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COALMINING, POPULATION AND ENCLOSURE IN THE SEASALE COLLIERY DISTRICTS OF DURHAM (NORTHERN DURHAM), 1551-1810: A STUDY IN HISTORICAL GEOGRAPHY

A thesis in two volumes, submitted for the Degree of Doctor of Philosophy in the University of Durham, 1989

by

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VOLUME ONE

- 3 APR 1990

ABSTRACT

COALMINING, POPULATION AND ENCLOSURE IN THE SEASALE COLLIERY DISTRICTS OF DURHAM (NORTHERN DURHAM), 1551-1810: A STUDY IN HISTORICAL GEOGRAPHY

Robert Ian Hodgson

By reference to a wide range of sources and with an especial, but deliberately not exclusive, concern for events in Northern Durham, an attempt is made to reconstruct basic patterns of coalmining, population and enclosure. A second major task is to provide a framework of explanation for these patterns: to examine the factors which may have created and, in turn, destroyed them, and to explore ways in which the patterns may have been interrelated or interdependent. Rising demand for coal throughout the period 1551-1810, emanating chiefly from London, stimulated population growth within the mining districts, and the rise of an increasingly specialized industrial work force, in turn, put pressure upon agriculture to reform its technical and organizational structures in order to ease the task of providing more locally grown food. Developments were not as simple as might be assumed from the above scenario, however. The variable attitudes and actions of decision makers were no less crucial than the uncertainties of natural resource endowment in determining the pace and location of developments through time and space, period and place. Landownership emerges as a dominant factor in understanding contrasts and similarities in the changing economic landscape of Northern Durham. An appreciation of the richness and variety of regional experience is essential to the formulation of descriptive or explanatory models of economic and social change.

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DECLARATION

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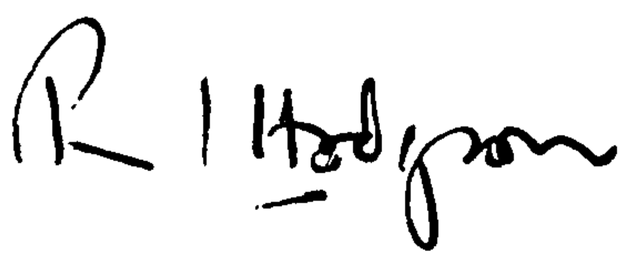
Signed 

Date 9th October 1989

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Chapter 1

INTRODUCTION

Footfalls in the memory

Tanfield churchyard on a grey, windswept November day. Weeping ash, ornamental cherry and stunted laburnum shelter incongruously beneath stout sycamore and lime; their gnarled and twisted branches reaching out like arthritic fingers against the cold; their roots in layers of sandstone, coal and clay intermingle and feed among the bones of departed generations: families and friends, rivals and rebels, the loved and the loving, the despised and despising. Lichen-covered tombstones bow, falter and fall in drunken profusion; their memorials half-eaten by time's sun, wind and rain, half-hidden by autumn's long, dying grass-stalks and yesterday's chrysanthemums. Thomas Tinn, Baptiste Mason, Raiph Cock and Ann Outterside; the Wrays, Hedworths and Claverings; how many others have inhabited this parish, worshipped at its church, are buried in this place? Men, women and children who nurtured, challenged and refashioned a harsh but richly-endowed landscape: folk who, early in the eighteenth century, carved a meagre living upon the open moor; those who later came to enclose it with hedges, fences and walls. Who among them were the gainers, who the losers? How many happy, joyful souls; how many lives of sadness and despair? Where are the men who, surreptitiously at nightfall, came to dismantle Lady Clavering's waggonway? Where are those who came to restore it? What now remains of the pitmen whose toil and tears fuelled the fires of London when Tanfield coals took top price and Bucksnook were 'the darling at the Gate'?[1] Flesh and bones decay and memories fade, but the thoughts and messages, scratched on parchment and paper, in diary, notebook, letter and ledger remain: echoes from the deep cavern of time.

Period and place

The historical geography of the industrial revolution has still to be written, and a scholar who wishes to contribute faces a daunting challenge. As an observer he must strive to 'rethink the thoughts'[2] of those who lived in the past; as an interpreter, trapped in his own time, he is affected by the viewpoints and attitudes of the academic community to which he belongs.[3] Thus there are times when it is appropriate and rewarding to peer over dead men's shoulders: to intrude upon the colliery viewer, perplexed by the rise and fall of faulted seams but ever hopeful of a 'winning'; to wonder at the wisdom of an enclosure commissioner about to set in motion the dramatic transformation of a landscape that had remained little altered over many past centuries. Equally, there are other times when the broad expanse of today's intellectual landscape unfolds to reveal in one direction a methodological swamp, choked with the techniques and ideologies of many a shifting paradigm, while in another direction lie the foothills of empirical enlightenment still, alas, strewn with unresolved questions about the nature, timing and location of industrial revolutionary change.[4]

What was the industrial revolution? What were its main ingredients? To what extent can one recognise mutually reinforcing innovations and developments? Just when and how did rapidly-advancing economic activity and social change first take root? The apparent simplicity of such questions is only matched by the difficulty of finding reasonable

or satisfactory answers. Hartwell's proclamation -'on the causes of the industrial revolution there is silence, simplicity or confusion'- may be as true today as it was when first uttered nearly a quarter of a century ago.[5] Three topics in particular can be isolated for special consideration: population, enclosure and industrialization. Such is the nature of their timing and alleged manner of interconnection that according to one enthusiatic, if over-optimistic, historian, once these three 'are in place, it becomes a simple matter to fit the minor pieces of the puzzle'.[6] The relationship between population change and overall economic and social advancement is certainly seen as an important, if perplexing, matter.[7] Enclosure represents an organizational change in agriculture which may or may not have been inextricably linked to technical change, but which in any case fundamentally assisted the rise of capitalism.[8] But what of industry *per se*? The cotton industry, above all, has been viewed as *the* symbol of the industrial revolution, the leading sector in Britain's take-off into self-sustained growth. Scarcely of less significance, it has been argued, was the contribution of the iron and steel industry.[9] What then of the coal industry, whose achievements in the late eighteenth and early nineteenth centuries were apparently less spectacular but whose importance to an expanding Elizabethan economy led Nef to propose an early industrial revolution for the late sixteenth and early seventeenth centuries?[10]

Regional inquiry, regarded until quite recently as *passé* in some geographical circles, now appeals to scholars in several cognate disciplines, most notably in economic history and development

economics, as a realistic and rewarding way of tackling such important issues. Just as international events today are most readily understood through an appreciation of the distinct roles played by several nation states, so in the past Britain's growth from the sixteenth century to the nineteenth is only to be made intelligible at the sub-national level. Even before the transport innovations of the late eighteenth and early nineteenth centuries, the national economy was already an amalgam of separate but linked localities or regions, each with a special character: a blending of communities, landscapes and particular levels of economic and social development. Each region had its own distinct combination of development factors allowing it to surge forward, less quickly than the more innovative regions, more quickly than the laggards.[11]

In outline, the main features which give North East England its distinctive historical and geographical personality in the period from 1551 to 1810 can be discerned with ease. First, there is physical diversity: in the west, inhospitable uplands rise in places to over 2000 feet; eastwards, they fall and finger among welcoming river valleys and eventually give way to thin-soiled plateaux, water-ridden claylands and fertile coastal plains. Secondly, there is a variety of mineral wealth: iron, silver, and lead, especially in the west; and a triangular-shaped coalfield, whose development in the period up to 1810 was sharply focused upon the lower Wear and Tyne valleys. Thirdly, there is a rich and varied distribution of population and settlement: remote farmsteads, industrial villages, port and market towns,

reflecting, through the centuries, variations in human ability and desire to exploit the opportunities afforded by resource endowment. Lastly, there is lordship, the subtle, all-pervading hand of landscape patterning: administering the human and physical assets of vast estates; protecting territorial integrity in times of border warfare and incursion which diminished but scarcely ceased after the Union of the Crowns in 1603. The Dukes of Northumberland were most distinctively at work north of the Tyne, the princely Bishop and his Dean and Chapter in County Durham.

Beyond these broad outlines there is much receiving or still awaiting detailed examination. Although the coal industry has attracted a good deal of attention with regard to such aspects as technical developments, transport innovation, and the role of monopoly capital,[12] it has only quite recently been lamented that 'a most glaring deficiency...is the absence of any comprehensive account of the Great Northern Coalfield which played such a vital part in the evolution of the modern North East'.[13] Again, agriculture has been isolated for particular specialist inquiries[14] while consideration of developments over long time-periods or with regard to both technical and organizational change has not. A third element in the region's history to receive little scrutiny is the demographic record up to 1810.[15] In view of the crucial relationship between population change and the industrial revolution, the sensitivity with which population dynamics reflect upon and are in turn reflected by other economic and social factors, this is a deficiency urgently in need of correction; even though, as we shall discover, data sources provide many

difficulties. While so many gaps in our knowledge remain to be filled, even general views of the region's development from the late sixteenth to the early nineteenth centuries must remain partial and incomplete. Especially noticeable in both the particularist investigations so far completed and in the attempted general accounts is a failure or reluctance to pay sufficient attention to the spatial dimension of problems, though it is a tribute to the scholarship of an earlier generation that Smailes' chapters on the historical geography of the region can still be read with freshness and interest nearly thirty years on.[16]

A single researcher in his lifetime cannot expect to fill more than a few of these gaps in our knowledge and his selection of topic or subject matter must be framed on the one hand by considerations of what is judged worthy of investigation, and on the other by whether or not the source materials which exist are likely to yield a satisfactory or reasonable solution to the important questions raised. Some gaps in our knowledge will never be filled, of course: we may never know the contents of those muniments which in 1854 were reported to have been converted into kites, strewn on Palace Green, or used by the citizens of Durham 'for their more domestic purposes.'[17] More regrettably, perhaps, in our own generation, fire, flood, mildew and vermin have left large and unmendable holes in the delicate fabric of which our historical geographical interpretations are woven.[18] Yet archival material has become available in sufficient quantity in the past two decades or so to demonstrate two things: 'our ignorance and the

untrustworthiness of many hitherto accepted views'.[19] Its effective exploitation for purposes of this present inquiry clearly requires a more explicit definition than we have attempted so far of the task to be undertaken. What are the important questions; and just how might they be answered?

In search of an historical geographical problem

Darby's methodological discussions identified two distinct though not necessarily inseparable approaches: cross-sectional reconstructions of past geographies (or 'synchronic' studies, as they have been later termed) and the examination of 'vertical themes' or studies of geographical change through time ('diachronic' studies).[20] It is the second of these approaches which has received most attention and critical acclaim in the subsequent literature and discussion. Synchronic studies, by contrast, have been characterised as essentially descriptive in conception and execution and capable of yielding only low-level explanations. Their shortcomings are well rehearsed in Prince's pellucid commentary.[21] He suggests that the study of spatial patterns or relationships at some point in the past can be examined with greatest precision and most fully when little change is taking place, when social institutions are stable, when economies are balanced and when peace is maintained. Unfortunately, the choice of cross-sections is determined largely by the available source materials which, far from being intended to pander to the needs of future generations of historical geographers, may have been specifically designed to stimulate innovation, and so may have been, in themselves,

change-producing. Of course, a true cross-section of the past can only be drawn for a single instant in time while in practice the reconstruction of past geographies has often acquired a certain thickness or time-depth to the slice taken. Even so, this does not solve the central problem for the historical geographer: cross-sectional reconstructions are essentially ahistorical, they fail to provide a rigorous examination of causality or satisfactory answers to when?, how?, and why? questions about processes of geographical change which can operate only within the dimension of time.

The word process may be used to indicate any sequence of events through time but a more precise definition requires that the sequence be connected by some established mechanism, and the basic mechanism in all the social sciences is, according to Chapman, decision-making.[22] A rather different approach towards processes or factors of change is provided by Langton. In what is perhaps the most expansive and searching methodological excursion into process modelling yet undertaken, he suggests that a most useful route to explanation of geographical change may lie in the feedback mechanisms of systems theory. Unfortunately, the statistical techniques required to operationalise such diachronic models are even more complicated than those used in synchronic models, and their power to predict diminishes rapidly with each step through time.[23] It is to be wondered whether the systems approach can ever have operational significance, as opposed to conceptual merit, in historical geography. Certainly Langton has quite recently demonstrated how, largely as a consequence of the nature

of data sources used for a reconstruction of the historical geography of coalmining in South West Lancashire between 1590 and 1799, he is not able to practise what he had once preached; and he characterises his earlier work, with a disarming honesty which perhaps does less than justice to the stimulating ideas it evoked, as 'one of those methodological flights of fancy which are easily launched when the bonds imposed by the need to consider a particular empirical problem are loosed'.[24]

An apparently less demanding approach to the problem of analysing processes of change, one which more closely regards process as a sequence of events through time as envisaged by Chapman, is suggested by the historian, Berkhofer.[25] He provides a checklist of questions to ask when endeavouring to measure change:

1. Delimitation of the sequence - when did it start?

2. The order of the sequence in relation to time - what followed what?

3. The order of the occurence - why did it happen in that sequence?

4. The timing of the sequence - why did it occur when it did? Why did not something else occur? (These questions help establish the sufficient as well as necessary conditions for the sequence).

5. The rate of change - how long did the entire sequence take? Were certain elements of it faster or slower than others?

Full answers to these questions may demand the kind of comprehensive and reliable data which rarely occur in pre-nineteenth century British sources, and techniques of quantification not yet

available to historical analysis. However, as Baker argues, the 'remembering of these questions as a checklist' should produce better historical studies of change through time, especially, he suggests, if the historical geographer's checklist, as opposed to that of the historian, should include 'the occasional where?, to incorporate the spatial dimension'.[26] But is this really adequate for the investigation of an historical geographical problem? The question 'where?', rather than being a mere 'extra' on a 'process-seeking' checklist is crucial and fundamental. A geographical problem correctly specified must be shaped by considerations of 'where?', whether seeking to emphasize space, place, location or landscape. If the 'where of things' is established at the outset of an inquiry, and arguably this is most readily accomplished via a synchronic approach, then the questions on Berkhofer's checklist for studying change through time take on an added significance when modified to read: 'When did it start *in that particular place* ?'; 'What followed what *there, rather than somewhere else* ?'; 'Why did it happen when it did *just there* ?'; and so on. Thus emphasis upon where? in problem definition does not exclude the importance of when?, how? and why? in problem solving: subject matter merely delimits what is to be studied, not how it is to be explained. Neither should it be thought that such an emphasis denies the primary importance of people, whether acting individually or in groups, in historical geographical inquiry; for it is they, the decision-makers, who give character and meaning to both time and space: a sense of period and place.[27]

But is our methodology, no less than our source material, capable of

satisfactorily accommodating the demands we now wish to place upon it; demands which clearly require a reconciliation rather than separation of the synchronic and diachronic approaches? A solution to the problem of 'writing incontestable geography that also incorporates the chain of events necessary to its full understanding' was sought by Darby.[28] One favoured and 'most interesting methodological approach' was that used by Broeck in his study of the Santa Clara Valley of California, in which cross-sectional reconstructions were at once separated but linked by intervening chapters of explanatory comment on the social and economic forces that led to successive changes in the landscape.[29] It is an approach adopted with equal success by Harris in his study of the rural landscape of the East Riding of Yorkshire between 1700 and 1850.[30] It is an approach which has been carefully considered, though not overtly adopted, in devising a scheme of inquiry for the present investigation which seeks to link 'spatial' pattern to 'temporal' process with the aid of maps.

The map is, perhaps, the single most explicitly geographical construct associated with the cross-sectional method and as such became in the 1960s and '70s the focus of criticism for reviewers both within and outside the discipline. Maps were thought to symbolise the historical geographer's contentment with a descriptive methodology, and maps showing 'static' patterns at particular points in time were actually taken to be -or were characterised as- the intended goal or end product of the historical geographer's investigations:

'geographical interpretations consisted in mapping the data and giving

them a spatial dimension'.[31] It was suggested that the historical geographer 'lives through the looking glass, where resources have distributions but not functions and time exists only in flashes'.[32] And where attention was paid to a single 'static' historical data source, it was seriously proposed that the 'historian's impressionism may be more realistic than the geographer's exclusive concern with mappable data'.[33] In the face of such accusations as these, it is perhaps not surprising to find that for a time methodological discusson within historical geography recoiled from any further serious concern for the use of maps as methodological tools. Yet maps remained the means by which scholars in cognate academic disciplines, and indeed people within the community at large, most readily recognised the work of geographers; and most geographical textbooks and periodicals continued to display a wide variety of maps and a growing level of cartographic sophistication. A revival of interest in the methodological value of the map in historical geographical inquiry could not, therefore, be long delayed. The recent publication of an *Atlas of industrializing Britain* suggests that while geographers can no longer lay exclusive claim to the map as a intellectual prop -contributors to the study are drawn from social and economic history as well as historical geography- they have pioneered the use of a uniquely valuable tool; but one which, greedy for 'comprehensive and consistent data', must be approached with circumspection and applied with skill.[34]

Maps of patterns and distributions, rather than being employed as if to represent the conclusions of research effort, can be used most

effectively to define a geographical problem in need of an explanation. And, as we shall also hope to show, while maps may readily focus upon 'static' spatial patterns, they can also be made to convey some measure of spatial pattern change through time; to convey a succession of observable or reconstituted distributions that are the outcome of complex and often elusive processes at work. In this sense they have merit and value as 'links in the chain of change'.[33]

A framework of investigation

Thus far the discussion has sought to identify three topics -coalmining, population and enclosure- for detailed examination within a regional framework and to suggest that these may be best treated by an approach which focuses upon processes of change; but only after a modified version of the cross-sectional method has been employed in the first place to define a geographical problem in need of a solution. It is useful at this stage to pause, momentarily, to appreciate that already the totality of the actual empirical situation in the past is being left behind; that the past is already being perceived through personal filters of assumption and attitude in order that a *practical* framework of investigation can be created. As Gregory reminds us, such a procedure is necessary because the mind can only 'structure its apprehension of the world in a limited number of ways'.[34] Spatial order must exist within the mind even if it does not reside, in any obvious sense, within the landscape.

For purposes of exposition, the three topics selected for detailed

investigation are pragmatically isolated in Parts I, II, and III respectively. Within each, a first concern is to identify and describe patterns. It is important to stress that pattern reconstruction is a major and challenging task, especially when it is intended to incorporate elements of geographical change rather than settle for a treatment which reflects the situation for a mere moment in time (or more accurately, for a thin 'slice' of one or several years). The problems of cross-sectional reconstructions are well demonstrated in figure 1.1. First, notice the apparent ephemeral nature of colliery location patterns: the distribution of activity in 1768-69 appears to bear little relationship to that almost twenty years later. Second, it is necessary to ask -and in some ways this is a more important matter- is the comparison meaningful, a true reflection of real differences or merely a reflection of the unequal reliability of the two sources? Gibson deliberately set out to produce a map of the seasale collieries; Armstrong came upon them almost as a secondary consideration and he appears to have strayed little from the course of the Great North road![37]

A particular concern in pattern reconstruction is to provide a means of making cross-thematic comparisons; that is, between what was happening to coalmining, population and enclosure at certain periods of time. This is considered important in order to offset the 'isolationist tendencies' inherent in a thematic treatment which is concerned with the events of 260 years -a lengthy period, but one which is thought essential if anything of value is to be discovered about

the relationship of geographical change to the genesis and course of the industrial revolution.[38] At the same time, it has not been possible to escape from the constraints imposed by data availability and reliability in arriving at a 'best fit' solution. Thus for coalmining and enclosure, reconstructions are attempted within the broad framework of three periods of unequal duration: 1551-1680, 1681-1740 and 1741-1810. For population patterns it is possible to show changes over two periods: 1563-1674 and 1674-1801. Where, in the case of coalmining, comprehensive estimates are required for specific dates, appropriate data can be mapped for c.1636, 1728 and 1804, while in the case of demographic sources, population totals can only be reconstituted for 1563, 1674 and 1801. As will be discovered, the form of presentation adopted in this particular investigation allows possible linkages between coalmining, population and enclosure to emerge rather than be pursued *ab initio*.

A second major task within each of the three parts of the study is to examine, and attempt some explanation of, the patterns described; to pinpoint some of the processes of geographical change at work, some of the factors affecting the patterns. While pattern reconstruction embraces much of the traditional methodology of Darby's cross-sectional approach, though with the added attempt to incorporate in the maps some indication of the dynamics of change, those sections relating to process can be seen as an attempt to apply the kinds of solution adopted by Broek and Harris,[39] but again, with important differences. For in this work not only are there three pragmatically isolated topics under scrutiny (coalmining, population and enclosure)

rather than some synthetic empirical holism (the landscape), but within each part the change-producing factors involved are only considered once the whole sequence of pattern change between 1551 and 1810 has been described. There are good reasons for adopting this approach, even though it may seem to separate process from product.

It will be realised, most obviously, that while our understanding or interpretation of processes of geographical change is conditioned somewhat by the timing of the reconstructions that data sources permit one to attempt, these processes did not necessarily fit neatly into the time-periods (1551-1680, 1681-1740 and 1741-1810 for coalmining and enclosure, 1563-1674 and 1674-1801 for population) which, for the reasons noted above, have been chosen for examination. Some processes were of longer duration, some shorter. Thus, to have attempted to link separate chapters of pattern description with intervening chapters of explanatory comment would have led to needless repetition and run the risk of losing the thread of any argument regarding the nature and timing of the processes involved. Process explanation, like pattern description, is only possible, of course, because of the particular nature and survival of documentary sources, and one can never wholly escape the bias which they impose upon our interpretations. The point, which must be stressed above all, is that the sources which relate to process are not always the same ones as those which relate to pattern reconstruction, and so may impose not the same, but different, constraints in their usage. By remembering this point we may avoid another difficulty familiar to geographers. Relationships between

pattern and process have long been debated in the discipline, and when process is to be seen through pattern alone, problems of indeterminacy, inertia, equifinality and multi-causality can be encountered.[40] The procedure adopted in this study, the sources used and the way they are used, will not necessarily free us from the 'morass of inference'[41] which, almost by definition, afflicts all historical inquiry; but a willingness to bear in mind what pattern can or cannot tell us about process, and process can or cannot tell us about pattern, may be helpful. The methodology adopted here does, at least, free us from the need to force a consideration of process into a tight temporal mould in order to get from one pattern and arrive at the next.

The link between pattern and process is an important and complex one; it can be pursued most profitably perhaps by focusing upon the actions and attitudes of people. Only in this way can we fully respond to Wheatley's suggestion that historical geographers should 'focus on events *of* change, rather than events *in* change'.[42] Individual or group behaviour inevitably finds expression in the landscape, of course, which thus emerges as another essential element of historical geographical inquiry.[43] As indicated above, this work is not first and foremost a study of landscape change *per se*, as, for instance, is seen in Harris' study of the East Riding of Yorkshire; and it does not pursue with vigour the recent pre-occupation with landscape imagery or examine the theme of valued landscapes; neither does it focus upon morphogenesis as exemplified in the work of Roberts.[44] Rather, it is concerned with landscape as the outcome or expression of man's practical appropriation of space;[45] and as such it

takes us a little closer to the reality of the past -or what we take to be the reality- which pattern maps employing symbolic abstractions cannot do; it takes us a little closer to the contemporary human scale of values. At several places in the text, but most overtly in chapter 7, the relationship between man and landscape is explored: proportional circles on pattern maps are transformed into territorial units or landscape domains which are capable of visualization, two-dimensionally at least; and sometimes with the aid of contemporary description they can be visualized three-dimensionally, in the mind's eye.[46] Such visualisations, of course, provide observable phenomena which circumstantially teach us about process or point us in the direction of process.

Scale variations: discussion

Not only is the subject matter of historical geography highly varied but so too is the scale or level of resolution at which problems can be tackled. There are geographers with major interests in global patterns, such as, for instance, weather systems, and there are others perhaps content to spend a lifetime contemplating a single peat bog or archival source. The range of possibilities is not endless but it is certainly wide, as Haggett has indicated.[47] Yet, as suggested earlier, it is the apparent predisposition of the geographer towards regional inquiry which most readily identifies him to the world outside. And it is difficult to counter Harvey's cogent argument that 'a basic tenet of geographic thought is that its domain is defined in

terms of a regional resolution level'.[48] Any phenomenon that exhibits significant variation at that resolution level is likely to be the subject of investigation by the geographer. Hagerstrand unequivocally defines geography as 'regional synthesis with a time depth',[49] while Gregory, with an eye to the requirements of the historical geographer, argues that the time has arrived when we should reaffirm geography's 'traditional attachment to particular places and the people that live in them' because 'we need to know about the constitution of regional social formation, of regional articulation and regional transformations'.[50]

Regional inquiry is not without its problems, as is well known. Whether viewed as a problem of boundary delimitation as in the traditional mould of regional geographical inquiry or posited in terms of enclosing a regional landscape or regional economic system, it is apparent that factors operating beyond the region affect what happens within it. Thus it is quite logical to expect geographers with a regional interest also to declare a concern for problems at a variety of other scales. There is, however, scant literature, certainly in historical geographical circles, to explain how information at one level should be related to that at another.[51] Harvey simply warns that 'inferences made about relationships at one level cannot be extended, without making strong assumptions, to any other level', while at the same time accepting that 'this is not to say that conditions at one level are irrelevant to conditions at another'.[52] Systems analysis teaches us, of course, that systems may be embedded within systems, that the elements of one system may, in fact,

constitute systems in their own right at a lower order of resolution. This is obviously a useful means of conceptualising scale differences even though its applicability in operational terms is, as already suggested, fraught with great difficulty.[33] In the present investigation, scale variations are quite consciously employed; not because the methodological problem just referred to is seen by the writer as capable of a ready solution, nor from a desire to make the structure of the investigation more complex than it need be: scale variations are essentially used in striking a reasonable or satisfactory compromise between the important questions about a changing regional landscape to which we require answers, and the ability of surviving information sources to supply them.

Scale variations: application

During the period with which this study is concerned, the coal mines of North East England were regarded as either *landsale* or *seasale* collieries. These designations were a reflection, though not an entirely accurate reflection, of the type of demand they were intended to serve. The largest undertakings were the *seasale* collieries whose main markets were reached by sea, either around the coasts of Britain or over the North Sea in Europe (and sometimes further afield); but these seasale collieries also supplied some local or 'landsale' demand. The *landsale* collieries, by contrast, were usually smaller concerns and supplied only local requirements. The focus of this inquiry is upon the changing economic and social landscape of the

colliery districts of Durham in which seasale coalmining occurred at some stage up to 1810; that is, upon the whole district which centred upon the river Wear and the southern (Durham) portion of that district which centred upon the river Tyne. In practice, this area, designated *Northern Durham* (figure 1.2),[54] consists of a group of twelve contiguous ecclesiastical parishes (figure 1.3), of which only eight were directly affected by coalworking over the whole or a part of their territory at various times between 1551 and 1810. Of the four parishes not affected directly, Bishopwearmouth parish contained the port of Sunderland -the outlet for Wear district coals and sufficiently distinct as a place by 1719 to be granted independent parish status- while at Monkwearmouth, on the north bank of the Wear, there were industries associated with coalmining. Least affected of all by mining were Boldon and Whitburn, where the coal seams lay too deep for exploitation prior to 1810, though this did not deter at least one early prospector.[55] The omission of these two parishes from the study would not only have left an unnecessary 'hole' in our spatial framework but would have robbed us of an opportunity to make some potentially interesting comparisons between coalmining and non-coalmining parishes.

While Northern Durham, as defined above, remains the one constant areal unit, other scales of analysis are employed as thought appropriate (figure 1.2). Thus in Part I it is evident that any attempt to describe and explain the spatial incidence of seasale coalmining requires the inclusion in our areal framework of that part of the Tyne seasale district which lay north of the river in southern Northumberland; and available data sources permit such inclusion.

Were this study concerned only with seasale coalmining and solely within an economic regional framework, then the basic areal unit for consideration could be drawn with that in mind; but it is not, and in Parts II and III, where population and enclosure patterns are considered, southern Northumberland is excluded from any detailed examination. However desirable its inclusion might seem -again, mainly from the point of view of a developing economic region, less so from the point of view of a changing economic landscape- the absence of suitable or comparable data for the reconstruction of basic pattern maps (in Parts II and III) makes such an objective virtually impossible. For instance, our ability to reconstruct enclosure patterns for seventeenth-century Durham is essentially dependent upon the workings and recordings of the Bishop's Court of Chancery, which only had jurisdiction throughout the Palatinate.[36] Similarly, though the demographic record of Northumberland may permit cross-sectional reconstructions to be made at the time of the hearth-tax collections (1662-89) and for 1801 (the first true census), no return comparable to that for Durham in 1563 was made for the area north of the Tyne.[37] Traditional counties may be thought to provide very poor areal units for the study of regional economic development but they were always important political and administrative units for collection of data, even of an economic nature, and this should never be forgotten in historical geographical research. It is especially important in Durham where the county as such provided an areal framework within which the two great landowners, the Bishop and his Collegiate Church, had their main scatter of sizeable estates.

It is recognised that there is a need to consider pattern and process, even cartographically, at a higher resolution level than the seasale colliery districts of Durham (Northern Durham), for the extent to which useful inferences may be drawn regarding the relationship of coalmining to population change and enclosure activity is much affected by our ability to compare the incidence of demographic and agrarian events in Northern Durham with those in neighbouring or more remote non-coalmining parishes. To this end, patterns of population change and enclosure are considered for the whole of the traditional geographical county of Durham (the Bishopric of Durham)[58] while the coalfield pattern maps in Part I are extended southwards beyond the seasale districts to include the whole of the Durham portion of the coalfield in which landsale mines existed. At the micro-scale of analysis it is also useful, where the rather patchy information sources permit, to examine in greater detail the experiences of particular localities (figure 1.2); to delve more deeply into the processes shaping the landscapes of emergent capitalism. Such particularist reconstructions allow greater insight into the motives and perceptions, attitudes and actions of individuals, groups and communities.

By seeking to understand people in the past in this way we are also accepting that scale is important to our investigation in yet another sense: scale is a function of perception. Time and space are constraints of the human imagination in so far as levels of technology set specific limits at particular places and periods. Thus, if the

time-space transformation technique, popularised by Janelle and taken up more recently by Langton,[39] is applied in the context of our present inquiry (figure 1.4), it will be seen that, relatively speaking, the seasale colliery districts of Durham -the major areal focus of our investigation- constituted a much 'bigger' region two hundred years ago than they form today. Purely from the point of view of measures of time-cost or cost-distance, the regions or subregions of the past may indeed be viewed almost like the nation states comprising the international economic community of the present.[40] No doubt there are dangers in taking the analogy too far, for we can never expect to understand in full how time and space were regarded by past societies. But equally, we must be ever aware of the potential importance of a view different from our own.

PART I

COALMINING

Chapter 2

COLLIERY LOCATION PATTERNS, 1551-1810

> ...the country wears an unpleasant aspect to the traveller, cut and harrowed up with loaded carriages, scattered over with mean cottages, from whence swarm forth innumerable inhabitants, maintained by working in the mines; where many a sooty face is seen by every hedge-way side....whilst through the deep vale the river Tyne forms a fine canal of seven or eight miles in extent, and flows with solemn majesty, as if conscious of the wealth that loads its bosom.
>
> (William Hutchinson, 1787)[1]

In his perception of events an observer *in* the past benefits from an immediacy that is denied an observer *of* the past. The latter is amply compensated, however, by a variety of evidence, methods and perspectives not available to a contemporary inquirer; a circumspect examination of historical sources can combine with cartographic skills to provide another kind of visualization of the past that is both fascinating and challenging. Figures 2.2-2.4 are, at one and the same time, a product of the writer's imagination and an attempt to understand, in model form, something important about the reality of the past. For particular points in time, c.1636, 1728 and 1804, they display, with the aid of proportional circles, three sharply contrasting patterns of colliery distribution and output. When compared to the time-series data graphed in figure 2.5, they are seen to depict three stages or 'stills' in a temporal pattern or sequence of

growth which, after an initial steep climb in the late sixteenth and early seventeenth centuries, shows a fairly steady upward trend into the early nineteenth century. Behind this broad simplicity of long-term growth and changing colliery location and output, there is a complexity of detail; and two maps in particular (figures 2.3 and 2.4), are used to emphasize, through the use of hexagonal symbols and graded shading, the essential ephemerality of our simple cross-sectional reconstructions. However, before seeking to disentangle some of this temporal warp from the spatial weft, it is necessary to examine the problems, limitations and procedures encountered in such pattern reconstruction. Some technical points in the following discussion on information sources are treated more fully in appendix 1.

Information sources and the task of pattern reconstruction

The fundamental task of colliery pattern reconstruction must aim to provide satisfactory or reasonable answers to questions about numbers and quantities, locations and timings. Ideally, calculations should be attempted on the basis of knowledge about a full population of collieries for the entire period 1551-1810. Only for certain dates, or occasional short periods, is it possible to approach these ideal requirements. For many years between 1551 and 1810 there is a complete absence of information relating directly to the existence of any particular colliery, though clearly, want of such evidence cannot be taken unquestioningly to mean lack of activity. When and where information is forthcoming, it is not necessarily in a form which yields unambiguous and reliable answers to the important questions

posed. For instance, it is not always possible to decide with reasonable assurance whether a number of contemporaneous pieces of evidence relate to one or more collieries or whether successive references through time plot the progress of a single working colliery. The very act of colliery identification (appendix 2) must, therefore, incorporate at times, some arbitrary decisions.[2] If, as sometimes happens, a record survives for the output of a particular coalpit, this data cannot be taken as evidence for the total output of the mine or colliery unless it is known for certain that no other pit was working at that time; in fact, most seasale collieries usually had several working pits. Where output totals for entire collieries are given, their true significance may be difficult to assess. In part, this may happen because of the failure of contemporaries to distinguish between a mine's seasale or vend (appendix 3) and that portion of total output which entered the local landsale trade or was consumed in pitmen's hearths and by colliery machinery. But problems can also arise from the employment of a confusing array of pecks, bolls, fothers, tens and chaldrons in an industry where standardisation of measure did not arrive until 1854. Clearly, any attempt to make sense of output data must work to some common base, and for this reason the ton (of 2,240 lbs.) is used in this study, though references to other measures, especially the chaldron and the ten (identified more fully in appendix 3), will need to be made from time to time. Assessing the life-span of a colliery can also provide a challenge of infinite complexity. One set of questions can be directed towards unearthing detail about the duration of operations, discovering whether these were continuous,

interrupted or intermittent; another set can hope to reveal whether output, however measured, was kept at a fairly constant level or fluctuated violently. Seldom can a full range of answers be expected and sometimes there is none which inspires unerring confidence.

In general, colliery data are thinly scattered throughout the period 1551-1680, and it is only around 1610 and again from c.1630 to 1665, but most notably 1636, that information of sufficient quality and quantity is available to permit a worthwhile attempt at the mapping of colliery numbers and output. Even so, this information must be approached with caution. Some of it was drawn up for purposes of litigation (most collieries were the subject of legal wranglings at one time or another) and so might, depending upon where opinion or evidence originated, either exaggerate or understate quantities or trends. Much of it survives in the form of rentals, tax assessments and survey valuations; and as far as possible such fiscal statements or estimates must be tested for their trustworthiness before being converted into output (or vend) equivalents (appendices 1 and 5).

For the periods 1681-1740 and 1741-1810, there are improvements in both the quality and quantity of the available information, especially with the more widespread keeping and survival of colliery accounts, minute books and memoranda, colliery viewers' reports and boring books, title deeds, correspondence, topographical writings and other, miscellaneous documentation. In short, there is less need to resort to surrogate measures of trends such as tax assessments and periodic valuations. Problems remain, nonetheless, for there can be a lack of

clear meaning in what does survive. Collieries can be hard to identify because of the not uncommon practice in the past of changing names (appendices 1 and 2), sometimes by adopting a locationally misleading 'brand name' in order to ensure a ready market for their coals.[3] When examining output data it is quite often difficult to disentangle the contributions of separate colliery enterprises from the overall figures credited to a single proprietor or partnership; or to decide whether surviving figures relate to the actual, estimated, potential or projected quantities of a mine's output or vend. Furthermore, although the duration of colliery workings can be gauged with an element of precision that is quite impossible when applied to the data surviving for the years before 1681, there are many years, most especially in the 1680s and 1690s, but also in the 1750s and 1760s, for which little of value survives; and even during the most favoured decades, when coverage is reasonably complete for the colliery population as a whole, the character and amount of detail available on individual enterprises varies enormously between the best and least-well documented. Thus, while the life-span of each seasale can be measured with reference to decennial units of time (appendix 6), such an organizational framework for data handling might on occasion fail to register a working colliery that is poorly documented. Equally, it must not be assumed that a colliery always worked *throughout* a particular decade, and certainly not at a constant level of output, simply because it was recorded working *at some stage* in that decade.[4]

The foregoing discussion has important implications for the

cartographic portrayal of colliery locations, outputs and distributions. It is not possible to provide a full and totally reliable picture of the succession of trends and distributions; and it must always be borne in mind that asymmetry of pattern change, so obviously a factor of interest to the historical geographer, may sometimes merely reflect the asymmetry of data survival and reliability, both temporal and spatial. Nevertheless, for 1681-1740 and 1741-1810, data can be mapped in such a way as to permit a reasonanbly uniform treatment (figures 2.3 and 2.4) and interesting visual comparisons and contrasts can be drawn, both between the two maps and within them; at the same time each map is able to reveal features that are uniquely distinctive. It would have been helpful for purposes of direct comparison had figure 2.2 depicted information on output and pattern change in precisely the same manner. To have attempted such a presentation, however, would have stretched the credibility of the evidence too far. Paucity of information may encourage a justifiably inferential approach, but equally, it can too readily lead to the making of unwarranted assumptions, as evidenced in Nef's treatment of the early coal industry.[5] The sacrifice of some degree of comparability would seem highly desirable where it results in maps that are thought individually to command a strong measure of confidence.

Compared to the experience of some coalfields, especially those that were virtually landlocked in the pre-canal era, the Northumberland and Durham coalfield has an additional valuable category of source material in the form of the port books and custom accounts which record

the amounts of coal shipped annually from both the Tyne and Wear (appendix 4). Once allowance has been made for the fact that these records comprise neither a fully comprehensive nor totally reliable data source, they can be used to estimate aggregate colliery vend, or as a check on aggregate colliery vend derived from other independent sources. And while of limited value for spatial analysis, because they do not provide a breakdown of the performance of individual collieries within either district, it is evident that where some output data survive and where surrogate information is available to suggest proportionate shares of individual collieries towards total output, as in c.1636 (figure 2.2), a reasonably acceptable estimate of colliery numbers and outputs can be achieved.[6]

The antecedent pattern: coalworking to 1550[7]

Patterns of coalmining after 1550 were not imposed upon a *tabula rasa*. Archaeological evidence points to the exploitation of coal in Roman times, probably for use by local smiths and limeburners or for shipment to the Fen country. Whether these or any subsequent operations survived to the period of its first documented use, in the thirteenth century, is not known. Much detail regarding the medieval industry also remains elusive, especially information on timings, precise locations and output levels, but there are clear signs of an upturn in activity in the fourteenth and early fifteenth centuries -signalled on ecclesiastical estates by the appointment of officials with specific responsibility for the supervision of mining operations and the

implementation of lease provisions.[8] Among a wide scatter of sites were a few of particular importance (figure 2.1). On the estates of Durham Cathedral Priory, the mines at Rainton and Ferryhill appear as major foci of activity from the middle decades of the fourteenth century, maintaining a scale and continuity of operations apparently not met with in its other workings at Heworth, Spennymoor, Aldingrange and Broom. More impressive was the record of the two major production centres on the Bishop's estates, in south-west Durham and on the south bank of the Tyne, where, before the mid-sixteenth century, rentals were being assessed in tens or hundreds of pounds compared to the few pounds or shillings attached to all other undertakings.[9]

The market for coal, even by the fourteenth century, was apparently quite varied and widespread. The religious foundations of the North East consumed coal in their domestic hearths as well as selling, or allowing their lessees to sell, considerable quantities to both domestic and industrial users. And while there is no specific evidence to suggest that coals from the Cathedral Priory's chief mines at Rainton and Ferryhill were carried far beyond the local area, this clearly did occur in the case of other major works in the Bishopric. By the early fourteenth century, if not sooner, mines at Gateshead and Whickham, and to a lesser extent at Winlaton, were probably supplying regular and quite substantial amounts of coal for shipment to London and other east coast destinations as well as the near continent.[10] Yet the most highly prized mines in the Bishopric, at least until the 1530s when there occurred a sharp upturn in shipments from the Tyne, were those in the south-western part of the coalfield at Raby, Carterthorne

and Cockfield (figure 2.1). Regarded as too remote for the seasale trade after c.1550, these collieries evidently involved the Bishop's lessees and their neighbours in extensive trade contacts in the thirteenth and fourteenth centuries. And while use of the word 'seacoals' to describe the products of these mines cannot be taken as sufficient proof that they were at some stage carried by sea, it must at the very least signal a recognition by contemporaries of the importance to be attached to them as objects of trade.[11]

The colliery location pattern, 1551-1680

With the aid of the time-series data on coal shipments (figure 2.5 and appendix 4), it is possible to recognize a marked expansion in exports from, and thus vendible output of, the seasale collieries as a whole between 1551 and 1680. Equally evident are the contrasting chronologies of growth of the two mining districts. Comparison of the rather flimsy shipment data of the 1550s and '60s with the more reliable returns of the 1590s suggests something in the order of a threefold increase in the Tyne vend over that period (from around 40,000 tons to just over 120,000 tons per annum in the case of the coastal trade).[12] More confidently, we can recognise a doubling in the vend from the early 1590s through to about 1610, after which the rate of expansion slackened somewhat. On the Wear, where coal shipments had almost certainly begun in the 1590s[13] but remained very modest until c.1610, a sharp upward trend is noticed in the 1630s. However, the much higher output recorded by the late 1650s and 1670s fully justifies

the belief that Sunderland was able to take advantage of Newcastle's misfortunes in the Civil War to double her exports in a matter of two decades.[14] By 1660 Sunderland was already exporting an amount that was a quarter the size of that produced on the Tyne.

Table 2.1 provides an estimate of the vend of twenty-two Tyne south-bank collieries, nine Tyne north-bank collieries and eight Wear mines which are believed to have been working in 1636. For a period of twenty years on either side of that date, it is also possible to indicate the maximum level of vend and usable output that might have been achieved by these collieries, and by nineteen others that were probably closed in the year 1636 as such (appendix 5a and figure 2.2). A wide range of values is evident within both mining districts in 1636, but particularly on the Tyne. However, one seasale mine, Whickham Grand Lease colliery (identified on figure 2.2 as S15), stood head and shoulders above the rest. Then in, or just passed, its prime, it

Table 2.1: *Sizes of seasale collieries, 1636*

Estimated vend (in thousands of tons)	Number of collieries	
	Tyne	Wear
<4	9	4
4-11	11	2
12-18	8	-
19-36	2	2
37-55	-	-
56-75	1	-
	31	8

Sources: Appendices 5 and 6

produced nearly 70,000 tons of vendible coal, or, assuming that it contributed *pro rata* to local consumption, about 90,000 tons of usable coal all told.

Since there is no evidence for a colliery in existence prior to c.1616 or after c.1656 which does not also appear as a working colliery between these dates, figure 2.2 is also a record of the distribution of all important collieries which are believed to have worked at some time between 1551 and 1680. But this discovery does not in itself, of course, reveal the nature or sequence of pattern changes involved over this long period of time. Of more value is the distinction that can be made, in the case of thirty collieries for which adequate data survive, between eighteen which had yet to reach their full potential in c.1636 and twelve which had probably performed better, though not necessarily dramatically so, before that date (figure 2.2).

In the 1550s almost all the 'sea coal' shipped from North East England probably came from the manors of Gateshead and Whickham, but within a matter of two or three decades other sizeable south-bank collieries were to be found further west at Stella (S4, S5, and S6) and Blaydon (S8); and at Winlaton (S7) which alone is credited with producing about 20,000 tons of coal per annum for shipment as early as 1581/2.[15] By the close of the sixteenth century large quantities of coal were also being mined at the Northumberland collieries of Elswick (N10), Benwell (N9), Denton (N6) and Newburn (N5). Indeed, it seems reasonable to conclude that in the first decade of the seventeenth century the aggregate contribution of these north-bank collieries might

well have accounted for nearly forty per cent of the entire Tyne vend, which was considerably in excess of their more usual proportion: perhaps as little as twenty-five per cent in the years before c.1580 and only around thirty per cent by c.1636.[16]

High output at all these Tyne riverside collieries was sustained well into the seventeenth century by the sinking of new pits, and, in some instances, by the periodic revival of earlier abandoned workings which could thus shift the focus of activity back towards the river. But a more general trend both within and between coal royalties[17] was evidently gathering pace. By 1610 complaints were mounting about the additional expense of mining 'in regard that the greatest quantitye of coles are now wrought at further pits then they were the last yeare'[18] and it is significant, perhaps, that Greenlaw freehold (S14), situated inland from the manor of Whickham but nominally a part of it, became in the 1610s and '20s the source of great quantities of 'shipcoal'.[19] By the middle of the seventeenth century, it is apparent that all the remaining seams in Whickham manor and within a mile or so of the river Tyne had been 'drowned out' and that until their future potential could be realised, by the introduction of more advanced drainage techniques, coalmining would have to focus increasingly upon an area of higher ground south of the village which had last been vigorously exploited in the 1570s and '80s. In fact, after 1652 Whickham Grand Lease colliery (which occupied the major, and predominantly northern, portion of the manor) probably never again achieved that annual output of 70,000 tons or so of vendible coal which had made it, before the Civil War, the greatest coalmine in Europe.

Nevertheless, it remained pre-eminent until at least the third quarter of the seventeenth century.[20]

A gradual movement of coalmining away from sites in close proximity to the river also occurred in the more recently developed coal royalties which lay to the west of, and upstream from, Whickham. In 1636 Blaydon (S8) had been assessed as the second largest colliery on the coalfield with an annual value of £2,200 and a vendible output of perhaps 33,000 tons, nearly one half that produced at Whickham Grand Lease (S15). However, it was soon to be eclipsed by Stella Grand Lease colliery (S4) which had pits two or three miles inland and was served by one of the earliest colliery waggonways in the region, built by 1660. While in 1636 the colliery appears to have been already worth £650 per annum, by 1647 its value had risen to £1,500 and in 1662 Bishop Cosin could record it as 'ye best Colemine and best Lease that the Bp. of Duresme hath to let ... worth beside the Rent ... 2,400£' and likely to provide some future holder of the See with 'more profit from a single renewal than all the [other] fines that I have received'.[21] A potential constraint on rising vend and profit levels at the mine had evidently been abandoned by Bishop Cosin's time: the lease agreement of 1615 (plate 1) was probably the last one to restrict the number of working pits to just four.[22]

Immediately south of Whickham manor were two more royalties in which coalmining assumed significant proportions by the middle years of the seventeenth century. On Blackburn Fell (S19), two or three miles from the river, three Newcastle hostmen,[23] John Marley (Mayor of Newcastle),

Thomas Liddell and John Clavering, were granted the lease of coalmines in 1637/8. Then worth £300 per annum, the colliery probably advanced a little in value by 1662, after which there occurred a more dramatic rise in its fortunes.[24] A more important undertaking, however, was the colliery at Ravensworth (S22) which was worked by the estate owners, the Liddels. Valued at £1,200 in 1636, and so producing around 18,000 tons of vendible coal per annum (appendix 5a), it appears to have raised output even higher after the brief hiatus of the Civil War and, as one of the most innovative collieries on the coalfield, generally prospered throughout the period to 1680; and indeed, beyond.[25]

In the Wear district coalmining was a much younger industry than on Tyneside, the first serious attempts at full-scale expansion not coming until the 1620s and '30s, and this was reflected in a generally more restricted zoning of activity up to 1680.[26] On the north bank the manor of Harraton became a notable focus of activity: in the decade 1629-38 the amount of vendible coal raised there was said to have ranged between 6,000 and 10,000 tons per annum. Although temporarily unworked when the parliamentary forces captured Durham and Northumberland from the Royalists in the early 1640s, the Harraton mine (W3) was, according to Sir Lionel Maddison, certain to prove 'wonderfull beneficiall' again, because 'the coles may even from the pitt be almost put into the keeles for a very small matter leadinge'.[27]

On the south bank of the Wear, pits at Offerton (W5) and Penshaw (W6) were probably among the first to produce coal for seasale before 1600, but their output remained fairly modest.[28] Early in the reign of

Charles I, it was the mines within the manors of Lambton and Lumley that were gaining a reputation for quantity and quality.[29] By the late 1630s Lambton (W8) in particular was expanding rapidly and despite the disruptions of the Civil War was soon to reach, or even exceed, an annual vend of 30,000 tons.[30] Yet when Chief Justice North visited the Wear district in c.1676, it was not Lambton but the neighbouring riverside coal royalty (W9) to which his attention was drawn:

> His lordship was curious to visit the coalmines in Lumley Park, which are the greatest in the north and produce the best coals, and being exported at Sunderland, are distinguished as of that place.[31]

However, even in the Wear district the chance of exploiting more distant seams for the seasale trade was being taken. By 1624 two mining adventurers in Chester manor were petitioning the Privy Council for a wayleave from their landlocked pits at Fugerhouse (a part of W1) through an adjoining manor to the river.[32] Yet more striking was the experience of the old landsale colliery at Rainton (L17/W7). By the 1660s substantial amounts of coal for seasale were almost certainly being hauled four miles or so overland to Biddick staiths, a little north-east of Lambton (located between W4 and W8 in figure 2.2); and some small quantities of Rainton coal might well have been destined for the Sunderland trade as early as 1600 by way of a more southerly but short-lived shipping point on the Wear.[33]

The coal boom, at first in the Tyne district and later in the Wear, aroused expectations of profitable explorations at other inland locations, and the increased value of some Bishopric concessions,

though of modest proportions, argues persuasively for an upturn in their fortunes, even though they were not to flourish until some decades later. On Tanfield Moor, an area some six to eight miles from the Tyne staiths by cart or wain, but destined to produce some of the very best coals of the entire coalfield in the first half of the eighteenth century, the concession was already in the hands of Newcastle mining adventurers by the reign of Charles I. Their expectation of raising large quantities of coals for shipment, rather than merely for landsale, is signalled by a clause in the original lease which granted:

> ... soe many Colepitts and other Drifts and worke as shall seem good ... And alsoe free heaproome, wayleave, steithleave and water leave for laying leading venting and conveying away of the said Coles.[34]

In 1647 the whole concession was said to be worth £50 above the annual rent: a small sum when set against the value of the Grand Leases of Whickham (S15) or Stella (S4), rated at £4,500 and £1,700 respectively in 1636, but an indication, nonetheless, of a coal royalty that offered potential and would one day, with the aid of a new transport technology, reshape the spatial patterning of coalmining.[35]

Tanfield colliery (S10), like the more precocious Rainton (W7), was an awakening giant. Few other landsale collieries of the period 1551-1680 were ever to achieve seasale status. Though details of their changing fortunes remain, for the most part, extremely obscure, it would seem that, in comparison with their performances in the years before 1551, many may have suffered a relative, and some even an absolute, decline. In 1647 the parliamentary commissioners found that

the pits at Knitsley and Clewburn (L8) in the parish of Lanchester had been 'of late years neglected as of no value' while the mine at Charlaw (L10) was now only worked 'unlicensed' by a 'poore man at a grove or hole in the bankside'.[36] On the other hand, in the south-western portion of the coalfield there was, as of old, a major focus of mining activity, with Railey and Carterthorne (L36) still assuming sizeable dimensions in the mid-seventeenth century (figure 2.2). Less fortunate by this date were circumstances at nearby Grewburn (L39) where the mine was described as 'much wrought' and only 'kept on foot with a very great charge being much subject to be drowned'.[37] The commissioners were more expansive in their comments on the fate of the ancient colliery at Hargill (L40), which was held on lease from the Bishop, and intended to be worked by the Mayor and Burgesses of Durham for the benefit of the poor of that city at an annual rent of £18:

> The said Colliery is so fallen in the yearly profitt thereof by reason it being an Inland Colliery (lying farr from the Rivers of Tyne and Weare) .... [it] is partly wrought out and decayed and partly in respect that other Collieries have been found out and are now wrought which lie between it and the Sale to landward.[38]

The colliery location pattern, 1681-1740

After a decade or so around 1700 when coastal exports from the Tyne were fluctuating quite markedly but, in general, showing no upward trend (figure 2.5 and appendix 4), a higher plateau of vendible output was achieved in the third and fourth decades of the eighteenth century so that by the 1730s coal shipments coastwise of about 700,000 tons per

annum were probably higher by thirty per cent or so than they had been in the 1680s when they averaged around 530,000 tons. Overseas shipments, though liable to fluctuate quite markedly from one year to the next, appear to have risen by around fifty per cent between the 1670s (c.35,000 tons per annum) and the 1730s (c.53,000 tons).[39] From the surviving evidence it is not possible to know for sure whether the Wear district experienced a slackening in demand around the turn of the century to the same extent as the Tyne. What does emerge clearly is the near two and a half-fold increase in total vend (coastal and overseas combined) between the 1670s (c.130,000 tons) and the 1730s (c.310,000 tons). No longer content to produce a quarter of the quantity of coals shipped from Newcastle, as had been the case in 1660 and throughout the 1670s, Sunderland's vend was almost a half that of the Tyne by the 1720s; a circumstance which did not go unnoticed by Lord Harley, while on a visit to Newcastle in 1725:

> This is the most populous and busy town I have ever seen excepting London .... Its chief trade is the coal, which produces about 250,000£ per annum. They seem a little jealous of Sunderland, which has of late shared with it pretty considerably in this trade, and as I am told, is likely to gain more and more upon it every day.[40]

For 1728 it is possible to provide a reasonably clear picture of just where the vend originated and in what quantities (figure 2.3 and appendix 5b), though when examining the pattern account must be taken of the somewhat unusual circumstances of that year: total coal shipments at just under a million tons were at their lowest since 1724 and down by nearly eight per cent on the average for the three years on

either side of 1728. The shortfall was especially pronounced on the Tyne, to the extent that the Wear coal district with about 345,000 tons (34.6 per cent of the total vend as mapped) contributed some four to five per cent more coal than its usual proportion.[41] The mean size (vend) of the seasale collieries for the coalfield as a whole was 29,216 tons, and there was little difference between the two mining districts with twenty-two Tyne collieries averaging 29,486 tons and twelve Wear collieries recording a mean of 28,721 tons. Had 1728 been a more 'normal' year, the Tyne collieries' mean might have been higher and that of the Wear lower by about 2,500 tons (in other words, a difference between the two of around 5,000 tons). It would appear that the Wear collieries' sizes tended to cluster around the mean with probably not less than 21,200 tons produced at the smallest seasale collieries (W17 and W19) and not more than 42,400 tons at the biggest (W1/2 and W16). On the Tyne, by contrast, sizes ranged from as little as 3,763 tons at Stella Clavering (S2) to as much as 87,450 tons at Beckley (S56).[42] Most North East seasale collieries were enormous in comparison with neighbouring landsale workings; and, indeed, with mines that were to be found on other British coalfields at this time.[43]

Direct comparisons with 1636 are rendered problematical by the nature of seventeenth-century sources,[44] but several important developments seem evident: a near two and a half-fold increase in the quantities of coal shipped by 1728;[45] a small decrease in the overall number of seasale collieries contributing to the vend in any one year (an increase on the Wear being more than offset by a fall on the Tyne) so that mean seasale colliery size must have easily trebled; and

finally, a wider range of values for colliery sizes in 1728 than 1636 with the class distribution becoming negatively rather than positively skewed (table 2.2).[46] Also worthy of note is the appearance in 1728 of seasale collieries in twenty-three locations not recorded for 1636.[47]

How had these changes come about? How had the pattern of 1728 taken shape? And how representative was it of the period 1681-1740 as a whole? Further examination of figure 2.3 and appendix 6 (including summary tables), provides a framework of answers regarding changing numbers and distributions, and the life-spans of individual collieries.

