarcity was easiest to perceive.¹⁴¹ Chatham was one of the principal dockyards of the Royal Navy which suffered from timber shortages at various times throughout the seventeenth and eighteenth centuries. Built

¹⁴¹ Select button "Wealden Boundary". If not visible, select the layer "Royal Navy Dockyards" to see the 6 principal dockyards during this period. Zoom out if necessary. Note the strategic location of each dockyard to service different naval squadrons active in east, south, and west.

during the Tudor period, it was strategically located at the end of the Thames on the Medway River, with easy access to continental Europe and significantly, the Dutch Republic. Chatham was one of the only dockyards with a ropeyard, and concentrated on shipbuilding and major repairs of the fleet.¹⁴² Through the 1690s, Chatham employed over 1200 officers and men, and an additional 96 ropemakers, making it one of the largest dockyards in England.¹⁴³ Chatham had been run as a pseudo family business by the Petts since the rule of James I, until Sir Edward Gregory took over as Commissioner from Phineas Pett in 1689.¹⁴⁴ Sir Edward Gregory, George St Lo, and James Littleton served as successive Commissioners at Chatham in the late seventeenth and early eighteenth centuries. Many of their correspondence from their time as Commissioners are deposited in the Navy Board and the Board of Admiralty record collection at The National Archives. These letters provide intimate and detailed information about the intricacies of timber scarcity at Chatham in the 1690s and further recovery in the early eighteenth century.

Sheerness dockyard opened in the 1660s to help alleviate pressures on Chatham and allow for large warships to dock for maintenance without having to enter the mouth of the Medway River which had restricted depth depending on the time of year.¹⁴⁵ Sheerness' strategic position made it an optimal based for war ships in the North Sea during active conflict.¹⁴⁶ It's close connection to Chatham allowed for Sheerness to be under the direct supervision and control of the Chatham Commissioner.¹⁴⁷ Chatham and Sheerness both were serviced by timber from the Weald, usually transported along the muddy Wealden roads to Maidstone and then

¹⁴² Daniel Baugh, *Naval Administration, 1715-1750*, (London: Navy Records Society, 1977), 261.

¹⁴³ Ibid, 189.

¹⁴⁴ Rodger, *The Command of the Ocean*, 104.

¹⁴⁵ Philip MacDougall, *Royal Dockyards*, (North Pomfret, Vermont: David & Charles Inc., 1982), 9.

¹⁴⁶ Baugh, 261.

¹⁴⁷ Ibid, 262.

along the Medway River to the dockyards. The Chatham Commissioner thus had an interest in Wealden woodland markets.

Perceived timber scarcity attracted substantial attention from polemicists who wrote at length to place blame on different woodland users and suggest various solutions. Although these texts were widely circulated and often published in several editions, there was little measurable change in management because of them. The two most well-known works are Arthur Standish's *The Commons Complaint* (1611), and John Evelyn's *Sylva* (1664) were originally published before the period of study, but continued to be republished, sold, circulated, and cited by others from 1680 to 1790. Polemicists stand apart from the other interest groups because they were not necessarily as directly invested in woodland economies or the timber trade. However, they served as some of the loudest voices of concern and alarmism regarding possible timber famine and thus also have a role in this story.

Standish argued that the use of trees from woodlands for fuel and industry, along with the clearing of woodlands for farmland to feed the growing English population was “general destruction and waste of wood”.¹⁴⁸ His remedies to this problem were large, but all dealt with what he considered more productive and efficient land management. For example, he suggested that trees for fuel should be planted in hedgerows rather than collected from woods, so more trees could be left to grow into timber trees.¹⁴⁹ He also vehemently promoted the idea of planting trees. John Evelyn shared this urge to plant trees but had a more drastic understanding of what waste and destruction meant. Evelyn equated any management of woodlands that didn't prioritize timber tree growth as “spoil of the woods”.¹⁵⁰ His idea of the wasting of woods was

¹⁴⁸ Standish, 1.

¹⁴⁹ Ibid, 2-3.

¹⁵⁰ Evelyn, epistle to the Reader.

equal to usurpation or actions taken against the crown,¹⁵¹ a crime punishable to the highest degree. Their sentiments about waste and timber shortages were framed within concern for the Royal Navy and its role in furthering and protecting England. Standish concluded his introduction in *The Commons Complaint* with “and so it may be conceived, no wood, no Kingdome”¹⁵² suggesting that his concern was one of the utmost severity. He dedicated his book to the King and wrote to him directly in the opening pages about the future of the Kingdom and its success being connected to woodland management. Similarly, Evelyn wrote, “there is nothing which seems more fatally to threaten a Weakening, if not a Dissolution of the strength of this famous and flourishing Nation, then the sensible and notorious decay of her *Wooden-walls*, when either through time, negligence, or other accident, the present Navy shall be worn out and impair’d”.¹⁵³ This provides sentiment that not only did the people of England have something to fear if the Navy was impaired due to timber scarcity, but that the Crown itself could be threatened. Standish and Evelyn’s works spoke with vigor and alarm, much like the complaints of the Royal Navy in the 1690s and again in the late eighteenth century, and both authors orient perceived woodland waste and timber scarcity within the confines of the Royal Navy’s ability to procure timber for the good of the whole Kingdom.

The various actors in this story demonstrate the competing interests’ different people had in Wealden woodland resources. Wood and timber suited a diverse range of needs from individual, community, and empire, and these varying needs often conflicted with each other. To private landowners, woodlands represented an opportunity to grow their social and economic power. For villagers and rural folk, woodlands represented their ability to keep their houses

¹⁵¹ Ibid, epistle to the Reader.

¹⁵² Standish, 2.

¹⁵³ Evelyn, 1.

warm, food cooked, and fuel their industry. For timber merchants, woodlands represented opportunity to buy and sell timber and its byproducts. For the East India Company and the Royal Navy, woodlands represented one of the places where their most valuable shipbuilding material was grown. In times of perceived timber famine, the Royal Navy and polemicists blamed the other interest groups of fomenting shortages through poor management, wastefulness, and destruction. Standish and Evelyn foretold of a future where the Royal Navy, England's "wooden walls" would fail due to lack of timber and the Kingdom would suffer. However, that never materialized.

Ideas of Environment, Ecology, and Nature

The period of this study coincides with transitions in English understanding of the natural world. The development of specific markets for natural resources made economics more important than ideas of nature and ecology when establishing the use of natural resources like wood.¹⁵⁴ The Age of Improvement and the English Enlightenment created an intellectual atmosphere which had drastic impacts on ideas of nature, land, and husbandry. The Enlightenment emphasis on reason and logic encouraged attempts to demystify human understanding of nature and the environment. The common understanding that emerged out of this emphasis in much of the Western world, including England was that wilderness was a place of discomfort, and nature was a force to be brought under control by humans.¹⁵⁵ Wild lands brought under human control were commodified as more than just natural resources, but as products, such as underwood and timber.

¹⁵⁴ Simmons, *An Environmental History of Great Britain*, 71.

¹⁵⁵ See Roderick Nash, *Wilderness and the American Mind*, (New Haven: Yale Nota Bene, 2001) for a in depth understanding of nature as something to be subdued in English and American ideologies.

The commodification of woodland resources was where the difference between timber and underwood became significant. Timber trees were commodified trees that have been left to grow to sizes appropriate to be used for construction and shipbuilding whereas underwood was classified as all the other trees growing in woodlands and hedges, cut into poles, cordwood and faggots. This provides an important distinction within conceptualizing the perceived timber famine, as timber is a commodification of a particular type of managed tree, not a reference to trees generally. Scientific advancements, growing Enlightenment ideas of nature as a force to bring under control, and the commodification of woodlands and growing private ownership helped shape a movement where productive land use for profit became increasingly popular amongst landowners.

Countless works were published throughout the seventeenth and eighteenth century touted to be the newest and best resource for land management. These works were mostly focused on husbandry, but often included attention to woodland and tree management. Gervase Markham's *The Inrichment of the Weald of Kent*, published repeatedly from 1636 onwards demonstrates that these same ideas of control and productivity were circulating on Wealden estates. He wrote, "This weald was for many yeares held to be a wild desert, or most unfruitfull wilderness"¹⁵⁶ He was not suggesting that the Weald was a desert as we understand the term, rather, that it was *deserted*, or rather, unproductive. He argued that the efforts of improvers had brought "a great number of woody and over-grown grounds [to be] converted of late",¹⁵⁷ much to his approval. His book was predominantly focused on the use of marl to enrich the arable soil in the Weald, where clay and sandy soil made it difficult to turn the land into productive farmland.

¹⁵⁶ Gervase Markham, *The Inrichment of the Weald of Kent*, 1656 Ed. (London: W. Wilson, 1656), 2.

¹⁵⁷ *Ibid*, 3.

Marle, a carbonate-rich material found in clayey and silty soils like the Weald helped improve soil nutrition for growing crops. Since it was commonly found in the Weald, it was a staple on farms like those at Glassenbury. Concerns of land productivity and bringing wilderness under human control were common throughout the Weald.

Similarly, Leonard Meager's 1697 *The Mystery of Husbandry* held chapters titled "Wood-land and inclosures improved, and the great advantage made thereby", "Of oak, elm, and beech, how to order and improve them for the best advantage", "How to order trees for their better growing and speedily turning to good advantage", and "How to take the stag, buck, hare, fox, badger, wild-goat, and otter, which destroy corn and underwood."¹⁵⁸ Lord Kames' 1779 *The Gentleman Farmer* encouraged ways in which land managers could "imitate nature" and "protect against nature" to better improve productivity of trees and crop growing.¹⁵⁹ Kames' text demonstrates the clear boundary between nature and human by enforcing that there are ways to work *with* the landscape and ways to work *against* it in the name of efficiency and productivity. These texts give a strong sense of the Enlightenment idea of human domination and control of nature as a means of productivity in the Weald. Arthur Young, a prominent husbandry writer, founded the *Annals of Agriculture* and published dozens of volumes with hundreds of essays on topics of husbandry, woodlands, and general land management and improvement in the late eighteenth century, written by various authors from across the British Isles and beyond. His work serves as yet another example of plethora of texts on productive land management.

These types of publications were popular throughout the seventeenth and eighteenth centuries. Countless works on land productivity, improvement, and woodland management were

¹⁵⁸ Leonard Meager, *The Mystery of Husbandry*, (London: W. Onley, 1697), contents.

¹⁵⁹ Lord Kames, *The Gentleman Farmer*, (Dublin: James Williams, 1779), 188-89.

published and re-published throughout the period. The opening line of Kames' work demonstrates the saturation of these texts on the publishing market: "Behold another volume on husbandry! Exclaims a peevish man on seeing the titlepage: how long shall we be pestered with such trite stuff? 'As long, sweet Sir, as you are willing to pay for it: hold out your purse, and wares will never be wanting'."¹⁶⁰ Land management during the seventeenth and eighteenth centuries was deeply shaped by ideas of efficiency and productivity of the land. Efforts to improve farming techniques and woodland management defined this period. At the same time, Enlightenment ideas of nature as something to be subdued and controlled shaped English understanding of how to manage the land.

Although there were ever-increasing studies in horticulture, botany, and other natural sciences, there was less of an understanding of ecosystems or ecology in the biological sense. However, there was an understanding of the interconnectedness of elements of ecosystems, or as Paul Warde has established, ecology as "interaction and operation as a system."¹⁶¹ Meaning that landowners understood the need to control access to productive land to ensure the appropriate interaction and operation of that land as a system. For example, ensuring animals do not graze on growing sapling trees being managed to grow into timber.

The Roberts understood the landscapes they owned within the bounds of these ideas of productivity and control of nature for the purpose of generating profit. The nature of the available sources from Glassenbury Estate can help shape our understanding of woodland management through ideas of commodification and profit. The Roberts cared deeply about the manipulated woodland ecosystems they created through intensive management, and they acted to

¹⁶⁰ Kames, vii.

¹⁶¹ Paul Warde, *Ecology, Economy, and State Formation in Early Modern Germany*, (Cambridge: Cambridge University Press, 2006), 11.

control outside interference with them to ensure that these human-shaped landscapes continued to produce capital for the Estate.

Tenant lease agreements at Glassenbury Estate outline the importance of managing access and interference to woodlands. The Roberts used a financial penal system to control tenant use of lands. On top of the regular annual or bi-annual rent paid for tenancy, they levied additional fees depending on how the land was used. For example, lands that were not already earmarked as “under the plow” could not be plowed and sowed without additional payment. John Larkin, who paid £50 a year for 133 acres of land in the Glassenbury Estate had to pay 50 shillings (£2.5) per acre for every acre he plowed.¹⁶² Sometimes leases were even more specific. Thomas Morgan’s lease in 1734 stated that the “tenant to pay 50 shillings per acre if he plows any of the 2 pieces of mead called the Wose and Barn Mead and the like sum for plowing more than 3 crops before and 3 crops after amendment, the amendment to be 300 loads of marle or 64 of lime per acre.”¹⁶³ Land brought under the plow meant land where trees couldn’t grow, and thus, a possible financial incursion for Glassenbury Estate. If the land was to be used to grow crops, which were sold or used by the tenant, not the Roberts, then the loss of revenue from those lands for the estate were considered and accounted for in the lease terms.

All leases included amendments that required tenants to ensure that hedges, compass timber, and fruit trees were kept safe from grazing animals. In Francis Gibbon’s lease, it was stated that he had to “maintain the hedges and ditches” and “preserve all hedges and fruit trees from spoil by cattle.”¹⁶⁴ Leonard White’s lease stated that he was to maintain posts, rails, barn gates, stiles, hedges, ditches, and enclosures to keep springs from hurt or spoil by cattle or other

¹⁶² KA, U410/E118.

¹⁶³ Ibid.

¹⁶⁴ Ibid.

animals.¹⁶⁵ This represents a different type of enforcement. Tenants were contractually bound by the limits of their lease to ensure that woodlands, hedges, trees, and orchards were kept safe from possible grazing animals.

Fences and woodbank ditches marked administrative boundaries but were also used as physical barriers to control access to carefully managed landscapes. Often, the Roberts would include amendments in their woodland sales that required buyers build or replace fences around said woodlands.¹⁶⁶ In 1730, Walter Roberts sold 19 acres of underwood from Cowden Wood in Brenchley to John Osborne. In the agreement signed between both parties, it stated that John Osborne was to fell all underwood but “leave all the young oakes” and do “no damage to the springs thereof nor any other timbers or those most likely to become timber.”¹⁶⁷ Additionally, the memorandum stated that “John Osborne is to make all the fences that now are belonging to the said wood at his own charge, having the wood that shall be left when the fence is made”.¹⁶⁸ The significance of maintaining physical barriers to woodlands placed on tenants and buyers of underwood at Glassenbury demonstrates the priority the Roberts had in controlling access to woodlands to ensure there was no disruption or destruction of their woodland ecosystems.

Leases that included woodland in the rented property had additional limitations set on them. Thomas Morgan’s lease in 1734 allowed for him to remove rough timber for repairs on the buildings on the property but otherwise he could not interfere with their growth.¹⁶⁹ Edward Ongley, Isaac Lewis, Thomas Burr, Ambrose Gibbon, and Joseph Diamond all had multi-year leases starting in the 1730s with Glassenbury Estate that included small woodlands for which

¹⁶⁵ Ibid.

¹⁶⁶ The sale of trees from a particular woodland, not the actual sale of the land.

¹⁶⁷ KA U410/E119.

¹⁶⁸ Ibid.

¹⁶⁹ KA U410/E118.

they had access to underwood for fuel. Their lease agreements outlined that “timber young tallows & oakes & the bodys of all Pollards be excepted” from felling.¹⁷⁰ William Manwaring’s 21-year lease at £74 a year, starting in 1741 included two woodland holdings from which he was granted permission to fell. He was limited “to fell only one of the woods in one year, nor either of them more than twice, & after fell’d preserve them from hurt by bite of cattle or otherwise.”¹⁷¹

Ideas that grew out of the Age of Improvement and the Enlightenment shaped how Glassenbury Estate was managed. The Roberts brought nature and “waste” under their control and carefully managed them through felling rotations and physical barriers, in the name of productivity for revenue. The limitations and financial penalties forced on tenants demonstrate their attention to careful preservation of their curated woodland environments. The largest enemies of intensively managed woodlands were grazing animals and people. Meadow and pastureland provided opportunity for trees, bushes, and compass timber to grow. Thus, plowing those lands took away estate financial opportunity and the Roberts enforced financial penalties per acre for tenants who wanted to bring such lands under the plow. These financial and physical limitations placed on tenants show how intensive woodland management went further than rotating tree cutting. Limitations placed on tenants prioritized tree growth and woodland protection, which suggests that private landowner’s interest in preserving their manipulated ecosystems came out of their commodification of woods. These carefully managed woodlands provided significant income, thus any threat to their created ecosystems also represented a threat to their wealth.

¹⁷⁰ Ibid.

¹⁷¹ Ibid.

Understanding how landowners perceived of their woodlands is an essential part of understanding the larger story of woodland management and timber scarcity. However, the way landlords understood the landscape, woodlands, and their environment was not the same as the way tenants, the government, or other interest groups understood it. Jaritz and Winiwarter sum this up nicely in their discussion on perceptions of nature, which we would do well to keep in mind:

Perceiving nature necessarily has to mean something different for a peasant, whose existence is daily influenced and determined by the confrontation with nature, for a theologian dealing with the subject theoretically and for didactic purposes, for the owner of land trying to maximize his revenue by exploiting nature, for somebody-whoever it might have been- being interested in her or his own surrounding nature or somebody dealing with the other's nature, for somebody to dominate nature or for somebody seeing nature in the broadest sense as a phenomenon dominating man.¹⁷²

¹⁷² Gerhard Jaritz and Verrena Winiwarter, "On the Perception of Nature in a Renaissance Society", *Nature and Society in Historical Context*, eds. Teich, Porter, and Gustafsson, (Cambridge: Cambridge University Press, 1997), 91.

Chapter II: From Trees to Commodities - Woodland Management

There are several studies on the intricacies of woodland use throughout the medieval and early modern period in England. These studies reveal that early modern people were experts at exploiting natural resources and their byproducts.¹⁷³ Ingenuities for woodland resource use were part of every day life in the early modern period as land management techniques continued to evolve to create particular human-made landscapes, like coppiced woodlands, that benefitted the people who designed them.¹⁷⁴ However, most of the literature on woodland management techniques do not come from works of history per se, rather, they come from works of historical ecology, most notably those done by Oliver Rackham. His research provides a strong foundation about how English society, government, and private landowners shaped land use through tree management techniques like coppicing, suckering and pollarding.¹⁷⁵ However, his work does not explore ideas of commodification in detail, nor does he explore the motivations behind woodland management and greater political and economic conditions at play.

This chapter investigates how woodlands were managed on private estates through a case study of Glassenbury's woodland management from 1686 to 1786. First, I outline technical aspects of early modern woodland management, how mismanagement in Crown woodlands led private estates to be the primary reserves for naval timber, and how what was once common woodlands fell almost entirely into private hands. Then, I use a detailed HGIS study of Glassenbury Estate to reveal how their woodlands were managed, demonstrating that the Roberts' woodland management was intentional, intensive, and sustainable.

¹⁷³ D. Woodward, "Straw, Bracken and the Wicklow Whale: The Exploitation of Natural Resources in England Since 1500." *Past & Present*, no. 159 (1998), 44.

¹⁷⁴ Simmons, *Environmental History*, 22.

¹⁷⁵ Rackham, *Trees and Woodlands*, 8-9. See glossary for definitions of pollarding and suckering.

Rackham argued that, “by the thirteenth century woodland management was a fully developed art with conservation as its chief objective.”¹⁷⁶ Early woodland intervention created systems of productive and conservative management, and by the start of this study in 1680, the intensive technique of coppice-with-standards was well-developed and the most popular woodland management system in England.¹⁷⁷ Coppice-with-standards was a management system based on two different types of commodified trees: underwood and timber. Underwood, typically lime, hazel, ash, oak, maple, and other broadleaf trees were managed by coppicing. Coppicing involved felling young trees at the base and then letting them regrow. If the stool and root system of a tree is unharmed, most of the broadleaf trees in the Weald naturally regrow new shoots after they are felled, leading to a form of regenerative forestry. In this management system, one tree can be cut on a regular cycle and continues to regrow indefinitely. In coppice-with-standards management, some trees, usually oak, are left alone to grow into timber trees. These types of timber trees are called standards, and they grow straight and tall since they compete for sunlight and space with the rest of the woodland. Standards were essential materials for shipbuilding and construction because they were cut into planks which had diverse uses.¹⁷⁸ Coppice-with-standards was a popular management system because it allowed woodland owners to grow both underwood and timber, harvesting underwood from coppice annually and allowing timber to grow for longer periods of time.¹⁷⁹ This system also allowed for woodland managers to assess how much standard timber they wanted to grow within their woodlands, which meant they could respond to market demands and their own needs as they saw fit.

¹⁷⁶ Rackham, *Ancient Woodland*, 1.

¹⁷⁷ *Ibid*, 63.

¹⁷⁸ Rodger, *The Command of the Ocean*, 192.

¹⁷⁹ Rackham, *Trees and Woodlands*, 63.



Figure 5: Example of coppice-with-standards woodland in Old Park Wood, Glassenbury (2023).

Trees were also managed in settings outside of woodlands. Wood-pastures and hedgerows made up important reserves of wood and compass timber. Compass timber grew primarily in fields, wood-pastures, and hedgerows. Here, English oaks could spread their branches to grow into curved fashion because of its exposure to the elements.¹⁸⁰ Compass timber was an essential product for construction and shipbuilding. The large, curved branches of compass timber were needed for timber roofing in large buildings, and the knees, floor pieces, catheads, futtocks, steam posts, crutches, and wing transom knees of large ships.¹⁸¹

¹⁸⁰ Albion, 7.

¹⁸¹ Ibid, 8.



Figure 6: Example of a compass timber tree growing outside of a woodland in the Weald, Glassenbury (2023).

