FISCAL, SOCIAL, AND SILVICULTURAL STATE FORESTRY IN SEVENTEENTH-CENTURY ENGLAND, c. 1600-1700

by

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Abstract

In early modern England, wood supplies were fundamental to the existence of the state which relied on woodland both to generate revenue and to build naval capacity. This study examines how state forestry began to be practiced in England as woodland was increasingly treated as a national natural resource rather than the private property of the king. In charting the development of state forestry in England, this study evaluates the fiscal exploitation of the forest and crown methods for asserting its exclusive control over forest resources under the early Stuarts and considers the newfound material interest in woodland and corresponding silvicultural management during the Civil War, Interregnum, and Restoration. Ultimately, this study contends that a variety of early modern state-woodland interactions can be understood as aspects of a developing state forestry apparatus which substantially altered the usage and treatment of state-owned woodland in England.

List of Abbreviations Used

HLJ	*Journals of the House of Lords*
SR	*Statutes of the Realm*
CSPD	*Calendar of State Papers Domestic*
APC	*Acts of the Privy Council of England*
AOI	*Acts and Ordinances of the Interregnum*

Where possible, spelling and punctuation of quotations has been amended to reflect modern conventions.

Glossary

Coppice – a silvicultural management technique whereby certain favourable species of tree are cut back to their stump at a young age to encourage the growth of new shoots, particularly useful for the generation of firewood, fencing, and other applications not requiring timber.

Disafforestation – the process of removing the legal status of a Royal Forest from a parcel of land, with an according nullification of forest law.

Estovers – a collection of rights to wood use afforded to residents of a Royal Forest under forest law. For instance, firebote and housebote, wood for heating and for the repairing of houses respectively, was a commonly exercised estovers right.

Fishing Busses – a two or three-masted fishing vessel, commonly employed in the herring fishery of the North Sea.

Forest Eyre – a circuit court held by Justices in Eyre, senior judges of forest law, which was the highest court in which cases pertaining to forest law could be tried.

Mastage – acorns, walnuts, and other tree fruit on the forest floor used to fatten pigs before slaughter, often sold or otherwise used as the right to drive swine through a certain section of forest.

Pig Iron – cast iron as a result of smelting from iron ore, usually from bloomery furnaces in oblong ingots.

Pollard – a silvicultural management technique, similar to coppicing, where young trees are felled leaving a sizeable portion of their stump intact, thus encouraging the re-growth of new shoots above the browsing height of most animals.

Ship's Knee – a component in marine architecture, ship's knees were used to secure the interior frame of a ship, such as the decks, to the hull. These were commonly made from sections of trees naturally bent at or near right angles.

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Chapter I - Introduction

In 1611, Arthur Standish's treatise, *The Common Complaint,* offered an ominous portent: "no wood, no Kingdom."[1] Standish's words represent a basic reality of the pre-modern economic order in England: that the kingdom, both its subjects and governors, depended on wood for its material existence. Individuals relied on wood for the quotidian demands of heating and construction and the English economy depended on cordwood and its derivative charcoal to fuel nascent industrial processes. Meanwhile, the crown required vast quantities of the costliest woodland resource, mature timber, for the maintenance of the navy which upheld its sovereign existence internationally, while using wood sales from crown estates as a tool of fiscal solvency. The estates of the crown held rich prospects for meeting these needs – properties across the kingdom contained various sorts of woodland, managed as simple possessions of the crown. Furthermore, the crown also held numerous Royal Forests, subject to specific forest laws largely from the medieval period which governed the use of their resources and their management as a hunting preserve for the king and other nobility. Therefore, the crown had a great interest in ensuring that wood supplies, both on its own estates and in the country at large, were reliable and capable of meeting the fiscal, domestic, economic, and martial needs of the nation, making woodland, in effect, a national resource.

Nevertheless, the incongruous range of interactions between the state and woodland during the seventeenth century attest that this imperative was not uniformly acted upon in the period. Even as Standish lamented the loss of woodland resources and counselled plantation and conservation as remedies, the early Stuarts sold concessions on forest resources and dismantled their Royal Forest holdings through disafforestation, while elsewhere expanding forest bounds as

[1] Arthur Standish, *The Common Complaint* (London, 1611), 1.

a tool of revenue generation.[2] Later, in 1653, Parliament passed legislation which curtailed the powers of forest officers to prosecute the cutting of wood within Royal Forests on the tenements of residents, while simultaneously making provision for the enclosure, protection, and plantation of those same Royal Forest resources.[3] Yet the woodland of Royalist estates was seemingly not spared the wrath of Parliamentarian forces, as in April of 1656, John Evelyn lamented the destruction of the parks and woods of Eltham Palace by rebels.[4] Later still, Evelyn congratulated himself in an edition of his silvicultural treatise *Sylva* for having encouraged the planting of many millions of trees for shipping. In the same period, Samuel Pepys protested in a draft speech to parliament that "all the king's forests, and private men's timber within twenty miles of his Majesty's yards and river of Thames, will not afford compass timber, knees, standards, break hooks, etc to build two first-rates and six second-rates in four years."[5] Considering these seemingly competing actions and assessments in a variety of settings, it is apparent that state-woodland interactions in the period were not only undergoing a period of change, but operated at times with vastly different imperatives and techniques. Variously, the state focused on the fiscal or material potential of woodland, while also contending with the social conflict that arose from

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[2] Disafforestation refers chiefly to changing the status of a parcel of land such that it was no longer under the jurisdiction of forest law and could instead be bought sold and otherwise exploited under the same conventions as the other saleable land. Standish, *The Common Complaint,* 2; Andrew Richard Warmington, *Civil War, Interregnum and Restoration in Gloucestershire, 1640-1672* (Suffolk: Boydell & Brewer, 1997), 18; Paul Warde, *The Invention of Sustainability: Nature and Destiny, c.1500-1870* (Cambridge: Cambridge University Press, 2018), 84 f.n. 94.

[3] "June 1657: An Act for the mitigation of the rigor of the Forest Laws, within the Forest of Dean, in the County of Glocester, and for the preservation of Wood and Timber in the said Forest.," in *Acts and Ordinances of the Interregnum, 1642-1660*, C. H. Firth and R. S. Rait eds. (London: His Majesty's Stationery Office, 1911), 1114-1115, *British History Online.*

[4] *Diary of John Evelyn*, 22nd April, 1656.

[5] J.R. Tanner, *Naval Manuscripts in the Pepysian Library at Magdalene College Cambridge, Publications of the Navy Record Society*, *Vol. XXVI* (Cambridge: Navy Records Society Publications, 1943), 49-50.

the use of the forest in order to authenticate its claim to resource usage.

However, although the motivations animating interactions between the state and woodland may have changed during the period, along with the methods the state employed, the basic fact remains that during the seventeenth century, the state increasingly treated its woodland as a national resource in a relationship usefully described as state forestry. Early in the century both James I and Charles I pursued extensive programmes for the conversion of the nation's forests into financial supports for a cash-strapped crown, using patents, commissions, leases and even state-owned ironworks to see the woodland wealth of the realm meet the fiscal demands of the state. Later in the period, during both the Interregnum and the Restoration, the increased importance of naval shipbuilding saw state-owned timber resources exploited for their material potential. During the seventeenth century, the formerly private and personal forest properties of the king, managed for pleasure and at times for revenue, gradually became a public and national resource, managed for the benefit of the state.

The exploitation of English forests for national purposes did not materialise in a quick transition, and neither did it evolve without substantial impediments and obstacles. For instance, while the state sought to exploit the financial wealth of the forest, how did it practically achieve this end, and was it efficient? As only one of many claimants to woodland resources how did the state authenticate and uphold its claims to resource usage alongside those of other actors in England's woodlands? How did the state contend with the logistical and practical challenges of building ships from its own timber? More generally, what needs, challenges and approaches characterised state-woodland relationships in seventeenth-century England, and how did these reflect the increasingly national treatment of state-owned woodland resources through varying programmes of state forestry? In answering these questions, this study focuses on developing a

coherent account of the development of state forestry in early modern England.

This study builds upon a substantial literature devoted to the history of woodland usage in England. George Hammersley's work on the uses of woodland and the changing status of Royal Forests has done much to outline the technical and economic aspects of early modern England's wood usage, particularly the significance of these resources to the industrial and financial health of the realm.[6] Cyril E. Hart has also produced very detailed and useful accounts of the history of the Forest of Dean, focusing variously on its mineral and timber resources, as well as status as a Royal Forest.[7] Meanwhile, R.G. Albion's work *Forests and Seapower* has outlined the important connections between timber supply and the integrity of the Royal Navy, with Sara Morrison's more recent work examining the links between Royal Forests and the timber needs of the navy during the restoration.[8] Building on this existing literature surrounding the uses of state woodland in early modern England, this study seeks to analyse the relationship between the state and woodland across the seventeenth century cohesively as an evolving set of institutions and practices recognisable as state forestry.

Of foundational importance to structuring this account is a definition of state forestry

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[6] George Hammersley "The Crown Woods and Their Exploitation in the Sixteenth and Seventeenth Centuries," *Historical Research,* Vol. 30, No. 82 (1957): 136-61; "The Charcoal Iron Industry and its Fuel, 1540-1750." *The Economic History Review*, Vol. 26, no. 4, (1973), 593-613;"The History of the Iron Industry in the Forest of Dean Region, 1562-1660." Queen Mary University of London, Ph.D Thesis. 1972; "The Revival of the Forest Laws Under Charles I." *History*. Vol. 45 June 1960, (154): 85-102.

[7] Cyril E. Hart, *Royal Forest: A History of Dean's Woods as Producers of Timber,* (Oxford: Clarendon Press, 1996).

[8] Robert Greenhalgh Albion, *Forests and Sea Power: The Timber Problem of the Royal Navy, 1652-1862* (Hamden: Archon Books, 1965); Sara Morrison, "Forests of Masts and Seas of Trees: The English Royal Forests and the Restoration Navy," in *English Atlantics Revisited: Essays Honouring Professor Ian K. Steele*, Nancy L. Rhoden ed., (Montreal: McGill-Queen's University Press, 2007); Sara Morrison, "Good Stewardship and the Challenges of Managing the Stuart Royal Forests in England, 1603-1714," *Journal of Markets and Morality,* Vol. 17, No. 2, (Fall 2014): 405-427.

which is both universal in scope while respecting the temporal particularities of early modern England. Practically speaking, this reflects the fact that while state control of the forest is motivated by basic human proclivities toward natural resource consumption, the management of this consumption through the state in the early modern period remained a relatively novel development, nested within both the ecological and political climates particular to the early modern period. A key underlying factor to define state forestry has been identified by James C. Scott in *Seeing Like the State* as a desire to impose legibility, that is, making the irregular, natural and vernacular landscape of the forest intelligible to the state which, generally, seeks to rationalise and abstract demographic and geographic realities for easier management.[9] In the case of the forest, this means conceiving of woodland not as a diverse ecosystem with a variety of possible purposes and use claimants, but as a single resource representing an abstracted quantity of wood or an attendant cash value. In a broader sense, this imperative cuts across human-nature interactions – generally, while those who interact with nature seek to make it intelligible to themselves, the state has simply historically employed a specific set of tools to accomplish this end. Scott's work generally emphasizes that while legibility-increasing projects often met the needs of the state, they also created adverse conditions for the subjects of the state. While this was true of early modern state forestry, this study focuses more so on how the state used an increased legibility of the forest for the state's own benefit, and for its own ends.

At the same time, while the desire to control natural resources may be characteristic of human behaviour, the particular actor which sought to exert this control, the state, had a unique character in the early modern period of great importance to the challenges it faced in practicing

[9] James C. Scott, *Seeing Like A State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press, 1998).

forestry. The early modern state remained flexible in its manifestations and rather loosely defined. In recognition of this mutability, this study draws on Michael Braddick's view of the state articulated in *State Formation in Early Modern England*, as "a coordinated and territorially bounded network of agencies exercising political power […] exclusive of the authority of other political organisations within those bounds."[10] In particular state forestry falls under the purview of fiscal-military activity which Braddick identifies as a distinct type of growth in the early modern period. Indeed, the challenges of state forestry in the seventeenth century fit very tidily into Braddick's definition, and attest the active growth of the state, as in many cases, particularly in Royal Forests, the activity of the state largely constituted attempts to define and claim the territory in which it held power and to counter competing claims to resource entitlement within those bounds.

Early modern state forestry also developed against a backdrop of ongoing contentions over the availability of wood products more generally. One of the greatest factors governing the usage of wood products was their high demand. The early modern economy was confined in its productive capacity by the photosynthetic constraint, as articulated by E.A. Wrigley in *Energy and the English Industrial Revolution*, and wood was one of only a few possible building materials and the only material for building ships.[11] Arthur Standish was not alone in his concerns about timber shortages, as they abounded in the period. Scholarship including J.U. Nef's *The Rise of the British Steel Industry,* Paul Warde's *The Invention of Sustainability*, and William Cavert's *The Smoke of London* have affirmed that timber was not generally scarce, but

[10] Michael Braddick, *State Formation in Early Modern England, c. 1550-1700* (Cambridge: Cambridge University Press, 2000,) 9.
[11] E.A. Wrigley, *Energy and the English Industrial Revolution* (Cambridge: Cambridge University Press, 2010), 14.

suffered from local shortages owing to logistics with an economic impact equivalent to general scarcity.[12] This reality of timber availability existed within a contemporary political ecology surrounding woodland use in which notions of abundance and scarcity were disputed, particularly in the colonial context as Keith Pluymers has noted.[13] Thus, early modern state forestry operated in an environment where intense debate swirled around the very substance of its efforts, the exploitation of woodland. Considering these factors then, early modern state forestry might be defined as consisting of the rationalisation of recognisably finite woodland resources for their easy exploitation for the purposes of the state, and the assertion of exclusive control over these resources against other parties who sought to use them to their own ends.

While this study generally seeks to examine how state forestry, as defined, evolved in England during the seventeenth century, it does so though a particular methodological approach. As an *environmental history* of early modern state forestry, the study examines state forestry not just as an aspect of the growing early modern state, but an important chapter in the story of human-nature interactions, and the interactions of government institutions with woodland. While not treating woodland as an historical actor itself, neither does this study treat it as a completely passive backdrop. Rather, the forest was a dynamic environment which presented challenges to those who sought to use it, and which could itself be contested by other groups. This shift in focus away from human action and toward nature has been a foundational aspect of any environmental history, even before Donald Worster defined it as such in *The Ends of the Earth:*

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[12] J.U. Nef, *The Rise of the British Coal Industry, Vol. 1* (London: Frank Cass & Co. Ltd, 1966), 156-165; Paul Warde, *The Invention of Sustainability: Nature and Destiny, c. 1500-1870* (Cambridge: Cambridge University Press, 2018), 65-78; William M. Cavert, *The Smoke of London: Energy and Environment in the Early Modern City*, (Cambridge: Cambridge University Press, 2016), 17-31.

[13] Keith Pluymers, "Atlantic Iron: Wood Scarcity and the Political Ecology of Early English Expansion," *William & Mary Quarterly* 73, no. 3 (2016): 426.

Perspectives on Modern Environmental History.[14] Further, this study treats state forestry not as a further example of deforestation in an inevitable advance of human despoliation of woodland, an attitude which has dominated much of early modern English forest history, and instead treats the development of state forestry in a much less deterministic fashion. The importance of treating both the forest and its exploiters as entities capable of change and adaptation over time, rather than the simple growth of one and depletion of the other has been emphasized by Emily K. Brock in her essay "New Patterns in Old Places: Forest History for the Global Present," which draws attention to the shortcomings of the declensionist mode of forest history focused on deforestation.[15] An example of where this approach brings fresh value to existing literature on state forestry is the navy. Where R.G. Albion based his conclusions in *Forests and Seapower* on critical assessments of formal government policy, institutional administrative efficiency, and the personalities at the helm of naval timber management, this study acknowledges geography, scientific knowledge, and resource contestation as highly important challenges faced by the navy in securing a timber supply.[16] While the demands of the navy created an unprecedented capacity for deforestation as chapter three shows, this demand also spurned the creation of novel silvicultural techniques which saw the forest used in more efficient ways than before. Rather than chronicling the interaction of the state with English woodland as a narrative of inevitable ecological decline, this research treats the relationship between the state and woodland as one

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[14] Donald Worster, *The Ends of the Earth: Perspectives on Modern Environmental History*, (Cambridge: Cambridge University Press, 1988), 289-306.
[15] Emily K. Brock, "New Patterns in Old Places: Forest History for the Global Present" in Andrew C. Isenberg, ed., *The Oxford Handbook of Environmental History,* (Oxford: Oxford University Press, 2014), 155-177.
[16] Robert Greenhalgh Albion, *Forests and Sea Power: The Timber Problem of the Royal Navy, 1652-1862,* (Hamden: Archon Books: 1965); Roger Knight, "New England Forests and British Seapower: Albion Revisited", *American Neptune*, XLVI, (1986): 221-9.

with a great capacity for change and innovation, with corresponding adaptability in the ecological structure of the forest.

In chapter two, this study uses an examination of fiscal state forestry as a first step toward understanding how state forestry and national woodland resources developed in England. Although limited precedents existed for the fiscal use of forests, both the scale and duration of these activities make the beginning of the seventeenth century a suitable beginning for a study of state forestry in England. Under James I woodlands were surveyed, valued, and sold by a variety of means to provide income to a financially troubled crown. The widespread use of surveying to assess the value of crown woodland, among other environmental resources, represented the abstraction of woodland into monetary potential. However, developments such as this which facilitated the application of fiscal state forestry did not enjoy universal success. Surveys often remained incomplete or were sometimes inaccurate, and the wood sales they enabled were confounded by the entrenched and cumbersome administrations of royal forests with their attendant commitments to political patronage, fears of deforestation, and most pervasively, rampant corruption and mismanagement. Concurrent with this rationalisation and commodification of crown woodland came the establishment of a professional bureaucratic system of oversight for the implementation of fiscal state forestry policies. Thus, although the revenue-raising objectives of James I's sales of woodland were never truly realised, they laid important institutional and practical foundations for the later exploitation of state-owned woodland in other ways.

With this basic understanding of how the state apprehended its woodland resources, and to a lesser extent, the obstacles it faced in using them, chapter three turns to consider one of the greatest ongoing challenges particular to state forestry in the period, that being the exploitation

of a resource which is undeniably contested. Particularly in the Forest of Dean, entrenched systems of property right not necessarily recognised by the state complicated the attempts of the state to realize the fiscal potential of woodland. As both a rich forest resource and the location of widespread dissent against the state use of forest resources, Dean serves as an excellent case study of the social implications of state forestry and of the inherent difficulties the state faced in exploiting a contested resource. Drawing on the work of Garret Hardin and Elinor Ostrom, this section examines the variety of potential solutions to the "tragedy of the commons" as realized in Dean, including the imposition of external power through Royal Forest administrations, the institution of private property through leasing, and the governance of resource usage through communities such as the free miners.[17] To facilitate the fiscal exploitation of the forest, the crown attempted to establish a clear and direct kind of property right in the Forest of Dean in the form of leases granted to enterprising individuals and giving them a clear entitlement to use the resources of the forest which rendered an ultimate profit to the state. In theory, this process would reduce the contestation of the forest's resources and expedite exploitation by the crown. However, the customary claims of resource entitlement, founded in memory and tradition, proved a formidable obstacle to the imposition of these leases, and the rapacious actions of the leaseholders imperilled the future integrity of the very resource they used. A lack of adequate supervision of the activities of leaseholders and an inability to project authority into the landscape of the forest left the crown ultimately unable to halt the ongoing contestation of the forest's resources. Ultimately, the failure of the crown to arrest competing claims to its resources, and even to supervise the activities of those who exploited resources on its behalf,

[17] Garrett Hardin, "The Tragedy of the Commons," *Science* vol. 162, no. 3859 (1968); Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action*, (Cambridge: Cambridge University Press, 1990).

limited the forestry activities of the early modern state, and demonstrated the resilience of forest communities to the imposition of legibility.

Having examined the early imperatives for state forestry, the tools with which it was carried out, and the challenges it faced, chapter four examines the fullest treatment of the forest as a truly national resource, when during the Interregnum and Restoration the forest found value in undergirding the defence of the country through naval shipbuilding. After continual attempts to derive revenue from the forest through leasing schemes and wood sales, during the Interregnum, state forestry changed to a more direct interest in the actual material wealth of state owned woodland rather than its profit potential, particularly as it applied to the production of timber for naval construction. Owing to both the geopolitical demands of the Interregnum period and the unique political circumstances of the Commonwealth, state woodland was put to more explicitly *national* purposes than ever before. The use of woodland was justified in term of the public benefit, particularly in the case of the navy, which complements William Cavert's recent scholarship suggesting that fuel supplies, particularly wood, were viewed by seventeenth-century commentators as a basic necessity of life, and one which ought to be curated in tandem with the needs of the public.[18] Much of this novel approach to state forestry remained during the restoration, and in the later part of the seventeenth century, a variety of intellectuals from political, mathematical and scientific circles built on this legacy of the Protectorate, seeking out new approaches to make state forestry more efficient, accurate, and territorially exploitative, in governmental, academic, and private contexts. Also during this period, the creation of the Province of Massachusetts Bay with the 1691 charter, and the ensuing reservation of white pine

[18] William M. Cavert, *The Smoke of London: Energy and Environment in the Early Modern City* (Cambridge: Cambridge University Press, 2016), 103-117.

to the crown for use in naval construction, rapidly expanded the scope of state forestry from the kingdom of England to an imperial and transatlantic setting. Thus, in focusing principally on the development of state forestry within England, this study treats the end of the seventeenth century as a temporal boundary in the scope of its arguments and analysis.

Considering these developments comprehensively, it become clear that during the seventeenth century, changing fiscal and material needs prompted the state-woodland relationship in England to be governed by a series of approaches and paradigms usefully described as state forestry. Specifically, these developments occurred in three distinct and chronologically sequential realms - the fiscal exploitation of the forest under James I, the navigation of the social contestation of woodland during the reign of Charles I, and the material use of woodland in a system of direct management informed by nascent silvicultural knowledge during the Interregnum and Restoration. In sum, interactions between woodland and the state in seventeenth-century England represent an important facet of the trends characteristic of the early modern period. While the growth of bureaucratic institutions to address the challenges of resource management, the assertion of territorial authority, the rationalisation of the forest, and the regulated use of woodland for national defence were all important developments in their own right, they are usefully understood as inextricably connected to the changes occurring with the development of the state during the period. What had been a largely medieval system of resource management through Royal Forests and local landholding became more recognisably modern in the seventeenth century, and while the vestiges of medieval administration did not entirely disappear, the approaches, institutions, and mandates which undergirded the state's treatment of woodland represented a new approach to managing the kingdom consistent with developments elsewhere. Perhaps most importantly, what had been the private and largely personal resources

of the king and his household changed in their status to be treated as resources of the crown in the discharge of its responsibilities, and finally, as the rightful resources of the state, to be used for what was construed as the national public good and managed to that end. Whether through imposing legibility with surveys, attempting to assert exclusive authority over the forest, or experimenting with novel approaches to using wood products, the seventeenth century witnessed a profound change in which a recognisable set of practices and ideas identifiable as state forestry came to govern the state-woodland relationship in England.

Chapter II - Fiscal State Forestry and the Genesis of the Natural Resource

Introduction

Adaptation to change, both climatic and human induced, has been a defining constant of English forests since the retreat of the glaciers at the end of the last ice age permitted their growth. Although always present, change and adaptation in English forests were particularly salient during the early modern period. In fact, one could argue that the sixteenth and seventeenth centuries saw a greater period of change in English forests than had been the case for many centuries, if not for the forest ecosystem itself, then undoubtedly for the ways in which the human population of England viewed and interacted with woodland. Novel and expanding industrial processes with a ravenous appetite for charcoal used the forest in more intensive and demanding ways than before. Changing patterns of landholding with the Dissolution of the Monasteries under Henry VIII altered the management protocols and incentives of woodland whose administration had little changed in the previous centuries. Concurrently, as England employed increasingly large and numerous ships in the Royal Navy, demand for timber trees grew, while a growing population and corresponding growth in agricultural price indexes made soil, including that bound under root, more lucratively cultivated than previously.[1]

These largely economic and ecological changes are an important backdrop for a more abstract but nonetheless important change on which this chapter focuses: the early seventeenth-century conceptualization of crown woodland as a *natural resource*. During the reign of James I, woodland resources, which had always been undeniably *natural*, whatever the degree of human intervention within them, found novel utility as *natural resources*, that is, something which could

[1] Ian Gentles, "The Management of Crown Lands, 1649-60", *The Agricultural History Review*, Vol. 19, No. 1 (1971): 37.

supply a deficiency, a stockpile to be drawn upon as necessary.[2] Simultaneously, and of most importance to the state, woodland became a resource of *national* importance. Increasingly, crown woods served to sustain the crown, and by extension, the nation, in a fiscal capacity, as the cash-strapped early Stuarts sought out fresh means of squeezing revenue from crown estates.[3] This development within state revenue coincided with the new status of woodland as a matter of national interest. Although documents in the period continued to refer to crown woodland as the king's property, the bounds of acceptable use for these woodlands underwent substantial redefinition. Where royal forests, a preserve for noble hunting activities, formerly represented the extent of crown woodland, in the sixteenth century, discourse touching on the subject of the King's woods, which included these same royal forests, often spoke of the greater societal benefit proper use of the woods entailed, including the maintenance of His Majesty's shipping.[4]

When the potential for woodland destruction this conceptualisation created is considered with declensionist presuppositions, the significance of this development is easily dismissed or mischaracterised as marking the beginning of heightened and wanton destruction of English woodland. Such appears to have been the case when R.G. Albion, in *Forests and Sea Power,* wrote "the first two Stuarts greatly hastened the danger of an oak shortage by extending the exploitation of forests commenced by the Tudors. That practice of deriving revenue at the expense of the future oak supply must stand as the real forest policy of England from 1535 to

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[2] The term resource, in these senses, is recorded as having first entered into written language in the early to mid seventeenth century. "resource, n." OED Online (Oxford University Press, accessed March 06, 2020).

[3] Michael Braddick, "The Rise of the Fiscal State" in Barry Coward, ed., *A Companion to Stuart Britain*. (Hoboken: Blackwell, 2003), 69-70.

[4] It is interesting to note that the OED begins listing definitions of a resource in the sense of "[t]he collective means possessed by a country or region for its own support, enrichment, or defence" near the very beginning of the eighteenth century.

1600."[5] While it may indeed be true that the actions of the early Stuarts did heighten the problem of oak scarcity in the later seventeenth century, and their actions may have, in hindsight, amounted to attaining short term revenue increase at the long term cost of the integrity of woodland, Albion's characterisation suggests that this destruction occurred without due regard for the future supplies of naval timber in the kingdom and ignores the importance of systematically deriving revenue from crown woods in itself.

Albion's view neglects two important factors. First, fiscal state forestry was in part motivated by a desire to finance the growth of military power, the same military power that later drew on the material wealth of woodland for shipbuilding during the restoration. Whether revenue-raising or timber felling, both these actions represented different approaches to achieving the same goal of increased martial capacity. Thus, while the actions of the first two Stuart monarchs may have had regrettable consequences for the Restoration navy, they were not simply a thoughtless transaction. Michael Braddick notes that in general "the long term pressures behind the transformation of the finances is clear: the escalating cost of war led to a fairly continuous pressure to raise money and secure credit in order to procure the necessary materials."[6] Rather than felling trees for short-term gain, in reality, the crown turned to woodland to meet its fiscal-military needs for much of the period. The type of demand simply shifted from being liquid cash assets to actual oaken timber over the course of the century.

Second, even while the early Stuarts sold woodland, contemporaries paid attention to the impact of such sales on the naval capacity of the country. For instance, in response to an early

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[5] R.G. Albion, *Forests and Sea Power: The Timber Problem of the Royal Navy, 1652-1862.* (Hamden: Archon Books, 1965), 127.
[6] Michael Braddick, "The Rise of the Fiscal State" in Barry Coward, ed., *A Companion to Stuart Britain.* (Hoboken: Blackwell, 2003), 69-70.

seventeenth-century petition which proposed leasing all the king's woods, the Earl of Nottingham objected that granting such a lease would create conditions such that the lessee would "have power to cut down all the [King's Majesty's] best timber, and leave him unfurnished for his shipyard."[7] Arguments such as these frequently accompanied anxieties both from statesmen and commentators about selling woodland for revenue increase.

Far from a knee-jerk revenue raising measure, the crown approached wood sales with both planning and rationality. With the goal of efficiently raising revenue in mind, the crown acted with a good deal of rationality, selling unprofitable woods and removing those which perished for lack of sale.[8] Certainly, the end result of the selling and leasing, preservation and disafforestation across the realm had disparate consequences. Profitable timber markets did not exist uniformly across the realm, thus making the application of a general policy futile, although a single principle of revenue raising undergirded these actions.[9] Nor was profit a motive to the exclusion of preservation – the major survey of the crown wood possession conducted in 1607 made provision to not only assess the number of saleable trees, but also to preserve a set number for exception, even going so far as to outline individual species and maturities for exclusion in each region.[10]

What made the fiscal exploitation of English crown woodland under the Stuarts remarkable is that it marked the departure of state forestry as it existed in England from a period of haphazard, decentralized, and disparate policy and management, and its entry into what James

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[7] SP 14/28 f.188. National Archives, State Papers Online.
[8] George Hammersley, "The Crown Woods and Their Exploitation in the Sixteenth and Seventeenth Centuries" *Historical Research,* Vol. 30 No. 82, (November, 1957): 159.
[9] Ibid, 157.
[10] SP 14/42.