Embodied within the pattern of 1728 were elements of both recent change and longer-term stability. In the Tyne district, where the field of potential exploitation was considerable, a quite complex pattern of change is indicated. In 1728 there were two major axes of coalworking. One trended north-south along the course of the Ouseburn and just east of the Team, where the productive middle coalmeasures

Table 2.2 *Sizes of seasale collieries, 1636 and 1728*

Vend in thousands of tons	Number of collieries			
	Tyne		Wear	
	1636	1728	1636	1728
<4	9	2	4	-
4-11	11	1	2	-
12-18	8	3	-	1
19-36	2	9	2	8
37-55	-	6	-	3
55-75	1	-	-	-
75>	-	1	-	-
	31	22	8	12

Sources: Appendices 5 and 6

dipped beneath the mostly barren strata of the upper coalmeasures. Here were four major long-life collieries; that is, collieries which worked in four or more decades between 1681 and 1740, though not necessarily consecutively (N22, S70, S72, S30). The other axis, in the north-west Durham uplands, ran east-west between the Team and the Derwent, and represented a tight cluster of collieries, of varied age and vend potential, situated some four to eight miles from the Tyne. Elsewhere there was relative emptiness. But clearly this had not long been the case. Up to, and more especially during, the first decade of the eighteenth century most coalworking was still concentrated fairly close to the river, despite the landward surges and partial retreats of activity already detectable long before 1680; and it was not until 1710 or thereabouts that this basic pattern received a major dislocation which was to be felt most keenly north of the river: no fewer than eleven north-bank collieries which had worked in one or more decades prior to 1710 failed to do so thereafter.[48] Of those vending in 1728, only Jesmond (N22) had been extensively worked between 1681 and 1710: in the face of mounting drainage problems the ancient colliery of Elswick (N10) had stood abandoned from the 1680s until its revival in c.1718, while Byker (N25) and Heaton (N24) had vended only intermittently.[49]

On the south bank of the Tyne a more varied chronology of stoppage and decline can be discerned among collieries within a mile or two of the river. Especially afflicted by mounting technical difficulties and dwindling output were a cluster of collieries at Gateshead: two major mines at Bensham (S67) and Gateshead Park (S29); and five minor

undertakings at Wilson's Field (S25), Redheugh (S65), 'Petty Owners' (S66), Claxtons (S68) and Deckhams (S69). When, in 1697, Thomas Fenwick, colliery viewer, reported on all the pits in the manor of Gateshead, his typical comments were 'broaken worke', 'may worke a year or two' and 'almost wrought out'. At Gateshead Park (S29) there were '160 acres of whole myne of the best maine coal in the River thought to be, if she be wonn, but considering great weight of water that's upon her, it may be a question when she may be undertaken again'. In fact, following a brief and modest revival in the early years of the the eighteenth century, the colliery was to remain closed for seasale production until the 1770s.[50]

Most symptomatic of changing circumstances around 1700 was the decline of seasale coalmining in Whickham parish. Once boasting the richest, most productive, seams on the coalfield, output at the Grand Lease colliery (S15) in the 1690s, of about 55,000 tons per annum (or 40,000 tons for seasale alone), was probably under two-thirds of what it had been in the 1630s and soon after 1710 plummeted to negligible amounts for all but the landsale markets.[51] Between 1681 and 1700 the leading colliery on the Tyne was Stella Grand Lease (S4) with a peak annual vend of 90,000 tons or so. After c.1700 though, it, too, experienced a decline, eventually to close in the 1730s.[52] Even so, it was still contributing 26,000 tons in 1728, and clearly overshadowed its neighbour, Blaydon Main (S8), another long-life colliery in Ryton parish which was a good deal closer to the river and whose imminent demise in 1728 was signalled by a mere 8,480 tons of vendible coal.

Shortly before 1710, high expectations were still being entertained at some riverside collieries, notably Bensham (S67) and Felling (S31), but the chief focus of activity now switched to Gateshead Fell (S70); to the Liddell family's workings at Team (S71), Eighton (S72) and the long-exploited Ravensworth (S22); and most particularly, to Northbanks or Hutton colliery (S57), which lay four miles or so from the staiths and was, in 1712, according to Henry Liddell, 'ever allowed to be ye chiefest colliery in either river'.[53]

Undoubtedly the most novel feature of the colliery location pattern to emerge in the period 1681-1740 was the full-scale exploitation of a large number of coal royalties in the uplands of north-west Durham, remote from the riverside staiths at Derwenthaugh, Dunston and Team. Seasale coals were already being carried six or seven miles from Tanfield (S10), and possibly from Pontop (S45), in 1700; and after 1720 many new mines were to open. A high density of coalworking was achieved by 1728 (figure 2.3) and this was soon reinforced with the opening of no less than fourteen more collieries by 1740, five of which (S46, S47, S48, S49, S50) penetrated far south into Lanchester Fell. Many of the mineral estates exploited at this time were so small and so vigorously mined that they were rapidly worked out. Beckley (S56), the largest producer in 1728 with a vend of 87,450 tons, raised rather more coal than had Whickham Grand Lease (S15) as the largest producer in c.1636, but while Whickham held a position of pre-eminence for most of the late sixteenth and seventeenth centuries, Beckley's supremacy was short-lived: the colliery was only seriously worked in the third and fourth decades of the eighteenth century and its true life-span was

probably a matter of just twelve to fifteen years.[34]

Though sources make it less easy to follow the successive stages in pattern change on the Wear than on the Tyne, it would seem that longevity was a particularly marked feature of Wear district collieries with no fewer than ten of the fifteen at work between 1681 and 1740 qualifying as long-life mines. Most of these worked seams quite close by the river and while drainage problems must have arisen here as on the Tyne, especially in the years up to 1720, they were not sufficiently severe as to lead to their full-scale abandonment. On the other hand, the spatial concentration of activity that had characterised the period to 1680 was relaxed somewhat. By 1700 the outlying pits of at least two of the older collieries (Chester, W1/2; and Lumley, W9) were supplying coal via a somewhat circuitous journey of three miles or more to the nearest available loading sites on navigable water; and by the 1720s the coals of two new seasale mines (Newbottle, W17/18; and Morton, W19) were being carried over a similar distance. Meanwhile the four- to five-mile long haul from Rainton (W7) continued with increasing vigour.

Information is sparse regarding trends in the number, size and duration of landsale collieries working between 1681 and 1740. Nevertheless, for some workings on the Bishop's and Dean and Chapter's estates it is possible to form a distinct impression, often from marginal comments attached to rental and survey documents, that, while one colliery, Coldknot (L40), suffered a terminal decline after c.1710, and at least seven experienced growth, the majority remained little changed. Three

landsale collieries within Northern Durham, Whittle (L46), Plawsworth (L12) and Knitsley (L8), were apparently supplying more coal after c.1710 than they had before, in spite of competition in the landsale trade from nearby seasale collieries.[53] But the major improvement was recorded in south Durham (figure 2.3), and most noticeably among a group of workings which centred upon Etherley (L35). Here, William Peirse and Ralph Gowland sublet the Bishop's mineral rights to an unnamed tenant who by c.1730 'clear'd near £1,500 p.a. above ye Rent of £550'.[54]

The colliery location pattern, 1741-1810

Despite quite violent fluctuations in the quantities of coal despatched overseas during the Napoleonic wars, the shipment data reveal, when the total vends of both the Tyne and Wear are combined (figure 2.5 and appendix 4), a fairly steady rate of increase for the period as a whole, from about 1,080,000 tons per annum during the 1730s to an annual average of 2,386,000 tons in the decade 1801-10. The fortunes of the two mining districts differed appreciably, however. In the 1720s and '30s the Wear accounted for just over thirty per cent of all coals shipped out, and by the 1770s for forty-two per cent; thereafter, it fell back to around thirty-five per cent. The unbridled advance of Sunderland, which the Newcastle-based coalowners had so feared in the early decades of the eighteenth century, was now checked.

Figure 2.4 and appendix 5c reveal a pattern of colliery vends and locations in 1804 which was very different from that of 1728. Of

thirty vending Tyne collieries, only four -Heaton (N24), Tanfield Moor (S10), Northbanks (S57) and Gateshead Fell (S70)- were among the twenty-two which had contributed in 1728. The overwhelming dominance of south-bank collieries had disappeared with sixteen now at work north of the river compared to fourteen to the south. The most notable feature in 1804, however, was the concentration of activity in the eastern sub-district (that is, east of the Ouseburn and Team), especially in the synclinal trough of the Wallsend Basin where the main productive seams lay beneath the mainly barren strata of the upper coalmeasures and where, in two cases at least, shafts were being sunk to a depth of 140 fathoms (840 feet).[57] It was here that the largest collieries on the coalfield were to be found. Thus, while mean colliery size for the seasale districts as a whole was 47,607 tons, and for the Tyne district alone 56,236 tons, six deep mines in the heart of the Wallsend Basin (N12, N49, N50, N55, S82 and S83) averaged 109,239 tons and ranged from 79,680 at Jarrow Temple Main (S83) to 159,350 tons in the case of Wallsend (N49) which, as primate colliery, stood head and shoulders above the rest. The largest producer in 1728 had been Beckley (S56) with a vend of 87,450 tons; now five Tyne collieries exceeded that amount. More impressively, the vend of the second largest colliery in 1728, 54,643 tons at Bucksnook (S42), was surpassed by thirteen of the thirty Tyne collieries in 1804; and all but two lay in the eastern sub-district. The exceptions were Benwell (N9) and Pontop (S45/46) with 82,781 and 85,563 tons respectively. They tended to dwarf neighbouring collieries in the western sub-district where all remaining vends fell within the range 9,349 to 46,309 tons. Table 2.3

provides, in simplified form, a summary of these and other changes in the size-distribution of collieries.

Of twenty-two working seasale collieries on the Wear in 1804, there were just seven which had been among the twelve contributing in 1728: Wharton Main (W6), Rainton (W7), Lambton (W8), Lumley (W9), Fatfield (W13), South Biddick (W16) and Newbottle (W17/18). Vends ranged from 12,142 tons at Leefield (W27) to 61,183 at Beamish South Moor (S62/W22), but there was an apparent marked tendency for colliery sizes to cluster around the mean (of 35,841 tons), just as there had been in 1728 (when the mean was 28,721 tons). Seven of the working collieries in 1804 were now larger than the two biggest of 1728, though six of them were only marginally so. While a high level of vend was still

Table 2.3 *Sizes of seasale collieries, 1636, 1728 and 1804*

Vend in thousands of tons	Number of collieries							
	Tyne					Wear		
	1636	1728	1804			1636	1728	1804
				E^	W^			
<4	9	2	-	-	-	4	-	-
4-11	11	1	1	-	*(1)*	2	-	-
12-18	8	3	3	-	*(3)*	-	1	3
19-36	2	9	8	*(2*	*+ 6)*	2	8	9
37-55	-	6	5	*(2*	*+ 3)*	-	3	9
56-75	1	-	3	*(3)*		-	-	1
75>	-	1	10	*(8*	*+ 2)*	-	-	-
	31	22	30	*(15+15)*		8	12	22

^ E= Eastern sub-district (east of Ouseburn and Team and including Wallsend Basin)
W= Western sub-district (west of Ouseburn and Team)

Sources: Appendices 5 and 6

maintained at collieries in the early eighteenth-century zone of production, new coal lands were being increasingly exploited on both sides of the river. Most in evidence was the new westward sector of activity whose reach was such as to necessitate an overland journey of six and a half miles from the district's largest colliery, at Beamish South Moor (S62/W22), to the riverside staiths. Here, and at Birtley (S30/W30) and Stanley (S78/W21) (the last-named was not working in 1804 as such), the Wear district catchment embraced collieries which prior to 1740 had vended solely via the Tyne. There were clear signs, then, that towards the end of the study period the coalmining industry of the region was experiencing a degree of spatial and economic integration; indeed, at various dates between c.1790 and 1810, though not in 1804, William Russell's Washington Usworth colliery (W31/S85) sent coals to both rivers.[58]

What is known of the nature and pace of change in the decades between 1741 and 1810 which might account for such a sharp contrast between the pattern of 1728 and that of 1804? While the overall numbers of working collieries showed a quite significant increase, with at least thirty-nine working at some stage in the decade 1741-50, fifty-seven by 1771-80 and seventy-two in the decade 1801-10,[59] the actual turnover was even more marked as substantial numbers of closures in succeeding decades were more than compensated for by new openings and revivals at different locations. Without resorting to a mass of statistical detail, which is more properly assigned to appendix 6 and its summary tables, the essential features of pattern change can be

identified with the aid of figure 2.4: within the visually dominant pattern of 1804 can be discerned collieries of relatively recent origin alongside the survivors and casualties of much older patterns.

A large number of long-life collieries -those recorded working in four or more decades- were to be found roughly along a north-south line joining the Tyne colliery of Long Benton (N23/42) with the Wear mines at Rainton (W7); thus emphasizing that for the period as a whole, and even more strikingly than in the period 1681-1740, colliery working was especially important at those sites where the main productive coal seams were fringed or partly overlain by a comparatively thin covering of mainly barren strata. But it is also evident that in the western sub-district of the Tyne a string of long-life collieries ran approximately in an east-west line along the north bank of the river, while on the south side a concentration of durable workings was still to be found in the uplands of north-west Durham, remote from the riverside staiths. Although seven of the twenty-one long-life collieries in the western sub-district had closed by the decade 1801-10, six of the fourteen remaining were still yielding quite large quantities: Baker's Main (N6), Walbottle with Holywell Main (N3/29), Whitefield (S74), Pontop (S45/46), South Moor (S49) and Tanfield (S10).

Yet it is also evident that these older mining areas of the Tyne were especially prone to early colliery closures: in the decade 1741-50 sixteen of the twenty-eight collieries whose coals were led to the Tyne were clustered in the north-west Durham uplands between the Team and Derwent, by 1781-90 only eight of forty-four working mines

were found there, and by the decade 1801-10 only four of forty-seven. By contrast, among the Tyne's forty-three short-life collieries -those recorded working in three decades or less- fourteen only appeared *after* 1780 and nine of these were in the Wallsend Basin, thus emphasizing the comparative newness of collieries there as constituents in the pattern of 1804. Indeed, one of the collieries, Hebburn (S82), producing 112,511 tons in 1804, had opened in 1792, while Jarrow Temple Main (S83), producing 79,680 tons in 1804, had opened fully as recently as 1803; and another, Chapter Main (S84), was only to begin full production in 1810.[60]

In the Wear district there were eleven short-life collieries of which seven first opened after 1780. The four remaining are so classified because of an intermittent pattern of working over the period 1741-1810; for in sharp contrast to what happened on the Tyne, there is no record of any Wear collieries ceasing production by 1780 and failing to reopen thereafter. However, while the colliery population as a whole undoubtedly had a good survival record in the Wear district, it seems likely that a number of long-life collieries here (and on the Tyne too for that matter, but where it is less clearly demonstrable) experienced marked fluctuations in vend levels, with periodic stoppages of several months or even years, rather than continuous operations and constant production over many decades. In other words, their misfortunes were simply less severe than those of some collieries classified as short-life. Be that as it may, the reconstructed biographies of several Wear mines suggest a remarkable consistency of working over many years or decades. It seems likely,

for instance, that, from the mid-seventeenth century to the early nineteenth, both Lambton (W8) and Rainton (W7) produced regular and substantial quantities of coal for the seasale trade.[41]

An assessment of the fluctuating fortunes of the Durham landsale collieries is again rendered difficult by the imprecise nature of information contained in available sources. However, for the decade 1801-10 there occurs valuable detail on the distribution and performance of thirty-five working landsale mines. With a combined output total slightly in excess of 200,000 tons (appendix 5d), they produced only twenty-nine per cent more coal than was vended in 1804 at Wallsend (N49), the single largest seasale colliery on the coalfield at that date, and well short of twice the quantity raised by Willington (N50), the second-ranking seasale enterprise. Mean annual output of the landsale collieries stood at just 5,883 tons: nine produced less than 3,000 tons per annum and only six exceeded 10,000 tons. None of the larger undertakings were in Northern Durham where, it can be assumed, their meagre output was greatly overshadowed by the landsale output of some of the neighbouring seasale mines. Despite their very modest size, certain landsale collieries still seem to have prospered by specialising in a particular market. Thus Pittington coal mines (L49) in 1804 were said to supply 'the largest proportion of the count(r)y consumption' of coals for 'burning lime in kilns'.[42] Nearly all the major landsale collieries in c.1804 were, as indeed they probably had been since the Middle Ages, in the south-west portion of the coalfield (figures 2.1-2.4). Carterthorne (L36), though probably

performing rather better before 1750 than after, was still pre-eminent with an output of 18,620 tons. At Evenwood (L34), which produced just 4,620 tons per annum around 1804, there was apparently much potential still to be realised -in 1808 Lord Strathmore was willing to pay a leasehold fine of £2,700 for the mining concession there.[63]

Not all landsale collieries working between 1741 and 1810 were necessarily at work in the decade 1801-10, of course; and so the total number working at some stage over the period must have exceeded thirty-five. One gains the impression that for many of these mines periodic bursts of activity were interrupted by prolonged phases of very modest output or even complete cessation of working. It is clear that some mines exploited in earlier times were considered quite exhausted or capable of producing only small quantities by the closing decades of the study period. Charlaw (L10), which had been 'worth little' in 1795, had staged a modest recovery by 1810, but there is no similar record of a revival at Frankland (L18) and Framwellgate Moor (L19) where, in 1795, the mines had been 'long out of work'.[64]

We have shown how, in the period 1551-1810, the coal industry in North East England underwent a remarkable transformation. The late sixteenth and early seventeenth centuries witnessed a dramatic surge in output from the seasale mines in the Tyne district while the middle decades of the seventeenth century saw a similarly impressive phase of development in the Wear district. Thereafter the pace of growth slackened, or even faltered, as around the close of the seventeenth century, but a fairly constant pace of expansion characterised much of the eighteenth century

so that by the opening years of the nineteenth the two districts were vending nearly 2.5 million tons of coal per annum. Total usable output of the seasale mines, at around 4.5 million tons per annum, represented about thirty per cent of Great Britain's entire production at that date.[49] Most of the earliest worked seams were close to the coal-exporting rivers, but their rapid depletion soon led to the exploitation of more distant reserves and a consequent landward shift in the main focus of activity; a phenomenon that was most noticeably in evidence in north-west Durham between c.1710 and 1740. There was, however, a countervailing trend to be observed as, in succeeding generations, it became possible to exploit seams at ever greater depths, including, of course, those near the rivers. Nowhere was this more apparent than in the Wallsend Basin after c.1780. Although the Tyne catchment was more extensive than that of the Wear and certainly more susceptible to locational shifts in the focus of mining activity, the overlapping of the two economic zones which occurred towards the end of the study period tended, on balance, to favour the Wear: three collieries which had once vended solely via Newcastle switched to Sunderland. Within these broad patterns of change can be discerned the highly variable experiences of individual collieries with regard to output levels and duration of working. Some mines rose quickly to prominence, were soon exhausted and sank into obscurity; others grew slowly at first but then performed consistently well over many years; yet others experienced the kind of periodic revivals and erratic production levels that, at a lower order of magnitude, were more typically associated with many of the region's landsale mines. But

almost from the outset of the study period there were a significant number of seasale collieries operating at a scale sufficient to signal a real break with the past -the emergence of a 'modern', capitalist system of industry. Well into the nineteenth century the major seasale collieries of North East England continued to dwarf many of the chief mines on other coalfields. In Parts II and III of this study we shall explore the relationship between the temporal and spatial trends described above and the region's demographic and enclosure history. Of more immediate concern, however, is to examine the factors which accounted for these interesting but complex patterns. *A priori* reasoning suggests that demand and supply considerations were among the key variables.

Chapter 3

FACTORS AFFECTING COLLIERY LOCATION PATTERNS, 1551-1810: DEMAND AND SUPPLY CONSIDERATIONS

> The cry of the people of London for want of coals is very great. They have been with great clamour and noise to the Lords.
>
> (Sir Edward Nicholas, 1630)[1]

> I hope ye coles will give content, for tho' my Tanfield are small they are applely, and Gelsfield howle excessively round.
>
> (James Clavering, 1712)[2]

Markets

Although sizeable quantities of coal were consumed locally (pie-graphs in figures 2.2-2.4),[3] by far the largest amount, and practically all of a better quality, was shipped to British and continental ports whose hinterlands were often served by navigable rivers and waterways. Data from the port books (appendices 4, 7 and 8) point clearly towards generally rising aggregate demand and an increase in the number of destinations supplied between 1551 and 1810; and while a detailed breakdown of the quantities of coal reaching separate locations, other than London, has not been possible (except for 1683 and 1731, and only then for coastal trade), a counting of the number of coal shipments in years for which suitable data survive provides a useful if imprecise measure of the size and durability of individual markets, and of their

relative dependence upon the two supply districts (figures 3.1 and 3.2a-s).[4]

The coastal trade

London and the Thames valley dominated the national market, consuming prodigious quantities of coal, at first in domestic hearths and soon after in a growing number of industrial production processes. Already, in 1610, Sir William Slingsby and partners, petitioning for a patent for the more widespread use of pit coal, were distinguishing between manufactures in which it could be used -'all boilings of bear, Dies, Allom, Sea Salt'- and those where it was still necessary to resort to dwindling supplies of wood bought at inflated prices[5] -'Malt, Brede, Brycke, Tyles, Pottes and melting of Bell metal, Copper, Brass, Iron, Leade and Glass.'[6] Increasing supplies of coal were both an encouragement and response to the capital's population growth[7] and came almost entirely from North East England. Even in the first decade of the nineteenth century, when the canal network that opened up the heartland of England was approaching maturity, little came to the metropolis from inland coalfields: in 1805 it amounted to no more than 2,580 tons compared to a million tons arriving by sea.[8]

If London relied so heavily upon the Tyne and Wear for its coal supplies, was it, in turn, the great monolithic single market for their coals which contemporaries and some later writers have suggested?[9] In the first half of the seventeenth century only about forty per cent of the Tyne vend reached London and at times in the second half of the sixteenth it appears to have been even less (table 3.1) However, once

Table 3.1: *Percentage share of shipped quantities of coal destined for the London market*

From	Newcastle	Sunderland	From	Newcastle	Sunderland
1562	21		1710	83.7	43.7
1592	c.34		1722	80.6	29.7
1615	44		1730	76.3	31.9
1638	c.40		1731	77.4	
1682	69.4		1738	81.8	30.1
1683	71.0	22.9	1749	82.3	21.6
1691	81.6	39.1	1789	75.6	18.6
1703	81.5	37.4	1791-99 mean	76.5	22.0

Sources: Appendices 4 and 7; and RepCCT 1800a, app. 43.

the rebuilding of London was under way after the Great Fire of 1666, a closer dependence was forged.[10] Moreover, it endured the economic recession of the late seventeenth and early eighteenth centuries when most other coastal markets were proving uncertain.[11] In 1683 and 1731 (figure 3.3) the quantities despatched to London represented 71.0 and 77.4 per cent of the Tyne vend respectively; at other dates in the late seventeenth and eighteenth centuries the capital accounted for over eighty per cent (table 3.1). The prominence of the London market remains impressive even when measured by coal shipment numbers which tend to understate the true extent of the Tyne's involvement owing to the greater carrying capacity and actual loads of London-bound ships compared to those serving other ports (see appendix 8, including figures A8.1 and A8.2). And while Newcastle coals did, of course, reach many other markets on the south and east coasts of Britain -at least thirty-four in 1562, thirty-nine in 1691 and forty-seven by 1749- only King's Lynn, Great Yarmouth, Hull, Portsmouth, Rochester, Sandwich, Southampton and Wells regularly took in excess of fifty

shipments, and of these only the first two received over one hundred on most of the dates for which we have information (figures 3.1, 3.2a-s and appendix 7).[12]

For reasons which as yet cannot be fully explained, the pattern of Sunderland's coastal trade was markedly different from that of Newcastle. While many small quantities of coal were despatched to a similar wide scatter of destinations, its chief markets -those receiving over fifty shipments in one or more years for which data have been analysed- were greater in number and apparently more durable (figures 3.2a-s and appendix 7). In the early years of its expansion much of Sunderland's trade was with the nearby ports of Whitby, Scarborough, Grimsby and Hull. In the eighteenth century these links appear to have been maintained almost to the exclusion of Newcastle, whose traditional markets in East Anglia, most notably Great Yarmouth, were also under threat from Sunderland.[13]

By way of contrast was Sunderland's failure ever seriously to challenge Newcastle's dominance of the London market (table 3.1 and appendix 8a). London's share of the Wear coastal vend fell to as little as 18.6 per cent in 1789 and even when it peaked at 43.7 per cent in 1710 the quantity of coal shipped (77,616 tons) was well below that leaving the Tyne (345,910 tons, which represented 83.7 per cent of its coastal trade). It is important to remember, however, that some Wear collieries enjoyed particularly strong ties with the capital: Harraton (W3), through it large-scale funding by London entrepreneurs in the seventeenth century; Lambton (W8) and Lumley (W9) because of

their reputation -gained by the 1620s and '30s- for high quality coals.[14] Only in the second half of the eighteenth century, when competition from the Tyne collieries -most notably those in the Wallsend Basin- became especially intense in the London market, was the owner of Lumley colliery driven to fight a rearguard action: on 28 May 1779 the Earl of Scarborough was reported to be promoting his coals by offering the buyers a 'treat' at the coal exchange in Billingsgate![15]

Overseas markets

The foreign trade in coal was at a modest level compared to that generated by the national market with never more than twelve per cent of the combined vends of the Tyne and Wear being sent abroad. However, Sunderland showed signs of greater dependency than Newcastle: as early as 1660, and for most of the first half of the eighteenth century, the two rivers despatched roughly the same quantities, despite the lower overall vend on the Wear; and by 1792 Sunderland overseas shipments of 141,274 tons represented 20.5 per cent of the entire Wear vend whilst Newcastle's 113,924 tons only amounted to 8.8 per cent of its grand total (figure 2.5 and appendix 4). Both coal districts served a large scatter of market locations between 1551 and 1810, but for dates at which our information is most complete (at various times between and including 1661 and 1750) the bulk of regular trade was sharply focused upon just four ports on the near continent: Hamburg, which was mainly supplied by Newcastle throughout, and Amsterdam, Rotterdam and Dordrecht where Sunderland's influence was clearly to the fore from the early decades of the eighteenth century. Newcastle was the only supplier of more distant and unspecified destinations reached via the

Sound, however (appendix 7a).

All markets were disrupted from time to time by bad weather, especially storms and severe frosts, and by labour disputes among the workforce of pitmen, keelmen and mariners; but shipments directed overseas were also very much at risk because of hostilities with or on the near continent. Most in evidence is the volatility of European markets during the Napoleonic Wars (from 1793) as most dramatically revealed in the vend data for the Wear (figure 2.5 and appendix 4). France's involvement in four major conflicts prior to 1793 (the War of the League of Augsburg, 1689-97; the War of the Spanish Succession, 1702-13; the War of the Austrian Succession, 1741-48; and the Seven Years War, 1756-63) meant that she remained an attractively close but perilously uncertain market; especially, it would seem, for Newcastle producers; in 1710, for instance, at the height of the War of the Spanish Succession, they saw their shipments to French ports reduced to nil.[16] Not only was foreign trade disrupted: coastwise shipments, especially to London, were a natural object of attack by the French navy as well as by 'Dunkirkers' -the privateers who found in coal the same fascination as did the pirates of other regions in gold and silver.[17]

Overseas markets were attractive to coal producers because of their willingness to take coals of an intermediate or even poor quality which, at one time or another, all collieries seem to have produced to excess and found difficult to dispose of in the home markets or to sell with profit to consumers on the coalfield itself.[18] Moreover, while

continental consumers did not always restrict their requirements to the poorer grades, they were apparently less sensitive than consumers in the home markets to the practice of 'mixing' coals; that is, of selling coals as of one quality which in reality were a combination of that quality and inferior grades. Such activity in the coastal trade, though quite common, was outlawed and could even land miscreants in gaol; as happened in 1616, for example, when six coalowners were committed to the Fleet.[19] The lure of overseas markets, though strong, was evidently not sufficient to cause all collieries to contribute; rather, by some combination of marketing strategy and resource usage no longer clear to us, the survival of a few collieries in both coal districts had, by the closing decades of the period of study if not sooner, come to rely heavily or exclusively upon the foreign trade. Such was the fate of Northbanks (S57) and Stella Grand Lease (S4) on the Tyne and of Washington (W31) on the Wear.[20]

Local consumption

Over the centuries the Tyne and Wear coalowners raised large amounts of inferior qaulity coals which could not be readily sold in coastal and overseas markets but which, on account of their cheapness and ready availability, proved attractive in supplementing, or even dominating, the fuel needs of local householders, farmers and, more important, incipient industrialists.[21] The chief non-domestic local uses of coal were in limeburning, ironworking and shipbuilding, and in the production of salt, glass, pottery and copperas (figure 3.4 and appendix 9). The coal industry not only supplied these industries with

cheap fuel but, through its transport and marketing arrangements, a means of disposing of their products at home and abroad. And where raw materials other than coal were not close at hand, as with the sand, chalk and pot clay needed by the glass manufacturers or the quality bar iron required by the iron workers, these could often be introduced cheaply, as ballast in returning colliers.[22] Such was the coal industry's role in encouraging and sustaining the growth of these local and often mutually-reinforcing industrial enterprises, and such was the backing of technology and high levels of investment to which they gave rise, that by the late sixteenth and early seventeenth centuries the region was showing signs of cumulative economic growth sufficient, in Nef's opinion, to warrant the term early industrial revolution.[23]

Unfortunately, the size of local demand cannot be determined with any precision. Such evidence as we possess suggests that nearly twenty-five per cent of the usable coal mined at seasale collieries in c.1636 may well have been consumed locally; by c.1728 the figure was probably around thirty per cent and in c.1804 perhaps thirty-six per cent or so (pie-charts in figures 2.2-2.4 and appendix 9).[24] Household needs may have risen approximately in line with population growth, though clearly some sections of the community might have taken to it more readily than others; for instance, the pitmen, who received coal at reduced rates or entirely free of charge.[25] Against a background of overall increase in consumption, the pattern of industrial demand must have varied considerably according to the changing fortunes of particular industries and their efficiency or profligacy in the use of

fuel. In coalmining itself there were, by the seventeenth century, ventilation techniques which involved the use of coal as a fuel; and during the eighteenth century an increasing range of colliery machinery required coal, none more so than the Newcomen engine which, after c.1760, was widely adopted for mine drainage and winding purposes.[26] Certain industries were users on such a scale as to merit closer examination.

Salt-making. Ease of access to sea water had supported small-scale salt-making on the coast of Northumberland as early as the twelfth century and at the mouth of the Tees by the fourteenth, but the scale of operations as well as their geographical location was to be quickly and completely transformed with the rapid expansion of commercial coalmining. While some industrial production processes experienced difficulty in substituting coal for wood as a source of heat this was not so with the salt pans. The mouths of the coal-exporting rivers soon became the foci of a highly capital- and labour-intensive industry, well-placed to take delivery of 'pancoals' transported overland or, more usually, via rivercraft; and conveniently situated to reach seaborne markets which, like those of the coal industry, were scattered around the coasts of Britain and Europe.[27]

In 1636 South Shields boasted 'the vastest salt works'[28] in England; about 220 salt pans were then in use compared to 153 in 1605, twenty-six in 1564 and just four in 1535.[29] With perhaps a further thirty or so pans at North Shields and Howden (near Wallsend) in 1636, the industry on the Tyne consumed about 75,500 tons of coal in

producing around eleven or twelve thousand tons of salt for shipment (appendix 9). Though subject to periodic faltering or collapse, as in the Civil War, the Tyne industry expanded further to reach a peak output in the 1720s of about 15,000 tons per annum when it was valued at around £20,000: the near equivalent of one-seventh the at-river value of all Tyne coals at that date.[30] At the mouth of the Wear, where Robert Bowes was erecting salt pans in 1591 with a view to burning coals from his Offerton mine (W5),[31] the industry was on a more modest scale: output was only about one-twelfth that of the Tyne in c.1636 and one-fifth in c.1728 (appendix 9). Not all collieries benefited from the local market for 'pancoal'. In 1727 seven colliery proprietors on the Wear agreed that only Henry Lambton, owner of Lambton mine (W8), should sell coals for salt- and glass-making in Sunderland and Bishop Wearmouth.[32] Again, on the Tyne, in both c.1636 and 1728, the effect of close business links between certain leading coalowners and a few major proprietors of saltworks was to restrict market access to a handful of producers only; at favoured collieries such as Chopwell(S2), Hedley Fell (S1n), Stella Grand Lease (S4) and Ravensworth (S22) in the early decades of the eighteenth century, output could be carefully graded and priced to suit the particular demands for 'shipcoal', 'glasscoal' and 'pancoal'.[33] Despite such strategies the salt industry soon after 1730 experienced terminal decline in the face of competition from the Cheshire rock-salt industry; by the opening years of the nineteenth century salt manufacture in North East England was of very limited significance.[34]

Glass manufacture. Early attempts to substitute coal for wood in the

manufacture of glass presented particular problems on the North East coalfield because its 'seacoal' was regarded as altogether 'too sulphurous'. According to Sir Robert Mansell, who with his partners received in 1615 a well-known patent for the exclusive manufacture of glass in England, it was only 'after the expense of many thousand pounds, that worke for Window-glasse was affected with Newcastle cole'.[33] By c.1636 there were probably just three coalburning glass furnaces in the region, all at Newcastle. In 1696, when the town possessed eleven of the nation's ninety glassworks (other major centres were London, Stourbridge and Bristol in England, and Leith on the Firth of Forth in Scotland), a major phase of expansion was under way with activity soon to move south of the river to Gateshead and also to blossom along both banks of the Wear near Sunderland.[34] By c.1728 the glass houses in the two districts were probably consuming some fifty to sixty thousand tons of coal annually, about one-half the amount used by the salt industry (appendix 9). Coals for glass-making were expected to be of a superior quality to pancoals and, as such, fetch a higher price.[37] Further growth occurred over the remaining years of the study period with 'great quantities of flint glass, crown glass, and bottles' in particular, continuing to be manufactured in the great 'glasshouses' at Sunderland, South Shields and Gateshead. On Tyneside alone, the number of 'glass-makers' is said to have risen from sixteen in 1772 to thirty in 1812.[38] Such was the impact of the glass manufacturing industry on local agriculture that the chief reason why some farmers near Sunderland grew oats was to provide a good packing medium for large numbers of glass bottles and other wares that were regularly

shipped out.[39]

Iron and steel making. In North East England, as elsewhere, coked coal was probably not used widely or with much success in the blast furnaces of the iron industry before the third quarter of the eighteenth century.[40] And in the making of steel by the cementation process -one of the specialities of the industry in the North East in the eighteenth century- charcoal was still favoured at Derwentcote, and possibly at other sites, as late as 1810.[41] However, coal was probably used in some quantity in the smiths' forges and foundries of the seventeenth century and became even more important by the eighteenth when there were to be found a scatter of small-scale iron workings in north-west Durham, an elaborate grouping of ironworks at Team and forges on the rapid burns at Beamish and Lumley (figure 3.4). But, provided the technical difficulties of using coal could be overcome, its most successful adoption occurred when and where it was found in association with other locational advantages, as the experience of Ambrose Crowley was to demonstrate. After his first attempts to establish a nail-making factory at Sunderland in the 1680s had faltered, he moved in c.1690 to the Derwent valley, where, in addition to some of the richest coal seams on Tyneside (worked since the sixteenth century), there were to be found workable deposits of iron ores (some of the best in the region, albeit of an inferior quality and inadequate to need), extensive woodlands, fast-flowing streams and a transport infrastructure to rival that of Sunderland. The staiths on the Tyne at Blaydon and Derwenthaugh, and on the Derwent

at Swalwell, provided easy access to the great port of Newcastle and beyond; relatively cheap waterborne transport allowed rod iron from Birmingham and the Stour valley and considerable quantities of Swedish bar iron to be imported, and finished goods to be sent away to national and European markets.[42]

By the early eighteenth century another entrepreneur, William Bertram, was making steel at Blackhall Mill and Derwentcote for German sword-makers who were situated up-river at Shotley Bridge, where the local millstone grits provided an excellent sharpening medium.[43] These undertakings did not rival those of Crowley, however, either for their scale or durability. In the middle decades of the eighteenth century Crowley's ironworking complex was regarded as an object of wonder and admiration and, according to Arthur Young in 1770, constituted the 'greatest manufactory of its kind in Europe'.[44] At Winlaton Mill and Swalwell there were forges, slitting mills, steel furnaces and warehouses while at Winlaton -Crowley's original industrial settlement- a community of iron smiths made nails, files and edgetools. Their strong dependence upon local coals as a source of heat is evident from colliery records of the early eighteenth century and clearly implied on a plan of 1782 (figure 3.5) which, for part of the village of Winlaton, identifies smiths' 'shops' and 'cole holes'.[45]

Shipbuilding. Coal was used as the major source of fuel in ship construction and repair: heat was needed to smelt, forge and shape all metal, and, in addition, to dry planks and bend them into proper shape to fit the curving hulls and sides.[46] The rate of expansion in

shipbuilding and the quantities of coal consumed thereby cannot be accurately determined. Matters had not always been quite as straightforward as Daniel Defoe's pointed comment of c.1725 might lead one to suppose:

> They build ships here to perfection, I mean as to strength and firmness, and to bear the sea; and as the coal trade occasions a demand for such ships, a great many are built here.[47]

In c.1636, when four to five hundred vessels, many of two to three hundred tons burthen, were engaged in the coastal and overseas trades, Newcastle's involvement in the construction and ownership of the collier fleet, though clearly important, was overshadowed by Great Yarmouth, Ipswich and King's Lynn. Thereafter the tendency appears to have been for the North East's share to increase. In 1702, when there were about one thousand and two hundred ships involved, some in excess of five hundred tons burthen, Newcastle merchants owned eleven thousand tons of shipping, a figure surpassed by only three other towns; by 1788 London alone owned a greater tonnage afloat. In 1792 the port of Newcastle, with shipyards at Gateshead and at North and South Shields as well as Newcastle itself, had 541 ships (or an aggregate tonnage of 119,051) while Sunderland held 390 ships (an aggregate tonnage of 57,082).[48] The meteoric rise of South Shields in particular, undoubtedly did much to boost the shipbuilding industry, and hence the local consumption of coal, in the second half of the eighteenth century. In 1740, when the salt industry at South Shields was on the verge of collapse, only four ships of two hundred tons each belonged to the town. By 1809, when just seventeen salt pans survived, it

accounted for 40,343 tons of shipping; it possessed sixteen docks, five shipyards, seven boat-building yards and six roperies.[49]

Not all boat-building activity was directed towards the collier fleet. In 1705, for instance, we find Thomas Reed, a Gateshead shipwright, leasing two smiths' shops and a wet dock near Rock Staith on the Tyne for the construction of keels: the small boats which carried coals from the shallow waters by the staiths to the colliers waiting in the deeper water down-river. The amount of work that went into the construction, repair and periodic replacement of such small river craft as these must have been prodigious if, as seems likely, the Tyne and Wear possessed about six hundred keels between them around 1700 and over eight hundred a century later.[50]

Supply factors: resource endowment and technological progress

Coal seams

The Great Northern coalfield occupies a roughly triangular area of about eight hundred square miles, the apex of which is near Amble and the base along a line extending eastwards from Woodland Fell to just north of Hartlepool (figure 3.6). The coalmeasures, which form the solid geology of most of this area, are usually divided into three stratigraphical groups: the upper, middle and lower, which at maximum thickness reach 1,100, 900 and 200 feet respectively. They are mainly composed of sandstones and shales, with coal, the most valuable constituent, comprising only around five per cent. In both the upper and lower groups the seams of coal are especially thin and infrequent

and it is only in the middle group that the most productive seams occur.[51]

Had these seams retained the horizontal stratification which accompanied their initial formation, as they were successively laid down in a lowlying coastal swamp of deltas, estuaries, shallow lagoons and lakes, 360 million years ago, the best coals would not have been discovered let alone exploited before the nineteenth century. However, the Hercynian orogeny of the Carboniferous-Permian interval gave rise to the major structural feature on the coalfield -the synclinal trough of the Wallsend Basin- which runs north-west to south-east on lower Tyneside causing the seams in all but a small eastward portion of the exposed field to dip generally eastward. As a result the lower coalmeasures are found at or near the surface on the far western edge of the coalfield while the main productive seams of the middle coalmeasures occupy the remaining western and central portion. By contrast, east of a line running from Gateshead southwards to Fatfield and Coxhoe -a line which coincides with the outcrop of the High Main- these preferred seams disappear beneath the mostly barren strata of the upper coalmeasures which, although much denuded immediately after their formation and subsequent tilting, still afforded a significant barrier to good coal extraction before the late eighteenth and nineteenth centuries (compare figures 2.2, 2.3 and 2.4). Still further east, where the coalmeasures are overlain by up to 900 feet of magnesian limestone, the existence of deeply buried seams was only demonstrated in 1820 -by a sinking at the foot of the escarpment near Hetton- and not widely accepted until much later.[52]

This basically simple geological configuration is complicated by the presence of structural faults, commonly referred to as 'dykes', which run generally east-north-east to west-south-west. The most dramatic of all, the Ninety Fathom Dyke, with a northward downthrow of as much as a thousand feet in parts of southern Northumberland, formed an important barrier to coalworking up to 1810. Within Northern Durham a serious discontinuity in several valuable worked seams was caused by the Tanfield or Tantobie Dyke with a 'down-cast to the south of 40 fathoms, upon Tanfield Moor',[53] and by the Heworth Dyke, with an upthrow to the south of twenty-five fathoms as it passed from near the Grand Lease colliery of Whickham (S15) through Gateshead Fell to Heworth Common. There were, according to Bailey (writing in 1810), at least nine other significant geological faults and many more minor ones of which colliery viewers had to take account when estimating the likely life-span of a colliery.[54] Geological faults disrupted coal working, added to costs of mining and, since it was common practice to leave barriers of unwrought coal on either side of a fault, wastage of potentially valuable coal. Not surprisingly, therefore, 'dykes' were often displayed on contemporary colliery maps and plans, such as, for instance, those assembled by William Brown in the middle decades of the eighteenth century.[55]

Further complications have arisen from marked inconsistencies in the thickness and quality of individual beds, the result of locally varying conditions of deposition in the deltas and swamps of 360 million years ago. To this day no single seam has been traced throughout the entire

coalfield. In general, those in the eastern part of the coalfield have tended to be thicker but softer and more gaseous than those in the western. Thus explosions from choke and fire damp afflicted the Wear and lower Tyne collieries in particular (appendix 10d), but they were not unknown in north-west Durham which generally possessed the highest ranking seams on the coalfield, of less than thirty per cent volatile matter. Once mining advanced beyond surface working, the seams of coal or overlying strata of sandstones and shales were never hard enough to dispense with the bord and pillar method of coalworking, though more opportunity for 'robbing' pillars of valuable coal was afforded in the firmer western seams before the widespread introduction of panel-working from about 1750.[56] At Northbanks colliery (S57), for instance, in the first quarter of the eighteenth century, difficulties in extracting sufficient amounts of 'merchantable' coal from the 'Main' seam led to pillars of the best quality, and much worked, 'Top' coal being removed, even from the most sensitively watched areas of the estate: the north-western border with Byermoor royalty and along the north-eastern edge of the 'Great Dyke' (figures 3.7 and 1.2). By way of contrast we find at Bourn Moor colliery (W36) on the Wear, as late as 1810, half the seam still having to be left behind as pillars to support the roof.[57]

Fewer seams outcropped at the surface than depositional conditions and structural faulting of the rocks alone would have allowed: the coalfield is masked by glacial drift -mostly boulder clays but with patches of sands and gravels- which is usually deepest in the floors of

entrenched river valleys like those of the Ouseburn, Derwent and 'Team Wash'; this last named being the abandoned outflow channel of the pre-glacial Wear, and occupied in the study period by the Team rivulet. Heavy drift material could hide some coal seams and seriously interfere with the drainage of those that were discovered and worked. By contrast, glacial deposition was often thin or absent on upland areas or, more notably, on valley sides; and it was here that chance encounters with outcropping seams and the opportunity for free drainage encouraged many early colliery sites to be located. It must have been these very conditions of ease of working, rather than seam thickness or quality, which allowed a few landsale collieries to survive on the lower and upper coalmeasures into the early nineteenth century (figures 2.1-2.4).

Knowledge of geological conditions was acquired only slowly, mainly by practical experience in the course of which many of the idioSyncracies outlined above were to prove extremely disconcerting, even to the more skilful colliery viewers and engineers of the seventeenth and eighteenth centuries, and decidedly baffling to the less enlightened.[58] Little wonder, then, that confusion arose, and indeed persists to this day, over the naming of the working seams. Not only have different names been given to the same seam, but the same name has been applied to different seams. Part of the explanation for this confusion, of course, must lie in the fact that in mining practice the coalfield has been divided between the Tyne and Wear districts, each with its own distinct chronology of development as well as seam nomenclature. Although modern geologists identify twenty-one named

workable seams over the coalfield (ranging from the Brockwell upwards to the Shield Row or High Main), it is more appropriate for purposes of this particular inquiry to recognize, and compare by name, the eight or so major seams that were extensively exploited up to 1810 (table 3.2). Among these, two in particular were especially favoured because of their excellence as household coals for the London market: the High Main and the Low Main. Contemporaries sometimes confused both with a third seam, now recognized simply as the Main seam.[57]

In coalmining, success sowed the seeds of its own destruction: the sooner the most-prized seams were discovered and removed, the greater

Table 3.2. *Principal coal seams identified and worked by 1810*

Tyne collieries Western	Wear collieries	Tyne collieries Eastern
Shield Row =Upper Main	Three-Quarter =Five-Quarter	High Main
-	Metal	Metal ¦ > Stone coal ¦
Five-Quarter=Hard = 'Top' coal	Five-Quarter =High Main	
Main=Brass Thill	Main	Yard
	Maudlin	Bensham
Maudlin ¦ > Pontop Low Main ¦ Hutton =Tanfield Moor	Low Main Brass Thill =Low Main	Six-Quarter Five-Quarter
(Low) Main=Hutton	Hutton	Low Main

Sources: Mainly, colliery views, plans and reports in NRO 725/F3, F3, F9-14; NEIM Watson 5/9, 8/22-3, (MP)24, 29-35, 37-40, 43B; Easton 17/1; Johnson 4/11; Buddle 5/58-65, 22/25; GPL Park Moor plan, 1773; DUPD Shafto 1450/1; with additional information from Hopkins 1954, 301; Dunn 1844, 4-6; and sources cited in appendix 6.

became the need for technological innovation in the following generations if the recurrent threat of an exhaustion crisis was to be averted. On the one hand, attention focused upon the need to improve the means of handling and carrying coal, whether underground, at the surface or at the shipping points. Most urgent was a technological development in transport that would allow commercial exploitation of coalmining at greater overland distance from the riverside staiths and shipping points than hitherto. On the other hand, there was also a need to recover coal that lay at greater depths than had been previously exploited, especially if, as William Cotesworth claimed in c.1710, 'the Deeper the veine lyes, the better and stronger is the coal'.[40]

Coal working at depth

It is not possible to establish with any assurance how the mean or modal values for mine depths may have varied between 1551 and 1810, but an indication can be given of the changes in the range of working depths. In the early part of the seventeenth century coal was probably worked in most pits to a depth of between ten and twenty fathoms (sixty to 120 feet) but thirty-five or thirty-six fathoms was not unknown and, indeed, may have been reached at Gateshead soon after 1550.[41] In c.1710 depths were said to range between ten and seventy-three fathoms, though later authorities regarded sixty fathoms as a maximum for the early eighteenth century.[42] By 1765 'common depths' were said to range from thirty to forty fathoms according to Gabriel Jars, to 'average' sixty fathoms according to another contemporary authority. In fact,

several sinkings to eighty fathoms were known at about this date and a maximum of a hundred fathoms was recorded at Walker (N12).[43] In the 1790s, 125 fathoms was exceeded at Hebburn pits (S83) and by 1810, in the heart of the Wallsend Basin, depths of 140 fathoms (840 feet) were encountered.[44]

Advances made in combatting the problems of poor ventilation and lighting were severely limited before the nineteenth century and, though arguably adequate for most of the time, they did not always suffice in the deeper or more gaseous mines which experienced many accidents, especially, it would seem, from the 1750s (appendix 10d).[45] Before the invention of the famous Davy Lamp in 1815, much reliance was placed on candles for lighting the workings. In 'fiery' mines, where naked flames could not be used, it was quite common in the eighteenth century to resort to the feeble light provided by phosphorous and putrescent fish. From about 1763 some mines introduced Carlisle Spedding's flint and steel mill, one of which could provide light for five or six miners. It was only in 1813 that Buddle demonstrated that, contrary to generally accepted belief, the size and luminosity of the sparks emitted from the steel mill were a sign of impending disaster rather than an indication of its efficacy![46]

Ventilation of coal workings was tackled in one of several ways. Before 1700 the expulsion of 'ill aires' and explosive gases was probably aided by the blowing of bellows and more certainly by the sinking of a ventilation shaft away from the winding shaft. In the eighteenth century fire baskets were lit and suspended in the shaft, or

furnaces were constructed at its foot. By 1724 it is evident that at least one colliery, probably Byker (N25), had adopted a scheme (thought to have been first used at Liege in 1665) which dispensed with the need for an additional air shaft: a small tower was built near the winding shaft with a basket of fire suspended in it and from this a wooden pipe was carried into the workings, so drawing out foul air. The method was apparently in use at Wear mines by 1760. Ventilation by fire long continued in use and was aided by the technique known as 'coursing the air', which gained acceptance after 1760 at both Tyne and Wear collieries. To prevent the accumulation of gases, 'stoppings' (brick or wood partitions) and wooden doors (tended by child trappers) were constructed. Fumes from the upcast shaft were helped to disperse by brick or stone funnels capped by a large windvane. These had become typical features at mines by the early to middle nineteenth century.[47]

The disposal of flood water was regarded as the most intractable problem in mining, once pits were sunk to a depth which no longer permitted drainage by the cutting of adits to a point on the surface below the level of the seam. Letters, view books, colliery surveys and accounts in the eighteenth century, as well as chance sources for earlier periods, make quite frequent reference to the continuing difficulty of 'drowned out' workings.[48] There was plenty of energy expended in attempting to solve it; judging, that is, from the large number of patents relating to mine drainage that were issued in England between 1561 and 1668.[49] There is a record suggesting that the monks of Finchale, near Durham, may have met with some success as early as 1486 with a type of suction pump, but it is clear from the contemporary

accounts of Sir Ralph Delavel, Stephen Primatt and George Sinclair, that the most widespread device in operation on the coalfield by the seventeenth century was the 'rag and chain' pump. This had probably been introduced from Germany where, according to Agricola, it was in common use in metal mines by the sixteenth century. Although a considerable expense was incurred in the purchase of timber wheels, leathers and chains, it was evidently regarded as a very sound investment. One leading landowning-entrepreneur, Sir Thomas Liddell, built a most elaborate system of water-powered chains at Ravensworth (S22); together with a newly constructed waggonway, it was thought in 1669 to give him a competitive edge over most other colliery proprietors.[70]

One method of dealing with unwanted water was simply to lift it in buckets and bail it out. Though generally regarded as less efficient than the 'rag and chain' pump which had a more continuous movement, the bucket method was apparently inexpensive enough to find favour in some mines throughout the eighteenth century and even into the nineteenth. Both the cog-gins of the seventeenth century and the more advanced whim-gins which gradually replaced them from the second quarter of the eighteenth century, and which were intended primarily to draw coals, are known to have been used for raising water as well. For instance, such a dual-purpose machine was observed at work near Newcastle in 1724 by Sir John Clerk.[71] Though impossible to quantify or identify with precision, these developments must be reflected in the early colliery location pattern of figure 2.2 and to some extent in the patterns of

figures 2.3 and 2.4. It was these developments which raised the prospect of continuous mining -so important a prerequisite of the commercial coal industry- in at least some of the deepening mines by the rivers, and at the same time encouraged the opening of new collieries further inland.