Coppice was cut at varying intervals depending on the type of underwood was necessary. Short felling cycles could average four to eight years, and longer cycles of sixteen to twenty years were also common.¹⁸² If done carefully through intensive rotation schedule to allow for appropriate regrowth, coppiced underwood could be harvested on a regular annual basis. Products generated from coppiced underwood included primarily cordwood, poles, and faggots.¹⁸³ Cordwood was used as fuel for fires and for producing charcoal. Trees cut for cordwood were not standardized in size but needed to be large enough to cut into sections and halved or quartered to make appropriately sized logs for burning. It was measured out into

¹⁸² Rackham, *History of the Countryside*, 85.

¹⁸³ CM, *Wood Book*.

“cords” of four feet high and wide, and eight feet long.¹⁸⁴ Poles were longer pieces of felled wood that were not cut into cordwood. Lengths and width varied based on need, but they were often between 12 and 18 feet long.¹⁸⁵ Poles were used in construction, for building tools and farming implements, and for growing hops.¹⁸⁶ Faggots were used primarily for fuel but also for fencing and thatching. They comprised of sticks packed in standardized bundles measuring 3 feet in length and 2 feet in circumference.¹⁸⁷ Sticks in faggots had no standard sizing, they largely comprised on the branches that were a byproduct of felling for cordwood or poles.

Unlike underwood which could be felled on regular short cycles, timber had to be felled over much longer stretches of time. Timber took anywhere from 40 years on the shortest end, to 150 years to grow to the appropriate size to be felled, depending on its use. English oak, the most prized timber tree, does not reach full maturity until 60 years. Naval timber took even longer to grow and could not be felled until it was between 80 to 125 years of growth to account for the large timber pieces necessary in shipbuilding¹⁸⁸. The height of timber trees ranged from as short as 20 feet to well above 100 feet, and the girth at the trunk of a timber tree was standardized at no smaller than feet, otherwise it would not meet the standard requirement of a timber tree.¹⁸⁹

Private woodlands had woodbanks or fences as physical barriers to manage access. Woodbanks were man-made earthworks that marked administrative boundaries through a visible feature in the land and stopped grazing animals like cattle and sheep from entering the woodlands and eating new shoots and saplings.¹⁹⁰ Woodbanks were created by digging a ditch

¹⁸⁴ Roland Edward Zupko, *A dictionary of weights and measures for the British Isles: The Middle Ages to the twentieth century*, (Philadelphia: American Philosophical Society, 1985), 98.

¹⁸⁵ Zupko, 310. CM, *Wood Book*.

¹⁸⁶ Brandon, 151.

¹⁸⁷ Zupko, 124.

¹⁸⁸ Ibid, 7.

¹⁸⁹ Rackham, 67.

¹⁹⁰ Rackham, *Trees and Woodlands*, 107.

and putting the displaced soil on either side which created two distinct banks. Coppiced and pollarded trees were often planted on the interior side to help stop grazing animals from entering woodlands and eating coppice shoots and young trees.¹⁹¹ Crown-owned woodlands were part of Forests so did not necessarily have fences or woodbanks to mark their boundaries. However, the larger Forest (wooded and non-wooded) did have a fence, stone wall, or earthworks to keep people out and deer in.¹⁹² Although they are no longer maintained, these boundary features can still be seen in most Wealden woods today. They are a strong indicator of woodlands that were intensely managed through the early modern period and are useful tools for investigating woodland management.



Figure 7: A woodbank marking the boundary of a woodland in part of what used to be Glassenbury Estate (2023).

¹⁹¹ Rackham, *The History of the Countryside*, 98.

¹⁹² Brandon, 75.

In theory, Crown woodlands, or the woodlands within Forests, should have been managed with a similar intensive regime to coppice-with-standards with more attention paid to timber for the sake of the Royal Navy. Since the Royal Navy, or England's "Wooden Walls" were an essential part of England's defence, global trade network, and warcraft, the Crown had an intrinsic interest in ensuring the King's fleet had access to ample naval timber. However, as it was through the Tudor period, woodland management in the Forests varied depending on the monarch's personal interest in preserving timber. The period of 1680 to 1790 saw just as sporadic and contradictory Royal woodland management as the previous two centuries.¹⁹³ The case of attempted crown management in the Forest of Dean to ensure timber supplies for the Royal Navy starting in 1667 serves as an excellent example of the state of the Crown's woodland management.¹⁹⁴

The Forest of Dean was both a place of ironworking and charcoal production, but it was also the Forest that most consistently supplied timber to the Royal Navy.¹⁹⁵ This meant that coppice and timber were grown in its woodlands, some privately through Royal and Parliamentary grants to manage woodlands for charcoal and ironworks, and others through Royal Forest administration. In 1667, "An Act for the Increase and p[re]servation of Timber within the Forest of Deane" was presented to parliament in response to "apparent scarcity of Timber there as in as in all other Parts of this Kingdome so that some course is necessary to be speedily taken to restore and p[re]serve the growth of Timber for the future supply of his Majesties Royal Navy and the maintenance of Shipping for the Trade of this Nation".¹⁹⁶ This "apparent scarcity" was

¹⁹³ Albion, 110.

¹⁹⁴ **Press button "Forest of Dean". Note how the Forest is along a navigable waterway, making it ideal as a timber nursery.**

¹⁹⁵ Ibid, 108.

¹⁹⁶ "Charles II, 1667 & 1668: An Act for the Increase and p[re]servation of Timber within the Forest of Deane.", in *Statutes of the Realm: Volume 5, 1625-80*, (s.1, 1819) 636-639. *British History Online*.

surely sparked in part by Evelyn's widespread *Sylva* published just three years prior. The Act outlined that 11,000 acres of the Forest of Dean were to be enclosed within two years.¹⁹⁷

Enclosure was meant to protect the woodland from being grubbed illegally or damaged by deer and grazing livestock. The enclosed woods were to be managed as "a Nursery for Timber" to combat concerns of the Royal Navy's timber scarcity.¹⁹⁸ However, following the Act, much of Dean Forest continued to be leased privately for charcoal used in iron production. By 1683, much of the woodlands in the Forest of Dean were coppiced underwood rather than timber.¹⁹⁹

By 1756, 86 years after 11,000 acres should have been enclosed and managed for naval timber by Royal and Parliamentary decree, only 500 acres were enclosed.²⁰⁰ In his interview for the "Report from the Committee appointed to consider how His Majesty's Navy may be better supplied with Timber" in 1771, John Pitt, Surveyor General of the Royal Forests stated that upon his appointment in 1756 he enclosed an additional 2,000 acres.²⁰¹ Since enclosure was essential to protect saplings and young trees from grazing animals and to control access to woods, the lack of proper enclosure around the woodlands of the Forests left the woods unprotected and open to pannaging, cottagers, and encroachers who had slowly eaten away at timber within the woods.²⁰² Additionally, very little oversight had been given to the actual management of timber trees. Many had grown well past the point of usefulness for the Navy, while others had been cut down illegally by encroachers and cottagers. Pitt reported that as of a 1764 survey, there were 27,302 loads of naval timber, 16,851 loads of 60-year old trees, and 17,649 loads of 30 to 40-year old

¹⁹⁷ Ibid, I.

¹⁹⁸ Ibid, IV.

¹⁹⁹ Cyril Hart, *Royal Forests: A History of Dean's Woods as Producers of Timber*, (Oxford: Clarendon Press, 1966), 180.

²⁰⁰ "The Report" (1771), 27.

²⁰¹ Ibid, 27.

²⁰² Hart, 199.

trees growing in Dean Forest.²⁰³ Although Pitt assured the committee that since the timber in Dean Forest grew quite fast, that he was sure those numbers would be enhanced at the time of interview, he also reported that there were “20,066 Loads dotard and decaying”²⁰⁴ in the Forest of Dean alone.

This portrays a completely different management style, or perhaps just a total lack of any management in the woodlands of Dean Forest. Pitt’s 1764 survey demonstrated that nearly 25% of all the timber trees were dotards or decaying, meaning that they had grown past the point of naval use and were unusable because of their size and quality of wood. Between 1763 and 1769, the Royal Navy used an average of 22,000 to 25,000 loads of oak timber per year.²⁰⁵ Thus, the dotards and decaying trees in Dean Forest alone would have furnished nearly a year’s worth of Royal Navy construction and repairs in the 1760s, had it been managed effectively. In fact, the same year as the survey, the Royal Navy consumed 18,829 loads of oak timber, less than the amount of decaying timber growing in Dean Forest.²⁰⁶

Forests held tens of thousands of acres of woodland in the eighteenth century. The Forest of Dean alone had 23,000 acres of woodlands, shaws, and groves.²⁰⁷ Despite the size of the woodlands, Forests only supplied 93,312 loads of timber to the Royal Navy from 1730 to 1787, a very small percentage of the total timber used by the Navy during this time.²⁰⁸ Through the 1780s, the Royal Navy used 25,000 loads of timber on average, and the Forests were only able to furnish 2000 loads a year while the rest came from privately owned estates.²⁰⁹ Albion

²⁰³ “The Report” (1771), 27.

²⁰⁴ *Ibid*, 27.

²⁰⁵ *Ibid*, 30. Hart, 204.

²⁰⁶ “The Report” (1771), 30.

²⁰⁷ *Ibid*, 27. “Charles II, 1667 & 1668: An Act for the Increase and p[re]servation of Timber within the Forest of Deane.”

²⁰⁸ Albion, 111.

²⁰⁹ Hart, 204.

characterized the administration Forests in their laziness, which he argued “reflected the sleepy, remote atmosphere which pervaded them all.”²¹⁰ The case of the Forest of Dean demonstrates the type of management in Forest woodlands through the period of this study. The crown’s inability to appropriately manage its woodlands to serve the Royal Navy resulted in timber from private estates becoming an essential resource for domestic shipbuilding. In another Parliamentary report in 1792, the Committee concluded that, “we have shewn, that while the Estates of Individuals, in every Part of this Kingdom, have been advancing in Improvement, the Property of the Crown in those Forests has been left unprotected, and exposed to unlimited waste.”²¹¹ As we will see in the case of Glassenbury, the intensive attention private landowners gave to woodlands management stood in complete contrast with the mismanagement of the Crown’s lands.

Creating Private Woodlands

Enclosure was a popular means for gentry to gain complete control over their land. Enclosure first became popular in the decades immediately following the Black Death, when it was used primarily as a response to agricultural changes which prioritized both grain production and livestock rearing.²¹² The drastic drop in population left many small farms empty and enclosure allowed for the amalgamation of arable land to be brought under one farm to ensure continued food production. From the Tudor period onwards, enclosure was a method used to expand landlord’s personal and estate wealth by removing common rights to land for peasants, which included rights to graze livestock and collect underwood for fuel.²¹³ The Crown often granted rights to landlords to enclose and empark land as a reward for their dedication.

²¹⁰ Albion, 109.

²¹¹ “The Eleventh Report” (1792), 3.

²¹² Hanawalt, 21.

²¹³ Cantor, 29.

In 1485, Henry VII granted Walter Roberts the right to empark and enclose 600 acres of arable land and 1000 acres of woodland in the Glassenbury Estate, and “liberty of free warren in all his lands and woods, and of fishing in all waters in his lands in those parishes, with all liberties and franchises usually granted in such cases”, as a reward for the family’s passive resistance against Richard III’s reign.²¹⁴ By this point, Glassenbury Estate had grown to include large parcels of land in Cranbrook, Goudhurst, Ticehurst, and even some land in Sussex.²¹⁵

The early enclosure of such a substantial amount of Glassenbury Estate meant that the Roberts family had complete control over their woodlands. This gave the Roberts opportunity to intensively manage their woodlands by restricting access. Although manorial seats already had feudal control over rents and land use, the enclosure and emparkment serves as the beginning of an entirely different kind of land control from which the Roberts could exercise power over the parish of Cranbrook. From this point forward, the Roberts were able to exercise economic power through holding a monopoly for underwood, while restricting grazing and placing additional limits on how tenants could use land. Thus, the Roberts were able to make their livelihood and grow the Estate’s wealth off passive income from rents and active income from managing their large, enclosed woodland holdings.

Enclosing included building fences, hedges, ditches, or other physical barriers that controlled human and animal movement in and out of the landscape. From 1440 to 1520, this was often done with the goal to cultivate fields for sheep farming in favour of the growing woollen industry.²¹⁶ There are no surviving records that explain exactly what the Roberts did with their 600 acres of enclosed arable land in the fifteenth and sixteenth centuries, but rental

²¹⁴ Hasted, 95.

²¹⁵ Olsen, 20.

²¹⁶ Cantor, 29.

rolls and few manorial records from the period suggest that the arable land continued to be rented to farmers for mixed uses of growing crops, rearing livestock (sheep and cattle), and occasionally for planting fruit tree orchards.²¹⁷ The 1000 acres of enclosed woodlands at Glassenbury led to complete ownership and management of these woodlands. It is unclear when exactly they started intensively managing woodlands as a major revenue source, but by the late seventeenth century, their management was already in full swing.²¹⁸

Enclosures had drastic impacts on everyday life for rural peasantry. Prior to this, villagers could graze their livestock, pannage pigs, and collect berries and mushrooms, and other woodland resources from the lord's woods.²¹⁹ The same woods were also used by peasantry to collect fuelwood to heat their homes and cook their food. Common rights allowed them collect deadwood on the ground and in hedges, and branches from trees and assemble them into faggots for domestic use.²²⁰ Enclosure removed most of these rights and forced villagers out of the woods. In Cranbrook, this meant that those who once used Glassenbury's woodlands to collect essential natural resources for their livelihood were forced to purchase wood from the Estate.²²¹ The relationship between the people of Cranbrook and Glassenbury's woodlands were permanently altered by its enclosure and significantly more local power was placed into the hands of the Roberts family. Following enclosure, not only did the Roberts have complete control over their woodlands, but also had complete control over the local woodland economy which relied on Glassenbury to produce underwood for essential services and important industry.

²¹⁷ KA, U410/M22-M44.

²¹⁸ CM, *Wood Book*.

²¹⁹ Hanawalt, 20.

²²⁰ *Ibid*, 50.

²²¹ KA, U410/E30-35. With enclosure came a higher poor tax which the Estate paid annually to Cranbrook, Goudhurst, and Brenchley. Additionally, the *Wood Book* records regular sales to the Overseers of the poor who were responsible for the poorest folk in the parish.

HGIS Case Study: Woodland Management at Glassenbury, 1686-1786

Sources and Methods

This HGIS study covers woodland management at Glassenbury Estate through a spatial-temporal study of underwood felling from 1686 to 1782 and a spatial study of a timber survey and felling in 1786. The spatial data for this study is derived from three sets of historical maps of Glassenbury Estate from 1628, 1823, and the early twentieth century.²²² Adding georeferenced to-scale drawing of woodlands from the *Wood Book* and using detailed records of land descriptions estate lease books provided additional evidence to recreate a spatial setting of Glassenbury Estate from 1686 to 1786.²²³ The attribute data was derived from the *Wood Book*, a timber survey and felling record, and Thomas Redford's estate account books which various woodland management details related to felling, selling, and transporting wood.²²⁴

The *Wood Book* details underwood sold at Glassenbury recorded in its felled state, as faggots, cords, and poles.²²⁵ The timber survey was done by John Neve, surveyor, and details the location of timber trees across Glassenbury Estate's Cranbrook, Goudhurst, and Brenchley holdings.²²⁶ Redford's estate account books span through the 1770s and report on income from land rentals, cost of underwood felling, and additional underwood sales.²²⁷ Other Glassenbury Estate records, primarily wood sale agreements, rental agreements, estate valuations workbooks,

²²² KA, U410/P7, "Some Holdings of Glassenbury Estate, 1628". CM, A282.A.921 CRA GLA, "Plans and Maps of the Glassenbury Estate Situated in the Several Parishes of Goudhurst, Cranbrook, Brenchley and Horsmonden, Kent. The Property of Thomas Walton Roberts, Esquire, surveyed in the year 1832 by John Adams Junior, Surveyor". CM, "Glassenbury Estates – Cranbrook & Goudhurst", c.1900. **Select "Glassenbury Maps". Switch to the secondary map setting by selecting the small map in the lower left-hand corner. This new map shows select images from the georeferenced historical maps. Select and deselect the layers as you wish to view them one by one. When complete, switch back to the original map view by reselecting the small map in the lower left-hand corner.**

²²³ KA, U410/E118.

²²⁴ Attribute data is the nonspatial information about physical or geographic features.

²²⁵ CM, *Wood Book*.

²²⁶ KA, U410/E145.

²²⁷ KA, U410/E30-35.

and general estate bills bolster the primary attribute data to create a robust dataset for Glassenbury's woodland management.²²⁸ These detailed records have been combined to create an interactive map which allows for a spatial analysis that visualizes how underwood and timber were managed by the Roberts from 1686 to 1786. There are 48 woodlands and farmlands at Glassenbury Estate recorded between the *Wood Book* and the 1786 timber survey, 34 of them are georeferenced using the spatial data from the above sources.²²⁹

Since underwood and timber were two different resources, records of their management were very different. Underwood was felled on an annual basis while timber was felled infrequently. Poles, faggots, and cordwood were the most common types of underwood sold, but each of these were categories of their own with further distinctions. For example, faggots were recorded simply as faggots, but also as brush, kiln, and butt faggots.²³⁰ This complicates the data, but also provides further insight into the intended use and markets for the wood.²³¹ Poles were also recorded with different distinctions. The most common recording for poles was as a hop pole or a pole between 12 and 18 feet, half-poles, and three-quarter-poles.²³² Hop poles or

²²⁸ KA, U410/E119, A33, E118, E119, E146, E121 & E149.

²²⁹ Layers are divided by locations of underwood management and the timber survey. Press button "Glassenbury Estate" to see the georeferenced farms and woodlands. Next, press button "Glassenbury Maps", and select layer "Timber Survey 1687" and sublayer "timber trees final". Next, turn on the "swipe" function above the timeline. Use this to swipe between the two maps to visualize how the historic maps were used to identify the farm and woodlands. To zoom in to get a closer look at particular areas, turn off the swipe function, zoom in, and turn the swipe function back on. To view the swipe with only one historic map visible, switch to the other map by pressing the small map in the lower left-hand corner, and deselect/select the maps you want visible, then turn the swipe feature back on. When complete, turn off the swipe feature, and if necessary, return to the original map by selecting it from the lower left-hand corner.

²³⁰ CM, *Wood Book*.

²³¹ CM, *Wood Book*. Zupko, 124-5. For example, butt faggots are comprised of the hardest and highest quality wood of a tree, located at the bottom, or the "butt" of the tree; kiln faggots are made of wood ideal for small-scale industrial burning; brush faggots are made of the small, twig-like wooden material; and household faggots are made of wood ideal for burning for household purposes.

²³² CM, *Wood Book*.

poles between 12 and 18 feet were used for hop growing and half-poles and three-quarter-poles were used primarily for fencing, farming implements, and tools.²³³

Glassenbury woodlands were managed through a felling rotation, which meant that only one or two woodlands were felled each year. To effectively manage the data spatially and temporally, I divided the entries in the *Wood Book* by decade so that I could analyze them one decade at a time to grasp a better visual understanding. This method presents two limitations. First, it places artificial temporal boundaries on the data. Second, bigger woodlands, like Old Park Wood and Severalbury Wood, often were felled for 2-4 consecutive years while other woodlands were sometimes felled more than once in a decade. To resolve this, all the data for fellings of the same woodland have been condensed into one entry per decade. The years it was felled are recorded separately so that it easy to identify woodlands that were felled for more than one year per decade.²³⁴

The 1786 timber survey and felling are the only remaining records of such an event at Glassenbury. There is no other evidence of other major timber felling at the estate from 1680-1790 other than irregular fellings of select timber trees as necessary to repair Glassenbury Manor or its tenanted buildings.²³⁵ John Neve marked 2967 timber trees and characterized them under five different categories: “40 feet & upwards”, “under 40 feet”, “for plank under 30 feet”, “for plank 30 feet & upwards”, and “knees”. Neve valued the 2967 timber trees as they stood at a staggering £11,454.40.²³⁶

²³³ Brandon, 151. Richard Filmer, *Hops and Hop Picking*, (Oxford: Shire Publications, 1982), 8.

²³⁴ **Press button “Glassenbury Estate”. Deselect “Timber Survey 1786” and select “Underwood Management” Select any sublayer and use the time scale at the bottom left of the map to visualize changes over decades. Information about individual woodlands is available by selecting the woodland on the map. When done, deselect all sublayers under “Underwood Management”.**

²³⁵ KA, U410/E30.

²³⁶ KA, U410/E145.

Trees characterized as being “40 feet & upwards” were matured English Oak ranging from 40 to well over 100 feet.²³⁷ These trees were large, extremely heavy, and ideal for construction and shipbuilding. Trees “under 40 feet” refer to English Oak that had not quite met full maturity. Based on the measurements of total feet of timber per tree characterization, the average height of timber trees marked as “under 40 feet” was between 30 and 38 feet.²³⁸ These timber trees were also ideal for construction, small vessels, and industrial use. Timber trees categorized as planks of either under 30 feet, or 30 feet and over refer to trees growing straight, or standards, which could be cut into planks for construction, flooring, furniture, carriages, and large farming and industrial implements. Timber trees marked for planks under 30 feet average 22-29 feet in height, while those marked as 30 feet and upwards ranged from 30 feet to over 100 feet.²³⁹ “Knees” refer to compass timber that had large branches that had grown in a crooked nature, which was necessary for the knees, brackets, and futtocks of ships, and sometimes large buildings like mansion halls.²⁴⁰ Their size varied, but was measured only at the knee, or specific branches, rather than the whole tree. They range in 23 to 36 feet for the knee alone,²⁴¹ suggesting that the timber tree in its entirety was extremely old and large. For clarity, attribute data for the timber survey is broken up into the following layer categories: knees, planks, and non-planks.

²³⁷ Neve’s survey includes the total feet of timber per timber tree characterization, per area. This allows for a rough estimate in the general heights of trees. For example, Minepit Shaw was recorded as having two timber trees of 40 feet and upwards, for a total of 162 feet. If we assume one of the trees was 40 feet, the other would have been 122 feet. We cannot know what actual sizes of either timber tree was, but because of this we can give it the general range of 40 to 122 feet tall. This method was used to estimate the range of height for all timber trees, except knees.