C. Scott has termed "state fiscal forestry."[11] Although Scott's work speaks more generally to the unsuccessful state imposition of plans for rationalization, and uses the scientific forestry practices of eighteenth-century Germany as an example, the same rationalising principles were largely at work in the case of the early Stuarts. During the early seventeenth century, the state conception of crown woodland underwent a narrowing of vision, when the crown abstracted forests into a quantity of commercial wood representing the profit potential of the forest.[12] The ecological dimension of the forest disappeared in the focus of this revenue driven lens, as did the complex and negotiated networks of social relations which governed the use of forest resources by individuals other than the state.[13] Scott concisely states that "the actual tree with its vast number of possible uses was replaced by an abstract tree representing a volume of lumber or firewood."[14]

This chapter contends that under James I, this abstraction of the tree first occurred at the level of the state in England. With this new concept of woodland utility, the English crown practiced fiscal state forestry more comprehensively than ever before, and the state gained both a much less restricted vision and mandate for managing its woodland possessions. Perhaps most prominently, a desire to increase revenue prompted the state to extract profits from its landed estates with greater intensity, which in turn led to the first comprehensive surveys of crown

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[11] James C. Scott, *Seeing Like A State: How Certain Schemes to Improve the Human Condition Have Failed,* (New Haven: Yale University Press, 1998), 12.
[12] Ibid.
[13] Chapter 2 contains a fuller discussion of the implication of fiscal state forestry on the social networks of the forest community. Ibid, 13.
[14] A possible caveat that might be added to Scott's argument here is that in the early modern period, and even during the time of scientific German silviculture as he describes it, the uses of the tree remained myriad, as was especially the case in England, where most parts of the tree, including the bark and roots, had commercial uses, and other less evident uses, such as mast, were also recognized by the state, although to a lesser degree than other commentators. Nevertheless, even these woodland products were commoditized. Ibid, 12.

woodland which abstracted crown woodland into figures representing revenue potential. However, developments that facilitated the application of fiscal state forestry did not enjoy universal success. Surveys often remained unfinished, and even when the crown fully apprehended its forest resources, substantial impediments to the extraction of revenue from woodland existed, including the entrenched administration of royal forests, concerns over deforestation, and where wood sales did progress, rampant corruption and mismanagement. Concurrent with this rationalisation and commodification of woodland, the state established a professional and bureaucratic system of oversight for the implementation of fiscal state forestry policies. Thus, although the crown never satisfied its desire for financial relief through sales of woodland and its products, the administrative and conceptual developments of the period laid substantial foundations for the more "rational" and commercially oriented treatment of woodland, which would be of great importance in the decades to come.

James I's Search for Revenue in the Crown Lands

The spending habits and large expenditures characteristic of James I's reign first prompted the search for revenue that motivated fiscal state forestry. In the effort to squeeze additional revenue from its estates, the crown land administration created the necessary conditions for institutions of fiscal state forestry, chiefly through conducting surveys, a number of which facilitated the scrutiny of woodland for its fiscal potential.

Within the first year of his reign, James I's household expenditures doubled those of his predecessor in her final years. While on the surface this spending appeared to be the lavish excesses of a king, the thought surrounding kingship and magnificence common to the early modern period justified this behaviour to some observers. Not only did James believe, as did other renaissance princes, that being a sovereign demanded demonstrating magnificence and

majesty, but he also faced greater costs in attaining this goal than had Queen Elizabeth: the costs of outfitting a new household and supplying both his wife and successor with adequate budgets placed completely different pressures on his expenditures than his predecessor had faced, in addition to the contrast with her comparatively austere approach to household finance.[15] Although contemporaries expected a monarch to protect his assets from waste to avoid impoverishment, he undertook this action to ensure that ample funds existed to command public and private authority through patronage networks and the maintenance of a stately household.[16] As Linda Levy Peck has noted, James I's spending habits were defended as the legitimate and expected behaviour of a generous monarch, a defence made alongside the expectation that the distribution of wealth was part of a reciprocal ruler-subject relationship.[17] These demands of the royal household and business of being an early modern king multiplied with the cost of waging war, which grew incrementally but relentlessly in the period.[18] In James' case, the demands of securing his authority were met by exhausting regular revenue sources, and thus, the crown turned to extract greater revenue from its existing possessions. The crown lands were a naturally attractive prospect for such intensified extraction.

At the dawn of James I's reign, the revenue potential of the crown estates was greatly undervalued, with tenants paying low rents, corrupt officials eating away the profits of the crown coffers, and a lack of enclosure leaving the profit potential of common ground unrealized.[19] The

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[15] Roger Lockyer, *The Early Stuarts: A Political History of England, 1603-1643*, (London: Longman, 1989), 71-72.
[16] Daniel W. Hollis, "The Crown Lands and the Financial Dilemma in Stuart England" *Albion,* Vol. 26, No. 3, (1994): 419.
[17] Linda Levy Peck, ""For a King Not to Be Bountiful Were a Fault": Perspectives on Court Patronage in Early Stuart England," *Journal of British Studies* 25, no. 1 (1986): 36.
[18] Braddick, 69-70.
[19] Heather Lawrence, "John Norden and his Colleagues: Surveyors of Crown Lands" *The Cartographic Journal* Vol. 22, (June 1985): 54.

crown hoped to increase regular revenue by as much as two or three times by conducting surveys and evaluations of the king's lands. Additionally, as part of the king's estates, this revenue would come without the caveats which so often accompanied revenues generated through parliamentary means.[20] Moreover, the crown lands in themselves held great value as a saleable asset. However, the crown normally only sold its lands as an extraordinary revenue-raising measure, a precedent reinforced under Elizabeth, when land sales had been restricted to times of national crisis, such as the defenses against the Spanish Armada in 1588, or paying the debts of the 1560 Scottish campaign.[21] While it is true that the early Stuarts engaged in land sales somewhat more regularly, both their Lord Treasurers and those of Elizabeth approached the matter with the obvious knowledge that the short term revenue increase from land sales sacrificed the long term fiscal security of the crown, and thus, sought only to sell small and disparate parcels, and to preserve the larger self-managing estates, such as honours, on which the crown could more reliably depend.[22]

As an alternative to large scale land sales, beginning early in James I's reign, treasury officials sought to squeeze revenue from the crown lands in new and creative ways. One of the most tangible examples of these new attempts at raising new revenue from crown lands was the discovery of parcels of land which had escaped crown attention, in some cases for centuries. Particularly in Royal forests, assarts, wastes and purprestures had effectively disappeared from the royal portfolio by way of untitled holders occupying the territory without paying rent.[23]

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[20] Frank Kitchen, "John Norden (c.1547-1625): Estate Surveyor, Topographer, County Mapmaker and Devotional Writer, *Imago Mundi*, Vol. 49, (1997): 51.
[21] Gordon Batho, "Chapter V" in Joan Thirsk, ed., *The Agrarian History of England and Wales*, *Vol IV 1500-1640*, (Cambridge: Cambridge University Press, 1967), 265.
[22] Frederick C. Dietz, *English Public Finance, 1558-1641,* (London: Frank Cass & Co. Ltd. 1964), 299.
[23] Ibid, 116.

These lands in Royal forests were accompanied by other non-forest lands where the tenants had defective titles, former church properties with unpaid tithes, and waste lands which were improved for cultivation.[24] As early as 1567, Elizabeth created a commission to rectify these deprivations of the crown of income, and concealment hunters received patents both in Elizabeth and James' reigns. In 1613 these patents expanded to grant recipients the right to retain the lands they found concealed from crown possession.[25] This attempt to recover concealed lands fit into a broader programme of revenue generation, or "projects" which also included "unimproved revenues (estates entailed, wastes and commons, coppices and underwoods, old houses and castles), tenurial incidents and other casualties (by-rents and other obscure fees, perquisites of courts, outlawries, alienations, issues royal, the mint) and the all-too-familiar 'newe' projects (fishing busses, usury, apprentices, starchmaking)."[26]

The Survey as an Instrument of Fiscal State Forestry

These efforts to verify titles, uncover owed debts, and discover forgotten parcels of land amounted to a rationalization of the crown land portfolio insofar as it permitted the extraction of additional revenue from the crown estate, and this rationalisation extended to the forests and other woodland possessions. A specific instrument of this rationalisation was the survey. Following the Dissolution of the Monasteries under Henry VIII, and the attendant increase in the need to assess large numbers of properties, surveying manuals began to be published more widely in England.[27] Concurrently, the surveyor and surveying became more frequently relied

[24] Hollis, 428.
[25] Ibid., 428.
[26] John Cramsie, *Kingship and Crown Finance Under James VI and I, 1603-1625*, (Suffolk: Boydell Press, 2002), 129.
[27] Rudolf Wittkower, "English Literature on Architecture" in Rudolf Wittkower, *Palladio and English Palladianism*, (London: Thames Hudson, 1974), 96.

upon in estate management, as the number of potential private landholders expanded.[28] McRae argues that the rise of the surveyor in the agricultural context particularly rejected the traditional patriarchal socioeconomic structure that governed landholding, and instead advanced a "representation of the land as property: to be held, developed, or transferred within a dynamic market economy."[29] It is difficult not to see James I's attempts to extract revenue from his estates in this same vein – ignoring the traditional and negotiated methods of land use, the crown reimagined property values along the lines of economic potential. The importance of surveys to the early Stuart exploitation of crown lands only underscores this.

Robert Johnson suggested use of surveys, a relatively novel tool for estate management, to the queen's chief advisor, Robert Cecil, as early as 1602.[30] Beginning in 1603, manorial stewards submitted reports of rents, leases and the different types of land held, along with their values, and 1604 marked the beginning of the regular use of surveyors in assessing crown lands.[31] These surveys continued throughout James I's reign, expanding in scope until they earned the collective name of "The Great Survey," although it was never actually completed.[32] During this uptick in the use of surveying in royal estate management the crown rationally apprehended its woodlands for the purposes of fiscal state forestry for the first time - in December of 1607, crown land officials ordered a comprehensive survey of crown woods in a effort to sell decayed timber, as part of the ongoing effort to survey the crown estate.[33]

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[28] Francis Michael Longstreth Thompson, *Chartered Surveyors: The Growth of a Profession,* (London: Routledge & K. Paul, 1968), 9.
[29] Andrew McRae, "To Know One's Own: Estate Surveying and the Representation of the Land in Early Modern England" *Huntington Library Quarterly,* Vol. 56, No.4 (1993): 333.
[30] Hollis, 422.
[31] Lawrence, 54.
[32] Roger Kain, *The Cadastral Map in the Service of the State: A History of Property Mapping*, (Chicago: University of Chicago Press, 1992), 236.
[33] Ibid.

Fortunately, the text of this survey survives, and can be usefully analysed to reveal the imperatives and methods at play in the crown treatment of woodland resources, as the information collected in the survey implicitly conveys the approaches commissioners took to extracting revenue from the woodland to the English crown.

Most significantly, the survey attests that the crown aimed to apprehend all of its woodland possessions, irrespective of their jurisdictional status or location within the realm, one of the most basic steps toward rationalising the forest required in a programme of fiscal state forestry. While the survey appears to be incomplete, it evidently sought to cover the whole of England and Wales in its scope.[34] The description inscribed on the inside of its cover describes how the survey consists of "several briefs returned by the surveyors of his majesty's woods and underwoods within the particular counties here after mentioned."[35] The ensuing pages contain fifty one names for all the counties of England and Wales, although only twenty six counties have entries. Considering both the opening inscription and the fact that no Irish counties are listed on the survey, one can only assume the survey's original designers intended to include the whole of England and Wales but never managed to live up to that aspiration.[36]

Beyond the simple geographic scope of the survey, the survey also reveals that the crown treated woodland possessions with an uncharacteristic degree of uniformity. In this survey, the

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[34] Annotations reading "not finished" may be found beneath the county headings for several entries, in addition to empty pages.
[35] SP 14/42 f.1.
[36] The counties which are listed as having some kind of surveyed timber are Bedfordshire, Berkshire, Buckinghamshire, Carmarthenshire, Denbigh, Derbyshire, Dorset, Essex, Hertford, Huntingdon, Kent, Leicester, Montgomery, Nottingham, Northampton, Oxfordshire, Pembrokeshire, Rutland, Shropshire, Somerset, Southampton, Stafford, Surrey, Worcestershire, Wiltshire, and York. These names are updated to reflect modern conventions, and were extracted from the summary of the survey contained in H.C. Darby, *An Historical Geography of England Before A.D. 1800,* (Cambridge: Cambridge University Press, 1936), 398-399.

common characteristic of the items included is not their jurisdictional status, such as royal forest or honour, but the simple existence of coppice or timber wood with commercial viability. For instance, in the return for Cambridgeshire, both demesnes (with a breakdown of individual names) and copyholds of inheritance are listed with their corresponding stocks of timber and underwoods.[37] Elsewhere, for instance, in Carmarthenshire, demesnes, forests, parks and wastes are all listed with their wood products.[38]

This new method of ordering woodland surveys is significant. During the previous reigns, when surveys for wood had been commissioned, they were neither so comprehensive in scope, nor so focused on the value, quantities, and types of wood available. For instance, surveys of woods conducted under Henry VIII focused mainly on assessing the value of timber on monastic properties, not the whole extent of crown woodland possessions.[39] In other cases, where surveys were conducted in jurisdictions with substantial woodland holdings, they were assessed as tangential to the primary purpose of the survey, for instance when in 1577 a survey was conducted in New Forest for a parcel of land in which to make saltpeter, "woods" only appeared as a secondary entry beneath a description of the land itself.[40] Even when surveys were designed to discover the extent of woods exclusively, they were often still restricted to a single jurisdiction, as appears to have been the case when in 1578, Roger Taverner informed Lord Burghley that commissioners directed "to survey what woods of her Majesty were in every forest of her Highness in that county" found that "her Majesty had no woods to the same forest

[37] SP 14/42 f.8.
[38] SP 14/42 f.12.
[39] *Letters and Papers, Foreign and Domestic of the Reign of Henry VIII*, Vol. 13: Part I: 18 March 1538, Entry 544, Page 202.
[40] Lansdowne Vol/24 f.149, British Library.

belonging."[41] By contrast, the 1607 survey at least sought to examine all woods which were in crown possession in England and Wales, and only seems to have acknowledged jurisdictions where necessary, rationalising the survey under the single mandate of determining the value of all woodland possessions. Thus, the crown accomplished the abstraction of forest and woodland into commercial quantities of timber through the instrument of the survey.

Beyond the geographic scope and comprehensiveness of the survey conveyed in its structure, the kinds of information gathered during the survey offer much insight as to the approaches and anticipations of the crown at the time the survey was undertaken. For instance, it is clear that the crown had at least some interest in preserving the woodland and managing it for the long-term. Occupying the pages of the survey under each county heading are tables corresponding to each crown woodland possession, along with fields for the number or acreage of timber trees, decaying trees, coppices in lease, and coppices out of lease. Interestingly, in some cases, such as that of Buckinghamshire, the table with fields for timber trees is subdivided by species, with space for "timber oaks" and for "timber ashes."[42] While the coppice-timber distinction is obvious, owing to the differing timescales on which these woodland products grew, and the different prices they commanded, the speciated record-keeping of tree types indicates an attention to the role of species in commercial viability which is not always present in other contemporary woodland surveys. It is also possible that the original surveys may have compiled even further information on valuable woodland products which were not transferred to the bound copy that survives – a series of 1607 instructions for the survey directed commissioners to "make an estimation of the value of roots, dead barks, and shrubs in every wood" which indicates the

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[41] *Calendar of the Manuscripts of the Most Hon. the Marquis of Salisbury, Preserved at Hatfield House, Hertfordshire*, Vol. 2: September 18, 1578, Entry 594, Page 203.
[42] SP 14/42 f.5.

extent to which the crown sought to eke out every commercially viable product from its woodland possessions.[43]

In each of these rows, the survey indicates the total number of trees, and then the number of these trees "to be spared." On initial assessment, the number of trees to be "spared" when compared with those to be taken is indicative of the desperate and urgent revenue raising motive behind the survey, and this basic motivation should be kept in mind when analysing the plans for tree-felling and wood sales conveyed by the survey. If we are to analyse the values for the total numbers of trees provided in Royal Parks, Chases, and Forests, provided in summary at the end of the survey, the extent of trees permitted to be felled seems rather rapacious – on average across the counties where such data was listed, the survey reserved only 32.9% of the timber trees in the forests to be spared. The paucity of spared trees was most severe in Northamptonshire where this figure averages a rate of 7.28% of trees preserved.

However, several factors seem to be at work here in making the extent of tree felling to occur seem potentially greater than it actually was. First, it seems as though the quantity to be spared did not indicate that the remainder had to felled and sold but rather, it represented what the crown required to be preserved to maintain a basic level of functionality and emergency timber supplies. In other words, because the survey did not spare a tree, did not mean it had to be taken. Consider for instance in Berkshire, where the extent of timber felling was restricted as "on the Manors more cannot be spared by reason of want of timber and convenient fuel for the tenants."[44] Thus, it seems that the number to be spared represented the number of trees required to remain as an absolute minimum, and which would not, and should not have been felled in the

[43] SP 14/28 f/196, National Archives.
[44] Ibid., f.4.

course of woodland use, either for maintaining tenements or raising revenue. These figures also fail to take into account the coppices, which were designed to be used on a rotational basis, hence the fields for coppices both in and out of lease indicated in the survey. The felling and selling of a coppice did not entail permanent or long-term deforestation, whereas this outcome was much more likely in the event of mass tree-felling. Finally, it should also be noted that the regions slated for the smallest percentage of trees to be "spared" in their Royal forests appear to have possessed the greatest quantities of timber at the time of the survey, which suggests that perceptions of overabundance may have fuelled an over-eagerness to fell. Of the ten counties with Royal Forests listed with "spared" totals, only three – Northamptonshire, Wiltshire, and Hampshire - have fewer than 20% of their trees spared, and it does not seem a coincidence that these counties also possessed the greater amount of timber surveyed in the Royal Forests, 107,870, 41,792, and 151,753 trees respectively. The next largest reserve of surveyed timber, by contrast, stood in the Royal Forests of Buckinghamshire, with 21,613 timber trees, of which 39.75% were to be spared. Moreover, in many cases, especially for the Royal Forests, totals of trees to be spared were not entered into the survey, indicating that at the very least, surveyors did not calculate these totals, while in other cases, such as for demesnes in Cambridgeshire, all decaying trees were spared, and most of those in sound condition "by reason of the scarcity of timber and wood within this county."[45] That the jurisdictional peculiarities of royal forests afforded the crown much more freedom in felling timber also suggests that the surveyors may have assigned more liberal values for the number of saleable trees in these areas than elsewhere.

This consideration for local demands and the long-term viability of the woodlands is further reflected in the instructions contained beneath most of the survey entries, which often

[45] SP 14/42 f.9.

give justifications for the number of trees marked to be spared, or those to be sold. In some cases maintenance of existing buildings with timber supplies governed the quantity of saleable wood, as was the case in Bedfordshire, where "the trees mentioned to be spared are not timber, subject to decay and therefore fit to be taken, and the young trees reserved for repair of the pales and lodges."[46] A concern for the general long-term profitability of the woods is also articulated in the note, repeated elsewhere, that "the trees in the coppices in lease are all young trees and fit to be preserved."[47] Elsewhere, customary rights posed a potential problem for the sale of timber that demanded negotiation. In Westmoreland, the anonymous annotator of the survey warned that "the timber and woods there do for the most part grow upon the customary lands wherein the tenants claim gift of inheritance doing their services and doth appear by order from the Exchequer and thereby they claim the woods for their own," although he claimed that surveys gave evidence to the contrary.[48] In any event, surveyors undertook wood sales and tree-felling with at the very least, an aspiration to maximise profits and efficiency. While the survey was still possibly being conducted, Sir Julius Caesar recorded "preventing spoils and sales of wood" as a preoccupation of the Robert Cecil, the newly appointed Lord Treasurer.[49]

Finally, where trees did not fall under the category of being spared, or were under demands for other purposes in the county, reasonably concrete plans existed to ensure that the timber had a ready market. Below most of the county entries are specifically tailored instructions offering the reasons for which certain quantities of timber were allotted for exception and suggesting the ideal methods by which the wood could be sold. For instance, in Hampshire, the

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[46] Ibid., f.3.
[47] SP 14/42 f.3.
[48] Ibid., f.51.
[49] L.M. Hill, "Sir Julius Caesar's Journal of Salisbury's First Two Months and Twenty Days as Lord Treasurer: 1608" *Historical Research*, Vol. 45, No.112, (November 1972): 317.

notes suggest that "the most easy means for vent & sale of the wood trees is by permitting of iron mills and glasshouses to be created, also by making of charcoal and especially of that which lieth toward Salisbury, Southampton [...]."[50] The instructions then proceed to suggest an order of precedence by which timber trees should be sold to local buyers, first listing cartiers, and then coopers, who needed the wood for making barrels and clapboard.[51] Without a clear market the short period in which a tree held maximum timber value before rotting, and this awareness of the ideal conditions for felling reflects the "psychological moment" Albion describes as representing the peak value in the maturity of a tree.[52] For instance, the notes for Worcestershire read: "the trees mentioned to be spared in the park may well be taken being now at their full growth and of valuable price, yet daily wasting [...]."[53] In some cases, the already deplorable state of the trees justified that greater quantities of felled and sold, such as in Hampshire where "the reason why such great quantities are said to be taken is for that the trees there are very old & in decay."[54]

As a whole, although the 1607 survey never saw completion, the portions of it that were finished suggest that early in James I's reign, the crown took definite steps to rationalise crown woodland as a uniform commercial resource, exploitable for the revenue needs of the state. Importantly, the presence of what seem to be absolute minimum amounts of timber to be preserved, and the incorporation of even tenants' woodbote rights into the amount of timber which could possibly be felled indicates that even if the survey indicated the potential for tremendous profit from wood sales, the crown nevertheless took caution to ensure that it did not wholly denude its possessions of timber, or cause a dire shortage of timber in the future.

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[50] SP 14/42 f.45.
[51] Ibid.
[52] Albion, 99.
[53] SP 14/42, f.52.
[54] Ibid., f.45.

The Surveyor-General of Woods as a Forestry Professional

In addition to the rationalisation and commodification of the forest as a natural resource which occurred in the 1607 survey and beyond, the reign of James I also saw the increasing activity of surveyors themselves as agents of fiscal state forestry. In particular, the early decades of the seventeenth century produced rich evidence for the office of Surveyor General of His Majesty's Woods existing as a skilled and relied-upon bureaucratic post to facilitate the management of crown woods. Thus, if surveys served as a tool for the abstraction of the forest, and leases, disafforestation and wood sales as the means of extracting revenue from the commercialised forest, the Surveyor General was an important intermediary, acting on behalf of the crown in managing its wooded possessions, both as that involved sales and the preservation of woodland.

Much as the widespread practice of surveying estates had been adopted before the crown applied it to woods in 1607, so too did surveying emerge as a distinct occupation before the crown availed itself of surveyors in its quest to extract revenue from woods. In fact, Surveyors of Woods had been employed by the crown in assessing its woodland assets for the better part of the previous century, beginning in earnest with the Dissolution of the Monasteries, when appointed officials certified the value of woods on monastic properties prior to their sale.[55] The institutional presence of these officials continued through successive iterations of sixteenth-century revenue courts: the Court of Augmentations, the Court of General Surveyors, and the Court of Augmentations and Revenues of the King's crown, expanding in scope and power until the Surveyors General of Woods became the preeminent forestry bureaucracy in England, having

[55] G.R. Elton, *The Tudor Revolution in Government: Administrative Changes in the Reign on Henry VIII.* (Cambridge: Cambridge University Press, 1953), 167-168.

oversight of all crown woods.[56]

With the growing institutional power of the Surveyor General of Woods also came an increase in the proficiency of the holders of the office in their trade. When the Court of Exchequer absorbed Second Augmentations in 1554, the Surveyor General of Woods also transferred to that institution, and the first office-holder appointed under that authority was Roger Taverner.[57] Qualified with experience in surveying from plying his trade during the Dissolution of the Monasteries, Taverner represented a distinct shift in the qualifications and duties of the Surveyor General. Where former Surveyors General of Woods were usually patronage appointments, attaining the office near the ends of their lives, Roger Taverner worked in the position for most of his life, and passed the role on to his son John. While an act of obvious preferment, this did not entail a degradation in the quality of the office holder.[58] John Taverner appears to have routinely travelled throughout the kingdom to enforce forest preservation legislation, and Burghley sought his advice on matters of expertise.[59]

An interesting parallel might be drawn here between the rise of Surveyors General of Woods and the auditor within the state finance apparatus. Madeline Gray has noted that the

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[56] 33 Henry VIII c.39 III; W.C. Richardson, *Tudor Chamber Administration, 1485-1547*, (Baton Rouge: Louisiana State University Press, 1952), 331; W.C. Richardson, *History of the Court of Augmentations, 1536-1554*, (Baton Rouge: Louisiana State University Press, 1961), 127, 142.
[57] W.C. Richardson, *History of the Court of Augmentations, 1536-1554*, (Baton Rouge: Louisiana State University Press, 1961), 308; Andrew W. Taylor, "Roger Taverner (d.1572) surveyor and writer," in "Taverner, Richard (1505?–1575), translator and evangelical reformer," *Oxford Dictionary of National Biography*, (2008).
[58] Earlier Surveyors General were often appointed as acts of patronage, being of advanced age at the time of their appointment, and usually having already finished an illustrious career, as was the case of William Fitzwilliam and Henry Sacheverell see Matthew Davies, "Fitzwilliam, Sir William (1460?–1534), merchant tailor and sheriff of London," *Oxford Dictionary of National Biography*, (2010) and S.M. Thorpe, "Sacheverell, Sir Richard (by 1469-1534), of Newarke College, Leicester, Leics. and Ratcliffe-upon-Soar, Notts.," *The History of Parliament: The House of Commons* 1509-1558, ed. S.T. Bindoff, (1982).
[59] Lansdowne MS 43/58,59; 62/60.

sudden increase in the complexity of the crown estate following the Dissolution of the Monasteries prompted an increase in the number of auditors employed by the crown, mainly tasked with scrutinizing the local accounts of officials who belonged to the community in which they worked, along with other collectors of crown revenue.[60] Notably, these auditors were not just patronage appointments, but skilled officials, possessing a degree of professional qualification, and an ability "to function not as bureaucrats but as professionals, serving the state but not part of it."[61] Broadly speaking, the same might be suggested as true of the Surveyors of crown Lands, including the Surveyor General of Woods. Although it is difficult to ascertain the degree of control the surveyors may have had over entry into their profession, it is clear that they acted as quasi-independent servants of the crown, possessing an official title, although charging for their services in a way analogous to a modern contract. In 1607, the crown owed John Taverner £88.8s.3d. for "the year's charges for works etc. at Nonsuch Park," presumably including expenses.[62] By contrast, the earliest Surveyors General of Woods simply received a lump sum, out of which they were required to pay for workers and supplies.[63] Other examples, such as that from an Exchequer account of extraordinary issues from 1610-1611, wherein both John Norden and Robert Treswell are listed as receiving £40 for the survey of lands, and £46 to Norden for his "riding charges," or one from 1610 when Norden was to be paid £36 for his "services" and £49.6s.8d. "for repairs done in several forests" suggests that the post functioned on a much more independent and active basis than the appointment and payment of a regular

[60] Madeline Gray, "An Early Professional Group?: The Auditors of Land Revenue in the Late Sixteenth and Early Seventeenth Centuries" *Archives*, Vol 20, (April 1, 1992): 45-46.
[61] Ibid, 52.
[62] SP 14/28 109-120.
[63] SP 1/22 f.12.

pension which earlier office holders experienced.[64]

This trend of having well-qualified, quasi-professional Surveyors General of Woods continued beyond the Taverners' occupation of the office. In 1610, Robert Treswell received a grant of the office of Surveyor General of Woods South of the Trent. Treswell served as Somerset Herald, a post he seems to have continued to occupy both before and after his appointment as Surveyor General of Woods.[65] In this position, conducting visitations to compile heraldic information, and in mustering the necessary artistic skills to render heraldic devices, Treswell would have cultivated many of the basic proficiencies required for surveying. Moreover, there is an indication of familial expertise, much like that of the Taverners in surveying more broadly. Robert Treswell's father, Ralph Treswell, was a noted surveyor of urban properties, and participated in the woodland surveys of 1607.[66] He too worked as a heraldic painter and transferred his skills to the creation of maps.[67] Moreover, Robert Treswell's son, Andrew Treswell, secured the reversion of his father's office in March of 1617, and went on to serve in that role until as late as 1638.[68]

By the time of James I's reign, it appears that in general terms, the Surveyor General of

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[64] Reprinted in John Norden, *Speculi Brittaniae Pars: An Historical and Chorographical Description of the County of Essex*, (London: Camden Society, 1840), xl; *CSPD* Jac. I, 1603-1610, Vol. LVIII (16), 642.

[65] Treswell was mentioned as being "Bluemantle Officer of Arms" in 1596 in Cotton Titus B/V f.93 and conducted a heraldic visitation of Shropshire in 1623. Robert Treswell and Augustine Vincent eds. George Grazebrook and John Paul Rylands, *The Visitation of Shropshire Taken in the Year 1623*, (London, 1889).

[66] Robert Cooke author, Joseph Howard and George Armitage eds. *The Visitation of London Taken in the Year 1568, and since Augmented Both with Descents and Arms*, (Harleian Society, 1869), 92; Ralph Treswell, *The London Surveys of Ralph Treswell*, ed. John Schofield (London Topographical Society Publication No. 135, 1987); John Schofield; "Treswell, Ralph (c. 1540–1616/17), painter–stainer and surveyor." *Oxford Dictionary of National Biography*. 23 Sep. 2004; Lawrence, 54.

[67] Schofield, John. "Treswell, Ralph."

[68] SP 16/384 f.16.

His Majesty's Woods dealt with all matters touching on crown woodland possessions. Just as the surveys of crown woodlands became comprehensive in scope, so too did the duties of the offices which managed the woods. Surveyors of crown Lands in the reign of James I performed a remarkable array of services, certainly going far beyond the basic task of surveying. John Norden is recorded mapping Windsor Castle, overseeing the demolition of a tower at Sandown Castle, listing munitions, and mending a sea wall at Calshot Castle, among other tasks.[69] For the Surveyor General of Woods, this range of responsibilities simply adapted to the woodland realm.