However, the chief solution to the drainage problem in the eighteenth century, especially for deep mines, lay mainly in another direction: with the famous Newcomen atmospheric engine and its successors. There is little doubt that from about 1712 to 1775 it provided the only practical method of pumping large quantities of water out of coal and metalliferous mines; and beyond that date, when more advanced machines were being popularised, like those of James Watt, it was still of overwhelming importance in coalmining or other areas where fuel economy was not at a premium.[72]

Soon after its first commercial application at Dudley, Staffordshire, in 1712, the Newcomen engine was introduced to Northumberland and Durham. By 1715 it had apparently reached the Tyne south-bank colliery of Tanfield Leigh (S52/S76; figure 3.8), though without having any immediate practical effect,[73] and by 1717/8 another was to be found at the Wear colliery of Washington Oxclose (W14). Up to 1803, at least a further 158 Newcomens or improved Newcomens were introduced, along with a further ten Newcomen-type engines, ten Boulton and Watt engines, and six miscellaneous pumping devices constructed by local builders (or, in the case of Mr Hornblower's engine destined for Lambton colliery (W8), possibly pirated from Boulton and Watt).[74] In

addition, a further fifteen Boulton and Watt engines, introduced after c.1777, appear to have been steam-driven winding engines (appendix 11a-b). Clearly, towards the close of the eighteenth century the efficiency of deep mining was becoming dependent upon steam power for both pumping and winding purposes, especially in and around the Wallsend Basin (figure 3.9).[73]

Valuable as our collection of data is (as far as is known, it is the fullest of its kind so far assembled for the Tyne and Wear districts), it does not constitute a complete picture of the pace and scale of engine adoption. In particular, the number of recorded adoptions for pumping purposes after 1780 looks suspiciously low: just 1.6 per annum up to 1803 and none thereafter, compared to 2.85 per annum between 1741 and 1780. Unless the area experienced a trend that was greatly out of step with that of other coalfields, the real number of adoptions could be fifty or so more than the number actually discovered.[74] Perhaps the novelty of steam engine technology no longer excited comment here to the extent that it had once done, and so often went unrecorded. However, it is important to note that those post-1780 adoptions we do know of, were undertaken at a wide scatter of workings, old and new, in a way which is entirely consistent with supposed need; and it may be that our omissions are not sufficiently selective spatially as to rob the pattern of its true shape but merely to suggest that it should have greater density than is depicted in figure 3.9. Prior to c.1780 it is the pace of adoption rather than the extent of any omissions for which allowance must be made in interpreting the map. Some of the sources record the date or supposed date *by* which, rather than *at* which, an

engine was erected. This can distort the innovation trend curve, and indeed does so quite noticeably in the decade 1761-70 when knowledge of adoptions made over a period of perhaps twenty years was revealed in the form of a list drawn up by William Brown in 1769.[77]

Even supposing that figure 3.9 did reflect fully the pace and scale of adoptions, it would obviously not be a perfect indicator of successful usage. Before 1740, when engines were small and crudely built, they appear to have met with limited success, especially in the heavily drowned workings close by the Tyne, Ouseburn and Wear. Several collieries at which Newcomens were tried failed to open or re-open for seasale altogether, while stoppages and low output characterised others.[78] After 1740, however, and more especially from about 1760, both new and existing engines were more suitably equipped to perform the task for which they were intended; longevity and reliability became their passwords (appendix 11c).[79] Indeed, a cursory inspection of figures 3.9 and 2.4 provides a strong visual correlation between engine adoption and colliery working such that one pattern appears virtually unintelligible without recourse to the other; a more circumspect examination of the evidence in the reports of colliery viewers suggests that, in many cases, coalmining could not have occurred where and when it did, nor at the pace indicated, without the progressive assistance of an advancing atmospheric and steam engine technology.[80] On the basis of the incomplete data set assembled in appendix 11a, it would appear that of fifty-one seasale collieries at work in 1804, at least thirty-five possessed one or more pumping

engines.

Distance constraints and transport innovation

The national pre-eminence of the Tyne and Wear coal districts in the period 1551-1810 was based firmly upon the comparative cost advantage of water transport over land carriage, and no amount of efficiency gains in the latter mode of transport could destroy that fundamental situation.[e1] In fact, some of the most substantial savings must have been made on the sea voyage between the Tyne and the Thames, as increasingly sophisticated, purpose-built colliers gradually ousted the ordinary merchantmen that had commonly been in use to carry coal in the sixteenth century; and the size of the 'average' cargo rose appreciably, from under fifty tons in the 1560s to about 350 tons by the mid-eighteenth century.[e2] Improvements were less impressive on the Wear, however. Sunderland, like many of the ports of destination served by coal ships leaving both rivers, could not cope with the larger vessels, and the size of most cargoes for both coastal and overseas markets remained modest in comparison to those on the Newcastle-London run (appendix 8b, including figure A8.2).[e3] Even on the Tyne there were difficulties: at the beginning of the seventeenth century colliers were commonly able to come up river for loading at or just off Newcastle, but the indiscriminate disposal of ballast and an abundance of sandbanks soon choked the river to all but the lighter vessels. And although coals continued, under the watchful eye of the city's Mayor and Burgesses, to be cleared as 'of Newcastle', colliers increasingly loaded towards the river mouth at North and South Shields where they were provisioned by a growing army of keelboats ferrying

coal from riverside staiths strung out along both banks.[84] As coal handling and storage increased, the early types of staith (little more than simple quays at which coals were barrowed from waggons into keelboats) were replaced, quite rapidly after c.1700, by large wooden structures. These, sometimes roofed over (and known as trunk staiths) and capable of storing maybe 80,000 tons, employed spouts or chutes for the disposal of coals.[85] At the mine itself, where workings became more and more extensive, the underground conveyance of coal became not only the most arduous of work but also potentially the most expensive for the the coalowner. Horses were probably first used on the underground roads in the first half of the eighteenth century, and soon after 1750 corves were being carried on four-wheeled rolleys in some mines.[86] But what represented the most significant obstacle, and in turn experienced the most revolutionary technological change, was the overland transport of coal from pithead to staith.

Traditional methods of carriage by cart, wain or pack-horse were cumbersome and liable to exacerbate the already mounting problems created by countless pit excavations and scattered waste. In 1647 most of the six hundred acres of Whickham Common were reported to be 'with Cole Carriages and other carriages....totally spoyled with great beaten and worne ways'.[87] In summer coals were liable to arrive at the riverside staiths badly broken; in winter traffic was normally suspended. Of course, shipping, too, was affected by snows, frosts and winter gales, but if coal had to be stock-piled at all, the colliery proprietor much preferred to do it at the staiths than in the confined

surroundings of the pithead. The waggonway -the precursor of the modern railway- provided an alternative and altogether more efficient means of overland haulage. Not only was the season for leading coal increased[88] but so too were the weights that could be transported. In 1739, Mr Millett, owner of a landsale colliery at Whittle (L46), told a parliamentary commission inquiring into the coal trade, that in the Wear district a waggon pulled by one horse could convey about three times the amount carried by a wain or cart which might need two horses and two oxen.[89] Later estimates, for the more rugged terrain of the Tyne district, suggest that gains might have been even more impressive.[90]

Attempts to introduce the English waggonway into Northumberland in the first decade of the seventeenth century (at about the same time as it was being weaned in the Shropshire coalfield) met with commercial disaster;[91] and it is not until 1645 that there is clear evidence for the existence of the Tyneside waggonway, in the coal-rich manor of Whickham,[92] while the earliest indication of a waggonway serving the Wear collieries is not given until 1693.[93] By 1810 waggonways had successfully penetrated the valleys and uplands of both coal districts to form a pattern of routeways that was quite extensive; only variations in the size of gauges on these privately-owned lines prevented them acquiring the connectivity of a true network.[94]

By drawing upon Lewis's invaluable researches,[95] as well as incorporating important additional information, especially with regard to the poorly documented Wear district, it is possible to provide what

is probably the most detailed picture to date of the sequence of waggonway development (figure 3.10). Even so, there are several repects in which it is not yet possible to provide a full account. First, it is evident that while in some instances waggonway openings and closures can be dated precisely, in other cases it is only possible to identify the dates *by* which or *at* which they were recorded as open or closed. Second, it is to be noted that no meaningful allowance can be made for the existence, in an indeterminate but undoubtedly increasing number of locations after c.1710, of double main ways (that is, two parallel tracks used for taking coals to the staiths) and bye ways (a single line used for returning empties). These might have tripled the mileage of trackway on some of the routes depicted in figure 3.10.[76] Neither is it possible to know what allowance should be made for the very many short branch lines which were constantly being built, uprooted and relaid so as to serve the requirements of individual pits whose working lives could be anything from a few months to many years.[77] Third, no systematic account can be taken of variations in the volume of traffic between one routeway and another or upon any one routeway over time: estimates of traffic density are possible for only some few routes.[78] Finally, there is every likelihood that a small number of waggonways went unrecorded and so, consequently, have not been shown at all. For instance, there is nothing relating to the north bank of the Tyne before 1681; and the Wear district seems under-represented prior to 1741, though fascinating detail of waggonway routes and other features of the coalmining landscape close to the river is afforded by Burleigh and Thompson's

plan of 1737 (figure 3.11). Unlike steam engines, which were noted for their longevity and cheapness to maintain, waggon tracks were constantly in need of expensive repair or renewal so that once a colliery closed, albeit temporarily, the tracks were likely to be lifted for use elsewhere and the waggonway as such would disappear.[99]

Despite these limitations, it is instructive to compare the sequence of waggonway building (figure 3.10) with the changing patterns of colliery openings and closures described in chapter 2 (and see figures 2.3 and 2.4) The essential relationship is one of growing interdependence such that from the second and third decades of the eighteenth century a waggonway was rapidly becoming a *sine qua non* for any successful long-term colliery enterprise more than a few hundred yards from the Tyne or Wear: by 1728 at least twenty-four of the thirty-four vending collieries can be shown to have made use of a waggonway; by 1804 probably all of the fifty-one working seasale mines were served by one.[100]

Yet waggonway building did not occur as an automatic response to the need for carriage of inland coals with costs determined as if on some isotrophic plain. Waggonway construction could only go ahead where rights to do so were granted -as we shall wish to demonstrate more fully in due course-[101] and where existing levels of technology allowed problems of difficult relief and terrain to be overcome. The earliest waggons and tracks were made entirely of wood, which was subject to much physical friction and frequently in need of replacement; to warrant their use, loads needed to be small, inclines gentle, maximum

distances no more than three or four miles, colliery output high and coals of a good quality.[102] Where most or all of these conditions could be met, as in Whickham, Gateshead and Ryton parishes, waggonways were in use by 1680; though sometimes, it must be added, only as a supplement to, rather than replacement for, carriage by cart.[103] The great potential of this major new transport medium was not lost on a visitor to Ravensworth in 1669. On viewing the construction of Liddell's waggonway from the family colliery (S22) to the Team staith he envisaged it as an impressively profitable venture such that 'they may work what quantyty they please, and in regard they have begun a waggon way, they may lead what quantyty they please'.[104]

Even more persuasive of the cost-effectiveness of a waggonway over other means of carriage is the record of a sharp increase in output at Northbanks colliery (S57) following the building of the five-mile long Dunston Way in 1699 (appendix 13a, figure 3.7, and see also figure 1.2). This line, as it took its meandering course across Whickham Fell and down to Dunston staith, was something of a pioneer in the rolling uplands of north-west Durham between the Team and Derwent rivers.[105] For many years between c.1710 and c.1740, most of the Tyne vend came from these uplands (figure 2.3): it was only here that demand for best coals could be met because the Newcomen engine, still in its infancy, often battled without much success to save the drowned workings of riverside collieriers where alternative supplies of quality coal were known to exist.

The achievement of waggonway building in the early decades of the

eighteenth century looks all the more striking in the light of only modest and sometimes doubtful improvements that were made in vehicle size and trackway construction. Before the widespread introduction of flanged wheels, curves and braking mechanisms, any added weight and freer movement of loads brought increased dangers on steep slopes; it was generally believed in the mid-eighteenth century that gradients in excess of 1 in 10 were prohibitive for a main way (the down track) and 1 in 30 for a bye way (the up track).[106] In the event, difficult terrain, such as that encountered in dropping down Busty Bank to cross the river Derwent with coals being lead from Bryans Leap (S41) to the staiths at Derwenthaugh, might be tackled with a 'double-horse pull'.[107] Other major physical obstacles were overcome by some of the most remarkable engineering feats known to contemporary society: by numerous cuts and embankments a straightness and gentleness of gradient could be achieved and collieries still worked at a profit. The most spectacular engineering achievement of all, Causey Arch, built in 1727 for a partnership of coalowners known as the Grand Allies, attracted visitors from far and wide.[108]

After 1740 the waggonway pattern reached full maturity with average length of haul increasing considerably so that here and there the longer routes broke through the economic watershed between the two mining districts. Thus Beamish colliery (S62/W22) which had formerly vended via the Tyne changed to the Wear and was able to make some profit despite a six and a half mile journey to the staiths.[109] Technical developments were now advancing rapidly towards the railway

age as the challenge of difficult topography was taken up with renewed vigour. In 1805 a stationary steam engine was used to raise coals from Birtley to the heights of Black Fell, while in 1808 the same principle was used in hauling Ouston coals over Eighton Banks; although the last of these was regarded as a technical triumph it was also a financial disaster.[110] But most of the new terrain encountered after 1740 was much gentler; and the increased efficiency of both waggons and tracks, made possible mainly through the gradual replacement of wood by iron for key parts, meant that the load which one horse could pull on the level in 1810 was considerably in excess of what had been possible at the beginning of the waggonway era.[111] This must have been an important consideration in the survival of many inland mines when, despite much cooperation among the coalowners to regulate the vend on both rivers, inter-colliery competition was rife after c.1770, particularly in the matter of labour costs.[112] Collieries producing high quality coals near the Tyne and Wear still had a considerable saving in transport costs, of course, with or without a waggonway -and very few proprietors seem to have believed that a waggonway did not repay investment even close to the river-[113] but this cost advantage was usually offset by their much greater dependence upon steam-pumping technology.

Supply factors: the coal royalty

By contrast with most European countries, base minerals in England usually belonged to the owner of the soil beneath which they lay[114] so that the coal royalty -the territorial unit available for mining

operations- had boundaries which coincided with those of a pre-existing lordship, manor or estate, whose limits had been determined by the political and strategic ambitions or agrarian needs of an earlier age, when coal was regarded as little more than a modest resource to be dug up or gathered along with turf and peat. Once coal became the object of large-scale exploitation, from the mid-sixteenth century, the apparently infinite variety of territorial units of ownership with regard to size, shape, extent and relative location (figure 3.12) was to have an important bearing upon the temporal and spatial patterning of coalmining.

An obvious difficulty arose between the limits of coalworking imposed by the pre-existing pattern of landownership and what might be termed the 'natural' boundaries of mining: what might have been regarded as a workable territory purely with regard to subterranean conditions -the disposition of coal seams and, most especially, the occurence of physical barriers in the form of geological faults or natural drainage channels and basins- could seriously conflict with the extent of territory actually available for working. Watson's map of Tanfield Wester Leigh (S76) in 1750 provides a clear and simple example of such disparity (figure 3.13). Within the estate, coalmining had so far been restricted to an area south of the '20 fathoms dyke'; meanwhile, the 'natural' area of working evidently extended yet futher south into Bushblades and Harperley grounds, and although coal pits had already been sunk in Bushblades royalty (S51), it is evident that the accepted rule in mining practice, of leaving a 'warren' or barrier of

fence coal between one royalty and another so as not to interfere with or encroach upon the coal reserves of a neighbour, was being respected. Such practice inevitably meant a loss of precious coal, additional to that already sacrificed to bord and pillar working, and, *ceteris paribus*, the smaller the royalty the greater the proportion of total available coal that had to be left behind.

Mining practice did not always adhere strictly to accepted principle, however. While a barrier of forty yards breadth -as found at Tanfield Wester Leigh- was commonly favoured throughout the coalfield, it might be considered safer to extend it to sixty yards, as at Lanchester Moor in 1744,[115] or even a hundred yards, as with the southern boundary of Jarrow Heworth colliery (S73) in 1750 (figure 3.14). Sometimes, legally-sanctioned agreements, or amicable arrangements of a less formal kind, could be reached for dispensing with fence coal altogether -as happened between the Bishop of Durham's colliery and that of the Dean and Chapter depicted in figure 3.14- and provision could even be made for making outstrokes from a working royalty into an adjacent estate.[116] However, underground extensions into adjacent royalties were not invariably made with the blessing of all interested parties. The practice of encroaching upon a neighbour's territory, of redefining boundaries, was often not detected or resisted above ground, as will be seen later;[117] how much easier and more tempting, then, to conceal knowledge of what might be happening in the dark recesses of the mine.[118]

Royalty boundaries could seriously impede the practical efficiency

or cost-effectiveness of any technical developments that were introduced, notably those aimed at tackling the drainage problem. It could be as expensive to clear water from a small royalty as from a big one, and even where the fence coal as such did not directly impede drainage, it was often necessary to construct, in districts of small contiguous royalties, more atmospheric and steam engines than physical conditions alone would have dictated, if only because one colliery operator could not expect, and certainly could not rely upon, his neighbour to solve his drainage problems for him; that would have called for a very careful synchronization of seam exploitation which was virtually impracticable. Bearing in mind that our record of adoptions is as yet far from complete, figure 3.15a may be thought to reveal a remarkable, not to say excessive, clustering of pumping engines within certain royalties. In fact, in the first decade of the eighteenth century, before the arrival of the Newcomen engine, it was estimated by an informed writer that the annual charge of maintaining all the drainage devices in the Wear district already amounted to several thousand pounds. More pointedly, Sir John Lowther, in c.1740, argued that no less than five-sixths of the sum spent on drainage in the Newcastle district could have been saved by operating all mines as a single enterprise.[119]

Something of what might be achieved given a favourable mix of geological and territorial conditions had been witnessed in the extensive manor of Ravensworth in the second half of the seventeenth century: pumps, quite primitive by eighteenth-century standards but regarded as advanced in their day, were able to drain every pit within

a radius of three miles and even ease the drainage problems of neighbouring Blackburn Fell colliery (S19).[120] But circumstances were seldom as favourable as this, even in the relatively free-draining uplands of north-west Durham; as was made plain in 1798 when John Buddle, the most eminent colliery viewer of his day, made reference to events that had occurred in the Bishop of Durham's Tanfield Leigh royalty some four or five decades earlier:

> This Colliery [S52/76] was wrought by the late Alderman Ridley who was to have £150 p.a. for drawing Mr Silvertop's feeders from Bushblades colliery which communicated with his engine. But it was not paid because Mr Wm Brown [Silvertop's viewer] raised pumps in his engine pit 10 fa[thoms] by wh[ich] means a great number of walls in the Alderman's colliery were for ever drowned up and lost.[121]

Buddle's advice to William Emm, the Bishop's secretary, was that the prospective lessee in 1798, Miss Jane Simpson of Bradley, should pay a renewal fine of only £250 for a new lease of twenty-one years and in return, as part of the bargain, be allowed 'liberty of outstroke' to communicate with her own freehold at Bushblades so that the two collieries could be worked together. Otherwise, the royalty was to be regarded as 'too small for the establishment of a new winning'. Mr John Grey, on Miss Simpson's behalf, found the proposal 'not altogether unreasonable'.[122]

Cooperation was often sought, seldom easily won, and sometimes expressly avoided. In 1763 Mathew Ridley's efforts to drain his colliery at Byker (N25), on the north bank of the Tyne, were made in anticipation of -and succeeded in- flooding and bringing about the closure of his arch-rivals' colliery at Friar's Goose (S81), which lay

on the southern bank opposite.[123] At Lumley colliery (W9) on the Wear, in 1796, threats to drown the mine by stopping the fire engines from working were used as a prolonged bargaining ploy by the lessee, William Henry Lambton, in order to secure permission to make an outstroke into a further portion of the owner's land not covered by the original lease.[124]

Rights of ownership and other privileges relating to minerals constituted a yet more complex issue than might be assumed on the basis of our foregoing discussion, and this was particularly so with regard to surface rights. The discovery and exploitation of coal not only led to a heightened sense of awareness of the value and strategic significance which now attached to land but also to a need for clarification about the precise territorial extent of royalties and the rights which they carried. Special difficulties arose with regard to the status of common lands: sparingly used in the past, especially for mineral extraction, their boundaries were often vaguely defined. To look to enclosed acres for guidance or legal precedence was to encounter a confusing array of practice. Freeholders on some estates possessed, or successfully assumed, rights of overlordship and hence the ownership of minerals beneath; other freeholders, like those holding under the Bishop of Durham, might be mesne lords without such rights but be prepared, nonetheless, to contest the matter. Colliery adventurers, whether as outright owners or lessees of coal royalties, also needed to be aware of, and accommodate, the rights of tenants, who, depending upon the nature of their tenure and their understanding

of manorial or lordship custom, might expect one or more of the following: the right to dig for or obtain coal for their own use and perhaps for sale as well; compensation for damage caused by the working, heaping and leading of coal by others; and the exclusive right to carry seasale coal across their land, township or manor at suitable rates of pay.[125]

It was not simply in royalties where coal was being actively mined that ownership rights or other privileges relating to minerals were at issue; also under close scrutiny was the status of lands which were needed for access to, or the passage of, minerals. Holders of surface rights in estates which lay between the working royalty and the riverside staiths could demand considerable sums in the form of wayleave payments, while those with rights in riverside royalties could also claim staith rent. Failure to come to some amicable arrangement could result in potentially valuable coal lands being denied an outlet to the coal-exporting rivers -the ultimate requirement of a seasale colliery.[126] Problems became particularly acute after c.1645 with the arrival of the waggonway. Not only did it extend the field of mining landward, thereby involving more and more royalties in coal extraction and carriage, it also confronted the law with an ambiguity incapable of speedy resolution: unlike traditional means of carriage, by cart and wain, waggonways represented fixtures, albeit fairly temporary ones, upon the surface of the earth; but what rights attached to such? In the absence of legal precedence, the law seemed vague and confused.[127] It was a situation which assertive copyhold tenants at Whickham and

Ryton could exploit to the utmost when reinforcing their rights to monopolise, -or, if they so wished, to wholly obstruct- the carriage of minerals, often from distant workings, across their lands.[128] At Heaton it took many years of legal wranglings and a rebuke from the King (in 1724) before the Aldermen and Corporation of Newcastle permitted the colliery (N24) a waggonway link to the Tyne, while at Coxlodge and Gosforth the reserves were not seriously exploited before the early nineteenth century because a waggonway connection was repeatedly denied, despite litigation in 1672, 1708, 1720, 1763, 1790 and 1800.[129]

The disposition of coal royalties must be seen, therefore, as of prime importance in understanding the pattern of waggonway routes described earlier. Figure 3.15b provides a visual reminder of this relationship. Because wayleaves had to be bargained for, and might be allowed only at excessive cost, and sometimes refused entirely, waggonways were arguably more costly and ephemeral than they need have been had they simply taken the most direct and agreeable routes as suggested by terrain conditions. Many of the embankments, batteries, bridges and other engineering achievements connected with the carriage of coal on steep or otherwise difficult terrain were the direct outcome of the need to circumvent problems of royalty ownership and wayleaves.

The coal royalty emerges as a factor worthy of further consideration in this investigation. We have seen how, in responding to market demand, the *ultimate* limits on the supply of coal were set by geology, geomorphology and technology. But the *effective* limits were, of

course, determined by the delicate and only partly fathomable interplay of human forces. Of utmost concern were the interests, decisions and territorial policies of those on the coalfield who were charged with the difficult task of matching supply and demand: the mining adventurers; or *coalowners* as they were almost invariably described, whether in reality choosing to work coal lands of their own, as landowning-entrepreneurs, or simply leasing reserves from another party.[130] The manner in which they attempted to control space through the appropriation of coal royalties is a matter of crucial importance. However, before examining the spatial strategies of the coalowning fraternity, and those of the landowning society to whom they were inextricably linked, it is necessary to understand something of the economic structures which affected their activities.

Chapter 4

FACTORS AFFECTING COLLIERY LOCATION PATTERNS, 1551-1810: ECONOMIC STRUCTURES AND SPATIAL STRATEGIES

> A Welch pedigree doth not descend by more steps and degrees, than the property of coal is varied.
>
> (Ralph Gardner, 1655)[1]

The marketing system and the price of coal

In the absence of detailed information on coal marketing arrangements with continental Europe and most localities served by the coastal trade, attention is inevitably drawn to what was probably the most highly developed system, and certainly the most carefully watched by contemporaries: that linking the Tyne and Wear coal districts with their chief single market, London. Insofar as a system which underwent quite frequent adjustments is susceptible to simplification, it is useful to recognise three broad structures which, in succession, display a growing level of sophistication with respect to the number of intermediary, specialized functions and relationships involved. In figure 4.1 major links are shown with a solid line, other important links with a dashed line.[2]

An elaborate market organization in which all traders were geared to profit-making for survival was commonly believed to be the reason for

sharp differences in the price of coal between producer and consumer. 'What else but the method of distributing the coal,' asked Daniel Defoe in 1728, 'should raise the value of the coals between the coal pits whence they come and the chimneys where they end from 4s. per chaldron to 30s. and in many places to 40s. or 50s. per chaldron?'[3] Over time, as the number of intermediary functions in the coal trade increased, the gap widened between prices in the North-east and those in London. In figure 4.2 the trend is clearly discernable, even though one important element of change is omitted: the growing difference between pithead prices (details of which are very patchy and so not plotted) and those paid by the shipmaster after keelage and fittage charges had been met.[4] Particularly dramatic might be price differentials at times when trade was dislocated by wars, adverse weather or labour troubles; circumstances clearly envisaged in Defoe's observation. Serious disruptions of more than a year were uncommon but episodes of a few weeks or even months might occur two or three times in a decade.[5] What was most vociferously complained of at such times was the way in which high prices were thought to be inflated yet further by those who, profiteering already through the operation of restictive practices, were able to manipulate the crisis to their own ends; opinion was usually divided, however, as to just who the chief culprits might be.

The last quarter of the sixteenth century and first quarter of the seventeenth are thought to have been an especially profitable time for the coalowners, and while impossible to demonstrate statistically, it seems that this was due in part to their periodic success in contracting with the London dealers or woodmongers for deliveries of

agreed quantities at pre-arranged prices. In effect, this reduced the shippers, who technically acted as principals, to little more than agents for the coalowners.[6] At other times, however, and increasingly from the opening years of the seventeenth century, the shipping interest appears to have been more assertive and prosperous: much bargaining for sales between shippers and woodmongers (the owners of wharves whose yards were used to store the coal pending dipersal to customers) continued, as of old, to take place in the informal, open-air coal exchange at Billingsgate, but some coals were now contracted for in advance, not only with the woodmongers but sometimes with small retailers and London consumers too (figure 4.1).

By the closing decades of the seventeenth century and opening years of the eighteenth, two new groups of intermediaries dominated the trade. On the Tyne and Wear there appeared the fitters whose job it was to transact 'the bargaine of buying and selling between the master of the ship and the coalowner' and with 'keles or lighters....take the coales from the staithes or wharfes and carry them on board the ships'.[7] In similar manner, the lightermen in the Pool of London interposed themselves between the shipmaster and the wholesaler; and, although unable to stop all direct dealings between the two (figure 4.1), their gild -the Company of Watermen and Lightermen, incorporated in 1700-[8] provided an institutional framework with which to completely dominate the London market. At a time when the coalowners and shippers could find little to comment upon but the gloom and misery of a prolonged depression, the operation of combinations, not only among but

also between the fitters and lightermen, evidently proved profitable to them and intensely irritating to others. Their liasons reportedly succeeded to an extent never before experienced so that coalowners could not hope to find a market for their product without excessive offerings to both groups of overmeasure or 'gift coals' and the payment of premiums of around 6d. or 1s. per London chaldron.[9]

Although the coalowners restored some control over the fitters from the second decade of the eighteenth century, it was only after an alarmed House of Commons' committee had discovered in 1729 that just ten lightermen controlled two-thirds of the London coal trade that the stranglehold of the lightermen was relaxed. This was largely achieved by the coalowners employing as their agents a new and otherwise independent grouping of merchants (officially recognized as a Society of Coal Factors in 1772) who became the principal buyers of coal from the shipmasters. It was, however, the wholesalers or 'first buyers' who, partly by reason of their numerical superiority over the coal factors, now dominated the market; exercising control over a growing range of specialist retailers and consumers in London and beyond (figure 4.1). And since it was these wholesalers who now possessed the lighters, and numbered among their brethren many of the old lightermen families, it is to be wondered whether the decline of the lightermen as a group was really as definite as even Flinn suggests.[10] The offending title of 'lighterman' may have been dropped -a document prepared for the North-east coalowners in c.1760/70[11] reverted to an older and by then anachronistic term of 'crimp' to describe them- but coalowners who wished to secure a market for their coals were still obliged to pay

premiums to a ring of coal dealers whose membership, in 1790, stood at about sixty.[12]

The periodic flexing of economic muscle by one distinct power group of intermediaries could reduce or eliminate the profits of another, whose protestations were, in consequence, considerable. Yet it is important to note that, contrary to what Westerfield argues, the personnel of the competing groups were not always as sharply differentiated as their fuction.[13] Thus a quite common feature throughout the period of study, but especially after the mid-seventeenth century, was for coalowners, fitters and London dealers to take a stake in the ownership of ships. A still more significant development, perhaps, was the way in which some entrepreneurs might manipulate the system by involving themselves at all stages, or yet more skilfully, in just those stages which at any particular time were most profitable.[14]

This tendancy towards a dispersal of ownership interests may be one reason why complaints about the alleged price-rigging tactics of coal traders, though commonplace, generally brought little in the way of redress. Equally, the absence of effective action may simply be seen as an inevitable consequence of the inelasticity of demand for coal: an acknowledgement that all but the most exhorbitant price levels must be tolerated for a product which had become a necessity of life only a little less precious than bread itself.[15] Yet it is also evident that the very body which should have been best placed to take decisive action against combinations or price-rigging -the government through

Parliament, or, in earlier times, the Crown- might, if too successful, have run the risk of drawing attention to its own activities. For it, too, was aware of the advantage to be had from a commodity whose geographical and economic origins and destinations were so relatively restricted: by the closing decades of the sixteenth century, coal had become, and was to remain, a temptingly easy target of state fiscal policy.

Taxation, more than the profiteering tactics of intermediaries, was perhaps the most important single factor in determining the 'normal' price of coal. And over the course of the seventeenth and eighteenth centuries there was an evident trend, both in the case of Newcastle shipments and those from Sunderland, for taxation to account for an increasing proportion of its final selling price.[16] It is clear that the imposition of taxes conditioned behaviour all along the marketing chain but its immediate impact was on the shipmaster. A careful, though not entirely impartial, estimate of c.1760/70 suggested that the various dues levied at Newcastle and in London accounted for one-third of the selling price of a chaldron of coal: the King's duty alone, at 8s. per London chaldron (exclusive of a small rebate for prompt payment), amounting to as much as the price paid to the coalowner in Newcastle.[17] Looked at another way, taxation accounted for about sixty per cent of the shipmaster's itemized costs (figure 4.3b); and even if allowance is made for the wages of the crew as well as the capital invested in the ship -an adjustment which would greatly reduce the shipmaster's alleged profit of thirty-five per cent, as indeed would a

further allowance for 'risks and failure'- taxes must have approached fifty per cent of costs. This led to avoidance: taxes were perhaps the greatest of all encouragements to abuse in the trade. In an industry where standard measure was not introduced until 1854, it was relatively easy to give extra quantities, 'overmeasure' or 'gift coals' -coals for which no taxes were paid. For shippers, and other intermediaries too, this could make the difference between profit and loss; or the difference between a large profit and a small one. It is against this background of a system shot through with corruption that we can view the activities of the suppliers in the North East.

Capital and entrepreneurship on the coalfield

Profits and losses

The coal industry was the graveyard of many personal hopes and ambitions. In the opening decade of the seventeenth century the most celebrated of all failed adventurers, 'Master Beaumont', a 'south gentleman ... of great ingenuity, and rare parts', was reputed to have 'consumed thirty thousand pounds' in a Northumberland mining venture before riding home 'upon his light horse'.[18] With less apparent sense of exaggeration it was claimed that the Blackett family had lost £20,000 in their colliery speculations on Tyneside in the seventeenth century.[19] The eighteenth century was replete with casualties. Among them was Francis Rudston: at one time a leading merchant-shipper with interests in collieries at Birtley(S30) and Heworth (S73), he was declared bankrupt in 1733.[20] A similar ignominious fate befell the owners of Urpeth colliery (S23/W25) in 1810.[21] Even the most wealthy

and credit-worthy adventurers, like the Lambtons in the first decade of the nineteenth century, could not expect to survive long with a 'bad policy'.[22]

A colliery was indeed a 'very casual and uncertain estate',[23] but it also presented irresistible temptations, and for those adventurers with luck and skill the rewards were considerable. In 1625 the activities of several hostmen coalowners on Tyneside were said have so enriched them 'that some are worth £20,000, some £30,000, some £40,000'.[24] In 1662 Bishop Cosin alleged -perhaps with a note of exaggeration, since he was airing a grievance at the time- that the greatest colliery on the coalfield, Whickham Grand Lease (S15), was 'worth now above the Rent, com[nibus] a[n]nis about MM£ having worth heretofore and so may be hereafter 5000£ and sometimes 8000£ p.a.'[25] More assuredly, William Bowes, owner and lessor of Northbanks colliery (S57), declared in 1720 that the mine had 'never made less than £1500 per annum these last thirty years' and would 'soon improve ... above £3000 per annum.[26] But the most spectacular single success must have been that of William Russell whose colliery at Wallsend (N49), leased from the Dean and Chapter of Durham, made vast profits in most years between 1781 and 1810; in 1809 alone they amounted to £60,000.[27]

Of course, the significance of these and other profit levels can be judged properly only when related to the output or vend of a colliery, and to the full sum invested in both winning and working it. The ideal requirement, and one which can be met in part, is for a series of models of 'average' collieries, at various dates, against which to

measure the experiences of real ones. For an 'average' colliery in c.1760/70 (figure 4.3a), situated four miles from the riverside staiths, working at a depth of sixty fathoms (360 feet) and producing 1,000 tens (about 46,000 tons) of coal per annum, calculations suggest a profit equal to nearly fifteen per cent of receipts (the selling price at Newcastle), the equivalent of about 17.5 per cent of total investment. While no similarly detailed document has been found with which to make direct comparisons for other dates, it would appear that a fifteen to seventeen per cent return on total investment (that is, a little lower than the 17.5 per cent suggested above) had become a fairly constant expectation on the North East coalfield by the middle decades of the eighteenth century.[28]

Unfortunately, it is not easy to determine how closely experience matched expectation. Unlike the model, which incorporates all items of expenditure[29] (initial and ongoing investment, allowance for depreciation and all running costs), the accounts of real collieries, in those fairly uncommon instances where they survive, normally appear to focus narrowly upon trading profits as the difference between current costs and current revenue. Thus, depending upon the size of initial investment, the time expected in which to recoup it[30] and the level of vend (or output) achieved, these recorded profits might understate the true amount; or, more likely, inflate it, as would appear to be the case with some of the fifteen North East seasale collieries for which, on the basis of accounts ranging in date between 1717 and 1807, Flinn discovered a mean return on expenditure of around

twenty-eight per cent.[31]

What is known of earlier times? There is a good deal of circumstantial evidence, not least the record of annual 'gains' or 'values' for collieries in 1611 and c.1636, to suggest that the late sixteenth and early seventeenth centuries were a particularly profitable period for the coalowners; and it would seem not unreasonable to conclude that profit levels well in excess of fifteen to seventeen per cent might well have been anticipated, and quite often achieved or exceeded, in the more successful ventures such as Whickham Grand Lease (S15), Stella Grand Lease (S4) and Ravensworth (S22).[32] By contrast, detailed calculations of c.1710, drawn up to express the concern of the coalowners at what they regarded as the parlous state of an industry still in the trough of long-standing recession that had deepened in the 1690s, suggest average returns at that date were only around nine per cent and considered too low.[33]

What is of particular geographical interest, of course, is how profit levels may have varied from one colliery to the next. In 1767 the expected profits of nineteen Tyne collieries, when expressed as a percentage of costs 'exclusive of winning' (that is, as a percentage of current expenditure only), recorded a mean of 22.6 per cent but ranged from nil at Bushblades (S51) to as much as 33.3 per cent at Throckley (N2), Denton (N6) and Tynemouth Moor (N17). Clearly, highest *percentage* returns were not restricted to the two collieries producing best quality coals (figure 4.4): Tanfield (S10) and Long Benton (N42). Even greater was the range of profit levels found in 1788 (figure 4.5);

and while there was some obvious tendancy for the collieries producing poorer quality coals to be the less profitable, and in the case of a colliery 'near Pontop' (its true identity was deliberately not disclosed) to record a loss, the relationships were far from straightforward (figure 4.6). It would appear that collieries producing poor quality coals in 1788 had quite low investment and modest vends, but made profits which, while not large, could often represent a good percentage return on capital sunk. Most collieries producing high quality coal probably needed a high output to justify their generally high investment levels but two of them, Gateshead Park and St Anthony (S29 and N48 respectively in figures 4.5 and 4.6) prospered on only a moderate investment (of £10,000 each) and vend.

Interesting as these spatial differences in profitability may be, they only provide the 'stills' in a sequence of pattern change of almost kaleidoscopic complexity. We find, for instance, that just nine of the twenty-two collieries vending in 1767 were doing so in 1788 (figures 4.4 and 4.5)[34] and among these, three -Wylam (N1), Tanfield (S10) and South Moor (S49/50)- had experienced changes in vend size and product quality that were to the detriment of their profit levels. There seems little doubt that most collieries were subject to some degree of cyclical behaviour. Given an extractive industry geared to resource depletion this was almost inevitable: the greater the quantities of coal extracted the sooner came the day when difficulties might arise, profits diminish and new investment be required. In the middle decades of the seventeenth century, Harraton (W3), on the Wear, was especially prone to lurching between extremes of profitability and

loss.[35] But perhaps typical of many more collieries in the period 1551-1810 as a whole were the somewhat less violent fluctuations which occurred at Benwell (N9) from 1709 to 1722, when the operator's fortunes ranged between a profit of £2,721 in 1710 and a loss of £317 in 1718 (appendix 13b). Assuming that the income of a colliery lessor can be taken as a crude surrogate measure of profitability, it is also worth noting the variations which occurred at Northbanks (S57) from 1692 to 1723, when the rental income ranged between about £220 in 1699 and £2,307 in 1722 (figure 3.7); and at Lumley (W9) from 1784 to 1810, when the lessor made as much as £2,688 in 1809 and as little as £408 in 1798 (appendix 13). Of course, there were some collieries which, as we saw from the evidence considered in chapter 2 (and see appendix 6), blossomed and faded overnight; and yet others which, through a fortuitous combination of physical conditions and skilful investment, appear to have prospered in many years over a remarkably long period of time.

Costs

The corollary of these findings on colliery profits is that the costs of mining could be highly variable too. Among the major areas of current expenditure identified in the model (figure 4.3a) were 'allowances', which took the form of premiums, bribes or 'gift coals' given to local fitters and keelmen, to shippers, and to the London dealers in return for gauranteed sales. Though difficult to quantify in practice, these payments probably assumed greatest importance as a proportion of total costs, and most especially for collieries producing

inferior grades of coal, when the product was difficult to dispose of; as, for instance, in the trough of a depression such as that which occurred around the 1690s.[36]

Other payments were made to the labour force of underground and surface workers, this latter group including the waggonmen who transported coal to the staiths. Though not specifically itemized, and therefore not precisely measurable within the two categories 'sinking and getting coals above ground' and 'transport to staiths' shown in figure 4.3a, examples drawn from sources ranging between 1717 and 1811 suggest that the total wage bill often accounted for fifty per cent or more of current expenditure. Unfortunately, there is some confusion as to how often the quantities cited in contemporary sources might have included a hidden allowance for horse feed![37]

Especial interest attaches to the cost of technological innovations for, as our earlier deliberations have shown, these had a significant bearing on changing colliery location patterns: waggonways were of particular importance to the survival of profitable workings at some distance from navigable water while atmospheric and steam engines facilitated mining close by the rivers where inundation most often threatened. Because both were cheap in comparison with other technologies -but, it must be stressed, not so cheap as to see alternatives completely discarded by 1810- they pushed the frontiers of mining to new depths and distances and so increased the scale of expenditure. A steam engine could represent a high level of initial investment: ten to twelve and a half per cent in the case of the model,

and twenty-five per cent in the specific instance of Bushblades (S51) in 1730.[38] Once built, however, the cost of 'attending, keeping and repairing' was generally very small, perhaps less than one per cent of current expenditure. Newcomen engines were noted for their longevity and, where coal was close at hand, they were cheap to run. A word of qualification must be entered, nonetheless. Some collieries in their working lives required several engines; Heaton (N24), for instance, needed six between 1729 and '41 and Long Benton (N23/42) employed no fewer than ten between 1745 and '85 (appendix 11a; and see figure 3.9). For these mines, therefore, pumping devices became a heavy burden of fixed expenditure. Moreover, once these 'wet' collieries became dependent upon steam pumping for their survival, the engines had to be kept working continuously, even if production halted, otherwise the mine was liable to flood and be permanently lost.[39]

The situation with regard to waggonway building was rather different. Not only was the initial cost of laying the track high -calculations for 1739, 1792 and 1810 suggest just over £1,000 per mile was quite typical, with additional large sums where levels and embankments were needed-[40] but the maintenance costs were considerable too. Heavy traffic along a limited number of routeways necessitated the annual replacement of upper timbers -at least until the gradual introduction of iron-plating from the 1770s eased the situation somewhat- while lower timbers and cross pieces needed replacing, on average, once every three to four years.[41] It appears that for most collieries, waggonways took a greater proportion of ongoing investment,

over the long term, than did steam engines. Thus in expenditure estimates for the riverside colliery at Gateshead Park (S29) in 1733, a short waggonway to the Tyne was expected to account for 11.9 per cent of current costs and the pumping engine for just 8.5; while in the north-west Durham uplands at Tanfield Leigh (S52/76) in 1755, 49.7 per cent of current costs were for a six-mile waggonway and only 5.3 per cent for the pumping engine.[42]

Waggonway costs were often inflated by the need to make payments for wayleaves and spoil of ground. Alone, these items appear to have represented about four per cent of the hypothesized costs of c.1760/70; when added to the *certain* and *tentale* rents[43] payable to the owner of the worked royalty -a situation encountered more often than not and so allowed for in the model (figure 4.3a)- they accounted for around ten per cent of the coalowner's costs. This was a considerable sum for those who had to pay it; and by the same token, a great saving for those who did not: the landowning-entrepreneurs whose lands bordered the Tyne or Wear. In practice, the charges made and the proportion they contributed to total costs varied considerably but in general tended to rise over the period 1551-1810 as a whole. As far as payments for certain and tentale rents are concerned, it would appear that between 1580 and 1610 royalty owners may sometimes have received sums equal to no more than three per cent of the pithead price of coal; after 1660 figures representing as much as twenty-five per cent might sometimes have been encountered. William Bowes certainly enjoyed a fat income as lessor of Northbanks colliery (S57) in most years between 1692 and 1723 (figure 3.7 and appendix 13a); and the Earl of

Scarborough was similarly rewarded from 1784 to 1810 (appendix 13c) as lessor of Lumley colliery (W9).[44]

Wayleave costs were a frequent source of complaint in the seventeenth century,[45] but it was after c.1710, when more and more collieries were worked at inland locations, that they rose most appreciably, often being inflated by the need to take routeways that could be most successfully bargained for rather than what might have been cheapest and most convenient purely from the point of view of relief and terrain.[46] On the Bucksnook waggonway, which between 1712 and '26 carried coals from several collieries in upland north-west Durham, the operators of the principal mine -at Bucksnook (S42)- incurred annual wayleave charges of £285, and staith rents of around £42, at a time when the rent of the colliery itself stood at just £37 (plate 2). The difficulties encountered by the owner of Beamish colliery (W22/S62), whose waggonway took a meandering course of six and a half miles to the Wear, were commented upon by John Buddle in 1797, when the lease of a wayleave over the Bishop's lands at Pelton Fell was due for renewal:

> As Sir John Eden is so heavily burthened with wayleaves already and his colliery can yield him but little profit, I recommend his renewal on the former fine.[47]

All of the above elements had a bearing upon the cost structure of coalmining ventures but the ultimate determinant of a colliery's success or failure might be wholly unpredictable factors, incapable of costing for purposes of the model. Among these contingencies, wars were of particular importance because they were liable to disrupt the

shipping lanes to the detriment of the shipping interest and coalowners alike, often through the operation of press gangs which could cause an immediate scarcity of keelmen and mariners. The impact of warfare was seldom as dramatic as in the Civil War when some collieries were deliberately destroyed,[48] but it could be serious, nonetheless. During periods when hostilities intensified on the near continent (figure 4.2), the vulnerability of a few Tyne collieries producing poor quality coals for the overseas vend was only too evident (figure 4.7). Northbanks (S57), once the pride of the river, was totally geared to the foreign market when, in 1807, prices dropped to 7s. per chaldron; that is, to barely more than one-third their average level of 1806.[49] A similar fragile dependence on continental customers during the Napoleonic Wars also characterised Stella Grand Lease (S4) and Washington colliery (W31) on the Wear.[50] The extent of the problem in earlier times cannot be fully gauged; that it existed there can be no doubt. During the first Dutch War (1652-4), for instance, the operators of Winlaton colliery (S7) complained that sales to Holland had been stopped eight months and that the coal was 'too small for the English market'.[51] Not that wars always had a purely negative impact. On the contrary, they could stimulate demand, as appears to have happened in the American War of Independence (1775-83) when coal was needed as a source of fuel in the armaments industries and for the building of new ships.[52]

Among the many other uncertainties to confront the coal industry were explosions and floods (appendix 10d) which could cripple a mine

for many years, or even decades. Yet some collieries might recover quite quickly, as did Wallsend (N49), for instance, after the 'heavy fire' of 1802.[53] Incompetant management, too, could lead to heavy losses, as at the Vane-Tempest's Rainton colliery (W7) which ran out of 'Old Ducks' (their best quality coals from the High Main seam) in c.1800.[54] The weather was perhaps the most consistently unpredictable element to contend with, however. Winter snows and frosts especially disadvantaged the collieries in the north-west Durham uplands compared to those in the Wallsend Basin or Wear district; gales, on the other hand, held up shipping to the detriment of all producers: forced to stockpile their output, they saw prices rise dramatically in London.[55] Some of the worst episodes of adverse weather are indicated in figure 4.2. Collieries might also suffer from a scarcity of food for the workforce of miners and horses. At Killingworth (N43), where a trading loss of £46,000 was recorded between 1806-10, the shortage and consequent high cost of oats and hay for the horses was singled out as a major factor eroding profits.[56] Labour disputes (figure 4.2 and appendix 10a), especially among the pitmen and keelmen, were often triggered, and most certainly exacerbated, by the high price of cereals, especially rye and wheat.[57]

Such, then, were the contingencies which ate into profits and investment. Yet capital was raised; and in sizeable amounts. The sum involved in sinking and maintaining a colliery in the sixteenth and seventeenth centuries can only be surmised: Nef believed that before the end of the seventeenth century reserves of 'from £15,000 to £20,000, and often more, were required for undertaking any of the great

seasale enterprises ... and from £3,000 to £5,000 for the more important landsale collieries'.[58] Evidently, overall investment rose sharply after 1750 or so: in the Tyne district alone the amount of 'capital sunk' in twenty-four collieries in 1788 was already £339,000, and by 1808 the sum 'employed on the River' (at about thirty vending collieries and perhaps half as many again not then working) was £883,000.[59] The amount of capital needed for an individual enterprise in the closing decades of the study period could vary greatly, however. Garesfield (S35), for instance, was reportedly won in 1801 for just £6,500.[60] Hebburn (S82), on the other hand, cost £40,000 to win and in 1797, when it first vended, its lessees were said to be 'out of pocket' by more than £36,000. When a share in the colliery was sold in London in 1802 it raised £12,400.[61] Most striking of all is the claim that the much troubled Killingworth colliery (N43) cost nearly £130,000 to sink between c.1798 and 1805.[62] Clearly, coalmining was becoming more expensive. Yet it continued, as of old, to attract the necessary investment. So where did the money come from?