²³⁸ KA, U410/E145.

²³⁹ Ibid.

²⁴⁰ N.A.M. Rodger, *The Command of the Ocean*, 192.

²⁴¹ KA, U410/E145.

Each attribute in the GIS study has its own layer which uses a choropleth technique to visualize the data using graduated colours.²⁴² The timber plank and non-plank have an additional layer where I have applied a normalizing feature to visualize the ratio of those categories of timber trees compared to the overall number of timber trees recorded at that location.²⁴³ This interactive map provides a detailed spatial-temporal visualization of woodland management at Glassenbury over a nearly 100-year period.²⁴⁴

²⁴² Attribute refers to the data being visualized. These attributes include underwood revenue, cordwood, faggots, brush faggots, poles, timber knees, “planks” and “non-planks”. Choropleth is a type of map symbolization and analysis that uses colour in relation to the numbers assigned by the attribute data. This allows for a visualization of the specified features in comparison to each other. In this case, graduated colours have been used to visualize patterns and differences.

²⁴³ Normalizing features allows for additional analysis based on ratios. In this case, this means the ratio of total timber trees to specific types of timber trees.

²⁴⁴ If using the interactive map, the name of each woodland and farmland appears when you select it. If not using the interactive map, see figure 8 for the names of all georeferenced woodlands and farmlands.

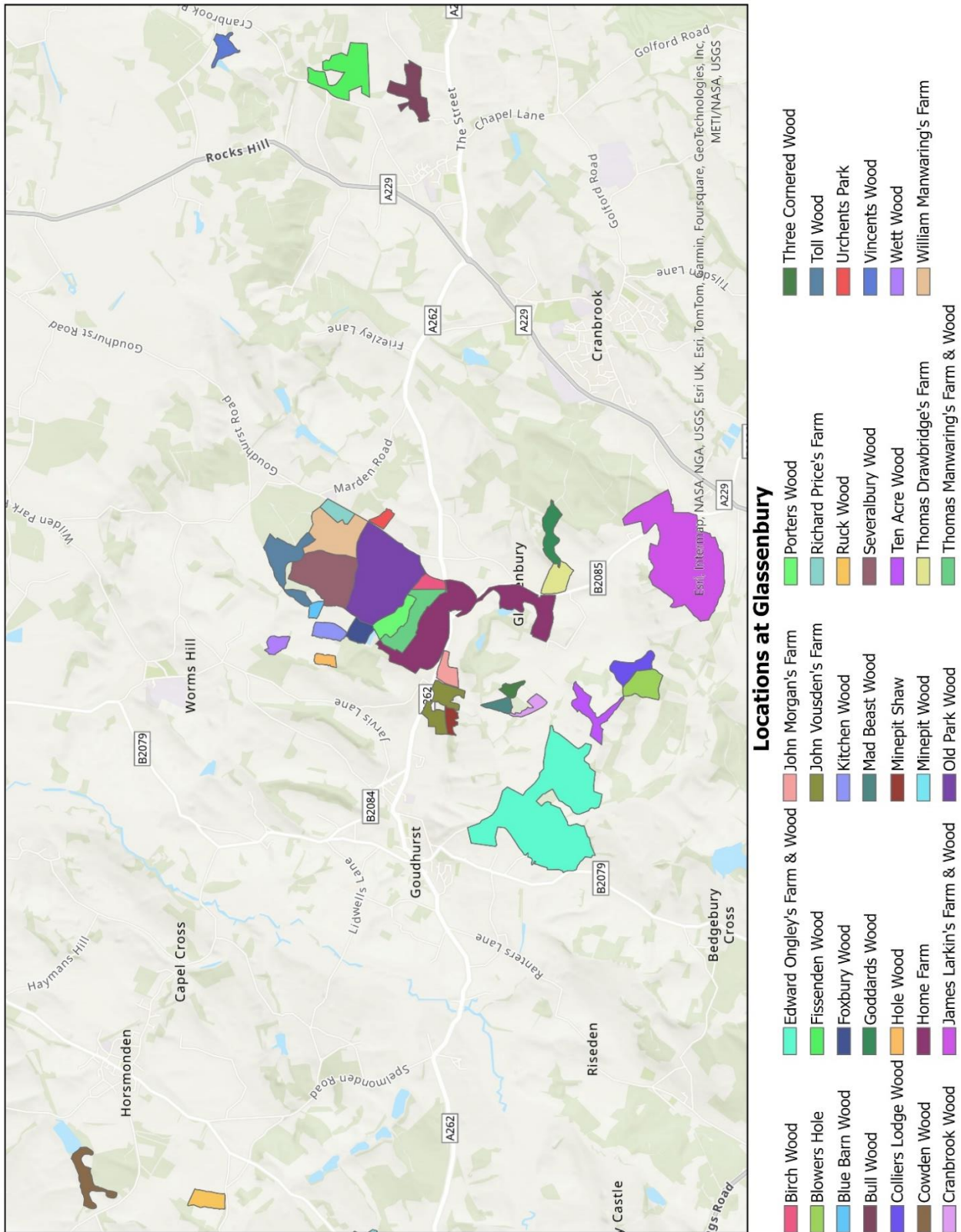


Figure 8: Georeferenced farms and woodlands at Glassenbury Estate.

Managing Underwood and Timber at Glassenbury

Felling wood was a winter activity. The Roberts hired woodcutters and paid them based on how many cords, poles, or faggots that they put together during the season.²⁴⁵ Often, Glassenbury tenants were hired to cut and transport the underwood. For example, John Vousden, longtime tenant, cut and transported underwood throughout the early eighteenth century.²⁴⁶ His son John Vousden was paid annually for drawing timber and transporting underwood in the 1770s and 1780s.²⁴⁷ The *Wood Book* holds records of when woodlands were felled, who it was sold to, in what form, and for how much. The records suggest that wood was sold annually to buyers following winter felling.²⁴⁸ Most of the woodland felled in the in the *Wood Book* were in Cranbrook and Goudhurst in the area surrounding Glassenbury Manor. Most woods were under 20 acres in size, other than Old Park Wood and Severalbury Wood which were much larger.²⁴⁹

The HGIS study reveals immediate patterns that Glassenbury woodlands in this region were intensively managed. Figure 9 visualizes the woodlands in Northern Glassenbury over three decades of felling. Woodlands were felled on a general rotating schedule that allowed for coppice regrowth. Larger woodlands like Old Park Wood and Severalbury Wood had their own internal rotation schedules so they could be felled continuously decade after decade and even year after year.²⁵⁰

²⁴⁵ CM, *Wood Book*.

²⁴⁶ Ibid.

²⁴⁷ KA, U410/E30 & 32.

²⁴⁸ CM, *Wood Book*.

²⁴⁹ Ibid, 2.

²⁵⁰ Ibid. Select “woodland revenue” in the “Underwood Management” layer. Use the time slider to visualize felling rotations. Deselect the sublayer when complete.

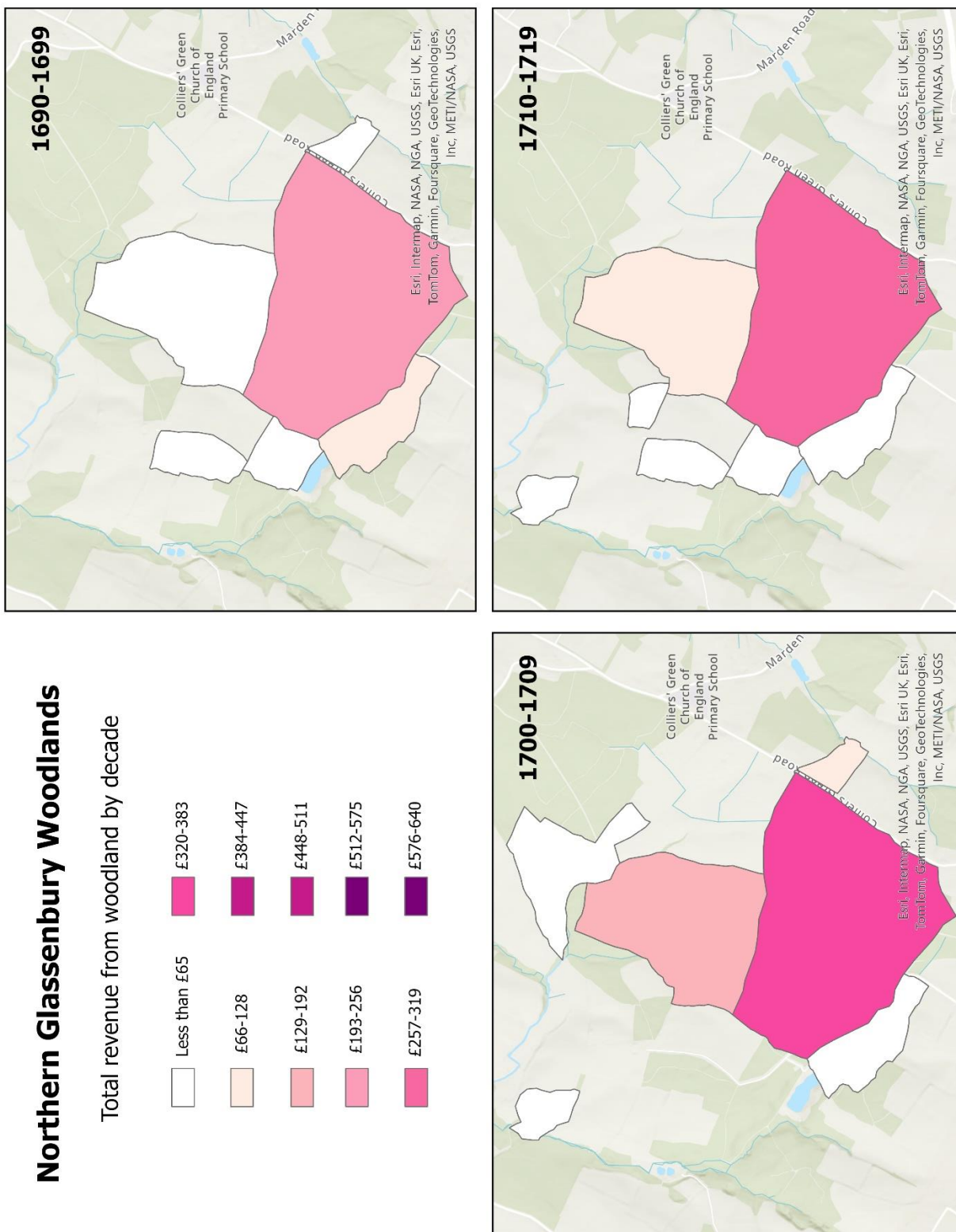


Figure 9: Revenue from northern Glassenbury woodlands, 1690-1719.

These maps demonstrate that Old Park, Severalbury, and Porters Woods were all felled in each decade visualized in figure 9, with variations in revenue.²⁵¹ The rotation schedules at Glassenbury were essential aspects of coppice management and were reflective of the careful and intensive management that ensured continued growth.²⁵² When compared to the maps for type of wood material felled and sold in each woodland, these maps provide spatial-temporal evidence of the intensive management at Glassenbury. Figure 10 visualizes the amount of cordwood felled over the same decades in these same woods.²⁵³ Over the 30 years figures 9 and 10 visualize, patterns of sustained management and felling are clear. These woodlands were, as Rackham describes them, “permanent self-renewing assets with a regular sustained yield”.²⁵⁴

²⁵¹ Ibid. Porters Wood was felled in 1696, 1709, and 1713. Severalbury Wood was felled in 1699, 1700, 1701, 1711, and 1712. Old Park Wood was felled in 1690, 1691, 1692, 1703, 1704, 1705, 1714, 1716, 1718, and 1719.

²⁵² Cantor, 13.

²⁵³ **Select sublayer “woodland cordwood” and use the time slider to further visualize. Deselect this sublayer and repeat for any other sublayers you would like to investigate. When complete, deselect “Underwood Management”.**

²⁵⁴ Rackham, *Ancient Woodland*, 137.

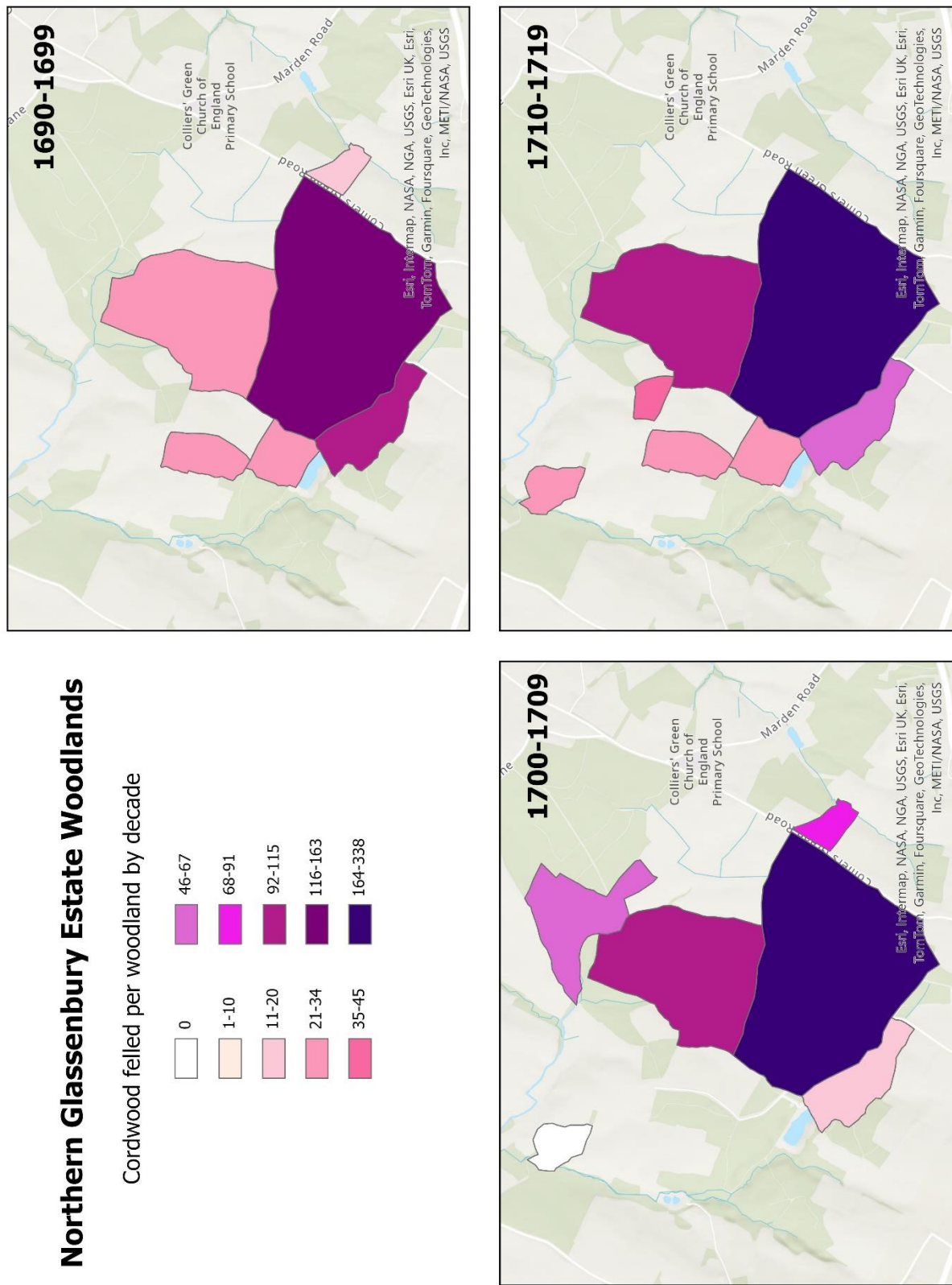


Figure 10: Cordwood felled in woodlands in Northern Glassenbury Estate, 1690-1719.

The HGIS of the 1786 timber survey reveal differences between farmland and woodland and confirms that different types of timber trees were grown in particular environments at Glassenbury.²⁵⁵ Timber trees were more highly concentrated on farmland. Edward Ongley's, James Larkin's, Richard Price's, and William Manwaring's farms all had a high density of timber trees.²⁵⁶ The woodlands with the highest density of trees were Severalbury Wood, Toll Wood, Wett Wood, Ruck Wood, and Blowers Hole.²⁵⁷ Most other woodlands had low densities of timber. Some, primarily Kitchen Wood, Foxbury Wood, Blue Barn Wood, and Porters Wood had extremely few timber trees.²⁵⁸ Old Park Wood, the most heavily felled for underwood had only 58 timber trees in its over 200 acres of woodland.²⁵⁹ Old Park Wood, Kitchen Wood, Foxbury Wood, and other woods that were the most intensively managed over regular felling rotations had lower numbers of timber trees while other woods, like Toll Wood, Ruck Wood, and Blowers hole, which were felled less frequently, had higher concentrations of timber.²⁶⁰

Figure 12 visualizes the percentage of timber trees marked as planks or non planks on the Cranbrook-Goudhurst section of Glassenbury Estate.²⁶¹ "Plank" timber, or standards made up the bulk of timber trees in woodlands.²⁶² Farms that included woodlands, such as Edward Ongley's William Manwaring's, and James Larkin's farms and woodlands also have higher concentrations of standard timber compared to farmlands without woods.²⁶³ Knees were found exclusively on

²⁵⁵ Select "Timber Survey 1786" and the sublayers "timber wood trees" and "timber farm trees" to visualize where timber trees were located. Variations in the classes between farmland and woodland is due to drastic differences in the number of timber trees. Classes were assigned using an adjusted Jenks Break to account for non-uniform data distribution at similar intervals.

²⁵⁶ KA, U410/E145.

²⁵⁷ Ibid.

²⁵⁸ Ibid.

²⁵⁹ Ibid.

²⁶⁰ Ibid, CM, *Wood Book*.

²⁶¹ Deselect sublayers "timber wood trees" and "timber farm trees" and select sublayers "timber farm plank" and "timber wood plank".

²⁶² KA, U410/E145.

²⁶³ Ibid. Repeat footnote 261 with "timber farm nonplank" and "timber wood nonplank".

farms and likely grew in hedgerows or wood-pasture where they had no competition for space from other trees, leaving them to grow in the oddly shaped arrangements so commonly seen in ancient oak trees.²⁶⁴ Non-plank trees, or trees classified as either “40 feet and over” or “under 40 feet” by surveyor John Neve likely were compass trees with larger canopies, which is why they were grown more commonly out of woodlands.²⁶⁵

Cowden Wood and Ruck Wood in Brenchley had an unusually high numbers of non-plank trees compared to other woodlands.²⁶⁶ However, these woodlands were felled more irregularly than others.²⁶⁷ This suggests that the lack of intensive underwood management left space in Cowden and Ruck Wood for timber trees to grow to consume more space. This is significant in terms of competition between trees for sunlight and canopy space. To manage woodlands where underwood is prioritized, there must be consistent attention to equaling out access to the sun so trees for underwood can grow at a steady and consistent pace for felling.²⁶⁸ This is why the coppice with standards system was so popular; by limiting the number of timber trees, more sunlight reaches young coppice which encourages growth.

Farms with woodlands had higher numbers of timber trees overall.²⁶⁹ The woodlands included on tenanted farms were not felled for underwood on regular cycles in the *Wood Book*, suggesting that they were not managed for regular underwood sales. However, Thomas Redford recorded hundreds of pounds (£) of underwood sales annually through the late eighteenth century in addition to the *Wood Book* which were not tied to specific woodland locations which could

²⁶⁴ KA, U410/E145. **Deselect all sublayers and select sublayer “timber knees”. Deselect sublayer when complete.**

²⁶⁵ Ibid.

²⁶⁶ KA, U410/E118. **Select sublayers “timber farm nonplank” and “timber wood nonplank” to see variations in where these types of timber made up most timber trees. Deselect them when complete.**

²⁶⁷ CM, *Wood Book*.

²⁶⁸ Rackham, *Ancient Woodlands*, 138.

²⁶⁹ KA, U410/E145.

have included the woodlands under lease.²⁷⁰ These woodlands could have been where these types of underwood were harvested. Nevertheless, this does suggest that these woods were not managed as intensively or actively as the woodlands Glassenbury depended on for consistent income through underwood, like Old Park Wood or Severalbury Wood. Thus, woodlands that were intensively managed for underwood had a higher concentration of timber trees.

²⁷⁰ KA, U410/E30-36.