A primary task of the Surveyor General lay in maintaining the traditional woodland possessions of the crown, royal forests, although the scope of his duties far surpassed those enshrined in the ancient institution. Where typical forest officers usually had their influence and jurisdiction restricted to a single forest, Treswell operated in a wide variety of forest-law jurisdictions. A 1611 warrant lists a series to quantities repayable to Treswell for repairing the fences in Woking Park and in Cornbury Park in Surrey and Oxfordshire.[70] Moreover, his duties extended beyond simply maintaining the forests themselves, as he appears to have been tasked with using forest resources to repair crown buildings and infrastructure, or at the very least, maintaining buildings within the Royal Forests. In November of 1610, he was to be paid £243.6s.8d. for repairing the chapel at Hainault Lodge in Waltham Forest, and another £81.13s.4d. for repairs at Woking Park and to the Surrey town bridge.[71]

However, the maintenance of Royal Forests seems to have only accounted for a portion of Treswell's responsibilities. Naturally, as a surveyor, Treswell was responsible for producing

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[69] Heather Lawrence, "John Norden and His Colleagues: Surveyors General of Crown Lands" *The Cartographic Journal*, Vol. 22, (June 1985): 55.
[70] CPSD, Jac. 1, 1611-1618, Vol. LXVII (63)
[71] CPSD, Jac. 1, 1603-1610, Vol. LIII (25)

and managing access to the surveys of crown woods, which allowed crown woods to be bought, sold or leased. Although his control over the surveys seems evident from the letter written to him by Treasury officials who instructed him to provide surveys to Giles Mompesson, who was tasked with selling crown woodland, and his role in producing the 1607 survey of woods, Treswell was also involved in providing surveys of less momentous schemes.[72] In 1610, after purchasing the lease of Sir Francis Fortesne in Wychwood Forest, Sir John Townshend petitioned the king to allow him to lease the coppice woods in the same region, simultaneously petitioning Salisbury to have Treswell provide of a survey of the woods for the purposes of his plea.[73] As Mompesson's commission for wood sales was failing in 1617, Suffolk recorded meanwhile that "For the other business of Blackamore & Pewsham [forests] we have gone well on, the Parke being sett out & the Palings in hand, set as Mr. Treswell hopes it shall be finished by Michaelmas."[74] Even later in his career, Treswell continued to perform on-the-ground surveys of the King's woods, with Phineas Pett writing that "a little after Christmas [1627] I was employed as a commissioner with Mr. Treswell, Surveyor of His Majesty's Woods, to view certain Parks of His Majesty: as Ditton Park, Sunning Park and Folly John Park, lying near about Windsor; which we despatched in four or five days, and returned back to Westminster, and delivered in the account and certificate of the business to the Lord Treasurer."[75]

Beyond surveying, it appears that Treswell participated in the quotidian business of conducting wood sales and timber felling. In 1609, Treswell acted as a commissioner for wood sales in Warwickshire, and wrote a letter to Salisbury to ask for guidance both on the matter of

[72] Lawrence, 54.
[73] CPSD, Jac I, 1603-1610, Vol. LVIII (51, 52, 53).
[74] SP 14/92 f.112
[75] Pett, 143.

potential buyers of 1000 trees for 1000 marks meeting their offer with only 600, and the claim of a local landlord on 2000 trees they had already valued for sale.[76] In another case, Treswell was ordered to stop felling trees in woods in the Manor of Steple Ashton pending a verification of the authority by which the commission for felling was granted.[77] Treswell's duties in the office of Surveyor General even extended to supplying timber for the navy, as indicated by a letter which instructed the Justices of the Peace in Surrey that "the said Robert Treswell and his deputies may be forthwith supplied with so many carriages from the places adjoining as shall be needful" in the task of carrying timber marked for the navy to a waterway.[78]

Insofar as extracting revenue, Treswell also seems to have offered input on the terms and conditions of leases for coppices, with an eye to preserving their long-term integrity and sustaining timber supplies. In a note from July 1621, he wrote that "[a]ll manner of Timber trees, viz. Oaks, Elme, also, Beech and Ashes" were to be excepted from leases, save for "Crabtrees and Maple."[79] Similarly, the leases were not to grant any right to herbage or pannage, and "[a]ll Samples and Standels once left to be generally excepted be they of Oak or of any other kindes."[80] Caution was also to be taken in the management of the coppice while under lease, and Treswell included instructions which would prevent a coppice from being rendered destitute before it was leased to a different holder, including that "the fall of wood to be made yearly at Christmas" and that no wood was "to be felled within three years of the end of the term."[81]

In sum, the activities of the Surveyor General of Woods as they occurred under James I

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[76] *Calendar of Manuscripts of the Most Hon. The Marquis of Salisbury*, Vol. 21: 1609-1612, Page 40, Entry 108.
[77] SP 46/69 f.150.
[78] Acts of the Privy Council of England, 36 (1617-1619), Page 315.
[79] SP 14/122 f.7
[80] Ibid.
[81] Ibid.

represented a gradual accretion of duties and powers toward an increasingly comprehensive treatment of crown woodland. Just as the uniform treatment of all crown woods in the 1607 survey represented their commodification and perception by the state as a natural resource, the existence of the Surveyor General of Woods as a comprehensive office tasked with maintaining these same woods and facilitating their exploitation was a more tangible step toward dissolving the traditional uses and understandings of woodland, and treating it as a single revenue-oriented resource.

Disafforestation to Extract Revenue

Both the commercial abstraction of woodland and a comprehensive treatment of its management were essential steps for the application of fiscal state forestry to crown woodland possessions, and was also the most straightforward – the actual generation of revenue from woodland proved much more complicated. As was implicitly acknowledged by the 1607 survey in the mention of the varying jurisdictional statuses of woodland parcels, substantial impediments stood in the way to selling or leasing crown woods, be they the lack of a readily available market for timber products owing to geographical positioning or the claims of tenants for customary rights to harvest wood. Moreover, disagreement abounded about the method of generating revenue itself. Sales of timber were underscored by anxiety about permanent deforestation and long-term profitability, as were leases of coppices, while even in the cases of general leases, questions abounded about the power the leaseholder would have to wreak havoc on the integrity of crown woodlands.

The restructuring of the Royal Forests stood as a commonly advanced method to realise the greatest profit from the crown woods, and as some of the densest reserves of timber in crown

possession, they were a logical target for intensive exploitation. To a contemporary Surveyor General of Woods, John Norden, the benefits of disafforestation were clear:

> That it [disafforestation] shall be much to the profit of His Majesty cannot be doubted; for, upon the divisions of these places, whereas now His Majesty hath not only no profit, but is charged with the maintenance of lodges, pails, rails, wages, and other allowances, there will arise a greater portion and more valuable per [sic] ann. In the remote places of the kingdom than I dare aim at.[82]

From 1607 until after the death of Charles I, the disafforestation and sale of forest land was repeatedly advanced as a sensible way of raising revenue from crown estates.[83] An inclination toward substantially exploiting woodland in Royal Forests similarly appeared in the 1607 survey, where Royal Forests appear to have had the fewest trees marked to be spared.

From the standpoint of revenue, Norden's assertions were sensible, as in addition to the profit from wood sales, there were also substantial administrative efficiencies to be realised in a restructuring of the Royal Forests, with an attendant increase in revenue. At the time the surveys were being conducted early in James I's reign, a popular rationale for disafforestation suggested that improving the administration of the Royal Forests could reduce the financial burdens placed on the crown by the various Royal Forest officials who were paid in cash or in kind from forest resources.[84] The seeming political popularity of disafforestation accentuated these administrative and financial efficiencies. Royal Forests were popularly perceived as the scourge of commoners and as an unnecessary imposition of Royal privilege on contested landscapes. Such views were fuelled by longstanding resentment of Royal Forests, arguably dating back to the prohibition on

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[82] John Norden, "Norden's Project for Improving Some of His Majesty's Forests, Parks, Chaces and Wastes, Presented to Sir Julius Caesar" (1613) in John St. John *Observations on the Land Revenue of the Crown* (1787) Appendix ii, 4.
[83] Gordon Batho, "Chapter V", in Joan Thirsk ed., *The Agrarian History of England and Wales*, *Vol. IV 1500-1640*, (Cambridge: Cambridge University Press, 1967), 272.
[84] Ibid., 271.

the extension of Royal Forests contained in the Magna Carta. Thus, suggestions for disafforestation often joined popular appeals, such as in 1621 when the Heads for Relief of the King's Estate justified such an action as a "safe enriching of the crown and a welcome act to the people."[85] Similar proposals for disafforestation appeared earlier in the reign, both in 1612 and in 1616 when a proposition suggested that "all remote forests, chases and parks whereof the sale dose belong to the king, may be disafforested […]."[86]

However, the disafforestation and sale of Royal Forests was much more easily proposed than accomplished. Even if disafforestation might have resulted in a positive popular reaction, which was unlikely, considering the retinue of traditional resource rights afforded to residents of the forest which would have been disrupted under such an action, the Royal Forests were already being employed as a crown resource in ways which transcended their wood fibre. crown lands were a prime object of patronage, and Royal Forests were no exception.[87] With various woodland officials and other clients of the crown receiving benefits both from the collection of fines and from the right to harvest some wood itself, the simple sale of the woods was difficult to accomplish, lest the accrual of financial capital in one aspect of crown affairs result in the loss of political capital in another. Thus, a 1612 report to Cecil which valued the Royal Forests at £509,000 noted that the sale of those assets would both profit the King little and discontent the subjects, as clients held the rights to collect profits from the Royal Forests.[88] Ultimately, although disafforestation was enthusiastically suggested in the reign of James I as a means of

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[85] SP 14/123 no.80 in Joan Thirsk and J.P. Cooper eds. *Seventeenth Century Economic Documents,* (Oxford: Clarendon, 1972), 607.
[86] SP 14/87 f.155
[87] Michael J. Braddick, *State Formation in Early Modern England, c.1550-1700*. (Cambridge: Cambridge University Press, 2000), 246.
[88] Hollis, 423, citing *Historical Manuscripts Commission*, Salisbury MSS, 27.

raising revenue from both the lands and timber contained in Royal Forests, this enthusiasm was not acted upon until the later 1620's and the reign of Charles I.[89]

Comprehensive Leasing Proposals

Disafforestation was not alone as a potential method of generating revenue from assessed forests. At the same time as the crown conducted surveys of woodland, proposals began to be submitted to the King which rather than providing suggestions for how the crown might sell its woodland, offered to sell the woodland for the King, in exchange for a fee which would guarantee revenue.[90] Going beyond disafforestation, which would be limited to woodland under forest law, these proposals to lease were total in scope, aspiring effectively to lease all crown woodland as one unit. For instance, in 1607, Sir Francis Stoner petitioned, writing that he "desireth to have in lease all woods and underwoods with the pannage of them where the same de jure is not common, together with dead bark, roots, and shrubs of trees of his Majesty being in the Survey of the Exchequer. Duchy of Lancaster, or Cornwall, or Principality of Wales […] any of his Majesties forests, chases, parks, wastes, or manors."[91] In his petition, Stoner appealed directly to the revenue raising imperatives of the crown, promising that the lessee "will yearly pay for the term of fifty years the fine of £20,000 unto His Majesty."[92]

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[89] Peter Large, "From Swanimote to Disafforestation: Feckenham Forest in the Early Seventeenth Century" in R.W. Hoyle *The Estates of the English Crown 1558-1640*, (Cambridge: Cambridge University Press, 1992), 392.

[90] It is not entirely clear to what extent the proposals prompted the survey, or vice versa, however, it seems clear that the two were related in some capacity – the instructions for the commissioners of the survey were dated as having been created in the same month as the surveys were received.

[91] SP 14/28 f.179

[92] Ibid., item 9. In *Forests and Sea Power* Albion claims that an initial offer of £10,000 per year atop what was already being earned by the king was offered, followed by another offer of £20,000 atop existing revenues. Clearly, the figure of £10,000 is being based on the *CSPD* entry, which lists £10,000 as the value, as this value is not contained in the document, being instead £20,000. Moreover, there is no mention of this fee being in addition to regular revenue, and it

The ambitious proposal expanded the commercial potential of the woodlands in question far beyond saleable timber. Underwood, suitable for fencing and fuel, along with roots and shrubs, presumably for the same purpose, were included. Meanwhile, the petition also included a provision which requested that "[t]hat liberty may be given him to erect upon Mills, Glasshouses, and Tanning Houses," which would presumably make use of fabricated charcoal for the creation of glass and iron, or in the case of tanning houses, use the bark which was often coveted from felled trees for its tannins.[93] Moreover, it appears to have been designed with long-term use in mind, and an increasing growth of its purview. The petition demands "That no lease of any woods or underwoods now in being, be at any time during the demise of this petition reserved, but suffered to expire," thus allowing additional woodland properties to accrue into the lease.[94] Additionally, the petition took deliberate measures to assure the crown that woodland would not be spoiled, and that the lease would not deplete crown timber reserves in the long term. In the same sentence that he outlined the payment to be rendered to the crown, Stoner also noted that "for every tree they cut they will be bound to plant and preserve young trees," implying there would be no net degradation of timber supplies.[95]

In the same year, the crown received another proposal from "AB who offers to farm the kings majesty's woods."[96] In a much more detailed manner than Stoner's proposal, AB provided a detailed list of the woodland products he sought in the lease, which included all woods, underwoods, coppices, dead bark, roots, shrubs, and windfalls.[97] In a more comprehensive way

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seems unlikely this would be the case, as Giles Mompesson's offer several years later only aimed to provide £25,000 per annum, which ultimately proved unachievable.

[93] Ibid., item 7.
[94] Ibid., item 3.
[95] Ibid., item 9.
[96] SP 14/28 f.187
[97] Ibid.

than Stoner's proposal, that of AB demanded "[a]ll rents reserved upon leases of woods and underwoods and coppices not lying within any forests parks or chases already granted" and, as had been in Stoner's petition, "[t]he reversion of all such woods and underwoods, coppices, as are now demised for rent."[98] Also similar between AB and Stoner's petitions was the "Liberty to erect Iron mills, Glass houses, Tanning Houses," with the whole lease being agreed to for a term of fifty years.[99] A notable difference between the two petitions is that while they both exempted trees which would be marked for preservation by the King's commissioners, AB also exempted all "woods underwoods and coppices within the Duchy of Cornwall."[100]

Where AB's petition departed substantially from Stoner's petition was in the recompense due to the crown for the privilege of leasing the King's woods. Although the rent itself remained at £20,000, AB communicated the lease would entail additional relief of burdens imposed by crown woodlands the King would normally need to pay. The petition suggested that the lessee would "pay yearly all such fees and wages in money to the masters of the game forests and keepers [...] payable by grant or patent from His Majesty."[101] In so doing, AB would significantly relieve many of the financial pressures which had lain behind arguments for disafforestation. Moreover, the petition also made provision that while farming the King's woods, AB would provide, on a yearly basis, loads of wood to a number of the King's residences, including Whitehall, Greenwich, and Hampton Court.[102] Both petitions, and especially that of AB, in effect offered to completely farm out the King's woods, rendering a tidy revenue to the crown in so doing, and still allowing for timber to be reserved for the crown as it

[98] Ibid.
[99] Ibid.
[100] Ibid.
[101] Ibid.
[102] Ibid.

deemed fit.

Although these proposals for farming the crown woods seemed to meet many of the needs and desires of the crown in its revenue raising ventures, crown officials disagreed with them extensively. Stoner's proposal prompted a series of objections on the grounds of terms requiring further definition, or preclusions on where wood could or could not be leased.[103] As these objections seem to have been met in AB's proposal (most notably through the exclusion of the Duchy of Cornwall and the meticulous enumeration of which woods were in question,) it is reasonable to assume that the proposal of AB may have represented either a second draft of the original advanced by Stoner or a counter proposal from the council or a royal agent. However, even with these more legalistic arguments addressed, a fresh barrage of objections arose concerning the profitability and sustainability of the enterprise.

Usually, these complaints related to a suspicion that the terms of the lease would allow for such spoliation of crown woodlands that it would result in a greater impoverishment of the crown than the rents could offset. Some of these concerns related directly to timber, such as that made by the Earl of Nottingham, the Lord High Admiral, who protested of AB's petition that there was such an abundance of trees with dead boughs that hardly any would be left reserved for the king, and that even replanting would not suffice as the new trees would take too long to grow and would be susceptible to destruction by animals.[104]

A different set of objections by an anonymous author to AB's proposal included alarm at the terms of the grant which would allow for the erection of industrial facilities in the King's woods "at the pleasure of the grantee, which if it be granted, all the timber & wood within his

[103] SP 14/28 f.180.
[104] SP 14/28 f.188.

majesties parks forests, and chases will quickly be consumed, as may appear by divers [...] examples within this kingdom."[105] Both Nottingham and the other anonymous objector's exceptions appear somewhat well-founded, although they appear to neglect the ability of crown commissioners to set aside trees for exception under the leasing scheme.

Other concerns, relating to AB's reservation of roots, shrubs, bark and windfalls, appear to arise from the lack of subjection he would have to forest officials, and the disrespect of customary forest law, as Nottingham claimed "spoil of the woods is likely to be greater than such because he shall not be subject to the control of the woodwards and other officers of the King's woods when he may challenge all his own for his rent."[106] This concern for the establishment of the Royal Forest administration, and in all likelihood, the loss of political favour curried by the granting of forest offices was specifically noted by Nottingham as a further reason against such a lease, as the forest officials would lose lucrative posts under AB's proposal.[107] Although Nottingham expressed concern for the integrity of the deer stocks in Royal Forests, he offered no real reason for why AB's provision was insufficient, instead pointing to how such an arrangement would make redundant forestry offices, which were valuable patronage positions.

Objections from the anonymous critic convey similar worries, one of the foremost listed being with regard to how the traditional entitlements of forest officers might be encroached upon if windfalls were to be given to the grantee. There is also a degree of concern expressed over other contested interests in the crown woods. For instance, the writer worried that "by having the barks, roots, and shrubs the grantee may dig up the soil [...] the common of pasture will be

[105] SP 14/28 f.189.
[106] SP 14/28 f.188.
[107] Ibid.

spoiled for he is not bound to fill up the holes again."[108]

No surviving records seem to indicate that such a comprehensive lease agreement was ever granted for the crown woods. Ultimately, although the crown made concentrated efforts to survey and lease coppices, by 1612, only a small fraction of the lands surveyed for that purpose had actually been let.[109] Batho has suggested that this owes largely to a lack of ready market for coppice wood, which may well be true, and ultimately may have been responsible for the lack of coppice leasing on a small scale.[110] However, as indicated by the proposals made by AB and Stoner, it seems that broader attempts to comprehensively lease the woods were not being stopped by the forces of the market so much as by objections arising from the entrenched system of property right and administration embodied in the Royal Forests, in addition to genuine concern for woodland preservation.

crown-Directed Wood Sales for Revenue Extraction:

Although disafforestation appears not to have been undertaken owing to fears surrounding the loss of patronage potential, and wholesale leasing was seemingly stopped owing to the potential both for encroachment on traditional rights and the potential for woodland spoilage, the crown did eventually contrive a means of extracting revenue from its woodland possessions, by way of appointing a commission for wood sales. Much as the petitions submitted by Stoner and AB were for their own profit, so too did the commission for wood sales revolve around the profit of the commissioner. In this case, the individual to profit was Sir Giles Mompesson.

The marriage of Mompesson's sister-in-law to the half-brother of George Villiers, the

[108] SP 14/28 f.189.
[109] Batho, 271.
[110] Ibid.

Duke of Buckingham, afforded him considerable freedom in suggesting revenue raising schemes for the crown and reaping the rewards of these schemes himself.[111] With this access to the King's favourite, he not only suggested the commission for granting licences to inns, for which he would become notorious, but simultaneously advanced the idea of establishing a commission which would sell decayed timber in the forests of nine counties of the realm.[112] His proposal was attractive, offering to raise £100,000 in four years, and with this promised revenue in mind, the councillors negotiated with customs farmers to pay the King's creditors the same £25,000, to be repaid at the end of each year with the revenues generated by Mompesson's scheme.[113]

However, much as Nottingham and others had been skeptical of offers to lease the whole of crown woodland, it appears that some in the crown finance administration were also skeptical of Mompesson's revenue-raising schemes. The king, alternatively, seems to have remained enamoured by the idea, and the matter was ultimately settled rather dramatically:

> the old Chancellor had vowed not to seal the patent for sale of woods nor the one for inns, but the King visiting him, sealed the first in his presence, and then sending for the Great Seal, after sealing the other patents for Giles Mompesson, an ally of Buckingham, delivered it to Sir Fras. Bacon, as Lord Keeper[114]

With the sealing of the patent, Mompesson was placed in charge of timber sales, and his powers appear to have been relatively far-reaching in that pursuit. In the same month that Mompesson was issued the patent, a letter was sent by the Lord Treasurer to Robert Treswell, the Surveyor General of Woods, instructing him to allow Mompesson and his associates to "have the

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[111] Sidney Lee, "Mompesson, Sir Giles 1583/4-1651x63" *Oxford Dictionary of National Biography*, (2008).
[112] Ibid.
[113] Cramsie, 147.
[114] *CPSD*, Jac 1. 1611-1618, vol. VC, Pages 441-442, Item 105.

sight and perusal" of wood surveys he held.[115] This letter conveys both that access to the surveys, presumably those conducted within the previous decade up until that time, were important to Mompesson's work, but more interestingly, the fact that such a warrant needed to be issued to the Surveyor General indicates further resistance to Mompesson's plan from within the state forestry establishment. In correspondence from June of that year, passing mention is given to Mompesson appearing before the House of Lords to clear himself of accusations from Treswell.[116] Although the letter did not convey the nature of the accusations, it suggests a less-than-amicable relationship between the two officials.

In addition to having access to surveys of crown woods in conducting his business, it also appears that Mompesson was empowered to act in the interests of preserving wood in the forests under his care, a task typically under the jurisdiction of forest officials or the Surveyors General of Woods. In July of 1617, the Remembrancers of the Exchequer received a warrant informing them that they were to permit Mompesson and his associates to take view of warrants for wood sales and repair in the course of their investigation against abuses.[117]Although at the time Mompesson's approaches to managing wood sales were not known, his acting in position as an investigator of abuses of woods in 1617 is quite ironic. Mompesson also seems to have ensured that great scrutiny was placed on lesser officials for potential corruption, having in late March of 1617 complained "against the receivers, or rather their deputies, who, in the absence of the principal officer, giveth slack attendance, and notwithstanding the strict charge given unto the contrary, do either exact fees, or which is worse, refuse sufficient security for the King's money,

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[115] "A Letter to Mr. Treswell," *Acts of the Privy Council of England*, Vol. 35, 1616-1617, PC 2/28 f.573.
[116] SP 14/92 f.180.
[117] *Acts of the Privy Council of England*, Vol. 35, 1616-1617, 284-285.

of purpose to draw a fee, and so exceedingly prejudice his Majesty's service" receiving a warrant of warning for the same officials in return for his complaint to the Treasury Officials.[118] By Autumn 1617, it was becoming increasingly clear that Mompesson's project was failing. After the King requested to know whether Mompesson would be able to raise the £25,000 without spoiling his woods, and Winwood requested this information through Suffolk, Julius Caesar reported finding that timber, including that reserved for naval shipbuilding, was being sold at less than half its true value.[119] Although it is difficult to assess the extent of damage wreaked upon the crown woodlands by Mompesson during his tenure as commissioner, it is clear that spoiling activity had taken place.

While Mompesson remained in office, Phineas Pett recalled having been tasked with repairing some of the damage he had created only two months after receiving the patent, having to choose out of all the trees Mompesson felled those that were useful for shipping, which he found to be "a great deal of trouble."[120] In reply to the king's query, Suffolk, in turn, admitted that "[i]t is true that the Commissioners for the wood do fall short this year of the £25,000 undertaken the one half, so as for the present it lies upon us to make a supply."[121] The longstanding corruption which no doubt impacted the efficiency of the timber-selling operation was only more fully realised in 1621. At this time, when Mompesson was coming under increasing scrutiny for the various excesses he had committed as a patentee, claims circulated that Mompesson had received £1000 from the Exchequer at the commencement of his

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[118] *Acts of the Privy Council of England*, Vol. 35, 1616-1617, 209. PC 2/28, f.611.
[119] SP 14/92/76 f.188r; Cramsie, 148, citing Lansdowne Manuscript 161, fo. 343v (14 July 1617).
[120] Phineas Pett, *The Autobiography of Phineas Pett*, ed. Perrin Ward (Navy Records Society 1918), 117-118.
[121] SP 14/92/90 f.212.

operations, and was set to receive the same sum at the end of the four year term, in addition to accruing £10,000 in profits from the sales themselves.[122]

Although it is not immediately clear whether or not Mompesson's control over timber sales in the nine counties continued, it seems likely that this was the case – Mompesson continued to amass grants and patents until his ultimate flight from the country in 1621 when under investigation for abuses of the commission to grant licences to inns, including a commission to find the value of freehold and copyhold fines on alienations in July of 1619, a grant of the Surveyorship of Profits for the New River Company in November of 1619, and a licence to convert sea coal, stone coal and other fuel to stem the use of wood for making charcoal in April of 1620.[123] Ultimately, one of the few schemes to extract revenue from the newly commoditized forest that did proceed in the reign of James I was stymied by corruption and ineptitude.

Conclusion

Overall, the developments of fiscal state forestry in the reign of James I were much more administrative than practical, and while the crown went to great lengths to treat its woodland possessions as a commercialised and abstracted natural resource, institutional inertia, traditional land use, and the political economy which co-existed with the financial demands of the crown encumbered any efforts to realize revenue from the crown woods.

Although a sensible step considering the rationalisation of the forest which was occurring elsewhere at the time, disafforestation was ultimately stopped by the very structure it set out to

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[122] Sidney Lee, "Mompesson, Sir Giles 1583/4-1651x63" *Oxford Dictionary of National Biography*, (2008).
[123] SP 14/242 f.133; *CPSD*, Jac. I, 1619-1623, Vol CXI (11b), 91; SP 14/141 f.142.

remove. The entrenched commitments enshrined in forest law, and the patronage positions arising from them, appear to have obstructed the ability of the crown to bring a substantial portion of its woodland holdings under more revenue-oriented use. Thus, ironically, the political economy of the crown was competing with the fiscal economy of the same institution.

Comprehensive leasing schemes offered an even more efficient means of deriving revenue from the crown woodlands. Not only did they seek to raise revenue from all crown woodland possessions, but they would also have provided a steady stream of revenue to the cash-strapped crown without the attendant administrative burdens of wood sales and leasing. The leasing schemes proposed even sought to make commercial use of products which had not been covered in the 1607 survey. However, once more, fears of encroachment on the privileges and customs enshrined in forest law stood as a substantial roadblock to the adoption of the leases. Moreover, fears of the abuse of power by the lessee, and the degradation of timber that the crown could require for naval uses, seems to have stopped these plans from being enacted. The only large revenue-raising scheme of the period which actually proceeded, the timber selling commission of Giles Mompesson, was met with similar resistance, and ultimately both failed to produce any meaningful supply of revenue and resulted in the destruction of valuable timber.

Yet despite the overall failure to raise revenue from the woods under James I, the foundations of fiscal state forestry were laid in the administrative developments of the period. Although not completed, the 1607 survey represented a novel and important development in the treatment of the crown woods as a natural resource for fiscal use. Its aspirations were comprehensive in geographic scope, and the revenue-raising imperatives of the crown in creating the survey are clear: speciation and state of the trees are only acknowledged insofar as those factors had an impact on revenue, and the various jurisdictions the woodlands existed within,

manors, demesnes, parks, forests and chases, are only dealt with to the extent that they impede the fiscal use of the forest. Moreover, even though the extent of deforestation hypothetically permitted under the surveys was extensive, the inclusion of quotas of trees to be spared, and limitations based on the demands of local tenants, indicates not only a desire to exploit the forests for revenue but an intent to do so over a long period of time, sustainably.

Concurrently, the continued existence and development of the Surveyors General of Woods in the period meshed tidily with the revenue-raising imperatives of the crown. Skilled and generally capable, they applied the profit-oriented and empirical methods of surveying to crown woodland in a relatively novel way. Both the scope of their jurisdiction and the breadth of their duties reflected the comprehensive treatment of crown woodland in the survey: it was a single natural resource to be exploited by the crown to meet its needs responsibly. Whether maintaining royal forests and their buildings, supplying the navy with timber, or making recommendations for the most beneficial terms of leasing agreements, the Surveyors General operated as the hand of the crown in the fiscal administration of its woods. Although the king's coffers saw very little revenue from crown woods by the end of James I's reign, the Surveyors General, the abstraction of woodland accomplished in the 1607 survey, and the continued revenue raising desires of the crown would play an important role in state-woodland interaction in the coming decades.

Chapter III – Social State Forestry and the Royal Forest as a Contested Resource

Introduction

In the early seventeenth century, crown woodland served as a financial expedient for the cash-strapped Stuarts, albeit one whose potential as a source of income did not translate into easily realized profit. After first employing extensive surveys to apprehend the forest fiscally, thereby abstracting the forest landscape into a hypothetical quantity of timber and cordwood, the crown proceeded to attempt to extract the revenue potential of its woodlands. Comprehensive leasing schemes, commissions for wood sales, and the continued use of a powerful and somewhat professional crown forestry bureaucracy facilitated this process, although the result was often ambiguous – where schemes were permitted to proceed they were often pursued at great cost, with woodland destruction and corruption making the often paltry returns on wood sales seem less-than-justified.

The case of Sir Giles Mompesson demonstrated that even in a plain economy of woodland usage in which the crown had but to find a reliable market for its timber and an agent to complete those sales, corruption impeded the profitable sale of wood. Beyond this basic difficulty, in other cases, such as that of disafforestation or comprehensive woodland leasing, the rights of tenants and office holders in Royal Forests posed a significant impediment to the fiscal exploitation of woodland by the crown. Over these individual demands – the various uses for wood, including shipbuilding, charcoal-burning, iron making, and construction - and the degree to which they were considered in crown plans for wood sales, were perennial concerns raised against the sale of woodland. Much as the crown navigated the ecological diversity and complexity of its woodland possessions through fiscally rationalising surveys and professional forestry officials, it also contended with other claimants to the forest's resources: for crown

woodland existed as a contested resource.

At the most basic level, the diversity of uses for woodland products created material economic contestation; that is, a single resource was in demand by multiple stakeholders. Timber, for instance, could be used in shipbuilding, but it could also be used to build houses, for mining supports, or for firewood once split and corded. Coppices could be used for firewood, but could also be turned into charcoal for iron smelting, or could be turned into fences, building materials, or a huge variety of "treen" wooden household objects which populated the domestic realm before the advent of mass manufacturing. The ground on which the forests grew could be enclosed to quickly regrow lopped coppices and could also be used for mast of swine herds or turned to intensive agriculture. Thus, when the crown sold wood, or the rights to use wood, to a single owner, or even behaved as a single owner rather than a broker of shared resources, it denied the great variety of potential uses of woodland.

Secondly, use of crown woodland was socially contested. Commoners and tenants expected a basic level of entitlement to wood for their own uses, whether for fuel or for repairing their houses. Forest office holders, meanwhile, expected annual entitlements of wood for the services they rendered to the crown. Enterprising landholding industrialists were keen to expand their control over woodland, particularly for the production of iron, whether by legitimate or illegitimate means. On the margins were poor cottagers, who, lured to the forest by the abundance of raw materials for their crafts, or the prospect of plentiful labour, also sought to eke out a living from forest resources. Looming over the whole ecosystem of contestation was the crown, which, in Royal Forests at least, held extraordinary powers to conserve its woodland holdings and to punish those who encroached upon them, but experienced perennial difficulties in exercising this power. Thus, to put the woodland resource of the crown to new uses was to

upset a delicate ecosystem of socially and legally negotiated resource. Often well-intentioned action to preserve woods or to increase revenue via wood sales resulted in deleterious effects not only for the woodland, but also for those individuals aside from the crown who used it – and strategies of the crown to respond to this upsetting constituted an integral part of its approach to state forestry.