Sources of investment capital

The major part of colliery finance probably consisted of ploughed-back profits, but this could not apply in the case of initial funding, ongoing investment for the less successful enterprises, nor perhaps, when major new developments were undertaken.[63] While there are indications of funds being drawn from a variety of occupational groups, the most striking feature of early colliery financing is the involvement of the local merchant classes, especially in the Tyne

district. The broad-based trading links of medieval Newcastle meant that merchants with their stocks of corn, cloth and fish and associated financiers with their stocks of money, bonds and mortgages were already on hand with wealth to invest once the coal boom arrived. Some of the rich families which came to invest in and own collieries, such as the Riddells, Selbys, Mitfords, Carrs and Bewicks, can be traced back to tradesmen of the fourteenth century. Other local adventurers would seem to have risen to prominence after the mid-sixteenth century; such were the Andersons, Claverings, Liddells, Maddisons, Dudleys, Jennisons, Chapmans, Tempests, Blacketts, Marleys and Coles.[43]

Tyneside merchant funds spilled over into the Wear district where, from the late seventeenth century, local urban capital also flowed in from the Ducks, Heslops and Whartons of Durham.[45] By the eighteenth century, merchant and industrial funding in both coal districts was increasingly being supplemented from a wide range of other local sources, among them lawyers, clergymen, goldsmiths, ships' captains, landowners and, after mid-century, colliery viewers (managers).[44] The establishment of a banking system (five banks were founded in Newcastle between 1755 and 1788 and one in Sunderland by 1787) provided more formal channels for the raising of capital, though it is a mute point as to whether it was bank deposits or bank profits which made the greater contribution to mining capital: several of the bank proprietors, among them Bell and Brown of the first Newcastle bank (the 'Old Bank') and William Russell of the Sunderland, invested heavily in collieries as well as a range of other commercial enterprises.[47]

The region appears to have achieved a marked degree of self-sufficiency in the supply of industrial capital, especially before the Civil War when Newcastle was acknowledged as a great financial clearing house for the counties of Northumberland and Durham.[68] Even so, both then and later, considerable funds were sucked into the coalfield from more distance parts. Adventurers were particularly attracted from Yorkshire: Sir William Gascoigne, 'a man of great wealth'[69] with coal pits in the West Riding, took the coal-rich manor of Ravensworth in the sixteenth century, before eventually selling out in 1607 to his wife's brother-in-law, Thomas Liddell, a wealthy Newcastle merchant; in the middle of the seventeenth century the Yorkshire branch of the Whartons was financing collieries at Denton (N6) and Lumley (W9), and a landsale colliery at Softley (L41); and by the late seventeenth century and for much of the eighteenth, the most celebrated and wealthy of west Yorkshire landowners and industrialists, the Wortleys (also variously known as the Montagues or Wortley-Montagues), were heavily involved. When Sir Sidney Wortley died in 1727, the size of his fortune was said to have surprised even his friends: he was reported to be worth nearly three-quarters of a million pounds, exclusive of landed properties.[70]

The Wortleys and their Durham mining interests were eventually to be linked to another powerful family of newcomers by the marriage of an heiress to the third Earl of Bute; but of more immediate significance before 1810 was the fourth Earl of Bute's inheritance in c.1770 of coal-rich lands in north-west Durham, most notably at Pontop, Collierly

and Winlaton. These properties had descended (though much fragmented), through the failure of the male line of the Newcastle Mallabars, to the Claverings, and later to the Windsor family which already owned extensive coal estates in Glamorgan. In addition to these Durham and Welsh possessions, the earls of Bute held large estates in Berkshire and Scotland.[71] Occasionally, entrepreneurs for whom we can trace no obvious pre-existing local ties, either through friendship or marriage, joined the coalowning fraternity. One such was George Pitt from Strathfieldsay, Dorset, progenitor of a noted family, who in 1686 took a lease of Tanfield Moor; from the early years of the eighteenth century until well into the nineteenth, the Pitts were to work this important coal royalty.[72]

Strong trading connections with south-east England sometimes drew investors from among the shipping interest: between 1590 and 1613 John Lyons of Yarmouth, one of the many East Anglian traders whose ships dominated the carriage of coals at this time, held a lease of Greenlaw colliery (S14) in partnership with two Newcastle merchants, and also invested in the salt industry at South Shields.[73] More prominent were links with London. Merchants and tradesmen -among them leathersellers, fishmongers, haberdashers and clothmakers- appeared frequently as financiers in the region in the early days,[74] managing at times seriously to challenge the Newcastle merchants' near-monopoly on the Tyne. In 1649 they were even reported to be seeking an interest in the most prized concession of all, the Grand Lease of Gateshead and Whickham.[75] But it was to the Wear coal district, away from the protective atmosphere of the Tyneside merchants, that London financiers

were especially attracted in the seventeenth century, sometimes having to accept a closer involvement than they had first anticipated in order to rescue monies advanced to an original undertakers whose fortunes, rather than improving, had merely deteriorated. Just before the Civil War, for instance, we find a London merchant, Richard Evans, confiscating Lumley colliery (W9) from the Yorkshire Whartons for 'great sums' owed him,[76] and under similar circumstances Josiah Primatt, a London leatherseller, and George Lilburne, a trader at Sunderland, taking Harraton colliery (W3) from Robert Conyers and partners.[77]. By the early years of the eighteenth century, Charles Atherton, latest in a long line of undertakers of Harraton, was facing legal action from John Conyers, a London mercer, who was owed 'several great sums of money for work done at the coal works'.[78]

Even those with a most intimate knowledge of the coal industry, and who in consequence might have been expected to fair better, did not always escape disaster: in 1715, two London dealers, Coltman and Blunkett, were said to be 'deeply soused' by their involvement with Brumell and Wright, operators of the ill-fated Bucksnook colliery (S42).[79] 'South Country men', Stephen Primatt had warned in 1667, 'seldom get anything but trouble for their undertakings in collieries'. Yet for every potential investor who heeded the warning there was many another unable to resist the seductive charms of an industry in which fortunes were to be made. And while 'North Country men' might have shown 'an antipathy towards the thriving of any but themselves',[80] there were undoubtedly many occasions when they had reason to be deeply

grateful for the help of outsiders. At the end of Queen Anne's reign, for instance, a leading London financier, Tom Gibson, was heavily engaged in sustaining several collieries in the region. Without the friendship and financial support of Maltis Ryall, a big London dealer, Richard Ridley would have been hard pressed to fund his Dipton (S46) and Byker (N25) collieries in 1729.[81]

In view of the size of investment required for a major seasale colliery -several thousand pounds in the early seventeenth century, £40,000 or more by the late eighteenth-[82] it is not surprising to find that many were subject to associate financing; only in this way, perhaps, could sufficient funds be raised.[83] Unfortunately, it is difficult to gauge the precise extent of partnership funding or to know how the pattern of investment changed over time because it is seldom possible to identify all of the investors involved, especially those who had a minor stake or were merely 'sleeping' partners. Never more that twelve partners at any one time were named as holding parts in the Grand Lease collieries of Whickham and Gateshead and sometimes less (in 1618, for instance, only four were named: Sir Peter Riddell, Henry Maddison, Nicholas Tempest and William Hall), yet it was claimed in 1595 that 'there are ... above thirty that are interested and parties to this Lease ... many be wedowes and orphanes ... some have not more than 144 [th] parte'.[84] Many of these small shares or parts, and some of the larger ones too, appear to have been passed on from one person to another with remarkable frequency.[85] Another colliery whose funding became much divided by the splitting of shares was Stella Grand Lease (S4) in Ryton parish. Already the subject of associate financing in

the early seventeenth century (plate 1), and probably for some time before that, it was, in 1793, divided into no less than 480 parts; though at this date they were effectively in the hands of twelve individuals, only one of whom, Silvertop, actually worked the colliery.[86]

Of particular interest, of course, is the extent to which investors, where capable of identification, might be seen to have spread their funds and hence their risks between different collieries, or even among different industrial and commercial enterprises both on and off the coalfield. When reinforced through partnerships and formal alliances this led to a widespread interlocking of interests and considerable mobility of capital out of which there emerged a clear hierachy of entrepreneurs able to exert control over most of the mines in North-east England; or, as Gabriel Jars was to observe in 1765, 'there are some who are interested in the majority of enterprises in the district'.[87] Most notable among their number were those who could trace a close, and often direct, link back to the wealthy merchants of Newcastle in the late sixteenth or seventeenth centuries. Infused with new blood among their ranks, a circumstance which may have become especially marked after about 1750, these individuals had a special interest and role in controlling the pattern and timing of colliery development in the Tyne and Wear colliery districts, for their coal mines were the foundations upon which the whole economic, and one might argue, social, superstructure of the region was built.

Landowning-entrepreneurs. There was never a time when the chief colliery proprietors did not include among their number several landowners working their own coals. This might seem hardly surprising. Landlords, after all, had outright ownership of coal-bearing lands; unless they were an excessively unadventurous and impoverished class, some, at least, were bound to be tempted by the prospect of huge windfall profits. What is of particular interest, however, is to note the extent to which, on the Northumberland and Durham coalfield, landowning-entrepreneurs survived, and indeed, in some cases thrived, to the end of the period of study; well beyond the time when they were vanishing from all but the smallest undertakings on the Lancashire coalfield -and perhaps on other coalfields too- as the levels of finance required for a major colliery mounted.[88] Of course, the prominence of Church lands as the scene of coal extraction in the Tyne and Wear districts (figure 3.12) meant that landowners working their own coals can seldom have been in a majority: throughout the period of study the Bishop of Durham, and the Dean and Chapter, were under a more or less certain obligation to distance themselves from such an overtly profit-seeking activity as coalmining by leasing out their minerals. This did, however, give the more enterprising lay lords, most notably the Liddells in the seventeeth century and the Lambtons and Vane-Tempests in the eighteenth and early nineteenth, the additional opportunity of exercising their entrepreneurial talents as lessees.[89]

Just how heavily committed landowners as a group were to direct involvement in coalmining over the decades has yet to be established in detail. On the Tyne in c.1710 we find seven of the seventeen major

seasale collieries, accounting for 35.6 per cent of the total vend, entirely in the hands of royalty owners who, in some cases at least, also had interests, as lessees, in one or more of the remaining mines. By the opening decade of the nineteenth century there were clear signs that new sources of adventure capital were being drawn in to disturb this balance, especially in the Tyne district (table 4.1). Even so, we still find the Lambton, Liddell, Bowes and Brandling families working mines on their own lands, at Lambton (W8), Team (S71), Northbanks (S57) and Felling (S31) respectively, and sometimes using their profits to buy more coal-bearing lands.[70] At the level of the individual family there was much variation over time. The Liddells, with their family collieries at Ravensworth (S22), Eighton (S72) and Team (S71), were heavily committed as landowning-entrepreneurs from the early seventeenth century to the beginning of the nineteenth. Similarly, the Lambtons appear never to have allowed the family mine at Lambton (W8) to leave their possession. The Lumleys (earls of Scarborough), on the other hand, worked their own mine (W9) fitfully, choosing to withdraw at times in the seventeenth century and again in the late eighteenth when financial stringency made this necessary.[71]

How far did the continuing existence of landowning-entrepreneurs in the coal industry depend upon their ability to finance collieries directly out of agriculture? Unfortunately, such estate accounts as survive for the years prior to 1810 seldom contain accounting procedures designed to yield the kind of information that is required to answer adequately this important question; but there seems little

doubt that, from time to time, agricultural funds were channelled into coalmining. For instance, in the century before the Civil War, Newcastle merchant-colliery owners who invested the profits of commerce

Table 4.1 *Colliery operators on the Tyne, c.1710; and on the the Tyne and Wear, c.1804*

	Tyne collieries c.1710		Tyne collieries c.1804	
	Worked by landowner	Worked by lessee	Worked by landowner	Worked by lessee
	N21	N9, N22	N1, N32	N3/29, N6, N9 N12, N13, N24[?] N34, N35, N42 N45, N49, N50 N53, N55
	S2, S8, S10, S22 S25, S38	S4, S7, S19, S29 S31, S33 S57, S67	S10, S31 S35[?], S57, S80	S3, S29, S45/46 S49, S70, S71 S74, S82, S83
Vend in tons	178,875	323,300*	226,742	1,460,340
Percent share	35.6	64.4	13.4	86.6
			Wear collieries c.1804	
			W6, W8 W13, W16 W22, W34 W36	W3, W7, W9 W14, W17/18 W23, W24, W25 W27[?], W28[?] W30, W31, W32 W35
Vend in tons			264,420	524,085
Percentage share			33.5	66.5

Notes: * Total includes 1,325 tons for 'other small collieries' which, though not separately identified, were probably leased.

Sources: Mainly, GPL Cotesworth CK/3/135; NEIM Watson 5/9; Watson 8/20; Simpson 1930-1.

in coalmining ventures must often have had the opportunity of drawing upon agricultural income as well; either directly from properties which they had purchased, perhaps with the profits of trading or mining, or indirectly from the farms and estates from which many of their fee-paying merchant apprentices were recruited and with whom they often had close ties of kinship.[92] While Nef appears anxious to play down the role of the landowning interest in early colliery finance in North East England,[93] it is worth remembering that merchant-colliery owners like the Maddisons, Tempests and Claverings all sprang from a landowning background. Thus, insofar as the financing and ownership of collieries might also have led them to direct their profits into the purchase of estates, they were often doing no more than returning to their agrarian roots. The propulsion of a son and heir out of agriculture into the merchant classes in one generation could easily lead to a reverse trend in the next. Sometimes the whole cycle was encapsulated in one generation, as with William Cotesworth (?1668-1726) who began life as the son of a yeoman in Eggleston, Teesdale, and ended his days as a major landowner on Tyneside, having in the meantime made his mark as a merchant trading in coal, salt and other goods, and as a specialist in the purchase and exploitation of mining rights.[94] Social and occupational mobility such as this, by no means a rare occurence, makes the apparently simple task of placing in neat categories both colliery investors and the ultimate origins of their finances a somewhat hazardous undertaking, and never more so than when attempting to assess the scale of the contribution made by one form of economic activity rather than another.

Circumstantially, it would appear that prior to c.1650 agriculture's contribution to colliery finance was fairly modest: the widespread existence of 'decayed' holdings on the one hand, and under-rented tenancies on the other, suggests that whatever agricultural improvements may have taken place at this stage, they would not have yielded a large surplus of funds for investment in mining. And after the mid-seventeenth century, and more especially after the mid-eighteenth, when agricultural rents did rise appreciably, so did the amount of investment capital required to undertake and maintain a colliery.[73] This is not to say, of course, that because agriculture's contribution was modest it might not have been crucial, nor to deny that for some projects in particular, it may have been the sole or major source of funds. Thus the agricultural side of the Lumley estates appears to have contributed all or most of the £17,000 required for a new winning at Lumley colliery between 1777 and 1783, though much of this was probably drawn from estates in Yorkshire and Lincolnshire rather than Durham.[74] After c.1750 it is clear that rising agricultural rents, especially from Northumberland estates just off the immediate area of the coalfield, were being deposited in substantial quantities in the Tyne and Sunderland banks. And it was from these banks that coalowners could borrow money to meet the heavy financial requirements of new winnings; as happened, for instance, with the sinking of Killingworth colliery (N43) between c.1798 and 1805, when the proprietors also had to borrow directly from their own agricultural rents.[77]

Flinn has suggested that by the eighteenth century landowning-entrepreneurs had less need than other colliery adventurers to involve a wide range of external sources for their colliery funding.[98] For the Tyne and Wear colliery districts sufficient evidence does not survive with which either to support or refute this assertion with any conviction. The individual circumstances of landowners were in any case very variable. Landowners certainly were to be found borrowing from beyond their immediate circle, from goldsmiths and lawyers, for instance; or entering into important alliances with non-landowning adventurers.[99] What perhaps was of more importance was the advantage landowners possessed over other adventurers in being able to offer their estates as collateral if and when the need to borrow arose. For despite the increasingly lucrative nature of other forms of investment by the second half of the eighteenth century, the widespread popularity of enclosure, both in County Durham and several other parts of England at this time, shows that land could still attract substantial funding, and not solely from incumbent tenants. Indeed, the very achievement of enclosure was to make land an even more attractive form of investment for those who wished not only to lend but to buy as well. And where that land also included minerals, it was made all the more attractive.[100] Not that land was possessed only for its economic value, of course: social and political status attached to ownership of land, and never more so than for an uncompromising businessman like William Russell who, in the last decades of the period of study, rose from the ranks of the fitters to become a major colliery proprietor and one of the wealthiest commoners

in England. Between 1787 and 1810, he is said to have bought in County Durham estates to the value of £750,000. The main source of that wealth was one colliery, Wallsend (N49), which, as we noted earlier, netted him a profit of between £30,000 and £60,000 over many years.[101] One of his purchases, Brancepeth, had been sold in 1636 to Ralph Cole, a member of an earlier generation of successful mining adventurers.[102] Thus, while agriculture undoubtedly contributed towards the funding of colliery adventures, the flow of capital in the opposite direction, into estate purchase and building projects, if not, strictly speaking, into farming as such, was probably more impressive. The uncertainties of coalmining far outweighed those in farming, but the annual profits of a successful colliery venture far exceeded the agricultural income from a well-run estate.

The relationship between landed society and colliery proprietorship emerges as a fundamental one in understanding the geography of coalmining. By choosing to work their own coals, landowners were not only affecting the pace and extent of coalmining through the decisions they were constantly having to take in response to ever changing circumstances of resource exploitation and market conditions, they were also effectively denying or restricting the entry of other entrepreneurs into the industry. Moreover, as rentier lords they were able to exert an influence on the progress of mining through the provisions which governed the leases they granted, especially those which specified the amount of rent to be paid, the quantities of coal which could be extracted and led per annum, and the number of years for

which the lease was to run (appendix 14 and plate 1). Of course, the extent of the landowner's influence was dependent upon the strength of his bargaining power in relation to that of a potential lessee; and neither party's bargaining stance was likely to be determined in some casual or haphazard fashion. The ultimate purpose of coalmining under a capitalist economic system was to make as much profit as possible, while the vital prerequisite for success was possession of, or control over, coal-bearing lands. Everything was geared to the conscious pursuit of strategies aimed at securing these two objectives. Consistency was not to dominate activities, however, for while fierce competition might often typify relationships between individual coalowners, or more often between one group of financially-associated proprietors and another, external pressures -usually activities along the marketing chain and out of their immediate control but which threatened to damage them all- drew them into liaisons and attempts to control or regulate supply.

Combination, competition and territorial possession

The monopoly of the Newcastle hostmen

The early coal industry on the Tyne was under the tight control of the Company of Hostmen whose members not only exercised a traditional right as freemen of the town of Newcastle to 'host' or trade with visiting shippers but also enjoyed exclusive right, conferred originally upon the citizens of Newcastle by act of Parliament in 1529,[103] to trade in coal and all other commodities shipped from the river, including those which came from the south or Durham shore. Moreover, through their

membership of the twelve merchant companies or 'mysteries', they were also able to elect municipal officers and dominate the town government. Meanwhile, the principal hostmen were able to hold, either directly or through their immediate family and friends, the major 'parts' in collieries at a time when the area available for profitable seasale coalmining was fairly restricted geographically.[104] The possession or acquisition of these coal royalties owed less to their financial resources, which were considerable, than to the opportunities afforded by the sequestrations of ecclesiastical properties at the time of the Dissolution of the Monasteries (from 1536), and of lay properties following the Rising of the North in 1569. The Elizabethan monarchy, anxious to protect its political authority in the North as well as supplies of coal to London, offered its new-found friends in Newcastle confiscated properties on highly favourable long-term leases. None was to be of more fundamental importance than the 'Grand Lease' of the Bishop's manors of Gateshead and Whickham. In keeping with the Crown's desire to limit severely the temporal and spiritual powers of the Church, and fuelling still further the traditional animosity between Newcastle and the Bishop over the right to ship coal from the Durham shore, these coal-rich lands were transferred, on somewhat questionable legal grounds, to the Newcastle merchants between 1577 and 1583. Thomas Sutton, Master of the Ordnance at Berwick, who had negotiated the lease, probably received £5,500 for the transfer (though a figure of £12,000 had been suggested), while the Bishop of Durham was left with the ultimate title to the ownership of the manors and an annual rent of just £117 15s. 8d. for the duration of a 99 year lease.[105]

Not content simply to possess the coal estates and control the channels through which coal was traded -and in recognition of which their *de facto* monopoly acquired official recognition by royal charter in 1600-[106] the hostmen promoted the formation of a cartel in order to reduce competition among themselves. By means of agreed annual quotas, the total vend was regulated along with the contribution to be made by each hostman colliery owner. The records of the Hostmen's Company, dating from 1600, show that such agreements were in operation in 1602, 1605, 1617, 1622, 1627 and 1637.[107] Similar periodic arrangements were probably reached prior to 1600 as well, but specific detail is missing. The shippers, dealers and London authorities attacked these combinations on the grounds that they raised the price of coal. This was done, so it was alleged, by deliberately reducing the number of working pits, or, what was perhaps more common, by increasing the number of 'base pan-cole pits' in proportion to those producing higher grades of coal so that a resultant 'mix' could be sold above what should have been its true market value.[108] The outcry was usually such that combinations among the colliery proprietors could not be sustained for long periods, certainly after 1600, without a more serious step being threatened: the outlawing of the hostmen's monopoly.[109]

Yet one reason for the short duration of combinations, in addition to fear of retaliation in London, was perhaps a strong element of competition among the merchant colliery owners themselves. In the agreement of 1617, a hierarchy of ownership is apparent: the coals of forty-eight brothers were to be channelled through a smaller group

consisting of just eight leading hostmen -all brothers were equal but some were more equal than others![110] The existence of this inner ring with interests in many collieries, and which appears to have been capable of dominating not only the progress of the coal industry but the town's affairs more generally, did not necessarily accord with the interests of coal proprietors lower in the hierarchy or of those to whom they had responsibilities. Thus, when the combination of 1627 was in operation, we find Rebecca Chapman filing a bill of complaint against her late husband's nephew, Henry Chapman, to whom she had leased a part share she had inherited in Greenlaw colliery (S14): she drew most of her maintenance from this colliery and Henry Chapman had been obliged to close all but one pit.[111]

Such a case is merely symptomatic of more widespread instances of manipulation, conflict and competition on the coalfield. Sometimes, these originated in personal jealousies and family quarrels, or in deep-seated religious differences: between the late sixteenth century and early eighteenth the strong Catholic influence among the Newcastle coalowners was almost completely ousted by the Puritan element.[112] But the major conflicts for which we have evidence, and which were to be of importance in restricting the number of colliery locations and intensity of working, were those which arose between coalowners who were in the Hostmen's Company (or well-connected to it by partnership and marriage) and so able to vend their coals, and those who, 'unfree' of the Company (that is, non-members), were for the most part debarred.[113] Before the Civil War there were two particularly

acrimonious struggles, neither of which was successful, to overturn the *status quo.* In the last decade of the sixteenth century, Henry Sanderson, himself a free burgess of Newcastle, but prevented by the Grand Lessees of Whickham from selling coals mined in the adjoining parish of Lamesley, set about championing his own cause and that of the lesser merchants and coalowners. Thirty years later, with equal fervour, Robert Brandling of Felling, a Newcastle burgess whose ancestors had traded in coals long before the families of most of the Grand Lessees had risen to prominence but who was not a member of the Company of Hostmen, was thwarted in his attempts to ship coals from his mines on both banks of the Tyne, and in his encouragement to other non-hostmen to do likewise. Most vociferous in his condemnation of the hostmen's monopoly and demonstrably unsuccessful in challenging it, however, was Ralph Gardner, whose collieries at Chirton near the mouth of the Tyne were denied an outlet to the river in the middle decades of the seventeenth century.[114]

Despite the failure of these attempts to break the monopoly, there were signs before the Civil War that the stranglehold of the hostmen might soon be relaxed. Profit levels were falling and funds beginning to dry up. When, in 1637, William Selby had to sell his £11,000 interests in collieries, due mainly to the profligacy of his son, he could find no one within the Company able to take them and no one outside willing to do so without a guarantee of trading rights.[115] The war itself caused severe dislocation to the coal industry, especially in 1641 and 1644, though its impact on individual estates was very patchy. Royalists and Papists in particular suffered severe financial

hardship as they saw their collieries destroyed and estates sequestered. And while the majority of dispossessed coalowners eventually regained their properties, they often had to resort to mortgages to pay off their fines and restore their estates, just at a time when their coal lands close by the river were becoming yet more difficult and expensive to work.[116] Meanwhile, in direct competition with the Tyne district, new coal royalties were opening up and expanding production on the Wear, and these could not be controlled by the Hostmen's Company, even though several of its members had individual interests in collieries there.[117]

The second half of the seventeenth century also saw changes within the Company of Hostmen whereby the economic functions of its members became more sharply divided between those who were coalowners first and foremost and those who acted in a new specialized role as fitters. This latter group appears to have wrested the initiative from the former to the extent that individual fitters came to deal in the coals of several coalowners some of whom were not necessarily 'free' of the Company. This had the effect of undermining one of its crucial functions: to prevent or restrict the entry of newcomers to the industry.[118] By the 1680s and '90s, at a time of generally faltering output and sluggish markets,[119] the difficulties of the hostmen coalowners were becoming yet more acute: they had substantial sums invested in old coal lands by the river which they could not drain with existing apparatus and so could not work efficiently, while, in anticipation of better times, they had further committed their funds to

buying up or leasing more distant coal royalties; but only in competition with newly-arrived and wealthy outsiders such as George Pitt, who took Tanfield Moor (S10) in 1686, and Charles Montague, who invested heavily -and as time was to prove, very wisely- in the colliery at Northbanks (S57).[120] Moreover, access to these inland collieries saddled the hostmen coalowners with such heavy payments for wayleave and staithroom that they made repeated attempts between 1674 and 1696, but without success, to get a bill through Parliament to regulate (effectively to lower or abolish) these charges.[121]

Faced with an exhaustion crisis which called for further investment in already over-capitalized collieries, uncertain markets, competition from the Wear and difficulties with the assertive fitters, the hostmen coalowners seem to have become convinced that their interests were to be identified more and more with those of the 'unfree' colliery proprietors; their Company could no longer remain the sole or dominant power base on the coalfield. Although it was to retain an active and important supportive role for some entrepreneurs throughout the following century -for instance, every Governor of the Company between 1700 and 1810 was also a coalowner-[122] the search was now on for new structures of protectionism with which to avert the very worst consequences of inter-colliery competition. The talk was now of alliances, contracts and regulations.

Regulation and the rise of the Grand Allies

There are indications that an attempt was made to 'regulate' or restrict coal supplies at the very beginning of the eighteenth century

through the agency of a 'coal office' in Newcastle.[123] To what extent this may have contributed to the sharp rise in London coal prices, particularly between 1701 and 1703 (figure 4.2), is questionable, however. More important may have been the existence of a strong combination among the London lightermen, or the delays to shipping caused by the War of the Spanish Succession when convoys were needed to escort the colliers, most notably in 1703.[124]

As far as can be currently established, the first successful attempts to bring about a regulation on the Tyne in the eighteenth century came in 1708 when the five self-styled 'Directors', Sir Henry Liddell (Governor of the Company of Hostmen), Mr James Clavering (hostman), Alderman Matthew White (hostman), John Ord (hostman) acting for Sidney and Edward Wortley (non-hostmen) and a John Wilkinson (hostman) and their chief executive, William Cotesworth (non-hostman), drew up 'Articles of Agreement Tripartite' between ten colliery proprietors on the first part, some twenty-three Newcastle hostmen fitters on the second and a certain Daniel Poyen 'ye principal agent' on the third part. It was planned that 16,400 tens (probably around 500,000 tons) of coal should be vended in total in 1709 with specific 'proportions' allocated to each colliery or owner.[125] A similar arrangement was later proposed for 1710, and by 1711 attempts were being made to involve the Wear coalowners in 'what might be proper to be done for the common good of the coal trade'.[126] Although no evidence has been found to suggest the formation of an alliance or agreement between the two rivers for this early period, it is clear

that a regulation, or 'Contract' as Cotesworth preferred to call it, was still in being on the Tyne when in 1711 the Anti-Monopoly Act, aimed at preventing combinations in the coal trade, went through Parliament.[127] In fact the act was weakly worded and certainly capable of misinterpretation to the extent of being more or less ignored by later generations of coal monopolists and would-be monopolists.[128] Cotesworth, who was called before Parliament to give evidence to a select committee, felt that he had managed to 'procure a good bill' through some persuasive argument which shifted the onus of blame for combinations in the coal trade in the direction of the shipmasters and, most important of all, the London lightermen who, he claimed, had received over the past twelve months '£1,250 for unlading the Contractors' coals'.[129]

The regulation survived more or less intact until 1715 when mounting difficulties hastened its demise. Its members had succeeded, principally through their possession of extensive wayleave rights on both sides of the Tyne, in restricting or preventing the working of inland collieries not in the regulation, so maintaining or even enhancing prices at a time of sluggish markets.[130] But tensions were never far from the surface. While participants in the combination spent large sums in promoting and defending their policies, often with the aid of expensive law suits,[131] they could never control more than about two-thirds of the Tyne vend (about half that of the Tyne and Wear districts combined) and so could not long prevent 'interlopers' from undercutting their prices.[132] Moreover, the practice of ridding some collieries of their inferior coals to both foreign and home markets, as

with Blaydon (S8), Clavering Stella (S2) and Felling (S31) in 1711, tended to succeed at the expense of collieries such as Benwell (N9), Bucksnook (S42), Northbanks (S57) and Tanfield Moor (S10), which were capable of greater sales and profits, their coals being much-favoured by the London dealers upon whose goodwill the industry so much depended at times of depressed demand.[133] From 1712 Wortley began boosting his Benwell and Northbanks sales by supplying the London dealers with fixed quantities of coal rather than a proportion of the total vend as had been the original intention of the 'Contract'.[134] His independent stance and aggressive policies generated an especial mistrust in Sir Henry Liddell, the other leading capitalist in the coal industry at the time, and were a major reason for the collapse of the regulation. Suspicions about Wortley's true nature and intentions had been aroused in 1711 when Liddell had warned Cotesworth that 'we are harbouring a snake in our breast'. Once the regulation had foundered, Lady Bowes, never a person to mince her words, could openly declare 'Old Wortley [Sidney who died in 1727] and J. Ord .... two of the greatest R[ogues] that ever a County was blessed withall'.[135]

In 1726 there arose from the ashes of the old regulation a new, and what was to prove more durable, grouping of coalowners in the shape of the Grand Allies: Sidney and Edward Wortley (father and son, both non-hostmen) with their agent Thomas Ord (hostman); George Liddell (hostman) who acted on his own behalf and that of Sir Henry Liddell, fourth baronet and still a minor (Sir Henry, the third baronet, had died in 1718); George Bowes (hostman) whose family had not been

directly involved in the 1708-15 regulation; and William Cotesworth (non-hostman), who once more held a key role, this time as secretary. By their partnership agreement of 27 June 1726, they agreed, on behalf of themselves, their successors and assigns, to pool for their common use all rights to wayleaves and waggonways and to introduce a quota system for determining the vend of their collieries whether held singly or jointly.[134] Thus linked, by bonds of mutual dependence, the Allies were to exert, particularly during the first quarter century of their partnership's long existence, a powerful influence on the pace and location of coalmining activity. This they achieved by pursuing a policy whose ultimate aim was complete domination of the Tyne coal trade, and whose key strategy was to acquire, by purchase or lease, as many coal estates and wayleave rights as their finances would allow. Where intended for some future rather than immediate use, these were to be held as *dead-rent collieries* and *negative wayleaves* (appendix 3) so as to prevent their use by other coalowners. If circumstances made it necessary they were willing to join forces with the other coalowners in a new regulation. By employing such strategies, the Allies were to earn a degree of notoriety which, judging from the internal evidence of the alliance, was well-deserved.[137]

In order to understand the role played by the Grand Allies in shaping the course of colliery pattern change, it is necessary to consider, in some detail, the circumstances which brought them together in the first place. In the decade or so of open trading and intense competition among the coalowners which followed the breakdown of the regulation of 1708-15, each of the future members, either independently

or sometimes in partnership with one of the others, had been strengthening his territorial hold and hence potential value to the Grand Alliance at its inception. This was most obviously to be seen in north-west Durham (figure 4.8) where, between the Team and Derwent, the richest workable seams were then to be found. It was there that the Liddells and Boweses had important family estates replete with coal seams, and where the Wortleys, though lacking a power base in outright ownership of lands, took, alone or in uneasy partnership with the Liddells, leases of a considerable number of coal royalties and wayleaves (figure 4.8 and appendix 14). William Cotesworth had a direct financial interest in at least a dozen collieries in the region and while none save Bucksnook (S42) was particularly successful[138] his membership of the Alliance was seen by the others as crucial. Since 1712, when the manor of Whickham along with many of its wayleave rights had fallen into his lap and effectively given him control over the main exit routes for coals being led to the shipping staiths on the south shore of the Tyne, he had made further territorial gains, most notably by purchase of a half share in estates at Winlaton and Stella which had been taken from the attaindered Lord Widdrington for his involvement in the unsuccessful Jacobite Rebellion of 1715.[139] Moreover, the act of 1715, which required all Roman Catholics still possessed of their estates to register them with the local magistrates at Quarter Sessions, allowed Cotesworth, by then a J.P. with many close personal contacts, to gain knowledge of their often dire financial circumstances and use this to good effect.[140] By 1720 he could claim that most of the coal in the Tyne district was marketed 'by my Lycence or under my

influence'.[141] Others, less kindly, accused him of 'playing the tyrant over his neighbours.[142] It was in recognition of his tight hold on the industry that under the terms of the Alliance treaty he was to receive 5s. a ten (later reducing to 2s. 6d.) for all coals led from the partnership collieries, whether over his land or not, as his price for not granting mining rights or wayleaves to other parties.[143]

Fundamental to any future success of the Alliance was the commitment of its members, deliberately written into the agreement of 1726, to put an end to the rivalries which had dogged their relationships in the past: the Bowes family had been at loggerheads with Cotesworth since the building of the Bucksnook waggonway in 1712;[144] conflicts between the Liddells and Wortleys, it will be recalled, had helped to destroy the regulation of 1708-15. A permanent state of cooperation and goodwill among the members of the Alliance was to prove illusory, as we shall see; yet equally important to remember is that the Alliance could never have been formed in the first place, nor been in any degree sustainable, had not its members realised the advantages to be gained from a successful marriage of their private and common interests. In fact the battle for control of the coal-rich lands of north-west Durham, upon whose outcome the strength and early successes of the Alliance were so much to depend, demonstrates how, by gradually submerging their personal animosities, they had been able to counter successfully the territorial schemes and ambitions of what were to prove their most implacable adversaries in the shape of the Ridleys, Simpsons and Claverings.[145] The course of this struggle can be

followed in some detail.

On the eve of signing their agreement in 1726, the future Allies were working eight collieries in north-west Durham compared to just two in c.1714 (figure 4.9). Moreover, they had succeeded in concentrating most of their traffic on the newly-built Tanfield Way, so avoiding the kind of legal wranglings which had so far frustrated their effective use of other waggonways in which they had an ownership interest. Only Bowes was still using an alternative outlet: the Western Way which, built in 1721 as a rival and parallel waggonway to the Bucksnook of 1712, was more conveniently placed to take coals from Northbanks (S57) than was the new Tanfield Way, or, for that matter, the old Dunston Way of 1699 which had duly closed in 1723.[146] But the Western Way was predominantly used by Ridley, Simpson and the Claverings who, in 1721, had switched most of their traffic from the Bucksnook Way in order to avoid confrontation with Cotesworth.[147] Early in 1726, however, rumours spread, probably at Cotesworth's instigation, that the future Allies would force the closure of the Western Way, which their part ownership and wayleave rights entitled them to do, and force all traffic onto the Bucksnook once more. A dramatic and timely response was forthcoming: the very day after the Alliance was signed, Sir Francis Clavering, in a fit of pique, seized the initiative and closed the Bucksnook instead.[148] Though a part owner in, and recipient of rents from, the Bucksnook (plate 2), he also enjoyed a fat income from wayleaves on the Western Way. The Allies immediately retaliated by persuading George Pitt to build a cross-line from Byermoor to Marley Hill (shown in figure 4.9 running east from S38 in 1728) so that his

Tanfield Moor coals could go down the Tanfield Way thereby depriving the Western of some of its traffic and wayleave income.[149] Soon after this, Clavering, deprived of funds and a secure outlet for his coals, was prevailed upon to lease the Allies his best colliery at Beckley (S56). He drove a hard bargain, however, demanding a certain annual rent of £3,000 on up to 2,000 tens of coal in the first two years and £2,250 on up to 1,500 tens thereafter, and a tentale rent of 30s. for every ten over and above these agreed quantities.[150] He also insisted upon a term of eleven years only and may have expected to work the colliery himself at the determination of the lease. If so, he was to be sorely disappointed, for the severe terms prompted the Allies to exploit it to the full: in 1728 it produced more coal than any other royalty on the coalfield (figure 2.3 and appendix 5); by 1738 all the best coals had been removed.[151] There could be no better demonstration of how the terms of a coal lease might affect the pace and timing of coalworking.

It was in an atmosphere of tit-for-tat confrontations that in 1727 the Allies urgently sought another regulation. They were then facing payments of over £6,000 per annum in certain rents alone and obviously in need of some protection for their massive overall investments, especially when the increased demand and rising prices which they had anticipated in 1726 did not materialise.[152] Though not yet able to achieve a monopoly of good coal lands which was their ultimate aim, and which would, of course, have rendered the search for a regulation involving other coalowners unnecessary, they were in control of

sufficient lands to feel able to exert pressure on the rest. So as to elicit full cooperation, they presented their main adversaries with calculations showing the losses they were likely to incur in a 'contesting' or 'fighting' trade compared to the profits which would result from the 'peaceable' trade of a regulation. They even allowed their arch-rival, Richard Ridley, to work out what the Allies themselves should contribute to the vend.[153]

The bullying tactics apparently worked: an agreement was signed with Lady Clavering, Mr Mallabar, Mr Ridley and Mr Simpson with a view to avoiding a 'fighting trade'[154], and a measure of regulation was imposed on the Tyne by 1728 with consequences for the colliery location pattern as shown in figures 2.3, 4.9 and 4.10. It would appear to have been a somewhat loose arrangement, however, with the Allies apparently using it to steal a march on their rivals by vending 62.7 per cent of the total seasale of the river compared to the 48.8 per cent anticipated by Ridley when contemplating joining the combination.[155] By 1730, in fact, the proto-regulation had foundered; though, by contrast with later and more certain regulations of 1733-5 and 1747-50,[156] the crisis which brought it to an end came from within the Grand Alliance itself. One of the partners, Bowes, who was facing severe financial problems, unilaterally cut his prices and thereby threatened to throw the whole coal trade into confusion. His crime was further compounded by his refusal to pay 'premiums' to the London dealers by which means the Grand Allies were assured of a market. The dealers retaliated by refusing to take his coals. Meanwhile, the other coalowners were forced to drop their prices too, and a period of intense competition

ensued among coalowners both within and outside the Alliance.[157] When, by April 1731, some measure of cohesion had returned to the Alliance, other coalowners like Clavering and Ridley were still giving excess measure in order to safeguard or enhance their own share of the market; and as the price-cutting war intensified, the Allies determined once more to force a regulation. Seizing upon the financial plight of Ridley, whose Byker colliery (N25) urgently needed another 'fire' engine (that is, a Newcomen engine) if it was not to be drowned and lost, they prepared a 'desparate remedy': each to spend '£10000 to £12000' so that Ridley 'must Either come into a Regulation in twelve months or blow up'.[158] By 30 January 1732 a regulation was in force again with Team coals showing an immediate and sustained rise from 9s. to 11s. per Newcastle chaldron and Tanfield from 9s. 6d. to 12s.[159]

Meanwhile, another scheme was showing signs of success. The Allies, who had some minor but expanding colliery interests in the Wear district (figure 4.8), had been working since 1728, if not sooner, towards a joint agreement with the Sunderland owners whose own predisposition for partnership and eventual regulation had been shown by a seven-year price-fixing treaty in 1727.[160] But personality conflicts no less than hard-nosed economic reasoning were as rife and disruptive between the two rivers as they were on the Tyne alone. In February 1731, Sir Henry Liddell had warned his partners: 'they have put Harry Lambton at their Head, and he will be drawn but not ledd'.[161] However, in January 1732 an accommodation appeared to have been reached at last: for the next eleven years (commencing in January at Sunderland, and

March at Newcastle) the Wear would vend annually 130,000 chaldrons (344,500 tons) compared to the Tyne's 315,000 chaldrons (834,750 tons).[162]

For how long the Wear owners stuck to their side of the bargain, or, indeed, to their internal apportionments of the vend, is not known.[163] What is clear is that the regulation on the Tyne collapsed in 1735 with the withdrawal of Ridley and White whose collieries at Byker (N25) and Jesmond (N22) were saddled with high drainage costs and needed a greater output than the regulation allowed if they were to repay the heavy investment and make a profit.[164] Nevertheless, the Allies appear to have gained from the arrangement sufficient to sink yet more funds in new colliery leases and wayleaves both during and immediately after the regulation.[165] By 1739, when bad weather (severe frosts and gales) and the outbreak of war with Spain brought a steep rise in London coal prices (figure 4.2), and the activities of the monopolistically-minded coalowners once more came under scrutiny by parliamentary committee, they had reached the very pinnacle of their success as the leading power group in the North East coal industry; the extent of their territorial hold in c.1740 is clearly depicted in figures 4.8, 4.9, 4.10 and 4.11.[166] The evidence presented to the parliamentary inquiry of 1739 fully supported the view that the Grand Allies now had a virtual stranglehold on the supply of coal from the Tyne. Yet the depositions of witnesses also made clear that on the Wear, too, there existed a small group of coalowners fully capable of employing just those tactics of dead rents and negative wayleaves which the Allies had perfected.[167]

1740 and 1741 were to be years of difficulty for the coalowners, not least for the Allies: a dramatic increase in corn prices raised the costs of provisioning pitmen and colliery livestock, and promoted serious unrest; control over the partnership fitters was temporarily weakened as they began, contrary to agreement, to vend the coals of other coalowners; and the Hostmen's Company, upon whom the Allies (and for that matter other coalowners too) still partly depended for blocking the entry of newcomers when their own spatial strategies failed to have that effect, was unable to 'find how and by whom Mr. Silvertop', an 'interloper' and Catholic colliery owner, 'vends his coals' or prevent him from doing so.[168] By 1744 conditions had much improved, however, and the Allies were once more acquiring new coal lands, renewing the leases of others they already held, and preparing to take advantage of Ridley's continuing financial problems as a means of forcing yet another regulation. Ridley was now deeply in debt on account of interest owed on money borrowed and was in need of further investment for his much-troubled Byker colliery (N25); he could expect little help or sympathy from the Allies, whose favours he had seemingly courted only to deceive (plate 3). They decided to press home their advantage by urging his creditors to seek settlement whilst themselves dropping the price of coals from 10s. 6d. per chaldron to 9s. 6d.[169] Their policy had the desired effect: a regulation was in existence from 1747 to 1750. There can be no doubting its success: coal prices which had stood at 13s. per chaldron in 1747 fell, albeit temporarily, to as low as 5s. when the regulation collapsed.[170] Equally, there can be no

doubting a prime factor in its collapse: a solution to Ridley's financial problems. In 1747 he had married Elizabeth White, daughter and heiress of his friend, Mathew White. In 1750 White died, leaving Ridley his considerable interests in collieries and glasshouses.[171]

The Limitation of the Vend

In view of the difficulty of sustaining a regulation for more than a few years in the first half of the eighteenth century, it is all the more striking to find that when a more formally organized cartel came along in 1771, in the shape of the Limitation of the Vend, it should have survived with all but a few brief interruptions until c.1845.[172] Specifically designed to regulate output and prices of various grades of coal from the seasale collieries in both districts, and functioning also as an employers' association, the Limitation appears to have broken down completely only on three occasions before 1810: in 1780-3, 1795-6 and 1800-2. A full and satisfactory explanation for its rise and persistence is not yet possible but several factors are believed to have contributed.[173]

After many years of sluggish markets and trendless price fluctuations, the decade which preceded the imposition of a new style of regulation in 1771 witnessed a sharp and generally sustained upturn in demand for coal, but just as assuredly prices began to fall on the London market (figure 4.2). These developments must have seemed all the more alarming because they occurred at a time when the level of funding in mining was beginning to show a steep rise as new and improved technologies, capable of greatly extending the depth and field

of coalmining, were being introduced: better methods of waggon and track construction after mid-century were to allow an expanded waggonway network to support seasale mining at an increasing number of distant, inland locations; improvements to the Newcomen engine after c.1760, encouraged and sustained a movement of coalworking into previously unexplored depths, especially those which lay east of the Ouseburn and Team and in the heart of the Wear district.[174] More pointedly, the introduction from 1766 of screening -the use of riddles to dispose of all but the choicest, most saleable pieces of coal- held out the prospect of successful survival for those collieries producing poor quality coals which were most often to be found above Tyne bridge.[175] The 1760s also signalled the start of more troubled times with the labour force. In 1765 a shortage of skilled workers triggered a steep rise in wage rates which the coalowners attempted to counter by the introduction of stricter binding arrangements. A strike by 4,000 pitmen ensued; only to be ended by the intervention of the York militia.[176] For a variety of reasons, then, the coalowners became convinced of the need for united action to safeguard their present and future supplies of capital.

Although no documentary evidence from the agreement of 1771 has yet been found,[177] enough is known of the Limitation's activities to suggest that it operated in a more democratic manner than its predecessors and that this very fact may have been conducive to its survival. At an annual meeting to which all the colliery proprietors were invited, the owner of each colliery was allowed one vote in

determining policy for the following year with regard to the coastal vend of the two rivers (and sometimes, it would seem, the overseas vend as well), the contribution to be made by each colliery, and the prices to be charged for the various grades or classes of coal. Some dissention was both anticipated and tolerated, but provision was made to call off the regulation if widespread agreement could not be achieved on these matters.[178] Attempts were also made at these meetings, though with less apparent conviction or success, to standardize measure, and in later years in particular, to reach agreement on binding fees and other miners' remuneration. The day to day business of the Limitation was carried out by an elected management committee whose main task was to fix monthly quotas based on the annual quotas for each colliery and, under threat of heavy penalties for transgression, ensure these were adhered to. In this way it was determined that 'the market should be fed and not glutted'.[179]

In marked contrast with the Hostmen's Company in the seventeenth century and the regulations of the earlier part of the eighteenth, the Limitation of the Vend did not have the power, nor did it pretend, to restrict the entry of entrepreneurs into the coal trade. The expansion in the size of the workable coalfield which steam engine and waggonway technology had made possible (figures 2.4, 3.9 and 3.10) effectively meant that no single group or individual among the coalowning fraternity could any longer command sufficient territory or capital resources to dominate the regulation as of old. Symptomatic of this trend towards a wider ownership structure on the Tyne was the diminishing influence of the Grand Allies. Though remaining a fairly

important power group within the Limitation to the very end of the period of study, and still periodically succeeding with their old tactics of subterfuge and price-cutting to get rid of inferior coals, the number of working collieries in their individual or joint possession declined from a peak of sixteen in c.1740, to eleven in c.1770, nine in 1784 and just five by 1804 (figure 4.10), while their share of the Tyne vend fell from well over a half in the middle decades of the eighteenth century to a mere 12.5 per cent or so by the opening years of the nineteenth.[180] With one or two exceptions, they had failed, through a lack of funds, foresight or opportunity, to buy up appropriate coal lands and wayleaves in anticipation of the boom east of the Team and Ouseburn (figures 4.8 and 4.10). Geological conditions determined that their dead-rent collieries at Fawdon (N36), East and West Brunton (N37 and N38), Dinnington (N39), Wideopen (N40) and Westslade (N41) could not be exploited for seasale before the mid-nineteenth century, long after the Allies' lease had reverted. Meanwhile, the collieries which they did work, especially those acquired before 1750 in the area between the Team and Derwent, were producing coals that were more frequently of an inferior quality than hitherto and becoming more expensive to work; not only did the relative remoteness of their coal lands involve them in fixed transport costs far in excess of those found in newer collieries but the need to reach deeper seams now involved them in additional charges for drainage.[181] Moreover, lease renewals, even for dead-rent collieries and negative wayleaves, were becoming more expensive and difficult to negotiate. Even the most conservative of lessors, the Bishop of Durham, was

beginning at last to appreciate the full significance of his bargaining position; as Lord Ravensworth, one of the Grand Allies, was to discover when he attempted to renew the lease of the key manor of Whickham:

> The leasee of this Manor [Whickham] refusing the admission of a Clause allowing the Bishop and his [other] Lessees wayleave over it, without which some valuable collieries are shut out from the Rivers Tyne and Wear, Bp Barrington has granted a concurrent Lease of it to the Revd Mr Thomas Burgess prebendary of Durham which lease is dated 26 Oct 1793 and confirmed by the Dean and Chapter.[182]

A wide ownership structure was also to be found on the Wear during the period of the Limitation; though it was rather less marked by the decade 1801-10 than it had been in or about 1771 (figures 4.10 and 4.12). The Lambtons of Lambton (as opposed to the Biddick branch of the family) evidently prospered more than most proprietors, increasing the number of collieries in their possession from one in the early 1770s to six by the opening years of the nineteenth century, and at the same time raising their share of the Wear vend from a little more than eight per cent to as much as twenty-five to thirty per cent.[183] Significantly perhaps, it was during a period when the Limitation had been suspended (1780-3), and when the Sunderland trade was in turmoil over the giving of excess measure, the collapse of continental markets and falling prices in London, that Lambton negotiated the lease of the much-prized Lumley colliery (W8) from the impoverished Earl of Scarborough.[184] As landowning-entrepreneurs and lessees on a grand scale, the Lambtons held an unrivalled position of power among the coalowning fraternity. Yet arguably the most influential figure in the North East coal industry to emerge by the first decade of the

nineteenth century was not a coalowner at all but a colliery viewer, John Buddle. At one time or another he acted as an agent for the Lambton and Vane-Tempest groups of collieries on the Wear, was secretary of the Tyne Management Committee on which he regularly represented Wallsend and Jarrow collieries (N49 and S83) and became spokesman for the North East industry on all parliamentary inquiries.[183]

In spite of its longevity, the Limitation of the Vend was just as susceptible as the alliances and regulations that had gone before, to the internal stresses and strains which inevitably result from an attempt to reconcile private and general interests. A notable feature of the colliery location pattern, and an evident source of tension among the coalowners, was the sharp disparity which existed between the large-scale, high-quality undertakings that were increasingly to be found east of the Ouseburn and Team, in the Wallsend Basin and in the heart of the Wear district, and the smaller-scale enterprises elsewhere on the coalfield that often produced coals of a medium or poor quality. For the Tyne collieries in 1784 and 1810 these disparities can be readily seen (figures 4.13 and 4.14; and see also figures 4.4, 4.5, and 4.7). It is easy to reason why the smaller mines producing poorer quality coals should have favoured a regulation: their very survival probably depended upon the generally higher prices it afforded.[184] But what was to be gained by the first class collieries under such an arrangement?

Because these generally deeper mines were very expensive to win and

work, the Limitation undoubtedly afforded, through price maintenance, a much-needed measure of protection for their funding, and when supported by rising demand, as reflected most noticeably in figure 4.2 for the 1770s and '90s, an encouragement to further investment in new mining projects. At the same time, however, these massive investments could not be adequately repaid and the collieries make a profit without achieving levels of output which might exceed the quantities allowed by the regulation.[187] In practice, when prospects for sales looked good, at least some proprietors were tempted to withdraw from the Limitation, and in so doing, of course, threaten its survival. Thus, in 1780, on the eve of the first major collapse, and after a decade of rising demand and prices, the Tyne collieries within the Limitation vended just 307,650 chaldrons (815,273 tons) while 366,260 chaldrons (970,589 tons) were shipped out: a number of collieries were taking an independent stand and among them was Willington (N50), generally regarded as the best colliery on the river at the time.[188] On the Wear, a rather different approach was being adopted, with the coalowners attempting to circumvent the strict quotas of the regulation by offering excess measure; a strategy which was encouraged by the existence of marked variations in the size of measures used at different collieries.[189] According to Francis Thompson, manager at Washington colliery (W14), 'irregularities' of measure were a major reason why the mine had made 'very small returns' on an investment of nearly £15,000 in 1771.[190]

By the 1790s a generally buoyant market and rising prices were

placing the regulation under even greater strain as the gap widened between what the collieries were capable of vending and what their quotas allowed. This was an almost inevitable outcome of the way in which the Limitation operated, for under its rules the annual quantity that each colliery was allowed to vend was calculated in proportion to its periodically adjusted 'basis' -a theoretical figure which was originally intended to match as perfectly as possible its annual quota but which in practice came to represent the colliery's capacity, other factors such as quality being considered equal. Thus in order to increase its vend a colliery had to increase its capacity. Clearly, expectations ran ahead of what the market could actually sustain: excess capacity appears to have been the major factor leading to the Limitation's collapse in 1795 and probably contributed to that of 1800 too, for by 1799 we find the Committee of the Limitation only allowing the equivalent of 72.5 per cent of the Tyne 'bases' to be vended (483,902 chaldrons compared to the total bases of 666,500).[171] By this later date, however, a further and probably more pressing reason for suspending the Limitation of the Vend had arisen: a parliamentary committee was inquiring into the coal trade in 1800 and the coalowners were anxious to avoid drawing attention to their continuing defiance of the 1711 Anti-Monopoly Act.[172]

Whatever the precise circumstances which led to these brief interludes of open trading, the consequences were always the same: a fall in coal prices in London (as shown in figure 4.2 for 1781-2, 1795, and 1800-01) and an almost spontaneous reaction from the majority of coalowners to correct the markets -though usually without any apparent

short-term success- by reducing their vends; a feature most demonstrably in evidence on the Wear (figure 4.12 and appendix 15).[193] Soon after, the regulation was re-imposed, the coalowners deciding that it was more advantageous to work within rather than outside its relatively secure confines. That the Limitation should have remained so attractive to them, and hence worthy of preservation, evidently owed much to its adaptability. The growth of excess capacity *appeared* to place it under ever greater strain, but at the same time some relaxation of its democratic procedures allowed the proprietors of the 'best collieries' to work towards achieving their own optimum output levels and also set a pace which the rest were obliged to follow. For 1808 we can see how this was done: on the day before the annual policy meeting of all the Tyne owners, nine of them met together and agreed to a reduction in output -a regulation within a regulation![194] So what were these optimum levels for which they bargained; how were they arrived at?