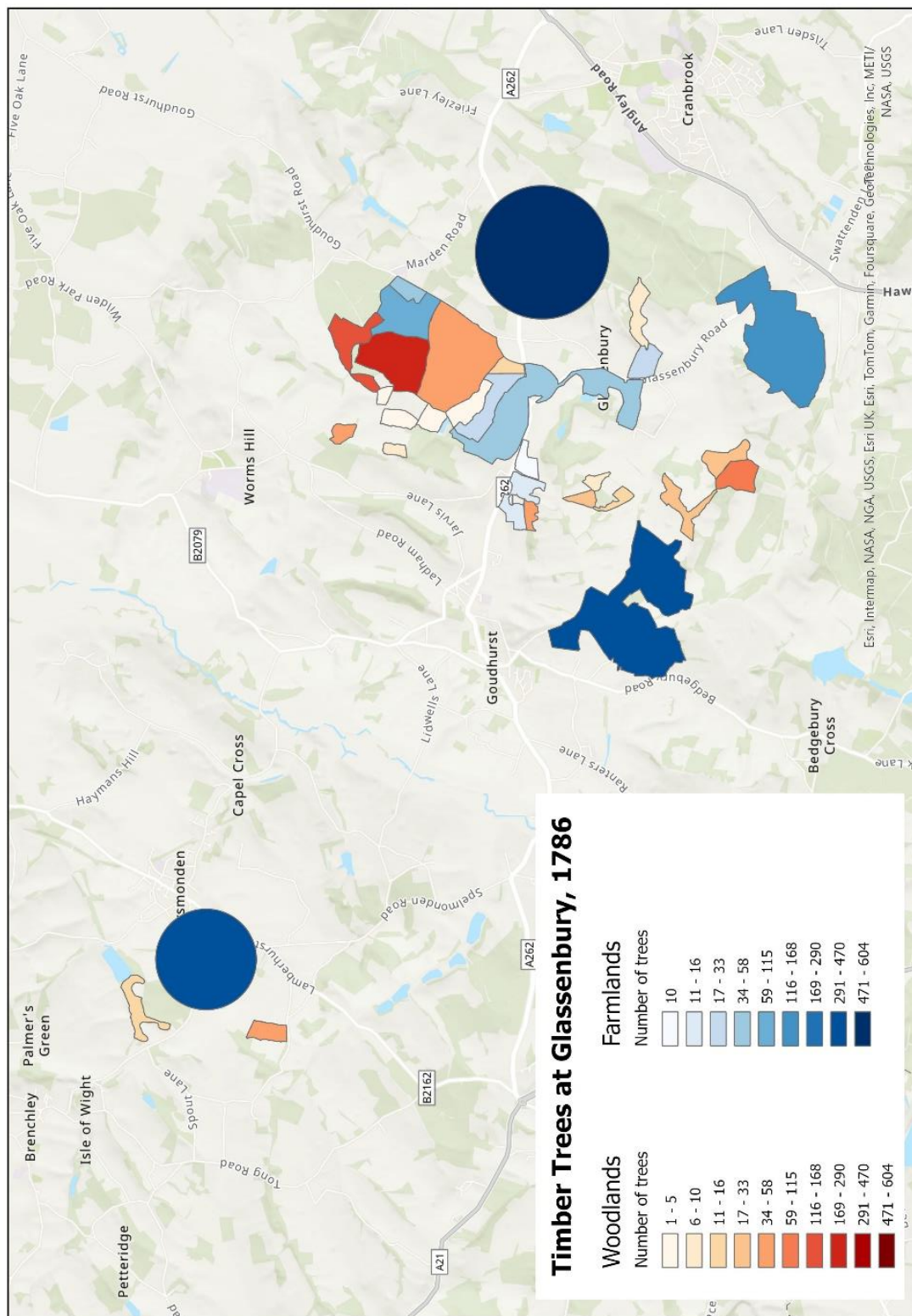
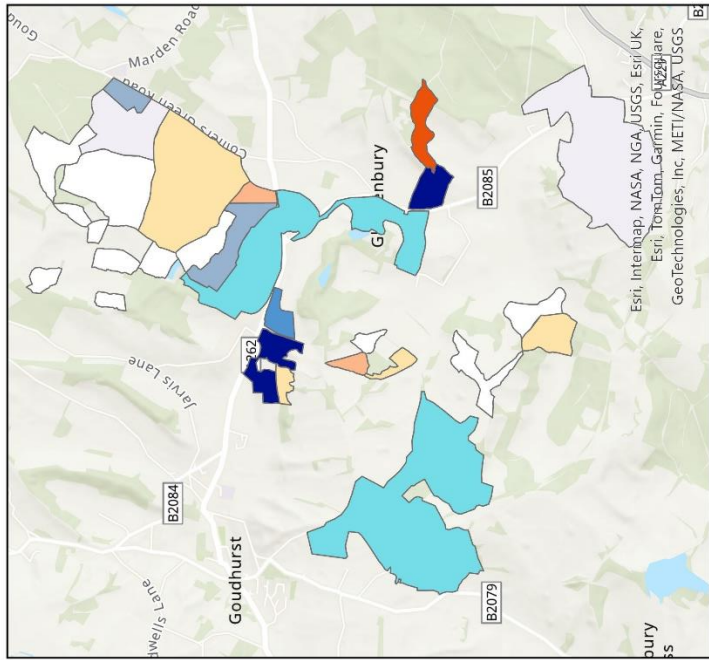
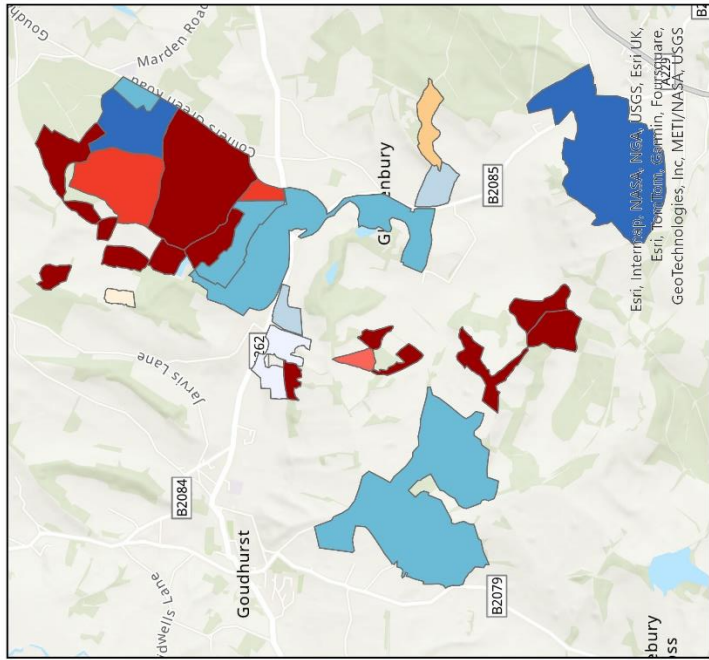
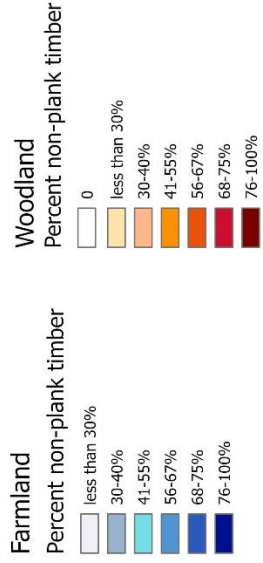


Figure 11: Map of timber trees at Glassenbury marked by John Neve's survey, 1786.

"Plank" and "Non-plank" Timber at Glassenbury Estate, 1786



"Non-plank" Timber, Glassenbury Estate, 1786



"Plank" Timber, Glassenbury Estate, 1786

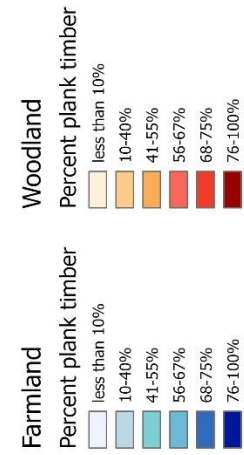


Figure 12: Percentage of "plank" and "non-plank" timber trees at Glassenbury Estate, 1786.

This spatial-temporal study is compelling evidence to suggest that Glassenbury's woodlands were intensively managed with a preference for underwood from 1686-1786. Local underwood markets, discussed in the next chapter, promoted woodland preservation by encouraging the Roberts to manage their woodlands to regrow through coppicing. There is no evidence of overuse, waste, or exhaustion of woodlands at Glassenbury. Rather, the evidence suggests purposeful sustainable management to ensure continued revenue. Purposeful management was also used when deciding where to let timber trees grow. Woodlands that were preferred for heavy coppice management, like Old Park Wood, Porters Wood, Kitchen Wood, and so on, had significantly lower numbers of timber trees. The timber trees that were grown there were mostly standards, or "planks" which grew straight up and still allowed for sunlight to reach the growing coppice.²⁷¹ This preference for underwood was common on Wealden estates. Wealden timber merchants noted as much in their interview with the commissioners of the 1792 Report. When asked by the Commissioners if underwood was more valuable and led to landowners cutting down timber because of "injury they do to the underwood",²⁷² timber merchants answered as follows:

William Collins, Wealden timber merchant:

In general more timber has been cut in the underwoods from their increase in value, but still a succession of tellars are for the most part preserved; and more attention has been paid the last twenty years to saving young timber in the Wield of Kent and Sussex than formerly.

John Larking, Wealden timber merchant:

It certainly is more the practice now to cut down timber in woods where hop poles are raised than it used to be; and in some instances, woods have been entirely stripped of the oak timber because of the underwood, particularly in Kent.²⁷³

²⁷¹ Select sublayers "timber farm planks" and "timber wood planks" to visualize the higher percentage of plank trees in woodlands. Deselect all sublayers when complete.

²⁷² "The Eleventh Report" (1792), 61.

²⁷³ Ibid, 61-62.

Glassenbury represented a typical well-wooded Wealden estate during a period of national anxieties of timber shortages provoked by alarmist concern from Polemicists and the Royal Navy. Enclosures provided landed gentry like the Roberts with the opportunity to commodify their woodlands to the highest degree possible through extensive management and exploitation. Woodlands were intensively managed year after year in rotating coppice cycles which allowed continuous regrowth. During the height of the “timber famine” in early modern England, polemicists blamed woodland industries and private landowners of fomenting shortages through the destruction of woodlands for revenue.²⁷⁴ Studies in the past 40 years have revealed that the iron industry in particular was largely responsible for the maintenance of woodlands in the Weald.²⁷⁵ Brandon, Cantor, and Rackham have all revealed general ideas of the significance in maintaining woodlands for iron foundries. In reality, there were iron-makers who were adept at conserving woodlands through effective management techniques, and those who were destructive and lacked foresight.²⁷⁶ However, generally, iron-makers and other woodland industrialists had a vested interest in maintaining woodland regrowth to ensure continuous access to fuel wood for their forges, and most were motivated to sustainably manage woodlands. The Weald generally, which had the highest concentration of iron forges and foundries in England, have more ancient woodlands today than any other regions.²⁷⁷ There were very few iron forges in the parish of Cranbrook, yet the woods in this area persist largely unchanged since the early modern period.

²⁷⁴ Evelyn, Epistle to the Reader. Standish, 2.

²⁷⁵ Rackham, *The History of the Countryside*, 90.

²⁷⁶ Brandon, 154.

²⁷⁷ Rackham, *Trees and Woodlands in the British Landscape*, 85.

A comparison to the 1623 map of northern Glassenbury woodland holdings and modern satellite imagery is compelling evidence to suggest that Glassenbury's woodlands have changed very little in the last 400 years.²⁷⁸ Thus, it seems clear that the underwood trade at Glassenbury also promoted woodland preservation and protected these woodlands from being permanently deforested under the same motivation as iron-makers; continued revenue generation.

Conclusions

During the early modern period there were intentional and well-thought-out woodland management techniques that allowed for sustainable regrowth and use of woodland resources. The most popular method was coppice-with-standards, which prioritized underwood growth through regenerative forestry practices while allowing space for limited timber trees to grow. Other timber trees were grown in fields, wood pastures, and timber nursery woodlands like those in the Forest of Dean. The Royal Forests were characterized by their severe mismanagement during this period, which forced the Royal Navy to seek domestic timber from private estates. Here, woodlands were intensively managed as part of the estate revenue-generating project. However, private estates limited timber growth. Estate owners like the Roberts managed woodlands to prioritize underwood for local woodland economies. Nevertheless, their intensive and sustainable management allowed many private woodlands to thrive for hundreds of years. Today, the woodlands of Glassenbury Estate remain largely intact. The landscape has changed very little, and the woods are still actively managed through coppicing. The spatial-temporal study reveals that Glassenbury's woodlands were intentionally managed to yield continuous woodland resources through intensive sustainable management.

²⁷⁸ Press button "Glassenbury Maps" and switch to the secondary map by pressing the thumbnail in the lower left-hand corner. Deselect all layers except "Glassenbury 1628_tif" to see how the woodlands today remain the same size and shape as they did in 1628.

Chapter III: Woodland Wealth and Naval Woes

The state of Crown woodland management in the late seventeenth through the eighteenth century left the Royal Navy to procure timber from private estates through contracts with timber merchants. As we saw in the previous chapter, private woodland owners like the Roberts preferred to manage their woodlands prioritizing underwood rather than timber. This put landowners and the Royal Navy at odds because of their competing interests in woodland resources. The Royal Navy was interested in naval timber, which private landowners preferred to limit in their woodlands. This chapter dives into the differences between local underwood economies and the larger timber market. I will outline why private landowners like the Roberts preferred these local underwood economies and how that may have shaped ideas of perceived timber scarcity, but ultimately were not responsible for the Navy's perceived timber famine. Then I will return to the Royal Navy and investigate how lack of funds, poor dockyard organization, and shipbuilding inefficiency had a much larger impact on perceived timber scarcity than the choices made by private woodland owners.

In the last chapter, I investigated how private woodlands were managed using an HGIS study of Glassenbury Estate. That study revealed that underwood, primarily in the form of cordwood, poles, and faggots, were felled on a rotating coppice cycle that allowed for wood to be harvested from different parts of the estate every year. Timber was felled on a much longer cycle, and there was only one mass felling from 1680 to 1790. Underwood and timber were separate types of commodified natural resources that became products in different woodland economies. Glassenbury's underwood economy was closed, local, and consistent, whereas timber was part of a larger nation-wide market.

When it comes to the history of woodland management, underwood has often been relegated to the back while historians focus on timber. Big questions about how England managed to create such a powerful naval force while the Navy complained of constant timber shortages, and just how much woodland was grubbed in the pursuit of shipbuilding and land conversion tend to be at the front of the conversation.²⁷⁹ In pursuit of answering these sorts of questions, the significance of underwood management and local woodland economies have been left behind. Underwood was the primary natural resource for fuel, heating, and small construction, making it a vital natural resource in early modern England and a more regular and significant product than timber for everyday life.²⁸⁰ Private landowners recognized this and prioritized their woodland management to meet the needs of their communities because it generated more regular revenue. Underwood was a localized but integral part of the larger woodland resource economy, especially in densely wooded areas like the Weald. In Kent alone an average of 7000 to 8000 acres of coppice woodlands were felled annually in the seventeenth and eighteenth centuries.²⁸¹ Wood, as underwood or timber, is a heavy material, and although timber had to be moved varied distances by land or water to make it to the dockyards, underwood tended to stay within its local community. Since the largest number of woodlands in and around Cranbrook and Goudhurst were enclosure and privately managed by the Roberts, this meant that they had a monopoly over the local woodland market. Everyone in the community needed underwood and they only had one place to get it.

²⁷⁹ Cantor, Pluymers, and Collins are all such examples.

²⁸⁰ Rackham, *History of the Countryside*, 85.

²⁸¹ E.J.T. Collins, "The Agricultural Serving and Processing Industries", *Agrarian History of England and Wales VI*, 491.

Glassenbury's woodland market: underwood versus timber

As much as the community relied on Glassenbury for underwood, the Roberts also depended on the community's needs to generate revenue. Nearly all the underwood at Glassenbury was cut and sold to locals who purchased the faggots, cordwood, poles, and other types of underwood as they needed it on an annual basis. Any unsold underwood, which there typically wasn't much of, was transported to Glassenbury Manor.²⁸² The Roberts seem to have been particularly apt at assessing the needs of the annual underwood market and felled wood in response to local demand. This is reflected in the HGIS study of faggots, cordwood, and poles harvested at Glassenbury from 1686 to 1782.

Throughout this period, faggot sales were consistently high across all woodlands. There was an average of 89,527 faggots made and sold per decade from 1686 to 1782.²⁸³ People purchased anywhere from 50 to 500 faggots annually depending on their needs.²⁸⁴ For example, Cranbrook weaver Thomas Sibley bought an average of 1 to 2 loads²⁸⁵ annually from Glassenbury through the first half of the eighteenth century, except in 1711 when he purchased 400 faggots (4 loads), and purchased none the following year.²⁸⁶ Sibley paid an average of around 6 shillings per 100 faggots, which was the average price in Cranbrook throughout the period of study.²⁸⁷

²⁸² CM, *Wood Book*.

²⁸³ Ibid.

²⁸⁴ Ibid. **Press button "Glassenbury Estate" and deselect layer "Timber Survey 1786". Select "Underwood Management". Select sublayer "woodland faggots" and use the time slider to explore the data.**

²⁸⁵ 1 load of faggots is approximately 100 individual faggots.

²⁸⁶ CM, *Wood Book*.

²⁸⁷ This price varied slightly, from as low as 5 shillings 6 pence to 6 shillings 2 pence in the *Wood Book*, demonstrating the cost of faggots was very steady over the century.

Northern Glassenbury Estate Woodlands

Faggots sold per woodland by decade

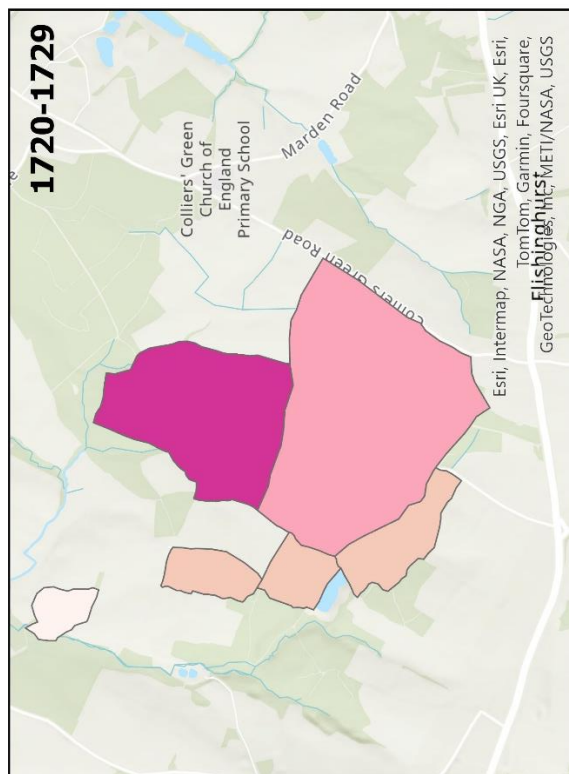
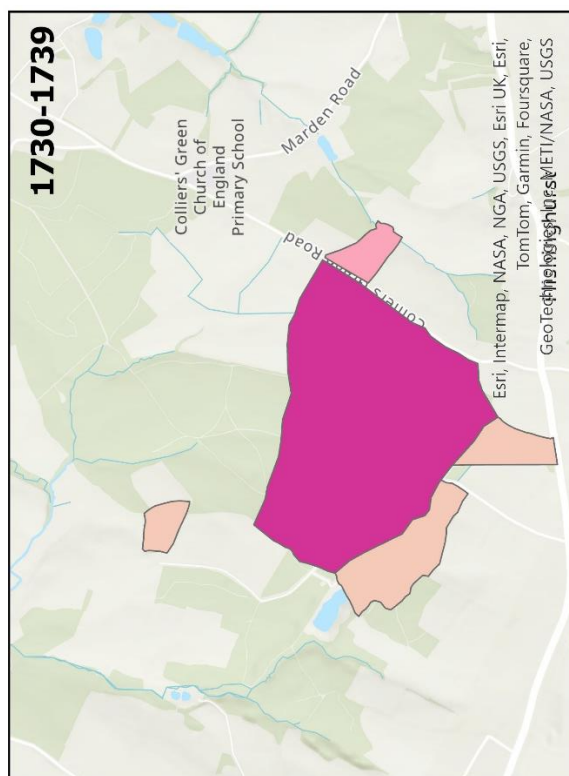
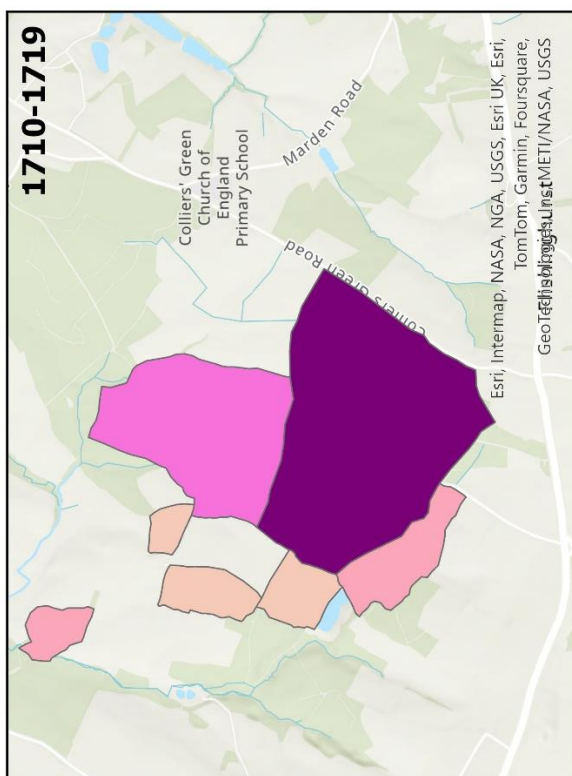
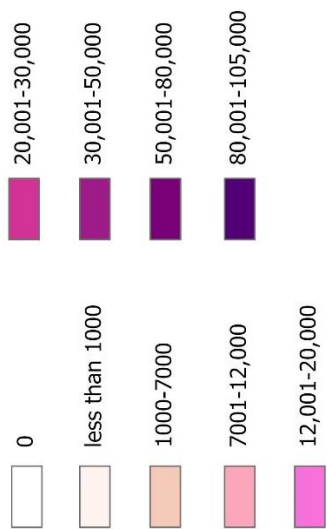


Figure 13: Faggots felled and sold at Glassenbury Estate's northern woodlands, 1710-1739.

Even though the Roberts sold underwood to their own tenants, the *Wood Book* suggests they often did not sell it to them in the form of faggots. Rather, tenants like the Vousdens, Manwarings, and Ongleys purchased mostly cordwood from Glassenbury.²⁸⁸ These tenants leased shaws or small woodlands from Glassenbury. At times, lease agreements outline access to underwood as part of their rents.²⁸⁹ This suggests that unlike the rest of the community of Cranbrook and Goudhurst, some Glassenbury tenants were able to build faggots by collecting dead wood and branches from the shaws and small woodlands they rented. This is representative of some small lasting elements of the common rights system where faggots were collected from the lord's woods.