Using the case study of the Forest of Dean, this chapter considers how the crown navigated the competing economic and social claims to its forest resources, particularly in the royal forest jurisdictions of the realm, where this contestation was most acutely present. In the early seventeenth century, England's evolving state forestry apparatus faced the challenge of managing the various social claims to crown woodland, an obstacle which had to be addressed to accomplish either the fiscal or material exploitation of woodland. The approaches the crown employed to ensure that it held the absolute right to use woodland resources it saw as its own entitlement and to correspondingly restrict the access of third parties to those same resources might be labelled the social dimension of state forestry.

First, this chapter will explore the various ways in which the Forest of Dean, and others like it in England, were contested resources, illustrating the variety of stakeholders in Dean and their distinct claims to the resources found in its landscape. Following a general overview of the resources available for contestation in the forest, the chapter will survey the different groups and power structures which laid claim to the forest, such as the crown, the free miners, and landowners. Specifically, the chapter will examine in what they based their claims to resource entitlement, especially the use of custom, emphasizing how custom could be appropriated by a diverse set of stakeholders to legitimize their claims to resource usage in the face of mounting pressure from the crown to control the forest.

With an understanding of Dean's contested landscape in hand, the chapter will then examine how the crown navigated this legal and social landscape of contestation in the early seventeenth century through commercialisation of the forest resources. Particularly, it will analyse the tenures of successive leaseholders and how their grants of land within the forest represented an attempt by the crown to assert its right to exploit forest resources through third parties, using leases to negate the customary claims of entitlement to woodland resources. The chapter will also examine violent resistance to the activities of the crown grantees as an example of local resistance to the imposition of rationalising property improvement techniques by the state.

During the early to mid-seventeenth century, the crown attempted to assert its entitlement to the woodland wealth of the forest, particularly its financial potential. The crown unsuccessfully pursued this goal by establishing a clear and direct form of property right in the Dean in the form of leases, granted to enterprising individuals and giving them a clear entitlement to use the resources of the forest, which rendered an ultimate profit to the state. In theory, this process would reduce the contestation of the forest's resources and expedite exploitation by the crown. However, the customary claims of resource entitlement, founded in memory and tradition, proved a formidable obstacle to the imposition of these leases, and the very integrity of the resource in question was imperilled by the rapacious action of the leaseholders. An inability to supervise the activities of leaseholders adequately and to project authority into the landscape of the forest left the crown ultimately unable to halt the ongoing contestation of the forest's resources. The contestation of England's woodland resources was therefore a protracted and longstanding issue, which was not resolved by the Stuarts in their

attempts to exploit woodland, and demonstrated the privatisation and the imposition of outside control were not certain solutions to the misuse of communal resources.

The Forest of Dean's Contested Landscape

Key to understanding how the crown navigated the social facets of state forestry in its woodland possessions is knowing how exactly the resources of these woodland possessions were contested by a variety of stakeholders. Dean's circumstances were similar to those of many Royal Forests, where one of the greatest challenges was maintaining a degree of good stewardship of the resource itself, while simultaneously balancing the demands of a variety of competing stakeholders, from landlords and tenants to industrialists and forest officials, in addition to the crown's basic need to draw an income from forest resources.[1] A wide variety of natural resources, including mineral coal and iron ore, coppice and timber wood, and by-products of the forest were available for use in domestic, industrial and agricultural economies, and thus, invited claims to the right of use from a variety of stakeholders.

The Forest of Dean was a particularly ripe landscape for extensive contestation of resources, being much more than a simple collection of trees, even if the state did not always perceive it as such. Arguably the most prominent of Dean's resources aside from the trees themselves, and that most intimately connected to their usage, was the mineral wealth of the region. While its coal and iron ore deposits are considerably smaller than those of other regions in the British Isles, such as those in Staffordshire or South Wales, the geographic, ecological, and geological circumstances of Dean made its mineral deposits attractive in the pre-industrial and early industrial period. Coal outcrops near the surface, particularly accessible with pre-modern

[1] Sara Morrison, "Good Stewardship and the Challenges of Managing the Stuart Royal Forests in England, 1603–1714" *Journal of Markets and Morality,* Vol. 17, No. 2 (Fall 2014): 406.

mining equipment, provided a readily available source of fuel in addition to the wealth of wood resources in the area. Iron ore was also readily available to be worked. As early as the Roman occupation of Britain, rich deposits of hematite relatively close to the surface created by downward percolating water were recovered for use in metallurgical processes, with this same resource usage persisting into the early modern period, as mining methods including new pumping technology allowed for deeper penetration for ore extraction.[2]

Given these rich and easily accessible mineral resources, Dean was home to a high number of ironmaking operations in the early modern period. Bloomery furnaces, in which higher grade iron ore was usually worked into bars manually, remained common in Dean until the end of the sixteenth century, when blast furnaces common to the Wealden region and elsewhere in England were introduced.[3] Blast furnaces, which used water-power to feed air to a furnace, were kept fired for months at a time. With this process, both lower and higher quality ores could be used and cast into pig iron for further refinement.[4]

Although charcoal production had long occurred in the forest, it became more explicitly linked to industrial production in the sixteenth and seventeenth centuries to fuel these increasingly large furnaces. Roger Taverner in his 1565 survey of the forest found that many oak trees had been stripped of their branches for charcoal making, a process likely encouraged by an extensive fee-paying arrangement whereby the Constable of St. Briavel's Castle and the lessee of

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[2] F.T. Baber, "The Historical Geography of the Iron Industry of the Forest of Dean" *Geography: Journal of the Geographical Association* Vol. 27, Issue 2, June 1, 1942, 54; Gloucestershire County Council Archaeology Service, "The Forest of Dean Gloucestershire: The Scowles and Associated Iron Industry Survey," (2004), 89.

[3] Peter King, "The Iron Trade in England and Wales, 1500–1815: The Charcoal Iron Industry and Its Transition to Coke" (Ph.D. diss., Wolverhampton University, 2003), Chapter 3, 43; Hart, 87.

[4] Keith Pluymers, "Atlantic Iron: Wood Scarcity and the Political Ecology of Early English Expansion," *William & Mary Quarterly*, Vol. 73, No. 3 (2016): 397.

the castle estate, the local woodward, the chief forester and rider all enjoyed profits from the operation of charcoal pits.[5] As early as Elizabeth's reign, coppices were already being regularly enclosed by the crown for sale to local ironmasters for use as fuel.[6] The use of woodland for charcoal and fuel, particularly coppices, remained the single greatest financial opportunity for the crown during the seventeenth century, and was likewise the object of much disputation and complaint.

Beyond the metallurgical industries and their fuel, Dean's resources were also in demand for a variety of other industries, including shipbuilding. Although Dean's timber appears not to have been used for Royal navy shipbuilding until the second decade of the seventeenth century, the forest nevertheless figured prominently in public discourse and policy as a preserve of naval timber.[7] Contemporary legends circulated that in 1588 the Spanish were given express instructions to burn the forest to devastate England's sea power, and in 1633, John Broughton conducted a survey of the forest, stating that the woods surrounding Lea Bailey "is without exception at this day for the quantity the best wood in England and most fit to be reserved for His Majesty's use, for it is all young wood and most of it to the beholder's eye seemeth excellent timber, and by nature framed for ship-timber, viz. for crucks, knees, bends, planks, etc."[8] Beyond official state use for shipbuilding, it appears that local shipbuilders and merchants made use of

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[5] E 315/429, f. 126; E 407/168 cited in A.P. Baggs and A.R.J. Jurica. "Forest of Dean: Forest administration," in C.R.J. Currie and N.M. Herbert eds. *A History of the County of Gloucester: Volume 5, Bledisloe Hundred, St. Briavels Hundred, the Forest of Dean*, (London: Victoria County History, 1996), 354-377.
[6] Ibid.
[7] George Hammersley, "The Crown Woods and Their Exploitation in the Sixteenth and Seventeenth Centuries," *Historical Research,* Vol. 30, No. 82 (1957): 151.
[8] SP 16/245 f.27, reproduced in C.E. Hart, *Royal Forest: A History of Dean's Woods as Producers of Timber* (Oxford: Clarendon Press, 1966), 274. Hart seems to have miscited this survey as being in SP 16/236, in page 191 of the relevant *CPSD* volume.

Dean's timber – in 1634 the merchants and shipowners of the city of Bristol remonstrated the lord Chief Justice in Eyre South of the Trent that such was the destruction of woodland wrought by the activities of ironworking patentees in the forest that the price of timber had risen by over fifty percent, rendering shipbuilding impractical and forcing them to buy Dutch built ships.[9] Shipbuilding also appears to have been carried out illicitly. In 1633, Broughton, the Surveyor of His Majesty's Woods in Gloucestershire, reported that Thomas Dean and William Jones built a ship of seventy tons on a Dean riverbank, and he claimed that "divers other barques are building and have been lately built in the like manner with his Majesty's timber."[10] Dean and Jones' ship was ordered to be seized by the Lords of the Admiralty, along with any other such vessels.[11]

On a smaller scale but no less important was the use of secondary products of the forest, such as the bark from felled trees. The wide availability of oak bark in the Dean region made the tanning and leatherworking industry a natural companion to the ironworking and charcoal making which consumed other wood fibre. Leather products were commonly soaked in an oak bark and water solution for between six months to two years, and such was the need for oak bark in the tanning process that an act of 1603/4 decreed that "no person or persons shall regrate engross or get into his or their Handes by buying contracting or promise taken, any Oaken Bark before it be stripped, or after, to the intent to sell the same again."[12] In Dean the importance of bark as a resource to tanners was reflected by its separate treatment as a resource in grants of cordwood for fuel, such as when, in 1630, John Duncumbe was granted the bark from the trees

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[9] John Latimer, *The history of the Society of Merchant Venturers of the City of Bristol; with some account of the anterior Merchants' Guilds*, (Bristol: Arrowsmith, 1903), 132.
[10] SP 16/250 f.230.
[11] SP 16/307 f.22.
[12] L.A. Clarkson, "The organisation of the English Leather Industry in the Late Sixteenth and Seventeenth Centuries", *The Economic History Review,* New Series, Vol. 13, No. 2 (1960): 245-256, 245-246; 1 Jac. I c.22, *Statutes of the Realm*.

granted to the Earl of Pembroke on a 21 year lease.[13] Mast or pannage, that is, the pasturing of animals, especially swine in the forest understory before slaughtering, was yet another subsidiary use of the forest.[14] Joining the tanners and herdsmen in their use of the forest resources were other groups of artisans, the trencher makers, turners, coopers, joiners, carpenters and shovel makers who used the wood in the forest to make plates and bowels, barrels and bobbins, joists and cabinets.[15] In a 1608 survey of men fit for military service in St. Briavels Hundred, 30 percent alone of the artisan population was engaged in a woodworking or animal product related craft.[16]

Thus, the Forest of Dean stood as a multifaceted resource, whose natural resources, whether under the ground or growing upon it, were useful to a number of legal and illegal stakeholders, and thus invited a variety of claims to the right to their use. However, the diversity of possible resources Dean offered were not always considered alongside one another, and often, both those who sought to use the forest and the institutions which conserved it focused on either the use of particular resources, or specific methods of conservation to the detriment of others.

Competing Claims to Property Right and Resource Usage in Dean

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[13] *CPSD,* Vol. 4, (July 1629 - Mar 1631) Vol. CLXVIII., [24b], 277.
[14] Pasturing of plains country hogs in woodland countries was listed as a use of the forest in Arthur Standish, *New Directions of Experience to the Commons' Complaint,* (1613), 22-23.
[15] Individuals working in these trades were listed in a 1608 survey of the Hundred of St. Briavel's in John Smith *The Names and Surnames of All the Able and Sufficient Men in Body Fit for his Majesty's Service in the Wars, Within the County of Gloucestershire, 1608 […]* (London, 1902), reprinted in Buchanan Sharp, *In Contempt of All Authority: Rural Artisans and Riot in the West of England* (Berkeley: University of California Press, 1980), 185-186; These individuals were also explicitly listed as persons who ought to be removed from the forest for their illegal use of wood supplies in a set of instructions to deputy constables and lieutenants of the forest, C. 99/31, m.2 reproduced in Hart, 114, f.n. 34.
[16] Brian Short, "Forests and Wood Pasture in Lowland England" in Joan Thirsk ed., *The English Rural Landscape,* (Oxford: Oxford University Press, 2000), 128.

Any landscape which contains resources useful for human activity, whether for sustenance, industry, or recreation, requires a mechanism of usage governance. In early modern England, and indeed, much of the modern world since, differing institutions and practices have been created to fill this governing role, although the shape and function of these governing institutions has varied widely. Models advanced in the mid twentieth century, namely Garret Hardin's "tragedy of the commons," posited that open access to a resource was largely untenable - when no one owns a resource, none can claim benefits from husbanding the resource, thereby incentivising destructive behaviour.[17] In the forest, given the extensive and long-term husbanding required to realize its profits, the implications of Hardin's model are particularly pronounced. When none can guarantee that they will reap the benefits of allowing trees to grow to maturity, they are encouraged to harvest them as soon as they hold marketable value, or better yet, to turn the land on which they grow into fields whose cycle of minimum yield can be reached even more quickly. According to the dire consequences of open access predicted by Hardin's model, either the institution of an external agent to regulate resource consumption, or the privatisation of formerly common properties have been advanced as possible solutions to this "tragedy" of the commons.[18]

More recently, Elinor Ostrom has noted that neither the imposition of an external power nor private landholding is required to avoid the abuse of commonly held resources. Parties using

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[17] Garrett Hardin, "The Tragedy of the Commons," *Science* Vol. 162, No. 3859 (1968) 1244; A. Wilson and Ralph Townsend "An Economic View of the Tragedy of the Commons" in Bonnie J. McCay and James M. Acheson eds. *The Question of the Commons: The Culture and Ecology of Communal Resources*, (Tucson: University of Arizona Press, 1987), 313.

[18] S.V. Ciriacy-Wantrup and R.C. Bishop, 1975, "'Common Property' as a Concept in Natural Resources Policy," *Natural Resources Journal*, Vol. 15, No. 4 (1975): 713; Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action*, (Cambridge: Cambridge University Press, 1990), 8-14.

a natural resource may easily negotiate with one another to produce a set of rules governing resource usage, and then appoint a private external arbiter to enforce the rules to which the parties agreed to begin with.[19] In such an arrangement, neither true external force nor private property is imposed while multiple parties may still reap the benefits of having access to a single common resource. In the forest environment, the importance of having a set of rules, agreed upon and upheld by an external arbiter is particularly salient – both the abundance of available resources, their relatively easily assessed nature, and the long term management requirements of the forest landscape are well-handled by such a model.

In Dean, aspects of all three of these possible solutions to the tragedy of the commons existed in the negotiated system of property right and resource usage that was present. On one hand, the Royal Forest administration had served in principle as an external power governing resource usage for over five centuries before the early Stuarts took an interest in exploiting the forest for revenue. When the Forest of Dean was established shortly after the Norman conquest in 1066, along with many other royal forests, the degree of control over resource usage given the crown within these special legal jurisdictions was extensive. All usage of tree and animal resources was exclusively controlled through rights regulated by the Royal Forests administration, usually in the form of customary privileges afforded to tenants, which satisfied only basic needs of subsistence. Varying from forest to forest, inhabitants would be allowed estovers, the right to harvest wood for fuel and repairing houses, along with pannage and agistment, forms of grazing rights, although these latter two were usually subject to payment.[20]

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[19] Ibid., 15-17.
[20] John Langton "Forest fences: enclosures in a pre-enclosure landscape", *Landscape History*, Vol. 35, No. 1, (2014): 6.

These restrictions were primarily geared toward the conservation of game.[21] However, in effect, these restrictions also precluded the use of the forest by any but the crown or its designates for generating revenue beyond subsistence. The imposition of laws governing the usage of formerly communal resources, including wood cutting and communal grazing, had a deleterious effect and in some cases, such as that of New Forest in Hampshire, there is evidence that the creation of the forest may have been attended by evictions, depopulation, and the devaluation of affected manors.[22] That Royal Forests represented some of the earliest enclosed tracts of land before enclosure became a common phenomenon, marked with extensive physical landmarks and boundaries, only underscored their status as a realm of special and singular control.[23] Throughout the kingdom, the Forests stood as formal legal tools by which the crown was able directly to control woodland resources, supported by extensive court systems and written documentary evidence of legitimacy in the form of charters. The Royal Forest was plainly the imposition of an external governmental power to regulate resource consumption which did not necessarily respect the intricacies of the forest as an ecosystem into which local economies were intertwined.

However, by the seventeenth century, the Royal Forests had greatly diminished as an administrative tool for controlling resource access, both in geographical extent and legal effectiveness. In Dean, the progressive incursion of inhabitants on woodland through cutting left only the more inaccessible regions of the forest thickly wooded.[24] The Forest Administration was also deeply corrupt. Often perquisites attached to the various forest offices were exploited by the

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[21] John Langton, "Royal and non-royal forests and chases in England and Wales," *Historical Research*, Vol.88, No. 242 (August 2015): 381-382.
[22] Brian Short, 134.
[23] Langton, "Forest Fences": 12-13.
[24] Leonard Cantor, *The Changing English Countryside, 1400-1700* (London: Routledge, 1987), 100.

very individuals tasked with preserving the woods, causing destruction of wood supplies. Such was the case when Roger Taverner reported on the devastation of Dean's oak wood, which was likely abetted by the extensive system of fee-payment enshrined by the forest system. For every charcoal pit worked for six weeks or more, the lessee of St. Briavel's Castle was entitled to 5s, the Constable of the Castle 5s, the chief forester and rider 10d each, and the local woodward 18d. Moreover, even when forest offences were noted, there was a substantial capacity for them to be dismissed without trial or restitution to the crown, as forest officers often arranged private bargains with offenders with financial implications far less than the fines imposed by the court. Even the very heart of the projection of property power in the Royal Forest, the forest courts, had been diminished considerably. Justice in Eyre, the highest of the Forest Courts, sat only occasionally in all but a few forests. The courts attached to the forest administration were similarly impotent – in many jurisdictions they had not sat for several generations, and where they were revived by the crown (as was eventually the case in Dean), they often dealt with cases which had occurred decades earlier.[25] With the decline of the higher forest courts, the remaining courts specific to each forest, swanimotes, became powerless, incapable of levying high fines or imprisoning offenders.[26]

Thus, while the forest did possess a sort of proprietor which might have been able to impose the restrictions necessary to conserve resources, the tangible power of this proprietor, the crown, to assert its rights over the forest resources had faded greatly by the reigns of the early Stuarts. In the absence of this controlling power, and indeed, long before the seventeenth

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[25] A.P. Baggs and A.R.J. Jurica "Forest of Dean: Forest Administration." in C.J.R. Currie and N.M. Herbert eds. *A History of the County of Gloucester: Volume 5, Bledisloe Hundred, St. Briavels Hundred, the Forest of Dean*, (London: Victoria County History, 1996).
[26] George Hammersley, "The Revival of the Forest Laws Under Charles I", *History*, Vol. 45, No. 154, (June 1960), 87.

century, Dean saw the emergence of various other groups which sought to lay claim to the forest's resources. These groups, not holding the absolute right over property but also not enjoying complete open access instead negotiated use of the forest through custom. Arguably, the use of custom functioned in largely the same was as Ostrom has argued an agreed-upon set of rules would function for governing the use of common property.

E.P. Thompson described custom as the interface between law and agrarian practice, and indeed, this same definition can be extended to the various activities conducted within the forest, agricultural or otherwise.[27] While on one hand these claims to the use of forest resources developed in spite of the Royal Forest administration, and often worked against its ultimate aims of preserving the forest for the use of the crown, the claims nevertheless incorporated the limited privileges afforded under forest law and other legislative tools to their benefit. The customs of the inhabitants of the forest of Dean were much less a creature of the state than of the communities which created and upheld them, but could nevertheless be invoked, maintained, and rioted in support of much like written law. Andy Wood has usefully summarized this dual status of custom in the context of the Peak Country in Derbyshire, where similar to Dean, tin miners claimed extensive rights to work the mineral resources of the region:

> it represented the codification of negotiation and conflict over long periods of time. As local law, custom regulated production within village economies, defining and intermeshing forms of subordination and exploitation. Its norms and rules could be invoked by lord against tenant, rich against poor, and landed against landless. Hence,

[27] E.P. Thompson, *Custom in Common* (Penguin Books, 1991), 97.

> early modern social conflicts were often reducible to confrontations over the control of customary offices and institutions, or over the authentication of the local memory.[28]

The invocation of custom as a claim to resource usage is well attested in Dean. Moreover, the scant evidentiary basis of many of these claims to resource usage made custom in the Forest of Dean easily appropriated. As Simon Sandall has argued, the obscurity of occupational practices in Dean allowed both rich and poor, industrialist and forest officer, to claim to custom in their use of the Forest resources.[29] Perhaps most famously, the forest was home to a unique occupational class known as free miners, who claimed the right to mine the coal and iron ore wealth of the forest. Buchanan Sharp has explicitly connected these privileges to the increasing weakness of the Royal Forest administration in the early modern period: the extent of the privileges claimed by the miners was a measure at once of the neglect by the crown of its demesne rights in the forest and of the miners' well-entrenched position, successfully maintained against repeated encroachments by the governments of James I and Charles I.[30] The free miners were not unique in their claim to customary mining rights. Inhabitants of the Peak Country in Derbyshire and the Forest of Mendip in Somerset all claimed some degree of customary right to earn a living from the ores of the earth.[31] However, their privileges were somewhat restricted by comparison to those of Dean. For instance, in the Forest of Mendip, miners were only permitted to mine under the aegis of a Lead Reeve, whose power to grant licences to mine was ultimately

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[28] Andy Wood, *The Politics of Social Conflict: The Peak Country, 1520–1770* (Cambridge: Cambridge University Press, 1999), 127.
[29] Simon Sandall, "Custom, common right and commercialisation in the Forest of Dean, c.1605–40," Bowen, J.P., and Brown, A.T., eds. *Custom and Commercialisation in English Rural Society: Revisiting Tawney and Postan* (Hertford: University of Hertfordshire Press, 2016), 162-163.
[30] Sharp, 176.
[31] Wood, 163; *The Ancient Laws, Customs and Order of the Miners in the King's Forrest of Mendipp in the County of Somerset*, (London: Printed for William Cooper, 1687), 1.

held by the Lord who held the soil where the mining was to occur.[32] In the Peak Country and the Thievely Lead fields of Lancashire, mining operations were tightly controlled by local landlords.[33] By contrast, the Dean miners based their claims to the privilege on birth right, restricting the status of freeminer to only those who were born within the bounds of the Forest and the Hundred of St. Briavel's.[34] They drew their rights directly from the crown, and did not recognise the authority of local landlords to restrict their activity. The rights they claimed to mine were also extensive and afforded them considerable liberty within the otherwise restrictive environment of the Royal Forest. In addition to the right to mine in the forest, the free miners were permitted to use the timber of the forest for shoring their mine workings, which was to be delivered to their workings by the Constable of the forest no less.[35] In some cases, the miners were even freely permitted to overrule the authority of forest officials in the assertion of their rights. A printed version of the laws and customs of the miners produced by William Cooper in 1687 included a provision that the miners could harvest their own timber and have it declared their own if the constable of the forest would not deliver it.[36]

Beyond these extensive rights to the use of natural resources, the miners also claimed the right to resolve their disputes in a court system that, while technically operating within the hierarchical structure of the forest, afforded a considerable degree of liberty to the miners to resolve their own disputes. Although the Constable of St. Briavel's Castle was required to be

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[32] *Ancient Laws […] Mendipp*, 3.
[33] Simon Sandall, "Custom, common right and commercialisation in the Forest of Dean, c.1605–40," in J.P. Bowen and A.T. Brown, eds. *Custom and Commercialisation in English Rural Society: Revisiting Tawney and Postan* (Hertford: University of Hertfordshire Press, 2016), 166.
[34] *The Laws and Customs of the Miners in The Forest of Dean in the County of Gloucester*, (London: Printed for William Cooper, 1687), 17.
[35] Ibid., 15-16.
[36] Ibid., 16.

present at court proceedings, ultimately, the miners themselves held the judicial power of the court. From the text of the miner's privileges, it appears that although outsiders could not avail themselves of mine law, if they were to run afoul of it, they were to be judged by the miners, as were miners who raised disputes arising from their privileges.[37]

Most prominently, miners both in Dean and elsewhere in England's forests, while claiming extensive rights, based their claims to these rights in ancient tradition. In Dean, while the miners did acknowledge grants from the crown, including one purportedly made by Edward III, the greatest claim to their rights emerged from long-standing practice.[38] The preamble to Cooper's publication placed Edward's grant simply as a confirmation of pre-existing rights to mine, granted "time out of mind."[39] Cooper's publication of the mining rights of those in Mendip Forest made similar claims to tradition and necessity to justify their use of mineral resources, specifying not only that mining was one of the "four staples of England," but that it had been practiced by the Somerset miners "from the time where of no man living hath not memory."[40] Although the miners based their claim on the immemorial origin of their rights, memory was also a powerful tool for verifying their ancient provenance. On the basis of tradition and custom, the miners were able to claim the right to use Dean's mineral and woodland resources with a great deal of liberty. Contemporarily, historical evidence presented to support the legitimacy of the miners' claims included the provision of a deed affirming their rights by Edward II and the grant of a charter of privileges by John, Duke of Bedford, presumably in exchange for services during

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[37] Ibid., 13.
[38] If this charter existed, no extant copy survived in the seventeenth century, nor has one emerged in the time since. The text of Cooper's summation of the Laws and Customs of the Dean Miners merely makes passing reference to a grant by King Edward III.
[39] Ibid., 3.
[40] *Ancient Laws […] Mendipp*, 3.

the Hundred Years War.[41] It is likely that in response to the increasing pressure placed on their rights by enterprising landed industrialists and a revenue seeking crown, they stitched together the extensive rights claimed in Cooper's publication from remembered inquisitions and other historical claims.[42] Ultimately, though, the miners were never able to produce proof accepted by the courts as conclusive evidence of any legal entitlement to the mineral resources of the forest or to the woodland resources they used to support their operations. Although still operating under the auspices of the crown, the existence of the miner's court and the freeminers more broadly as a self-regulating community with custom as an agreed-upon set of rules bears a remarkable degree of similarity to Ostrom's alternative solution to the tragedy of the commons.

Another group which contested Dean's resources were the landed industrialists who increasingly sought to use Dean's woodland and mineral wealth to make and sell iron, whose use of the resources most closely resembles the imposition of private property right. Moreover, their use of forest resources neglected the ecological realities of the forest, instead focusing narrowly on the exploitation of a specific subset of resources. As opposed to basing their claims on ancient privilege, these landowners often exploited the customs afforded them through manorial holdings, in addition to the perquisites of offices in order to secure their use of the forest. For instance, in 1565, William Winter acquired the Manor of Lydney, having secured the reversion of properties in that region and elsewhere in Gloucestershire upon the death of his father in 1545.[43] His son, Edward Winter, first set about establishing ironworks within his family's

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[41] Sharp, 178
[42] Ibid, 178.
[43] George Hammersley, "The history of the iron industry in the Forest of Dean region 1562-1660", (Ph.D. diss. Queen Mary University of London, 1972), 117; David Loades, "Winter, Sir William (c. 1525–1589), naval administrator," *Oxford Dictionary of National Biography*, (23 Sep. 2004).

manorial domain. In 1604, he acquired a grant which allowed him to make charcoal for iron smelting at his holdings in Lydney and Newland.[44] In 1610, he successfully petitioned the Exchequer for a lease of coppices in the forest, with the crown paying for the enclosure and regrowth of the cut coppices. By the beginning of James I's reign, Edward had attained the Constableship of St. Briavel's Castle, which afforded him considerable liberty in influencing the administration of forest law.[45] Winter appears to have exploited this office through substantial charcoal burning activities – in 1606, he complained to Star Chamber that despite the entitlements of his constableship allowing him to have a single pit of charcoal worked for the requirements of his household, the workers making that charcoal were assaulted by locals.[46] Although Winter claimed this owed to his prevention of illegal hunting in the forest, it is likely that it was a response by the free miners to what they saw as an incursion on their entitlements to mining. Although Winter characterised his use of the forest's resources in terms of its appropriateness to his domestic demands, Exchequer litigation from 1612 suggests that his use of forest resources was on a much larger scale. When Robert Treswell entered a bill of complaint against Winter and other local industrialists for destruction of the local woodland, Winter again tried to justify his use of woods under the aegis of his Constableship, particularly the perquisite of one beech and oak per year entitled to the Constable. Although the attorney general confirmed his entitlement to estovers, he also noted that Winter had taken hundreds of timber trees from the forest, in addition to thousands of loads of boughs and branches, wood suspiciously suitable for charcoal making and iron smelting.[47] By the third generation, Sir John Winter had managed to

[44] SP 14/9A f.218
[45] Hart, 86.
[46] Sandall, 167-168.
[47] Ibid., 169.

secure leases from the king for substantial quantities of wood to fuel his furnaces in exchange for a guaranteed revenue to the crown.

Other, less prominent landowners in the forest made similar claims of entitlement to forest resources on the basis of forest custom. In 1608, 17.9% of the men in St. Briavel's hundred were gentry, yeomen or husbandmen, who, according to the custom of estovers, were entitled to take dead wood for fuel, as well as wood to build fences, repair buildings, and create farm equipment.[48] These entitlements were often defined in terms of necessity and suitability to demand, reflecting a relationship between the subsistence demands of the environment and climate and the available resources of the region.[49] Given the imprecise, vague, and contextually negotiated definitions of what was acceptably and unacceptably taken under the right of estovers, such claims, although deriving from well-accepted principles of common allowance in Royal Forests, were easily abused by inhabitants. Conversely, this same vagueness could be exploited by the crown in restricting the amount of wood and other forest resources allotted to tenants, especially when these resources became of real fiscal interest to the king. Such was the case in Kingswood chase in the first half of the seventeenth century – when what landlords assumed were the manorial wastes of their estates assumed a new dimension of revenue potential owing to mineral exploitation, the crown unsuccessfully engaged in litigation and surveys to prove that the land was part of the Royal demesne.[50]

Leasing of the Forest

[48] Sharp, 190.
[49] Jean Birrell, "Common Rights in the Medieval Forest: Disputes and Conflicts in the Thirteenth Century," *Past & Present*, No. 117 (1987): 29; Thompson, 102.
[50] Sharp, 189; SP 14/84/46.