The chief factor which motivated capitalist coalowners, we have assumed, was the expectation of high profit; but just what level of output was needed to achieve this objective was, as already intimated, a matter for careful calculation and considered judgement. Where a rapid return on investment was needed, the prime objective might be to work the colliery to its full capacity thereby achieving maximum aggregate profits. Under such circumstances the vend regulation could prove a hindrance, especially when, as after c.1790, massive excess capacity existed.[195] But an alternative objective might be to maximize

profit per unit of output or as a percentage of receipts, and this could be more readily accommodated within the vend limits imposed by the regulation. Thus we find that at St Anthony colliery (N48), in 1789, a vend of 14,000 chaldrons (37,100 tons) was expected to yield a total profit of £1,456 4s. 2d. while one of 30,000 chaldrons (79,500 tons) would -if allowed, and despite all the extra effort involved- yield only a little better at £1,725 1s. 0d.[196] For two reasons in particular, the pursuit of maximum unit profits rather than maximum aggregate profits may often have been judged the more realistic objective, the optimum solution, and hence a major consideration in keeping the regulation in being. First, it is to be remembered that where coal lands were held on lease, a circumstance encountered more often than not, the treaty covenants relating to extraction and wayleave usually restricted the annual amount of coal that could be raised and carried and might even limit the number of working pits; overworkings, where allowed, incurred penalties which might soon eat into profits.[197] Second, in spite of the trend towards a wider ownership structure in coalmining, proprietors often had interests in several collieries and it was clearly not to their advantage to see some prosper to the detriment of the rest, especially if by a careful assessment of the market a profit could be made on them all -regardless of the particular qualities of coal they happened to be producing at the time- and a greater overall return on investment result.

There may even have been an element of conservation involved. Coalmining is, after all, an extractive and exhaustive industry in which competitive success geared to rapid exploitation was likely to be

short-lived; whereas a more judicious approach involving the careful regulation of output, and the application, in successive stages, of advances in mining technology, could prolong the life of a mine almost indefinitely as the inaccessible reserves of one generation became available for exploitation in the next. It is this factor which might explain more than any other why some collieries -Tanfield (S10) on the Tyne and Lambton (W9) on the Wear, for example- were able to produce large quantities of coal over many decades; why, amid the almost bewildering array of forces provoking colliery pattern change, elements of continuity and stability could still be discerned (figures 2-2-2.4 and appendix 6).

In a capitalist system of coalmining, geared to profit-making for its very survival, an understanding of the attitudes and actions of the leading participants in the industry is of crucial importance. We have shown that it is only by examining, in some detail, the competitive and cooperative strategies of key decision-makers in the North East, especially with regard to their use and control of space, that we can approach a full and satisfactory explanation of the colliery patterns described in chapter 2. The proposition advanced in chapter 3, that the coal royalty, despite its relative neglect in previous studies of this and other coalfields, is a major explanatory variable of pattern change, has been borne out by the evidence adduced above. As we shall wish to show in Part III of this inquiry, an understanding of the relationship between landownership and entrepreneurship is not only central to an explanation of patterns of coalmining; it is also

necessary to a proper appreciation of the enclosure history of the region. Indeed, the two processes, coalmining and enclosure, could be inextricably linked. Enclosure was, however, but part of a wider process of agrarian reform for which, as will be shown in Part II, demographic pressures, emanating chiefly from the expanding colliery districts, were arguably the major catalyst.

PART II

POPULATION

Chapter 5

POPULATION PATTERNS AND THE FACTORS AFFECTING THEM, c.1551-1810

> Most of the people that liveth in these parts, lives by the benefit of coales.
>
> (William Gray, 1649)[1]

The foregoing examination of colliery location patterns in the Tyne and Wear seasale colliery districts has emphasized their essential ephemerality and this must have implications yet to be described in detail for the size and character of the labour force. There is a need to identify similarities and contrasts in demographic trends both within and between seasale coalmining parishes, but this task is most usefully undertaken only when these trends can be viewed within a broader context of change which incorporates the experience of other parishes where coalmining was on a more modest scale, as in landsale districts, or absent altogether. For reasons already explored in chapter 1,[2] it is essentially a comparison between the experience of Northern Durham and the rest of the traditional county that is made in the present inquiry. The value we attach to our findings relates to the quantity and quality of two distinct categories of documentary source: population counts, which list the members of a community alive at a particular point in time; and parish registers of the Anglican, and occasionally the nonconformist, churches which, at their most

complete, provide detailed weekly, monthly and annual records of baptisms (and occasionally births), marriages and burials.

Information sources and the task of pattern reconstruction

In an attempt to reconstruct the general pattern of population growth in the traditional county of Durham, and to provide a setting for more detailed Anglican parish register analysis in Northern Durham, the ecclesiastical census of 1563, the hearth-tax returns of 1674 and the first official census of 1801 have been used (appendix 16). These are the only population counts which are sufficiently complete and reliable to permit worthwhile comparisons between dates near to the beginning and end of the study period and, in the case of 1674, usefully close to 1680 -the end of the first time-period identified for coalmining in Part I.[3] Comparisons are somewhat crudely drawn, nonetheless, since it is only in 1801 that the total population as such is recorded; and in order to work to some common base the numbers of households listed in 1563 and 1674 have been compared to their near equivalents of 1801: the numbers of families (figures 5.1-5.3).[4] An alternative approach, to convert the households of 1563 and 1674 into population totals, has not been adopted. The procedure would have the effect of adding another element of uncertainty to our calculations, for insufficient is known about the extent to which the size of families varied from time to time and from place to place. That it did so is undeniable, and quite probably in a manner which means that the interpretation presented here somewhat understates the rate of increase of population in

urban-industrial centres such as Gateshead, South Shields and Sunderland where, towards the end of the eighteenth century, an enumerator might have found in a single dwelling ten or twelve families with an average membership half as big again as that more commonly found among rural families. Thus a diocesan survey of Durham, taken in 1793, suggested that in Sunderland there were on average 6.6 persons per family, while in the rural community of (Monk) Hesledon there were just 4.1 -a figure which was probably much nearer the mean for the county as a whole.[5]

In figure 5.1 proportional circles are employed to map the numbers of families or households which in 1563 were associated with a particular ecclesiatical parish; or, with an ecclesiastical parish minus its chapelries (or chapelry) where the later can be conveniently regarded as discrete areal units worth plotting separately. For 1674 (figure 5.2) and 1801 (figure 5.3) grouped townships constituting areal equivalents of the 1563 units have been employed for data assembly.[6] While some distortion results from the use of proportional circles which emphasize certain population nodes (they are plotted as near as practicable to the chief settlement of a parish or other unit), this can be offset to some extent by the second technique which is to map the likely density of households per thousand acres.[7]

The three census returns discussed above indicate population patterns at three specific times and reveal the likely *scale* of change between one date and the next; they do not, however, give a measure of the *pace* of such change. This information is supplied only by the

regular recording of demographic events in the Anglican parish registers. Ideally, therefore, analysis of parish registers would be undertaken for the whole county, both as a means to checking, and hopefully corroborating, the trends suggested by the population counts and as a way of revealing something of the dynamics of change both secular and short-term. In practice, the exercise is restricted to those parishes which constitute the main areal focus of this inquiry: Northern Durham.

Unfortunately, the application of family reconstitution procedures -the most thorough-going and sophisticated procedures currently in use for revealing demographic characteristics- provide very partial or unsatisfactory results when applied to the Northern Durham registers. And even aggregation techniques, though less demanding of the sources, too often yield imprecise or ambiguous answers.* In part, this is because these methods are best suited to the study of 'closed', immobile, rural and staunchly Anglican communities: the very antithesis of most of those encountered in Northern Durham. But it is also because the registers, though varying greatly in their reliability, all present some problems of continuity and under-registration, as demonstrated more fully in appendix 16. None provides anything approaching an unbroken sequence from the start of official registration (1538), or of earliest register survival (1559 in the case of Gateshead, 1560 at Lanchester), through to 1810. And in the middle decades of the eighteenth century, when gaps appear less often, and when growth of population in communities such as Sunderland, Penshaw and Tanfield necessitates a break with the mother church for

the purpose of keeping registers, under-registration due to nonconformity becomes a serious problem; though more acutely so for some communities such as Gateshead, Ryton, Jarrow and the Wearmouths, which by 1793 had between thirty and fifty per cent of families recorded as dissenters, than for Houghton-le-Spring, Washington, Whitburn and Boldon with less than ten per cent so categorized[9]

Despite the limitations of the Northern Durham parish registers, it is perhaps too pessimistic to dismiss them, along with those for the rest of the county, as merely 'confused and confusing'.[10] They provide scope for numerous statistical experiments and, for present purposes, some elementary analysis: in particular, they seem suited to identifying trends of natural increase which may be associated with phases of economic development, and can also be used to pinpoint some of the demographic crises which afflicted the communities of an early industrializing region (figures 5.4a-q).[11]

Patterns of population change

When allowance has been made for some few errors and omissions in the census of 1563,[12] a figure of 9,037 households would seem appropriate (perhaps indicating a total population of around 40,000). Thus the overriding feature to emerge is the relative low density of population for the county as a whole, with an average of only fourteen households to every thousand acres (or nine per square mile).[13] But obviously the population was not evenly distributed: figure 5.1 suggests that fairly sizeable concentrations of population were to be found at favoured

localities in a central belt stretching from Gateshead (307 households) southwards to Durham City (846) and Bishop Auckland (409) and then bifurcating south-westward to Staindrop (294) and Barnard Castle (304) and south-eastward to Darlington (366). The lightest scatter of people was to be found, as might be expected, in the Pennine uplands where high inhospitable moorland was broken only by the more welcoming valleys of the Derwent, Wear and Tees in which the majority of the population lived. However, fewer than ten households per thousand acres were also found within parts of south-east Durham, between the central corridor of relative high population density and some fairly populous coastal or estuarine parishes.

By 1674 the number of recorded households in County Durham had risen to 14,461, an increase of sixty per cent in eleven decades; just under 500 per decade on average. There was much variation at a subregional level (figure 5.2, table 5.1 and appendix 17). Overall density was still relatively low with a mean of just over twenty-two households per

Table 5.1: *Population change by households, 1563-1801*

	Households/Families in			Change 1563-1674			Change 1674-1801		
	1563	1674	1801	Number	as % of 1563	as % of 1674	Number	as % of 1674	as % of 1801
NORTH'N DURHAM	2310	5169	20837	2859	124	55	15668	303	75
REST OF COUNTY	6727	9292	14730	2565	38	28	5438	59	37
COUNTY TOTAL	9037	14461	35567	5424	60	38	21106	146	59
England (% change based on Total Population estimates)					70			74	

Sources: Appendix 17; and for data on England, Wrigley and Schofield 1981, 208-9.

thousand acres; though irregular-shaped zones with in excess of twenty-five households per thousand acres were now more extensive, especially in south-central and north-central Durham. The experience of individual parishes (or township groupings) had been very variable. Seven of the thirteen parishes to double their household totals were in the seasale colliery districts of Northern Durham. Yet perhaps some of the greatest contrasts by this date were to be found in south-east Durham, where several of the moderately populated parishes of 1563 recorded a considerable increase (Stockton by 78%, Stranton 55%, Aycliffe 113% and Heighington 91%) while some close by, already thinly populated in 1563, had apparently experienced little growth (Elwick by just 18%) or even a further decrease (Long Newton by 5%, Stainton 20% and Elton 29%). In the Pennine uplands there were, on average, still fewer than ten persons per thousand acres, but while the parishes of Wolsingham and Hunstanworth had shown substantial growth (by 68% and 117% respectively) there had been a decline in Edmundbyers with Muggleswick (by 22%). We should not, of course, take all these figures too literally, especially those for the smaller parishes where fairly minor random errors in the household returns could have a disproportionate impact on our calculations of percentages; but in most cases they do, surely, point to significant differences in the experiences of individual parishes.

In 1801 there were 35,567 families recorded for the county: a rise of about 146 per cent since 1674. Or, looked at another way, on average about 1,620 households were added per decade after 1674

compared with only 500 before. Household densities in excess of twenty-five per thousand acres were found at and around Hartlepool (with a 176% growth in household numbers), Stockton (320%) and Darlington (197%) on the coastal or estuarine south-eastern margins of the county. But the predominant concentrations of population continued, though more sharply differentiated than before, in an irregular band of territory which stretched from south-central Durham to focus as never before on the parishes of Northern Durham. (In fact, such was the recorded increase in household numbers in Northern Durham that in constructing figure 5.3 it proved impossible to use the same scale for proportional circles representing the 1801 totals as was used for those depicting the 1563 and 1674 values). By way of contrast were zones of sparse settlement which, as of old, but to an extent never before encountered, occurred in south-eastern and western Durham. An important distinction between the two had now emerged, however, for while the leadmining dales of the Pennine uplands experienced considerable growth after 1674 (by 190% in the case of Stanhope parish), the scale of settlement shrinkage in some south-eastern parishes had been further accentuated, most notably at Long Newton (with a 33% decrease in households), Redmarshall (-30%), and Stainton (-16%).

Whether one turns to the evidence presented statistically (table 5.1 and appendix 17) or cartographically (figures 5.1-5.3), the growth of population in Northern Durham compared to the rest of the county appears remarkable, if also, in view of the evidence of general

economic development adduced in Part I of this study, in some measure predictable. Of particular interest, however, is the variable experience of individual parishes. In 1674, for instance, the hearth-tax returns suggest that some parishes had more than trebled their population since 1563 (Bishopwearmouth, Chester-le-Street, Heworth, South Shields and Whickham) while others had changed little (Washington and Whitburn) and one even declined (Boldon). Between 1674 and 1801 all parishes recorded increases -this is not to suggest that all communities within them did so, of course- but these ranged from a relatively modest forty-three per cent in the case of Boldon to over seven hundred per cent at both Bishopwearmouth and Monkwearmouth.

Do the parish registers corroborate the evidence of the population counts? In order to compare the magnitude of change suggested by the parish registers with that suggested by the returns of households, a count has been made of all demographic events (baptisms, marriages and burials) for each parish over an eleven-year period which centres, as near as possible, on the anchor dates 1563, 1674 and 1801. The percentage change in the number of demographic events for each eleven-year aggregate is then compared with the change in the number of households. We must not expect a very close correspondence since in one case we are dealing with annual events and in the other with households; in neither case are we dealing with a known total population.[14] However, it is clear from table 5.2 that a reasonable correspondence exists for most parishes between 1563 and 1674, though suspicions are raised regarding the veracity of one or both sources for Gateshead, Whickham and Boldon.[15] For the period 1674-1801, serious

discrepancies between the two sources might have been expected to emerge in view of the likely impact of nonconformity in encouraging under-registration after c.1750, especially of baptisms and marriages. In the event, the results are often surprisingly good and would appear to reflect, as indeed the graphs show (figures 5.4a-q), improvements in registration at the close of the eighteenth century which are known to have been instigated by Bishop Barrington.[16]

Table 5.2: *Population change in Northern Durham, c.1563-c.1801: a comparison of household totals with parish register entries*

Parish	Change c.1563-c.1674 as percentage of c.1563 total, according to		Change c.1674-c.1801 as percentage of c.1674 total, according to	
	Household Data	Register Data	Household Data	Register Data
BISHOPWEARMOUTH ^	220	239	728	542
BOLDON	-30	28	43	8
CHESTER-LE-STREET *	234	213	206	191
GATESHEAD	147	276	177	55
HOUGHTON-LE-SPRING +	66	52	168	168
JARROW & HEWORTH	304	266	341	365
LANCHESTER & ESH	?	55	88	63
RYTON	85	53	160	116
SOUTH SHIELDS	393	?	435	229
WASHINGTON	7	?	353	280
WHICKHAM	312	141	120	33
WHITBURN	26	14	65	75

Notes: ^ For c.1801 calculations, includes Sunderland register data.
* For c.1674 calculations, includes Lamesley register data; for c.1801, includes Lamesley and Tanfield register data.
+ For c.1801 calculations, includes Penshaw register data.
? Inadequate data.
All values are positive except the first entry for Boldon.
Sources: Parish registers, and see appendix 17.

Factors affecting population patterns

The industrializing economy in Northern Durham

The most striking impression conveyed by figures 5.4a-q is of each parish exhibiting its own highly distinctive characteristics: the pace of change varied both within and between individual parishes. Yet for all their evident contrasts, all the graphs display, at one time or another, episodes of high mortality. Indeed, the prominence of these is sufficient to require immediate consideration; especially in view of the emphasis so far given in this chapter to the magnitude of growth in Northern Durham compared to what happened elsewhere in the county.

Although mining accidents could decimate particular communities and occasionally significantly swell the burial totals of the parishes in which they occurred,[17] by far the greatest devastations resulted from epidemic diseases. Even the graphing of events by five-year moving averages cannot always disguise, but only dampen, the pronounced annual surges of crisis mortality (identified in figures 5.4a-q simply as 'high mortality' years).[18] When attributing causes to these crises, the registers usually cite 'plague' prior to 1665 and 'fever' thereafter. Since the second of these terms merely describes symptoms and the first may sometimes be used generically, the true causes or combination of causes of high mortality cannot be readily identified, though the seasonal incidence patterns might provide some clues; victims of bubonic plague and dysentry, for instance, are usually thought to have been struck down in largest numbers in late summer and autumn, while airborne infections like influenza occurred most commonly

in the cold months of winter.[19]

All Northern Durham parishes experienced outbreaks of 'plague' (probably bubonic plague in association with other serious disorders) during 1586-7 and 1596-7 (figures 5.4a-q). From September 1597 to January 1597/8, all but two of the eighteen entries in the Lanchester register were of burials (plate 4); and when other late sixteenth-century plague episodes in the parish are taken into account, it becomes evident that the period witnessed the decimation or virtual extinction of several prominent families, such as the Stringers, Hoppers and Taylors. With one or two localized exceptions, there can have been little growth of population in Northern Durham or elsewhere in the region before about 1600.[20] 'Plague' is frequently mentioned after 1600, and its severity appears to have been greatest in the main urban and industrial parishes such as Gateshead with '252 deaths since the visitation' in 1636 (293 burials in all compared to 131 in 1635), and Whickham with 251 deaths in 1604 (compared to twenty-nine in 1602 and sixty-nine in 1603).[21] Close trade contacts with south-east England and northern Europe made the ports, and industrial settlements closely connected with them, especially vulnerable. Attempts were made to halt the spread of the disease, as in 1579, 1605 and 1665 when, for a time at least, some London and Yarmouth merchants were dissuaded from trading with the North East altogether and mariners of colliers which did arrive were prevented from coming onshore.[22] But such desperate and disruptive measures were of necessity short-lived and of questionable efficacy: in 1665 the burial register for Bishopwearmouth

records the death of 'Jeremy Read of Gillyngham in Kent - Bringer of ye Plage'. Inland mining communities might have suffered too; compared, that is, with agricultural villages in the same parish. Thus the visitation of Houghton-le-Spring parish in 1589 was felt most severely at East Rainton and Hetton le Hole, while the ten deaths from plague in Chester-le-Street parish in August 1637 all occurred at the mining village or hamlet of Lambton.[23] The fear and dread engendered by the very thought of plague led to known or suspected victims being isolated, and some parishes were fortunate in having open moorland to which these people could retreat. In 1645 many of Whickham's victims were listed as 'dead in Lodges upon the Fell'.[24]

There was probably no further recurrence of bubonic plague after 1665 but other diseases, which, we may presume, included smallpox, dysentery, typhus and influenza,[25] continued to take their toll. There were notably high and widespread peaks of mortality in 1710/11, again in the 1720s, to some extent in '30s, and most dramatically in 1740/41, after which their incidence and severity generally diminished. Some interesting contrasts are to be drawn. In the 1720s, for instance, all parishes had one or more crises at some stage and it would appear that a combination of diseases was at work, with perhaps a strong endemic element involved.[26] The 'fevers' of 1741, on the other hand, mostly afflicted the crowded, industrialized and trading parishes. And it would seem that in this case the cause of so many deaths was either typhus or dysentery which may have spread from Europe and gained a foothold in the British Isles between 1739 and 1741. Since Northern Durham relied heavily upon commerce, trade connections with Europe in

the eighteenth century apparently made its communities which were based upon or dependent upon industry particularly vulnerable to these diseases, just as its coastal trade in the seventeeth century had made them vulnerable to plague.[27]

High mortality crises were devastating reminders of the frailty of human existence. But they were also something from which, under a set of favourable economic circumstances, communities in Northern Durham were, in the main, able to recover with some speed. Both marriage rates and associated baptisms could rise appreciably, even in the immediate wake of a mortality crisis, when periods of coalmining colonization or more general industrial expansion and colonization occurred;[28] and this could lead to high rates of natural increase, as measured by the excess of baptisms over burials. The link between the proximate causes of growth, nuptiality and fertility, and the wider economic context in which growth occurred is clearly reflected in figures 5.4a-q.[29]

Most of the population increases recorded for Northern Durham between 1563 and 1674, we have suggested earlier, occurred in the years after 1600 when total coal shipments from the Tyne (coastal plus overseas) rose from c.150,000 tons per annum to 530,000 tons, and those on the Wear from a few thousand to 130,000 tons.[30] But, it will be recalled, there had been a rapid expansion of coal output in the Tyne district even before the seventeenth century (figure 2.5 and appendix 4), which must have necessitated a considerable labour force in the parishes of Whickham, Gateshead and Ryton. Only the registers of

Whickham parish show any clear sign of growth in the face of severe outbreaks of disease and famine at that time: a remarkable rise in baptisms from the 1580s to c.1610 (figure 5.4c). There was a further growth surge to the late 1630s, by which date Whickham Grand Lease colliery (S15) alone was producing around 90,000 tons of usable coal per annum (appendix 5a); thereafter both coal output and population growth slackened. In 1674 Whickham recorded 393 households compared to just ninety-five in 1563. At neither date, however, did it seriously rival Ryton and the quasi-urban centre of Gateshead for size of population (table 5.2). And while the household counts accord them a slower rate of expansion, this is not the impression given by the registers: in both parishes after 1600, sustained growth was convincingly displayed in the record of natural increase gains and nuptiality trends (compare figures 5.4a-c). Even more impressive in the seventeenth century was the steady climb of baptisms in the Jarrow-with-Heworth registers which, until c.1650, included entries for at least some of the demographic events relating to the great shipping haven and salt manufacturing centre of South Shields. Its population trebled between 1563 (115 households) and 1674 (567) while its production of salt for export rose from negligible quantities to around 9,000 tons per annum.[31]

Salt manufacture also became important in the Wear district at an early date. While output was perhaps only one-eighth that of South Shields in 1674, the settlement of Wearmouth Panns on the southern shore of the river accounted for eighty-six of the 662 households

recorded for Bishopwearmouth parish. And although the first major thrust in the growth of coalmining on the Wear did not come till the 1620s or '30s, the rise of Sunderland as a port for coal and salt shipments was being signalled in the baptism and marriage registers for Bishopwearmouth long before this (figure 5.4q). By the close of the sixteenth century and opening decades of the seventeenth, the Chester-le-Street baptisms and marriages were rising quite steeply; and while not all of this growth was necessarily attributable to the expansion of coalmining, of course, there are important indications in the registers of a close relationship: new mining communities were springing up in association with coal pits at Lumley, Lambton, Harraton and Urpeth. In 1606, for example, the register of baptisms records 'Jan 26th Elizabetha fil Alexandii Emund de Harraton Pitts'.[32] The population of the large parish of Houghton-le-Spring, on the other hand, appears to have grown by a more modest amount between 1563 and 1674 with most of the increases occurring after c.1650 when seasale working was probably expanding at Penshaw (W6). Even so, it is possible to trace in the registers of this parish too, the growth of small pit hamlets by the close of the sixteenth century or opening years of the seventeenth: Offerton Pitts and Penshaw Pitts were both mentioned just before 1600, Rainton Pitts soon after.[33]

After 1674, more parishes -and certainly many more communities within them- became heavily involved in seasale coalmining, as first the waggonway and then the Newcomen engine revolutionized the nature and extent of exploitation. At the same time, to a degree that had not been in evidence prior to 1674, industrial employment in Northern

Durham became quite diverse. With the exception of salt manufacture, those industries which had taken advantage of cheap supplies of coal in the seventeenth century (glass, pottery, and shipbuilding) continued, in the main, to expand and flourish. Alongside were newcomers such as iron working and the production of copperas (figure 3.4).[34]

Though the occurence of under-registration undoubtedly distorts the accelerating pace of population growth within Northern Durham as a whole in the closing decades of the eighteenth century (but not markedy so around 1800, we have suggested),[35] it seems likely from a survey conducted at the time of Bishop Chandler's visitation in 1736 that for some few parishes at least, greater growth was experienced in the half century or so which preceded that date than in the one which followed it. For instance, Chester-le-Street recorded 898 households in 1674, 1,875 in 1736 and 2,661 in 1801; Gateshead had 759 in 1674, supposedly 1,800 in 1736, and 2,099 by 1801.[36] While the secular trends of marriages and baptisms were upward in most parishes, the five-year moving averages reveal many oscillations as a direct result, it would seem, of the almost cyclical nature of coalmining. Thus at Washington (figure 5.4f) a first major wave of mining activity and population growth in the late 1710s to early '30s had been checked by the 1740s and '50s. In 1761, however, the registers clearly signalled a further phase of growth as the mining settlement of New York made its first appearance; and in 1782, when there is first mention in the registers of the 'new winning', yet another surge of activity was under way.[37]

As coalmining flourished on Tanfield Moor during the eighteenth

century, new settlements were founded at Tantobie, Whiteley Head, Ewehurst Head and Clow Dean.[38] Their distinctive morphological characteristics, as revealed in the opening years of the nineteenth century, can be seen in figure 5.5. By the second decade of the eighteenth century Tanfield's population was already considered too large and remote to be served by the mother church at Chester-le-Street, or by what the registers reveal to have been a practical alternative, All Saints, Lanchester: from 1719/20 a separate register was kept at Tanfield. In 1749 the church -situated in the old village of Tanfield- had to be partly refashioned and extended to accommodate the ever rising tide of population. The predilection of coalminers and waggonmen for nonconformity in matters of religion -so evidently a feature of the later years of the eighteenth century- had scarcely taken root in the parish at this date. Indeed, Methodism had made anything but a promising start. On his first visit to Tanfield Leigh, in November, 1742, John Wesley was forced to concede that 'so dead, senseless, and unaffected a congregation have I scarse seen; except at Whickham'.[39]

In some of the oldest-established centres of coalmining too, the period after 1674 witnessed intense activity, with mine closures being countered in part by the opening or revival of other colliery enterprises and the taking of new industrial initiatives. The founding of ironworks at Winlaton and Swalwell by Ambrose Crowley in the 1690s, and to a lesser extent the opening of a smelting mill by the London Lead Company at Ryton (and Whitefield) in 1704, was reflected in the

registers of Ryton and Whickham, particularly in the last decade of the seventeenth century and first two decades of the eighteenth. In 1674 there had been only forty-one families recorded for Winlaton; in 1736 Bishop Chandler found three hundred families in 'Winlaton iron factory and Chopwell' alone. And by 1787 Hutchinson was speaking of 'about fifteen hundred inhabitants, chiefly smiths' in Winlaton.[40]

Outstanding increases in population occurred at the mouths of the coal-exporting rivers -at the Wearmouths and at South Shields. The further growth of Sunderland in the early eighteenth century was signalled by a substantial rise in coal shipments (from around 205,000 tons in 1710 to 350,000 tons by 1735),[41] reflected in a sharp rise in marriages and baptisms in the Bishopwearmouth register from about 1703, and acknowledged by the granting of independent parish status in 1719. At that date there were said to be '6000 souls' in Sunderland. By 1801, when the chief labourers in town were coalhevers, keelmen and sailors, 12,412 people were enumerated.[42] At Bishopwearmouth and Monkwearmouth, where a further 12,034 people were recorded at that date, most work (including shipbuilding and ironworking) was again said to be linked to the coal trade, but stress was also placed upon the manufacture of pottery and glass, and much limestone quarrying for shipment to Scotland and Yorkshire.[43]

When allowance is made for the high rate of nonconformity which affected South Shields by the close of the eighteenth century, the Anglican registers seem to suggest an accelerating rate of growth after c.1750 and this is fully supported by other information. In 1770, for

instance, its status as a provisioning centre was acknowledged by the granting of two annual fairs and a weekly market. By 1795 it was clearly a place of some character: 'ill built, ill paved and very dirty', it had 162 public-houses 'but only one church'.[44] The salt industry had almost disappeared -there were just seventeen saltpans remaining in 1810 compared to 130 in c.1740- but its collapse had been more than compensated by the extension of commercial services, shipbuilding and glass manufacture. In 1740 only 800 tons of shipping had belonged to South Shields, by 1809 the figure was 40,343 tons. In 1795, when there were said to be in excess of 500 ships belonging to the port of Newcastle at North and South Shields, only London and Liverpool had more seamen.[45]

What marked Northern Durham off from the rest the county in the two and a half centuries after the mid-sixteenth century was the remarkable growth of its population. Much of this growth, to the extent that it was out of line with what may have been happening in other parts, has been attributed to, or seen as a measure of, coalmining and the occupations to which it directly or indirectly gave rise. Unfortunately, when we seek numerical precision with which to develop and reinforce this undoubtedly valid assertion the necessary detail is not to be found. It is possible, however, to get a reasonable idea of how dominant the coalmining workforce was by the last two decades of the study period (table 5.3). Some few years after the census of 1801 had recorded 20,837 families in Northern Durham, Bailey enumerated just over 7,000 men at the Durham seasale mines with a further 1,257 employed on the Wear; in addition, there were perhaps 1,000 men on the

south bank of the Tyne engaged as keelmen, coal-casters, trimmers and fitters. When allowance is made for a further 3,000 or so miners north of the Tyne, mainly on the north bank but also some on the Northumberland coast, and when account is taken of the many seamen required for the colliers -about 8,000 for the Tyne alone- one begins to appreciate how an estimate of nearly 37,000 men for the whole coal

Table 5.3: *Size of the workforce in the seasale coal industry, 1792 and c.1804*

	1792*			c.1804		
	All Tyne	*Tyne south bank only*	Wear	All Tyne	*Tyne south bank only*	Wear
Underground	4500		3150	5000		?3000
Surface workers	2204		1470	2000		
All colliers	6704	*3000*	4620	7000	*3175*	3836
Keelmen	1547	*700*				750
Keelmen & related^				2000	*1000*	1257
Waggonmen	1100	*500*	700			
Seamen	8000		6000			
Not specified above	4549~		3680			
TOTALS	21900		15000			

Notes: * 'All Tyne' totals at this date may include some small quantities for collieries on the Northumberland coast near Blyth.
^ Includes trimmers, coal casters, and fitters as well as keelmen
~ Includes coal factors & clerks, fitters and runners, trimmers and ballast hewers, and pilots.
As is evident from the above table, some of the figures represent good (rounded) estimates while others are drawn from sources which purport to give accurate totals.

Sources: Mainly, McNab 1793; Baillie, 1801, 484; NEIM Watson 5/9/16; Buddle 14/197; NRO 263/minute book 1805-15; Bailey 1810, 12-22.

trade of the North East in 1792 must have been arrived at.[46] In 1637/8, when the population of Northern Durham numbered between 2,310 households (the 1563 total) and 5,169 (the 1674 total), the number of workers in the industry in the Tyne valley alone -but including the north bank, of course- was said to be 5,800 of whom about 3,000 worked in the pits.[47] Even allowing for the inclusion of many seasonal migrants in this figure,[48] it must surely point to a heavy involvement of Northern Durham's population in coalmining and allied industries.

The developing economy in the rest of County Durham

Without recourse to a systematic and detailed examination of the registers for parishes other than those in Northern Durham, study of the *relationship* between the proximate causes of population growth and the wider economic and social context in which growth occurred must, except where other direct and specific information survives, proceed with a greater degree of inferential reasoning. Especially difficult to gauge is the way in which the *pace* of change may have been affected. There are often strong pointers to what was happening, nevertheless.

Industrialization was not restricted to Northern Durham. Coal was mined on a quite considerable scale in the landsale districts of south-west Durham from the late sixteenth century (figure 2.2) and this may account, in part, for the rise in household totals at Brancepeth and Witton-le-Wear between 1563 and 1674; and at Bishop Auckland, Saint Helen Auckland, Hamsterley and Cockfield both before and after 1674 (see figures 5.1 and 5.2, including inset maps). At Stanhope in

Weardale, a boom in leadmining must largely explain the doubling of population between 1674 and 1801: over the course of the eighteenth century the amount of lead produced rose more than sixfold.[49] The manufacture of textiles, though never to be a great regional industry, assumed importance in the economy and, we may assume, the demography of several major towns by the eighteenth century. In 1795/6 Durham City's parishioners were said to be 'chiefly employed in the woollen manufactures; viz. in making moreens, stuffs, and carpeting'.[50] Barnard Castle's heyday for the production of worsted goods came before 1760, Darlington's was apparently of longer duration, thanks mainly to the sustained activities of prominent Quaker families.[51] In the 1720s Defoe at first saw 'nothing remarkable but dirt' in Darlington; later he declared it 'eminent for good bleaching of linens'.[52] In c.1810 linen manufacturing employed 'about 500 looms' in the town while the woollen manufactory employed '300 looms, 100 combers, and 5000 spinners by hand'.[53] The extraordinary growth of Castle Eden (figure 5.3) is largely accounted for by the establishment in 1792 of a factory for the production of 'corduroys and other cotton goods' in which about '200 boys and girls were employed in spinning, besides a number of men in weaving, cutting, &c'. By 1810 it had become a sail cloth manufactory.[54]

While the growth of Castle Eden village can be attributed almost entirely to the arrival of textile manufacturing, this was not true of the aforementioned towns. Along with several others they served a more fundamental role as market centres. Durham, Darlington, Bishop Auckland and Barnard Castle were strategically placed along the main

north-south axis of national travel and inland trade and, perhaps more important, along east-west routes for the exchange of goods between the pastoral farming and leadmining uplands in the west and the mixed arable lowlands to the south-east.[55] Their prime function in serving the traditional agrarian economy was already shown by their sizeable populations in 1563 (figure 5.1). And over the next two and half centuries these market centres were to assume yet greater importance as the agrarian economy underwent far-reaching technical and, what can be more clearly identified, structural reform. The latter principally involved the enclosure of much traditional ploughland in the Durham lowlands in the seventeenth century (figure 5.2) and the enclosure of upland wastes and fells after c.1750 (figure 5.3).

As we shall seek to demonstrate more fully in the following chapter, most Durham parishes were affected by enclosure at some stage between 1551 and 1810, but it is away from Northern Durham and capitalist coalmining's increasingly complex mix of social and economic conditions that we should now look most closely for evidence of enclosure as an independent determinant of demographic change. Circumstantially, there appears to be no simple or consistent relationship between enclosure and the population record of parishes as presented in figures 5.1-5.3. This may be because the necessary aggregation of data for mapping purposes merely succeeds in hiding the essential details of change which relate to just one of several communities within a parish or group of townships. Equally, it is clear that enclosures, and the changes they set in motion, could be extremely variable in their impact

on population in both the short-run and over the longer-term.

In those parishes which experienced enclosure of townfield ploughland in the second half of the sixteenth century or during the seventeenth, a size-selective process seems to have operated whereby many of moderate population size in 1563 experienced some growth whilst those already relatively small (for example, Stainton and Elton) continued to shrink. However, for some small villages and hamlets, notably those in south-east Durham where the normal economic and social constraints sufficient to maintain a community in existence were often weak or absent, enclosures and engrossments -well under way by 1563 and almost having run their course by 1600- undoubtedly had quite drastic demographic consequences. After about 1600 or 1620, the fortunes of individual families of yeomen, copyholders and cottagers continued to be affected by enclosure, but with few exceptions this did not lead to full-scale village desertion. Rather, one can discern, in some communities at least, a more gradual process of population decline in the wake of enclosure, typified by schemes of agrarian reorganization and involving the consolidation of landholdings and the partial dispersion of farmsteads away from village nucleations. This occurred, for instance, at Long Newton with the number of households falling from eighty-three in 1563 to seventy-nine in 1674 and to just fifty-three by 1801.[54]

Where enclosure involved the colonization and bringing into cultivation of new land from the waste it could encourage population growth. This may have happened to a limited extent in lowland

townships where considerable areas of pasture and waste were enclosed, either as part of a general townfield enclosure (as at Heighington in 1634-7) or separately (as at Aycliffe between 1654 and 1686).[37] But it was most strikingly seen in the case of post-1750 upland enclosures; and nowhere more so than with the enclosure of Lanchester Fell in Northern Durham in 1773-81 (figure 5.4g).[38] Even piecemeal enclosures of pasture and waste, if extensive enough, could foster population growth. Thus in Weardale, where many families were engaged in both farming and leadmining, much land on the valley sides was reclaimed informally over the course of the eighteenth century as part of the process of creating smallholdings or 'onsteads'.[39] It was the existence of this dual economy rather than leadmining alone which supported Stanhope's doubling of population between 1674 and 1801. In only one upland parish to experience waste enclosure by 1801 was there a fall in population. This was at Brancepeth where the decline is probably accounted for by the start of depopulation at Stockley, a village which totally disappeared in the early nineteenth century under the direction of powerful lordly influence.[40]

Seasale coalmining was, then, far from being the sole factor affecting the course of population change in County Durham between 1551 and 1810; indeed, in some parishes of significant growth remote from the coalfield it could have no direct influence at all. Northern Durham did experience, in almost spectacular fashion, a greater overall growth of population than the rest of the county, however; and it is clearly of some importance to know just how this was achieved. The apparent

ability of its population to recover quickly from episodes of high mortality has already led us to intimate that, in accordance with what has recently been argued for national trends,[41] a primary role must be assigned to rising fertility rather than declining mortality. But to what extent might population growth have been due to a steady influx of migrants in search of employment, who settled and soon contributed to the marriage and baptism totals, rather than the greater fecundity and fertility of a relatively immobile indigenous group? We can go at least some way towards answering this important question.

Mobility, migration and employment opportunities

One gains the impression of a remarkable amount of mobility on the coalfield. Seldom can it have been more in evidence or more carefully recorded than in 1805 when labour was in short supply at the mines and colliery operators were outbidding one another for skilled workmen. Some thirty per cent or so of the 3,430 hewers in the Tyne and Wear districts changed their place of work at the annual binding in that year; and since housing was often tied to individual collieries we must also assume that most of them were also changing homes. Moreover, there is no reason to believe that those who made up a further seventy to seventy-five per cent of the workforce at the mines were any less mobile than the hewers.[42] Unfortunately, information for what might have been a more 'normal' year than 1805 does not survive with which to make direct comparisons, but one gains the impression, from parish registers and other sources, that in most years after c.1750 inter-colliery mobility would involve well over ten per cent of the

labour force and that in earlier times too, the annual turnover, though even more difficult to estimate, must have been considerable.[43]

Regardless of any wage differentials which may have operated (as in 1805), the need of owners to attract new employees, or transfer existing ones as pits or whole mines became exhausted, made job-induced mobility a routine expectation for most miners and their families.[44] From the age of seven, children could be sent off to live in a strange household -a girl into service, a boy into a mining apprenticeship- while adolescents frequently moved independently of parental direction and lived in lodgings with friends or relatives. This could relieve space in the family's dwelling which, by the second half of the eighteenth century, was often a one-room cottage.[45] Not that pitmen's families were necessarily large at this time, even where accommodation was more spacious. Few appear to have had more than four children, and in the half century or so after c.1750 the average might have been just over two.[46] Thus, such growth of the highly mobile coalfield population as occurred, other than as a direct outcome of migration, must have resulted from high rates of marriage, especially among the young, but without the concomitant high levels of marital fertility which seem to have been common in the middle decades of the nineteenth century.[47]

When new mines opened or existing ones expanded, the demographic impact could be sudden and dramatic. In 1736 Bishop Chandler noted that the rapid recent growth in the population of Washington was due to the fact that 'many of ym [were] Colliers new come in'.[48] Mining

communities were sometimes grafted onto existing rural settlements; on other occasions they gave rise to purpose-built villages or, more usually, hamlets. In Houghton-le-Spring parish a few pit hamlets already existed by 1615, but it was in the eighteenth century that they proliferated most dramatically with place-name entries in the parish registers suggesting the creation of up to ninety new settlements. While some of these pit hamlets were short-lived, others were clearly more durable. The settlement of Colliery Row managed to survive even though at one stage, in 1778, virtually all its inhabitants were uprooted to found a new pit village at Philadelphia. Typically, it would seem that for most long-term colliery settlements there was a small minority of families who, amid the comings and goings, survived two or three generations and helped preserve continuity.[69]

When manpower requirements could not be met in the Tyne and Wear districts, particularly for pitmen with special skills, then labour had to be recruited elsewhere. A shortage of men in 1807 led to the poaching of workers from the landsale mines on the coalfield.[70] A century earlier it was said to be common for pitmen in south Durham, where landsale mines closed in winter, to migrate to the Wear seasale collieries, only to return again in summer when the pits reopened. How the Wear collieries made up the resultant seasonal deficit is not made clear.[71] Other pitmen were probably attracted in small numbers from more distant coalfields,[72] but equally there were times when labour moved in the opposite direction. For instance, Tyne and Wear miners were being tempted away to Cumberland, Shropshire, Staffordshire, Leicestershire and Scotland during the Napoleonic Wars and apparently

went in 'large numbers' to coalmines at Bagillt in Flintshire in the 1740s.[73] A common and long-held view by the mid-nineteenth century was that pitmen were bred, not made.[74] Even if the fertility of mining communities exceeded that of the population at large, however, the rate of expansion in coal output between 1551 and 1810 combined with only modest gains in manpower productivity, must have necessitated extending recruitment to other occupational groups and to non-coalfield parishes.[75] Particular genealogical investigations have revealed the movement of Weardale folk to the coalfield and especially to Bishopwearmouth.[76] At Stanhope in 1796, a depression in the leadmining industry was said to have led to 'several persons' having 'lately gone to work at the coal-mines near Newcastle, Sunderland, &c'.[77] For the less-skilled jobs in coalmining, general labourers could be more readily attracted to the coalfield. Hair's examination of the marriage registers of sample coalfield parishes between 1798 and 1812 found that about twenty per cent of male colliers who married gave as their birthplaces, parishes outside the seasale coalfield, and he assumed, quite reasonably, that they were likely to have been the sons of agricultural labourers.[78]

Even greater reliance upon agrarian communities as suppliers of labour for the mines must have characterised the earliest days of rapid expansion after the mid- to late-sixteenth century when many specialist skills were first being learned. The vast majority of the workforce in coalmining, as in some other occupations,[79] was probably drawn from within the counties of Durham and Northumberland, particularly from

those agrarian communities on the coalfield where familiarity with simple coalworking had been in evidence since medieval times. But some recruits were obviously drawn from more distant localities. In 1640 there were said to be three hundred Scots working in the coal-mines near Newcastle.[80] Even in the Wear district where, because of the comparative lateness of its first major expansion, it was possible to attract skilled workmen from the Tyne parishes of Ryton and Whickham,[81] longer-distance migrants are recorded as coming in, notably from Scotland, Yorkshire and, sometimes, south-east England. Indeed, these regions appear to have contributed a larger proportion of marriage partners in the seventeenth century than in the eighteenth.[82]

Unfortunately, we can seldom say with any assurance how many of the documented in-migrants were destined for work in the coal industry rather than some allied undertaking. The early coal industry on the Tyne was greatly influenced in its technology by methods pioneered in Belgium and Germany yet, interestingly, there is little sign in the registers, or in any other source, of manpower being recruited on the continent.[83] By way of contrast are the frequent references in the Ryton and Whickham registers in the late seventeenth and early eighteenth centuries to the presence of German families whose menfolk were employed as swordmakers at Shotley Bridge and ironworkers at Winlaton and Swallwell.

A particularly strong migration link can be identified for the keelmen. In 1637/8, when 1,800 transport workers were said to be out of work in the Tyne valley, they were described as 'mostly Scottishmen,

and Borderers out of Tindale and Riddisdale'.[84] Many were seasonal migrants, transporting coals in summer and returning to family homes in the poorer, overpopulated, rural parishes of their native Perthshire or Border dales in the winter when shipping on the Tyne and Wear was reduced or halted. From the closing decades of the sixteenth century until well into the eighteenth, these annual migrations persisted. Thus in 1740 a census of Tyneside keelmen revealed that fifty-five per cent were Scottish born while only thirty-nine per cent had been born locally: thirty years later half were still estimated to be of Scottish origin.[85] The continuing existence of a large if indeterminable number of migrant keelmen obviously has serious implications for any attempt to reconstruct their demographic history, for unless they met an untimely death they were not likely to make an appearance in the parish registers. Others among their number *were* recorded, however: by the early decades of the seventeenth century some were already arriving with their families, or taking local brides, to settle and pioneer distinctive industrial colonies along the banks of the Tyne at Dunston and Swalwell in the parish of Whickham. Scottish and border migrants not only made up most of the population of keelmen and formed an important element of the colliery workforce; after 1700 we find surnames such as Atcheson and Elliot even occurring from time to time in the registers of the relatively rural parish of Boldon. And from South Shields, where a quite diverse range of industrial and commercial occupations was to be found in 1795, it was reported that 'the people may be divided into three classes; Durham, Yorkshire, and Scotch men: the last class is very numerous'.[86]

The proximity of the Border with Scotland had a further influence, for County Durham was frequently the scene of military confrontation, and the stationing of troops, sometimes with their families, could have a brief or more lasting effect upon population growth. During the Civil War, the presence of Scottish soldiers at Bishopwearmouth would seem to account in part for a startling surge in both marriages and baptisms in 1642 and '43, and perhaps for the rise in marriages in 1645 (figure 5.5q)![87] Children of disbanded Scottish soldiers also appear among the baptisms of Bishopwearmouth in 1697 and those born to members of the East Yorkshire militia among the baptisms of Washington in 1781. Not all of those who came to settle on the coalfield, or to contribute to its demographic history, therefore, were closely tied to coalmining or the industrial and commercial enterprises it spawned; but the majority were. So why did they come? Was it simply the prospect of a secure, better-paid, job?

Wages and living standards

Wage rate trends in early modern England are notoriously difficult to study in any meaningful way, especially at the regional level.[88] Such information as we possess suggests that after c.1750 the coal industry in North East England usually offered its employees -hewers, in particular- higher real earnings than those available in other occupations; and never more so than during the Napoleonic Wars (1793-1815) when men were being enticed into the army and navy.[89] In 1805, a Northumberland coalowner, Sir John Hussey Delavel, was informed by his agent that miners earned 'double that of most other descriptions

of working men'.[70] In October 1795, workers in the glass industry at South Shields were said to earn from 2s.6d. to 3s.6d. a day, and a (ship's) carpenter more regularly 3s.6d., while those in the 'mines and coal works' at Tanfield in January 1796 had a more modest basic wage of between 2s. and 3s. (the range presumably reflects the different grades of work). But this calculation fails to include the miner's allowances: cheap coal and housing, annual bonuses and binding fees, and the periodic subsidising of food.[71] In 1768 Arthur Young noted that pitmen in North East England were 'prodigiously numerous' and among the best paid workers in the country with earnings of anything from '1s. to 4s. a day and their firing [house coal]'.[72]

The first half of the eighteenth century was probably a less certain time for the pitmen. Even so, earnings of 12d. or 14d. per day, quoted for sinkers and hewers in 1708, must have compared favourably with those in most other local occupations; and there were other times when skilled hewers in particular were in such short supply, as, for instance, at Bucksnook (S42) in 1722, that they could use the threat of strike action to secure payments over and above the sums agreed at the annual binding.[73] Before the eighteenth century the evidence is more speculative and also less convincing regarding the miner's superior economic status over other workers. Nef argued that most of the advances in the wages of the miner between 1550 and 1700 (perhaps a two- to three-fold increase) came in the heady days of rapid expansion between 1575 and 1625 when real wages for the rest of the population were declining, and that the depressions and disruptions which

afflicted the industry in the remaining years of the seventeenth century eroded the pitman's superior bargaining power and perhaps at times put him at a disadvantage compared to other industrial workers.[74]

Earnings in husbandry, though highly variable, were generally lower than in coalmining, but not, one should note, so low as to deprive any but a few of the more rural parishes of County Durham of some population growth between the mid-sixteenth and early nineteenth centuries (figures 5.1-5.3). The strong pastoral bias of agriculture in North East England, especially in the uplands, gave farm servants employment for which they received only a modest annual wage (for a male servant it amounted to around twelve or fifteen guineas in 1796, to about £21 by 1810) but considerable payments in kind in the form of bed and board, and a degree of security by way of the annual hiring.[75] On the other hand, the rural day labourer, who perhaps constituted the most numerous class of farm employee in the lowland areas, especially where grain growing predominated, was more precariously placed; facing work that could be seasonal at best, highly irregular at worst.[76] Average daily earnings of about 1s. 2d. to 1s. 6d. in 1795/6 and 2s. by 1810 were no more than two-thirds the amount paid to the average pitman and scarcely half that of the hewer. This was probably adequate remuneration for those who resorted to labouring mainly in order to supplement their income from a smallholding (and almost certainly more than could have been earned on a daily basis in most agricultural areas of England at the time), but for the remaining majority, without any other work, it could still mean a hand-to-mouth existence.[77]

The seasonal or part-time nature of agricultural employment in a coalfield parish is well illustrated in a unique set of accounts for Gateshead Park and Shipcote estates in 1730, where it is shown, *inter alia*, that three times as much work was done in the peak month of August as in the winter months (figure 5.6). Unfortunately, we have no information about the desire or ability of any of the redundant labourers to find alternative work during the off-peak periods. In theory, the range of employment opportunities on the coalfield should have provided them with more immediate chances of a job than might have been found elsewhere (except perhaps in the western dales where family economies relied upon the dual occupations of farming and leadmining).[98] Men, in particular, could often get supplementary work in the seasale coal industry;[99] indeed, they did so in such numbers that at times none were to be found to help on the farms so that, as George Culley explained to Arthur Young in 1790, agriculture relied heavily upon girls to do the 'Hoing, haymaking, and reaping, etc.'[100] That women and children were a vital element of the workforce at harvest time had been evident at Gateshead Park and Shipcote in 1730 (figure 5.6).[101] Competition for male workers was to be seen in the wage rates offered to a 'few agricultural labourers' in the heavily-industrialized parish of South Shields in 1795: a daily wage of 2s., which was a quarter more than that normally found on the seasale coalfield at the time and at least one-third more than was usually offered in other parishes.[102]

A notable feature in the economic life of coalfield parishes was the involvement of farmers and their labourers in the carriage of coals. Most farming and colliery leases obliged tenants to provide coal

cartage services; an obligation which was commonly, though not universally welcomed.[103] As early as 1459 we find copyholders at Whickham, W[illia]m Moore and Jo[seph] Erle, carrying sixty-seven chaldrons of coal from mine to shipping staith on fifteen days between April 1st and August 1st.[104] The probate inventories of yeomen sometimes specify coal wains and other equipment used in the industry. For example, in 1670 the possessions of Francis Bucke of Streetgate (in Whickham parish) included '2 cole waines and 5 cole waine horses', while John Gowland of Low Pitt Houses, Houghton-le-Spring, had '5 carts, 2 cole waines and a horse waine with all other implements of husbandrie'. In 1684, the inventory of John Rawling, yeoman of Whickham, included 'Thre Cole Carts' and 'Boreing Rods' (plate 5).[105] Without earnings in the 'land carriage' it is difficult to imagine how Gateshead tenants in the early eighteeth century could have afforded to pay rents of £2 to £3 per acre for land, even if milk sales from their holdings did prove highly profitable.[106] The obligation to provide cartage services formed such an attractive and necessary supplement to agricultural income that for some farmers it became a cherished prerogative. When the Whickham coalowners introduced labourers from neighbouring parishes to perform such services, on the pretext of a labour shortage, the indignant copyholders obliged these 'foreigners' to pay them 'catch' money or risk molestation.[107]

While ample evidence exists of the close links between agriculture and coalmining, it is not clear how widespread or permanently beneficial they might have been. For transporters of coal no less than

tillers of the soil, work could be seasonal: the snows, frosts and gales of winter disrupted the carriage of coal at every stage from the pithead to the London wholesaler.[108] More damaging still were the shortcomings of geology and mining technology which could close a particular mine; or the dislocations caused by warfare, labour disputes, restrictive practices and economic recession which could affect all collieries for a prolonged period.[109] Increasingly, of course, workers in the coal industry were specialists, able to command a good wage when their particular skills were in demand but also highly vulnerable when they were not. The annual bond, found at some mines in the first half of the eighteenth century and becoming widespread thereafter, only temporarily expunged the spectre of chronic insecurity.[110] Moreover, the clannishness among the hewers and keelmen, like the excessive introversion of the 'Crowley crew' amongst the ironworkers, bred an inflexibility of outlook which must have discouraged any movement into alternative occupations such as agriculture.[111] There were, in any case, too many of them to be absorbed into other jobs, particularly during a recession which spilled over into all sectors of the economy.