Unlike faggots, cordwood and pole felling varied more drastically from 1686 to 1782. Although cordwood was recorded at every woodland felling at Glassenbury, it peaked in the 1710s and then steadily declined in the decades after.²⁹⁰ A combination of factors likely led to the decline in cordwood demand in Cranbrook. By the early 1700s, coal was being used as an alternative fuel source in the Weald.²⁹¹ However, the close proximity to dense woodlands left wood as the preferred fuel when possible in the region. Wealden towns were not suffering for want of fuelwood the way London or larger cities were.²⁹² The Wealden cloth industry had also been slowly declining in Cranbrook for decades, and completely collapsed by the 1720s.²⁹³ This led to decreased demand for both charcoal and wood for industrial heating in the area, since the hundreds of vats that once operated in houses throughout the parish were no longer in operation. However, cordwood remained an important fuel source for households and general industry, so

²⁸⁸ CM, *Wood Book*.

²⁸⁹ KA, U410/E118.

²⁹⁰ CM, *Wood Book*.

²⁹¹ Brandon, 147.

²⁹² Richards, 194.

²⁹³ Cantor, 123.

even though cordwood demand declined after the 1710s, there was still a steady market for it. Throughout the period, cordwood was most heavily felled from Old Park Wood, Severalbury Wood, and Colliers Lodge Wood, which were the closest woodlands to the town of Cranbrook.²⁹⁴ Even when market demand was in decline, the woodlands closest to the town continued to be the primary source for cordwood. This provided easier delivery to the people of Cranbrook, since transporting a cord of wood required substantial human and animal power.²⁹⁵

Pole felling was uneven and varied widely from 0 to 56,412 poles per decade throughout the period.²⁹⁶ Poles over 12 feet were often used for hop growing. Hop growing had been concentrated in Kent since the early sixteenth century but drastically grew in popularity in the region in the early eighteenth century, around the same time as the final collapse of the broadcloth industry.²⁹⁷ Glassenbury itself had several hop gardens, many of which were mentioned in their lease agreements and estate valuations for Cranbrook and Brenchley.²⁹⁸ There is a discernable pattern between pole and cordwood sales. During the peak of cordwood felling, pole felling was nearly non-existent, and as cordwood sales declined, pole sales rose dramatically.²⁹⁹ Hop poles and cordwood were made from similarly sized and aged oak and chestnut coppice.³⁰⁰ When market demand for cordwood declined, Glassenbury woodland managers were able to sell more oak and chestnut coppice as poles rather than cordwood to keep their revenue steady. Pole sales made up for the decline in cordwood demand at Glassenbury. Hop poles did not need to be replaced every year, thus the demand for them fluctuated as new

²⁹⁴ CM, *Wood Book*.

²⁹⁵ **Deselect sublayer “woodland faggots” and select sublayer “woodland cordwood”. Use the time slider to explore.**

²⁹⁶ Ibid.

²⁹⁷ Brandon, 151. Richard Filmer, *Hops and Hop Picking*, (Oxford: Shire Publications, 2011), 8.

²⁹⁸ KA, U410/E118, E149.

²⁹⁹ CM, *Wood Book*.

³⁰⁰ Cantor, 14.

hop gardens opened and old poles needed to be periodically replaced. In the years where there was less demand for hop poles, more underwood was prepared into cordwood, while when the demand for cordwood declined, more underwood was left as poles rather than being halved and quartered for fuelwood.³⁰¹ Figures 14 to 16 visualize the pattern between cordwood decline and pole increase at Glassenbury from 1710 to 1739. Over these three decades, there is clear pattern of declining cordwood sales and increasing pole sales.³⁰²

³⁰¹ Ibid.

³⁰² Deselect sublayer “woodland cordwood” and select sublayer “woodland poles”. Use the time slider to explore.

Cordwood versus Poles felled and sold in Northern Glassenbury Estate Woodlands, 1710-1719

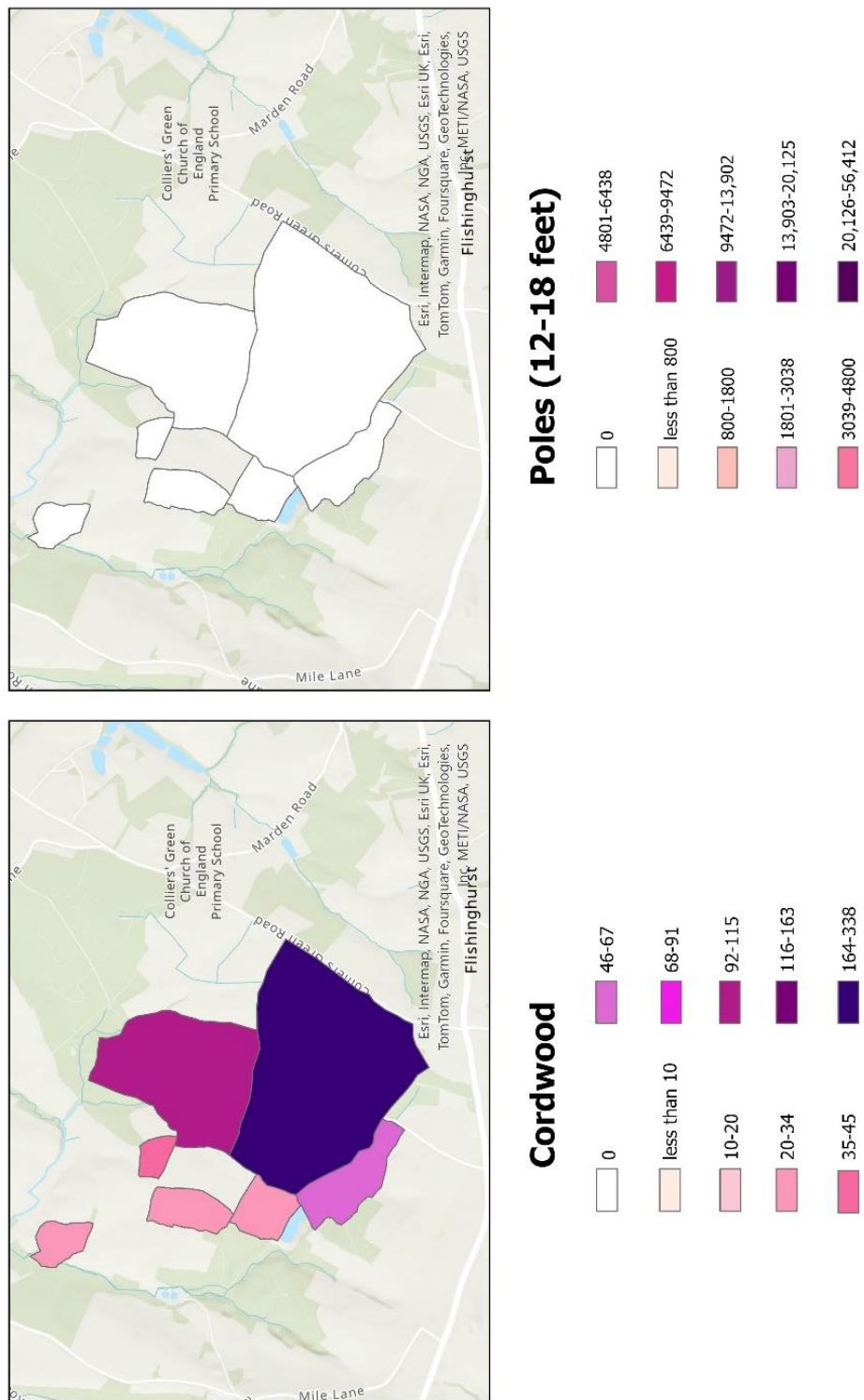


Figure 14: Cordwood versus poles felled at northern Glassenbury Estate, 1710-1719.

Cordwood versus Poles felled and sold in Northern Glassenbury Estate Woodlands, 1720-1729

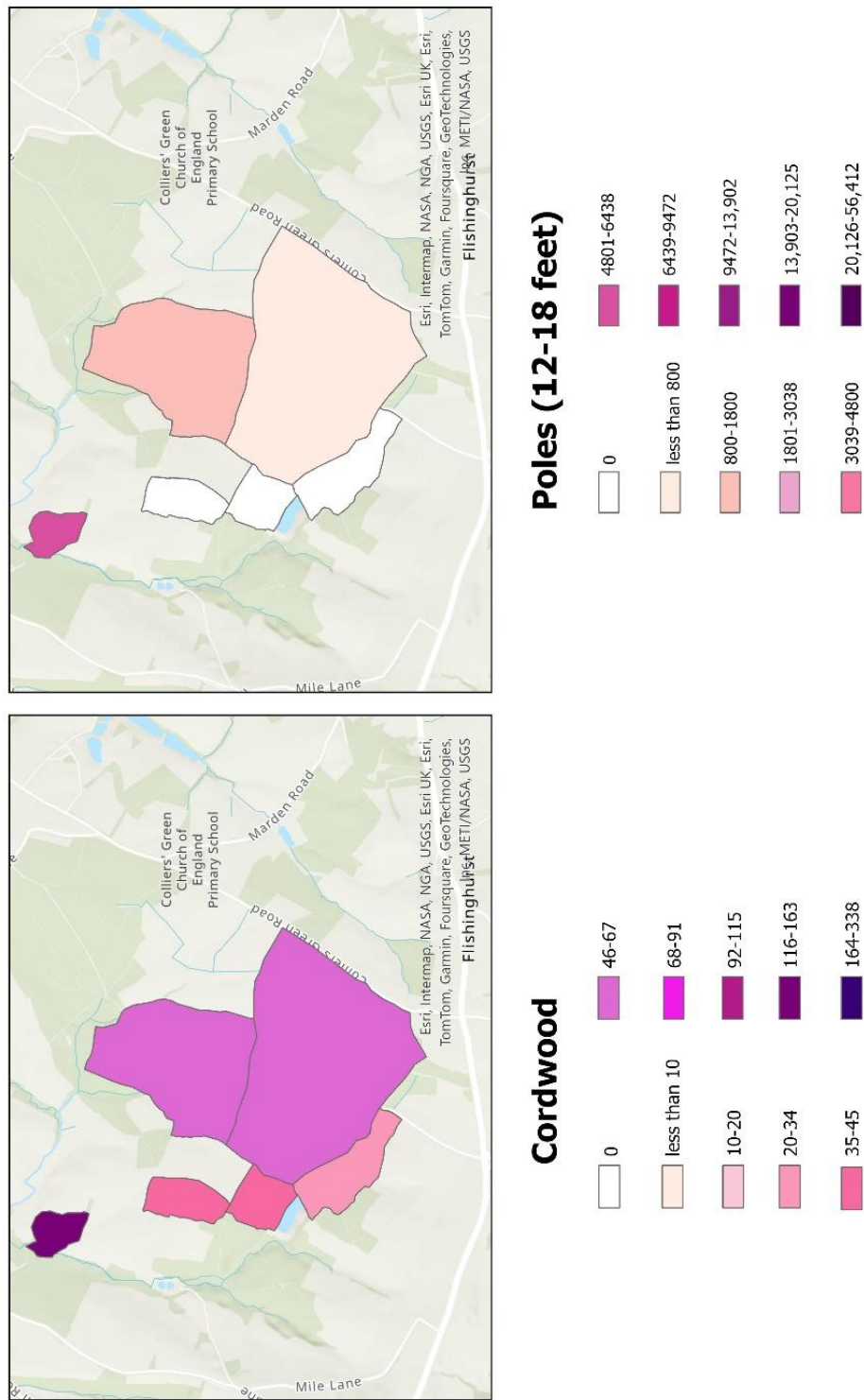


Figure 15: Cordwood versus poles felled at northern Glassenbury Estate, 1720-1729.

Cordwood versus Poles felled and sold in Northern Glassenbury Estate Woodlands, 1730-1739

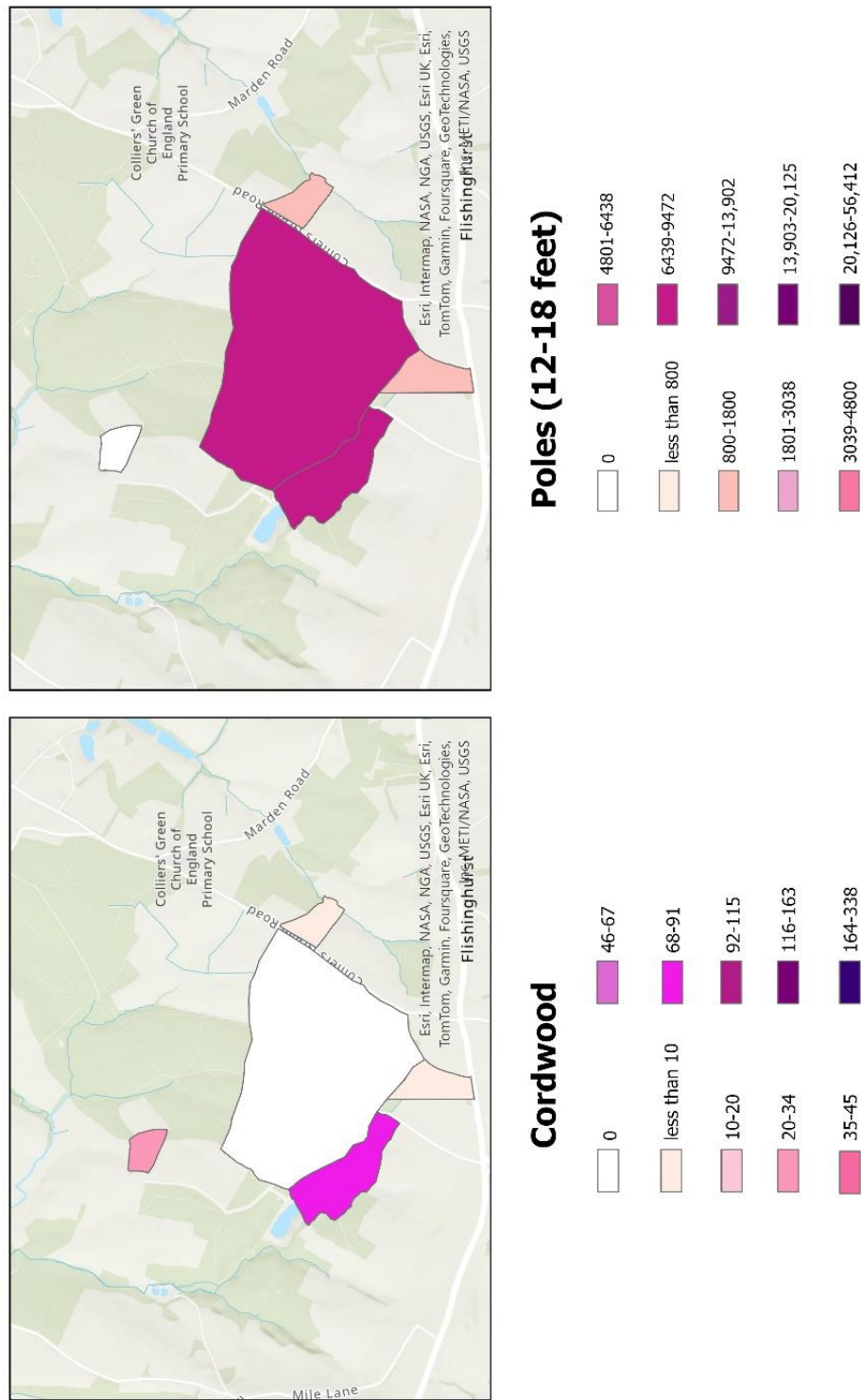


Figure 16: Cordwood versus poles felled at northern Glassenbury Estate, 1730-1739.

The Roberts were tuned into the local woodland economy and responded to market demands by felling underwood accordingly. They rarely had underwood that went unsold, which suggests that they were apt at understanding the needs of the local community. Responding to local market demands, like the transition towards hop poles rather than cordwood, ensured that the Roberts produced as much revenue as possible from woodland resources. Additionally, the cost of underwood products remained fairly consistent from 1686 to 1782. Faggots consistently cost approximately 6 shillings per load of faggots, cordwood averaged between 9 and 15 shillings, and poles between 13 to 18 shillings per load.³⁰³ The Roberts' woodland revenue also remained fairly consistent and substantial.³⁰⁴ Intentional intensive underwood management allowed the Roberts to participate in the local, yet large-scale woodland economy as the only substantial underwood provider. The local nature of underwood economies meant that any possible shortages were highly localized.³⁰⁵ There is no evidence of any type of underwood shortage or possible woodland exhaustion throughout this period, and the HGIS study visualizes a sustainable and thriving woodland economy.

³⁰³ CM, *Wood Book*.

³⁰⁴ See figures 17 and 18.

³⁰⁵ Gordan Batho, "Landlords in England" in *The Agrarian History of England and Wales VI*, 271.

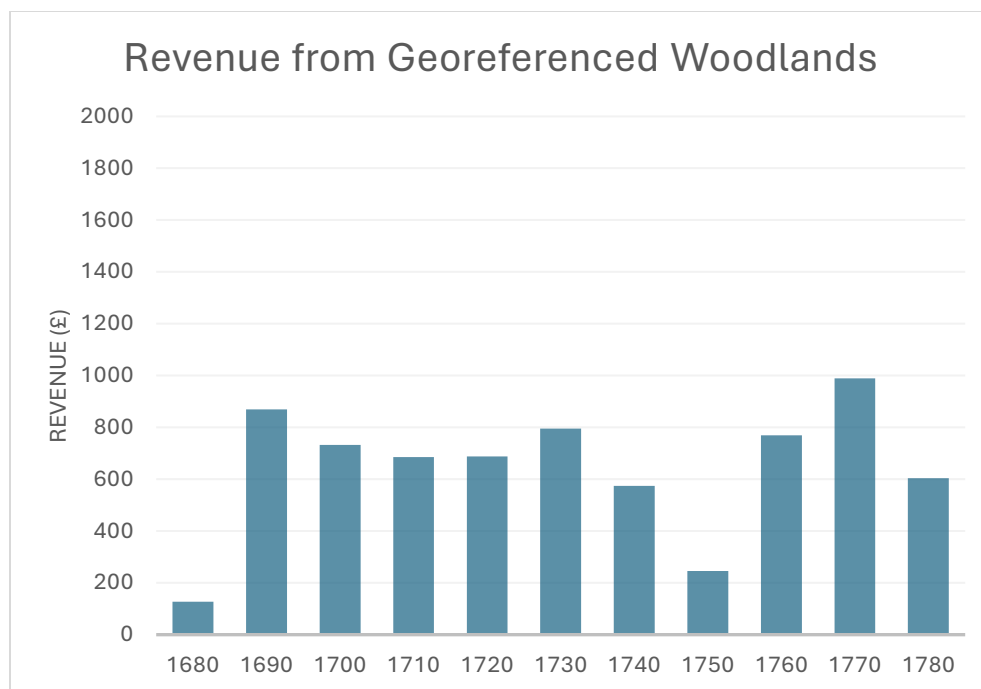


Figure 17: Total revenue from Georeferenced Woodlands at Glassenbury by decade.

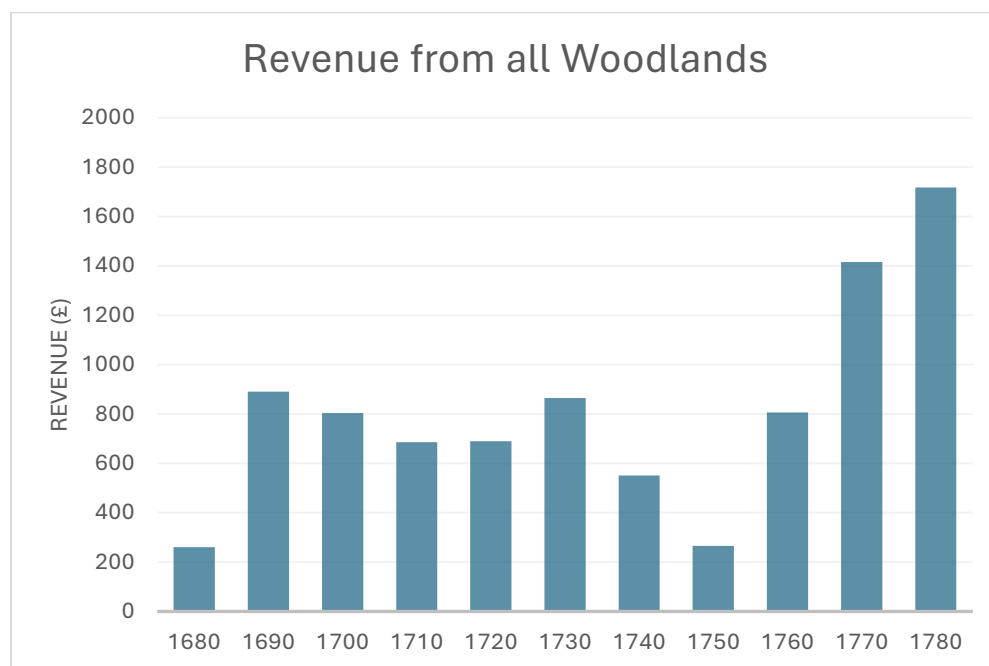


Figure 18: Total revenue from all woodlands at Glassenbury by decade.³⁰⁶

³⁰⁶ The 1750s were a disruptive decade for the Roberts as Jane Roberts and her husband George Beauclerk divorced which led to disagreements over woodland management. Lack of revenue from this period is likely due to lack of records as Beauclerk tried to collect woodland revenue without Janes's interference, rather than lack of management.

Glassenbury held the largest amount of woodland of any private estate in the parish and thus held a powerful monopoly on woodland resources for the local community.³⁰⁷ All members of society, from merchants to tavern owners to smiths, sadlers, husbandmen, clerks, and personal households needed sustained access to underwood, and together the Wealden community in the parish of Cranbrook formed an obvious market demand for the Roberts' woodland resources. The Roberts did not have to work hard to sell underwood because the locals had little choice of where to buy it from. This made for easy revenue without having to actively seek out buyers.