With increasing intensity in the early decades of the seventeenth century, the crown sought to assert its control over this contested landscape to generate revenue from the forest as part of its broader programme of fiscal state forestry. Initially, it did so by abdicating its control of the forest to the private sector in exchange for profit returns by way of leasing both ironworks and the coppice woods which sustained their fuel demands. This represented an attempt to introduce private property rights over a commonly accessible resource to facilitate its efficient exploitation and long-term management. However, the use of fee-farming as a method of extracting wealth from the forest both proved destructive to the crown's other interests in the forest and continually butted against the claimed customary rights of forest inhabitants. Intrinsic to the process of leasing was the profit incentive for landowners, which precluded the crown from achieving maximal financial exploitation and also incentivised the abuse of the granted woodlands. The enclosure of forest resources for the exclusive use of crown grantees, while an efficient means of sequestering and controlling access to forest resources, only underscored the contested nature of the forest landscape, and residents of the forest reacted violently to the leases which were, in effect, an attempt to impose economic legibility and rationalisation on a landscape which was governed by custom, memory, and negotiated resource use.

As previously discussed, the forest possessed a wealth of resources the crown could have exploited. For instance, in the reign of Charles I, a group of shipwrights in Bristol wrote to the king to remind him that "His Majesty has a great quantity of timber in the forest of Dean very fitting for shipping, there being not the like for building a Royal ship, which being sent to his Majesty's stores at Deptford, Chatham, or Woolwich, will be ready on all occasions."[51] The petitioners maintained that they could deliver timber to Royal Navy shipyards at a rate of 16s per

[51] *CSPD*, Charles I, Ch. CCLXXXIV, 22.

load using existing trade routes between Bristol and London. In addition the shipwrights guaranteed that the carriage could be offered at a rate at least 10s cheaper than what the King presently paid to have wood delivered from other Royal forests at the time, and that they would re-plant trees in the place of each of those they felled.[52] However, proposals such as these appeared to be ignored in favour of those relating to the iron industry, as the latter were ostensibly more financially lucrative. Concurrent with the crown revenue raising interest in Dean, the region saw a rise in the number of blast furnaces from one in the 1560's to between 13 and 17 between the 1620's and 1670's.[53]

The crown first began by leasing small sections of woodland to landholders with existing ironworks which perhaps exceeded the fuel capacities of their estates, as had been the case when in 1611/2, Edward Winter was granted the lease of several coppices for £300 for a term of five years, including the rights to use whatever mines and quarries were contained within them.[54] Following this, the crown began to take an interest in raising revenue both from the sales of fuel and the operation of ironworks themselves. In 1612, after an extensive bidding process, the Earl of Pembroke was granted the rights to build four blast furnaces and three forges which came to be known as the King's ironworks, along with a grant of 12,000 cords of wood per year for their operation.[55] The fiscal benefits of this process were evident. As Pembroke was required to pay a lease both on the ironworks and for each cord of wood consumed, the crown accrued extra revenue, in addition to maintaining control over the revenue-generating infrastructure of the iron

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[52] Ibid.; John Perlin, *A Forest Journey*: *The Role of Wood in the Development of Civilization* (London: W.W. Norton & Company, 1989), 206.
[53] Hammersley, "The Charcoal Iron Industry and its Fuel, 1540-1750," *The Economic History Review*, Vol. 26, No. 4, (1973), 596.
[54] SP 16/257 f.151.
[55] C 99/34 in Sharp, 191.

works, which it could, and did re-lease. In effect, this amounted to a vertically integrated iron production system, in which the crown reaped some of the financial rewards of resource exploitation while wealthy industrialists assumed much of the financial risk. This, in turn, dovetailed with a Caroline policy of creating larger units of production in the iron industry, which favoured hired outsider workmen and industrialist financing of iron making operations over independent miners and craftsmen.[56] Moreover, the practice of leasing ironworks meshed neatly with the Stuart proclivity to provide crown land leases to patronise courtiers, accruing a dual benefit of political as well as fiscal currency, without the need to enact substantial reform to land management.[57] More broadly, offering leases of forest land conformed to the same programme of increasing the legibility of crown woodlands which was begun with the surveys of 1608. After all, by reason of the complex and overlapping claims to property right in the Royal Forest, they were deemed among the least legible and improved of the crown's possessions.[58] By contrast, defining the bounds of a certain portion of the forest and then restricting the entitlements to its use to a series of patentees made it much easier to exploit the resources of the forest for increased profitability.

However, for all the potential financial benefit of exploiting the forest through this model for iron making, it conflicted both with the long-term profitability of the forest as a source of revenue and with its viability as a store of ship timber. Concurrently with Pembroke's operation of the ironworks, the forest was acknowledged as a store house of ship timber by the Privy Council, and a few years later, in 1616, Robert Treswell sent Peter Marshall, a shipwright, to

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[56] Sharp, 207
[57] Daniel Hollis, "The Crown Land and the Financial Dilemma in Stuart England," *Albion,* Vol. 26, No. 3, (1994): 419-442.
[58] Robson, 606-607.

conduct a survey of the forest for its use in that regard.[59] Although the coppice wood the ironmasters used in smelting would not normally have conflicted with the timber in the forest, the mining operations that provided the necessary ore certainly would have placed demand on the same mature trees required for building ships for the creation of supports and other mining implements.

The very presence of the ironworks also created unwanted demand on forest resources. The presence of raw materials from the ironworks, as well as a plentiful demand for labour, drew craftsmen and labourers from elsewhere in the realm to find work, who in turn brought with them their own quotidian domestic demands for wood, which in addition to fuel, would include timber for building lodgings which in turn competed with the ship timber of the forest. That the ironworks were successively leased and re-leased only grew this pool of itinerant labourers in the forest.[60] Furthermore, although the placement of the iron smelting in private hands streamlined the exploitation for the forest for the crown, and delivered profits more promptly, it also encouraged the abuse of forest woods in a way that would quickly deplete Dean's ability to provide a long-term source of revenue. Coppices, once cut, needed to be enclosed to ensure their regeneration, and wood within the forest could not be cut too quickly lest a shortage arise before the cut coppice stools could regrow. Thus, if a tight control was not kept over the use of cordwood in the forest, while it would render short term profit to the crown, in the long term, Dean would lose its greatest asset as a centre of iron production.

This result, and violent reaction to it, was realized in the case of Pembroke's lease with surprising speed. By 1613, the Privy Council had received complaints that his activities were

[59] E 178/3837 m.50 in Hart, 100; *APC*, Vol. 33, 279.
[60] Sharp, 182-183.

damaging the wood supplies of the forest, exceeding the activity permitted under the lease, and that itinerant labourers drawn to the forest were taking wood to which they were not entitled. This discontent quickly boiled over into open opposition. In August of 1612, fifteen "desperate knaves" set ablaze a portion of wood which had been corded under Pembroke's grant. The rioters appear not only to have drawn on popular support but also sought to expand the discontent with Pembroke wider still. It was reported that they continued to roam the woods with weapons after their initial outburst, and called "their neighbours cowards for not assisting them," and despite an order for their arrest, the offenders proved elusive as "the country favoured them."[61] Although it seems clear that this riotous behaviour was prompted by an unknown outsider profiting from what were seen as the entitlements of locals, Pembroke's alleged offenses reached beyond the scope of such simple localist backlash. On 22 November 1613, a warrant was issued to George Marshall to investigate

> information of much abuse and disorder in the felling and cutting of wood and timber trees within the Forrest of Deane, as well by reason of a contract lately made on his Majesty's behalf with the Earl of Pembroke, touching the delivery of certain cords of wood, at a rate, for his lordship's ironworks, as otherwise by the borderers and near dwellers to the forest, for their private benefit and advantage[62]

The impact of these activities on the shipbuilding timber of the forest was specifically noted, the writer lamenting that "unless some course be taken to stay and hinder the proceedings therein, it will tend to the utter devastation and spoil of the said forest, to the great inconvenience of the public, in such store and provision of timber as is requisite and necessary for the use of his

[61] SP 14/70/49
[62] *APC*, Vol. 33, 22 Nov. 1613, 279.

Majesty's navy."[63] To the end of providing such remedy, Marshall was specifically instructed to enforce an order forbidding any further cutting of timber until the King's pleasure could be known, and specifically to forbid wood cutting and force itinerant labourers to return to their home counties.[64] Thus, less than two years after Pembroke's lease had been granted, it was suspended for its ostensible competition with the crown's other interests in the forest and amplification of unfavourable social demands on woodland resources.[65]

This pattern of a lease of ironworks leading to complaints of despoliation of woods and an eventual suspension of the lease continued between 1613 and 1627. This cycle epitomized the difficulties the crown experienced in balancing the demands on woodland made by commoners and the traditional Royal forest administration, alongside its shipbuilding and long-term financial interests. Some attempts at integrating oversight came with the leases following that of Pembroke, usually in the form of commissioners appointed to oversee the felling of trees and to mark out appropriate timber, in addition to the supervision of those with other interests in the forest, such as the deputy constable of the forest, William Throgmorton. Such was the case when Sir Basil Brooke and Robert Chaldecott received a lease of the ironworks for fifteen years in 1615, with Robert Treswell assigned to supervise their activities.[66] In 1618, a commission was given to "to Sir Thomas Brudnell, Sir John Tracy, Sir William Cooke, and others, to survey and examine into the wastes made in the Forest of Dean by Sir Basil Brooke and others, farmers of the iron works there, proceeding on interrogatories prepared by Sir William Throgmorton."[67] Upon the discovery of various abuses, including the cutting of trees reserved for the navy and the

[63] Ibid.
[64] Ibid.
[65] Sharp, 207.
[66] Sharp, 196.
[67] Hart 97; *CSPD*, James I, Vol. 98, 22h.

removal even of the roots of trees normally given by custom to the commoners of the forest, the ironworks which had been let to Basil Brooke in 1615 then reverted to the king.[68] In total, the ironworks were let four times between Pembroke's original lease in 1612 and 1628, usually owing to a perceived violation of the agreement for leasing by the lessees, which freed the crown to seek new farmers once more.[69]

The fullest realisation of an attempt by the state to balance the interests of those dwelling within the forests, the enterprising desires of the ironmasters, and the safeguarding of its own timber supplies came in 1627 when the ironworks were granted once more to the Earl of Pembroke after a protracted bidding process, during which an advanced payment of £6600 had his bid accepted.[70] Immediately, Pembroke sublet the ironworks to Basil Brooke, George Mynne, and Thomas Hackett, all of whom had attempted, in partnership, to acquire the lease for themselves, and already held the lease of the Mineral and Battery Company's wireworks at nearby Tintern and Whitebrook.[71] The scope of Pembroke's entitlements under the lease were expansive, permitting him both to take purpose-grown coppice woods, windfalls, the lops and tops of trees cut for shipbuilding or impaling the coppices, and the right to make charcoal from these products.[72] His activities were also to be supervised by commissioners including Robert Treswell.[73] The demand on wood supplies created by the renewed activities of the ironworks in Dean was unprecedented, and local inhabitants pressed their concerns of encroachment on their customary rights in the Court of Exchequer, obtaining a decree which granted them, among other

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[68] Perlin, 206; Hart, 98
[69] Hart, 105.
[70] *CSPD*, Charles I, Vol. 86., 9d.
[71] Hart, 102; Hammersley, "Revival of Forest Laws," 91.
[72] Hart, 103.
[73] SP 16/139/f.164.

provisions, that no new cottagers would be permitted to have the right of common, that the right of pannage would be guaranteed to only freeholders and those who paid rent to freehold.[74] Thus, in principle, the interests of the crown for woodland preservation, the economic freedom of the industrialists, and the customary rights of commoners were protected under the new leasing scheme.

However, the prospect of enhanced revenue from further leases of woods, particularly those unrelated to the king's ironworks, rapidly upset this tenuous balance. In the years following Charles I's accession, several further grants were made to other interested stakeholders for a variety of woodland products. Later in 1628 and 1629, 4900 cords of wood were added to Pembroke's entitlements.[75] Appended to Pembroke's grant was a further grant to John Duncombe, which afforded him bark from all trees felled by the Earl.[76] Such a grant would naturally have had an impact on the tannery businesses in the area, in which many locals were employed. In August of 1628, William Murray received a grant of timber in Morewood, Little Deans Wood, and Myes Bailey, worth £800.[77] Tristram Flower received 153 acres of land in the Snoade, 124 acres of land in the Kidnalls for an initial fine of £10 and a yearly fee of £4 for the remainder of the lessees natural lives.[78] Eleanor James, the widow of Edward James, petitioned with John Powell for a lease of the roots of trees felled in the forest for a term of 21 years.[79] Once granted, James' patent for the roots was transferred to John Winter, who himself had already accrued substantial holdings in the forest beyond those accorded to his father in James'

[74] E 125/4/269 in Hart, 104.
[75] *CSPD*, Charles I, Ch. 140, 12.
[76] SP 16/257 f.151
[77] *CSPD*, Charles I, Ch. 115, 13b.
[78] Ibid.
[79] Ibid.

reign.[80] Even before Pembroke's grant, in 1626, Winter received a grant of 4000 cords of wood in exchange for £1266 13s 4d, to feed his growing ironmaking operations at Lydney. Similarly, Edward Villiers had received a grant of Maylescott at £20 per annum, with entitlements to all the coals and mines in the appurtenant land, which infringed on the right claimed by the free miners to mine anywhere in the forest they so chose.[81] With these extensive grants, subject to few limits and weak oversight, the violent outbreaks which had occurred during Pembroke's first lease occurred on a much greater scale.

Violent Resistance

Outbreaks of violence as a result of contested woodland were not unprecedented in England. For instance, in Cranbrook in the final years of the sixteenth century violent outbursts represented the culmination of a series of more measured and peaceful attempts to gain recourse. As a result of the increasing appetite of local ironmasters for cordwood to fuel their furnaces, clothiers, who required the same wood for the use of their dying vats, sought relief from the crown by requesting legislation which would restrict iron making activity and even managed to achieve some level of success with Elizabethan legislation which forbade the further proliferation of iron mills in the Weald.[82] However, as this legislation stopped short of the outright ban and measures to preserve woods they desired, they then planned to deprive the ironmasters of their fuel supply by taking over the leases of coppices when they expired, although this proved impossible as some of the most powerful ironmasters possessed highly

[80] Ibid.
[81] *CSPD*, Charles I, Appendix, Calendar of Docquets, 69.
[82] Stephen Hipkin and Susan Pittman, "'A Grudge Among the People': Commercial Conflict, Conspiracy, Petitioning and Poaching in Cranbrook, 1594-1606," *Rural History*, Vol. 24, No. 2, (2013): 101-125, 108; 27 Eliz. c.19, *Statutes of the Realm*.

vertically integrated operations, holding full title to the land from which they sourced their fuel.[83] Eventually, the clothiers tried to sabotage the furnaces and bays which powered the iron and hammer mills.[84] The inhabitants of Dean faced similar circumstances, although more conducive to quick escalation. As the grantees of woods in Dean received their woods directly from the crown, the opportunity to interrupt the supply of the ironmasters was limited, doubly so by the poor status of many whose entitlements were contested – the free miners, for instance, had the same status as other artisans in the forest, landless, on the margin of poverty, and living entirely on their labour.[85] Moreover, although the crown did issue proclamations to curtail unwarranted use of the woods, the leases, such as that granted to Villiers, voided these same proclamations.[86] Forest law also offered little in the means of actual protection, as senior forest officials such as Pembroke, who was Constable of St. Briavel's Castle and Warden of the Forest since 1608, or Baynham Throckmorton the chief forester from 1634 onwards, had interests in ironmaking properties themselves.[87]

Thus, Dean was the location of massive and violent resistance to the activities of the ironmasters and their agents. It is true that the riots in Dean occurred at the same time as what scholars such as D.G. Allen have termed "the Western Rising," and indeed, it is useful to keep in mind that disafforestation and enclosure in other, nearby Royal Forests was causing widespread popular sedition in the period.[88] However, to see these events as connected in a single, somewhat

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[83] Hipkin and Pittman, 110.
[84] Ibid., 110, 112.
[85] Sharp, 180.
[86] *CSPD* Charles I, Appendix, Calendar of Docquets, 69.
[87] V. Stater, "Herbert, William, third earl of Pembroke (1580–1630), courtier and patron of the arts," *Oxford Dictionary of National Biography* (2008); Jan Broadway, "Throckmorton family (per. c. 1500–1682), gentry," *Oxford Dictionary of National Biography* (2004).
[88] D.G. Allan, "The Rising in the West, 1628-1631," *Economic History Review,* Vol. 5, No. 1, (1952): 76-85.

coordinated act of rebellion, would be to recreate the contemporary fears of the Privy Council about coordinated sedition where it did not necessarily exist.[89] There is limited evidence to suggest that some individuals did traverse communities as the riots swept the west of England, but there is also evidence that the seeds of discontent were sufficiently numerous in Dean that violent opposition of its own was ready to emerge, particularly considering that violent resistance to the activities of crown grantees had occurred in the Forest well before the most notable riots, and conformed to a longer pattern of unrest which arose as a result of outside incursions into the forest. Disafforestation, the act which had prompted so much unrest in other Forests such as Gillingham and Braydon, did not occur in Dean until 1639, nearly eight years after the riots usually identified with the Western rising took place.[90] As for the ringleaders traditionally identified with the forest riots, although they used the similar alias of 'Lady Skimmington' it appears that there was little coordination between the forests, and that where leadership for riot activity existed, it was confined to individual locales.[91] A more useful understanding of the riots, irrespective of their possible linkages to riots in other jurisdictions through common figures, are as calculated and sustained acts of resistance by forest communities to the rationalising and commercialising imperatives of the crown and its grantees.

A particularly notable example of this kind of violent opposition occurred in 1631, when Sir Giles Mompesson, who was then acting as an agent for Lady Villiers, sought to commence wood harvesting and coal mining activities on the lands granted to her husband. Mompesson

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[89] Elly Robson, "Improvement and Epistemologies of Landscape in Seventeenth Century English Forest Enclosure," *The Historical Journal*, Vol. 60, No. 3 (2017): 628.
[90] A.R. Warmington, *Civil War, Interregnum and Restoration in Gloucestershire, 1640-1672*, (London: Royal Historical Society, Boydell Press, 1997), 18.
[91] For a more complete account of why the "Skimmington" associated with the Dean riot was unlikely to have been the leader of riots in the forests of Gillingham and Braydon, see Sharp, 97-106.

quickly set about enclosing the land of Maylescott in question and set men to work to establish pits to dig for coal. In reaction, as John Kyrle relayed to John Coke, Principal Secretary to the King, "the foresters grieved with this attempt of his, some twenty persons threw part of the enclosure in again, not without opprobrious words uttered by them against the said Mompesson whom they termed to be an odious projector." Mompesson, unfazed, set workers back to digging for coal, when the rioters returned with "drum and ensigns in most rebellious manner, carrying a picture or statue apparelled like Mompesson and with great noise and clamour they threw it into the coalpits which the said Sir Giles had dug." This was not the end of the demonstrations against Mompesson – on April 5th the commoners "in a new fury assembled together with sound of drums, ensigns displayed, and in warlike manner did enter into the forest and then and there without any resistance have committed many insolent and fearful parts, by breaking open the enclosures, destroying a ropehouse, burning some houses, and proclaimed that they would assemble again upon Saturday next, being Easter eve, with a far greater power to finish their work." By far one of the largest of the period relating to industrial activity in the forest, the riot was estimated to have had 3,000 participants.[92]

After Pembroke's grant had been instituted and those of the others expanded, the riots returned in force. In 1631, another of Villiers' agents, Robert Bridges, was violently assaulted. Similarly to the rioters who had opposed Mompesson, this group of 500 persons engaged in "throwing down of ditches, stopping of coal pits, and assailing the house of Robert Bridges, gentleman, and discharging of muskets at the same, using great threatenings and committing divers insolencies."[93] When Bridges testified he reported that the rioters consisted of "500

[92] *Historical Manuscripts Commission*, *12th Report,* Appendix I, Earl Cowper (Coke MSS), 429-430.
[93] PC 2/40 f.437; *APC*, Vol. 46, 284.

persons with two drums, two colours, and a fife, [who] assembled themselves together armed with guns and pikes, and threw down near 100 perches of ditching newly made, and shot off pieces charges with bullets against [the] deponent's house, which they threatened to pull down if he spake a word."[94] Much as the rioters which had disrupted Mompesson's work, those assaulting Bridges committed other acts of riot "proclaiming with an 'O Yes!' that if the deponent made the like work against mayday next, they would be ready to do him the like service again."[95] Other reports of the same group of rioters convey the seriousness of their intents. Robert Turner, a servant of Thomas Yerworth, "happened upon the rioters in his way through the forest, and they enforced him to work with them, by threats of striking him down with a club if he did not." Once more, as was the case with those who set fire to Pembroke's corded wood, the rioters appealed to a sense of commonality among perceived fellows, informing Turner after he warned that some of them would be hanged that "they would bring him in as deep as themselves."[96]

The riots Dean experienced during the years of most intensive enclosure and exploitation of the forest represented a clear defiance of the imposition of state forestry practices in the forest. As discussed in chapter one, the rationalising imperative of government surveying made the forest legible to the state at the expense of the ecological diversity and sophistication of the forest environment. The same was true of the economic activity and revenue generation these surveys permitted – leases and enclosures, activities which were undertaken with an eye to improving the quality of the crown's forest holdings, neglected the customary and communal use of resources in the forest. To impose exterior methods of land sequestration and entitlement to resource usage,

[94] Ibid.
[95] SP 16/188/f.24.
[96] SP 16/195/f.6.

while technically within the legal prerogative of the crown within its Royal Forest jurisdictions, fundamentally disturbed the long-established patterns of land use in the forest, which relied on memory and custom – lightning-blasted trees, brooks and ponds and winding paths were the markers by which forest inhabitants navigated its precincts, not fences, ditches and pales.[97] Invariably directed either at outside use of forest resources or the creation of implements which would allow their atypical exploitation, the riots represented a firm and direct opposition to the crown's rationalising imperatives. As Simon Sandall has written, "These riots serve as another reminder that ideological opposition to 'improvement' and privatisation of the wastes and external encroachment was very much cemented in the material conditions of Forest life."[98] That the rioters engaged in physical acts of destruction against the tools of state legibility, pulling down ditches and fences and destroying palings, as was done in other Royal Forest jurisdictions as a result of enclosure, only underscores that the riots were a clear response to attempts by the state to make its forests legible for resource extraction.[99]

Clearly, the general policy of providing leases to industrialists of crown-owned ironworks, in addition to a plethora of other smaller leases in the forest, brought with it a litany of disadvantages which encumbered the extraction or revenue from the forest. Where leases were allowed, they were often accompanied by devastation of the same resources the crown sought to preserve, and meanwhile, these leases encroached on what the residents of Dean believed were their entitlements, creating an atmosphere that was incredibly hostile to the exploitation of the

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[97] Simon Schama, *Landscape and Memory*, (Toronto: Random House Toronto, 1995), 143.
[98] Simon Sandall, "Remembering Protest in the Forest of Dean, c.1612-1834" in Carl J. Griffin and Briony McDonagh eds. *Remembering Protest in Britain Since 1500: Memory, Materiality and the Landscape* (Switzerland: Palgrave Macmillan, 2018), 115.
[99] Elly Robson, "Improvement and Epistemologies of Landscape in Seventeenth Century English Forest Enclosure," *The Historical Journal*, Vol. 60, No. 3 (2017): 630.

forest's resources by the state.

Leading up to the Civil War, the crown did make some limited attempts to quell this opposition in an effort to secure its right to exploit the resources of the forest. The activity of the riots specifically saw little prosecution - the rioters proved difficult to apprehend owing to support from local communities.[100] This much was clear from Ralph Dutton's report to the Privy Council, wherein he wrote that:

> One hundred twenty men by me guided passed over the river of Severn late in the night, with an intent to take the said offenders, and for that purpose waiting all night repaired before the break of the day towards the house of one John Williams called by the name of Skimmington thinking to have caught him in his bed, but being discovered by some of the inhabitants of that place they only apprehended two of the offenders, and so retired for that time.

There was even suggestion that Throckmorton, the chief forester of Dean, was encouraging the activity of the rioters on the information of Robert Bridges although they "were sent and cleared themselves."[101] The illegible terrain of the forest itself also posed a substantial impediment to the imposition of justice. Dutton ultimately concluded that owing to "the hills, woods mine pits and coal pits where they dwell the apprehending of theme becomes very difficult and must be effected only by policy, never by strength."[102] Although 140 people were indicted, the Commission appointed to investigate the riot only saw one or two persons at each session, as of

[100] SP 16/203/f.53.
[101] SP 16/195/f.13.
[102] SP 16/203/f.53.

May 25, 1632, of the three prisoners brought before the commissioners to investigate the riot, two were acquitted, and the remining prisoner was only sentenced to a fine of 20 nobles or six months' imprisonment.[103] John Williams, the notorious Skimmington, was eventually apprehended, and left to languish in Newgate for five years, but was eventually released on a bond of good behaviour and £2000 in sureties.[104]

The Eyre of 1634 and Disafforestation

Although the crown did not obtain full recourse for the damage to its authority wrought by the rioters, it pursued justice for the losses of its revenues at the hands of the ironmasters with a high degree of vigour. In 1634, the King gave notice to John Bridgeman, a deputy constable of the forest, that he had ordered the Earl of Holland to convene a court of Justice in Eyre, which opened at Mitcheldean on 10 July 1634.[105] Substantial fines were attached to the despoliation of woods by the ironmasters. John Gibbons was indicted "for cutting down divers goodly timber trees marked by the king's officers for shipping, and other uses for his Majesty" and fined £8000 for enclosing more land than he had been granted in the forest.[106] Basil Brooke, meanwhile, was fined £12,000 for various offenses, mainly relating to the unwarranted taking of wood in excess of his grant. However, he contested his original fine of £12,000, requesting that "their Lords will default out of the present charge not only all those cords of wood which have been bought by him and spent at the said ironworks, but also all such other wood which shall appear to have been taken by others out of the places where his wood was appointed."[107] Sir John Wintour, as

[103] SP 16/216/f.138.
[104] Sharp, 103.
[105] SP 16/266/f.145; Hart, 111.
[106] *CSPD* 16/402/53.c; Hart 122; SP 16/271/f.141.
[107] SP 16/293/f.142.

well, was charged with having taken 60,400 cords of wood to which he was not entitled.[108] Wintour appealed this charge on several grounds, specifically contending that judging by the amount of iron his forges had produced, there was no possible way that he could have overconsumed wood on the scale alleged.[109] In total, the Justice in Eyre levied a tremendous sum of fines, some £100,000 according to one contemporary account, although ultimately only a fraction of this amount was collected owing to successful petitions, mainly on the part of the ironmasters, to have their fines reduced.[110]

In some measure at least, this Forest Eyre could be viewed as a direct projection of power by the crown into the forest in an attempt to secure its control of its own resources, and indeed, this might be true to an extent. Abuses of the crown's resources were being punished. However, it would be excessive to suggest that forest law and administration was more generally being revived as a direct instrument of fiscal state forestry.[111] Although the Royal Forest apparatus sometimes helped as an administrative unit for the fiscal exploitation of the forests and worked to confirm the crown's rights to use forest resources, it hampered these efforts in equal measure. In the case of Dean, many of the fines levied by the court were never collected. In addition, it must be remembered that many of the individuals who were responsible for the disorder and destruction within the forest were themselves complicit in the operation of the forest apparatus. As already mentioned, there were reports that Throckmorton had used his position of power to abet and encourage the rioters. Pembroke himself served as the Constable of St. Briavels and

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[108] SP 16/289/f.199.
[109] SP 16/307/f.28.
[110] SP 16/273/f.26; Hart, 113.
[111] A sustained use of the Royal Forest administration for state forestry would not be achieved until the extensive enclosure of Dean and the direct stewardship of forest resources for the benefit of the state by John Wade during the Interregnum.

before his death, as Chief Justice in Eyre, and had a vested interest in ensuring that some abuses of forest law were never brought to light.[112] In fact, considering this connection, it is a likely supposition that Basil Brooke and Pembroke's other subletters were only fined to the extent that they were because Pembroke had been succeeded by Holland upon his death. There was limited activity during the 1634 Eyre which could be identified as the state using its legal power to confirm its entitlements to the resources in the forest. However, most of this incident might be more productively viewed as an attempt by the crown to extract profit from the inhabitants of the forest themselves, rather than to protect its resources, which was consistent with the broader Caroline policy of reviving prerogatives as a fiscal expedient.[113]

The Forest Eyre, however, was followed by a much more radical and direct attempt to ensure that the crown had unrestricted control of its forest resources, or at least, the exploitation of those resources for profit. By 1639, the revenue potential of Dean's forests which had animated much of the early Stuart leasing schemes had disappeared – widespread despoliation of the forests under successive leases had destroyed much. This is clear from a comparison of the surveys conducted of Dean in 1633 and 1634. Within even this short time span, during the period of heightened exploitation following Pembroke's grant, the forest went from having 166,848 timber trees to 141,632.[114] Although the survey did note that a good deal of timber "may be well sufficient to maintain His Majesty's Navy until the supply be made of young timber to be raised in the forest," the same optimism did not extend to wood available for ironmaking fuel, the most lucrative leasing opportunity, with the surveyors instead only noting that the forest possessed

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[112] Victor Stater, "Herbert, William, third earl of Pembroke (1580–1630), courtier and patron of the arts," *Oxford Dictionary of National Biography* (2004).
[113] Hammersley, "The Revival of the Forest Laws Under Charles I," *History,* Vol. 45, No. 154 (June 1960): 102.
[114] SP 16/236/f.191; Hart, 275, 278.

ground suitable for the raising of future ship timber and fuel crops.[115] The prospect of sustained resistance from local commoners to any form of resource exploitation by outsiders likely disincentivized investment by enterprising ironmasters as well.

Thus, the crown turned to a solution which, in theory, offered many of the same benefits as smaller individual leases, while curbing the contestation of the forest resources. In 1640, a comprehensive leasing scheme, not dissimilar to those which were proposed in James I's reign but simply on the scale of an individual forest, was instituted in Dean, with John Wintour as the grantee.[116] In theory, such a lease would allow the crown to accrue substantial revenue through advanced payments without needing to assume the risk and cash outlays of establishing ironworks. Meanwhile, such a comprehensive lease would, in effect, amount to the disafforestation of the forest, leaving the entitlement to its resources largely in the hands of a single holder rather than as a contested resource to be regulated through the courts of forest law. Plainly, too, it would also be easier to supervise the activities of a single stakeholder who had absolute power over the holding rather than multiple competing individuals, a benefit which would be particularly important to the preservation of ship timber, the preservation of which was laid out in the eventual grant.[117]

A proposal to disafforest Dean drafted in 1638 included several further justifications for the move. For one, it alleged Dean's ship timber supplies were inadequate, that "by a misconceived opinion, that in respect of the situation being betwixt two navigable rivers and well stocked with great trees, there in, may be found timber fit for shipping, and others Majesties buildings, whereof experience and travels made by the Kings officers, the ship carpenters have

[115] Hart, 278.
[116] *CSPD*, Charles I, Ch. 448, 51e.
[117] Ibid.

found the contrary" and that what timber did stand in the forest was "the most part old, hollow, decayed and wind shaken trees, and fit only for coal, and fire wood, and little can be found serviceable for other use." Moreover, even the land on which the trees grew was of little value, as there was no "delight of hunting to be taken within the forest, by reason the hills are steeple, the grounds uneven and rocky, full of bogs, mine pits, so that without danger hounds can not be followed on foot or horse back" and the "soil is of base condition, and can hardly with great charge and husbandry be made worth 12£ acre." Disafforestation also had clear financial benefits to the crown, as in Dean, the king stood to save over £172 from the payments due to officers, in addition to earning 4000£ in revenue from the rental of the forest to an enterprising undertaker.[118]

Certainly, given the activity which had characterised the use of woodland resources by leaseholders in the 1620s and 30s a general lease through disafforestation still had no reason to be taken as a feasibly better departure from the former policy, or to confer any additional benefits, especially given that Wintour himself had been the author of so much destruction in Dean. However, additional political considerations worked against this obvious caveat.