As the coal era advanced, the social and landscape consequences of industrialization became ever more apparent. Cottage encroachments were made on village greens, as at Ryton and Rainton, and miners' hovels sprang up on the open commons and fells at Gateshead, Whickham, Blackburn, Heworth and Eighton.[112] On Gateshead Fell, where grindstones, famous the world over, had been quarried since the Middle Ages and coal was to be intensively mined in the eighteenth century,

there were eighty-three families of squatters in 1713;[113] by 1809, when the fell was about to be enclosed, there were almost two hundred of them -nearly a thousand people in all. John Bell, one of the enclosure commissioners responsible for their eviction, was moved to write:

> The pulling down of these cottages was one of the most unpleasant acts the Commissioners had to perform, the greater number having to be taken down by force, whilst occupied by their distressed Owners, and the abuse and threatening language the Commissioners received in consequence was considerable.[114]

Industrialization created its own extremes of prosperity and poverty. On a visit to Monkwearmouth in 1796, Eden commented with some poignancy: 'I hope I may add, without being considered paradoxical, that the influx of wealth, which this parish has experienced within the last 40 years, has produced a more than proportionable addition of Poor.'[115] But were the benefits of industrialization really outweighed by the costs? After all, most of the labouring population was probably in work for most of the time and some of the evinced social consequences of industrialization were perhaps more readily attributable to the incautious way in which people had chosen to spend what they earned rather than the inadequacy of their remuneration; a reflection of the lifestyle or standard of living which, almost by custom, they expected to adopt, rather than an expression of the real potential which, when looked at more objectively, their wages.offered. Nowhere was this more in evidence than with the keelmen whose reputation for the rapid dissipation of their considerable earnings on drink and gambling rivalled that of the most disreputable or desolute pitmen, and stood in marked contrast to some other coalmining families

which, by the early years of the nineteenth century, were a model of cleanliness, well-being and thrift.[116] As a group the Weardale leadminers were regarded, at the close of the eighteenth century, as 'generally less profligate than those who work in the coal mines... better cloathed and... mostly better informed'.[117] They were not necessarily better paid. To appreciate the real value of earnings, the living standard they offered rather than the one they might sometimes have supported, it is necessary to relate trends in wages to trends in prices and, more particularly, to the cost of food.

Food supplies and prices

In North East England the strong tradition of pastoral farming appears to have ensured an adequate supply of meat and dairy produce to the region's population. Prodigious quantities were sold in the local markets, notably Newcastle and Durham;[118] and in many years, certainly after c.1640, there was a substantial surplus of butter and cheese as well as hides for shipment to national and sometimes continental customers.[119] But for grains, which constituted the chief element in the diet of the industrial labourer, it was a very different story. With the possible exception of oats, favoured in the upland dales by the leadminers[120] but regarded on the coalfield as more suited to the tastes of waggon horses and pit ponies, cereals were often imported. There are clear indications in the sources of a pattern of dependence that was of long-standing; one indeed which, pre-dated and post-dated the period 1551-1810: regular grain shipments were made from British ports, particularly in East Anglia, and when these proved inadequate,

or perhaps were entirely halted in the face of widespread harvest failures nationally, it was necessary to bring in foreign supplies.[121]

The consequences of a grain shortage for those who employed and so indirectly fed thousands of miners were expressed by William Cotesworth in a pointed reference to the crisis of 1709:

> The prices of working and drawing [coals] are considerably advanced on account of the price of corn which is double the price at least of former years and it cannot be supposed that a man's family can be mentained by less than formerly, the Price being double, he accordingly sets a value upon his Laboure and all this goes out of the Coalowner's Pocket.[122]

The recurrence of such crises during the Napoleonic Wars, when the costs of grain fluctuated erratically, forced colliery operators into subsidising the pitmen's grain purchases to the tune of thousands of pounds. Apparently this was thought preferable to giving way to demands for yet further wage increases which, once accepted, could not be withdrawn easily when corn supplies returned to normal.[123] Usually the coalowners were reluctant to adopt either measure and when the situation was exacerbated by dealers hoarding supplies and thereby raising yet further the price of what was available, ugly scenes could ensue. Engrossers of corn, even more than unsympathetic coalowners, became the targets of protest for striking miners and keelmen, and indeed, for any other aggrieved, poverty-stricken groups. Following the severe winter of 1739/40,[124] grain prices began to rise steeply in May 1740 and by July there were violent scenes in Durham and Stockton, and, worst of all, in Newcastle where an armed mob of three thousand was reported to have assembled.[125] In an address to the Grand Jury at

Durham Quarter Sessions, the Bishop of Durham appears to have had little hesitation in laying most of the blame for the 'rebellious and defiant' behaviour of the 'common people' at the feet of engrossing corn dealers who 'by avaritious and illegal practices grieve and irritate them into unruliness'. Eventually, with the arrival of fresh supplies of rye from the Baltic, the crisis subsided.[126]

There were times in the eighteenth century when food shortages and high prices coincided, or nearly coincided, with episodes of high mortality. For instance, there were high numbers of burials in 1710 and 1711 in most Northern Durham parishes (figures 5.4a-q) in the wake of the shortages of 1709; mortality peaks and harvest failures coincided at several dates in the 1720s, never more so than in 1728; and the many deaths in 1741, though restricted to the more industrialized communities, nevertheless followed the severe winter of 1739/40 and poor harvests in 1740 and 1741.[127] Again, in the 1750s and '60s many deaths recorded as resulting from 'fever' would appear, on the basis of entries in the Washington registers, to have been associated with wet, cold weather, harvest failure and high food prices. The temptation to make causal connections is a powerful one, to see adverse weather conditions and associated local harvest failures as triggering a period of malnutrition in which the population showed an increased susceptibility to infectious diseases -themselves perhaps made more virulent by the unusual weather- and from which imported grains bought at excessive prices could bring only marginal relief. Such a set of circumstances, if capable of depressing population growth for any considerable length of time, would, of course, amount to the

operation of the most severe of Malthusian controls: the positive check cycle of population change.[128] But for Northern Durham, no less than for England as a whole, this probably made its last appearance, and then rather weakly, in the terrible famine of the 1590s.[129] After c.1600 mortality crises still occurred, of course, with food shortages, high prices and diseases sometimes in apparent association, as we have indicated above for the first half of the eighteenth century,[130] but coalfield communities were, in the main, able to recover from such crises with evident speed: periodic high burials merely caused gaps in the expanding labour force which prompted those left behind to bring forward their marriage dates and encouraged those with poor prospects elsewhere to move in.[131] As we noted before, not everyone along the secular pathway of economic growth benefited from stable or rising real wages, or an enhancement of their standard of living, but most workers on the seasale coalfield probably did. Amid the inflationary trends of the century to c.1650, the years of near price stability to c.1750, and the gradual acceleration of inflationary trends thereafter, which culminated in the frantic fluctuations of the Napoleonic Wars (1793-1815), the secular movement of wages was probably able to keep in step with or, for some sectors of the working population, ahead of the long-term movement of prices.[132]

The generally favourable long-term relationship between wages and food prices suggested here may, of course, be thought to result largely from the region's dependence upon grain imports. These were, after all, intended to avert the prospect of starvation by dampening

excessive price rises at times of severe local shortage. More important, they might have had a moderating influence in normal years, keeping prices just tolerable for both consumers and local producers alike. But this cannot be regarded as an adequate explanation. In 1728, when harvests failed all over eastern England, thereby halting the usual inter-regional movement of grain, just over 100,000 quarters of rye had to be brought into the North East from Danzig and the Dutch ports: enough, no doubt, to feed a substantial proportion of the region's population. In more normal times in the second quarter of the eighteenth century, however, the region imported around 20,000 quarters of grains (mainly barley and rye) per annum into Newcastle while at the same time shipping out even larger aggregate amounts (of oats, barley and wheat) from Berwick, Alnmouth, Newcastle, Hartlepool and Stockton.[133] Given general stability of grain prices in the century up to 1750, the inescapable conclusion must be that in normal times local agriculture -if not on the seasale coalfield itself then within the North East region as a whole- was able to respond adequately, perhaps very well, to the increasing demands of a population in which the proportion of those employed in non-agrarian pursuits was growing more rapidly than the rest. By 1810 there was clearly much to admire about Durham agriculture, as John Bailey, one of the best-informed of contemporary observers, was quick to recognize:

> The increased population [since c.1700] ... has been owing to the increased commerce, manufactures, and improved agriculture; and the wages having increased in a greater ratio than the price of provision. This county, it is presumed, is "under peopled," as corn, pork, hams, butter, cheese, &c. are exported, and cattle and sheep driven to the southward, and to

> Wakefield and Skipton markets, for the supply of the manufacturing districts of Yorkshire and Lancashire.[134]

It remains to be seen how this was achieved. In the past, historians have often attempted to explain demographic trends as a reaction to agrarian change;[135] and indeed, we have already noted how in County Durham the enclosure and subsequent cultivation of upland wastes stimulated population expansion.[136] But an equally important question to ask, and perhaps in view of its comparative neglect, a more interesting one, is how far were agricultural trends a reaction to population pressures;[137] pressures which, in the case of County Durham, derived substantially from London's demand for coal? It is this question which is central to our discussion in the next chapter.

PART III

ENCLOSURE

Chapter 6

ENCLOSURE PATTERNS AND THE FACTORS AFFECTING THEM, 1551-1810

> Enclosing....can only be inimical to vagabonds, sheep thieves, and other pests of society.
>
> (John Bailey, 1810)[1]

Figures 6.1-6.4 show temporal and spatial patterns of enclosure activity between 1551 and 1810 (and, for sake of context and completeness, through to 1870). As with patterns of coalmining and population, confidence in our reconstruction must be borne of the conviction that the quantity and quality of surviving sources is such as to permit a reasonably accurate portrayal of what happened in the past rather than a gross distortion. Since enclosure involved not only the physical task of erecting fences, hedges and walls, but was concerned also to transfer into private hands pieces of ploughland, meadow, pasture or waste which had formerly been held in common ownership, it had profound legal significance as evidence of title to property in severalty. For this reason alone, one might expect the process to be comprehensively documented; in practice, what survives from the past (appendix 18) relates closely to the way in which enclosure was brought about, to the method and how it was administered.[2]

Information sources and the task of pattern reconstruction

Most easily identified are enclosures of the period 1741-1810 which, with very few exceptions, proceeded by act of Parliament. They gave rise to a good deal of official documentation, especially in the form of the act itself, giving legal standing to the intended division and providing appointed commissioners with a set of instructions on how it should be implemented; and an award, often accompanied by a plan, setting out the commissioners' specific agreed proposals as to the size, location and tenure of allotments together with arrangements for making and maintaining hedges, ditches, watering places and highways, and for dealing with other miscellaneous matters. Sometimes supplementary information survives in the form of enclosure commissioners' working papers which show how decisions were arrived at.[3] Surveyors and valuers were routinely involved in aiding the commissioners while the assistance of arbitrators was more sparingly restricted to those cases where the claims and counter-claims of the interested parties proved especially troublesome to resolve.[4]

Also well-documented, thanks to the distinct political and constitutional standing formerly enjoyed by the Bishopric,[5] are instances of general enclosure agreements which were confirmed by decree in the Bishop's Court of Chancery: they form a special feature of Durham's enclosure history in the seventeenth century (appendix 18; and see also figure 6.1b in particular). Though seldom giving rise to plans of enclosed ground or to an award with the lengthy provisions typical of a parliamentary award, enclosure by Chancery decree did,

nevertheless, involve the use of umpires and surveyors (or valuers). And as a formal procedural device designed to make enclosure legally-binding on all participants and their successors, it may rightly be seen as the precursor of the parliamentary method. Chancery decree awards relate chiefly to townships or estates in which the Bishop of Durham, and to a lesser extent the Dean and Chapter, had major interests of overlordship. However, in three cases where the legal force of Chancery proceedings was favoured -at Ingleton in 1623, Thorpe Thewles in 1626-7, and Long Newton in 1659-62- communities were sufficiently independent of ties with the Bishop to seek confirmation by decree at Westminster.[6]

Discovering the location and extent of enclosures brought about by other methods is problematical. Although enclosure divisions reached by general agreement, even without later recourse to a Chancery decree, are sometimes well-documented, on other occasions they receive brief mention only or are merely to be inferred from chance references in surviving estate papers whose spatial coverage is, in any case, very patchy.[7] Beyond this, it is clear that enclosures of a less formal kind could occur in association with or as part of a process of depopulation, involving the shrinkage or disappearance of a village or hamlet community, the engrossment (that is, amalgamation) of farm holdings and conversion of former tillage to pasture. By their very nature such enclosures were not intended, certainly as far as their promoters were concerned, to attract widespread attention, and such evidence of their occurrence as comes to light is often in the form of complaint and allegation rather than factual and dispassionate

reporting. Enclosure, depopulation, engrossment and land use conversion were not inevitably linked or always mutually dependent, however. In the case of alleged wrongdoings taken to Durham Quarter Sessions between 1607 and 1615 (appendix 18), there is no sign that the enclosures and land use conversions complained of were directly linked to depopulation or engrossment. Rather, they appear to represent instances of what is normally the most elusive of all procedures to identify: piecemeal enclosure. Although in isolation piecemeal enclosures might have accounted for trivial amounts of land, in sum they could have affected many hundreds of acres. There are sufficient documented examples, especially in townships and territories in which the Church or some major lay lords had an ownership interest, to convince one of the importance of this method of enclosure even though, with the exception of the period 1607-15, it is not yet possible to record and map their incidence in any consistent and meaningful way.[a] Only where piecemeal enclosures were later embraced within the provisions of a more formal enclosure by general agreement, Chancery decree or parliamentary act are they represented in figures 6.1-6.4 and appendix 18.

In any particular instance, the timing of enclosure *de facto* could clearly be at variance with enclosure *de jure*; and neither process was certain to be completed quickly. With parliamentary enclosures, several years, perhaps a decade or more, could elapse between the petitioning for the act and the signing of the award; or between the first attempts to erect new hedges, fences and walls and the completion

of the task within the time-limit laid down by the commissioners.[9] Chancery decree awards were often made to confirm, and perhaps territorially extend, general agreements entered into many years earlier when the efficacy of enclosure was being tried and tested before giving way to a legally-binding commitment.[10] All of this means, of course, that any attempt to explain the reasons for enclosure must take account of changing economic and social circumstances which, as enclosure proceeded from start to finish, could dampen or heighten enthusiasm. In determining the chronology of enclosure for mapping and tabulation purposes, the date of the award has been used in the case of a parliamentary or Chancery decree enclosure while in other instances the date chosen is that at which a substantial and permanent enclosure is believed to have taken place. A further point of qualification is also needed. It is possible that figures recorded in enclosure documents other than parliamentary acts and awards may refer in some instances to a *bishop's acre* of 7,840 square yards rather than to the statute measure of 4,840 square yards which, in the absence of any firm and contrary evidence, has been assumed throughout this study.[11]

With these considerations in mind it would seem safe to suggest that the true picture of enclosure in County Durham after 1550, were it capable of exact measurement, would tend to flatten those accentuated peaks in the periods 1630-80 and 1750-1820 (figure 6.4) as well as inflate the overall totals. It would be unlikely, however, to alter substantially the main arguments proffered below regarding the distribution and timing of enclosure activity or the processes shaping it.

The setting

For purposes of classification and ease of identification, each documented enclosure has been allocated to the parish in which all or most of the land concerned was to be found. It has also been assigned to a particular physiographic unit (figures 6.1a - 6.3b; but see especially, appendix 18, including figures A18.1 and A18.2). In order to make better sense of the descriptions of enclosure patterns which follow, it is useful at this stage to provide some detail of these physical conditions; and of the agrarian structures which they supported by the mid-sixteenth century.

Five physiographic units are distinguished, chiefly on the basis of relief and soils (figures 6.5 and 6.6) The *Tees Lowlands* may be regarded as the most productive area of the county: in 1810 Bailey acknowledged the potential of these 'fertile clayey loams' for either good crops of wheat, beans, and clover or for 'rich grazing pasture'.[12] On the gently undulating *East Durham Plateau*, at 250-400 feet, and its projection as the *South-west Limestone Ridge*, soil conditions vary markedly from dry loams on the Magnesian Limestone surfaces to 'unfertile clays' on the glacial deposits. Again, in the *Tyne and Wear Lowlands* of north central Durham a wide range of soil types is found but there is an increased tendency to gleying as one moves westward into the *Pennine Spurs* where relief amplitudes are of the order of 600 feet and the soils were traditionally described as 'water-shaken'.[13] In the *High Pennines* altitude rather than parent

material becomes a more fundamental consideration in soil formation, with peat cover on slopes at heights between 1,000 and 2,200 feet. Over most of County Durham, other than in the *High Pennines* and *Tees Lowlands* and a few well-favoured localities elsewhere, modern pedologists would identify brown forest earths with gleying, or simply gley soils, developed upon a surface strewn with boulder clay deposits.[14]

This generally unkind prospect for agriculture, especially arable farming, must explain in part the relative sparseness of population over much of the county in the mid-sixteenth century (figure 5.1). However, it would be wrong to think that the land everywhere was but little used. In the *Tees Lowlands*, the *Tyne and Wear Lowlands*, and on the *East Durham Plateau* and *South-west Limestone Ridge*, were nucleated villages with their open fields worked under communal rules of husbandry. Three open or common fields appear to have existed quite widely in medieval times when the system probably reached its full flowering, and even after 1550, when the old arrangements were rapidly disintegrating in the face of enclosure and other agrarian reforms, three is the number most usually encountered (figure 6.7).[15] Bundles of strips formed into furlongs were the basic cropping units for a three-course rotation, locally referred to as 'two crop and fallow'.[16] Crops of oats, barley or bigg,[17] rye, and some wheat were raised, as well as peas and beans for fodder. The whole of the cultivated area of a community, including intermingled pieces of meadow and pasture, was frequently referred to as the 'arable townfields' and measured or

assessed in ancient units such as oxgangs or husbandlands. Close by the arable townfields were the town meadows, pastures, and commons; and together these elements completed the area which was regarded as being *within* the township. Beyond lay the common wastes, 'outgrounds' or 'outfells' which were, in a strict sense, *without* the township.[18] These were available for the inter-commoning of livestock belonging to neighbouring groups of townships and they also represented a reserve of territory for fresh colonization. Some lowland townships had almost exhausted their reserves of waste by the sixteenth century and were soon resorting to the gaiting and stinting of their pastures,[19] but in the Pennine townships the wastes, fells and forests still dominated the landscape. The rural population of the upland dales was to be found in clustered hamlets or occupying lone farmsteads; relatively small amounts of arable townfield were cultivated but the moorland slopes and valleys provided much fine grassland. Although the lead industry was already important in the *High Pennines* and the coal industry was awakening from its medieval slumbers, especially along the south bank of the Tyne, miners in both areas were closely integrated into the farming communities.[20]

It seems likely that a considerable amount of enclosure occurred prior to 1551 in both upland and lowland townships, for the fate of only 43.75 per cent of the county can be accounted for thereafter, even when allowance is made for the fifteen per cent that was never enclosed at all.[21] Possibly it was prompted by the exploitation of former lowland commons and wastes for grain production in the high middle ages when pressures of population on resources were much greater than in the

mid-sixteenth century. Equally, enclosures might have been associated with periodic schemes of more intensive grazing in both lowland and upland.[22]

Enclosure patterns

Between 1551 and 1680, a period when the population of County Durham rose by upward of sixty per cent, that in Northern Durham by around 124 per cent, and the annual output of vendible coal from the Tyne and Wear districts rose from tens of thousands of tons per annum to nearly three-quarters of a million,[23] 40,549 acres of land are known to have been enclosed in fifty-three separate locations (exclusive of those where the changes were contested at Durham Quarter Sessions). And if our estimates are correct for those fifty-nine cases where figures are not specifically documented, the total acreage must be in the order of 62,610 (table 6.1); in all, nearly ten per cent of the total area of the traditional county. Up to 1620 (figure 6.1a), thirty-eight cases of enclosure can be identified; many more are suspected, especially of a piecemeal kind for which, as already indicated, the documented instances of enclosure and land use conversion taken to Durham Quarter Sessions between 1607 and 1615 may be symptomatic. Enclosures specifically associated with depopulation were a feature of the *East Durham Plateau* and more particularly, the *Tees Lowlands*; indeed, there may have been more of these than can be individually identified at present: in 1593 a survey of all castles and manor houses in Durham reported no fewer than sixty seats to have decayed and fourteen to have

Table 6.1: *Number of enclosures and amount of land affected, 1551-1810*

	Method^	North'n Durham No.	North'n Durham acres	Rest of Durham No.	Rest of Durham acres	All County Durham No.	All County Durham acres	Cumulative totals No.	Cumulative totals acres	Cumulative totals % of county
1551	Dep(e)	1	180	14	4200	15	4380			
-1620	A(e)	5	1230	11	3318	16	4548			
	A(k)	1	380	6	5692	7	6072			
		7	1790	31	13210	38	15000			
1621	A(e)	4	3225	19	7428	23	10653			
-80	A(k)	6	2845	8	3994	14	6839			
	CD(e)	1	680	4	1800	5	2480			
	CD(k)	8	7586	24	20052	32	27638			
		19	14336	55	33274	74	47610	*112*	*62610*	*9.64*
1681	A(e)	2	450	3	950	5	1400			
-1740	A(k)	10	3430	2	1642	12	5072			
	CD	1	216	5	4279	6	4495			
		13	4096	10	6871	23	10967	*135*	*73577*	*11.33*
1741	A(k)	3	497	4	3102	7	3599			
-90	CD			1	170	1	170			
	P	5	20275	16	34203*	21	54478			
		8	20772	21	37475	29	58247	*164*	*131824*	*20.30*
1791	A(k)	2	291	2	406	4	697			
-1810~	P	4	4881	3	7474	7	12355			
		6	5172	5	7880	11	13052	*175*	*144876*	*22.30*
1810-70		*8*	*4685*	*10*	*37298*	*18*	*41825*	*193*	*186701*	*28.75*

Notes: ^ Dep Depopulating enclosure.
A Agreement.
CD Chancery Decree.
P Parliamentary Act.
~ Only includes enclosures for which both act and award obtained by 1810.
* Include 1,500 acres at Eggleston for which no award as such made or surviving.
(e) Acreage estimated.
(k) Acreage known.

The list excludes cases taken to Durham Quarter Sessions 1607-15.

Sources: See appendix 18.

become uninhabited since 1522.[24] Only nineteen of the enclosures up to 1620 appear to have proceeded by general agreement of the township community and in just four of these cases -Carlton (c.1606), Elton (1609), Escomb (c.1615), and Tunstall (c.1591)- do the acreages involved appear to be recorded with any precision (appendix 18).

During the period 1621-80, nearly 48,000 acres were enclosed in seventy-four separate locations of which nineteen were in Northern Durham (table 6.1). Figure 6.1b shows a concentration of enclosures in the *Tees Lowlands*, on the *East Durham Plateau* and *South-west Limestone Ridge*, in the southern portion of the *Tyne and Wear Lowlands* and in the coalmining parishes of Northern Durham; that is, along the middle Tyne valley at Ryton, Winlaton and Whickham, and in the lower Wear at Herrington, Newbottle, Lumley, Chester-le-Street and East and West Rainton. Most of these enclosures sought to extinguish communal practices and create, with the aid of new hedges and fences, consolidated landholdings where there had formerly been ploughlands divided into strips and traditionally in permanent cultivation. But some common or regulated pasture (variously identified as common, waste, fell, moor, pasture or meadow) was often recorded as well; and in twenty-six cases it was the predominant or sole type of land involved: the largest single example being of 1,180 acres of 'moor' at Ryton Woodside in 1638. Virtually all of the enclosures in the period 1621-80 were accomplished by general agreement among the interested parties,[25] and in thirty-seven instances they were confirmed by Chancery decree -all but three in the Bishop's Court in Durham.

The reason for seeking a Chancery decree varied. In some instances the Chancery proceedings merely involved a collusive act, but in other cases the decree effectively legalized a division which was really threatened by a *volte-face* on the part of some participant in, or successor to, the original agreement. It was not unusual for enclosure agreements to be entered into and subsequently broken, as occurred at Ryton Woodside when prior to the decree award of 1638 the walls and fences were 'riotously throwne downe';[26] or they might even be declared null and void by the Bishop of Durham, as happened with a Darlington division of 1587.[27] Such a fate might have overtaken lands enclosed at Murton in 1585 and at Bishop Auckland in 1651 had not Chancery decrees been secured in 1640 and 1671 respectively; though in the case of Murton at least, the sources indicate (appendix 18) that the opportunity to enclose land additional to that originally involved provided an extra incentive.

For the period 1681-1740, only twenty-three general enclosure agreements are recorded -twelve affecting mainly townfields, eleven entirely or mainly affecting pastures and wastes- and just six were confirmed by Chancery decree (figure 6.2 and table 6.1). However, this sharp decline in general enclosures of a legal or quasi-legal nature was probably matched, certainly for numbers if not acreage, by cases of piecemeal enclosure which, were they all capable of measurement and precise location, would no doubt require a map with a veritable rash of small symbols. Estate records suggest that this was a particularly important period for piecemeal enclosure; a time when, for instance, large numbers of 'improvements', 'grants de novo' and illegal

encroachments were being carved from the wastes on the estates of the Bishop, especially in west Durham; and when small dairy farms were being created from the remnants of manorial demesnes and townfields in coalfield parishes of Northern Durham.[28] At Ravensworth, piecemeal enclosures had made significant inroads into the townfields by 1712 (figure 6.8) but thereafter little change occurred until the remaining 'flatts' and field units were enclosed (in 1818) under the provisions of the Blackburn Fell enclosure act of 1801.

Although piecemeal enclosures continued to be made in the remaining years of the eighteenth century, the number which failed to be included under the provisions of some later, more formal, agreement is probably fairly small. Only one enclosure made between 1741 and 1810 proceeded by Chancery decree award, and just twelve by general agreement. All the rest were accomplished by private acts of Parliament (figures 6.3a and 6.3b). Of the twenty-seven enclosures (involving 65,333 acres) for which both an act had been obtained and an award made by 1810, twenty-one (accounting for 63,357 acres) were concerned entirely, or almost entirely, with common, moor, fell or waste. In sharp contrast to the earlier enclosures, they occurred in the west and north-west of the county. Interestingly, those undertaken in the period 1741-90 were concentrated very much on or about the *Pennine Spurs* while those of the period 1791-1810 affected the physical extremes of both upland and lowland commons and wastes. For reasons which we shall wish to explore more fully in chapter 7, Northern Durham was affected by these late enclosures to an extent not met with in other parts of the county that

lay east of the *High Pennines*. The greatest amount of territory awarded in a single enclosure was the 17,356 acres of Lanchester Fell, and as was the practice with the larger and more remote enclosures, a distinction was made in the award between the 'more improveable' and 'less improveable' land. Sometimes land once thought capable of improvement was later adjudged too marginal. Thus at Wolsingham only a part of the land allocated in the award was actually enclosed (figure 6.3a) and in the case of Weardale Park and Forest only sixty per cent of the 25,000 acres mentioned in the act of 1799 was actually allotted in the award of 1815 (figure 6.3b).[29] Perhaps the amount might have been even less but for the claims of land-hungry lead miners in the Pennine valleys. At four places in the period 1741-90 (Plawswoth, Wolsingham, Bolam and Barnard Castle), two between 1791 and 1810 (Ryton and Crawcrook) and two after 1810 (Gateshead and Cornsay), the enclosure seems to have consisted entirely, or mainly, of townfields which had escaped the earlier wave of reform. At Crawcrook, where a traditional three-field system and associated three-course rotation survived into the 1790s,[30] the far-ranging nature of the structural changes brought about by enclosure can be readily grasped by comparing the fragmented landholdings of the Reverend Robert Croft in 1794 (figure 6.9a) with the consolidated units set out to him in 1795 (figure 6.9b) and awarded in 1800.

Factors affecting enclosure patterns

Why was enclosure undertaken? What motive or mixture of motives prompted its instigation? How fully did its consequences live up to,

or even exceed, the expectations of its proponents? Just what were the forces for change and were they all pointing in the same direction? In our current state of knowledge and within the confines of this study, it is not possible to afford these important questions all the attention they deserve, but it is possible to provide a useful framework of answers.

Towards agrarian capitalism: initiatives and constraints

In chapter 4 we noted how, from the mid-sixteenth century to the opening years of the nineteenth, a complex system of personal and business relationships developed between landowners, mining adventurers, merchants and the professional classes.[31] It was a system continually undergoing reinforcement and change through marriage alliances, financial partnerships, property purchases, exchanges and mortgage arrangements. It was also a system susceptible to more drastic restructuring at times of serious political upheaval. If, as Trevor-Roper has argued, the Reformation created the ideal conditions for the advent of capitalism in North East England, then the Rising of the North (1569), the Civil War and Commonwealth (1640-60) and the Jacobite Rebellion (1715) must be regarded as equally significant in furthering its development: industrialists and merchants were given a new chance to exercise their commercial skills as confiscated properties came their way in nearly every Durham parish. While these events radically affected the character and prospects of landownership, they did not, however, completely eliminate the *ancien regime*. Rather, the new breed mingled with the more adaptable elements of the old

order. It was a blend which, in the main, created a progressive outlook so that, when and where the chance arose, a landed proprietor would not only wish to exploit the mineral wealth beneath his property but would also look to the safer, if comparatively meagre, returns of agricultural production on the surface.[32]

The opportunities for acquiring land and adopting commercialized farming were not restricted to the seasale coalfield, nor confined to one level of society. Throughout the county, especially in the eighty years or so after 1550, powerful forces were at work to encourage a new outlook among the tenantry too. As we saw in chapter 5, visitations of the plague in the late sixteenth and early seventeenth centuries could decimate or wipe out whole families, and were often associated with decay of tillage, food shortage and agricultural distress.[33] But for those who had the enterprise and good fortune to weather such storms, the opportunities for amassing substantial landholdings were great indeed and must have done much to cultivate that spirit of individualism which was not only an outcome but also a prerequisite of enclosure. Of course, the interests and objectives of tenants were not necessarily the same as those of the gentry -nor, indeed, of the small independent freeholders whose role in agrarian advancement, though as yet poorly understood, might well have been crucial. Landlords threatened by an alarming number of 'decayed' rents were no doubt pleased to see vacant tenancies taken up by opportunist tenants,[34] because their main interest in this inflationary age was to benefit from the true commercial value of the land which was everywhere advanced by land consolidation and enclosure. For all landlords, but

perhaps most especially for those with large numbers of tenants and little direct personal involvement in farming, the case for rack-renting was overwhelming.[35] The tenants' enthusiasm for enclosure, on the other hand, was mainly conditioned by their expectation of resisting, or at the very least restricting, any such outcome, and this in turn was determined by the nature and security of their tenure.

In some of the smaller townships in lowland Durham, and occasionally in the uplands too, the closing decades of the sixteenth century witnessed the consolidation and enclosure of landholdings by middling and lesser gentry whose tenants, holding properties purely 'at the will of the lord', can have had little enthusiasm for enclosure and certainly no protection against the enhancement of rents following reform.[36] Yet a striking feature of other, usually larger, communities was the way in which the more adventurous among the tenantry took the initiative for improvement. This was almost certainly the case on estates which had been confiscated by the Crown after the Rising of 1569; policies of land acquisition and exchange were vigorously pursued in the period 1570 to 1630.[37] In the lordships of Raby and Barnard Castle in Teesdale and Brancepeth on the *Pennine Spurs* (all were former estates of the dispossessed Nevilles), the distant personal involvement of the Crown in the running of its northern estates facilitated a trend towards engrossing by substantial freeholders and customary tenants, often with the encouragement of disloyal Crown officials. In piecemeal but purposeful manner, parcels of townfield were exchanged and enclosed

and allotments held in severalty carved out of the common wastes. Just how much enclosure took place in this way and at what pace cannot be gauged and so has had to be omitted from our calculations and maps; but it appears to have proceeded with such ease that, with few exceptions, Crown territories did not require formal enclosure agreements in the middle decades of the seventeeth century.[38] For some of the tenants who had so forcefully promoted reform, however, the expected benefits of enclosure were to prove illusory. Shortly after the Rising of 1569, the tenants in the lordship of Brancepeth had been described as 'wealthy and substantial' with their leases, often for a term of twenty-one years, providing them with 'moche land for their rent'.[39] Once the estates passed from the Crown into the hands of Robert Carr, Earl of Somerset, and then into those of the Vanes, rack-rents were progressively introduced. By 1615 the tenants were complaining of harsh treatment by Somerset's officers, and offering to 'do anything to be the Prince's tenants again'.[40]

In localities where the nature of the relationship between landlord and tenant was carefully preserved by manorial custom, neither enclosure nor associated rent rises were so easily achieved. On Church estates, as on some lay manors, tenants could seek protection against rent increases and possible evictions, in the ancient custom of 'tenant right'. Although varying in detail from manor to manor, this provided many tenants with customary titles of inheritance at nominal rents in return for border services in the event of a Scottish invasion. The policy of landlords was directed towards extinguishing such right, especially after the Union of the two Crowns by James I in 1603 made

its status doubtful. Customary estates of inheritance were to be replaced with leasehold tenancies which would command more realistic fines; and where, on ecclesiastical estates, existing leaseholds were for lives -and so rendered very irregular in their yield of income- the objective was to convert them into leaseholds for years.[41]

It is clear that among the tenantry there were progressive and assertive elements who felt able to resist these particular threats while at the same time demonstrating the benefits of enclosure to their overlords and peer group alike. The mounting pressures for change on the Bishop's estates are revealed by a comparison of entries in the Halmote Court books for the early sixteenth century with those a hundred years later: in the 1510s and '20s stress is laid upon an accepted need to protect communal farming through the issuing of orders and injunctions, by the 1610s and '20s emphasis is very much upon imposing fines and penalties in a desperate bid to stifle a growing number of individual initiatives for land improvement.[42] In fact, any acts of enclosure undertaken without the backing of all tenants and the formal approval of the Bishop were liable to be regarded as of a temporary or experimental nature,[43] and significantly, it was only when Bishop Morton became vigorous in his support of enclosure in the 1630s that the first major wave of activity, sanctioned by legally-binding decrees issuing from the Chancery court, and confirmed by the Dean and Chapter, was able to get under way.[44] It was, of course, especially important for a great temporal and spiritual lord such as the Bishop of Durham (and the Dean and Chapter, for that matter) to be seen

conducting affairs in a proper manner; ever since depopulating enclosures had so afflicted the English Midlands in Tudor times, and spilled over rather later and with less severity into lowland Durham, powerful feelings of anger and resentment had been directed at suspect lords.[45] But the use of a formal procedural device in the guise of a Chancery decree also brought other advantages to the lord of the manor: in the short-term it prevented any further *volte-face* on the part of his tenants while securing an acreage payment in acknowlegment of his overlordship;[46] more important in the long-term, it paved the way for the introduction of higher rents.

On balance, the tenants of the Bishop were able to show a greater degree of resistance to rack-renting than could those on other Church properties, their traditional peasant copyholds being more easily defended 'as of inheritance' than the renewable leases commonly found on Dean and Chapter estates.[47] And it was only after c.1700 that ecclesiastical income on estates of both bodies was substantially boosted; and even then not by annual rents, which rose only slowly for most of the eighteenth century, but by leasehold renewal fines (levied every seven years or on the death of a named person). Before the inflationary trends of the Napoleonic Wars, these fines showed a near threefold increase on the Bishop's estates and fourfold on Dean and Chapter lands (table 6.2). The recorded increases look all the more remarkable when it is remembered that they fell far short of reflecting the full value of property at rack because many of the immediate Church tenants -drawn from a queue of deserving Royalists, relatives and friends in the case of the Bishop- received their estates

on highly preferential terms, only to sublet them at a sizeable profit.[48] It would be wrong, of course, to attribute such increases entirely to enclosure and the erosion of traditional tenures, especially when the time-lag between the one event and the other might have been considerable and when other factors such as farm reorganization schemes and new husbandry practices might also have had a bearing; but equally, it would be foolish to deny them an important role: enclosure in particular, whether wholesale or piecemeal, was the fundamental structural change easing the way for so many other changes.

Between the precocious rent increases on former Crown territories like Brancepeth in the early seventeenth century and the somewhat

Table 6.2: *Rent and renewal fine increases on ecclesiastical estates in County Durham, 1662-1791*

Date	Bishop's estates 1	2	3	4	Dean & Chapter estates 1	2	3	4
1662	1961		1500					
1680/1							1829	
1700/1	2106	0.19	1600	0.18	2640		1840	0.04
1730	2177	0.11	1865	0.55			2481	1.81
1751	2217	0.09	2544	1.73	2798	0.12	3269	0.75
1770/1	2588	0.84	3694	2.26	2916	0.22	4782	2.10
1790/1	2876	0.59	4344	0.88	4446	2.62	7284	2.62

Column 1 Annual rent return (£)
3 Recorded or estimated return from leasehold renewal fines (£s)
2 and 4 Percentage average annual rate of increase since previous date
The figures for leasehold renewal fines for 1680-81, 1770-71 and 1790-91 are based upon 5-year means beginning with the stated year, i.e. 1680-81 is based on accounting years 1680-81 to 1684-85.

Sources: DUPD CC/notitia books 54000-3, CC/boxes 130-3, 141-3, 156-61, 218; DUPD (PK) DC/audit and contract books, 1678-1813; DCL Sharp 167/Bishop Cosin's survey, 1662.

delayed movements on Church properties after c.1700, may lie the first significant advances to affect the majority of lay estates. At the Restoration, some proprietors were driven to act quite quickly by debt encumbrances incurred in their attempts to buy back estates that had been sequestered in the Civil War.[49] They were also encouraged and guided by the work of the Committee for Compounding which claimed to have revalued properties so that they might bring 'a greater improvement of rent than they were let at before the war or within any man's remembrance'.[50] Moreover, the exact 'valuations at rack' placed upon all Durham estates and lands 'upon the making of the late Book of Rate'[51] just before the war, alerted other landowners; not only to the gains that had been made in previous decades of improvement, but also to what might still be achieved through further schemes of enclosure and farm reorganization, or simply by a ruthless disregard for the tenants' rights and sensibilities on under-rented acres. After 1660, and with increasing vigour from the 1680s, many landlords in Durham and Northumberland, and probably most of the successful ones, managed to advance their rents at what was probably a time of negligible price or wage inflation up to c.1750.[52] For instance, on the Swinburne's Hamsterley estate in Northern Durham a series of engrossments reduced the number of tenants from eleven in 1668, to four in 1715 and to just two by 1747, while the estate rental rose from £96 in 1655/6 to £121 10s. in 1670 and eventually to £165 by 1750.[53] More dramatic, and directly linked to full-scale enclosure, were events in the parish of Long Newton. From a uniquely detailed record it can be shown that one

of the outcomes of the agreement of 1659, to be confirmed by Chancery decree at Westminster in 1662, was a nine-fold rise in leasehold rents.[54]

John Laurence, writing in 1726, was acutely aware of the association between enclosure and rent increases and seems to have been well justified in his claims that in the Durham lowlands 'nine parts in ten are already enclosed, and consequently improved in value and rents to a degree almost incredible', while in the uplands experiments were showing that by inclosure and the application of lime 'what was not worth above one shilling an acre, is now become twenty'.[55] By 1810, when chargeable rents upon enclosed and unenclosed lands alike were probably more closely attuned to their true worth than had been the case in earlier times of under-renting, Bailey was enthusing that he 'knew a great part of these commons in their native state, and think, that upon an average the lands are at least ten times more valuable by enclosure than they were in a state of common'.[56] For the few remaining townfields enclosed at this date, the financial rewards were less dramatic but substantial, nonethless: a specific calculation for Crawcrook townfield arable anticipated a doubling in the value of tithes after enclosure in 1794-1800.[57]

The immediate or short-term gains from enclosure were, of course, offset by its costs which, though difficult to quantify, must have been quite considerable.[58] According to Bailey, an act of Parliament alone cost £600 or £700 by the opening years of the nineteenth century, and since this was an expected charge regardless of the acreage enclosed,

it was an especial deterrent where only small areas of land were involved.[59] Only in the *long-run* could the financial rewards of enclosure be fully realized, and by then it had often been reinforced by, or become confused with, other structural changes. Thus at Long Newton, for many years after the enclosure proceedings of 1659-62, rentals continued to be boosted as the rural landscape underwent farm reorganization schemes involving both the dispersion of farmsteads away from the village and a reduction in the size of the farming population.[60] Generally, it would seem that it was only in the leadmining dales where the dual economy was prevalent, or in specific localities on the coalfield where by-employment or a large market for particular produce existed, that small tenancies of twenty or thirty acres, and often much less, could persist and succeed to any great extent after enclosure.[61]

For all the evident tensions which attended agrarian restructuring, landlord and tenant were drawn together by a bond of mutual dependence: neither could succeed for long without being sensitive to the wishes of the other. And by the early eighteenth century there had grown up a body of expertise to administer to this very relationship, in the form of the land agent or estate steward.[62] One of his crucial tasks was to advise upon and ensure adequate reinvestment of farm income, particularly with a view to the upkeep of farm buildings: all too readily might landlords be tempted to divert surplus funds into schemes aimed at enhancing their political or social standing; set aside sums for a new colliery adventure; or, where wiser counsels prevailed perhaps, make substantial deposits in banks. In the case of the Bute

and Clavering possessions in the western parts of Northern Durham, for instance, rent surpluses were probably channelled directly into the financing of colliery ventures at Crookbank (S39) and Andrew's House (S58).[43] And for some properties in Northumberland an even more convincing picture of the flow of agricultural capital into mining adventures has been advanced. On the Blackett, Allgood, and Greenwich Hospital estates, farm rents quadrupled between 1700 and 1790, and from c.1756 large deposits were made in the first Tyne Bank. It was from this bank, it will be recalled, that the Grand Allies borrowed, when their own agricultural rents were insufficient to finance the sinking of Killingworth colliery between c.1798 and 1805.[44]

But could structural changes alone, even in the long-term, have achieved all this? Or was enclosure, as intimated above, the promoter of wider agricultural revolutionary changes which brought both significant and sustainable improvements in farming technique? In a situation where the increasing demands of an expanding population and the rise of an active land market encouraged a commercial attitude towards property, decisions about land use became crucial. Higher returns from the land, in the form of produce or rent, could only be achieved and maintained by striking a best possible balance between the pastoral and arable elements of a progressive husbandry.

Enclosure and husbandry practice

When accounting for enclosure proceedings, the majority of seventeenth-century awards and related documents stress the impoverishment or total

exhaustion of the soils caused by years of grain cropping under traditional husbandry practice: the 'two crop and fallow' system.[45] Thus at Sherburn in 1635 the lands were said to be 'waisted and worne with contynuall ploweing and thereby made bare, barron and verie unfruitefull' while at Middle and West Herrington a few years later the townfields were described as so 'worne out' that the farmers scarcely received 'as much as their seed corne agayne'.[46] It would seem that land traditionally down to permanent tillage was in fact to be converted to pasture. The generality of this procedure is suggested by the frequency with which incumbents expressed fears about an actual or expected loss of tithe from grain crops and insisted upon some compensatory arrangement before finally sanctioning enclosure. At Long Newton (1659-62) and Seaton Carew (1689-91) the parson settled for a fixed annuity of £100 in lieu of tithes, while at Norton (1672-4) and Sedgefield (1634-6) it was decided to allot a piece of land to the incumbent rather than preserve too much tillage.[47] At Chester-le-Street (1635-7) it was agreed that a 'good sufficient and competent' portion of land should be retained in tillage (plate 6).

Where these new arrangements created permanent pasture rather than temporary leys, they contravened the tillage acts which were designed to 'protect good husbandry'.[48] Suspected offenders could find themselves before the Quarter Sessions; as occurred between 1607 and 1615 when almost 1,000 acres of tillage in fourteen lowland townships (figure 6.1a and appendix 18) were alleged to have been illegally enclosed or converted to pasture 'for the fatting and grazing of

cattle'.[69] Yet in general a liberal interpretation was placed upon the statutes and in the *Tees Lowlands*, where the practice of converting tillage to pasture was well advanced by the closing decades of the sixteenth century, the more formal enclosure agreements, as at Stainton in 1585, could simply require each farmer to keep 'such reasonable portion of his land in tillage as he can conveniently manage'.[70] In other instances we must assume a total disregard for the statutes, for at least some of the fifty-two shrunken or deserted village sites so far identified for the county can be associated with depopulating enclosures carried out by a gentry preoccupied with the raising of cattle and sheep.[71] A survey of Owton, Coatham Stob, West Layton and Hardwick in 1570 revealed a predominance of pasture and meadow over tillage so overwhelming as to throw serious doubts on agriculture's ability to any longer sustain a village community -unless, perhaps, one practising a Falkland Islands type of mutton economy![72]

The evidence afforded by these early enclosures (figure 6.1a), combined with the detailed listings of crops and livestock contained in contemporary probate inventories, strongly suggests that by the opening years of the seventeenth century there were many estates -some of them perhaps covering the whole of a depopulated township- in which enterprising farmers, acutely aware of market opportunities, were already catering for the needs of an expanding regional economy.[73] While dairy and meat products found their way to expanding industrial communities, extra supplies of hay fed growing numbers of horses and draught cattle that were needed to turn pithead machinery and, above all, pull the coal carts and waggons.[74] Meanwhile, considerable

numbers of hides and some butter were being shipped to more distant markets.[75] And when, after 1620, more formal enclosure agreements came along (figure 6.1b), they gave a further boost to the creation of a pastoral surplus: by the eve of the Civil War a sharp rise had occurred in the quantities of butter shipped from Stockton and, what is perhaps the more remarkable in view of the size of demand in the immediate neighbourhood, butter was now being sent out from Newcastle as well.[76] In the third and fourth decades of the eighteenth century the quality of grassland was being much improved with the widespread introduction of clover, trefoils and rye grass.[77] In Northern Durham, and probably on the north bank of the Tyne too, small dairy farms were to be found supplying liquid milk to customers on the coalfield and butter and cheese to those in London and Holland.[78] In the year ending Christmas 1731, Newcastle shipped out no less than 10,952 firkins of butter.[79] And though the necessary detail is lacking with which to make the point unequivocally, it seems likely that by this time, if not sooner, the surplus products of pastoral farming, sold locally or in more distant markets, were helping to offset the costs of imported wheat and rye for those landowning-entrepreneurs who employed and so indirectly fed hundreds of miners.[80]

After c.1750 the traditional pastoral bias of Durham agriculture was much encouraged by the growth of cattle fairs at regional centres such as Morpeth, Newcastle, Durham, Darlington, Barnard Castle and Yarm, and by a progressive outlook in livestock breeding which produced the famous Durham shorthorn, as well as animals merely to be 'esteemed

curiosities for their enormous size'.[81] The extensive movement of livestock both within and beyond the region was much facilitated from the 1740s by the turnpiking of roads.[82] That dangers were inherent in this new freedom of mobility soon became apparent as outbreaks of cattle distemper swept the region in the late 1740s and all traffic in livestock had to be halted.[83] Recovery was swift, however, and by the 1760s and '70s butchers at Newcastle, Shields and Sunderland were reported to be purchasing 'a great deal of fat stock in the neighbourhood of Darlington, and other parts of the county of Durham'; stock that it had earlier been anticipated would come from Northumberland farmers.[84]

So was the enduring success of pastoralism bought at the expense of the tiller of the soil, as the foregoing discussion might lead one to suspect? Presumably not, if, as we argued in chapter 5, North East agriculture was able to achieve a considerable degree of self-sufficiency in grains and, in some years, a surplus for export.[85] However commercially lucrative the products of meadow and pasture might have been during much of the seventeenth century, it is difficult to accept the view that, away from depopulated townships, there was any large-scale abandonment of tillage. While townfield lands 'worn bare and barron' with continual ploughing were profitably converted to grass, it was possible and worthwhile to cultivate the newly enclosed common wastes or traditional pasture grounds. In many localities they were in a much better condition for the plough than the old tillage lands since they were enriched by animal droppings in the summer months while the traditional ploughlands received little fertilizer save

lime.[86] Significantly, most townships of lowland Durham experienced enclosure of both pasture and ploughland in the seventeenth century. Not that the practice of cultivating the town pasture and laying to grass the ploughland was conditional upon large-scale enclosure as such; there were, for instance, pastures and meadow closes within Long Newton townfields long before the enclosure of 1659-62 while at Shadforth before 1635, and Newbottle before 1671, corn was already grown upon the moors and common pasture.[87] The achievement of enclosure was that it greatly accentuated the move towards a more flexible system of husbandry which experience and cautious experimentation had proved a worthy instrument of agrarian improvement. At Cockerton near Darlington a pasture called Grange Close was enclosed in 1668, but only after the tenants of the Bishop of Durham had divided a part of it in 1662 and had 'turned it into tillage and reaped many valuable crops',[88] while at Murton the whole townfield was brought to an enclosed state in 1640, some fifty years or so after an earlier, partial division had shown the lands to be 'better suited to pasture than tillage'.[89] And at Easington it took at least 40 years of experimentation, in which some enclosures were erected and others pulled down, before a series of satisfactory divisions could be made between 1655 and 1672.[90]

Thus the outcome of enclosure was readily apparent. In the short term much traditional pasture became tillage and much traditional ploughland became pasture in the years before about 1680; and this alone may explain why several enclosure agreements were preoccupied

with transferring 'beastgates' (grazing rights) on the common pasture into a suitable quality and quantity of land in the townfields.'[1] In the long term, enclosure meant that the central feature of the agricultural revolution as defined by Kerridge, and acknowledged by other scholars as of fundamental importance, was now attainable: the replacement of permanent tillage and permanent pasture by permanently cultivated arable in which temporary tillage and temporary grass leys alternated.'[2] In general, climate and soils in County Durham favoured a system of convertible husbandry which incorporated short periods of tillage and long periods of grass leys. In specific instances, however, the effect of enclosure was to ensure that each new close became a rotation unit on the holding to which it belonged, so that in a county where soil conditions could vary enormously over very short distances, the sequence of pasture and tillage crops could, in theory at least, precisely match the capabilities of the land.'[3]

However, a system of convertible husbandry which was rational in terms of physical geography was not to be wholeheartedly adopted. By the late seventeenth century, it is likely that the amount of tillage on the old ploughland had again become greater than could be properly sustained. In part this arose from the insistence of some incumbents that after enclosure they should continue to receive tithes of grain crops in kind from the traditional ploughlands because they were uncertain of their rights to such from the common wastes, 'seeing these are no part of the oxgangs'.'[4] The other vital consideration was, of course, the market. Although meat and dairy products were in greater surplus than grains for most of the seventeenth and eighteenth

centuries, the existence of bounties on the export of corn from 1688 to 1760 may well have been an encouragement to tillage."[75] Above all, a growing industrial population was a constant reminder of the need for local self-sufficiency in grains as well as dairy produce, especially when the price of grain soared to an exceptionally high level as in 1709/10, or experienced a more general rise as after c.1750. Moreover, during the Napoleonic Wars incentive became dire necessity as the price of importing grain continually threatened to inflate labour costs for those mining entrepreneurs whose workers, in a more sustained and successful way than in earlier times, demanded higher wages to support their families."[76] Though a marginal increase in grain production was probably achieved in the enclosed townships of lowland Durham through the introduction of new seed strains, the accelerating pace of population growth in the late eighteenth century was such as to require a more substantial response from within the region. So vast numbers of acres in upland west Durham were enclosed and then rented or leased out at between four and ten times their former value and, wherever possible, put under the plough. Such was the situation revealed by the agricultural writers and estate records of the later years of the eighteenth century and early nineteenth, and by the Crop Returns of 1801."[77] The most ambitious schemes were to be found in the *High Pennines* where, at St John's Chapel in Weardale, barley and oats were being grown at 1,200 feet."[78] And on the more favoured slopes of the *Pennine Spurs* the emphasis was very much on tillage. Even before the high cereal prices of the Napoleonic Wars, the award relating to the enclosure of Eggleston Common between 1785 and 1790 contained a

provision, pointing to the land-use purposes of enclosure, which was to become a quite common feature in documents relating to similar conditions elsewhere: it forbade reversion to sheep pasture on any newly enclosed land for at least seven years 'from the time of making up into tillage'.[99]

While the second half of the eighteenth century brought an undeniable response from agriculture to the dictates of the market, it also manifested clear signs of backwardness too, in both upland townships newly-enclosed and those lowland townships enclosed in the previous century. An examination of over one hundred tenancy agreements, most of them relating to the years after 1750, shows that on farms subject to short-term leases, tenants were prevented from converting areas of existing grassland into tillage on penalty of £5 per acre, while on their remaining land the scheme of husbandry practised with monotonous regularity was a 'two crop and fallow' rotation.[100] Thus it would appear that all enclosure did was to transfer and extend into severally-held closes what had formerly been practised in large, open, common fields. Or might it be that these leasehold arrangements reveal a regressive trend: a primitive state of cropping which resulted from a century-long retreat from an earlier more rational system of convertible husbandry made possible, as we have seen, by the townfield enclosures of the seventeeth century? By striving to meet market demands, had farmers all too readily reverted to traditional ways? In the closing decades of the eighteenth century Durham agriculture was often failing to achieve the ultimate goal of

the new husbandry: a full integration of crop and livestock elements. Because the wet Durham soils discouraged the folding of livestock on arable, there was limited appreciation of soil-preserving methods. Only land within easy reach of growing urban centres received sufficient manure in the form of night soil; and even that had, at times, to be supplemented by quantities 'brought at an easy expense from London, by way of ballast in the coal ships'.[101] Moreover, the 'absurd practice' still survived 'of confining the tenants to lay all their dung upon the old meadow grounds' while the tillage land received only lime.[102] In view of the constant pressure to grow more grain and the inability of lime alone to reinvigorate soil exhausted by cropping, there is little wonder that bare-fallowing was so widely employed. Ignorance of the true nature and capabilities of the soil meant that, even as late as 1794, land agents were 'too apt to make out the same scheme of husbandry for all varieties of ground'.[103]

Yet it is possible to advance a more favourable case for Durham agriculture. Enclosure may have restructured the landholding arrangements of whole townships, or large parts of them, but how particular pieces of land were to be farmed afterwards depended upon the policies of individual landowners and the responses of their tenants. It was these policies which gave rise to differences in husbandry practice through time and space; and which juxtaposed progressive features of farming with the more traditional elements. On the estates of George Baker which lay chiefly on the *East Durham Plateau* and in the *Tees Lowlands* and those of William Russell at Brancepeth, variants of alternate husbandry were adopted, incorporating

both clover and turnips. Farm leases, when running for periods of seven years or more, usually contained husbandry schemes more adventurous than any accompanying the short-term leases referred to above, and were probably akin to what was practised on freehold farms.[104] A scheme of husbandry for Baker's outlying property on the *Pennine Spurs* at Howns Farm (figure 6.10) shows that even on the more marginal lands features of the new husbandry were creeping in. While no Durham schemes appear to have matched those of George Culley in Northumberland, where a five- to six- or seven-year rotation was practised, with pasture for two to four years followed by a white crop, a root crop and another white, there were strong indications by the opening years of the nineteenth century that rotations other than the traditional 'two crop and fallow' were being more widely adopted.[105] Analysis of the 1801 Crop Returns (figure 6.11) stresses the overwhelming significance of traditional grains -wheat in the south-eastern parts of the county and oats in the western areas- but at the same time also reveals something of the newer elements in Durham agriculture with turnips ranking as the third most important crop over a remarkably extensive area and legumes assuming great importance in the *Tees Lowlands*. Unfortunately, the source tells us nothing about the most vital aspect of convertible husbandry: the amount and quality of grassland farmed in rotation with grain crops.