This closed system was based off of the enclosure of Glassenbury woodlands, which rewarded the Roberts with the right to commodify their woodlands and create highly productive and profitable woodland economies. By removing common rights to woodlands, the crown ensured that private estate owners had built-in buyers left with no choice but to purchase underwood from their local manors. This ensured local monopolies for estate owners who had ample motivation to implement intensive woodland management to ensure sustained income from the underwood market. Local underwood economies were locked-in lucrative markets that estate owners could invest in with little to no risk. These markets provided regular, sustainable income for landowners for very little upfront investment, if they managed their woodlands accordingly. This all gave ample motivation to landowners to manage woodlands with a preference for underwood rather than timber, as the Roberts did.

This preference for underwood was heightened by the drawbacks involved in selling timber. Although standing timber was high value; the 1786 survey estimated that the timber at Glassenbury was worth £11,454.40,³⁰⁸ the costs associated in felling and transporting it

³⁰⁷ Hasted, 91.

³⁰⁸ KA, U410/E145.

drastically reduced its value. Most of Glassenbury's timber surveyed in 1786 was sold to timber merchant William Collins.³⁰⁹ An agreement between Collins and John Roberts outlined that Collins purchased 1305 timber trees from the Goudhurst and Cranbrook Glassenbury Estate for a total cost of £2000.³¹⁰ Collins' felling account recorded an additional 309 timber trees for a total of 1614, or 54% of the estate's timber.³¹¹ The agreement between Collins and Roberts outlined that Collins was responsible for hiring workmen to cut and transport the timber and was liable for any damages done to property in the process.³¹²

The difference in Neve's estimated value of the Glassenbury timber and the price Collins paid is drastic. Neve valued each timber tree from £3 to £4.5 per ton while Collins paid just £1.04 to £3.33 per ton.³¹³ On the surface, this disparity seems incomprehensible. However, the value Neve assigned was the value of that timber tree as it stood, or the value it has before it is cut down and transported, which was an expensive endeavour. As per the timber purchasing agreement, Collins had to supply and pay the workmen to fell the timber, he had to pay to have it transported, and further, likely had to pay for the cost of workmanship to turn the raw timber tree into the sellable product. For example, the trees were sold with the bark,³¹⁴ which needed to be stripped off the timber and sold separately to tanners.³¹⁵ The workmanship involved in stripping 1305 trees of bark was paid for by Collins. All these additional costs by the timber merchant, with the added intrinsic idea that his goal is to make a profit through selling the timber for more

³⁰⁹ William Collins may have also been a tenant of Glassenbury Estate. Descriptions of Collins in *The Eleventh Report* state that he was from Brenchley, and John Neve's timber survey identified "William Collins Farm" as part of the Brenchley Glassenbury Estate.

³¹⁰ KA, U410/E121.

³¹¹ KA, U410/A33.

³¹² KA, U410/E121. **To visualize where the timber trees cut by William Collins were, deselect "Underwood Management" and select "Timber Survey 1786". Select the sublayer "timber trees felling".**

³¹³ KA, U410/E145, U410/E121.

³¹⁴ KA, U410/E121.

³¹⁵ I.G. Simmons, *Environmental History: A Concise Introduction*, Cambridge, Massachusetts: Blackwell, 1993), 86. Cantor, 14.

than he paid for it, were part of the negotiations that took place between landowners and timber merchants.³¹⁶ Timber merchants alleviated the heavy costs and human energy involved in felling and selling timber, and thus selling to them came at a cost, which lowered the value of the timber for landowners.

Unlike underwood, timber was a long-term investment that typically outlived its owners. Timber trees take longer than a human lifespan to grow to optimal sizes, which forced landowners to choose between profit in their lifetime, or that of their heirs.³¹⁷ Selling timber also required additional effort for estate owners. They had to hire and pay surveyors and find timber merchants, and the costs associated drastically reduced the revenue landlords made. Compared to the risk-free, highly profitable annual underwood market, timber was much less attractive. In the 100 years covered in this study, available archival materials reveal that Glassenbury profits from underwood totalled around £8952.40 while timber profits were only £2000.³¹⁸ Thus, as the HGIS study demonstrates, the Roberts prioritized underwood growth through intensive woodland management to generate as much regular revenue from their woodlands as possible. This meant that there was less timber available on their woodlands, since only select timber trees were left to grow surrounded by the coppice to ensure that sunlight reached the regrowing underwood trees.

Woodland markets: the Royal Navy's timber scarcity

Private landowner's preference for underwood did reduce the amount of timber available in the Weald. If we return to the timber merchants interviewed for the 1792 report, their observations confirm what the case of Glassenbury suggests, that underwood was more

³¹⁶ KA, U410/E121.

³¹⁷ Rackham, *Trees and Woodlands*, 11.

³¹⁸ CM, *Wood Book*. KA, U410/E33-36, U410/E145, U410/E121, U410/A33.

profitable and thus led to less timber within the woodlands.³¹⁹ To further complicate the matter for the Royal Navy, there were very specific circumstances in which timber was suitable for naval purposes. Ships required both straight and compass timber. Each rated ton of a standard warship consumed between 1.5 to 2 loads of timber, which meant that each ship consumed thousands of mature oak trees.³²⁰ It was wholly agreed upon by shipbuilders, the Navy, merchant ship owners, and the public that English Oak was the highest quality and best naval timber available, and that there was no comparable substitute.³²¹ The highest quality English oak timber came from the Weald, primarily in Sussex but also in Kent, and the Navy preferred Wealden oak whenever possible.³²² Once timber was received at the dockyard, it had to be properly seasoned and needed to be used before it began to rot in the open-air, uncovered storage in the yards. Standing orders for the Royal Navy in this period required cruisers in domestic waters to be docked every six weeks for maintenance, while ships of the line had to be docked more than once a year.³²³ This was complicated for larger ships, which could only be docked and undocked in the spring, creating tight schedules for ship refitting and maintenance.³²⁴ During peacetime, Navy ships which weren't in commission sat stagnant in the dockyards where they quickly rotted. This was especially the case since the warm waters of the Caribbean and Indian Ocean had dramatic effects on Royal Navy ships, which rotted at an increased rate in different climates. A transition to a full-time operating Navy in the early eighteenth century did help this issue, but even at its height, the peacetime fleet was never fully serviceable.³²⁵ Thus, naval timber needed to be the right size, cut at the right time of the year, from the right area, and seasoned and used at

³¹⁹ "The Eleventh Report" (1792), 61.

³²⁰ Richards, 203.

³²¹ Rodger, *Command of the Ocean*, 192.

³²² Albion, 117.

³²³ Rodger, *Wooden World*, 141.

³²⁴ *Ibid*, 142.

³²⁵ *Ibid*, 145.

the right time, to be effective for shipbuilding. This presented logistical nightmares and challenges for timber procurement and resource management with or without the added difficulty of possible perceived shortages.

Throughout this period, the Royal Navy was increasingly procuring timber from private estates because of poor timber management in the Crown woodlands. The Royal Navy's preferred method for buying from private estates was through a contract system with timber merchants. The Navy Board attempted to estimate the annual timber needs and advertised for contracts which were rewarded to the lowest bidder.³²⁶ However, this system only worked when the Navy had good credit. When they had poor credit, Navy Surveyors, Commissioners, and Shipwrights had to travel to seek out timber and secure contracts, often with great difficulty.³²⁷ The lack of substantial Forests and Crown woodland in the Southeast meant that there were no Royal timber nurseries within appropriate distance to the Kentish dockyards at Chatham and Sheerness. The Royal Navy refused to pay more than 38 shillings (£1.9) per load for land carriage, which drastically reduced the areas where they were willing to procure timber.³²⁸ Instead, their timber was procured almost entirely through private contracts for Wealden timber which could be easily transported to the dockyards, either via short land carriage to the sea or to the Medway or Rother River. This meant that their timber supplies were wholly reliant on their ability to make competitive contracts with merchants and pay them accordingly, to keep them in good standing.

Collins' 1786 timber purchase from Glassenbury Estate is representative of the typical way merchants bought timber from gentry. Collins purchased timber trees as they stood from the

³²⁶ Albion, 39.

³²⁷ Ibid, 41. TNA, ADM 106//397.

³²⁸ "The Report" (1771), 16.

estate using cash.³²⁹ The added expense of felling and transporting timber encouraged merchants to offload timber at the highest possible price to make up for upfront costs. The Royal Navy purchased it from timber merchants with an imprest rather than ready money, which were filed with the Navy Treasurer in order of issuance.³³⁰ This meant that payment to the timber merchants was dependent on the Royal Navy's credit from Parliament and how those funds were dispersed by the Naval Treasurer. Thus, when the Navy Board was in arrears due to accumulated debt, merchants often waited years to be paid for their timber.

Throughout last decades of the seventeenth century the Navy remained in substantial debt, which drastically impacted their ability to pay timber merchants.³³¹ By 1690, the Navy had continued to accumulate debt while also increasing the size of the fleet. The Royal Navy can be characterized by its massive shortage of ready money and growing debt, and the tug-of-war between Parliament, and the Crown's interests, all during the Nine Years War. This was cause for great concern in Chatham and Sheerness, where Commissioner Edward Gregory tried to procure contracts with Wealden timber merchants and inform the Navy Board about growing scarcity in the dockyard's timber stores.

Gregory's correspondence with the Navy Board officials demonstrates why the Chatham and Sheerness dockyards had little to no timber left through the 1690s. The timber scarcity in the dockyards was not because of scarcity of timber in the Weald brought on by woodland industry and private landowner's preference for underwood, rather it was because of lack of naval funds. The 1690s was a particularly difficult time for the Chatham dockyards because the Naval Board was not only deeply in debt and had bills in arrears with timber merchants and other suppliers,

³²⁹ KA, U410/E121.

³³⁰ Albion, 64.

³³¹ Rodger, *The Command of the Ocean*, 640.

but the Southeastern weather proved to be a major obstacle as well. Gregory complained of “so dismall a rain, that it has in great measure dashed our hopes of getting the large timber we expect from the Weald of Kent to the waterside”, however, he was careful to argue that this is not the sole reason for timber scarcity in the yard, but that “want of money” was the most significant issue.³³² Throughout 1690, Gregory complained at length about his troubles securing contracts with the timber merchants. He lamented about learning of “no less then two & twenty hundred load of serviceable timber, no piece under 50 feet” because, as he wrote:

This I assure you was a matter of much joy to me & I thought the Purveyours time & pains & my own very well spend. But there is a fall of heavy remorse in our way, they [the timber merchants] positively require the payment of the old debt before they contract me with a new, making a dismall complaint of the hardships they have been driven to by the unexpected dilatoriness of our payments, and I do know that some of them have undergone severely upon that account.³³³

Gregory was completely disabled from procuring more timber for Chatham without money to pay overdue debts to the increasingly frustrated timber merchants, who would only sell to him once their arrears were resolved. For example, in August 1690, he wrote to the Navy Board:

Inclosed you will find a copy of a contract made yesterday for neare 100 load of timber, the Merchant would not enter into, till I had pay'd him the debt that was oweing from the 6th of March 1689: which your last imprest enabled me to do. The moment his arrears were satisfy'd, he was prepared to give me further credit, and did assume me that if he might have a valuable price for his goods & money found to circulate briskly, he had a prospect of helping us to 300 load of the surest timber new in Kent.³³⁴

Gregory wrote to the Navy Board Officials informing them that the timber merchants “have been indeed disabled from buying of the Nobility and Gentry, who rarely sell but with exportation or

³³² TNA, ADM 106/397/344.

³³³ TNA, ADM 106/397/336.

³³⁴ TNA, ADM 106/387/351.

ready money.”³³⁵ Timber merchants whose bills were in arrears were not only put off from selling to the Navy, but the lack of timely payment also impacted their ability to buy more timber from landlords like the Roberts, who typically only sold timber for cash.³³⁶ Gregory’s experience in procuring timber from merchants whose debts were in arrears demonstrates the intricacies of timber scarcity at Chatham. It was not a matter of there being no timber to purchase, rather, it is clearly a matter of lack of funds to pay merchants. Since the timber market was an open economic system, timber merchants could refuse to sell timber to the Navy because they had other ready buyers, like merchant shipbuilders and the East India Company, who could pay ready money without concern.

This problem continued throughout the decade. In 1693, Gregory wrote to the Navy Board with increasing frustration about lack of funds to procure timber for the dwindling stores at Chatham:

Had the Lords of the treasury enabled us to make good payments for our dealers, and had it pleas’d God to have sent us a fair and kindly season, this yard would doubtfull have been provided with timber of all sorts. But since it has happen’d otherwise in both respects, your Honour cannot but be sensible that I have often expressed my fears to you, that there would be a scarcity of that commodity, and no man serving either in any of your stations or mine can be responsible for the consequences, for we can neither make the ways payable nor compel our Merchants to sell us their goods.³³⁷

That same year, Gregory received a letter signed by ten timber merchants from the Kentish Weald complaining about lack of payment. They informed Gregory that:

Tis true we have some of us some Timber by us which we would be glad for the publick Good that their & Majesty might have the refusal of but unless some way can be found to procure out money for what we have serv’d in, and we may have

³³⁵ TNA, ADM 106/397/351.

³³⁶ Ibid.

³³⁷ TNA, ADM 106/433/213.

prospect of better payment for the future, we must dispose of our Timber to the Merchants who pay us ready money.³³⁸

This problem plagued Gregory continuously. He wrote to the Navy Board of timber merchants informing him that “their whole fraternity [will] not enter into any new contract with you or me” until their arrears were paid.³³⁹ The constant struggles with the timber merchants seem to have had significant impacts on Gregory, who was caught in the middle of the timber merchant’s demands and the lack of funds from the Navy Board and Treasury. He lamented that “I think nothing in this world was ever a greater trouble to me then the distances at which our timber merchants stand with us.”³⁴⁰ Unfortunately, these problems never seemed to cease during his tenure as resident Commissioner at Chatham.

Inability to pay the timber merchants’ arrears had limited impacts on the Royal Navy as a whole, but had detrimental impacts on Chatham’s operations. Gregory complained about lack of planks, knees, and other timber consistently throughout the 1690s.³⁴¹ In September 1693, Gregory noted that Chatham had no plank whatsoever.³⁴² At times, he attempted to procure timber from other Royal Navy yards, since Chatham had several ships docked and waiting for integral repairs. His attempts were futile, as Sheerness, Portsmouth, and Deptford had no timber to spare.³⁴³ The lack of timber led to significant delays for dockyard operations. In 1690, all ship repairs scheduled for spring were delayed for want of timber.³⁴⁴ Warship *Brittania* was able to be repaired using pieces from other ships only after months of sitting in the dockyard behind

³³⁸ TNA, ADM 106/433/220.

³³⁹ TNA, ADM 106/433/247.

³⁴⁰ TNA, ADM 106/433/247.

³⁴¹ TNA, ADM 106/396/203, 327. ADM106/433/213, 248.

³⁴² TNA, ADM 106/433/248.

³⁴³ TNA, ADM 106/433/270.

³⁴⁴ TNA, ADM 106/397/327.

schedule, while the Prince, Victory, and Dunkirk were left on dry docks while Chatham waited for more timber.³⁴⁵ In 1693, Gregory again cited lack of timber stores for the incomplete ship repairs, also lamenting about issues hiring caulkers, whose bills were also significantly in arrears.³⁴⁶

By the late 1690s, prospects had not improved for Sir Edward Gregory or Chatham dockyards. He complained to the Navy Board about the same old problems:

I find myself obliged impartially to acquaint you with the dismal prospect I have of our affairs at this place. God knows we are not overstocked with timber at this time, but sundry of our merchants, and those, the most substantial of that sort, have been lastly with me to inquire what hopes there were of money. Upon my not being able to give them any solid encouragement, they unanimously declared that their condition was very precarious. And they stood on the brink of ruin, those of them who are all this day under contract to serve into his Majesty's stores, considerable quantities, affirm that having not where withal to pay their carriers, they are in no capacity to comply with there contracts.³⁴⁷

Evidently, the 1690s at Chatham were characterized by severe lack of funds which delayed repairing warships. Merchants, who benefitted from the open market had other proprietors who were happy to purchase their timber with ready money, or pay their bills within a reasonable time. The Royal Navy's timber scarcity had nothing to do with lack of timber, that much is clear. Communication between the timber merchants and Sir Edward Gregory make it clear that there was ample Wealden naval timber available for purchase on the market. Throughout the decade, the Royal Navy's accumulated debt ranged from £1,430,439 in 1690, to a new height of £2,245,957 in 1698, and back down to roughly £1,300,000 by the end of the century.³⁴⁸ Funds assigned to the Royal Navy by Parliament were at the whims of the Navy Treasurer to disperse,

³⁴⁵ Ibid.

³⁴⁶ TNA, ADM 106/433/270.

³⁴⁷ TNA, ADM 106/504/59.

³⁴⁸ Rodger, *The Command of the Ocean*, 642.

and despite Gregory's efforts to convince the Navy Board that their problems were due almost exclusively to lack of funds, little was done about the problem.³⁴⁹ The rain in Southeast England exasperated the situation, making it difficult to transport timber when they were able to procure it. Gregory was right in thinking that he was in quite a dismal situation as he was at the whim of the poor management of the Navy Board.

In the early eighteenth century, the Royal Navy seemed to be in better financial shape. Their accumulated debt did continue to grow, and reached a new peak of £5,655,536 by 1710, but within a year it was reduced to under £1,000,000 following the Parliamentary vote on Royal Navy expenditure.³⁵⁰ Afterwards, the accumulated Royal Navy debt remained under £2,000,000 until 1742. In the first half of the century, England was deeply involved in the War of Spanish Succession (1701-1714) and war against the Jacobites and Spain (1717-1720). Additionally, there was increased shipping through the Atlantic as massive growth in England's colonial holdings in the Americas, the Caribbean basin, and Indian Ocean continued to fuel trade. These circumstances led to Parliamentary arguments in favour of an enlarged and stronger naval force to support strategic and commercial goals.³⁵¹ Since the protection of trade had become an accepted responsibility for the Royal Navy, popular support encouraged better funding towards the Royal Navy which allowed it to pay much of its arrears.³⁵² Thus, the Navy Board and Commissioners at Chatham had a significantly different experience procuring timber from Wealden merchants.

³⁴⁹ Ibid, 110.

³⁵⁰ Rodger, *The Command of the Ocean*, 642-643.

³⁵¹ Baugh, "The Professionalisation of the English Navy and Its Administration, 1660-1750", *The Sea in History – The Early Modern World*, eds. Buchet, Christian, and Gerard Le Bouëdec (Marklesham, UK: Boydell & Brewer, 2017) 854.

³⁵² Ibid, 858.

Unlike his predecessor Gregory, George St Lo, Commissioner of Chatham from 1703 to 1714 rarely had to seek out timber merchants. Rather, his correspondence suggests that merchants were happy to approach the Navy themselves to sell their timber. He wrote enthusiastic letters offering their services to the Navy. Wealden timber merchant John Light of Goudhurst wrote to St Lo, offering additional timber to Chatham after his successful contract to Sheerness in 1709, and multiple times in 1719.³⁵³ That same year, St Lo was able to make competitive offers to other timber merchants after surveying their timber.³⁵⁴ There is no evidence in George St Lo's correspondence in 1709, nor his successor James Littleton in 1719 regarding lack of payments to timber merchants, or refusals to supply timber. Like St Lo, Littleton's correspondence suggests that timber merchants sought out contracts with the Royal Navy in this period. Edward Lynn, timber merchant, requested to increase the amount of timber he was contracted to supply in February 1719.³⁵⁵ Timber merchant Edward Bathurst wrote to Littleton in August of 1719 requesting that his timber be surveyed in hopes it was appropriate for the Royal Navy.³⁵⁶

There seems to have been little want for timber throughout the first two decades during this period at Chatham or Sheerness. Only once in the 1709 and 1719 series of the Commissioner's correspondence was there a mention of timber shortage. In March 1709, the Master Shipwright at Chatham wrote to George St Lo that, "being of great want of four-inch plank for the bottoms of the Restoration, which is very much rotten, so that a considerable part requires shifting."³⁵⁷ He warned St Lo that around fifty loads of four-inch plank would be

³⁵³ TNA, ADM 106/643/17. TNA, ADM 106/727/46.

³⁵⁴ TNA, ADM 106/643/227, 240, 243, 262.

³⁵⁵ TNA, ADM 106/727/5.

³⁵⁶ TNA, ADM 106/727/242.

³⁵⁷ TNA, ADM 106/643/267.

necessary to repair the warship Restoration.³⁵⁸ But otherwise, there is very little evidence of timber shortages at Chatham or other dockyards.

In fact, the Royal Navy seemed to be in the exact opposite situation it had been just a decade earlier. They were in a strong enough position with the timber merchants to strong-hold them into providing their highest quality timber and refuse their amendments. For example, Mr. Fuller, a timber merchant from the East Sussex Weald, was contracted for several loads of very large oak timber in 1709. Due to its size, he informed the Commissioner at Chatham that he would be unable to transport it to the dockyard whole unless they could send a convoy ship, because he expected the roads to be in to poor shape from summer rain.³⁵⁹ The Navy Board refused to pay for a sea convoy, so Fuller and the Purveyor suggested amending his contract to convert the timber into planks so that land transport could be possible.³⁶⁰ However, the Navy Board, who wanted “thick stuff,” not planks, refused this plan as well.³⁶¹ The ultimate solution of the Navy Board and George St Lo was that Fuller would provide the timber as originally contracted “by one means or another”,³⁶² suggesting that regardless of the difficulties presented to Fuller, the Navy Board expected him to deliver his timber within their agreed upon time with no convoy assistance.

The relationship between the timber merchants and the dockyards seems to be completely reversed during this period. Rather than the Commissioner and Surveyors hunting down merchants and carefully having to approach them thanks to their outstanding debts, the Navy Board were in a position where they could refuse or turn down timber if they felt like it. Albeit,

³⁵⁸ Ibid.

³⁵⁹ TNA, ADM 106/643/303.

³⁶⁰ TNA, ADM 106/643/308.

³⁶¹ TNA, ADM 106/643/312.