During Charles' reign, John Wintour had become one of the leading Catholic courtiers in England, and was the secretary to Henrietta Maria, the wife of the king.[119] It is altogether likely that he agitated for such an arrangement to be imposed in Dean given his prominent position and how he would stand to benefit, and the fact that he received the grant when it was eventually instituted only confirms this. In the years leading up to Wintour's receipt of the grant, he petitioned the King on several occasions, specifically elucidating how he had suffered

[118] SP 16/408/f.303.
[119] Wintour is mentioned as secretary to the Queen in various contemporary accounts, such as those found in SP 16/432/f.95, SP 16/420/f.160, and SP 16/479/f.113.

persecution for being a Catholic and had provided valuable service in assisting the administration of forest law, as well as assisting during the Skimmington riots.[120] Moreover, there was a small reason to expect that Wintour's control of the whole forest would confer some advantage over the other projects which had previously failed. By contrast to other leaseholders such as Brooke or Pembroke, Wintour claimed the added benefit of being a local landlord, who while bitterly despised within the forest, at least had the benefit of knowing the local territory. The benefits of a local leaseholder had been identified by the Earl of Northampton as a possible means of avoiding insurrection as early as Pembroke's first grant, when he noted in a letter to Lord Rochester that, "had the matter been put into the hand of the gentleman who could have tempered the wild humours of those Robin Hoods things had been carried in a better fashion but the earl is extremely odious and with attributions that concern himself would put other matters in distemper."[121]

Thus, in 1640 Sir John Wintour entered into a lease which afforded him the whole of the forest of Dean, containing 18,000 acres, in exchange for £10,000 to be paid to the Exchequer at the beginning of the lease, £16,000 per year subsequently for six years, and a rent of £1,950 12s. 8d. in perpetuity.[122] Wintour's powers were extensive, containing the rights to all woods, under woods, game and mineral rights in the acres he was leased.[123] However, Wintour's control in the forest was not total – in the grant, 4,000 acres of common land was allotted for the use of the forest's inhabitants, along with the Lea Bailey, a separate portion of the forest containing much ship timber, and 15,000 timber trees for the navy, along with a handful of existing leases to other

[120] SP 16/339 f.207; SP 16/339/f.206.
[121] SP 14/70/f.99.
[122] *CSPD*, Charles I, Ch. 448, 51e.
[123] Hart, 125.

ironmasters.[124]

This arrangement thus provided the crown with the maximum potential revenue while preserving its own resources. By allotting the bulk of the forest to a single private user, it sought to reduce contestation of the resources, and by excepting timber trees for the crown's own use, it still preserved the crown's material interests in the forest. Additionally, by allotting common for the use of the forest's inhabitants, the crown sought to disarm the commoners' ability to legally contest the forest's resources. Complaints abounded that the 4000 acres allotted to the residents was among the poorest land in the forest, which meant that in practice, the greatest quantity of exploitable land was being reserved to the crown.[125] This represented the same sort of disarming of custom to which Thompson has referred in writing that "it was possible to acknowledge the customary rights of the poor, but place obstacles in the way of their exercise."[126] In effect, the crown and Wintour were able to neuter commoners' claims to woodland while still tacitly acknowledging them in the form of grants of common, yet making these common grants the poorest available.

Despite the theoretical benefits of leasing the whole forest to a single individual, both Wintour's abusive behaviour and the riotous activities of the inhabitants quickly resumed. In the summer of 1641, the inhabitants of the forest destroyed nearly twelve miles of Wintour's enclosures erected in the forest.[127] That same year, Wintour sued the inhabitants of the forest, in the Exchequer court, which prompted Parliament to order a survey of the forest, which revealed the extent of his abuses.[128] Of the 128,557 trees reported in the 1638 survey, only 88,376

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[124] Ibid.
[125] Hart, 127.
[126] Thompson, 102.
[127] Sharp, 218.
[128] SP 18/71/f.84.

remained, with oaks being felled for cordwood and trees marked with the broad arrow for naval use felled without regard for their reservation.[129] In February of 1642, the Commons committee for the Forest of Dean voted that "Sir John Wintour, by reason of his recusancy and not conforming to conditions with His Majesty the King is not fit to hold his bargain any longer, especially his bargain being disadvantageous to the common wealth."[130] With the termination of Wintour's grant, the forest effectively returned to the same state of contestation that it had existed under at the end of James I's reign. Throckmorton and other subsidiary leaseholders continued to have the terms of their grants respected, and inhabitants continued to claim the common rights they had been denied under Wintour.

Conclusion

In order to extract profit from woodland efficiently the crown required a minimally contested claim to its resources. This was particularly true in the Royal Forests – in these locales, where illegible environments and great distance from seats of power made it difficult to project authority, the ability for resources to be exploited by those who did not hold claims to them which were recognised by the crown was greater than elsewhere. However, the decline of the Royal Forest administration severely reduced the ability of the crown to exercise its rights to its own possessions. Royal forests had effectively become communal resources where true communal usage had never been intended for them when established at the time of the Norman conquest, and a plurality of claims to the right to use the resources of the forest made it difficult to conserve or exploit the woodlands with any degree of efficiency, or without raising the ire of

[129] Hart, 129.
[130] SP 16/489/f.75.

inhabitants.

In order to exploit the resources of the forest, it was clear that the crown had to reintroduce or assert a different sort of property right to the forest. Under James I and Charles I, the crown pursued this introduction of property right in the form of leases, which gave clear entitlement to specifically enumerated resources of the forest, not only removing them from the custom-based realm of contestation by forest inhabitants, but also giving them legibility for easy fiscal exploitation.

However, this policy was a failure, principally owing to the fact that leaseholders did not act purely in the interests of the crown. As proved repeatedly by abuses of forest resources, leaseholders pursued their own interests at the expense of the long-term profitability of the crown's resources, felling timber with a high time investment, and consuming granted cordage in excess of their entitlements under their leases. Indeed, this was built into the very process of leasing – maximal profit could not be derived from a lease where a profit margin had to be allowed for the grantee to find the lease offer appealing. Moreover, even if entitlements to resources were guaranteed by leases from the crown, this did not ensure that these entitlements would be respected by the inhabitants of the forest, and in many cases they were not. Riotous behaviour which railed against the imposition of instruments of fiscal legibility in the forest, particularly the physical manifestation of enclosure, consistently demonstrated the fundamental belief of forest inhabitants that they had an entitlement to forest resources, which they were willing to fight to uphold at great costs. Even in the case of disafforestation, which erased many of the claims of entitlement by the inhabitants of the forest, and vested the power to manage landholdings in a single, more easily supervised grantee, the incentives to abuse crown woodland remained sufficiently powerful to render significant damage to the crown's forest holdings.

Thus, the crown's policies as they related to the social dimension of state forestry in the early to mid seventeenth century were a failure. The crown land administration under both of the early Stuarts showed a willingness to assert control over forest resources, but ultimately stopped short of assuming the direct control over the forest's resources required for truly effective exploitation, which would ultimately only come with novel approaches to state forestry which took an equal interest in the material and financial value of woodland, that developed under the Protectorate.

Chapter IV – Silvicultural State Forestry and the Material Wealth of Woodland

Introduction

For much of the seventeenth century, although the state took increasing interest in its woodland possessions as a fiscal expedient, the competing interests of various claimants to woodland resources repeatedly confounded their ready transformation into liquid assets. On a small community scale, the claims of local industrialists, tenants, and commoners made the crown's right to claim profit from its woodlands difficult to authenticate and even harder to enforce. When forest holdings were compounded into larger administrative units, such as was the case with Mompesson's commission or Wintour's lease, a lack of oversight and the expansive aspirations of leaseholders ensured that the little profit that came to the crown did so at an unequitable cost in woodland destruction. Even where the crown assumed a more direct role, such as in the creation and leasing of a royal forge, which allowed the extraction of profit from iron ore and fuel wood, the same excesses hindered their operation in the financial interests of the state.

Under James I and Charles I, as well as early Parliamentary rule, state agents treated the exploitation of woodland as simply one method among many to raise revenues, as attested by the wide variety of resources in addition to woodland that served as the subjects of grants of patents, leases and monopolies. The state's actions did not revolve around the particular products woodland created, such as timber or cordwood, but simply the profit potential they represented. However, during the Interregnum and Restoration, the approach of the state to the management of its forest possessions underwent a profound shift. Increasingly, the state's interest changed from the revenue potential of woodland to the contents of the woodlands themselves. Particularly, the rising demands of England's growing navy, one of the largest industrial

enterprises of the early modern world, forced the state to reconceive its use of woodland in order to construct the 'wooden walls' which figured so prominently as an instrument of national defence and colonial expansion.

E.A. Wrigley has outlined the primacy of a photosynthetic constraint in the organic economies of the pre-industrial world as a limiting factor in their capacity for production.[1] Chiefly, this applies to sources of energy: industrial societies use fossil fuels to supplement the inadequacy of short-term photosynthetic fuel supplies, whereas organic economies are forced to rely on the products of the land. This is true as much of energy as building supplies.[2] Where the use of coal has enabled the modern military-industrial complex to produce steel in abundant quantities for the manufacture of naval armament, in organic economies, such as England's in the seventeenth century, shipbuilding was limited by the number of trees which could be efficiently grown on a limited parcel of land. In turn, to supply one of the greatest early modern industries, naval shipbuilding placed an unprecedented demand on the inherently limited capacity of timber to constitute its wooden walls.

Increasingly, concerns about the availability of suitable timber for shipbuilding dominated political discourse surrounding woodland, as the integrity of England's forests become both economically and symbolically connected the nation's military strength and sovereignty. In short, state forestry policy in the mid to late seventeenth century became silvicultural, that is, oriented primarily toward the husbanding of woodland resources for a specific end usage of their material products, in this case, ship timber.

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[1] E.A. Wrigley, *Energy and the English Industrial Revolution* (Cambridge: Cambridge University Press, 2010), 14.
[2] Paul Warde, *The Invention of Sustainability: Nature and Destiny, c.1500-1870*, (Cambridge: Cambridge University Press, 2018), 75.

Although the origins of this approach to state forestry are conventionally attached to John Evelyn's seminal silvicultural work, *Sylva*, published in 1664, as the publication received both royal approval and was published at the behest of the Royal Navy, the earliest inklings of a reorientation of state motivations and approaches in forestry can be pushed earlier. Indeed, while the Royal Forests found new utility as sources of timber during the Restoration, as Sara Morrison has noted, the novel approaches to forestry which facilitated this novel use, both within Royal Forests and elsewhere, began earlier in the seventeenth century.[3] This chapter contends that a substantial reorientation of priorities of state forestry came during the Interregnum, when Protectorate officials assumed direct control over some of the state's most valuable timber reserves. This same approach continued through into the Restoration, when John Evelyn's writings and the activities of other prominent thinkers saw the approach more fully realized in published discourse and political theorizing. Thus, an approach to state forestry that prioritized the material resources of the forest instead of its financial potential might be seen as an enduring change of the English Revolution, which in so many other respects saw its changes either curtailed or erased with the restoration of the monarchy in 1660.

These administrative changes, which saw the state take a direct interest in the management of timber supplies, were accompanied by intellectual developments that abetted the changing approaches the state took to forestry. The intellectual climate of heightened empirical curiosity of the period created numerous novel approaches to forestry which sought to make the use of crown timber more accurate, more exploitative, and more efficient. Working under the institutional auspices of the Royal Society, the navy, and the patronage of the king himself,

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[3] Sara Morrison, "Forests of Masts and Seas of Trees: The Restoration Navy and the English Royal Forests," in Nancy L. Rhoden ed., *English Atlantics Revisited: Essays Honouring Professor Ian K. Steele*, (Montreal: McGill-Queens University Press, 2007), 136-173.

figures such as William Petty, Ralph Greatorex, John Evelyn, and Robert Plot conceived of novel approaches to harnessing woodland resources to benefit national defence. Meanwhile, bureaucrats in the government sought to implement these innovative approaches and motivated their conception. Among the most prominent of these was Samuel Pepys, a naval administrator, whose meticulous and detailed journal serves as an excellent historical microcosm for examining the intellectual currents which informed state approaches to forestry in the late seventeenth century. This chapter examines how those at the forefront of silvicultural experimentation and shipbuilding devised methods to make their use of timber more accurate, efficient, and exploitative, all key developments in treating England's woodlands as a national resource.

After continual attempts to derive revenue from the forest through leasing schemes and wood sales, during the Interregnum, state forestry changed to take a more direct interest in the actual material wealth of state-owned woodland rather than its profit potential, particularly as it applied to the production of timber for naval construction. Owing to both the geopolitical demands of the Interregnum period and the unique political circumstances of the Commonwealth, state woodland came to be used for more explicitly *national* purposes than ever before. Much of this novel approach to state forestry remained during the Restoration, and in the later part of the seventeenth century, a variety of intellectuals from political, mathematical and scientific circles built on this legacy of the Protectorate, seeking out new approaches to make state forestry more efficient, accurate, and territorially exploitative, in governmental, academic, and private contexts.

State Forestry During the Civil War and Interregnum

As discussed in chapter two, the years leading up to the Civil War, at least in the crown's largest woodland holding, the Forest of Dean, witnessed woodland destruction wrought by

tenants, industrialists, and other claimants to crown woodland resources. The crown had great difficulty in asserting its right to control woodland resources it claimed as its own and in extracting profit as it saw fit. This situation predominated through the early years of the Civil War and well after the execution of Charles I. More so than the crown, the parliamentary and protectorate governments struggled to assert their claimed right to control state forest resources, contending with breakdowns of authority and a fuel crisis in addition to their own exploitation of woodland resources for financial benefit.

Initially, the breakdown of authority on former crown and Royalist estates led to widespread plundering of formerly restricted woodland. In the absence of the controlling presence of a landlord, resources which had already been hotly contested were carried off by lawless tenants, with the properties of any of parliament's real or perceived enemies, including Catholics, Royalists, the royal family and the Church hierarchy being targets, with similar plundering of enemy holdings occurring in Royalist held territory. As Christopher O'Riordan has noted, this activity represented a sort of opportunism, with offenders taking advantage of the weakened position of Parliament's enemies to reassert previously practiced rights and perceived entitlements. Where enclosures were thrown down, they were often only those which had been established in living memory, and thus existed as an encroachment in the minds of the opportunists.[4]

The Journals of the House of Lords record a variety of complaints in the period from people who sought recourse for the destruction of woodland, even from individuals who were not in Parliament's good graces. Consider for instance the 1641 petition of the Bishop of

[4] Christopher O'Riordan, "Popular Exploitation of Enemy Estates in the English Revolution," *History* Vol. 78, No. 253, (1993): 183, 187.

Winchester, who complained of the despoliation of his woods by "tumultuous people," and received in turn action from the house which provided that "that there shall be no further Spoil, Cutting, or Carrying away, of any Woods, out of the said Chace, until the said Lord Bishop shall be evicted, by Course of Law, in some of His Majesty's Courts of Justice." Presumably, overzealous and enterprising commoners were destroying his sequestered estate while the Bishop retained title to his land.[5] Later, in 1643, the House ordered that the specific offenders be brought before the house to be tried for their offenses.[6]

Elsewhere, landowners with no clear connection to the church were also subject to the activity of individuals eager to claim a right to woodland where the tumult of the Civil War seemed to offer an opportunity. On March 15 of 1643, Henry Noell petitioned the house for the protection of his woods, and the next day was granted the same by the Lords in the form of an order which specified that "it be known by what Authority the same [woodcutting and refusal to pay rents] is done; and, if it be not done by express Order of Parliament, then the said Goods shall be delivered, and the Woods preserved from cutting, and a particular Protection of this House to be granted him."[7] The Earl of Newport also complained that the woods of his estates were being unlawfully depleted, thereby depriving the tenants of his manors of their customary allotments of wood. To the end of protecting these supplies, the Lords instructed the committee for sequestrations "to take speedy Care, and give Directions, that the said Woods may not be destroyed any more, but be preserved for the furnishing that Country with Wood, and preventing that which may tend to the Ruin of the Earl of *Newport's* Estate."[8] Repeatedly, it appears that the

[5] *Journal of the House of Lords*, Vol. 4, 3 December 1641, 460-462. Hereafter abbreviated *JHL.*
[6] Ibid., Vol. 5, 20 January 1643, 562-564.
[7] Ibid., 14 March 1643, 647-649; *JHL,* Vol. 5, 15 March 1643, 649-650.
[8] Ibid., Vol. 8, 30 March 1646, 245-247.

enemy status of a landlord, and the sequestration of their estate was taken as an opportunity to plunder their woodlands.

Nor was illegal woodcutting restricted to private woodland which had been sequestered by Parliament – in fact, the issue appears to have been equally if not exceedingly prevalent in Royal Forests. Orders for the preservation of wood in Eltham Park, and in the Manor of West Deerham were issued by the House of Lords in 1643.[9] In January of 1643, the house requested that troops be dispatched to Windsor forest to arrest delinquents who were engaged in illegal woodcutting. While it is likely that many of these offenders were cutting wood for quotidian uses, those who attracted the most attention had seized upon the opportunity to cut wood as a means of generating profit. In December of 1643, Robert Pitchley was brought before the house for illegally cutting and selling wood from Enfield Chase. His activities transcended the bounds of simply cutting wood for his own use for fuel or agriculture. John Butcher, the deputy to the Earl of Salisbury, alleged that the "he doth take no other Course of Living, but Stealing and Selling of Wood." Butcher's servants reported further details of Pitchley's activities. John Lawes reported that he had "taken the abovenamed Robert Pitchley cutting down and felling the Woods in Enfeild Chace at least Forty several Times, once whereof he found him about Twelve of the Clock in the Night, where he had felled a Beech of about a Load of Wood." William Linge recorded that, in a blatant rejection of crown authority to control the woodland, Pitchley claimed "That he had as much Power to fell any of the Wood in the said Chase as the said John Butcher."[10] Pitchley did not appear to be alone in his undertakings, or at least, he acted with the support of other members of the community – in November of 1643, when officials searched

[9] Ibid., Vol. 5, 28 January 1643, 576-577; Ibid., 20 January 1643, 562-564.
[10] Ibid., Vol. 6, 6 December 1643, 328-329.

local yards for stolen wood, they were met by a band of fifty or sixty people, including Pitchley, who "with Bills, Axes, and Staves, did, in a most riotous and violent Manner, assault and beat this Deponent and his Three Servants, and cut One of the Horses in Two Places, and also the Harness thereunto belonging, and would not suffer them to go on upon the said Service, notwithstanding the said Ordinance, and the Constable's Power and Persuasion therein."[11]

However, while woodland destruction during the period was extensive, as several scholars such as Albion and O'Riordan have noted, this was not the sole legacy of state forestry during the Civil War and Interregnum. In fact, Parliament's response to both illegal timber cutting and the management of crown timber resources proved to be a novel innovation of the period, with significant ramifications for state forestry during the Restoration. Parliament's initial solution to the problem of illegal timber cutting was a departure from previous methods, as it sought to curb the unrestrained nature of illegal cutting by legitimising it within certain permissible bounds, principally to meet the needs of London's population for fuel. As Newcastle, the principal producer of coal within the kingdom, lay within Royalist territory at the outset of the war, mineral coal, or sea coal, had become scarce in Parliamentary regions of the country. Nowhere was this more acutely felt than in London, where mineral coal had increasingly been employed as the chief source of heating fuel. In response to this shortage, in October of 1642, Parliament issued an ordinance that legalised the cutting of fuel wood by designated officials on the estates of declared enemies of Parliament in the vicinity of London. The Ordinance itself justified the measure as one made out of necessity for the good of the kingdom, prompted by common people "destroying great store of Timber trees being urged thereunto by necessity, to procure to themselves Fuel, The which if not timely prohibited will be of a dangerous

[11] Ibid., Vol. 6, 6 December 1643, 328-329.

consequence to the Common-wealth."[12] Overwhelmingly, provision of wood for the poor as a necessity of life was offered as a justification for the wood cutting.[13] The following year, Parliament returned to the woodland of sequestered estates in search of suitable timber for supplying the navy, explaining that the action was taken out of a balanced consideration both for the conservation of trees on sequestered estates and the "pressing wants of Timber for the supply and use of his Majesties Navy Royall, without which there can be no Fleet put to Sea for the defence of the Kingdome."[14]

This case of naval timber provisioning from sequestered estates was a direct and calculated exploitation of resources by the state, not the haphazard response to popular demand that had characterised the fuel ordinance. The ordinance for naval timber listed the woods of twelve specific landholders, including institutional holders such as the Archbishop of Canterbury, as the sources from which specific quantities of certain species of timber were to be sourced. For instance, the ordinance specified that "In the Woods belonging to the Archbishop of Canterbury, and the Deane and Church of Canterbury, situated near Canterbury, four hundred Trees of Oak and Elm." The specific quantities of timber listed suggests that, much like the early Stuarts, Parliament made use of surveys, presumably conducted by agents of the committee for sequestrations, to determine exactly which trees they would use and where they would source them from. Parliament also took pains to ensure that the operation would be largely self sufficient and would not require investment of existing funds, as the bark and other biproducts of

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[12] "October 1643: An Ordinance to supply the poore, and all other degrees and sorts of people with wood," in *Acts and Ordinances of the Interregnum*, 303-305. Hereafter abbreviated *AOI.*
[13] William M. Cavert, *The Smoke of London: Energy and Environment in the Early Modern City* (Cambridge: Cambridge University Press, 2016), 117.
[14] "April 1644: An Ordinance for felling of Tymber Trees in the Woods of severall Delinquents for the use of his Majesties Navy Royall," *AOI,* 423-424.

the trees were to be sold to offset the cost of felling, hewing, and transporting the timbers.[15] Sequestered enemy estates were not the only state-controlled woodland resource to be exploited either. In 1644, Parliament ordered the cutting of 600 trees from Waltham Forest, out of a fear that they were "like to be cut down and destroyed, by divers Persons, who presume to do what they list in these Times of Distraction."[16]

The willingness to use state-controlled wood supplies for matters of pressing public interest is a surprising shift in the approach to state forestry, particularly considering that only a few years earlier, Parliament seemed willing to protect the property rights of even those landlords who had their estates sequestered. Necessity, at least in the case of fuel, was certainly a compelling factor, and just as Charles I and James I had attempted to allow at least a bare minimum of customary claims to woodland resources in Dean, so too did Parliament need to respect the demands on forest resources made by exceptional economic circumstances. Nor did the financial exploitation of the forests stop with the effective end of Charles I's control – in 1647, disafforestation and the sale of forest lands began to be used as a means of compensating Parliamentary soldiers for their service during the Civil War.[17] However, in the case of requisitioning timber from sequestered estates and the ensuing shift to intensively exploiting the material wealth of state-controlled woodland for the benefit of the navy a greater change than simple necessity was afoot.

Since the time of Henry VIII, legislation touching on timber usage had been justified, among other reasons, with the importance of sea-power to England's standing as an island and

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[15] Ibid.
[16] *HLJ,* Vol. 6, 8 April 1644, 504-510.
[17] Ibid., Vol. 9, 1 November 1647, 506-507.

maritime nation.[18] Popular rhetoric also grew to match this treatment of crown wood supplies as not just another asset of the king, but as a resource whose stewardship concerns and potential usage transcended the personal interests of the king and were instead attached to the territorial and military aspirations of the nation as a whole. When Arthur Standish wrote that without any woods, there would be no kingdom, he clearly spoke to the preservation of woodland as essential to England's very existence, of which shipping was an essential component. In James I's proclamation on glass manufacturing in 1615, this connection between woodland, national maritime power, and public interest was clearly communicated:

> It hath bene of all time truly esteemed as a principal Patrimony of this Our Realm of England, and a precious inheritance both of crowne and Subject, in that Our said Realm hath yielded goodly quantities and abundance of Wood and Timber, in a manner and nature almost incomparable; for that the timber thereof is not only great and large in height and bulk, but hath also that toughness and heart, as it is not subject to rive or cleave, and thereby of excellent use for Shipping, as if GOD Almighty which had ordained this Nation to be mighty by Sea and navigation, had in his providence endued the same with the principal material conducing thereunto.[19]

With time, these repeated appeals to national interest, usually with reference to the navy, built the potential for woodland to cease being a matter of private interest to the king, and instead to become a national commodity, the concern of every subject by virtue of its importance to defense. However, while the potential for this shift existed, the political realities surrounding crown woodland prevented it from being easily realized. While the preservation of timber may have been a matter of national interest in theory, the greatest state reserves of timber were anything but a national possession – Royal Forests epitomized this, being the exclusive holding of the king. While suitable naval timber may have existed in Dean, Waltham, and other royal

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[18] 35 Henry VIII, c.17, *Statutes of the Realm.*

[19] "A Proclamation Touching on Glasses, 1615," in James Larkin and Paul Hughes eds. *Stuart Royal Proclamations Volume I: Royal Proclamations of King James I, 1603-1625* (Oxford: Clarendon Press, 1973), 342.

forests, the preservation of deer for hunting and the satisfaction of political patronage within the Royal Forest system remained a great concern. As the case of the Forest of Dean reveals, the king's own interests in the forest, paired with those of commoners and customary claims to resource usage, complicated any attempt to use the forest for matters of national interest, even if that national interest was the King's debt.

Although until 1649 the Royal Forests did technically remain the property of the king, from the outset of the Civil War, changing political circumstances facilitated a different treatment of woodland. There was substantial political impetus for disafforestation and a change in woodland management, as both the enlargement of forest bounds and the destruction of naval timber in Dean were specific grievances listed in the Grand Remonstrance.[20] With the declaration of England's Commonwealth status in 1649, this direct state control of the material wealth of woodland only intensified, with the navy being the foremost institution to lay claim to state forest resources.[21] Military action and territorial growth were intimately tied to English aspirations as a commonwealth, and timber supplies figured as a prominent aspect of those aspirations. The Navigation Act, constructed with the aim of consolidating England's economic ties to its colonies and necessitated by the severing of the dynastic and historic linkages contained within the crown, required both a strong domestic shipbuilding capacity and a naval presence to enforce it.[22] Meanwhile, Cromwell's martial plans also relied heavily on naval presence and therefore, a guaranteed supply of timber. Cromwell's suppression of Irish rebellion,

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[20] "The Grand Remonstrance, and Petition accompanying it," (1641), items 21, 25.
[21] "May 1649: An Act Declaring and Constituting the People of England to be a Commonwealth and Free-State," in *AOI*, 122.
[22] David Armitage, "The Cromwellian Protectorate and the Languages of Empire," *Historical Journal* Vol. 35, No. 3, (1992): 535; "October 1651: An Act for increase of Shipping, and Encouragement of the Navigation of this Nation," in *AOI*, 559-562.

which has often been examined through a lens of land conflict, also required extensive navy-backed supply networks and coastal patrols, to be waged successfully.[23] During the First Anglo Dutch War, when traditional timber supplies from the Baltic became unreliable, the navy also turned to Royal Forests as an important source of secure timber.[24] With these circumstantial demands for timber supplies, and without a king to serve as the personal and private proprietor of crown woodland, England's Royal Forests, Parks and Chases suddenly lost their symbolic status of Royal perquisite and took on new dimensions as a national resource. In short, as crown woodlands remained the possession of the state, but many of the historic and symbolic ties of royal prerogative to them were severed, their material usage for projects of national importance became the most obvious and sensible use for the woods.

In 1653, an act was passed for the disafforestation of former royal woodland possessions, in addition to the sale of other royal properties. This act aimed to settle the demands of all claimants to resources within Royal forests, and to set aside appropriate land for their needs. The material benefit of the state was also a powerful imperative, as the trustees of the forests were tasked with surveying all timber trees, marking them, valuing them, and then certifying that the purchaser of a parcel of land would be responsible for delivering a set quantity of timber on the order of the Council of State at an indeterminate point in the future.[25] By September of 1653, twenty six of fifty eight Royal forests had either been disafforested, sold, or partially sold, in

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[23] Elaine Murphy, "The Navy and the Cromwellian Conquest of Ireland, 1649-53," *Journal for Maritime Research* Vol. 14, No. 1 (2012): 2-4.
[24] Sara Morrison, "Forests of Masts and Seas of Trees: The Restoration Navy and the English Royal Forests," in Nancy L. Rhoden ed., *English Atlantics Revisited: Essays Honouring Professor Ian K. Steele*, (Montreal: McGill-Queens University Press, 2007), 137.
[25] "November 1653: An Act for the Deafforestation, Sale and Improvement of the Forests and of The Honors, Manors, Lands, Tenements and Hereditaments within the usual Limits and Perambulations of the same. Heretofore belonging to the late King, Queen and Prince," in *AOI*, 783-812.

counties throughout the realm.[26]

In the same year, Major John Wade received instructions to set up a naval iron production operation in Dean, reviving an existing iron furnace which had formerly belonged to John Wintour and constructing another.[27] To source fuel for this operation, Wade was given the power to "give order for cutting wood within the forest to make charcoal, and take care that it be dotards, or not fit for timber; and in case, after it is cut, you find any timber, you are to preserve it for the navy or other uses."[28] Thus, while Wade's task of making naval iron did not have harvesting of timber as its primary aim, the creation of a timber reserve was a subsidiary purpose.

With time, timber harvesting grew to become a much more important aspect of Wade's tenure as an administrator of the forest. In August of 1656, seeing Dean as the most fit location for the construction of a fifth rate frigate, the Commissioners of the Navy dispatched Daniel Furzer, a shipwright, to the forest, with the intention of having Major Wade oversee the finance and provisioning of the operation.[29] In making this move, the Navy Commissioners took a further step toward a sort of vertical integration for shipbuilding, in which the state cut out manufacturers of both iron and timber merchants from the supply chain in the construction of ships, instead sourcing their materials directly from the state controlled woodlands themselves. Within the span of a decade, Dean's administration by the state had shifted from being a revenue generating apparatus governed by middlemen to a material resource for national defense directly

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[26] SP 18/40 f.66; SP 18/40 f.68.
[27] For a fuller account of these operations, see A.R. Warmington's summary in *Civil War, Interregnum and Restoration in Gloucestershire, 1640-1672* (Suffolk: The Royal Historical Society, Boydell Press, 1997), 129-133.
[28] SP 25/70 f.289.
[29] SP 18/143 f.235.

exploited and administered by state appointed officials and institutions.