The acid test of good husbandry practice for landlords was the size of their rentals which, as noted before, had been rising long before the inflationary surges and husbandry improvements of the Napoleonic

Wars. Even Church landlords, castigated by an anonymous 'gentleman resident in the county' as the laggards of innovation in 1810,[106] could look to an obvious achievment: a remarkable three- or four-fold increase in renewal fines between 1700/1 and 1790/1. Since these fines were based upon the current valuation of the property, though somewhat deflated to allow for an increasing amount of profitable sub-letting,[107] they must reflect, in monetary terms at least, a sharp upturn in agricultural productivity.[108] And while on this occasion no cropping schemes survive to show how precisely this was done, it is tempting to see these increases being based not so much upon a wide range of husbandry techniques but rather upon the efficient management of a limited range of high quality seeds and livestock and an acute awareness of both land capability and market opportunity. The care with which Dean and Chapter estates were administered, in particular, is demonstrated by the inclusion in mining leases of clauses specifically designed to protect good husbandry.[109]

If the arguments advanced above amount to equivocation regarding the progress of Durham agriculture then this is simply an expression of the paradox which contemporaries like Granger and Bailey, and later Thomas Bell, recognized: the widening gap between the best and the worst or average standards of farming.[110] Of especial interest is the experience of parishes on the seasale coalfield, because it was there that the pressures for agrarian change were most strongly exerted and at the same time most often in danger of being thwarted. In the middle of the nineteenth century, when mining affected nearly all Durham

parishes (leadmining in the western dales and coalmining elsewhere), it was commonly believed that the surface of the earth had been sacrificed for the wealth beneath. Agriculture could not compete with industry for finance: the 'double damage' paid by mining adventurers to royalty owners and tenants for permission to take mine workings and wayleaves through their lands yielded an annual return that was twice the rental value of the land.[111] Already in 1794, Granger was complaining that 'tillage is seldom kept in good condition, the tenants deserting their ploughs, in the prime of the year, for immediate gain by employment of their carts [in carrying coals], to the ruin of the tillage'.[112] Clearly, it is of some importance to know whether such views might have been appropriate over a longer period. Did agriculture compete unsuccessfully with mining in those Northern Durham parishes and manors where coal was intensively worked between 1551 and 1810, or could a successful marriage of interests be achieved? And what might have been the particular motives for and consequences of enclosure in the seasale colliery districts in comparison with those elsewhere? The crucial importance of lordship in framing land use priorities in an age of growing industrial and agrarian capitalism requires a fuller consideration than that afforded it so far. As the following chapter seeks to demonstrate, the case for a geographical approach which looks to the activities of particular people in particular places at particular times is a strong one: by reference to a variety of experiences in a number of specific localities a means is afforded of integrating the diverse themes explored in this study.

Chapter 7

COALMINING AND ENCLOSURE: LORDSHIP AND LANDSCAPE IN NORTHERN DURHAM, 1551-1810

> If we fail to recognise that land use is a function of property rights in land our cognisance of the truth is deficient by a whole dimension of reality.
>
> (D.R. Denman, 1969)[1]

Land use priorities: three case studies

Rainton royalty in the Wear district (figure 1.2) was a major focus of landsale coalmining during the Middle Ages (figure 2.1), and was probably contributing to the seasale by c.1600. It vended perhaps 3,500 tons in 1636, around 21,200 tons by 1728 and 35,283 tons in 1804.[2] An indication of the extent to which coalworking affected East and West Rainton townships and other territories within the royalty in the period of study is provided by a sketch map of 1815 whose essential features form the basis of the reconstruction attempted in figure 7.1. In addition to showing the location of working and intended pits (numbers 1-17), thirty others, belonging to earlier generations of seasale coal extraction, are depicted (numbers 18-47). Also identified in 1815 (but not numbered) were two pits of indeterminate age occupying a small enclave of freehold land within the leased royalty. This wide scattering of pit workings, and the levels of output envisaged, have

important implications for the farming and settlement history of the townships.

In 1777 (figures 7.2 and 7.3) pitmen's cottages in the villages of East and West Rainton were clearly distinguishable from the freehold and tenement (leasehold) dwellings of the remaining population. Loose collections of pitmen's cottages were also strung out along the highways and byways at Low Pit Houses, High Pit Houses and at Wilson's Row. Some farmsteads survived in the old villages, others were scattered about the townships amid their enclosed fields. Although no copy of the enclosure agreement of 1628-38 survives, most of the closes and landholding units shown in figure 7.2 must have taken shape at or about that time. Only Rainton meadows remained to be divided, in 1821 or very soon after.[3]

Though we can discern but dimly the various stages in the settlement history of Rainton royalty, it would seem that prior to enclosure at least one of a small number of early industrial settlements recorded for Houghton-le-Spring parish had arisen here.[4] Occupational and locational designations entered in the parish registers suggest that the mining hamlet of Rainton Pitts, first mentioned in 1607, was quite distinct from the agricultural villages of East and West Rainton, though not bereft of familial ties.[5] Once enclosure occurred, the amount of land available for new settlement in response to the locational shift and greater intensity of coalmining was severely restricted; and for a time the mining population appears to have been forced into closer proximity with the farming population. However, the

creation of new farmsteads away from the villages in the wake of enclosure and the squeezing in of small mining communities along the post-enclosure roadside verges was eventually to cause a swing back towards locational differentiation which, as our maps show (figures 7.2 and 7.3), was quite marked by 1777. In fact Wilson's Row had only appeared since c.1750; High Pit Houses and Low Pit Houses on the other hand were already of some antiquity, occupying roughly the same location as they had at their inception, a century or so before. In the case of Low Pit Houses, however, there was now an important difference: in 1777 the settlement no longer extended northward and westward into a detached portion of Pittington township as it had done in the the 1650s when an expansion of coalmining had caused more and more pitmen's cottages to be forced into the confined spaces on both sides of the post-enclosure roads. In fact its shrinkage, evident in the registers from 1672 and probably involving the deliberate pulling down of cottages, had seemingly been the practical outcome of a lost legal battle: in 1667/8 the overseers of the poor of Houghton parish had attempted, without success, to determine at Quarter Sessions that the maintenance of any labouring poor residing on the Pittington side of the highway should be the responsibility of Pittington parish alone.[4]

Parish responsibilities aside, the most crucial factor in determining just what might or might not be done in this as in many other coalmining area was the attitude of the royalty owners. Rainton manor was the property of the Dean and Chapter of Durham, the post-Reformation successors to the medieval Prior and Convent. Still cast essentially in the role of feudal lords, their natural

inclinations were to give priority to farming and the soil, which was permanent and brought in a regular if modest income, rather than to coalmining which was a highly speculative venture. This is not to suggest, however, that they were unaware of the likely consequences of full-scale capitalist exploitation of their minerals. On the contrary, over the course of the eighteenth century in particular, they became well-attuned to the potential wealth it could bring them in the form of renewal fines on their colliery leases; but this was not taken as a sign that all traditional values should be abandoned. Up to 1810 and beyond, they continued to maintain in their husbandry leases, at Rainton as elsewhere, a clause aimed at promoting good farming, with especial emphasis on protection of the soil.[7] Indeed, as the scale of coal exploitation grew, they became, if anything, more specific and stringent with their lease provisions regarding good husbandry, reasoning that while a sitting tenant might be content to receive monetary compensation for any damages caused by coalworkings and leadings, for the lessor the main aim should be the permanent restoration of the property. Thus the Rainton colliery lease of 1805 contained a clause requiring the tenant within twelve months of a pit ceasing work to clear the land and 'render it fit for ploughing'.[8] The interests of farming were safeguarded in another way too: over the course of the seventeenth and eighteenth centuries seasale coalmining was to affect nearly the whole of the Rainton royalty (figure 7.1), but the field of mining operations active at any one time was effectively checked by limiting coalworking to only three pits.[9] The focus of coalmining activity may not have migrated around the royalty in quite

the way envisaged by Leister[10] -for this would appear to deny the possibility of pits being reopened and further exploited with the advent of new technology- but there seems little doubt that the damage sustained by coalworking and leading could be carefully watched and, in some measure, controlled.

Thus while conflicts must undoubtedly have arisen between the mining interest and the farming interest at Rainton, one gains the impression that, on the whole, the hands of lordship kept a fairly tight rein so that the two activities might often be regarded as complementary rather than competitive ventures. After all, mining presented the farmer with an incentive and opportunity to enclose, to improve farm management and husbandry practice: a growing number of pitmen and other colliery staff as well as their livestock constituted a sizeable and ready market for food while increasing supplies of manure from the colliery horses permitted the maintenance or enhancement of fertility in newly-enclosed townfields. Here, perhaps, was one parish where the incumbent's nervousness about loss of tithe from the tillage at enclosure need not have arisen: there would be enough manure available to keep a reasonable proportion of land under the plough in any one year, even though each field close might be geared to a rotation which also incorporated a fairly lengthy succession of grass leys.

A very different set of circumstances prevailed at Whickham. It will be recalled that, along with Gateshead, the manor had been seized from the Bishop by the Crown in 1577 and in the 1580s leased to the Mayor

and Burgesses of Newcastle for ninety-nine years on the most generous of terms, with the rights of the See reduced to nominal overlordship and a token rent.[11] Thus the effective lords of the mineral royalty were those whose main interests were in commerce and trade and who were fully aware of the locational advantages of coal-rich lands capable of exploitation. Restrictions on the scale and extent of colliery operations were minimal, even at times of vend regulation, so that by the early decades of the seventeenth century a vast quantity of coal was being won. Certainly the amount raised in an average year must have been twice that from any royalty of comparable size elsewhere on the seasale coalfield at the time and many times greater than the amount won at Rainton.[12] By the opening decades of the eighteenth century, of course, the consequences of such vigorous exploitation in earlier times had become only too apparent: seasale coalmining had all but ceased at Whickham.[13] Unfortunately, the parish records allow only a very limited insight into how demographic responses to large-scale coal extraction and subsequent decline may have affected the settlement geography of the manor or parish, but a proliferation of pit hamlets seems at least as likely here as in Houghton parish, even though the timing might well have been very different. By 1647 several former landholdings at Whickham had been wholly or partly divided up into building plots and occupied by around eighty cottages; some, at least, of their tenants or under-tenants must have worked in the pits.[14]

An inevitable consequence of coalmining on the scale envisaged at Whickham was that it seriously interfered with the practice of farming. Matters came to a head in 1619/20 when a case was brought before the

Court of Common Pleas in Durham.[15] The copyholders of the township of Whickham sought redress from the coalmining adventurers whose colliery workings were said to have laid to waste more than a third of their lands. It was claimed that corn and meadow lands were ruined by coaldust and 'cankered water', that the church and many dwellings were in a state of collapse because of subsidence, and that so many pit shafts remained open and unfenced that 'divers of the King's subjects have casually in the night time fallen into them and there perished'. Passing judgement in the case, Sir Richard Hutton, Chancellor of the County Palatine of Durham, expressed both sympathy and general agreement with the views of the copyholders of Whickham; but his ultimate concern was that the coal trade should not suffer on account of its national importance: 'the uttering and venting of coles from thence [Whickham] is become a matter of great necessitie and much concerninge the generall good of the kingdome'.[16]

A generation later, in 1652, coalworking was still hindering agriculture at Whickham; but future exploitable reserves were now thought to lie increasingly under the fell and southern parts of the townfields where the main focus of coalworking had apparently occurred in 1582 (figure 7.4). And it may be that by the time the townfields were formally enclosed in 1672-7 most of the area which they occupied was free from active mining -if not bereft of its consequences in the form of impeded drainage and pit waste. The fact that both the agreement of 1672 and the Chancery decree award of 1677 fail to specify a deadline by which the allotment boundaries should be made, suggests

that here, as in some other localities in the county, quasi-legal confirmation was being sought and given to what had already occurred in the landscape; perhaps over many years in an effort to minimise direct clashes with coalmining.[17] Moreover, by the time of formal enclosure in the 1670s, the copyholders and effective lords of the manor of Whickham were tending to become one and the same group: families of long-standing were selling out to the local gentry who, if not themselves members of the controlling group of Newcastle coalowners and businessmen, were often closely linked through marriage.[18] Arguably, all enclosure did was to transfer their already considerable collective privileges into individual rights. Even so, this did provide a later generation of coalowners who were not so closely tied to the Newcastle oligarchy with problems when wanting to secure wayleaves through Whickham. In the second and third decades of the eighteenth century in particular, they found themselves having to negotiate separate leases with individual proprietors, some of whom, though ostensibly copyholders, were in practice exercising freehold rights; and not all were as willing as the rector of Whickham to be wooed by a promise of '15 gallons of good Canary'.[19] Meanwhile, on Whickham Fell, which still retained its status as common land, the copyholders and their tenants were said by George Bowes to possess a 'liberum veto' on all 'improvements' such as enclosure while at the same time continuing to exercise a powerful hold on the carriage of minerals from distant coal royalties.[20] In fact, their collective rights of passage extended to other parts of the manor since at enclosure of the townfields existing coalways for wains and carts had been carefully safeguarded, and these

were now used not only for the transport of coal but also for the carriage of manure which in this locality must have been produced in amounts yet more prodigious than at Rainton.

At both Rainton and Whickham most key decisions regarding land use priorities were a collective responsibility; in the parish of Gateshead in the early eighteenth century events most clearly demonstrate the role of the individual in fashioning landscape change. William Cotesworth, the son of a Teesdale yeoman, was a mere tallow chandler in the town at the turn of the century. In a matter of fifteen or twenty years he developed into a leading politician of the Whig cause and an entrepreneur of the first rank with an annual turnover of £30,000, largely as a result of his enormously varied and time-consuming dealings in the coal and salt trades. He had commercial contacts with European businessmen in Bordeaux, Rotterdam, Amsterdam, Bremen, Hamburg, Dantzig, Konigsberg, Narva, Stockholm and Gothenburg. However, his ultimate gratification was the acquisition of landed property at home: in Northumberland, the lordships of Hartleyburn and Bellister; in County Durham, estates at Stockton, Gateshead, and Whickham, and a half share in lands at Stella and Winlaton.[21]

On acquiring the ancient demesne lands at Gateshead Park (in 1716) and Shipcote (in 1719), Cotesworth discovered from the title deeds and other estate documents that piecemeal enclosures, surreptitious encroachments and 'concealments' of land had taken place on a grand scale in the course of the seventeenth century, especially at Shipcote, and with little regard to the interests of farming. From a nucleus of

freehold land, known as St Edmund's, a certain William Riddell, kinsman of a former bailiff of Gateshead, had appropriated some adjoining copyhold lands and in order to disguise his activities had changed the names of many of both the copyhold and freehold closes, 'but in the doing thereof hath left one....without a name'. Eventually he had sold all the lands, both copyhold and freehold, to Sir Mark Milbank, but without relinquishing his claim to the minerals. He had then proceeded to work coals under the copyhold closes and to lay pit heaps on them without paying any rent or compensation either to the Bishop or his lessee. He had been able to get away with this deception, Cotesworth alleged, because the lord of the manor, Sir Gilbert Gerard, 'lived mostly in the south part of England and at a great distance'.[22] The legacy of dereliction and its manner of treatment were to be recalled a generation or so later, by the Bishop of Durham's clerk:

> When Mr Cotesworth ... first came possessed of the lease of this manor he found a great Part of the Inclosed lands in a much worse condition than a waste, being almost covered with pit heaps, so that neither grass nor corn could well grow. He carried them off, raised new fences and improved the land to its present condition at so great an expense (exclusive of building) that ... he might (with the money so laid out) have bought a Freehold Estate of equal yearly value.[23]

Cotesworth's achievement was indeed a remarkable one: in January 1720 there were no fewer than 156 pits and their spoil heaps in Shipcote alone and the estimated cost of removal was £781; by the end of 1723 they had apparently all gone. Once cleared and ploughed, the lands were hedged with 'quicks' of elm, ash and oak which had been grown by the thousand in a specially prepared nursery; lime, manure

(including night-soil from the Gateshead privies) and a short rotation of grain crops were used to 'improve the soils' and then the greater portion was put down to grasses and clover.[24] The sequence of events from 1722 to 1724 can be reconstructed in detail (figures 7.5a-d and 7.6). Once improved, the lands were either farmed directly or let to tenants at from £2 to £3 per acre.[25] It was the lucrative nature of market gardening and the milk trade in this quasi-urban district which enabled tenants to afford such sums and still make a profit from their small farms. Cotesworth's comment, that 'the coal fitters must not take all the cream and leave only the blue milk',[26] clearly represented much more than the emotional response of a yeoman's son who hated the devastations of coalmining. His was the realisation that at a time when coalmining at Gateshead Park and Shipcote was no longer easy or rewarding -the best seams were heavily flooded and not likely to be recovered again for many years- progressive farming was a more promising prospect; for nowhere was land more highly prized or potentially more profitable than when it lay in close proximity to, but not directly in competition with, coalmining and intensive urbanization.

The idea of Gateshead in the forefront of the agricultural revolution of the eighteeth century in North East England would no doubt come as something of a shock to many of its present-day inhabitants. Yet that was precisely where it stood. As far as is known, Cotesworth was the first person to grow clover in the region (by 1722),[27] but the husbandry practices he pioneered for Gateshead quickly

spread to other enclosed acres in the Tyne and Wear valleys. In 1726 Laurence was claiming that 'near all the populous places along the sea coast' the use of vast quantities of coal ash as a fertilizer had the effect of 'making the soil run much to clover grass and trefoil, which of all others is the sweetest and richest feed for cattle'.[28] Ryegrass, introduced at about the same time as clover, was by 1737 'so common everywhere' in the region that it was possible to dispense with the importation of seed from London.[29] By 1750 Gateshead had lost its competitive advantage, with rents thought more likely to fall than rise because 'ye country at a distance is very much improved of late years and... daily improving so that the Market is furnished with Hay, Milk &c more plentifully & at lower rates than formerly'.[30] As Cotesworth had told his steward, Thomas Sissons, in 1723, 'anyone can follow a good method but those that go out of one are surely to blame'.[31]

Yet, as the discussion in chapter 6 serves to remind us, progressive farming was never to be a ubiquitous feature in the landscape of North East England. The contrast between the best that could be achieved through enclosure and the introduction of convertible husbandry, and the worst that prevailed in neglected townships, can never have been more marked than in the middle decades of the eighteenth century. When, in 1770, the novelist, Smollett, surmounted Gateshead Fell to gaze upon 'a delightful prospect of agriculture and plantation' on both sides of the Tyne, he chose to ignore the scene of dereliction immediately before him on the open fell itself.[32] Agricultural improvement here, as on any one of the many other surviving upland commons and wastes of Northern Durham (figure 3.12), was by now

virtually conditional upon enclosure. The circumstances under which these last bastions of communality and agrarian backwardness were taken into several ownership are of especial interest for the further light they throw upon the often strained relationships between coalmining and agriculture.

The enclosure of Lanchester Fell

In 1773 an act of Parliament was obtained for dividing and enclosing an estimated 20,000 acres of commons and wastes in the extensive parish and manor of Lanchester.[33] Eight years of feverish activity followed in which the three appointed commissioners, with the assistance of surveyors, valuers and arbitrators, sought to determine the merits of the specific claims of twelve major landholders (those who were to receive 250 acres or more at enclosure) and 165 lesser ones (those in receipt of under 250 acres) on the basis of the value of their 'old enclosed lands'.[34] Particular consideration had to be given to the quality and quantity of the soil and the geographical location of new allotments in relation to the claimant's rights, or alleged rights, which attached to four different kinds of tenure and twenty-one townships. In the enclosure award of 1781 the commissioners enumerated 17,356 acres and 15 perches, of which 1,655 acres 1 rood and 34 perches had already been sold for £8,174 'to defray expenses of the division'. Of the remaining 15,700 acres 2 roods 21 perches, which were to be allotted to the individual proprietors, 11,374 acres and 6 perches were declared 'more improveable' while 3,966 acres 2 roods and 15 perches

-lying on the most exposed parts of the *Pennine Spurs*- were designated 'less improveable'. Any allotments not taken up and enclosed within three months of the date of the award, regardless of their location and new status, were to revert to their former status as common land. Even a cursory inspection of the enclosure proposals (figures 7.7a-d) reveals the immensity and complexity of the task undertaken. Given a similar set of circumstances, it would be difficult to imagine any twentieth-century commissioners being able to achieve the necessary agreements among so many interested parties!

By the time Hutchinson visited the commons in 1783, there had been a dramatic transformation of the landscape:

> This vast tract of country, which was barren, desart and dreary, where the perplexed traveller wandered in the ambiguous tracks with anxiety, is now inclosed, much of it cultivated, and intersected with direct roads, made in the turnpike manner, fit for the reception of any carriage; innumerable buildings are scattered over the prospect; merchandise has found an expeditious passage to villages heretofore almost inaccessible, but in the very midst of Summer; and the inhabitants, greatly multiplied, are cheerful and prosperous. In one farmhold, totally separated from all ancient inclosures, in the summer of 1783, we observed thirty-four stacks of corn in one yard, the produce of new cultivations.[35]

Such enthusiatic reporting must, of course, be set beside the knowledge that many of the 'less improveable' acres of the southern commons were never to be substantially improved for agriculture, and that even on the better favoured, northernmost parts, where the rapid transformation identified by Hutchinson occurred, much effort was needed to sustain good husbandry once the initial fertility of ploughed-up pastures had been exhausted. Even so, twenty years on from

enclosure, the Reverend P. Walker, minister of Lanchester, was clearly impressed at the relative success of grain production on the fell. In making his return to the Board of Agriculture in 1801, he noted that the 'old enclosed lands', at lower altitude and often in sheltered valleys, produced in 'an average year' eighteen or twenty bushels of oats per acre while the 'new inclosed lands' were capable of twelve to sixteen bushels; and although wheat was grown in limited quantities on the 'new enclosures', the recent good harvest had shown a return of sixteen to eighteen bushels there compared to twenty-four bushels per acre on the ancient enclosed lands.[36]

While agricultural improvement was undoubtedly an outcome of enclosure, and the one most readily identified from the pattern of farmsteads to be found in the landscape by 1857/8 (figure 7.7d), it was certainly not the sole, perhaps not even the main, consideration affecting the behaviour of its proponents. With the aid of some fortuitously surviving documentation, unusual enough to merit extensive quotation in what follows, it is possible to trace the origins of the parliamentary enclosure to a series of bitter disputes which called into question the rights of the Bishop of Durham, lord of the manor of Lanchester, to ownership of the minerals of the unenclosed wastes, particularly those beneath the northernmost commons.

The first serious attempt to enclose a large portion of Lanchester Fell came in the last decade of the seventeenth century when James Clavering laid claim to a 'large part of these Commons' in what were

arguably the strongest and most unequivocal terms possible for purposes of securing entitlement to minerals: 'in right of his manor of Greencroft'.[37] This action did not go unchallenged, and by 1718 the dispute had reached a level of urgency and animosity such that 'many suits in Chancery' were being prepared between Clavering on the one hand and the Bishop and 'several of his freehold, copyhold and leasehold tenants' on the other. Although it was feared that the time 'for applying healing methods was almost ellaps'd',[38] an alternative strategy for resolving the issue was being actively pursued in 1718. With the assistance of referees, it was hoped to come to some agreement which could form the basis of a legally-binding division of the fell by act of Parliament. Working against this solution was Clavering's own volatile temperament and personal ambition, both of which proved irritating to John Eden, member of Parliament for County Durham, and one of several political figures whose involvement and active support Clavering had solicited:

> You insist upon having your boundaries enlarg'd to Redwells which will never be agreed to.....I wish you may not stretch your demands 'till you loose your opportunity, for I am truly perswaded a fair tryall at law will leave you far short of what is now offer'd. [P.S.] I am sorry to hear you go on so violently against the Waltons, for I find all the neighbourhood have high resentments of that matter.[39]

In November, 1718, Eden reported that the aged, but wily, Bishop Crewe was showing some willingness to accommodate Clavering's claims:

> Suppose then to make peace betwixt my Lord and you, that wee allow your claim to a mannor; will you be pleas'd with a boundary from Chapman's Well to Stanley burn head, thence to Salter's Sike and from somewhere thereabouts directly over to the Lowd house, joining upon the wall of your own inclosure? [P.S.] I woud have this proposal kept as much as can be from taking

> air, 'till wee know how your freeholders will receive it. You must discourse upon it with them freely, there's no avoiding it, but to others - silence.[40]

By the middle of December, Clavering, still suspicious of his neighbours' intentions, received further words of assurance from Eden:

> Your neighbours seem better inclined to an accomodation then you think....I should think myself very happy in being instrumental to restore peace and good nieghbourhood amongst you, which is so valuable, that a great many more acres upon the barren commons can never be a sufficient recompense for the loss of it.[41]

Eden's judgement upon the worth of the mineral-rich commons suggests that he was either ill-informed or, what is more likely, being purposely naive. His wish to secure reconciliation was, in any case, put severely to the test as his next letter testifies:

> I cannot, at present, give you the satisfaction you desire, it being impossible to make any right judgement of what farther concessions can be made, without a map; but if you expect any great matters more, you'll certainly be disappointed....your own pretensions... may .... prove a fatall errour to you at last.[42]

Evidently an agreement was more or less completed, but suspicions were aroused by yet a further demand from Clavering; this time in respect of his lands at Iveston. Ever conscientitious in his duties, and prompted by news of the Bishop's failing health, Eden wrote on Christmas Day, 1718:

> My Lord's death, if it should happen soon, may be very inconvenient to you...you are to be concluded by this agreement from making any further claim in respect of the pretended mannor of Iveton.[43]

Nine months later the chances of an accommodation being reached among the disputing parties were receding in the light of Clavering's most recent proposals regarding an agreement. Eden advised:

> I have seen the articles of your amendments, to which, I find, the Freeholders not in the least dispos'd to consent .... your having your alotment made by the Commiss[ione]rs *in the first place* is what they refuse to comply with, insisting upon the general division alltogether.[44]

In October 1719 a desperate attempt was made to circumvent the cumbersome parliamentary process by resorting to a Chancery decree award.[45] This did not succeed and by March 1720 preparations were again under way to introduce an enclosure bill in Parliament. To meet solicitor's costs and 'fees in both Houses', it was necessary to raise £120. Clavering's opponents, led by the Spearmans, Hunters, Stevensons and Whittinghams were willing to contribute £80, but Clavering was expected to find the rest. Ralph Gowland, Clavering's attorney, complained of this as an 'unequall contribution', because it was contrary to the accepted procedure at enclosure of raising the expenses 'rateably according to the value of estates in the Book of Rates'.[46] In this way Gowland was simply admitting in private what other parties had been voicing in public about the true nature of Clavering's claim: that it related to a greater area of territory on the fell than the value of his old enclosed lands at Greencroft and Iveston would, according to the Book of Rates, have entitled him, *pro rata*:

> ...you receiving the greatest [individual] share of the Comon ... they thought the above method [a contribution of £40] was just enough.[47]

Clearly by this stage other freeholders with interests upon the commons were learning from Clavering's aggressive stance and busily pursuing their own ambitious ends. The Hunters of Medomsley claimed lands upon the fell in 'right of their pretended manor of Medomsley'

(that is, as outright lords) while at the same time arguing that their possession of enclosures already made upon the fell, and which they were obliged to acknowledge as being held by lease from the Bishop, entitled them to yet further shares of the unenclosed lands on the fell as well as the coal beneath. Riding two horses was evidently regarded as a way of ensuring the victory of one, though Ralph Gowland found it the 'greatest absurdity'.[48] Meanwhile, other manorial claims had been 'discovered' by Lord William Pawlett, who owned the village and estate of Langley. He kept in close touch with Eden during the bargaining over Clavering's claims and was assisted by Eden in promoting his own boundary claims 'in right of the manor of Langley' as well as securing confirmation of encroachments made at Langley by his father, the Duke of Bolton, in c.1700.[49]

With so many parties involved, and with a heightened awareness on all sides of the choice pickings to be made, anxieties about a just and fair settlement increased. By February 1720 there were signs that several substantial freeholders -Thomas and Robert Hunter, Francis Nicholls and John Sandford- might oppose the bill:

> Their chiefe objections are the want of a comon-quarrey ... and that they have noe better allowance for working the colemines and wayleaves in their grounds, and for makeing, keepeing and repaireing of gates.[50]

These freeholders were indeed the very ones to lead a successful counter-attack on the enclosure petition of 19 April 1721 (plates 7, 8 and 9).[51] The bill was rejected (plate 10), and its chief proponents, the sickly Bishop Crewe and James Clavering, were left licking their wounds. 'We throw our money away and shall be laughed at', Robert

Spearman warned Clavering in May 1721;[52] by September he was pressing for a settlement to their debts:

> 'I send this to reminde you that the money borrowed of Mr Randolph will be due the 18th instant, soe that a meeting some day next week is absolutely necessary.'[53]

Thus the chance was lost of transferring into private hands extensive tracts of land, and of resolving the matter of ownership of minerals to which a claim in right, or supposedly in right, of a manor gave an entitlement. Perhaps what was remarkable, however, was that the move had proceeded so far. Enclosure by act of Parliament was still something of a novelty in 1721[54] and the whole basis upon which it was expected to proceed, then as later, rested ostensibly and certainly most overtly, upon agrarian rather than industrial needs.

After the loss of the enclosure bill and, it would seem, the dropping of lawsuits, the controversy receded somewhat from public gaze; but not for long, for this was an old wound which would not heal. Shortly after his translation to the See of Durham, in 1750, Bishop Butler received a letter from one of his chief officers, Christopher Johnson, Clerk of the Great Receipt, informing him of renewed concern among his 'principal Freeholders, Copyholders and Leaseholders of Lanchester' about the disputed fell.[55] He reported that in 1738 Mr Lambton had purchased Lord Pawlett's estates and proceeded to make 'several large enclosures from these Commons which he claims as part of the manor of Langley, and also rides a boundary whereby he takes in a great many Acres, which he is now attempting to enclose with a stone wall'.

Meanwhile, James Clavering of Greencroft, and more recently his son George, had proceeded to make several large enclosures and also ride 'a boundary as belonging to the Manor of Greencroft in which he has comprehended Several Hundred Acres more than were agreed to be allotted to him if a division had been made [in 1721]'. So as to reinforce their claims both George Clavering and Henry Lambton had refused access to the Bishop's tenants to 'pull ling and winn stones' upon the disputed territories. In or about 1748 Bishop Chandler had been urged by his tenants to ride the bounds of the fell so as to establish or reassert the extent of the See's territorial rights, but Chandler had pleaded that this was not 'convenient for one of his Years and Infirmaties', and had seemed intent on avoiding further lawsuits with the Claverings and Lambtons. Instead the boundary riding was attempted by Christopher Johnson himself, but to no avail.

A critical stage was now (1750) being reached: all the 'mines of coal' within both the enclosed copyholds and unenclosed lands of the manor of Lanchester were 'in lease to Mr Bryan Harrison In trust for Mr Smythe and others', and believed to be worth 'Severall Thousand Pounds', but 'if Mr Clavering can by any means Establish his Right to the Common within his Pretended boundary, Mr Smythe's Colliery will soon be at an end, The Extreme part of Mr Clavering's boundary, being at a small distance from the Colliery which Lord Windsor and Partners [the sub-lessees] are now working'. There followed an extra inducement to action:

> Mr Smythe's agent ... proposes to renew it [the lease] the second day of December next ... he's willing to pay

one hundred and fifteen pounds.[54]

This was clearly intended to be the gilt on the gingerbread for a bishop in search of income from his newly-acquired See. However, Johnson's urgings could not compete with the guile of the Claverings; in March 1751 Thomas Clavering was writing from London to his brother George, at Greencroft:

> I dined with our Bishop last Tuesday along with Sir Thomas Bootle and before him mentioned our Affair, He told me, had been applyed to by a number of Gentlemen that had had a meeting on that Acct and understood that there had been Law sutes formerly on the same score, and said he wish'd an amicable end cou'd be put to our differences, without the expence of the Law and that was all that pass'd. I mentioned your being a sportman and that you wish'd to have the Honour of continuing, His Lordship's Game keeper. He said to be sure ... when I wait upon him again I will apply for the Renewal of our wayleave Lease.[55]

The Claverings were intent on keeping the Bishop quiet with the payment of an annual rent and sizeable renewal fine for a wayleave across the disputed land which, along with the minerals beneath, they eventually intended to hold as of right.[56]

It was left to Bishop Butler's successor, Bishop Trevor (1752-71), to take up the cudgels once more against the Claverings and Lambtons. At long last, in 1754, a boundary riding of the fell was undertaken; though it concerned itself, it will be noted, only with the disputed northern commons (compare figures 7.7d and 7.8). It revealed only too clearly the reason for Johnson's alarm: step by step, in succeeding generations, encroachments or 'intakes' had been made in order to secure an enlarged territorial base from which to promote yet more enclosures and boundary claims. The resultant survey identified both

the extent of the losses within or abutting upon the fell which the See was obliged to accept as well as those encroachments and further boundary claims it was prepared to contest (figures 7.8 and 7.9). Among the accepted losses were several substantial enclosures of some antiquity including a group of intakes made by the Claverings to the north-east of Greencroft 'ancient road'. Similarly regarded were 'Langley Ancient Enclosure' and the adjacent 'Old Intake' which lay in the south-east corner of survey where the boundary riding began: designated 'Nursen Fields' and 'Thackhill Inclosures' respectively on a more detailed contemporary map (figure 7.10), they had been taken in by Lords Bolton and Pawlett, Lambton's predecessors at Langley, at various dates between c.1690 and 1738.[89]

Other quite substantial intakes upon Lanchester Fell, as for instance at Moor Leases, again by the Claverings, and at Holmside by the Spearmans, were to remain intact, but only on condition that they would be regarded as a part of the fell held 'of the Bishop' and subject to the payment of a 'new improvement' rent. A further scatter of encroachments and claims was still very much in contension, however. Amongst them was Lambton's most recent enclosure at Langley Fellside (marked 'Inclosure by Mr Lambton' in figure 7.10 and located immediately north of boundary proclamation site number 1 in figures 7.8 and 7.9) and a claim for the manor or 'pretended manor' of Langley which was intended to project its boundary yet further westward and into an area of known coal reserves. Also still at issue were 146 acres or so of intakes north of Greencroft, and two extensive tracts of waste which were claimed for the manors or 'pretended manors' of

Greencroft and Iveston, and within which, significantly, were coal pits and 'groves' worked by the Claverings. In June 1759, when the disputed lands were being more intensively fought over than ever, four colliery viewers, led by William Newton, 'proved upon Tryal with the Claverings' that while 'great quantities of Tenns of Coals' had been taken already from these 'ancient coal pits', great reserves still remained, including those in the much-prized 'Main seam' which was 5 feet and 4 inches thick.[40] But, as figures 7.8 and 7.9 make clear, the Lambtons and Claverings were not the only parties interested in the mineral riches of the common. In the north-eastern sector of the fell an incursion was being attempted for the parish of Chester, while of more immediate concern were the intakes on the north-central margins, near to the Pea estates of the Simpsons and Swinburns, which threatened to envelop an area of particularly active coalmining. Yet more serious in the long run was the situation on the north-central edge, where Mr Pitt was riding and thereby claiming a more southerly boundary for Tanfield Moor than the Bishop was willing to concede.

These several disputes were only to be resolved by actions at law or, failing that, settled under the provisions of the parliamentary enclosure act of 1773. Yet the fact that only Pitt's claim was to be successful -the enclosure commissioners in 1781 adjudged and awarded 52 contested acres to be part of Tanfield Moor-[41] suggests that the boundary riding of 1754 not only allowed the battle lines to be more clearly drawn than ever before, both literally and metaphorically, but also signalled a marked revival in the fortunes of the See. By 1759

Chancery proceedings at Westminster were being taken against both the Claverings and Lambtons to repudiate once and for all, or so it was believed, their 'pretended' claims to be manorial lords.[42] Tactics, as ever, were all important; the opponents were to be picked off one at a time, as Henry Wilkinson, the Bishop's attorney, made plain to Thomas Thoresby, a London solicitor, in a letter of 7 October 1758:

> It is ye Bishop's desire that Mr Lambton be delayed and prevented from going to Commission in chief until ye next long vacation, in order to get the Tryal at Law ag[ains]t Clavering over before Lambton can Examine in Chief in this Cause.[43]

Before the end of 1759 the Bishop's cause had been won and there were 'mortifying scenes at Greencroft'. Thomas Clavering of Axwell Park, offered his brother a few words of comfort:

> I most sincerely wish I could add any consolation equal to the unpleasant feel that I am sensible you have by the decision against us this day, however as we have no reason to attribute our misfortune to any misconduct in ourselves or to believe, that anything more could have been done to procure success, I hope you will keep up your spirits and rest assured that I will do everything in my power both to make you easy in yr circumstance and happy in Life.[44]

George Clavering had lost his manorial claim and with it the right to ownership of the soil and minerals within his recently enclosed lands and claimed boundaries upon the fell.[45] By 10 December 1764, his 146 acres and 24 perches of intakes (numbered 1-6, 12, 14, 16 and 17 in figures 7.8) were being leased out by the Bishop to Sir Walter Wagstaff Bagot, Baronet, and William Fenwick and William Lutwyche Esqrs for twenty-one years at an annual rent of £5.[46] On surrender of the lease in 1773, Bishop Egerton, who had succeeded Bishop Trevor in 1771, granted a lease of the intakes to Clavering in return for a hefty

renewal fine of £250. The Bishop then ordered this sum to be paid to Mr Smythe, the lessee of the Lanchester coal mines, 'as a compliment to him for the Expence he was at, in Bp. Trevor's time, in suporting the right of the See in the premises'.[47]

With one major conflict settled, attention focused more sharply than before upon the other: the dispute with the Lambtons. A crucial factor forcing a resolution of the issue was the Church's growing awareness of the need to safeguard not only its rights to dig minerals but also to carry them. Thus, from the 1760s, we find that while the lessee of the Bishop's coal mines in the manor and territories of Lanchester continued as before to sublet the mining concessions to two main groups of adventurers, and to receive both a certain and tentale rent far in excess of the renewal fine or annual rental he paid to the Bishop, he no longer controlled the granting of wayleaves. These rights, arguably the single most important factor in converting a useless mineral into a valuable asset, were now leased separately and directly from the See.[48] Of such vital, strategic significance was this ultimate control on the output of coal that in 1770 it was made plain to the Lambtons that, contrary to what may have been assumed or accepted in 1754, they would only retain uncontested, as part of their freehold, the ancient enclosures between Langley and Nursen Field (that is, the territory marked 'Old Intake' on figures 7.8 and 7.9 and as 'Thackhill Inclosures' on figure 7.10), if they agreed to the See having free wayleave through this corridor which separated the Bishop's commons of Lanchester and Charlaw.[49]

With this last key battle won the See could proceed to a division of the commons by act of Parliament in a much healthier state, and with greater authority, than would have been the case in 1721; and while not all opposition was necessarily silenced, the chief protaganists, the Claverings and Lambtons, now had little reason to oppose the proceedings. The enclosure act, obtained in 1773, reasserted the traditional authority of the See with regard to coalmining by reserving all minerals within the limits of the commons to the Bishop, whether under copyhold, leasehold or freehold allotments. The holder of the mining concession would continue as before to compensate landholders and tenants for any damage caused by mineral working within their ancient enclosed lands in Lanchester but not within any newly-made allotments. Instead, the Justices of the Peace were given a special allotment of 300 acres (figure 7.7c), the profits from which were expected to meet the costs of any mining damage sustained by the allotment holders.[70]

Mineral ownership disputes and the timing of enclosure

Successful attempts by the See of Durham to establish or reassert its territorial rights at enclosure were revealed in other parliamentary acts and awards relating to the division of commons and wastes. In ten cases out of twenty-one undertaken between 1760 and 1810 (excluding Lanchester) and affecting 32,303 acres of land out of 44,407, provision was made to reserve the minerals to the Bishop.[71] To appreciate fully the significance of these expressions of lordly power, it is necessary

to view them against a background of widespread and protracted legal wranglings which, no less fiercely contested than at Lanchester, had left the Bishop with more territory over which to exercise lordship rights than he might have feared in the first half of the eighteenth century but less than would have been expected before the start of large-scale seasale coalmining in the mid-sixteenth century.

A reason for the See's susceptibility to erosion of its possessions is not hard to find. At just the time when territorial rights were becoming more highly prized than ever before but also urgently in need of clarification, the deliberate policy of the Elizabethan monarchy to limit the powers of the Bishop of Durham, on the pretext of defending the Protestant succession, left the See in a relatively weak position. Moreover, the nature of the office of bishop was not intrinsically conducive to firm government. No hereditary succession was involved, and responsibility for the continuity of affairs was in the hands of local officials whose private interests did not always accord with the wishes of each newly-arrived prelate and his company of favourites and retainers. And neither group necessarily acted to preserve or enhance the temporal powers of the Bishop.[72]

Some of the most far-reaching attempts to undermine the territorial integrity of the See were undertaken between the mid-sixteenth century and early nineteenth by, first the Gascoignes, and then from 1607, the Liddells, who, from a core of property at Ravensworth and Lamesley (figure 3.12), made substantial and successful encroachments into the Bishop's lands at Blackburn, Birtley, Eighton and Gateshead.[73] Many

hundreds of acres were involved: on Gateshead Fell alone, an estimated 1,300 acres in 1647 had been reduced to a mere 631 acres by 1809, the date of the parliamentary enclosure act.[74] Such assaults did not meet with passive acceptance, but the piecemeal nature of their proceeding, involving, where necessary, actions at law, did not usually work in the Bishop's favour.

A resurgence of episcopal power throughout the Bishopric threatened for a time in 1722, shortly after the dropping of the Lanchester enclosure bill, when the newly-arrived Bishop Talbot set about obtaining an act of Parliament which would confirm his supposed rights to mine in all the commons and wastes, and enclosed leaseholds and copyholds, of his See, and to grant permission for wayleaves and the laying of waggonways over such lands without any obligation on the part of the lessee to pay any compensation for damage done.[75] This bold measure met with stern opposition and eventually had to be abandoned, but at least one individual, Gilbert Spearman, continued to be haunted by its proposals; and with good reason, as his published work of 1729, attacking the powers of the Bishop, shows. Contrary to his wishes and behind his back, the coals and wayleaves within his copyhold grounds at Tanfield Leigh had been granted to the Bishop's son-in-law, Dr. Sayer, who then assigned them to the mining entrepreneur, Mathew Ridley.[76]

This exercise of episcopal authority at Tanfield Leigh, albeit in the guise of nepotism, stood in marked contrast to the fast-fading hopes of a revival of lordly power still being entertained for the neighbouring territory of Tanfield Moor. In the reign of James I the

Bishop of Durham had possessed and exercised the right to lease out mineral rights under the common; by the time formal enclosure came along in 1807 (figures 7.15a-d) all his interests had been alienated.[77] From the late seventeenth century the minerals under Tanfield Moor were held separately from the surface rights by parties who remained united only in their determination to exclude the Bishop. An area of common land so intensively mined for coal as this, and so manifestly predisposed to the proliferation of waggonway routes (figures 7.11 and 7.12, and especially 7.13) was inevitably an issue in the debates and territorial disputes which raged between the various factions of landowners and mining entrepreneurs.[78] More generally, it will be recalled, the north-west Durham uplands had been prone to much conflict and rivalry as the focal point of the Grand Allies' spatial strategies in the early and middle decades of the eighteenth century.[79] In fact, throughout the eighteenth century, ownership rights attached to land, but most especially boundary rights relating to common land at Tanfield, Beamish, Causey, Kibblesworth, Hedley, Lamesley, Ravensworth and Blackburn, continued to be called into question.[80]

Such was the legal uncertainty surrounding many of these rights and privileges that even the pretensions of a smallholder had to be carefully watched. Normally, those who held freeholds under the Bishop of Durham could be denied the minerals beneath any newly-enclosed land provided an act of Parliament specifically reserved them to the lord of the manor; but this did not necessarily apply, of course, where enclosure proceeded by less formal means, and most especially where lordship rights were as confusingly uncertain as on Tanfield Moor. In

October 1758, Lady Ann Windsor (inheritor of the Clavering coal interests in north-west Durham) wrote to William Pitt (owner of the coals beneath Tanfield Moor) warning him that 'it would be prejudicial ... to suffer Freeholds to be made upon the Moor... for by Prescription and long enjoyment the Possessors would claim an equal right to the Coal Mines, as well as the soil under such Houses or enclosure'. The only way to protect lordship rights, other than by pulling down any buildings, walls and fences that had been erected, would be to 'take an acknowledgement'.[81] The vulnerability of Tanfield Moor to encroachments is only too apparent in Watson's map of Tanfield Townhead estate in 1749 (figure 7.14); and from Cuthbertson's map of Tanfield Leigh of 1715 (figure 3.8) which shows a substantial intake of 61 acres 3 roods and 12 perches that was later pulled down.[82]

The importance of these and similar territorial conflicts should not be underestimated. Uncertainties about the ownership of mineral and land rights not only encouraged much piecemeal enclosure of an informal or quasi-legal nature but, arguably, also tended to delay the timing of formal enclosure at which these rights could be clarified to the advantage of some and the obvious disadvantage of others. What may have eventually tipped the balance in favour of parliamentary action was the mounting and irresistible need to grow more grain. This meant, effectively, that in some instances the timing of formal enclosure of commons and wastes in Northern Durham was not very different from that in other parts of the county, even though the period of gestation was much longer. Thus, at Lanchester a formal division occurred during the

period 1741-90 in sympathy with the experience of other commons and wastes on the *Pennine Spurs* (figure 6.3a), although, as we have seen, the matter had been actively pursued since the close of the seventeenth century. In other cases, however, formal enclosure was delayed beyond a time when agricultural needs, considered in isolation, seemed to make it merely desirable, to a time when they made it absolutely essential. Thus we find that many acres of land in Northern Durham were only affected by enclosure acts and awards after 1790 (figure 6.3b), during the period of grain crisis associated with the Napoleonic Wars; a fate they shared with more marginal agricultural land in the *High Pennines*.

Even parliamentary legislation did not always deal with matters adequately, for enclosure acts and awards had not been developed with the prime aim of determining title; certainly not in the potentially complex area of mineral rights.[83] Deficiencies in the Tanfield award, for instance, were to leave lingering doubts about wayleave rights which erupted into a serious legal controversy in 1939.[84] The most striking example of an unsatisfactory award, however, did not concern commons and wastes at all, but 700 acres of townfields at Crawcrook, where, on the eve of enclosure in 1794, a three-course rotation still survived within the confines of three, highly-fragmented, open fields. Although the surface rights were divided by the enclosure commissioner (figures 6.9a and 6.9b), no attempt was made to do the same with the subterranean rights (figure 3.12), and in consequence a serious and protracted dispute about minerals soon arose in the early years of the nineteenth century.[85]

In Tanfield churchyard our voyage of historical geographical exploration began; in Tanfield churchyard lie the bones of Thomas Tinn. In the thirty years of his working life trudging along the waggonway from Pontop Pike colliery to the staiths at Derwenthaugh or Dunston with his chaldrons of coal, he witnessed some remarkable changes in the landscape around him. In the 1790s he passed directly from the well-ordered enclosures of Lanchester Fell to the 'lofty and barren' [84] wastes of his native Tanfield Moor, strewn with an ugly profusion of pitmen's hovels, which here and there clustered around the bends or intersections of a waggonway or some rough track; or occupied the funnel of rough pasture which led into Tanfield itself. In this old village, amid the enduring wind-blasted greys and yellow-browns of farmstead and church, stood the newly-erected workhouse -a physical reminder of the despair which afflicted many of the parish's four hundred families at this time; a testament to the ephemerality of coalmining and the wealth it produced.[87]

On the same journey in 1807 the landscape of Tanfield Moor presented a new patchwork of neat, rectangular enclosures (figures 7.15a-d) whose construction, maintenance, and subsequent planting and cultivation gave employment to many a distressed family. Thomas is unlikely, perhaps, to have understood every nuance in the power struggle among the coalowners and landed proprietors which preceded the enclosure; neither might he have known precisely how their conflicts affected its timing and the eventual apportionment of shares. But equally, he could not have failed to recognize the variable impact of

lordship upon the people and places around him; whether in the form of tiny new allotments which Sir John Eden had bought from (and then leased back to) small farmers who had been unable to meet the costs of enclosure (figure 7.15b), or in the village of Tanfield itself, where the same paternalistic lord had recently made a more obvious gesture to immortality by financing a towering extension to the parish church.[66]

If Thomas had ventured further afield, he could still have found in 1810, other upland wastes ripe for enclosure and the growing of corn (figure 6.3b), but still being haggled over. On Blackburn Fell, where an act of Parliament had sanctioned enclosure in 1801, the Claverings, Liddells and Boweses were involved in a complex series of exchanges and land transfers relating to surface and subterranean rights which were not to be fully resolved, nor properly financed, until after 1818.[67] On Whickham Fell (figures 6.3b, 3.12 and 7.4), still exaggeratedly cherished by the copyholders and colliery proprietors as a strategic location for wayleave control, the high costs of enclosing what was considered a relatively small piece of land of about five hundred acres was the overriding factor which delayed, until the 1820s, any serious attempts to divide the waste.[70] In 1810 it remained a wounded and unwelcoming landscape; in sharp contrast to the 'Elysian fields'[71] of those stately homes both near and far into whose building or refurbishment the profits of coalmining had been directed: Gibside, Ravensworth, Gateshead Park House, Lumley and Lambton.

C O N C L U S I O N

Chapter 8

CONCLUSION

With the aid of detailed case studies, chapter 7 has served to link the three main themes of our study -coalmining, population and enclosure- by focusing upon the differential impact of lordship as an agent of change in the economic and social landscape of Northern Durham during the period 1551-1810. This step was anticipated in chapter 1 as a means of offsetting the 'isolationist' tendencies of our somewhat novel methodology; though, in practice, it became an easy and logical step to take once a measure of interdependence between the three sets of patterns began to emerge in the course of our inquiry (chapters 2 to 6). This final chapter provides a timely reminder of our main findings and arguments before going on to consider some of their broader implications.