³⁶² Ibid.

the correspondence still suggests that they found uses for all timber received, even if it wasn't the quality they hoped for. For example, John Light's timber delivered to Sheerness in 1708 was found to be "defective" and not high enough quality for naval timber, but Light and St Lo eventually sorted out an agreement that the defective timber would be sent to Chatham to be used for "tyes, warfing & such like uses".³⁶³ However, since much of Light's timber was found to be defective, the Navy Board issued a warrant to him, informing him that his contract was in arrears because he hadn't supplied to agreed upon naval timber.³⁶⁴ Thus, not only did the Navy Board find use for the defective timber rather than sending it back, but they were also able to procure additional timber from Light without additional payment. Light did supply additional naval timber, and he stayed in good standings with Chatham and Sheerness, continuing to give them first right of refusal for timber until at least 1719.³⁶⁵

There is stark contrast between the correspondence from the 1690s and the early eighteenth century. In the 1690s, Commissioner Gregory was constantly trying to stay in good standing with the timber merchants who often refused to sell to the Navy because of lack of payment. At the same time, Gregory wrote to the Navy Board almost daily about how timber itself was not scarce, but their ability to procure it was negligible due to outstanding bills to the timber merchants. Since the timber market was part of the free and open economy, there was no law or statute that forced merchants to give the Navy first right to refusal. Members of Parliament were often gentry landowners themselves who had a vested interest in ensuring they

³⁶³ TNA, ADM 106/643/17, 231.

³⁶⁴ TNA, ADM 106/643/231.

³⁶⁵ TNA, ADM 106/727/46, 282.

could sell their timber freely for the highest price. Thus, the market system promoted by the government ensured that timber merchants could do as they pleased with their goods.³⁶⁶

The Royal Navy's lack of payment not only encouraged Wealden merchants to sell their timber to customers prepared to pay ready money, but it also frequently debilitated merchants from procuring additional timber for subsequent seasons. Timber merchants were intermediaries between landowners and buyers like the Navy and typically had to purchase timber trees using ready money and were responsible for felling and transporting it from gentry land.³⁶⁷ Merchants who continued to sell to the Royal Navy in the 1690s found themselves nearly bankrupt and forced to leave the timber market when their bills weren't paid, because they were left with no ready money to purchase more timber from landowners.³⁶⁸ Timber merchants often sold their goods on imprest at much higher rates than they purchased it, risking the lack of ready money for the eventual pay-off. This caused a rise in the perception of the cost of timber for the Royal Navy.³⁶⁹ Thus, it is not simply a matter of timber merchants preferring clients who paid their bills in a timely manner, but the Navy's inability to pay their arrears to the merchants threatened the Wealden timber market generally, since merchants often couldn't restock timber after their dealings with them.

George St Lo and James Littleton's correspondence demonstrate that when the Navy Board was able to keep their bills in good standing with the timber merchants, they were competitive buyers on the market. There are almost no complaints of timber scarcity in the Chatham or Sheerness dockyards during their residency as Commissioners, and merchants

³⁶⁶ Rodger, *The Command of the Ocean*, 45.

³⁶⁷ TNA, ADM 106/397/351. KA, U410/E121.

³⁶⁸ TNA, ADM 106/433/220.

³⁶⁹ N.A.M. Rodger, *The Wooden World, An Anatomy of the Georgian Navy*, (London: Fontana, 1988), 142.

willingly sought out contracts with the Navy for their timber.³⁷⁰ In the opening decades off the eighteenth century, the Royal Navy was in a position where they could negotiate, and refuse offers when the timber was not to their standard. The timber scarcity 1690s can be completely explained by the Royal Navy's lack of funds. Thus, the scarcity Gregory and the Navy Board speak of is one of money rather than timber.

If lack of funds were to blame for Royal Naval timber scarcity in the late seventeenth century, increased shipbuilding, poor dockyard organization, shipbuilding inefficiencies, and continued mismanagement in the Royal woodlands were to blame through the later eighteenth century. Despite continued concerns from the Royal Navy about dwindling timber, the mid-eighteenth century saw an expansion of the Royal fleet. The War of Austrian Succession from 1740 to 1748 and the Seven Years War from 1756-1763 kept the Royal Navy on active duty, while the continued growth of colonial trade increased shipping across the Atlantic and Indian Ocean. Fleet growth slowed between 1720 and 1740, but consumption of timber after 1740 increased dramatically.³⁷¹ Fourteen ships of the line and 36 cruisers were added to the fleet in the 1740s.³⁷² From 1750 to 1765, the fleet grew to new records, at 139 ships of the line and 91 cruisers.³⁷³ In 1745 and again in 1755, the classes of Royal Navy ships were increased in size and tonnage, which required exceptionally more timber per ship than before; the 70-gun ships were increased to 74-gun ships, an increase in 300 tonnes.³⁷⁴

³⁷⁰ TNA, ADM 106/643/303-308.

³⁷¹ Rodger, *The Command of the Ocean*, 608.

³⁷² *Ibid*, 608.

³⁷³ *Ibid*, 608.

³⁷⁴ "The Report" (1771), 16.

Global trade continued to increase the number of British merchant ships throughout the same period. The East India Company alone built 75 new ships between 1759 and 1770.³⁷⁵ Although naval trade, built on an exploitative system of violence, displacement, slavery, and colonization, was booming across the British Empire, the Royal Navy continued to complain about timber scarcity, especially from the late 1760s onwards.³⁷⁶ In March 1771, a bill was brought forward by the Lords of the Admiralty “For the More Effectually Securing Sufficient Quantities of Oak Timber for the Use of the Royal Navy”.³⁷⁷ The bill painted the East India Company as the new primary offender responsible for the Navy’s timber “famine” and proposed to limit the tonnage of the company’s ships to solve the problem.³⁷⁸ The Admiralty saw this “only as means of preserving vital supplies of timber for the Royal Navy.”³⁷⁹

A committee was set up to investigate the timber shortage and report on their findings. In May 1771, it did so with the publication of “A Report from the Committee appointed to consider how His Majesty’s Navy may be better supplied with Timber”.³⁸⁰ The report consisted of an investigation into the opinions of timber merchants, shipbuilders, East India Company officials, and the Surveyor General of the Royal Forests regarding the timber famine, its causes, and possible solutions. The committee reported that their general findings confirmed that:

there is not a sufficient quantity of Timber in England to be purchased at any Price; and all their Purveyors and Timber Merchants agree, that the larger Timber near the Sea Coast, that is to say, within such a distance that the Land and Water Carriage does not exceed 38 shillings a load, is nearly exhausted.³⁸¹

³⁷⁵ Ibid, 35.

³⁷⁶ Ibid, 1.

³⁷⁷ Michael Snyder, “A Victim of Circumstance: The Timber Bill of 1772 and the East India Company,” *Past Imperfect* 1 (2008), 27.

³⁷⁸ Ibid, 28.

³⁷⁹ Ibid, 27.

³⁸⁰ Hereafter referred to as “the report”.

³⁸¹ “The Report” (1771) 16.

The first part of this statement was misleading, it was not a matter of there being no timber to purchase *at any price*, but that timber growing along waterways has become scarce, and the Navy's standard of not paying about 38 shillings a load for carriage is impacting their ability to procure timber, since most timber is now coming from inland where it remained timber trees grew more densely.³⁸² Perhaps a better way to phrase this is to say that there was not more convenient timber available for the Royal Navy.

The timber merchants interviewed by the committee shared general agreeance that the naval timber preferred by the Royal Navy had been exhausted in many areas. Henry Mills reported that "beyond all Doubt, there was a Scarcity of Timber for the purposes of the Navy."³⁸³ Other timber merchants reported that they had naval timber to sell, but required additional carriage allowance to transport it since the timber was more than 40 miles from any navigable waters.³⁸⁴ Specific to the Weald, Mills reported that there was ample timber growing, but it was not yet large enough for the purposes of the Royal Navy.³⁸⁵ Shipbuilders reported that there was a problem with procuring larger timber necessary for building and repairing ships of the line because of increased tonnage of Royal Navy vessels, however, they also noted that since merchant shipbuilders typically built ships smaller than the over 1000-ton Royal Navy vessels, they had less problems.³⁸⁶ In fact, merchant shipbuilders, including those who built East India Company vessels, reported having never had want of timber nor had they had to seek timber

³⁸² Ibid, 16.

³⁸³ Ibid, 19.

³⁸⁴ Ibid, 17.

³⁸⁵ Ibid, 19.

³⁸⁶ Ibid, 20.

from abroad.³⁸⁷ Again, it seemed to only be the Royal Navy that was having problems procuring timber.

The general solution agreed upon by most interviewed was that the woodlands in the Forests, if managed properly would more than suffice in furnishing the needs of the Royal Navy. Timber merchants, East India Company officials, surveyors, and shipbuilders agreed that the mismanagement in the forests caused substantial waste of timber. One timber merchant remarked that:

The Quantity of Timber that will be wanted for the Navy for 40 Years is easily ascertained by the Navy Board, by judging from the same Period backward, and by the Amount of the Survey of Quantities in the King's Forests, and a further Survey of the Timber of private Property that is fit for the Navy, so much as will be necessary for the above period to be secured by Purchase.³⁸⁸

Others made comments in the same vein; Gabriel Snodgrass, Surveyor General of the East India Company argued that “in the first Place, I am of Opinion, that the Forests and Waste Lands belonging to the Crown may be made, in 30 or 40 Years time, sufficient for the Royal Navy.”³⁸⁹ Although it seems that like the suggestions of Gabriel Snodgrass, timber merchants, and shipbuilders that the Royal Navy's timber scarcity could be solved through proper management of the Royal Forests, the Admiralty and much of Parliament doubled down on the East India Company. The report, which provided no tangible recommendations on how to solve the Royal Navy's problem with timber, was presented to Parliament with the general conclusion that timber was indeed scarce along easily navigable waterways.³⁹⁰ Interestingly, even though the Navy Board, Admiralty, and shipbuilders reported an increase in the cost of timber, records reflect that

³⁸⁷ Ibid, 21.

³⁸⁸ Ibid, 23.

³⁸⁹ Ibid, 24.

³⁹⁰ Ibid, 1-2.

timber had not risen in price at all, and only transportation fees associated with longer land carriages had increased.³⁹¹ The Act, which regulated the tonnage of the East India Company for the sake of the Royal Navy's access to timber passed in 1773. On the matter of the tonnage of East India Company vessels, Gabriel Snodgrass had a sound argument that eventually proved true. He argued:

I know great Cry has been raised against building large Merchant ships, and many Gentlemen believe this to be the Reason that large Timber is so scarce: whereas it is quite the contrary, as must appear when it is considered that very few large Merchant Ships have been built; therefore it must be the great Demand for small Timber, in Shipping and all other Branches of Consumption, that has tempted the landed Gentlemen to cut down so much Timber before it comes to its full Growth; and if these Measures are continued, a real Scarcity of large Timber must ensue in a few Years.³⁹²

Private landowners sold their timber when it best suited them. Merchant companies were willing to pay larger land carriage fees than the Royal Navy and paid timber merchants in cash within shorter time frames. The restriction of the size of East India Company vessels encouraged timber to be cut at younger ages than required for the Royal Navy. Interviewed shipbuilders confirmed that the largest ships they had built for the East India Company ranged from 800 to 900 tonnes, while Royal Navy ships of the line had grown to as large as 1,600 tonnes.³⁹³ The Royal Navy moved forward, in hopes that the limitation of the East India Company's tonnage and policies to maintain three-years supply of navy timber at the dockyards would be enough to extinguish timber scarcity.³⁹⁴ However, this caused further issues in timber procurement.

³⁹¹ Ibid, 39.

³⁹² Ibid 26.

³⁹³ Ibid, 53.

³⁹⁴ Rodger, *The Wooden World*, 142.

The *Eleventh Report* (1792) re-interviewed Gabriel Snodgrass, who reiterated his standing from 1771. When asked if the general consumption of timber for shipbuilding had increased since 1771, he answered, “The Consumption of Timber, for the Navy only, I suppose has been more than double, from 1771 to 1791, to what it was from 1751 to 1771, and the general Tonnage of East India Shipping (British-built) has increased, since the Year 1776.”³⁹⁵ Additionally, when asked what he thought of the Royal Navy’s policy of stocking three-years worth of stores in all dockyards, Snodgrass remarked that “Keeping Three Years Stock Timber, Thick-stuff, plank, &c. in His Majesty’s Yards, is so obviously destructive of Timber in general, and so extravagantly expensive, that it is next to a Miracle its having continued for so long.”³⁹⁶ He also argued that:

Rough Timber piled together in such vast Quantities, as is practiced in the King’s Yards, and to remain in that State for Three Years or more, must certainly receive much Damage; but what Proportion of it may be thereby rendered unfit for shipbuilding I cannot exactly ascertain, it may be One Third or more.³⁹⁷

Snodgrass’s advice was sound, as untreated timber did rot in the Royal Navy’s dockyards while piled together closely and exposed to the elements.³⁹⁸ This was likely part of why the Navy’s shipbuilding was so much more expensive and so much less efficient than the East India Company.

Upon conclusion of the interview, the committee asked Snodgrass for any other suggestions for “any Means by which the Consumption of Oak Timber may be lessened in Shipbuilding”³⁹⁹ to which he gave long feedback. His primary suggestions were about dockyard

³⁹⁵ “The Eleventh Report” (1792), 141.

³⁹⁶ Ibid, 142.

³⁹⁷ Ibid, 142.

³⁹⁸ Albion, 12.

³⁹⁹ “The Eleventh Report” (1792), 144.

policies for timber supplies, which he suggested should not exceed more than one years supply at a time, and that timber needed to be converted and treated as soon as it was received at the yard and shipbuilding should be completed under the cover of roof.⁴⁰⁰ He gave ample advice on shipbuilding techniques to lessen the cost of the Royal Navy's fleet, and that the Forests had still not been maintained to provide optimal timber to the royal dockyards.⁴⁰¹ In his conclusion, Snodgrass wrote:

And I further beg Leave to observe, from the previous Observations and Recommendations herein contained, together with what was suggested by me on the same Subject, and printed with the Report of the Committee of the House of Commons in 1771, that Government has the Power not only to double the Growth of Oak Timber in the Forests and Waste Lands, but also greatly to reduce the Consumption of Oak Timber for building and repairing the Navy. This, with the Supply that may be obtained, at very reasonable Rates, from the usual Falls of private Gentlemens' Timber, would (except from Mismanagement) effectually prevent the Want of that Article for the Navy in the future.⁴⁰²

The appendix of the *Eleventh Report* included summaries of the inefficiencies of the King's dockyards which confirmed Snodgrass's judgements. Royal Navy Ships took twice as long to build at a much higher cost per ton than merchant ships.⁴⁰³ Timber stored in the Royal dockyards was left uncovered and the Navy's policy to have three years of timber on hand led to rotting stores before the timber could be used in shipbuilding.⁴⁰⁴ Meanwhile, the East India Company was able to devise plans for more efficient shipbuilding. Snodgrass was responsible for various shipbuilding novelties used by the East India Company to decrease the need for timber knees and increase the size of ships beyond the natural limitations associated with timber tree sizes. East India ships were built with diagonal riders which stiffened the frames of the ship, and iron plates

⁴⁰⁰ Ibid, 145.

⁴⁰¹ Ibid, 145-46.

⁴⁰² Ibid, 146.

⁴⁰³ Ibid, 132.

⁴⁰⁴ Albion, 12.

rather than timber knees.⁴⁰⁵ Snodgrass had been actively working to lessen the Company's consumption of timber in shipbuilding since the 1750s and had effectively managed to employ techniques that allowed East India Company vessels to be built faster, cheaper, and with less timber, than those of the Royal Navy.⁴⁰⁶ However, most of Snodgrass's suggestions for improved shipbuilding were not implemented until much later under Robert Seppings, Surveyor of the Navy starting in 1813.⁴⁰⁷

Conclusions

The case of Glassenbury demonstrates the differences between local underwood economies and the larger timber market. The underwood economy in Cranbrook was a closed system where the Roberts held a monopoly on woodland resources as the largest owners of nearby woodlands. The difficult nature of transporting wood meant that townsfolk had to buy it locally. The local underwood market presented the Roberts with an attractive way to generate continuous revenue because they had a built-in market who had no choice of where to buy their woodland products. This encouraged the Roberts, like many Wealden estate owners, to manage their woodlands for underwood, preferring coppice and limiting timber.

In contrast, the timber market was no such local monopoly. Timber merchants travelled to find private estate owners willing to sell timber for ready money. The timber merchants then found suitable buyers from a much larger pool. In the case of naval timber, the Royal Navy, East India Company, and other merchant shipbuilders all participated as buyers in the privately-owned timber economy. The Royal Navy vehemently blamed private landowners and the East

⁴⁰⁵ Rodger, *The Command of the Ocean*, 422.

⁴⁰⁶ *Ibid*, 243. "The Report" (1771), 25.

⁴⁰⁷ *Ibid*, 422.

India Company for their inability to procure timber throughout the period.⁴⁰⁸ However, the preference private landowners like the Roberts had for underwood which limited timber growth in the Weald was not responsible for the Royal Navy's timber scarcity. Nor was the East India Company's growing shipping empire. Rather, the Royal Navy's debt, dockyard disorganization, and shipbuilding inefficiencies were amplified by the poor management of crown woodlands which created perceived timber famines when the Royal dockyards had difficulty keeping the timber stores sufficient. The Royal Navy continued to be the largest consumer of naval timber, despite the growing merchant fleets who noted no major difficulties procuring domestic timber.⁴⁰⁹ Through the Royal Navy's cries of timber scarcity, the fleet continued to grow in the number of vessels and their size. Even during the 1690s, a particularly difficult time when the Royal Navy's dockyards at Chatham and Sheerness were nearly empty, the Royal Navy still drastically increased the number of ships in the fleet.

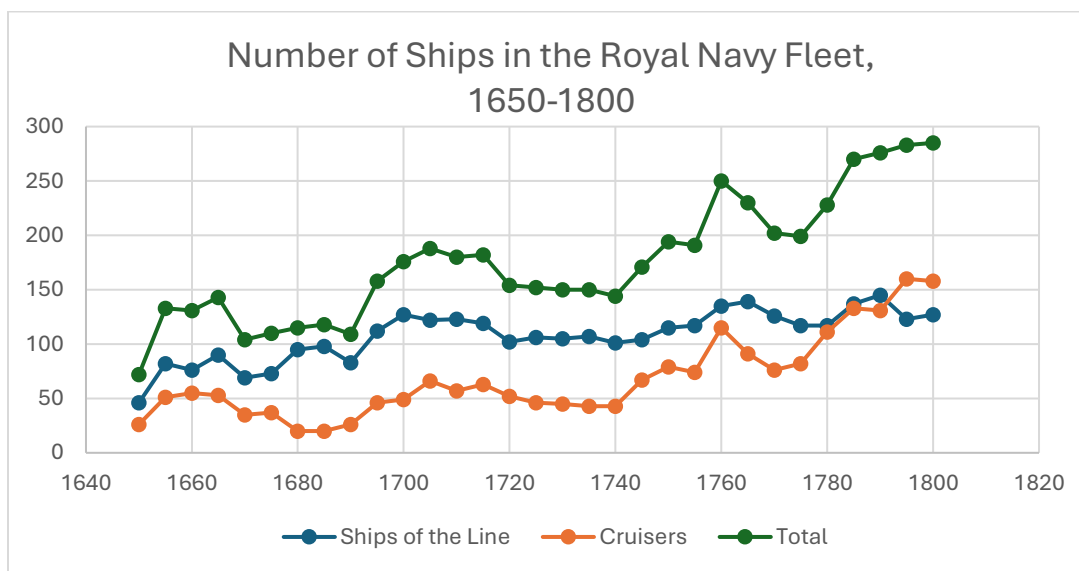


Figure 19: Growth of the Royal Navy Fleet, collected from data in Appendix II in Rodger's *The Command of the Sea*.

⁴⁰⁸ "The Report" (1771) & "The Eleventh Report" (1792).

⁴⁰⁹ "The Report" (1771), 16.

From 1680 to 1790, the Royal Navy experienced several periods where there were serious problems in procuring timber. However, there is little evidence to suggest any other users of English timber suffered to the degree lamented by the Admiralty and Navy Board. Three things seem evidently clear during this period. First, the Navy's timber scarcity was due to lack of funds and poor management. Second, although there were fewer timber trees growing in privately owned woodlands, merchant shipbuilders and other timber users were not experiencing the problems as the Navy, suggesting that this was not a problem of resource exhaustion. Third, the Royal Navy's timber scarcity did not affect its ability to continually grow in the size of the fleet or size of vessels. Importantly, what the Navy described as timber scarcity must not be confused with tree scarcity. "Timber scarcity" or "timber famine" referred solely to a lack of timber available to the Royal Navy, not a lack of trees growing in England. In the Weald, there was certainly no lack of trees, although other localized areas throughout England had been more heavily deforested. Thus, the Navy's "timber famine" from 1690 to 1790 was not a matter of natural limitations or environmental exhaustion, rather, it was a matter of the Government's inability to keep up with the domestic timber economy, Royal Navy debt, and shipbuilding inefficiencies.

Chapter IV: Conclusions - Contrasting Interests and Understanding Perceived Timber

Shortages

The early modern period was one of exploration, commerce, and empire building for England. There were significant confrontations with other European powers and violent colonization abroad which shaped priorities at home. Extensive commodification of woodland resources was an important part of the early modern English world because it was truly a world of wood. England's colonial exploits and supremacy on the seas relied on the strength of the Royal Navy and the efficiency of merchant vessels. England's largest domestic industries: iron, cloth, glass, and beer, all relied heavily on wood-fuel and charcoal. Every person in England needed access to wood products for shelter, fuel, heat, tools, and more. The reliance on wood as a necessity for life and a commodified good made people highly sensitive to perceived shortages.

The myth that England ran out of wood may have been largely debunked, but the complicated reality of ideas of scarcity remains convoluted.⁴¹⁰ Living in a period of climate crisis, natural resource inequality, and energy crisis has naturally pushed historians to investigate England's "timber famine" in more detail. Through historical investigation, the story of unrelenting destruction by woodland industries, conversion to arable land, and the greed of private landowners to the detriment of the Royal Navy has transitioned to critiques about exaggerating the scale of woodland destruction.⁴¹¹ With this transition came investigation into exactly why scarcity was such a concern through the early modern period if woodland destruction had been so largely over exaggerated.