The 1657 Act for the Mitigation of Forest Law further amplified the already extensive direct control the state exercised in Dean. The act afforded tenants unprecedented powers over their own property, while also awarding novel tools to the state to maintain its own interests in woodland resources. The Act voided the leases of the king's former grantees. It restored the demesne woods to their condition in the twentieth year of the reign of James I and liberated tenants to fell trees which lay within the bounds of their own holdings.[30] Of greatest benefit to the state's ability to muster woodland resources was the provision which permitted the Protector to enclose one third of waste lands on a rotating basis to ensure the growth of timber and wood. In this way, not only was the state able to muster timber supplies for shipbuilding and wood for fuel for naval iron, but it was also able to ensure continuous growth which would support their operations into the future. However, the broad extinguishing of common rights which came with the enclosure of a third of the forest's wastes summoned the same popular ire which had formerly confounded the attempts of the Stuarts to profit from the forest. While the expanded property rights of tenants under the act was popular with this relatively small segment of the population, it excluded the many cottagers and other seasonal labourers who held few rights in the forest.

As had been the case in preceding decades, this deprivation of rights was met with widespread riotous behaviour in the forest, directly targeting the harvesting of resources. In 1660, Wade wrote in despairing terms to the Commissioners of the Navy:

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[30] "June 1657: An Act for the mitigation of the rigor of the Forest Laws, within the Forest of Dean, in the County of Glocester, and for the preservation of Wood and Timber in the said Forest.," in *AOI,* 1114-1115.

> My humble entreaty is that my account may be taken and I discharged, for it eats my very heart and mind to see the barbarous dealings that are done in this forlorn, disowned piece of ground, so much talked of, and so little cared for in reality. It lies at such a pass now that it is dealt with by the inhabitants as if proclamation were made, " Let all the waste, spoil, and destruction be done and committed upon the Forest of Dean that the hearts of wicked people can invent or imagine to do." It had been better that the State had given 10,000*l*., and I dare say twice told, than that the same law that preserved should have been forborne to be executed, which has been the cause of all the ruin that has followed.[31]

Although Wade and his superiors had bold and ambitious plans to convert the Forest of Dean into a powerhouse of integrated naval production, their efforts were confounded by precisely the same social forces which impeded the financial exploitation of the forest in preceding decades. Wade was also astute to observe that Dean's potential lay as much in its rhetorical political value as in its actual resource wealth, and that while it was often cited as a major asset for naval construction, there seemed to be insufficient political willpower to see it realised as such.

Nor were riots the only issues that Wade faced in his administration for the forest, particularly in the construction of ships. A chronic lack of funds hindered much of Furzer's attempts to construct the frigate. For instance, in 1658, Furzer wrote to complain that in the shipyard he had no place for shelter, no money to provision the workers, and insufficient funds to muster the requisite materials for shipbuilding.[32] The availability of a cash supply to finance the shipbuilding operations was a perennial issue for Furzer, and indeed, for Wade. Administrative inefficiencies requiring officials in relatively distant Dean to wait on orders from London, and correspondingly creating delays in the provision of financing significantly hampered the productivity of the project. Nevertheless, Wade's activities in the forest enjoyed considerable success during the Protectorate – by 1660, the project had generated £41,000 income and £12,000 profit, in addition to providing hundreds of tons of iron and timber for use by the navy at

[31] SP 18/220 f.128.
[32] SP 18/184 f.41.

the cost of production, without the corruption and extra expense engendered through the use of leasing to industrialists.[33] The project also achieved a good deal of support among landholders even if it precipitated riots amongst their humbler neighbours, as a 1655 petition signed by many members of the landed class specifically called for a constable to be appointed to arbitrate their disputes, which in turn signified the broad level of support that existed for some degree of state intervention in the administration of the forest.[34]

Although many of the achievements of Parliamentary rule and Cromwell's protectorate were curtailed or erased at the end of the Interregnum, the new approach to treating forests as directly exploitable resources, particularly for naval production, remained intact. No doubt, this owed in part to the fact that the changes were largely policy adaptations rather than the formal products of statute, with the exception, of course, of widespread disafforestation. Certainly, there was some degree of return to the former status quo which had existed under James I and Charles I. For instance, Sir John Wintour, an ardent Royalist, was permitted to resume his tenure of some of the properties in Dean which he had lost at the beginning of the Civil War.[35] However, many of the individuals who had facilitated the direct naval usage of state timber supplies during the interregnum remained in their offices and continued to facilitate the extraction of forest resources. Daniel Furzer, the shipwright, continued to construct ships near Dean and elsewhere using crown timber resources after Charles II's accession– clearly the value of the Protectorate-era project was noticed, thus justifying its retention.[36]

Thus, from the time that Parliament assumed control of England to the end of the

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[33] Warmington, 131-132.
[34] SP 18/102 p.83.
[35] SP 29/54 f.66.
[36] SP 29/10 f.151; Warmington, 133.

Protectorate, the state approach to forestry in England underwent a substantial shift. What had formerly been the private preserve of kings had become a national storehouse of naval resources. Where middlemen and grantees had formerly facilitated the exploitation for forest resources, now officers of the state directly extracted resources from the forest, and then constructed instruments of national defense with those same resources. In turn, this approach prompted the state to consider a variety of novel woodland management techniques, approaching what might be called silvicultural, developed through its leading institution of state forestry, the navy.

Silvicultural Knowledge During the Restoration

By the time of the Restoration, the approach to state forestry in England had been profoundly altered, although this change was largely at the level of policy and administration – further developments in the methods through which timber harvesting and shipbuilding were carried out would continue into Charles II's reign. These changes in how exactly the state measured, processed, and managed timber are significant, although they have received relatively little attention in the context of state forestry. Much of Albion's analysis of timber supplies contained in *Forests and Sea Power: The Timber Problem of the Royal Navy, 1652-1862* focused on administration at the governmental level, and in the near century since its publication, the work has been characterised as heavily reliant on tenuously supported criticisms of British ship design, dockyard corruption, and administrative inefficiencies.[37] Undoubtedly, the navy as an institution played a large role in timber management, and as the preceding discussion of developments during the interregnum has shown, developments in policy and administration were very important to shaping state forestry as it existed in the second half of the seventeenth

[37] Roger Knight, "New England Forests and British Seapower: Albion Revisited," *American Neptune*, Vol. 46, (1986), 221-9.

century. In the period, the Navy became arguably the largest state consumer of timber as its fleet grew both in number and size of ships - the *Royal Katherine*, built between 1662 and 1664 at Woolwich, required over 1,900 loads of timber for its construction, the equivalent to as many trees.[38] That such large vessels came to be characteristic of the Restoration navy, in a period following the decimation of many private timber estates during the Interregnum, only heightened the pressure.[39] Consequently, forestry became the business of naval administrators, both at the dockyard and in the corridors of power. A contemporary speech to Parliament drafted by Samuel Pepys made the connection between the national use of English woodland, the material requirements of shipbuilding, and the strength of the navy abundantly clear: "[i]t is Sir Anthony Deane's [a naval shipwright] judgement all the king's forests, and private men's timber within twenty miles of his Majesty's yards and river of Thames, will not afford compass timber, knees, standards, break hooks, &c., to build two first-rates and six second-rates in four years."[40] Generally speaking, with scarce timber supplies and an enormous demand for wood, the navy became the chief practitioner of state forestry in seventeenth-century England.

However, the turn toward a material interest in the forest in the seventeenth century was not simply encapsulated by the management of state owned woodland for and by state institutions. Of equal importance were intellectual developments relating to how forest resources were stewarded and used, how trees were planted, surveyed, harvested and finally, prepared for use in the construction of vessels. The methods through which woodland materials were

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[38] J.D. Davies, *Pepys's Navy: Ships, Men and Warfare 1649-1689*, (Barnsley: Seaforth, 2008), 69.
[39] N.A.M. Rodger, *The Command of the Ocean: A Naval History of Britain, 1649-1815,* (New York: Norton, 2005), 217; Davies, 69.
[40] J.R. Tanner, *Naval Manuscripts in the Pepysian Library at Magdalene College Cambridge,* Publications of the Navy Record Society, Vol. 26, (1943), 49-50.

processed was equally as important a change as the reconceptualization of woodland resources as national resources. This concurrent but much less readily identifiable development occurred not at the highest levels of power and administration, but on the fringes of institutions, and was carried primarily on the backs of individuals committed to intellectual networking and indulging their curiosity, whose novel methods and approaches to silviculture eventually influenced the actions of the Navy itself. These actors were both inside and outside of formal state institutions. This was particularly evident in the intersection of empirical inquiry and the world of naval forestry. Samuel Pepys, a prominent naval administrator, acted as the president of the Royal Society and sponsored the publication of forestry-oriented research in *Philosophical Transactions*, which was itself conducted by Robert Plot as part of his own enquiries into the natural history of Staffordshire.[41] In 1670, Anthony Deane, a naval shipwright, penned a manuscript titled *Deane's Doctrine of Naval Architecture* as a gift to Pepys, wherein he claimed to apply mathematical concepts to the vernacular art of shipbuilding in completely novel ways which, in addition to discerning the displacement of a ship, also used timber more judiciously in construction and standardised the measurement and usage thereof. Meanwhile, individuals with little to no formal association with the navy nevertheless made substantial contributions to ensuring that the navy had a reliable supply of timber. Perhaps most famously, John Evelyn's *Sylva* promoted the use of private plantations as a means of bolstering the national timber supply. Elsewhere, political arithmeticians such as William Petty and Andrew Yarranton proposed bold new schemes to expand and consolidate the navy's access to timber supplies. These new ideas,

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[41] Margaret Willes, *The Curious World of Samuel Pepys and John Evelyn* (New Haven: Yale University Press: 2017), 127; Robert Plot, "A Discourse concerning the Most Seasonable Time of Felling of Timber; Written by the Advice of the Honorable Sam. Pepys Esq; Secretary of the Admiralty, and Presented to His Late Majesty," *Philosophical Transactions (1683-1775)* Vol. 16 (1686): 455-61.

while nebulous in some respects, condensed around three major imperatives.

The first of these was that state forestry was becoming increasingly accurate as the navy sought to apply mathematical principles to the measurement of timber and the construction of ships. For instance, to the end of improving his ability to negotiate timber contracts and ensure that best practices were being followed, Samuel Pepys educated himself in mathematics and practical measurement, including the use of relevant instruments. His collaboration with Anthony Deane in learning to measure timber, in conjunction with Deane's more general work in mathematics offers an excellent example of knowledge creation and sharing in the sphere of forestry, and attests broader trends in the period toward accuracy and precision in the use of woodland, much as had been the case with the prevalence of estate surveys in the early seventeenth century.

A second imperative, the improvement of efficiency, was also a leading motive in developments in state forestry. John Evelyn made critical contributions to these efforts through his publication of *Sylva*, and the intellectual circles in which both he and officials like Pepys positioned themselves served as powerful mediums for conceiving of new ways to increase the efficiency with which the state used its woodland resources. Members of the Royal Society tested the strength of wood and speculated on seasonable times for felling timber, while private partnerships applied principles of engineering to producing more efficient ship designs.

Finally, contemporary theorists sought to apply these principles of accuracy and efficiency in the broadest territory possible, making their consumption of timber exploitative. Throughout the period, naval officials were extensively engaged in the continual search for new

timber resources, whether from Royal Forests, private groves, or abroad.[42] Ultimately this expansionist tendency saw the Massachusetts Charter instantiate a government interest in mast timber in 1691, emblazoning the mark of the broad arrow on tree-trunks across New England, which summoned the ire and fury of new England colonists who saw other needs for the king's trees.[43] Yet before this point of expansion, the single most prominent non-domestic source of timber for the navy was the Baltic region, which was unreliable owing to corruption, unreliability, and competition, as interactions between naval officials and timber merchants attest. As an alternative, contemporary theorists sought not only to source their timber from new resources, but also to increase the exploitation of existing resources and to integrate crown forests as a direct crown asset to be used exclusively for the ends of the government. Through ambitiously proposing to redirect the flow of rivers and re-draw the organisation of Royal Forests, contemporary theorists such as William Petty and Andrew Yarranton used political arithmetic to conceive of the forest as a truly national resource.

All the while, these developments flowed through three distinct conduits of innovation, those being the institutional, as embodied by the Royal Society and the Royal Navy, the practical, as embodied by actual practices in shipyards, and finally, the informal, as exemplified by the many private initiatives and personally driven pursuits which generated new approaches to state forestry. Thus, while on a broad administrative level the state reconceptualised its use of woodland, in the forests themselves changes to how the state used the material resources of woodland were afoot, with contemporary actors seeking to make state forestry more accurate

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[42] Robert Greenhalgh Albion, *Forests and Sea Power: The Timber Problem of the Royal Navy, 1652-1862* (Hamden: Archon Books, 1965), 226-227.
[43] Joseph J. Malone, *Pine Trees and Politics: The Naval Stores and Forest Policy in Colonial New England, 1691-1775* (Seattle: University of Washington Press, 1964), 10.

through the application of mathematics, more efficient through the use of natural philosophy, and more exploitative by using political arithmetic. These intellectual changes might be viewed as the development of a silvicultural skillset to complement the new material interest the state took in its woodlands.

Accuracy in Silvicultural State Forestry

While the first of these matters, accuracy, was a quotidian concern, largely touching on the matters of individual skillsets rather than governmental policy or paradigm shifts in natural philosophy, it was essential to both the imperatives of efficiency and an increasingly exploitative policy. Much as surveys allowed the state to assess the financial potential of woodland, accurate methods of mensuration and ship construction facilitated the valuation of the forest for its material value, that is, the number of beams, boards and other components which could be extracted from timber trees. As part of broader early modern trends toward replacing traditional estate management with surveying techniques, and a greater technological sophistication of naval engineering, the Royal Navy also made the measurement and usage of timber more accurate through using mathematics and instrumentation.[44] In so doing, the state enhanced its ability to apprehend woodland beyond an abstract profit potential, and instead assess the material wealth of the forest, a key aspect of the treatment of woodland as a national resource.

If acquiring timber for naval use was a difficult problem, ensuring that it was reliably sized and accurately measured was equally troublesome. Under the contract system employed by the navy for acquiring timber, suppliers were bound to provide specific quantities and qualities of timber at particular dates specified in the contracts, drawn up on printed forms, subject to the

[44] Andrew McRae, "To Know One's Own: Estate Surveying and the Representation of the Land in Early Modern England," *Huntington Library Quarterly,* Vol. 56, No. 4 (1993), 333.

right of rejection by navy officials who found the supplied timber to be unsatisfactory.[45] Yet the errors of both those working in the shipyards and the forests created a significant potential for waste of precious timber resources. Often, vernacular practice and tradition perpetuated inaccurate methods, as was the case with Jonas Shish, a master shipwright described by John Evelyn as of "great ability" yet "one that can give very little account of his art by discourse, as hardly capable to read."[46] In 1664, Samuel Pepys was dismayed to find that upon asking Shish to measure a piece of timber, he did so "most cruelly wrong, and to the King's loss 12 or 13s. in a piece of 28 feet in contents."[47] Other dockyard officials were similarly guilty, such as a timber measurer in whose methods Pepys "found much fault and with reason, which we took public notice of, and did give them admonition for the time to come."[48] The source of timber was similarly apt to be wasteful, such as when Pepys and Deane rode "into Waltham Forest, and there we saw many trees of the King's a-hewing; and he showed me the whole mystery of off square, wherein the King is abused in the timber that he buys, which I shall with much pleasure be able to correct."[49] In both cases, we see evidence that Pepys saw improving the measurement of timber to be an action for the good of the navy and the service of the king, as in addition to minimising waste, possessing an objective and consistently accurate method of measuring timber would allow him to dispute timber contracts with merchants and their patrons on the navy board, one of the most valuable areas of naval acquisition.[50]

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[45] Robert Greenhalgh Albion, *Forests and Sea Power: The Timber Problem of the Royal Navy, 1652-1862* (Hamden: Archon Books, 1965), 39.
[46] John Evelyn, *The Diary of John Evelyn*, ed. E.S. De Beer (London: Everyman's Library, 2006), March 3, 1667/8.
[47] Pepys, Friday, July 22, 1664.
[48] Pepys, Monday, August 3, 1663.
[49] Pepys, Monday, August 18, 1662.
[50] Loveman, *Samuel Pepys and His Books*, 72.

Pepys and his contemporaries in the navy found this objective method in the application of mathematical measuring instruments. In March of 1662, he purchased a slide ruler for measuring timber from John Browne, a London mathematician and instrument maker.[51] In the following days, he studied both the ruler and the accompanying book he purchased with it, intently.[52] Although Pepys did not record the work he purchased by title, it was likely a copy of one of John Brown's own works, either *The Description and Use of the Carpenters-Rule*, which had been published earlier that same year, or *The Description and Use of a Joynt-Rule* published in 1661.[53] Generally, both the device and its accompanying book set out to improve the accuracy and speed of measuring various building materials, timber included among them.

This use of mathematical instruments to measure timber fit into the broader early modern trend toward rendering vernacular methods more accurate with the use of instruments and mathematics. Much as the liquidation of the monastic estates had prompted a growth in surveying proficiency, it had also encouraged the proliferation of technical manuals instructing the reader in the skills required for surveying, which in turn created greater numeracy and technological literacy.[54] Generally, the authors of these texts, especially in the seventeenth century, espoused the view that astronomy, navigation, architecture and surveying were all

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[51] Eileen Harris, *British Architectural Books and Writers, 1556-1785* (Cambridge: Cambridge University Press, 1990), 126.
[52] Pepys, March 25, 1662/1663.
[53] John Brown, *The Description and Use of the Carpenters-Rule,* (London: 1662); John Brown, *The Description and Use of a Joynt-Rule*, (London: 1661); Loveman, *Samuel Pepys and His Books*, 72-73. Loveman's assessment that Pepys read the later of these two works is justified by the presence of the same volume in Pepys' library (PL 85, Magdalene College, Cambridge). However, the earlier work, owing to its earlier publication, and mention of White as inventor of the ruler by name, which Pepys seems to have repeated, remains equally plausible as the title of the text he purchased.
[54] Elizabeth McKellar, *The Birth of Modern London: The Development and Design of the City 1660-1720* (Manchester: Manchester University Press, 1999), 141; Rudolph Wittkower, *Palladio and English Palladianism* (London: Thames and Hudson, 1974), 97.

embraced uniformly by the mathematical sciences, and as such, their guidebooks sought to apply mathematical knowledge to these trades which were otherwise practical in many respects.[55] At the same time, the expansion of maritime trade had brought about a growth in the use of instrumentation which was readily applied to the building trades.[56] While some authors may have had aspirations of edifying their audiences with mathematical theory, Deborah Harkness has shown that from their inauguration in the sixteenth century, practitioners were content to use the devices even if they did not understand the intricacies of their function.[57] Evidently, this same phenomena was at work in the slide rulers and number lines Pepys and his contemporaries used to measure timber. For instance, Moses Cook's forestry manual included a "A Table shewing the solid Content of one foot Length, of any piece of Timber according to the superficial Content taken at the End thereof" which the reader could easily consult to determine a measurement rather than requiring an advanced knowledge of the mathematical theories undergirding his approach.[58]

The case of Anthony Deane, a shipwright at Woolwich, offers a similar testament to the extent to which mathematics was becoming an important aspect of the functioning of the Royal Navy. Deane, a shipwright at the Woolwich Dockyard, instructed Pepys directly on the matter of measuring timber on several occasions and applied his own mathematical knowledge to shipbuilding.[59] In 1670, he authored a manuscript text that outlined the necessary mathematical

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[55] Wittkower, 97.
[56] Harris, 41.
[57] Deborah Harkness, *The Jewel House: Elizabethan London and the Scientific Revolution* (New Haven: Yale University Press, 2007), 130.
[58] Cook, 172.
[59] B. Lavery, "Deane, Sir Anthony (c. 1638–1720?), shipbuilder," *Oxford Dictionary of National Biography* (January 3, 2008).

calculations for determining the dimensions of a ship.[60] Remarkably similarly to the technical manuals of his period, Deane's manuscript contained tables revealing the necessary rigging for various rates of naval vessels, and copious geometrical examples for the design of ships.[61] While never published in a formal capacity, Deane's treatise constituted part of an ongoing trend in the codification and formalisation of shipbuilding practices. Shipwrights' texts had been in print since the middle of the previous century, Bushnell's *The Compleat Ship-Wright* of 1664 marking a transition from practice and doing-based shipwright techniques, transmitted orally, to a mathematical basis for the craft, a trend which Deane appears to have mirrored in his own writing.[62] Indeed, in many ways Deane's treatise demonstrates a more profound grasp of mathematical principles and their application, particularly in the calculation of displacement, than Bushnell's work.[63] Insofar as the actual measurement of timber was concerned, it is quite likely that he applied the same standards of measurement in which he had instructed Pepys to the regular discharge of his duties, evidenced by numerous letters to the Navy Commissioners outlining the size, quality, and cost of prospective timber supplies, as was the case when in 1664, Deane and Robert Magors visited Ditting, and did there "view of all the said timber thereabouts, and have marked and bought thirty loads of compass timber, and eleven loads of knee timber."[64]

The drive to increase the accuracy with which the navy used its timber supplies can be

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[60] Anthony Deane, *Deane's Doctrine of Naval Architecture, 1670,* ed. Brian Lavery (London: Conway Maritime Press, 1981).
[61] Ibid., 85-87.
[62] Elizabeth Tebeaux, *Flowering of a Tradition: Technical Writing in England, 1641-1700* (Abingdon-on-Thames: Routledge, 2014), 166.
[63] Ibid, 172.
[64] "Anthony Deane and Robt. Magors to the [Navy Comrs.]" October 15th, 1664, SP 29/103 f.86 ff. 86. This letter, while signed by both men, appears to have been composed by Magor, as the handwriting is distinct from that of other letters penned exclusively by Deane, such as SP 29/73 f.109.

seen, therefore, as an extension of the same imperative which drove the state to employ surveys in ascertaining the values of its timber holdings earlier in the century. Knowing the extent of resources available and ensuring that their judicious use could be authenticated was essential to the exploitation of the forest as a national resource, as without it an already scarce resource could be wasted to the damage of the whole kingdom.

Efficiency in Silvicultural State Forestry

Even if the Navy was increasingly well-equipped to accurately measure its timber, it still faced the problem of having insufficient quantities of the material for use in shipbuilding. The solutions sought by contemporaries to rectify the issue of timber scarcity fell broadly under one of two categories: exploitation, that is, expanding the scope of timber harvesting to include regions not previously considered, or efficiency, that being to use available resources more judiciously than before. Both of these imperatives within forestry may be considered as part of broader contemporary desires for improvement which had commenced earlier in the century. Before and during the Civil War and Interregnum members of the Hartlib Circle, itself a precursor to the Royal Society, frequently wrote on various topics of improvement, with the conservation of timber cited alongside orchard plantations and educational reform as improvements which could be made for the public good. This notion of public welfare, related to the concept of improvement, was a similarly useful concept, which both affirmed government action and placed limits on the just extent of prerogative rule. Over the course of the century, dictionary definitions of the term ‘improvement’ slowly changed from simply meaning to raise rents, to benefits to a profession, before becoming associated with reforms in the public interest

in the eighteenth century.[65]

Naturally, efficient practices can also be exploitative, and vice versa, and thus it is difficult to always distinguish between the two. For instance, when Andrew Yarranton mused about the linkage of the rivers Severn and Thames to improve the navigability of England's waterways, the proposal was one which both created greater efficiency in transportation and simultaneously enabled the more exploitative use of England's natural and agricultural resources.[66] However, for the purposes of this discussion, the key distinguishing factor of efficiency is the act of making more with less, specifically, the application of scientific principles to forestry with the aim of maximising the productivity of woodland resources and their use by the navy. Whether through analysing the suitability of various soil qualities for different species, assessing the best methods for felling timber, or creating ship designs less reliant on scarce shapes of wood, much as mathematics was being applied to timber measurement, so too was early scientific thought shaping the way in which timber was grown and used in naval enterprise. Thus, through the course of the late seventeenth century, naval forestry was being made more efficient through the application of natural philosophy to its precepts. Whether the publication of technical treatises on tree planting and species variations, studies on the most seasonable time for felling timber, or designing ships which made more efficient use of timber, state forestry as it manifested itself in the navy was intermingling with developments in the world of natural history through the conduit of varied networks of learning.

Sylva, published in 1664 and first presented to the Royal Navy Commissioners in 1662, may be considered emblematic of these processes, having aspired to address problems of

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[65] Paul Slack, *From Reformation to Improvement Public Welfare in Early Modern England* (Oxford: Oxford University Press, 1999), 80-82.
[66] Andrew Yarranton, *England's Improvement by Sea and Land*, (London: 1677).

efficiency in the broadest possible sense. In its full title, Evelyn explicitly set out its purpose as discoursing upon "Propagation of Timber in His Majesties Dominions."[67] However, *Sylva*'s reputation as the triumphal opus of a seventeenth-century virtuoso elides the extent of its collaborative and compiled nature. While Evelyn undoubtedly wrote the treatise, and his name has become invariably associated with it, the content of the work was the result of both the codification of traditional knowledge, much as had been the case with Deane's *Doctrine*, and the creation of new knowledge through a series of partnerships and collaborations. From its outset, the silvicultural work relied on a broader base of knowledge than that simply possessed by Evelyn; the Navy's original request for proposals on propagating timber were received by John Goddard, Christopher Merret, and John Winthrop, all early members of the Royal Society. Evelyn, in his experience as an author and gardener, simply combined their papers.[68] The collaborative nature of Evelyn's work only became more apparent in its successive editions. In 1665, for instance, Evelyn solicited submissions that could contribute "to the part, which concerns the improvement of forest-trees or that of cider" in an advertisement in *Philosophical Transactions.*[69] In succeeding editions, the information generated by John Smith, Dr. Robert Plot, Moses Cook, and William Petty, among others, appeared in his work.[70]

The formal framework of the Royal Society as a forum for collaboration also assisted Evelyn considerably. For instance, in a later edition of the work, Evelyn communicated an experiment whereby members of the society tested the various strengths of wood using different

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[67] Evelyn, *Sylva*, (London, 1670).
[68] Beryl Hartley, "Exploring and Communicating Knowledge of Trees in the Early Royal Society," *Notes and Records of the Royal Society of London,* Vol. 64, No. 3 (2010), 230.
[69] *Philosophical Transactions*, Vol. 1, No. 22, (May 30, 1665), 398.
[70] Lindsay Sharp "Timber, Science, and Economic Reform in the Seventeenth Century," *Forestry*, Vol. 48, No. 1, (1975), 64.

thicknesses and species, and subjecting them to weight stress, an experiment which was ultimately repeated with consideration of the effect of age, knots, solidness, soil of origin and location on the tree on how far the wood could bend before it broke.[71] In other ways, the knowledge contained in *Sylva* represented a codification of traditional knowledge, much as Anthony Deane's *Doctrine* had laid down well-established principles of shipbuilding. For instance, consider Evelyn's technical and detailed treatment of the coppicing potential for different species such as hazel. His description of how "being Planted about *Autumn,* may (as some practise it) be cut within three or four inches of the ground the *Spring* following, which the new *Cyon* will suddenly repair, in clusters and tufts of fair *poles* of twenty, and sometimes thirty foot long" simply represented a more formal and mechanical description of coppicing practices common to sixteenth-century husbandry manuals. John Fitzherbert's *Boke of Husbandry*, published in 1540, simply described the process in a more vernacularly attuned fashion, in the rhyme "Lop poplar and sallow, elm, maple, and pry, / well saved from cattle, till Sommer to lie. / So far as in lopping, their tops ye doo fling, / so far without planting young coppice will spring."[72]

Yet inasmuch as *Sylva* certainly represented the culmination of much silvicultural research and learning and benefitted the kingdom with the planting of many trees as Evelyn claimed, accepting that this progress was made almost solely at the direction of his work would be to obscure many other valuable scientific achievements in the realm of forestry.[73] Where *Sylva* sought to solve the problem of timber supply in broad and sweeping strokes, there were others who focused intently on specific issues which while at once a manifestation of scientific

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[71] *Sylva*, 183.
[72] John Fitzherbert, *Boke of Husbandry*, (London, 1540), 79.
[73] *Sylva*, Preface.

curiosity, were explicitly applied to the problems the navy faced in its efficient use of timber.

For instance, we might consider the case of ensuring that before felling, and after felling, timber was not susceptible to rot. This was evidently an issue facing the navy in Pepys' time, as he remarked in his 1690 publication *Memories Relating to the State of the Royal Navy* that he found toadstools the size of his fists growing in the unaired hulls of ships, the timbers and planks of the ships "in many places perished to powder."[74] In many cases this rot owed to insufficient allowance for the wood to season, with short supplies prompting shipwrights to use the wood as soon as it was available rather than allow it to dry for the traditional three years.[75]

In 1686 Dr. Robert Plot saw his paper "A Discourse Concerning the most Seasonable Time of Felling Timber" appear in *Philosophical Transactions*. Plot's paper sought to codify and rationalise vernacular practice to the end of improving the quality of timber available for naval use.[76] Essentially, during his time in Staffordshire writing a natural history of the region, Plot observed of timber that "they have this very good custom, that they flay it standing about the beginning or middle of May" and did not actually fell the tree "until mid winter or the ensuing spring."[77] This, Plot contrasted with the southern English practice whereby trees would be felled in the spring as soon as the sap began to flow, their bark being stripped immediately.[78]

By the scientific reckoning of his time, Plot was able to explain the numerous advantages

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[74] Tomalin, *Samuel Pepys: The Unequalled Self,* 332; Samuel Pepys, *Memories Relating to the State of the Royal Navy of England,* (1690), 18.
[75] Robert A. Church, *Depletion of the Sylvan Sea: Seventeenth-Century English Shipbuilding*, (Columbus: Past Foundation, 2008), 28.
[76] Discussions of Plot's research, and his projects in Staffordshire are documented in *Sir Han Sloane's Minute Books of the Royal Society Meetings, 1686-1691*, Ordinary Meeting of the Royal Society May 18, 1687, November 28, 1688, MS/575, Royal Society Archives. His research in Staffordshire culminated in the publication of Robert Plot, *The Natural History of Staffordshire*, (Oxford: 1686).
[77] Robert Plot, *The Natural History of Staffordshire*, (Oxford: 1686), 382.
[78] Plot, "Most Seasonable Time for Felling of Timber," 456.

such a process rendered in the use of timber. According to his understanding, spring felled timber was susceptible to rot as "their cavities and pores being then turgid with juices or sap, which (the trees being felled at that time) still remain in the pores, having now no manner of means of being otherwise spent, and there putrify; not only leaving the tree full of there cavities which render the timber weak; but secondly breeding a worm as both Pliny and Mr. Evelyn testify, that will so exceedingly prejudice it, that it becomes altogether unfit for strong incumbencies, or other robust uses."[79] Furthermore, and of particular relevance to shipbuilding, timber felled in such a way was liable to extreme shrinkage and checking, on a scale reckoned by Plot to be "that a piece of such timber of a foot square will usually shrink in the breadth of ¾ of an inch; than which, says Vegetius, nothing is more pernicious if used for the building of ships."[80] By contrast, Plot reckoned that leaving the tree bereft of bark in the winter months caused its pores to close, and thus made it "acquire a sort of eternity in its duration."[81]

Plot was quite specific in elucidating the efficiencies of this method, making his discourse more than simple scientific conjecture, but a practicable and implementable policy which would accrue benefits to the kingdom. Specifically, Plot proposed that his method of felling timber warranted "the debate of a parliament, whether it might not be worth while to enforce this custom to be strictly observed all over the nation" and that it be applied to "so public a concern as the building of ships."[82]

In addition to the implicit suggestion that it provided stronger timber, Plot situated his argument in broader economic, political, and practical realms of efficiency. Where prohibitions

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[79] Ibid., 456.
[80] Ibid., 456.
[81] Ibid., 457-458.
[82] Plot, *Natural History of Staffordshire*, 382; Plot, "Most Seasonable Time for Felling of Timber," 459.

on felling timber for purposes other than shipbuilding or repairing mills had greatly harmed the tanning industry, which faced difficulty in securing adequate and cheap supplies of oak bark and its valuable tannins, the method practiced in Staffordshire allowed for an adequate supply of bark to tanners, and timber to shipbuilders, without forcing tanners to destroy woodland unnecessarily for the sake of their livelihood.[83] In terms of practical considerations, we can infer according to Plots' description that it also increased the quantity of useable timber in addition to strengthening it, as "the trunks of their trees so dried and hardened, that the sappy part in a manner becomes as firm and durable, as the heart it self."[84] Insofar as political economy, where the antagonistic relationship between king and parliament characteristic of much of the Stuart reigns posed considerable difficulty in implementing legislation, the method meshed tidily with existing laws, and Plot emphasized that His "Majesty has no need of giving yourself the trouble of procuring the alteration or repeal of that act."[85]Throughout his work, Plot made the most important argument that this application of scientific reasoning to timber would render growth more efficient, and thus render great benefit to the defense of the kingdom in the institution of the Navy.

These proposed policies, driven by natural philosophy, were not simply limited to improving existing timber; indeed, they extended to the efficient use of existing land as well. Captain John Smith, largely an economic writer, was well acquainted with existing the sphere of silvicultural knowledge-making - in 1673, John Evelyn penned the preface to his work, *England's improvement revived: in a treatise of all manner of husbandry and trade, by land and sea*, in which he gave detailed instructions for methods by which tree plantation in existing land

[83] Plot, *Natural History of Staffordshire,* 382; Ibid., 382.
[84] Plot, "Most Seasonable Time for Felling of Timber," 457-458.
[85] Ibid., 459. The act to which Plot makes reference is 1 Jac I ch. 22.

under crown control could be leveraged to increase the timber yield of the Royal Forests.[86] Lord William Brouckner, the then-president of the Royal Society, also gave the work his personal encouragement.[87] As a former Royal Forest official, Smith felt himself very advantageously positioned to identify inefficiencies and wastages in the forest, and to address them using principles of economics and more importantly, silvicultural science.[88] Most prominently, he advocated that sections of Royal Forests which lay within 20 miles of a river should be converted to plantations for naval timber.[89] To this end, he expounded a series of principles based in contemporary scientific understanding which would serve to ensure the success of tree plantations. Of soil, he employed both elemental and humoral theory to describe ideal conditions, with "that ground where one of the four elements doth most predominate is an apparent sign of barenness, as when the grounds are either extremely cold and moist, or else hot and dry."[90] Having identified appropriate soils for planting, those seeking to create plantations were then tasked with choosing suitable seeds, for which Smith gave detailed instructions as to the size and appearance of the choicest specimens, even outlining a process by which acorns could be tested for their buoyancy to discern the most suitable seeds for planting.[91] Having grown seedlings, the enterprising crown forester could then follow a detailed set of instructions for surveying and laying out the plantation according to principles of space, adequate drainage, and the provision of woodland pasture, while also being given precise instructions for placing the seedlings into the

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[86] Anita McConnel, "Smith, John (fl. 1631–1670), writer on trade," *Oxford Dictionary of National Biography*, (September 23, 2004).
[87] Pepys, October 21, 1668; Sharp, 60.
[88] John Smith, *England's Improvement Reviv'd Digested into Six Books*, (London, 1670), 7.
[89] Ibid., 19.
[90] Ibid., 34.
[91] Ibid., 43.

soil.[92] Practitioners of Smith's methods were urged to use clean knives when pruning seedlings, to take great care not to damage their roots, and to ensure minimal damage to the transplants as "every cut is a wound and the more wounds the greater danger."[93] At once a work of silviculture, but also of economics and practical policy Smith's work applied scientific principles in a practical way to making the growth of timber more efficient in England.

Clearly, although mathematical instrumentation allowed for the accurate use of materials within existing practices, there was a considerable push in the period to manipulate the very fabric of the forest to maximise the efficiency of crown timber resources. Institutions of knowledge creation and empirical inquiry, particularly the Royal Society, were keenly interested in manipulating woodland as it had hitherto existed in England to suit the needs of the state, whether through encouraging new plantation methods, or seizing upon naturally advantageous conditions for the seasoning of wood to maximise the efficiency of timber use by the navy.

The Exploitative Capacity of Silvicultural State Forestry

Evidently, theorists and natural philosophers engaged with the issue of timber provision, applying the scientific principles of their time to the more efficient use of timber resources, from planting and raising, to harvesting and use in shipbuilding. Yet to analyse these approaches to efficiency in isolation would be to misrepresent their scope; while on one hand various actors sought to make more from less with the timber resources of the Royal Navy, there was also a genuine attempt simply to expand the scale of timber resources available for consumption. Reactive solutions adopted by the Royal Navy to supplement inadequate timber supplies allowed

[92] Anita McConnell, "Smith, John (fl. 1631–1670), writer on trade," *Oxford Dictionary of National Biography*, (September 23, 2004).
[93] Smith, *Englands Improvement Reviv'd,* 26.

for the continued operation of the navy yards, and they were indeed exploitative in the sense that they simply sought out new timber resources. However, these approaches created critical weaknesses in the timber supply of the nation by making it susceptive to the currents of international politics and private enterprise. As an alternative, contemporary theorists advanced an exploitative model which was centered on integrating forest resources as a central aspect of crown property, disconnecting naval timber provision from traditional economic and political forces, and harnessing crown land for maximum exploitation of timber resources.

The Royal Navy's earliest attempts to be more exploitative in its use of timber did not rely nearly so heavily on theoretical frameworks or planning but were rather governed by practical economic concerns, reactive in scope and execution. The acquisition of masts, particularly, serves as excellent evidence. As the conifers and other tall timber required for ships' masts in England were naturally scarce, as was compass timber, the navy had been required to either import timber or rely on private supplies, which while inventive in its exploitative method, made the navy susceptible to the whims of both the market and politics in disadvantageous ways.

Perhaps most prominently, the importation of mast timber for Royal Navy ships made England's sea power beholden to foreign influence, the critical materials for her wooden walls crossing often hostile seas to reach shipyards in southern England. This was not simply an idle fear. Strict Swedish regulations curtailed the ability of merchants to trade freely in timber and made the fulfilment of contracts impossible in many cases, the unfavourable trade balance prompting numerous works of political polemic.[94] Thus, when in November of 1666 Samuel Pepys wrote to Lord Bruncker that "some, I hear, do fright us with the King of Sweden's seizing

[94] Joseph J. Malone, "England and the Baltic Naval Stores Trade in the Seventeenth and Eighteenth Centuries," *Mariner's Mirror,* Vol. 58, (1972): 377, 379.

our mast-ships at Gottenburgh," he referred to an expected and likely routine disruption in the provision of mast timber to England.[95]

Of less risk was trade in masts from New England, which became a more realistic possibility with the cancellation of the Massachusetts Bay Company Charter in 1684 and the institution of the 1691 Massachusetts Bay Charter with its provision reserving white pines for crown use. Later, in 1696, these changes were complemented by the establishment of the Commissioners for Trade and Plantations, which saw a gradual turn away from Baltic timber sources.[96] Nonetheless, even if less susceptible to geopolitical instability, the merchant system which brokered the trade held its own notable deficiencies.

Throughout Samuel Pepys' diary timber merchants appear as figures whose basically suspect nature and underhanded tactics frustrated Pepys' efforts to acquire reasonable deals for the navy. In April of 1664, Pepys was repeatedly confined to his office owing to an ongoing conflict between himself, navy officials, and a contract for New England masts to be supplied by William Wood.[97] In October of the same year, Pepys remarked on a much less eventful interaction, in which he "made a very great contract with Sir W. Warren for 3,000 loade of timber."[98] Repeatedly, Pepys expressed his suspicion of the competency and motives of the merchants. In February of 1661/62, William Pen remarked to Pepys "how Wood the timber merchant and others were very knaves."[99] Pepys himself noted how were he a foolish man, he might be easily duped by the likes of William Warren, as during the negotiation of a particular timber contract he lamented how "the whole business from beginning to end being done by me

[95] Pepys, November 29, 1666.
[96] Malone, 381.
[97] Pepys, April 14, 1664, April 15, 1664, April 16, 1664.
[98] Ibid., October 18, 1664.
[99] Ibid., February 8, 1661/62.

out of the office, and signed by them upon the once reading of it to them, without the least care or consultation either of quality, price, number or need of them."[100] New England timber was not exempt from these difficulties, as in one case, Pepys relentlessly haggled with Warren to the point of making him angry for the sake of securing a shipment of New England masts.[101]

Mast timber was not the only shipbuilding material which while exploitatively sought, was still difficult to secure for the navy. Compass timber, used for ships' knees and other structural timber, was often sourced not from crown forests, but from private estates. In Hampshire, for instance, the Earls of Carnarvon, the Montagus of Beaulieu, and the Nortons of Southwick were prolific suppliers of compass timber from the mature trees which graced their parkland estates.[102] Routinely, where foreign imports could not satisfy the demands of the shipyards, officials turned to private landowners for timber. Anthony Deane wrote to the commissioners of the navy in 1668 that through dealings with a Mr. Mayle, he could secure an exceptional deal on timber, rivalled only by the resources of New Forest, although the commissioners were forced to accept the offer in 14 days, lest he sell the timber to the Southampton shipyard, at a higher price.[103] On other cases, the navy was compelled to compete directly with private interests, as was the case when Deane lamented how a great quantity of fine timber available in Titchfield park was bought by private men to be turned into buckets.[104]

While the obviously reactionary strategies to be more exploitative in timber sourcing adopted by the Royal Navy did usually provide the required timber for shipbuilding, they were

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[100] Ibid., September 10, 1663.
[101] Ibid., August 12, 1664.
[102] A.J. Holland, *Ships of British Oak: The Rise and Decline of Wooden Shipbuilding in Hampshire*, (Exeter: David & Charles, 1971), 38.
[103] "Capt. Ant. Deane to the Navy Commissioners," October 22, 1668, SP 29/248 f.46.
[104] "Capt. Ant. Deane to the Navy Commissioners," October 19, 1668, SP 29/248 f.19.

fraught with complications, and most importantly, made the crown as subject to the whims of market and political forces as any average consumer. While the king could acquire compass timber from private lands, he was forced to pay for that timber at the same, or higher rates than private consumers, and to compete with them as well. Although the timber required was a direct extension of the state and its ability to defend the nation through military power, it was hardly integrated into the function of the state at all, a critical point of weakness. Yet contemporary visionaries were keen to imagine a national political economy in which crown timber was fully mobilised for the benefit of the nation, and raised in a sphere protected from the whims of the market. They posited a model whereby timber resources could be more exploitatively harnessed to achieve the goals of the state, particularly with respect to the navy.

At its most basic, these proposals involved the intensive cultivation of existing crown land, ostensibly to make timber resources a direct state institution rather than a commodity obtained on open markets. The Royal Forest was the most obvious crown landholding institution for such a project, and, as an entity, was subject to various proposals to make it a more extensively exploited resource. This, at least, seems to have been the imperative of the commissioners of the Navy Board when they sought out John Smith's advice for preserving forests when the King had "taken into consideration the great wastes and decay of all woods and timber in England, especially in his own forests" and resolved "not only to preserve those young trees which were left standing, but to plant others for a future supply.[105] This programme of plantation was a generally popular solution to timber shortage, and advanced widely by natural philosophers and economists alike. In November of 1662, Evelyn prompted the Royal Society to discuss planting the Forest of Dean with oak, no doubt applying the idea of tree plantations,

[105] Smith, *England's Improvement Reviv'd*, To the Reader, n.p.

which he lauded in the context of private gentleman's estates, to a more state-focused sphere.[106]

The proposal also sought to bring territories which were already under crown control into the sphere of naval forestry and turn them into centres of military production. This approach was most comprehensively articulated by Andrew Yarranton, who in 1677, after having surveyed swaths of Ireland, noted that "in Ireland are great and strange quantities of timber to build ships, and places to build them, and at three fifths of the rates the king now builds at, with convenient places to lay up the ships."[107] In this case, rather than simply changing the way the land was used, as was the case with plantations, Yarranton advocated changing the physical geography of the countryside to bring existing forest resources within the reach of the navy. The obvious problem was that for all the richness of Ireland's woodland resources, they "could not be come at, the mountains and bogs having so locked them up, that they could not be brought to any sea-port to be employed in building of ships."[108] As a solution he posited that the river Slane "might be made navigable for ten thousand pounds, as all those wood may with ease and at very cheap rates be brought down the Slane to Wexford, and to other places near thereunto, to build men of war and other ships."[109] He advocated a similar, if more ambitious project to facilitate the exploitation of England's forest resources as well, noting that the Thames and Severn "are distant in the nearest place forty miles from each other, and so there is no advantage made of these two eminent rivers, in being helpful one to the other in point of carriage" and thus advocated linking the two waterways, which would improve, among other things, the transport of

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[106] Evelyn, November 5, 1662. On several occasions, Evelyn lauded timber plantations on noble estates he visited, for instance, see August 2, 1663; October 24, 1664.
[107] Andrew Yarranton, *England's Improvement by Sea and Land*, (London: 1677), 38.
[108] Ibid., 39.
[109] Ibid., 39-40.

timber.[110] To complement this programme of increased riparian navigability, Yarranton advocated bringing the centres of naval industry closer to their material supply to exploit them, advocating the establishment, as mentioned, of naval yards in Ireland, and additionally, the establishment of Christ-Church in Hampshire, as a naval yard, providing a direct riparian route from new Forest as opposed to then then-current methods, which involved sending "the timber out of the forest to Portsmouth to build" which involved legs of transportation totalling 22 shillings cost per load.[111] Lindsay Sharp has characterised Yarranton's view of improvement as founded on "sensible organisation of the economic and social infra-structures that supported English industry […] and on the systematic exploitation and development of England's own natural resources."[112] This imperative is clearly at work in miniature in Yarranton's case, with national resources, including colonial possessions, being narrowed to crown-held national resources, re-directing the very organisation of the land itself for the subordination of the forest to the state.

The basic impulses behind these proposals might be more productively understood within the larger framework of political arithmetic, championed in the period by individuals such as John Graunt and William Petty. As early as 1662, when making his observations on the bills of mortality, Graunt articulated a comprehensive notion of how quantitative management of commodities and populations could serve to benefit the government of any kingdom, and that to do so it was essential "to understand the land, and the hands of the territory to be governed, according to all their intrinsic, and accidental differences."[113] By becoming aware of the

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[110] Ibid., 64; Sharp, 62
[111] Yarranton, 42.
[112] Sharp, 61.
[113] John Graunt, *Natural and Political Observations Mentioned in a Following Index, and made upon the Bills of Mortality* (London, 1662), 72.

numerical dimensions of their kingdom, and treating statecraft as a mathematical exercise, early modern princes could achieve great efficiency in governing their populations.[114] While applicable to public health, taxation, and economic management, the concept of political arithmetic could equally as well be mapped onto England's forests, particularly those which lay within the exclusive purview of crown control, hence William Petty's listing of "the quality of timber grown in England for the last seven years *communibus annis*, and the survey of timber trees, to estimate the rising & the falling of the price thereof" as one of the many aspects of the political world which could be more easily apprehended by an understanding of lands and hands.[115]

In a series of unpublished manuscripts, Petty articulated a vision for timber plantations and growth in England which would free the navy from the constraints of private enterprise and maximise the amount of timber which could be exploited from existing crown properties in the country, supplying "the shipping needful in England according to the state thereof for the 20 years last past, or even to the double thereof if need require."[116] Under Petty's plan every Royal Forest would see half of its land enclosed in clear and definable boundaries, namely, a single straight line, and elsewhere, immoveable geographic markers such as roads and rivers, to clearly delineate the enclosed area.[117] Within this area, irrespective of acreage, the lot would be divided into 80 parcels, to be planted and harvested successively.[118] Ostensibly, Petty was basing this system on the assumption of an oak requiring 80 years to reach maturity, thereby ensuring a

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[114] Akos Sivado, "The Ontology of Sir William Petty's Political Arithmetic," *The European Journal of the History of Economic Thought*, Vol. 26, No. 5 (2019), 1004.
[115] William Petty, *The Petty Papers: Some unpublished writings of Sir William Petty Edited from the Bowood Papers by the Marquis of Lansdowne*, ed. Marquis of Lansdowne, Part I, 196.
[116] *The Petty Papers*, Part ii, 128.
[117] Ibid., Part ii, 128.
[118] Ibid., Part ii, 128.

continual and plentiful harvest of timber every year. While the locale of the Royal Forest was the most obvious location for such plantations, it is clear that Petty valued the exclusive and unrestricted access of the state to these forest resources more than the institutions that housed them. As alternatives, he laid out how the King might use other more agriculturally suitable crown lands for raising timber in a similar way, or more ambitiously, to secure 6400 acres of land split on each side of the Thames, a plantation which would "more commodiously answer the provision of timber than to plant the same by contract with the king upon his enclosed forest."[119] Further cementing the purely state owned and driven nature of this forestry regime was its oversight by commissioners tasked not only with overseeing the proper management of timber, but also with the efficient renting of surplus crown lands.[120]

In large part, these visions for the exploitation of timber resources were not enacted on the total scale their creators may have envisioned, and indeed, few plans of the sort were, in the realm of state forestry or elsewhere, However, tangible and important advances toward the exploitation of existing forestry resources were made in the period. In 1668, legislation enacted a plantation policy in the Forest of Dean for the purpose of taking measures "to restore and preserve the growth of Timber for the future supply of his Majesties Royal Navy and the maintenance of Shipping for the Trade of this Nation" and in 1698, a similar act applied the same principles to New Forest.[121] Under these schemes, the state at least aspired to enact a system of rolling enclosure similar to that advocated by Petty, although it ultimately experienced limited success owing to the varied uses of the forest and its complex entrenchment of common property

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[119] Ibid., Part ii, 129; Ibid., Part ii, 131.
[120] Ibid., Part ii, 129.
[121] Keith Thomas, *Man and the Natural World: Changing Attitudes in England, 1500-1800,* (Oxford: Oxford University Press, 1983). The acts in question were 19 & 20 Car II. C.8 (1668) and 9 Gul. III, c.33 (1697-8).

rights.[122] At least in contexts where geography did not pose an obstacle to state exploitation of the forest, the more complete and long-lasting cultivation of timber resources in the forests attests that the land was being used at least somewhat more exploitatively. Based on the testimonies contained in the Reports of Commissioners to Enquire into the Woods, Forests, and Land Revenues of the crown, Tubbs has argued that the presence of mature timber in some forests nearly a century after the first advancement of these proposals attests a high degree of care to maximise the output of the Royal Forests.[123] The presence of substantial stands of trees in Alice Holt in 1789, on formerly barren land, suggests an active program of planting, and in the case of Bere forest, the closest of all to the shipyards, the evidence is similar.[124] Although new rivers were not created to access the forests, where they were accessible, the navy sought to exploit the benefits of a state owned timber resource, and ensure its future presence to some extent.

Conclusion

While the policies ultimately enacted by the state may have fallen short of the aspirations of contemporary visionaries, it is important to note that they at least articulated a need to more fully integrate forestry as a direct arm of state operations, thereby elevating the forest from a simple resource exploitable on the market to one which was a truly national resource, harnessed by the national government for national purposes. In many ways, the intellectual developments of the period might be viewed as a simple extension of the increasingly interventionist approach

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[122] Sara Morrison, "Forests of Masts and Seas of Trees: The English Royal Forests and the Restoration Navy," in Nancy L. Rhoden ed., *English Atlantics Revisited: Essays Honouring Professor Ian K. Steele*, (Montreal: McGill-Queen's University Press, 2007), 157.
[123] Colin R. Tubbs, *New Forest: An Ecological History,* (Exeter: David & Charles, 1968), 155.
[124] Ibid., 155-156.

taken during the Interregnum – Wade's project to produce naval iron and timber in Dean was simply the beginning of a long series of innovations which facilitated the treatment of England's crown woodlands as a national resource to be exploited for national projects.

To make the measurement of timber more accurate, although Pepys and his shipyard contemporaries reached for the physical implement of the carpenter's ruler, they drew on an ongoing process of knowledge creation which brought mathematical principles from their vernacular and error ridden origins to codified and consistent methods articulated through print culture and eventually, mathematical instruments. In so doing, administrators like Pepys and shipwrights like Deane were able to apply a newfound degree of accuracy to their business, contesting contracts, more precisely determining the quantities of timber they could expect to obtain, and ensuring that the navy was not being cheated by unscrupulous timber merchants.

In pursuit of making the measured timber more efficiently grown, that is, of higher quality, contemporaries applied the emerging principles of natural philosophy to examining the best practices for improving the efficiency with which what timber England had was produced and used. As Pepys' position at the midst of three conduits of knowledge attests, these visions for forestry were developed in institutional, scholarly, and informal contexts. At once, Pepys may have prompted Plot to publish his discourse on timber felling owing to the benefits it would realise for the navy, but it was formulated in the incubator of the Royal Society. Alternatively, much as he had sought out mathematical instruction, Pepys took advantage of informal networks of knowledge creation as well, collaborating with individuals such as Petty in a private capacity to explore new and ambitious projects. Through these conduits, new ideas for how to make timber stronger, how to more reliably plant trees, and how to construct ships whose reliance on rare timber was lessened, were realised.

Finally, the direction of the exploitational imperatives of the navy contrasted sharply between the actual policies it pursued and those envisioned for it by contemporary theorists. On one hand, extensive reliance on the Baltic timber trade, intensive sourcing of wood from private estates, and a nascent New England timber industry supplemented scarce timber resources by expanding the geographic reach of the navy through trade. Yet individuals such as Andrew Yarranton and William Petty were keen to realise a radically different form of exploitation, one which while perhaps relying on a more expansive range for the sourcing of timber, fundamentally relied on making it a direct national resource, to be controlled by and harnessed to the aspirations of the state. While undeniably ambitious in their approach, their visions were, to an extent, realised by the end of the seventeenth century, as Royal Forests became home to timber plantations. Intellectual developments in the period were grafted onto the heightened willingness to exploit the material resources of woodland which was the legacy of the Interregnum. Simultaneously, state forestry was aided by a network of intellectuals who, while disparate in their methods, aims, and ultimately, the extent of their implementation, sought to codify the vernacular, update the traditional, and apply the wholly novel to their study of forestry. Thus, in the later decades of the seventeenth century, state forestry was adequately equipped with an impressive arsenal of conceptual tools to approach the use of the forest for the needs of the state.

Chapter V - Conclusion

Over the course of the seventeenth century, owing to changing fiscal and material needs, the state-woodland relationship in England came to be governed by exploitative and rationalising paradigms which can be characterised as state forestry. These developments occurred in three distinct and sequential realms, namely, the fiscal exploitation of the forest, the navigation of the social contestation of woodland, and the material use of woodland in a system of direct management informed by nascent silvicultural knowledge. Progressively, the changes created and approaches informed by these various experiences in state forestry helped to shape England's state forestry apparatus from a largely medieval and traditional system of royal forests to a recognisably modern series of institutions and practices which elevated the kingdom's forests to the status of a national natural resource.

This shift accelerated under the early Stuarts, whose sale of woodland products to achieve fiscal solvency facilitated the rationalisation of the kingdom's forests through extensive surveys, and furthered the establishment of a forestry bureaucracy, even if it did not succeed in generating much income. Although the exploitation of crown woodland was in many ways a short-sighted enterprise at the expense of future timber supplies, both surveys from the period and the broader political and economic considerations surrounding wood sales demonstrate that the crown took some care to ensure that the trees it harvested did not encroach on the customary entitlements enjoyed on its various estates and that its actions did not totally imperil future timber supplies. In the period, wood sales were simply one means of generating revenue from crown estates to achieve fiscal solvency, but the institutions and practices these wood sales created enabled the later treatment of crown woodland as a distinct resource providing material benefits for the kingdom. The creation of what was, in effect, a national inventory of state-owned woodland

subsumed the wide variety of wooded properties under crown ownership into a single intelligibly quantified survey, abstracting the vernacular and illegible landscape of the forest into a language easily understood by the state. This development remained of foundational importance to later attempts to sell woodland, and even to the later projects of figures such as William Petty, who recognised the need to have a firm hold on demographic and resource quantities for the management of a kingdom. Further, the designation of special surveyors to supervise the usage of these woodland resources aided in creating a professional class of practically educated personnel to ensure that timber supplies were used judiciously and in the best interests of the state. In some cases, too, evidence exists for their surprising defence of both the best interests of the state and the integrity of the woodland resources they managed.

However, even with these important developments, substantial impediments to the exploitation of the forest for the benefit of the nation existed. While there was a willingness, and even capability to use England's forests for the benefit of the nation, or at least, the maintenance of the power of the monarch at the head of the nation, competing claims to resource use hindered the efficient use of these forest resources, a protracted issue which was never entirely resolved in the seventeenth century. As an example, in the Forest of Dean, a variety of claimants to the forest's resources confounded the attempts of the crown to delegate grantees to extract wealth from the forest on their behalf. Whether free miners relying on obscure privileges granted by a medieval king, commoners asserting rights under forest law, or itinerant workers gaining sustenance from the forest, the oral, customary and difficult-to-authenticate evidentiary basis of claims to resources made it difficult for the state to police competing entitlements to resources. Even where the crown did attempt to govern the use of resources through the establishment of new forms of property ownership through leases and grants, those who held the grants were often

eager to illegally extract wealth for themselves, demonstrating that even the imposition of private property rights was not a certain solution to the contestation of the forest. Moreover, where claimants to woodland resource felt their entitlements were being encroached upon, they often opposed the activities of the state and its agents with violent force, which was difficult to supress owing to the illegible and distant location of the forest itself. The seeming chaos that characterised the state's attempts to assert control over Dean's resources demonstrates that neither the introduction of private property rights, nor the supervision of an outside authority are necessarily adequate solutions to prevent the spoliation of communal resources, even more so in a period where geographical factors made power projection difficult at best. Although the state wanted to harness the wealth of the forest to its own benefit, ultimately, the indirect methods of control the state used to extract this wealth did not afford it the necessary level of control fully to realise the potential of woodland as a national resource.

However, during the Civil War and Interregnum, changing political circumstances and the opportunities provided by the sequestration of Royalist estates permitted the state to take more direct control of woodland resources for national needs, including the provision of fuel, and for shipbuilding. With the execution of the king and the declaration of a Commonwealth, formerly crown-owned resources were now able to be reimagined in national terms, and the growing demand of the navy prompted parliament to turn to woodland for the benefit of the nation, not for its wealth potential, but for wood products, which necessitated a direct and sustained involvement in the stewardship of the forest. Thus, while the public good as embodied in the welfare of the poor justified the felling of fuel wood within sixty miles of London on sequestered estates, the public good in the martial benefit of the nation facilitated timber exploitation. John Wade's projects in the Forest of Dean demonstrated the immense potential in

the direct management of the forest for the needs of the state, and while his naval armaments production programme proved a financial failure, aspects of both his use of the Forest of Dean and the broader Interregnum approach to forestry were retained by Charles II upon his accession. The interventionist approach to forestry developed further as the institution of the Royal Navy placed unprecedented pressure on crown woodland to provide timber for shipbuilding. Through both naval officials and their knowledge networks, including the Royal Society, the state sought to increase the accuracy of its forestry operations, heighten the efficiency with which it used timber, and increase the exploitative capacity of timber harvesting. Thus, silvicultural and empirical approaches came to govern a relationship between woodland and the state in which woodland products, not the profit potential of woodland, was the objective of state forestry.

State forestry, when recognised as an ongoing set of developments in early modern England, helps to unite the various state-woodland interactions which have been studied by scholars such as Hammersley, Morrison, Hart and Albion into a more unified understanding of the development of state-nature relationships in the early modern period. When examined with the common denominator of state activity as a backdrop, wood sales, surveying, charcoal burning, iron smelting, the harvesting of naval timber, or the imposition of forest law become more usefully understood as varying manifestations of the state's attempt to harness forest resources to its own ends. While this study has only examined a few of these interactions in detail, a host of early modern state enterprises involving woodland might arguably be treated as facets of the ongoing development of a cohesive state treatment of woodland, and of the natural world more generally.

Within the span of a century what had formerly been the private and personal recreational resource of the king increasingly became a national natural resource, managed for the public

benefit in the naval strength of the nation. The forest had changed from being yet another possible personal source of revenue to fill the coffers of the king to being recognised as a distinct and unique resource with its own material value, with a set of specialised tools for its management. Concurrently, state forestry developed in England, playing a very important role in the governance of the state woodland relationship both within the realm, and in the coming decades, in England's colonial possessions. The set of approaches and institutions for the management of state-owned woodland which developed in England during the seventeenth century laid the foundation for a recognisably modern approach to human relationships with the environment, one where the state holds a great deal of control in determining which uses of the forest are useful and legal, and where natural resources more generally are treated as an asset of the state to be exploited for its own benefit.

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