⁴¹⁰ Rackham, *Trees and Woodland*, 23.

⁴¹¹ See Lower, 190 and Delany, 19 for destruction of woodlands and Rackham, 23, Brandon, 154, and Cantor, 96 on critiques.

Alarmist concern for timber scarcity came overwhelmingly from the Royal Navy or polemicists writing on their behalf.⁴¹² The Royal Navy's inability to procure timber at various points throughout the early modern period was the reason for national concern regarding perceived dwindling woodland resources, for if the "Wooden Walls" of England were threatened, so too was the Crown. By the time timber scarcity became a common fear in the Tudor period, enclosures had made most woodlands outside of Crown control private.⁴¹³ Thus, government attempts to respond to wood shortages were focussed on Crown woodlands that were subject to Forest Law.⁴¹⁴ As a result, most historians' attention has been on the management of Forests and Crown woodlands. The problem with the focus on Forests is that they did not make up most of the usable naval timber throughout this period. Governmental attempts to manage Forest woodlands were poorly executed and they were unable to furnish the Royal Navy with sufficient timber.⁴¹⁵ Rather, most timber used to furnish the Royal Navy's domestically built fleet came from privately owned woodlands. Thus, understanding how private woodlands operated and what motivated landowners is an integral part of understanding the issue of scarcity.

Gentry landlords intentionally managed their woodlands to be sustainable and self-renewing. Intensive intervention in woodland ecosystems allowed them to manage woodlands as coppice-with-standards whereby they prioritized underwood since it was a more lucrative and easily accessible market. As the case of Glassenbury and the Roberts demonstrates, sustainable woodland management was motivated by profit. The Roberts managed their woodlands to generate as much regular revenue as possible. Through intensive management that involved a rotational felling regime of coppice trees, the Roberts ensured they had annual woodland revenue

⁴¹² See Standish, Evelyn, and "The Report" (1771).

⁴¹³ Hanawalt, 21.

⁴¹⁴ Pluymers, 17.

⁴¹⁵"The Eleventh Report" (1792), 3.

through a form of regenerative forestry. This meant prioritizing underwood and limiting timber. At Glassenbury, most timber was grown outside rather than inside woodlands: in wood pastures, hedgerows, and fields.⁴¹⁶ Limiting timber within woodlands allowed coppice to regrow without competition for space or sunlight.

By the mid and late eighteenth century, timber merchants had noticed the decline in timber on private estates in the Weald, reinforcing evidence of the landlord's priority for underwood.⁴¹⁷ Prioritizing underwood not only suited the interest of landlords, who made easy regular revenue from private woodlands, but it also served as an essential natural resource for rural communities. In the case of Glassenbury and Cranbrook, everyone from the tanner, blacksmith, innkeeper, bailiff, and private households had annual needs for underwood to survive.⁴¹⁸ Underwood was a vital natural resource in early modern England and a more regular and significant product than timber for everyday life.⁴¹⁹ Together, the Roberts and the Cranbrook community made a local, closed woodland economy that thrived off of the Roberts' coppice management, albeit at the loss of common rights to woodlands. This put the interests of private landowners and the parishes they sold to at odds with the Royal Navy.

While the Cranbrook community's woodland economy thrived based on intensive woodland management from 1686 to 1782, the Royal Navy struggled on and off to procure timber, especially for the Chatham and Sheerness dockyards which were serviced by timber from the Weald. In the 1690s, the Royal Navy's accumulated debt hindered their ability to buy Wealden timber. Timber merchants like William Collins bought timber from private estates using

⁴¹⁶ KA, U410/E145.

⁴¹⁷ "The Eleventh Report" (1792), 61.

⁴¹⁸ CM, *Wood Book*.

⁴¹⁹ Rackham, *History of the Countryside*, 85.

ready money, but the Royal Navy paid by imprests which were left unresolved for years at a time.⁴²⁰ Timber merchants refused to provide more timber when their bills were left unpaid, and when they did sign new contracts with the Royal Navy, they charged higher prices on imprest in hopes that they would recuperate sufficiently on late payment.⁴²¹ This left the Chatham and Sheerness dockyards nearly empty for an entire decade.

In the early eighteenth century, the problem of accumulated naval debt was resolved through a Parliamentary vote on the Royal Navy expenditure, which resolved short-term timber scarcity in the Chatham and Sheerness dockyards, yet the Navy continued to complain of scarcity throughout the century.⁴²² By the late eighteenth century, the blame transitioned from private woodland owners and woodland industries to merchant shipping and the East India Company. Parliamentary reports in 1771 and 1792 demonstrated that the Royal forests continued to struggle to furnish the Navy with timber, and Royal Navy shipbuilding inefficiencies and dockyard disorganization contributed to timber shortages.⁴²³ The reports suggested that timber along navigable waterways and in the Weald had declined due most significantly to the growth of the Royal Navy fleet both in the size of and number of vessels.⁴²⁴ However, substantial timber was still available. The East India Company and merchant shipbuilders remarked on their ability to procure timber from inland regions, but the Royal Navy's policy of paying no more than 38 shillings for land carriage left limited options for them.⁴²⁵ Despite constant complaints from the Royal Navy, shipbuilding continued to increase, and the perceived timber scarcity never had any

⁴²⁰ Albion, 249.

⁴²¹ Ibid, 164.

⁴²² Rodger, *The Command of the Ocean*, 642-643.

⁴²³ "The Report" (1771) & "The Eleventh Report" (1792).

⁴²⁴ "The Report" (1771), 3.

⁴²⁵ Ibid, 3-6.

adverse effects on England's naval performance.⁴²⁶ This calls into question what scarcity really meant in late seventeenth and eighteenth century England.

Albion called problems of furnishing the Royal Navy with timber a “failure of the woodlands”.⁴²⁷ The failure Albion refers to is “their function of supplying naval timber”.⁴²⁸ However, the woods failed at nothing. In the case of Crown woodlands in Royal Forests, poor management resulted in a failure to construct efficient timber nurseries which limited naval timber from those lands. Private woodlands were never designed to furnish the Royal Navy. Enclosure was a means for gentry to secure power and wealth through land ownership and control of natural resources. The idea that English woodlands were designed to furnish the Royal Navy is as much a canard as England running out of wood.

What scarcity really alludes to is issues of how woodland resources were managed, distributed, and used. Pluymers argues that “scarcity is political; it requires questions about power within a society.”⁴²⁹ Timber scarcity was not necessarily an absence of timber, nor was it necessarily a sign of a natural resource exhaustion or limits. The interconnected nature of woodland resources as essential for all aspects of early modern life meant that prioritizing resources to meet certain interests undermined others.⁴³⁰ The Royal Navy's timber scarcity was a problem of management. In terms of the Royal Navy itself, the problem of management was one of poor finances, dockyard storage, and shipbuilding inefficiencies. In Royal woodlands, there was a lack of effective management, which forced the Royal Navy to participate in the open

⁴²⁶ Baugh, “The Professionalisation of the English Navy and Its Administration, 1660-1750”, 853 & *Naval Administration*, 237.

⁴²⁷ Albion, 95.

⁴²⁸ Ibid, 97.

⁴²⁹ Pluymers, 4.

⁴³⁰ Ibid, 17.

private timber market. On private estates, woodlands were managed for underwood which directly conflicted with the interests of the Royal Navy. Together, all of these varying “problems” of management created a perceived timber shortage for the Royal Navy.

Timber scarcity, woodlands, and deforestation

Ideas of England's "timber famine" have long plagued our understanding of early modern English history. Even after Oliver Rackham corrected the long-standing myth that England ran out of wood, ideas of exhaustion of woodland resources continue to drag their way back into our understanding of England's history.⁴³¹ Hitched to the pervasive idea of timber scarcity is the idea of deforestation and complete destruction of England's woodlands. This is in part due to differences in early modern English understanding of timber and our own. Decreased timber in the eighteenth century did not mean a decrease in trees. Timber did not mean trees: timber was a commodified natural resource that was intentionally managed to be used in construction and shipbuilding. Lack of timber trees did not even necessarily mean lack of trees that would become timber. If we return to John Neve's survey of Glassenbury, only trees over 20 feet were classified as timber trees.⁴³² In the Weald, limiting timber tree growth in woodlands to prioritize underwood did lead to a decline in timber. However, the decline in Wealden timber did not mean decline in woodland coverage, in fact, Wealden woodland coverage remained consistent throughout the period.

Deforestation and woodland destruction were highly localized problems, and were a wholly separate issue from timber scarcity. The Weald experienced very little deforestation after the Black Death, but other areas of England were prone to woodland destruction that did impact

⁴³¹ Rackham, *Trees and Woodlands*, 23.

⁴³² KA, U410/E145.

overall woodland coverage throughout the early modern period.⁴³³ Estimates approximate that as much as 1/3 of England was wooded around 500 CE.⁴³⁴ Proxy data and archival research reveals that during the Norman Conquest, roughly 15% of England was woodland. That dropped to 10% by the mid-1300s and throughout the period of this study, woodland coverage sat between 7% and 8% of total land coverage.⁴³⁵ This data suggests that the early modern period was one of reduction in deforestation compared both to the time between 500 CE and the Conquest, and from the Conquest until the Black Death.

Private woodlands and the maintenance of the Weald

The Wealden woodlands were almost entirely privately owned. Their continued existence today is in part because of the natural geology of the Weald which made it less productive for large scale agriculture, but also because of the management styles on private estates. Although the intensive woodland management dramatically and permanently altered the landscape, the profit-driven motivations of landed gentry ensured that most of the privately owned woodlands in the Weald exist almost exactly as they did 400 years ago because of sustainable management techniques. Thus, sustainable and productive woodland economies in the Weald were responsible for the maintenance of the woods in that area today.

However, sustainable woodland management, or sustainability in private woodlands does not mean “sustainability” as we tend to use it in the present. Caradonna defines sustainability as we understand it today as, “first and foremost, used as a corrective, a counterbalance, and directly tied to climate change.”⁴³⁶ When we use “sustainable” when referring to the present, we

⁴³³ Peter Brandon, “Medieval Clearances in the East Sussex Weald,” *Transactions – Institute of British Geographers* no. 48 (1969), 142.

⁴³⁴ Rackham, *Ancient Woodland*, 2.

⁴³⁵ Forestry Commission England, 21.

⁴³⁶ Jeremy Caradonna, *Sustainability: A History*, (New York: Oxford University Press, 2014), 3.

are using it as a response to resource crisis and climate change. When talking about what is “sustainable” in the early modern period, we are talking about management and use that could be sustained over time. Sustainable management at Glassenbury meant managing the woodlands so that they could continue to provide necessary woodland materials without exhaustion. This is a significant distinction because the intensive and sustainable woodland management employed by private landowners drastically impacted local ecosystems and thus in some ways works counterintuitively to our modern understanding about what sustainable management should look like.

The impacts intensive sustainable woodland management had on local ecosystems was significant and are generally beyond the scope of this study. However, there are some impacts that can be seen in the landscape today that help provide insight into how these ecosystems were permanently altered. The first is general landscape construction. Glassenbury, like much of England’s countryside, is a mix of woodlands, pasture, fields, and meadows enclosed by crooked and irregular hedgerows. These hedgerows demonstrate major influences by the Roberts on the landscape of Glassenbury. Additionally, the hundreds of thousands of carriages of marle dug from the ground around Glassenbury to fertilize plowed fields left large holes in the ground which through natural processes turned into ponds. Lease records reveal that often, fish were introduced to these ponds for both pleasure and sustenance.⁴³⁷ These ponds introduced whole new species to Glassenbury, and dozens of these ponds scatter their Cranbrook and Goudhurst Estate alone.

⁴³⁷ KA, U410/E118 & E144.

Lastly, and probably most famously, woodland management at Glassenbury was responsible for the thriving bluebells seen on the woodland floors throughout the Estate. Bluebells are woodland flowers which bloom in the early and mid spring. They have become an iconic feature in many ancient woodlands like those at Glassenbury. Bluebells require a significant amount of sunlight to bloom, and coppice-with-standards, and coppice style woodland management drastically reduces leaf coverage in woodland canopies, allowing sunlight to reach the woodland floor. Additionally, oak trees, which make up the majority of tree species in Glassenbury and other ancient woodlands, do not grow leaves until late into the spring. This has created the perfect environment for bluebells to thrive. The classic and iconic English landscape as we know it today is directly linked to the intensive woodland management gentry employed for profit.

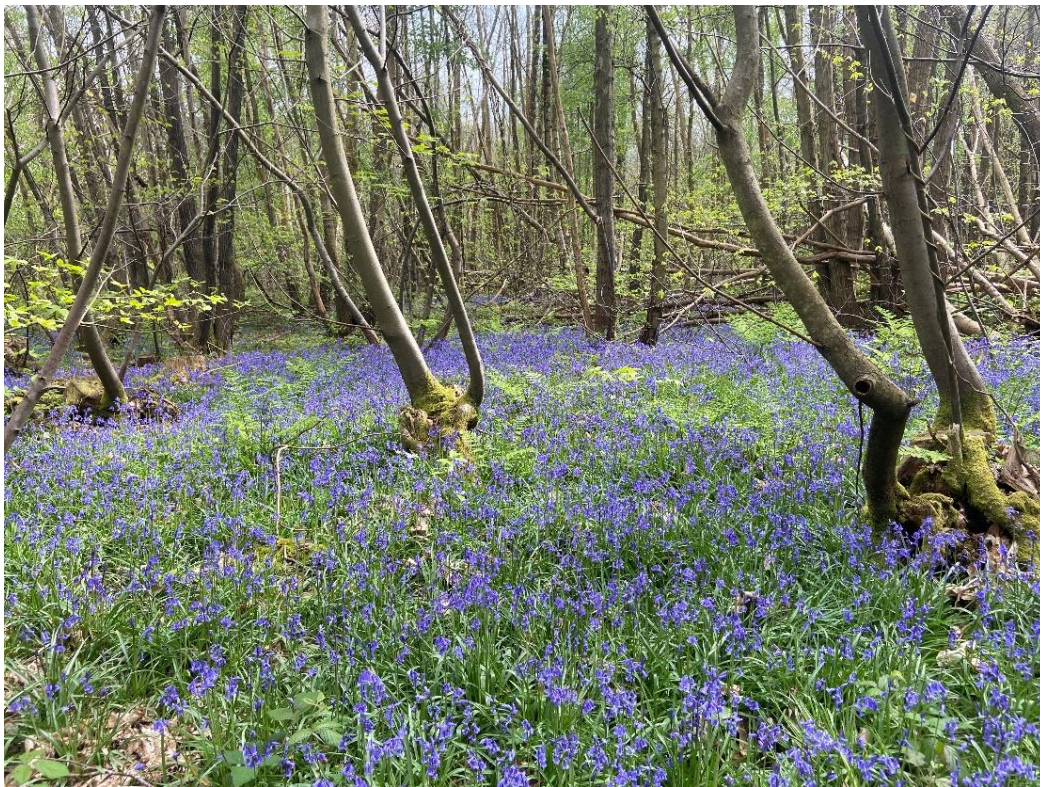


Figure 20: Bluebells in Foxbury Wood, Glassenbury (2024).

It is essential to understand that the Roberts and other land-owning elite, had little, if any interest in maintaining the natural ecosystem in their woodlands. The lens with which they viewed their property came through Enlightenment ideas of dominating nature and bringing it into their control to profit as much as possible. Woodlands are ecosystems that are easily altered by human activities.⁴³⁸ Woods and trees had long been part of the cultural landscape of England, and as they came under private control and intensive management, they also became part of England's economic landscape. Wealden woodlands, although largely unchanged since the medieval period because of intensive management, are just as much part of the human-built landscape as farms, parks, fields, and even villages. Thus, although intensive private management for profit is the reason Wealden woodlands have been maintained until the present, it is also responsible for permanent alteration to the natural ecosystems and landscape.

Conclusion

Timber scarcity is a complicated issue. There is no straight forward narrative that reveals the intricate balance of competing industries and markets all vying for wood, a natural resource necessary for shelter, heat, fuel, shipbuilding, and everything in between. Rather, the story of scarcity is caught up in various perspectives and interests that culminate together at the intersection of the environment and societal connection to it. Perceived shortages were founded in real physical concerns about the commodification and control of woodland resources. The importance of understanding the role private woodland owners played in early modern English woodland management and resource use is integral to understanding the relationship between early modern England and its most precious natural resource. Through a spatial-temporal study of woodland management at Glassenbury using HGIS to contrast the concerns of the Royal Navy

⁴³⁸ Rackham, *Trees and Woodlands*, 10.

and its perceived timber scarcity, this thesis offers a localized perspective of the ingenuities and sustainable use of private woodlands and local underwood economies. This HGIS study demonstrates that behind the tribulations and alarm around timber scarcity in early modern England, people were interacting with woodlands in a productive and sustainable manner.

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Appendix

Glossary

Glossary of terms as they are used in this work:

Compass – a type of timber tree that has curved shapes necessary for shipbuilding and large construction.

Coppice – a tree cut at the stool on multiple year cycles that regrow successive new wood.

Disafforestation – removing a tract of land from Forest Law, typically to sell it to generate personal revenue for the Crown.

Forest – a legal term for land owned by the Crown and operated under Forest Law. Originally kept for the purpose of keeping deer.

Hedgerow – human-made row of trees, shrubs, and other greenery that is planted to create a boundary around properties.

Knee – the curvature in a piece of compass timber.

Non-plank – see “compass”

Plank – See “standard”.

Pollard – a tree cut 8-12 feet above the ground on multiple year cycles that regrow successive new wood out of the reach of grazing animals.

Shaw – a strip of woodland often between 4 and 15 metres wide at varying lengths.

Standard – a timber tree growing in a woodland which typically grows tall and straight.

Sucker – shoots that grow from the root of a tree.

Timber – a large (at least 2 feet in girth and over 20 feet tall), commodified tree that is suitable for use in construction and shipbuilding.

Underwood – wood that is not timber, managed in the form of coppice, pollard, or suckers.

Woodbank – human-made earthwork that acts as the boundary to a woodland, or a way to subdivide it.

Woodland – general term used to apply to an area of land that is well wooded.

Interactive Web Map Guide

Instructions are given with the corresponding footnote and page number in the following format (footnote, page number).

1. (71, 24) Select the button “Wealden Boundary”.
2. (103, 36) Select the button “Cranbrook”.
3. (141,45) Select button “Wealden Boundary”. If not visible, select the layer “Royal Navy Dockyards” to see the 6 principal dockyards during this period. Zoom out if necessary.
4. (194, 63) Press button “Forest of Dean”. Note how the forest is along a navigable waterway, making it ideal as a timber nursery.
5. (222, 69) Select “Glassenbury Maps”. Switch to the secondary map setting by selecting the small map in the lower left-hand corner. This new map shows select images from the georeferenced historical maps. Select and deselect the layers as you wish to view them one by one. When complete, switch back to the original map view by reselecting the small map in the lower left-hand corner.
6. (229, 70) Layers are divided by locations of underwood management and the timber survey. Press button “Glassenbury Estate” to see the georeferenced farms and woodlands. Next, press button “Glassenbury Maps”, and select layer “Timber Survey 1687” and sublayer “timber trees final”. Next, turn on the “swipe” function above the timeline. Use this to swipe between the two maps to visualize how the historic maps were used to identify the farm and woodlands. To zoom in to get a closer look at particular areas, turn off the swipe function, zoom in, and turn the swipe function back on. To view the swipe with only one historic map visible, switch to the other map by pressing the small map in the lower left-hand corner, and deselect/select the maps you want visible, then turn the swipe feature back on. When complete, turn off the swipe feature, and if necessary, return to the original map by selecting it from the lower left-hand corner.
7. (234, 71) Press button “Glassenbury Estate” Deselect “Timber Survey 1786”. Select “Underwood Management” Select any sublayer and use the time scale at the bottom left of the map to visualize changes over decades. Information about individual woodlands is available by selecting the woodland on the map. When done, deselect all sublayers under “Underwood Management”.
8. (250, 75) Select “woodland revenue” in the “Underwood Management” layer. Use the time slider to visualize felling rotations. Deselect the sublayer when complete.

9. (253, 77) Select sublayer “woodland cordwood” and use the time slider to further visualize. Deselect this sublayer and repeat for any other sublayers you would like to investigate. When complete, deselect “Underwood Management”.
10. (255, 79) Select “Timber Survey 1786” and the sublayers “timber wood trees” and “timber farm trees” to visualize where timber trees were located.
11. (261, 79) Deselect sublayers “timber wood trees” and “timber farm trees” and select sublayers “timber farm plank” and “timber wood plank”.
12. (263, 79) Repeat footnote 261 with “timber farm nonplank” and “timber wood nonplank”.
13. (264, 80) Deselect all sublayers and select sublayer “timber knees”. Deselect sublayer when complete and “Timber Survey 1789” when complete.
14. (266, 80) Select sublayers “timber farm nonplank” and “timber wood nonplank” to see variations in where these types of timber made up most timber trees. Deselect them when complete.
15. (271, 84) Select sublayers “timber farm planks” and “timber wood planks” to visualize the higher percentage of plank trees in woodlands. Deselect all sublayers when complete.
16. (278, 86) Press button “Glassenbury Maps” and switch to the secondary map by pressing the thumbnail in the lower left-hand corner. Deselect all layers except “Glassenbury 1628_tif” to see how the woodlands today remain the same size and shape as they did in 1628.
17. (284, 89) Press button “Glassenbury Estate” and deselect layer “Timber Survey 1786”. Select “Underwood Management”. Select sublayer “woodland faggots” and use the time slider to explore the data.
18. (295, 92) Deselect sublayer “woodland faggots” and select sublayer “woodland cordwood”. Use the time slider to explore.
19. (302, 93) Deselect sublayer “woodland cordwood” and select sublayer “woodland poles”. Use the time slider to explore.
20. (312, 100) To visualize where the timber trees cut by William Collins were, deselect “Underwood Management” and select “Timber Survey 1786”. Select the sublayer “timber trees felling”.