Coalmining, population and enclosure in Northern Durham: a summary

By the first decade of the nineteenth century, the Tyne and Wear seasale colliery districts were vending just under 2,400,000 tons of coal per annum; the equivalent of twice the annual vend around 1750, four times that of c.1660, fifteen or sixteen times the amount shipped out each year in the 1590s, and probably more than fifty times the quantity at the very beginning of the period of study. The quantities

involved and the rates at which they expanded were a little different from those suggested by Nef for the late sixteenth and early seventeenth centuries, but approximated to those suggested by more recent writers for the period since c.1700.[1] In the years of most rapid expansion, from the 1580s or '90s to the second or third decades of the seventeenth century, practically the whole vend originated in the Tyne district and came mainly from the Durham or south bank collieries; over the following half century the Wear advanced rapidly and emerged from the sluggish conditions of the late seventeenth century and early eighteenth in a strong position, and capable, it seemed, of even overhauling or challenging the supremacy of the Tyne; thereafter a more consistent relationship was established between the two, aided most noticeably after 1770 by the quotas imposed by the Limitation of the Vend.

The spatial incidence of mining over this long period was less clear-cut than might be assumed from the pattern of zoning outlined by Smailes:[2] Although seasale coalmining did not abandon locations within two to three miles of navigable water to any significant extent before about 1710, there were often shifts in the focus of activity both within and between coal royalties in response to limited but nonetheless important technological innovations which, in succeeding generations, could permit the revival of earlier abandoned workings. The ephemerality of coalmining activity was yet more apparent thereafter. In 1728 nearly the whole of the Tyne vend was raised at royalties some miles distant from the river while in the more tightly

defined Wear district the outward spread of mining was balanced by the continued working of riverside seams. By the opening years of the nineteenth century, the newest, deepest and largest collieries in the Tyne district were in the Wallsend Basin but important workings, some of them revivals of earlier abandoned mines, were to be found both along the north bank of the river and in the north-west Durham uplands. Meanwhile, activity in the Wear district had intensified in older areas of working and also spread to more distant royalties such that, here and there, its catchment overlapped that of the Tyne.

A number of factors affected size of vend, the pace at which it expanded and the nature of the colliery location patterns. A prime consideration was the existence of growing markets for coal both at home and abroad. Of paramount importance, for most producers in the Tyne district and several in the Wear, were the requirements of consumers in London and the Thames valley. At first coals were needed for domestic purposes but soon after were taken by a growing range of industrial users. Different qualities of coal suited different categories of consumer but the preference of external markets was usually for the better grades: coals that were lumpy and hotly burning. Customers in the national markets were especially sensitive to the practice of 'mixing' coals; overseas buyers were apparently less fastidious, and towards the end of the period of study some few collieries can be seen to have depended for their very survival upon the disposal of lower grades to continental markets. The superabundance of poorer grades of coal stimulated or supported the growth of local coal-consuming industries such as salt-making, glass

manufacture, iron working and shipbuilding; each had a particular preference from within the quality range. When allowance is made for the growing demands of coalfield machinery, and of households both on and off the coalfield, it would appear that the amount consumed locally grew substantially over the period of study despite the near demise of one major customer, the salt industry, after the mid-eighteenth century.

Supply factors also had an important bearing on the historical geography of coalmining in the Tyne and Wear districts. Geological considerations, in particular the depth, width, quality, inclination and faulting of seams, and their susceptibility to choke and fire damps, and the accessiblity of coals as determined by surface geomorphology, placed significant constraints upon the exploitation of seams in the mid-sixteenth century. However, these gradually yielded to advancing technologies which, owing to their cost-effectiveness, permitted mining at increased depths and distances. In the eighteenth century the Newcomen engine made only a modest impact at first but after c.1760 it dramatically facilitated the exploitation of seams that had earlier been abandoned through flooding or had simply been regarded as too deep for winning without risk of inundation, as in the Wallsend Basin. In the first half of the eighteenth century, however, it had been the adoption of the waggonway that had most noticeably fashioned the pattern of colliery working with a major focus of activity in the north-west uplands of Durham. An additional important constraint on coal supply, yet one which has been afforded relatively little

prominence in previous studies of this or other coalfields, was the mineral estate or coal royalty.[3] The general need to maintain territorial integrity, irrespective of size, shape or extent, meant that the most suitable extraction policy as determined solely by the location of faults and natural drainage basins was not usually followed and in consequence less coal was obtained than might otherwise have been the case, and more engines were used to rid the collieries of water. But of even greater importance was the strategic control of space which attached to ownership of these royalties. Rights to both the surface and underlying minerals were usually regarded as being vested in the lord of the manor, and so the need for colliery adventurers without lordship rights to forge close links with landowning society was a strong one; but legal uncertainties surrounding these and other related privileges were often exposed once mesne lords and tenants sought compensation for surface damage, challenged wayleave arrangements or claimed carriage duties. Waggonways might only be built across lands that could be successfully bargained for, perhaps with several interested parties, and the routes taken were not always the most suitable as far as the terrain was concerned. Thus, while geology, geomorphology and the state of mining technology set the ultimate, physical limits to the amount of coal obtainable from any particular locality at any specific point in time, the effective limits were determined by the interplay of human forces operating within a complex system of landholding rights and privileges. It was a system subject to challenge and change from coalmining adventurers in pursuit of spatial policies with which to meet and, in

turn, influence the coal demands of customers in distant markets.

The coalowners were positioned at one end of a marketing chain which, for the London trade at least, became increasingly elaborate over the 260 years considered in this study. Intermediaries, acting alone or in concert, attempted to manipulate the system to their own advantage, usually through the operation of combinations, which were often cited as a reason for the excessively high price differences between pithead and consumer. The Crown or State, which might have acted decisively against these restrictive pratices, showed an ambivalent attitude to all but the worst excesses owing to its own considerable revenue receipts from coal duties. Taxation was probably the greatest single reason for the enormous price differentials. Contrary to Westerfield's view,[4] the personnel of the competing groups were not always as sharply differentiated as their functions within the system might suggest; coalowners, for instance, often held parts in ships. But it was on the coalfield that they had a dominant role to play.

An expected and overriding concern for profit meant that a watchful eye was kept on the relationship between costs and receipts. A return of fifteen per cent or so on total investment appears to have been a fairly constant expectation, though in practice, of course, considerable variations occurred across the coalfield. Uncertainties such as warfare and unfavourable weather might seriously compromise the survival of particular collieries; yet it was the uncertainty of mining which was arguably one of its chief fascinations for investors. Though

much still remains to be discovered about the origin of colliery capital, there was apparently no shortage of investors both from within and outside the district. Some funding was undertaken by landowners who, as entrepreneurs exploiting their own coals, showed a greater capacity for survival -certainly as major colliery adventurers- than they did on the Lancashire coalfield. Even without a direct involvement in mining, landowners could exercise a considerable control on the pace and location of mining through the rental and other provisions contained in the mining and wayleave leases they granted.

The scale of investment required for a large colliery undertaking, together with the predilection of the major coalowners to diversify their funds in order to spread risk, encouraged the formation of partnerships and associate funding. A further logical step towards protecting investments -on the coalfield as along the marketing chain- was through the formation of combinations or cartels. However, the coalowners often had difficulty in reconciling their individual interests and ambitions with what was judged to be for the general good, and consequently the colliery location patterns were neither wholly a product of cooperation nor of competition but a compromise in which first the one and then the other had the greater impact. When the workable field of mining was severely restricted, as before c.1700, the Newcastle hostmen were often able to maintain a near monopoly of Tyne coals; indeed, before c.1620 and the rise of the Wear district, they could command almost the whole North East vend. As the field of activity was extended, with the advent of new technology, fresh alliances had to be forged in order to limit the entry of new

entrepreneurs and regulate the vend as a means to achieving high profits. In the middle years of the eighteenth century the location of working collieries in the Tyne district was very much determined by the relative success of the spatial strategies of the Grand Allies. After 1770 it was the remarkable success of the Limitation of the Vend which, in seeking to provide a measure of protection for the colliery adventurers and their ever mounting levels of investment, conditioned the pattern of coalworking. Rivalries within the Limitation were only partly suppressed. Among the many issues which were a source of tension between the participants, and not fully resolved, was the vexed question of whether it was better to aim for maximum aggregate profits rather than maximum unit profits. The existence and general tolerance of excess capacity towards the end of the period suggests that the latter goal may have been the one more usually accepted. But the clearest message would seem to be that more proprietors were frightened of what might happen without the Limitation than with it, and that in consequence some immediate or short-term sacrifice of profit levels was justified. The protection afforded by the Limitation did not, however, work to the advantage of everyone in equal measure: it could not save the Grand Allies from suffering a marked decline in their hold on the Tyne industry nor prevent the Lambtons from taking a much firmer grasp of the industry in the Wear district.

A priori reasoning suggests that growth of coalmining on the scale envisaged could not have been sustained without an expanding and increasingly specialized labour force. By comparing the record of

population change in Northern Durham with that in the remainder of County Durham, it is possible to give an indication of the demographic impact of coalmining and associated industrialization: a nine-fold increase between 1563 and 1801 compared to little more than a two-fold rise elsewhere in the county. But it is also important to stress that each parish had its own distinctive chronology of growth, standstill and decline, often echoing through migration and natural increase trends the varying fortunes of particular collieries. In short, the pattern of coalworking within the seasale districts was such as to promote a shifting pattern of mining settlement. In the early days of coalmining the workforce must have been recruited from a range of occupational groups, but farming communities both on and off the coalfield probably constituted the dominant source. Seasonal and long-stay migrants were arriving from parts of Scotland and the overcrowded and impoverished Border Dales by the close of the sixteenth century, and there are indications in the registers of settlers from even further afield, though their numbers may have declined over time as the coalfield became better able to generate its own manpower requirements. In the eighteenth century there is evidence of Durham and Northumberland pitmen moving to mines in other parts of Britain and by the opening years of the nineteenth century there are signs of a great deal of intra-coalfield mobility. A more detailed examination of the information sources than that undertaken here might reveal interesting differences in the demographic characteristics of early mining communities compared with those of the middle decades of the nineteenth century, especially with regard to mobility and family

size.[5]

In general, population growth was well sustained and able to furnish an increasing supply of pit labour in an expanding settlement pattern, but it could be periodically checked by extremes of mortality. The evidence of the Northern Durham registers suggests that some communities were more vulnerable than others to particular diseases. Many factors not yet fully researched or understood must have influenced the relationship between the proximate causes of demographic change and the wider economic and social environment in which change occurred, but the apparent speed with which parish populations recovered from high mortality episodes after 1600 suggests that Wrigley and Schofield's supposition, that the Malthusian positive check cycle of population change had all but disappeared in England by this date, also holds good at the regional level of Northern Durham.[6] Fundamental in signalling its demise was an adequate supply of food at reasonable prices for the majority of the population most of the time. These requirements were met in part by imports of grain, especially at times of local harvest failure and shortage, but there was also a considerable response from local agriculture such that by the seventeenth century it was providing a surplus of dairy produce for shipment and by the eighteenth a grain surplus, too, in some years. Enclosure had a vital role to play in this transformation; though it also directly helped to shape the pattern of coalmining in some areas and was intricately involved in the whole complex tangle of ownership rights in land.

The rather patchy nature of information sources on enclosures of an informal or piecemeal kind frustrates attempts to reconstruct a fully reliable chronology of the process overall, but the existence of two main waves of activity is beyond question: the seventeenth century saw the near completion of townfield enclosures in the lowlands while the period 1740-1810 witnessed the division of extensive areas of upland wastes by act of Parliament. However, the incidence of less formal or piecemeal enclosures, though incapable of accurate reconstruction and measurement, suggests that the true chronology was less accentuated. The existence of a growing market for agricultural produce, especially on the coalfield, and an active market in land, encouraged a commercial attitude towards farming which was everywhere advanced by land consolidation and enclosure. For the tenant, enclosure was seen to hold out the prospect of greater independence and rising farm output. For the landlord, there was the prospect of raising rents. This was sometimes done at, immediately in the wake of, or even in anticipation of, enclosure, but more often rents were increased progressively; once the obstacle of tenant-right had been circumvented, or in the aftermath of the husbandry and farm management reforms for which enclosure had paved the way.

In the seventeenth century the immediate achievement of enclosure was to ease the introduction of convertible husbandry, which Kerridge believes was the backbone of the agricultural revolution, and which most other scholars at least acknowledge as a vital ingredient.[7] Pastoral farming, traditionally the strongest element in Durham agriculture, showed immediate benefits from the new flexibility in

husbandry practice and this received a further boost in the eighteenth century when new crops were incorporated into the system -clover and other new grasses from the late 1720s and '30s, turnips only in the closing decades. By the opening decade of the nineteenth century livestock improvements in the region had advanced to a stage where, Hughes has suggested, their impact nationally was to be no less revolutionary than that of the spinning jenny.[8] The scale of renewal fine increases on ecclesiastical estates over the course of the eighteenth century, and rent rises found on lay estates more generally, strongly supports the view that agriculture experienced a substantial increase in productivity per man and per acre, and not just an increase in output from an expanded acreage. Such an outcome should not surprise us, perhaps, in view of the low level of population density and likely associated demands on agriculture in the county at the start of the coal era. The existence of mutually reinforcing developments in Durham agriculture from the mid-sixteenth to early nineteenth century shows that while agrarian capitalism might have generally flowered later and less spectacularly here than in other parts of lowland England, it took root early, on some farms by the sixteenth century, and possessed a particularly distinct and dynamic quality through its close links with industrial capitalism. This was certainly not an area where rent (or renewal fine) increases were simply a matter of seigneurial exploitation, as, for instance, appears to have been the case in North West England in the sixteenth and seventeenth centuries.[9]

Lest we should be in danger of overstating the achievements of

Durham agriculture, it is necessary to acknowledge evident signs of backwardness, or perhaps even of a regressive phase, in the second half of the eighteenth century. The tendancy, among some farmers at least, to respond more readily to the short-term dictates of the market than to pay proper attention to the capabilities of the soil and methods of enhancing its fertility, encouraged the growing of cereal crops to an extent which arguably was detrimental to the long-term interests of farming. The need to expand grain production was probably felt by the later years of the seventeenth century and as matters became even more urgent after c.1750, in the face of rising population numbers, extensive areas of upland waste were enclosed to grow more cereals, even though much of the land was to prove highly marginal and certainly better suited to improved or rough grazing.

The contrasts between the best and worst aspects of Durham agriculture powerfully reflect the variable impact of lordship. Nowhere was this more in evidence or more acutely felt, nowhere were the attitudes and decisions of landowners and the responses of their tenants more crucial, than on the seasale coalfield of Northern Durham. It was there that improvements in agriculture were most urgently needed but arguably most difficult to bring about because of the competing interests of coalmining, whether through active exploitation of the land, a legacy of dereliction or through its demand for investment capital. The case studies undertaken in chapter 7 reveal some of the different ways in which these conflicts over land use priorities could be resolved; how the transition from feudalism to capitalism as a landscape phenomenon might vary in its very nature, pace and intensity

from one locality to the next as an outcome of the diverse policies and actions of groups or individuals. It is equally evident that a fundamental feature of the transition was the way in which, with the arrival of capitalist coalmining, society began to reassess the value of the land and in so doing create a heightened sense of territorial awareness and possession. While the physical appropriation of space was pinpointed as a major variable affecting the colliery location patterns, the process which most demonstrably had this effect was, of course, enclosure: nothing was potentially more expressive of the change from feudalism to capitalism than the measure of independence afforded to a sizeable group of people who abandoned communal practices and obligations for holdings in severalty. In territories where coal reserves were known or thought to lie beneath the surface, an additional impetus was given to enclosure, but this did not inevitably lead to an early division of the land. Indeed, it was sometimes thought to be in the best interests of those exploiting the minerals, and who could exercise a powerful influence on the decision to enclose, to delay a division. Insofar as enclosure might clarify the vexed issue of property rights it was likely to work to the benefit of some and obvious disadvantage of others.

For Northern Durham and adjacent areas a series of spatial patterns has been reconstructed as figures 2.2-2.4, 5.1-5-3 and 6.2-6.4, and an explanation sought by examining the factors which may have affected or produced them. Since at any one level, or scale of investigation, each of the different factors or historical processes involved had its own

spatial logic, then each pattern, each map, may be regarded as a unique blend of several other interacting patterns. But equally, because of the way in which processes operate through time and space, it is also clear that each reconstructed pattern was to some extent dependent upon the others for its shape and dynamic: not only is our understanding of a colliery location map enhanced by consideration of another colliery location map preceding or following it, but also, in some measure, by a consideration of the patterns of population and enclosure. A full understanding of these patterns and the processes which created them can only come about by paying yet more attention than has been possible within the confines of this monograph to the motivations, attitudes and values of people whose decisions were instrumental in determining the period and place at which economy, society and landscape were transformed. Meanwhile, it would seem appropriate, in the light of the questions raised at the outset of this investigation, to consider some of the wider implications of our findings.

The wider perspective

The coal industry in the industrial revolution

How significant were the changes we have described; how important were they to the success of Britain's industrial revolution? The answer to this question depends largely upon the role we assign to the coal industry, and that in turn is conditioned by the way in which we define the industrial revolution. If the revolution is still to be seen, in conventional terms, as a national event focusing upon a cluster of

innovations in production technology and organization, backed by striking improvements in transport, or as a sudden break in long-run national economic trends, occurring in the half century after c.1770 or 1780, then the role played by the coal industry may well appear quite modest. It had a product which was of relative low value in relation to its weight, and a rate of expansion in output that compared unfavourably with the two industries that were leading sectors in Britain's 'take-off' into self-sustained growth: between c.1770 and 1810 the British iron industry experienced a ten-fold increase in output and the cotton industry a fifteen-fold, while the coal industry recorded a mere two and a half-fold rise (or a less than two-fold rise if the North East is considered in isolation).[10]

But this would be to misunderstand, or at very least to distort, the changes involved. In the half century or more since Nef produced his seminal work on the rise of the British coal industry, scholars have questioned the statistical basis of his findings and more generally challenged their validity as proof of an 'early' industrial revolution in the late sixteenth and early seventeenth centuries;[11] yet somewhat paradoxically, it may seem, much recent research has also served to reveal that economy and society in the early modern period were indeed more progressive or advanced than had been suspected hitherto.[12] While the notion of two separate industrial revolutions, as Nef's argument seems to imply,[13] may be unacceptable, so too is the idea of one concentrated solely in the late eighteenth and early nineteenth centuries. Instead, the industrial revolution is to be seen, first and foremost, not as an event but as a process, or more accurately as a

series of interrelated processes, operating over a considerable period of time, in the course of which economy and society were transformed from their pre-industrial state. Thus, while elements in the industrial revolution as conventionally understood should still be afforded a prominent role, they need to take their place alongside those whose chronology of change was very different. This means assigning a greater role not only to industries like coalmining but also to demographic and agrarian changes.

The need for this wider perspective is recognised by Wrigley, who suggests that the quintessential characteristic of the industrial revolution -the outcome of all these processes overlapping and interacting- was 'the occurrence of a substantial and progressive increase in real incomes per head over many decades to levels above those found in pre-industrial economies': an occurrence stretching back to the early seventeenth century and forward to the late nineteenth; and during the course of which, somewhat perversely, it may seem, a standstill or regressive phase coinciding with the period of the classical industrial revolution was flanked on either side by several decades of impressive growth.[14] All of which, of course, makes the term industrial revolution highly dubious: neither adjective nor noun appears any longer appropriate and the only compelling reason for retaining it is that it has become so firmly embedded in both popular and academic usage as to defy any attempt at excision.[15]

By taking a broader view of the industrial revolution, by acknowledging the existence of many interlocking facets of change, the

fundamental nature of the break with the past can be better appreciated. At its core was the development of what Wrigley has called an industrial inorganic system in place of a traditional -or merely modernized- organic system. That is to say, there developed a system which in the main involved -at least as far as the period with which this study is concerned- the increasingly widespread substitution of coal for wood in industrial production processes so that economic growth became dependent upon a fuel whose availability was conditioned by advances in mining technology rather than one hamstrung by the time cycle of woodland regeneration.[16] The date by which the changeover became technically possible or readily accepted by entrepreneurs varied from one industry to another, of course, as we noted in chapter 3. This 'revolutionary' new fuel was, for instance, being used in salt-making in the sixteenth century, in glass manufacture from the early seventeenth and iron smelting only from the eighteenth.

Coal was not just a raw material burned directly as a source of fuel in a growing range of industrial production processes, however. In order to respond to increased demand, the coalmining industry faced technological problems in whose solution lay some of the most far-reaching consequences for Britain's subsequent economic expansion. None was to be of more significance than the development of a method of draining water from coal mines. Though originally introduced into the Cornish tin mines, it was on the coalfields, in the Tyne and Wear districts in particular, that the Newcomen atmospheric engine, and the principles underlying it, were most severely tested and advanced in the

early and middle decades of the eighteenth century; so laying the foundations for steam power technology which James Watt and his contemporaries were to build upon with such success. By 1810 steam power had been applied to a wide range of machinery; though we must caution against an overexaggerated claim for its use by this date, for many industries were still tied to more traditional sources of energy provided by humans, horses, wind and, most especially, water.[17] The most striking new application of steam power technology came later, born of the need to carry coal. The locomotive was pioneered by Trevithick at Coalbrookdale in 1802, but experimented with and further developed in North East England soon after, and put to use on the Wylam, Heaton, Killingworth, Newbottle and Lambton waggonways by 1813 or 1814.[18] And once techniques of track construction became sufficiently advanced to support heavy locomotives, there occurred, from the late 1820s and '30s, a rapid expansion of the railways -the natural successors to the waggonways in whose development the North East had been so prominently involved.

The need to carry coal was also a major reason for the development and success of canals in the later decades of the eighteenth century and early years of the nineteenth, and while much attention has rightly focused upon this fact, it should not be forgotten that up to c.1810 the sea still remained the chief artery of national commerce with Tyne and Wear coal as one of its major items of trade. Indeed, one scholar has recently been moved to ask whether 'the movement of a rapidly expanding volume of coal from the north-east ... was any less important to Britain's economic development than the price-reducing productivity

gains achieved in the cotton industry'.[19] The collier fleet not only carried a large amount of merchandise (outwards, mainly coal and such items as glass bottles and agricultural produce; and inwards, a wide range of goods including grains), it also helped pioneer shipbuilding techniques, and served as a nursery for seamen whose skills were most valued during times of war.[20] While many coastal and overseas destinations were served by the collier fleet, it was the primacy of London which was most demonstrably strengthened: its population rose from around 250,000 in 1600 to 600,000 in 1700 and to just short of one million by 1800.[21] Its imports of coal (almost exclusively from the North East) for both domestic and industrial consumers showed an even greater rate of expansion, rising from about 70,000 tons in 1600 to nearly 450,000 in 1700 and 1,242,000 tons per annum by the opening of the nineteenth century.[22] London's growth, it has been suggested, was the most important single factor in England's transition from a regionally based subsistence economy to a nationally integrated exchange economy; a transition already well advanced by the late sixteenth and seventeenth centuries. If London was the 'engine of growth'[23] in the industrial revolution then coal from the Tyne and Wear colliery districts was arguably its most vital fuel.

By the date of the industrial revolution as conventionally understood, the coal industry was an old industry, and while not displaying spectacular growth in the years up to 1810 (other than during its initial boom period between the 1580s and 1620s), it appears to have possessed the capacity for expansion at near constant prices as

the need arose. Had it not been for a highly elastic supply of coal being available to substitute for inelastic supplies of other forms of energy (human-, horse-, wind- or water-power), then Britain's economic growth might have slowed down, or, according to Thomas,[24] even faltered, at a crucial stage in the 1780s. By the opening decade of the nineteenth century, the coal industry was no longer Britain's pre-eminent industry in terms of output, as it had once been, but it probably still ranked among the nation's top four with annual consumption per capita running at about 1.4 tons compared with less than 0.5 tons per annum up to 1700.[25]

Regional change and industrial revolution

The coal industry in North East England played an important role in fostering and sustaining the long-term transformation of the nation's economy, but does this also imply that the region itself underwent industrial revolutionary change? The discovery that there was considerable economic and social development in other regions of Britain in the two centuries up to c.1750 -reported in studies devoted not only to specific regional inquiry but also to the examination of major themes over wider geographical areas- clearly affects the way we view the experience of the North East. For instance, Wordie's recent suggestion that, contrary to earlier accepted opinion, there was a greater amount of enclosure activity in England in the seventeenth century than in the eighteenth, must imply, if correct, that the townfield enclosures of lowland Durham were less of a novelty than once thought, even though the motives and expectations behind them were

undoubtedly dominated by considerations of a local and regional kind.[24] Other studies emphasize how specific industries or groups of industries, tied essentially to the needs of external markets, succeeded in much the same way as the coal industry of the North East in promoting wider economic and social change within their regions; though the scale of their developments was generally of a lower order of magnitude. This was, for instance, the experience of the West Cumberland coal industry in the century before c.1760 and of the West Midlands metalware trades from the middle decades of the seventeenth century. Similarly impressive were the achievements of the domestic textile manufacturers of East Anglia, the West Riding and the Cotswolds, who, as participants in a process that has been dubbed proto-industrialization, produced goods in abundance for distant markets in the sixteenth and seventeenth centuries and in so doing transformed their local economies.[27]

But nothing has come to light on these or other aspects of change which may be judged sufficient to rob the North East of its pre-eminent role as an industrializing region in which 'revolutionary' elements were writ large long before the 1770s and '80s. Indeed, some findings serve to enhance rather than detract from its standing. For instance, Langton's study of coalmining in South West Lancashire shows that before the eighteenth century growth was even more sluggish than previous estimates have suggested.[28] By comparison, the Tyne and Wear colliery districts in the 1630s -despite the relatively restricted zoning of seasale mining and significant population expansion- already represented, in the opinion of the much travelled Sir William Brereton,

a region of impressive growth, with sophisticated financial arrangements, focused upon Newcastle, binding together the disparate threads of commercial, industrial and agrarian life to an extent that was perhaps unique outside London at this date. Almost a century later the achievements and relative standing of the region were yet more in evidence, as contemporary accounts again testify: Laurence extolled the virtues of agrarian reform while Defoe, Harley and Clerk praised the buoyancy of its commerce and were awestruck at the pioneering quality of its industrial technology and engineering. The early decades of the eighteenth century were indeed a time of notable success: the largest collieries were barely equalled anywhere in Britain for the size and specialisms of their workforce and for their levels of investment; and a broad industrial base was beginning to take shape with salt-making, glass manufacture, potteries, iron and steel works, shipbuilding and several other undertakings on the coalfield, and leadmining and the manufacture of linens and stockings in other parts of the region. It was a time when advanced forms of social organization were taking root, as exemplified in Crowley's iron works in the Derwent valley, and marketing arrangements were becoming highly sophisticated; a time when the promotion of industrial capitalism was being increasingly interlocked with agrarian and commercial capitalism through the personal and business activities of entrepreneurs and landowners.[29] The region stood in an unrivalled position.

After c.1750, and through to 1810, the pace of development accelerated; for instance, the combined vends of the Tyne and Wear rose

by about 125 per cent between 1750 and 1810 compared to scarcely fifty per cent in the previous 60 years; in leadmining the record of achievement was even more impressive.[30] Within Northern Durham a greater extent of territory, and more settlements, occupations and families, were drawn into the process of industrial revolutionary change than ever before. Yet when viewed in relation to what was happening elsewhere matters look different: the middle decades of the eighteenth century would appear to represent a climateric in the relative fortunes of the region as its onward march to industrial greatness was checked by the competiting experiences of other regions. Its salt industry collapsed in the face of competition from Cheshire; its coal industry was expanding less quickly than that of other coalfields so that its overall share of national output, though still prominent, was declining; and while iron manufacturing continued to grow on the coalfield and further flirtations with textile production were made off the coalfield, there could be no competing with the dramatic advances being made elsewhere, most notably in Lancashire, the West Riding and the Midlands. These were the regions most affected by technological and organisational innovations in textile and iron manufacture and a consequent growth in output; and by a more intensive exploitation of coal reserves made possible by a revolutionary mode of transport, the canal, which breached the physical and economic watersheds of England, opened up its heartland, and, in so doing, shifted emphasis away from metropolitan growth to an extent not before encountered. Meanwhile, North East England, for all its widespread seaborne contacts in coal and lead, remained wedded to London, in a

relationship which, since Elizabethan times, had been in some respects one reminiscent of 'colonial' dependency: a heavy reliance for its well-being upon receipts from the supply of raw materials (in this case almost entirely coal); the sometime employment of metropolitan capital to finance the exploitation of its resources; and a population which, though expanding quite rapidly, was highly concentrated geographically and inadequate to establish a broad and expanding base in consumer goods. Up to 1810, away from the immediate area of the Tyne and Wear coal districts and a few notable towns, eastern England, from the Scottish border to East Anglia, was a land still predominantly rural and thinly populated.[31]

A high degree of dependence upon trade in a single commodity -coal- meant that throughout the period of study the North East economy was highly vulnerable to periodic depressions, or disruptions caused by weather, warfare or labour troubles. Such contingencies alone could quickly destroy the region's normal, highly favourable balance of trade. And these, as we have seen, were not the only difficulties. Others were brought sharply into focus over the course of the eighteenth century: both intra- and inter-district competition among the coalowners increased; levels of capital investment needed to win and maintain a colliery mounted; and from the middle decades of the eighteenth century came the threat, perceived as potentially very serious, of being undercut by coal from other coalfields. Given these problems, in addition to those presented by physical constraints on mining, and it is little wonder that the coalowners tried to protect themselves behind the barriers of regulation and limitation. However,

protectionism was a double-edged sword, for while in the short term it may have safeguarded the market interests of the leading coalowners and thereby, directly or indirectly, the employment and welfare of thousands of workers, it may also have served to exclude or discourage the kind of new capital and entrepreneurial talent that would have more readily accepted the challenging need to diversify the economic structure of the region. In comparison with Lancashire and West Yorkshire, female employment opportunities and, in turn, household incomes, must have been especially hard hit by the failure to develop textiles or 'light' consumer industries. Instead, the region's economic progress continued to be measured by the performance of the coal industry. Without the single-minded pursuit of success in that field, William Cotesworth had warned in 1722, 'there is not a cob[b]ler that will not suffer greatly'.[32]

However, the North East region was not to suffer the crucially debilitating fate of other regions of early or incipient industrialization, such as West Cumberland, Derbyshire and Shropshire, whose growth was checked around c.1750 and never really recovered, or East Anglia and the Cotswold, which arguably experienced deindustrialization.[33] From the 1820s and '30s a frantic period of railway building allowed industrialization to break out from the narrow confines of the Tyne and Wear districts and the lead dales, to engulf nearly the whole of County Durham and a large portion of Northumberland. By the second half of the nineteenth century the region was thrusting once more towards industrial greatness with a

dramatic expansion of coalmining, massive iron and steel works, shipbuilding and engineering industries and the large-scale production of chemicals. Yet the economy was still narrowly based, and this time there was to be widespread neglect of agriculture rather than a record of considerable achievement in the face of industrialization which, as we have seen, had typified the period from the seventeenth to the early nineteenth centuries. The heavy industries were seemingly incapable of generating local spin-offs into secondary and tertiary activities to the same extent as had industrial developments in Lancashire, Yorkshire and the Midlands rather earlier in the nineteenth century. The North East's dependency relationship continued with metropolitan England in a way not characteristic of any other major industrial region except South Wales. And when in the twentieth century the products of the region's narrow-based economy were no longer needed, especially in the late 1920s and '30s, and again after the Second World War, severe hardship was experienced; and indeed, unemployment remains stubbornly unyielding to this day despite the regional aid palliatives of successive Whitehall governments and the 'neocolonialism' of a Japanese car manufacturer now ensconced at Washington. In the historical geography of North East England, the highs of economic fortune in the second half of the nineteenth century and the lows of the twentieth perhaps mirror, in some degree, the advances of the first two centuries with which this study has been concerned and the relative regional retreat of the late eighteenth and early nineteenth centuries. Throughout there survives an essentially dependent or peripheral relationship with the metropolitan core.[34]

In a recent publication, *Atlas of industrializing Britain*, a welcome attempt has been made to bring together the various approaches of the historical geographer and the social and economic historian. The outcome is a study which, while reflecting both the pleasures and pitfalls of interdisciplinary cohabitation, undoubtedly contributes substantially to our awareness and understanding of the patterns and processes of industrialization during the nineteenth century. Unfortunately, not even a start such as this has yet been made for an earlier period, though the authors acknowledge the need for some 'brave soul' to step forward and make an attempt.[35] A major difficulty at both a national and regional level is the inadequacy of pre-nineteenth century information sources. Yet provided the necessary time and patience can be devoted to finding and examining these often intractable sources, there is much of interest and importance to be gleaned. Within the present inquiry an attempt has been made through the use of a wide range of sources to further our understanding of the early industrial revolution as a regional phenomenon. It has been done by adopting an approach which although essentially that of an historical geographer also owes much, the reader may judge, to the empiricism and methodology of the historian. Such an interdisciplinary blend is not to be regarded as unquestionably meritorious; in the end it can have most value, perhaps, only if it paves the way for a new theoretical framework for understanding industrial revolutionary change; a framework which is capable of accommodating a rich variety of experiences at different scales rather than promoting rigid selectivity

of topic and sources in order to arrive at conclusions already conveniently anticipated. Some of the most valuable ideas upon which to build a new theory may be contained within the currently debated historico-geographical models of proto-industrialization, core-periphery, and 'colonial' dependency.[36]

NOTES

N O T E S T O T H E T E X T

Citation of references.

Manuscript sources. The names of record repositories and manuscript collections consulted in the preparation of this study are listed in the bibliography, together with their abbreviated forms as used in the notes. In the notes the names, reference numbers/letters of manuscript collections (as abbreviated) are usually followed by volume, box and/or bundle numbers/letters, as appropriate; and finally, where relevant, page, folio, paragraph or item numbers are given. In the case of manuscripts housed in the North of England Institute of Mining and Mechanical Engineers at Newcastle-upon-Tyne, volume numbers are often preceded by a shelf number. Thus 'NEIM Watson 10/11/5' means the Watson collection on shelf 10, volume number 11, page 5. There are exceptions to this arrangement, however: the Buddle collection is numbered by volume, without shelf number ('Buddle 21/10' means the Buddle collection, volume 21, page 10) while for some bound colliery plans, shelf and volume numbers are one and the same thing ('Watson (MP) 30' means bound maps and plans in the Watson collection, volume/shelf 30). The method adopted throughout aims to ensure that references are as clear as possible, given the variety of cataloguing practice encountered at the various record repositories and the need to avoid excessive footnoting.

Printed sources. All but a few of the secondary sources consulted in the preparation of this thesis are cited, in full, in the bibliography; in the notes they are identified by author's surname and date of publication only, followed by page references where appropriate. Printed editions of contemporary manuscript sources are cited in full in the bibliography, by abbreviated title and page number(s) in the notes.

Chapter 1. Introduction

1. BL Add 38331/121. The reference is to Billingsgate, site of the London coal exchange until 1769. See Flinn 1984, 278; E. Hughes 1952, 159.

2. Guelke 1982, 189-96, esp. 190; and see also Collingwood 1946, esp. 213-15. The approach is criticized in Watts and Watts 1978, 123-7.

3. The point is neatly put by Teilhard de Chardin 1970, 39: 'I do not pretend to describe them [phases in our geological past] as they really were, but rather as we must picture them to ourselves so that the world may be true for us at this moment. What I depict is not the past in itself, but as it must appear to an observer standing on the advanced peak where evolution has placed us.'

4. There is now an extensive literature devoted to exploring the purpose and practice of historical geography. See, for instance, the following works and references cited therein: Baker 1972; Baker and Billinge 1982; Baker 1976, 169-82; Pacione 1987, esp. 16-45.

5. Hartwell 1966, 3.

6. Philpot 1975, 19-46, esp. 45.

7. See, for instance, Wrigley and Schofield 1981; J.A. Goldstone 1986, 1-33; and the contributions to a special issue of the Journal of interdisciplinary history 15, no. 4 (Spring 1985) entitled 'Population and economy: from the traditional to the modern world'.

8. For contrasting views of the relationship between organizational change and technical change in agriculture, compare Chambers and Mingay 1966, esp. 77-105; Kerridge 1967, esp. 15-40; Jones 1967, esp. 6-17.

9. Rostow 1963, esp. 53-5; Deane and Cole 1967, 182-92, 221-9 and 262.

10. Nef 1932, I, 165-89; Nef 1934, 3-24.

11. See, for instance, Williamson 1964; Richardson 1969; Palmer 1976; Pollard 1973, 633-48; Pollard 1980; Everitt 1977, 1-20; Langton 1979a, 1-3, 242; Lee 1981, 438-52.

12. See, for instance, Atkinson 1969; Lewis 1970; Cromar 1976, 1977 and 1978.

13. McCord 1979, 21.

14. Rowe 1971, 156-74; Brassley 1974 and 1984; Macdonald 1979, 5-21.

15. But see Hodgson 1978; Smith and Purvis 1982, 3-15; Pain and Smith 1984, 2-6.

16. Smailes 1960, esp. chapters 8 and 9. Further reference to both the particularist investigations and more general accounts so far completed, is made in the notes below and in the bibliography.

17. Appendix to Sixteenth Report of the Deputy Keeper of the Public Records (London, 1854), 54. The problem of record preservation encountered in 1854 was not a new one (as indeed the report itself made plain). Spearman, in his Enquiry of 1729, noted (p. 103) that: 'The Repository or Office of Custos Rotulorum, where the Records of the County were anciently kept, is so moist, mouldered

and decayed that most of the Ancient Records are either lost, eat by rats, or destroyed.'

18. Several instances of documents being lost by these means were brought to my attention during the preparation of this study. A further regret is that some surviving archival collections relating to the activities of leading landowners and entrepeneurs on the coalfield have not yet been made available for scholarly inspection.

19. M.W. Hughes 1970, 227.

20. See esp Darby 1960, 147-59; Darby 1962a, 1-14; Darby 1962b, 127-56; Baker 1972, 15; Mackenzie 1966. In a quite recent collection of essays in historical geography (Baker and Billinge 1982) eleven topics were subjected to a diachronic treatment while only four embraced a synchronic approach.

21. Prince 1971, 1-86, but esp. 23. And see also Harvey 1969, 11; Harley 1982, 261-73, esp. 271.

22. Chapman 1979, 10. For a fuller discussion on the meaning of 'process', see Harvey 1969, esp. 127-9, 483-5 and 419-31; and Baker and Billinge 1982, 192. According to Langton (1972, 136), 'the distinction between structure and function and between function and process are bogged in a semantic morass'. Note also Mead's wry comment: 'as epistomological discussion has sharpened the concern over ambiguity has deepened.' Mead 1980, 292.

23. Langton 1972, 126-79; Baker 1972, 17.

24. Langton 1979a, 30. It is interesting to note that geographers appear more overtly preoccupied with the need to underpin their historical investigations with methodological considerations than do historians. Indeed, while acknowledging the merit of Langton's substantive, empirical findings on the coal industry of South West Lancashire, a less sympathetic attitude prevails among historians towards his very attempt at 'methodological scaffolding'. See, for instance, W.R. Garside's review in EcHR 34 (1981), 52-3.

25. Berkhofer 1969, 231-2; Baker 1972, 16-17.

26. Baker 1972, 17.

27. Guelke 1977, 1-7, and esp. 6. See also Baker and Billinge 1982, *passim*; Lowenthal 1964, 241: 'The everyday life of man on earth is seldom far from our professional concerns.'

28. Darby 1960, 147-59.

29. Broek 1932.

30. Harris 1961.

31. Bowden and Koelsch 1972, 214-16. See also 'Introduction' in Baker, Hamshere and Langton 1970, 13-25; Postan 1954-5, 98-100; Finberg 1969, 77-8; Swanson 1969, 171; and Flinn 1980, 141-2. For a more appreciative view of the efforts of historical geographers in subjecting historical sources to geographical analysis with the aid of maps, see Mingay 1980, 72.

32. Jones 1963-4, 571-2.

33. Ibid.

34. Langton and Morris 1986, esp. p. xxiii.

35. Harley 1982, 271; and see also Langton 1979a, 2.

36. Gregory 1978, 104. On the idea that with each step taken towards limiting our inquiry some interesting or important aspect of a solution may be ignored, see Berlin 1960-1, 1-33; and Langton 1979a, 3-4, 260.

37. On the other hand, Gibson probably relied upon Armstrong for much of his detail other than the collieries and waggonways. See John Strawhorn, 'An introduction to Armstrong's map' (copy in DUL); Laxton 1976, 49-50. On both the need for and difficulty of achieving satisfactory description, see Relph 1981, esp. 183-4: 'The truth of landscapes ... lies ... in understanding their unique character. This character we can convey only through careful description. There is nothing easy or trivial in making ... a description. Indeed it constitutes one of the hardest yet potentially most rewarding tasks we can set ourselves.'

38. This view is shared by others. See, for instance, Wrigley 1987, 1-17.

39. Broek, 1932; Harris, 1961.

40. Robinson 1982, 87; and see also Harvey 1968, 71-9; Harvey 1969, esp. 36-43; Olsson 1968, 115-32; Olsson 1969, 14-34; Olsson 1974, 50-62; Prince 1971, 21-2; Langton 1972, 126-79, but esp. 138-40; Baker 1972, esp. 15.

41. Baker 1976, 169-182.

42. Personal communication as reported in Baker 1972, 15; and see also Lawton 1987, 259-83.

43. See, for example, the set of essays in Meinig 1979.

44. Harris, 1961; Roberts 1987.

45. On the importance of this approach historically, see Cosgrove 1985, 45-62.

46. Yi-fu Tuan, 'Thought and landscape: the eye and the mind's eye', in Meinig 1979, 89-192.

47. Haggett, Cliff and Frey 1977, 6-10, esp. 9.

48. Harvey 1969, 485.

49. Quoted by Mead 1980, 299.

50. Gregory 1978, 146. See also Guelke 1977, 1-7; Baker 1979, 561-63; and Mead 1980, 292-302.

51. Harvey 1968, 71-9; Lawton 1982, 99-113.

52. Harvey 1969, 352; and see also ibid., 383-4.

53. Ibid., 452 and 484; Langton 1972, 127-79.

54. The term *Northern Durham* is preferred to *North Durham* since the latter can be used to refer to that part of north Northumberland (the districts of Bedlington, Island and Norhamshire) which constituted detached portions of the Bishopric of Durham. Lapsley 1900, 20 and 157n; Galloway 1898, 55.

55. See below, chapter 3, note 58.

56. For further implications of this arrangement, see chapter 6 above, pp. 214-7.

57. All that survives of an intended Northumberland return of 1563 is a headed, but otherwise blank, sheet. BL Harl 594/187-91.

58. The county is defined for present purposes (figures 1.2, 1.3 and elsewhere in this study) as the traditional county or Bishopric of Durham, exclusive of detached portions in Northumberland and Yorkshire; that is, the county as it existed prior to the radical boundary changes of the early 1970s. This area has been variously estimated at between 622,476 acres (Whellan 1856, 77) and 699,626 acres (Return of Commons and Common Field Lands, 1873, British Parliamentary Papers, sessions 5 Mar - 7 Aug, 1874). In this study I have taken 649,433 acres to be the best estimate, after Stamp and Hoskins 1963, 102.

59. Janelle 1968, 5-10; Langton 1979a, 241-2: 'It is this 'expansion' of geographical space as one regresses back in time that makes the analysis of regional patterns and processes vitally necessary in the study of economies and societies of the past.'

60. Witness the comment by Smiles 1904, p. vii: 'the locomotive ... virtually reduced England to a sixth of its size.' And see the sources cited in note 11 above.

Chapter 2. Colliery location patterns, 1551-1810

1. Hutchinson 1787, 447 and 451.

2. For further comment on this point, and the problems of pattern reconstruction in general, see Langton 1979a, 35, 249; and Beckett 1981, 227-9.

3. Towards the close of the eighteenth century two words in particular became synonymous with good quality household coal: 'Main', after the High Main seam, and 'Wallsend', location of a Tyne northbank colliery (N49) from which large quantities of best quality coal were extracted. These words became passwords to successful marketing, and so producers quite naturally were tempted to adopt them. Thus a Tyne south-bank colliery opened near South Shields in 1810, and sunk within the confines of a manor owned by the Dean and Chapter of Durham, was variously known as Chapter Main and Manor Wallsend. When, at the close of our study-period, Edington (1813, 72) drew up a list of coal prices for the Tyne and Wear, he omitted a cluster of colleries on the Wear altogether, because, he alleged, their names had been changed so often, and their prices so altered of late, that to ascertain their present selling prices was beyond his power. For further comment on changes of colliery names, see also Galloway 1898, 388-9.

4. In figures 2.2-2.4, I have erred on the side of caution by referring to collieries working in a particular decade rather than throughout. For comment on the spasmodic working of mines on the South West Lancashire coalfield, and for a rather different approach to the mapping of data, see Langton 1979a, 38-9, 85-6, 136-8, 140-2 and 147-9.

5. With reference to developments on the Warwickshire coalfield, for instance, Grant has concluded that Nef was too ready to 'assume that if a colliery was in existence, it must also be in production, and if it produced, say 25,000 tons in one year, it must produce 25,000 tons every year'. Grant 1982, 331. See also, note 12 below.

6. On the merits and shortcomings of the port books as an historical source, see Woodward 1973, 147-65.

7. This brief survey of the medieval industry is based upon the following secondary sources: Dunn, 1844, *passim*; Hair 1844, 30; Galloway 1898, esp. 51-6, 62-75; VCH Durham, II, 320-5; Blake 1967, 1-26; Dobson 1973; Lomas 1973; Wilcock 1979, 5-16. The following primary sources were also consulted: DUPD HC/misc. book M66/65; CC/244145/survey of Whickham; CC/Assize roll 223, 27 Hen. III; CC/box 23/220203/arrears of Pontificate of Bishop Cuthbert Tunstall (1530-49). Some originality can also be claimed for the mapping and interpretation.

8. Lomas 1973, 134-9; Galloway 1898, 55

9. At Gateshead, for instance, mines valued at £222 in 1572/3 were already said to be worth £48 per annum in 1510/11. In south-west Durham, the pits at Raby, Grewburn and Hargill were leased for £180 by 1524. DUPD CC/188771/Receiver-General's accounts, 1510/11; CC/190203/ Receiver-General's accounts, 1572/3; Galloway 1898, 105; Lomas 1973, 134-9.

10. An indication of the size of Newcastle's foreign trade was given in 1377/8 when 158 ships from six West European ports of origin were recorded as carrying off 7,320 chaldrons (probably c.6,500 tons) of coal. It met a variety of demands, especially in Zeeland and Holland: from smiths and limeburners; driers of madder; smokers and driers of fish; and also from brewers. Most of this coal probably came from the pits at Gateshead and Whickham, or on a less regular basis perhaps, from those at Winlaton. Blake 1967, 8-9.

11. Galloway 1898, 73. A 'sea-coal lane' was to be found in London as early as 1228. Blake 1967, 11.

12. In arguing a case for a rapid advance in output from the mid-sixteenth century, Nef has been criticised for placing too heavy a reliance upon the veracity of a few scattered pieces of information from port books and customs accounts of the 1550s and '60s. See, for example, Coleman 1975, 46-7; and the debate between Coleman (1977, 343-5) and Kerridge (1977, 340-2). Moreover, Mott (1962, 235) maintains that 'the date for the rapid advance in shipments from Newcastle can be put at 1580 rather than 1550-60'. It should be noted, however, that Nef himself admitted that 'there came in the decade 1580-90 a great demand for coal'. Nef 1932, I, 146. In fact, recent research findings by Dr John Hatcher (presented to a conference of the Economic History Society, Norwich, April 1988) lend support to Nef's conclusions regarding an early surge from the 1550s or '60s, amounting to a threefold increase by the 1590s. The important point to stress,

of course, is that expansion began from a relatively small base.

13. In 1599, for instance, we find an order being passed in the Court of Aldermen 'touching the bringing of sea-coal from Sunderland to London' and 3,000 chaldron being subsequently shipped. CLRO Reps 25/250.

14. On the relative fortunes of Newcastle and Sunderland in the Civil War, see Compounding Records, *passim*; Moller 1933, 473; Howell 1967, 131. In April 1644 the Newcastle coal interest was said to be much alarmed by the report of about 120 ships riding in Sunderland harbour in readiness for carrying coals. Howell 1967, 158n.

15. PRO E134 29 Eliz., East. 4. The figure of 20,000 tons for Winlaton is suggested by Nef and seems about right. Nef 1932, I, 26. Where, in the text, reference is made to the progress of this or other collieries and no footnoting is made, it can be assumed that the relevant sources are those listed in appendix 6.

16. The information does not exist upon which to base an unequivocal statement of proportions at the various dates but the evidence in the sources -some quantitative, but mostly qualitative- leads inevitably to this conclusion. My judgement, based mainly upon the sources cited in appendix 6, is not substantially at variance with that made by Nef (1932, I, 361n). As a measure of the south bank's predominance, note that of several mines to be found within Whickham manor the Grand Lease colliery (S15) alone probably accounted for one-fifth to one-third of the entire vend of the Tyne in the last decade of the sixteenth century. BL Harl 6850/39.

17. The word royalty is used in this study to describe the mineral estate or territory available for working a colliery. See appendix 3 for further clarification; and also chapter 3, pp. 94-102, and chapter 4, pp. 128-65, where its implications for coal exploitation are explored more fully.

18. Hostmen's Records, 59.

19. PRO Durham 2/9 (Harding v. Barlowe); and E134 3 Chas. I, East. 11. Clearly, there were dangers in going too far inland. In 1611, for instance, mines at Chopwell (S2) were adjudged practically valueless 'by reason ... carriage is far from the water'. PRO E178/5037.

20. DUPD CC/box 20/220629/memo. and queries re. value of manors of Gateshead and Whickham, leased 1582. For further detail on Whickham's fortunes see chapter 7, pp. 254-8, and figure 7.4.

21. DCL Hunter 22/17/'A Particular Note...' [1636]; Lewis 1970, 118; DRO Lo/F/136; NRO ZCR/6/additional survey of Chester-le-Street manor, 1647; DCL Sharp 167/Bishop Cosin's survey, 1662, pp. iii and 85. Income from fines on the renewal of colliery leases were especially uncertain where, as in the case of the Bishop's estates, the leases tended to be granted for three lives rather than for a specified number of years (usually twenty-one). In fact, it appears that in order to boost his income, Cosin attempted to enforce a renewal of the Stella lease before it expired, a quite expected procedure when one of the three people upon whose lives it was granted had died, but he had met with opposition in the form of Mr Bewick, one of the 'chief partners', who maintained that 'he might have a Life renewed for a Butte of Sack, as Bp Morton forsooth promised'. Ibid., 85.

22. A lease of 1607 contained the same restriction. From 1635, £1 6s. 8d. per annum was charged 'for every pitt wrought', and at the same time the certain rent (paid whether any pits were worked or not) was raised from £5 to £6 13s. 4d. per annum. DUPD CC/186598/1/lease of 1607; CC/notitia 54001/559; DCL Sharp 167/Bishop Cosin's survey, 1662, 85 and 172.

23. The Newcastle hostmen were a powerful group of merchants and colliery owners who, in the period up to c.1700, held a near monopoly of the production and shipment of coal on the Tyne. For further detail, see chapter 4, pp. 135-41. Both Nicholas Tempest and Henry Maddison who took Stella Grand Lease in 1615 (plate 1) were hostmen.

24. NRO ZCR/6/additional survey of Chester-le-Street manor, 1647; DCL Hunter 22/17/'A Particular Note...' [1636]; and Sharp 167/Bishop Cosin's Survey, 1662, 173. By the early eighteenth century the colliery's 'improved value' (its worth per annum) was said to be '£1300 or more'. DUPD CC/notitia 54001/537.

25. DCL Hunter 22/17/'A Particular Note...' [1636]. In the Civil War the colliery was seen as a 'very casual and uncertain estate' with a yearly value of just £600. Compounding Records, 273. For details of the innovations at Ravensworth see chapter 3, pp. 83, 92.

26. Sunderland appears to have achieved little prominence as a port prior to c.1620; as late as 1614 it could be claimed that Hartlepool, though a 'poor town', was the only port of any note in the county. Burnett 1830, 11-12.

27. PRO E134 9 Charles I, Mich. 11; and Durham 4/I/533; Compounding Records, 388-94; PRO SP16/506/59 (Mansell's evidence).

28. By c.1590 Robert Bowes was investing heavily in Offerton colliery

(W5). Some of the coals were taken down the Wear to Sunderland to fuel the salt pans which he had erected there for boiling down sea-water. CalSPD Addenda 1580-1625, 327.

29. PRO SP16/502/77-8 refers to Lambton and Lumley having the 'best coals in the country ... known for their goodness at London as well as here'. See also Welford 1884-7, III, 289; Galloway 1898, 166-7.

30. In 1644 coals taken at Lambton and Lumley were valued at £20,000. Kingdomes Weekly Intelligencer 47, 6-13 March 1644, p. 380. At this stage in the war Lumley Castle was occupied by troops. See Howell 1967, 158n8.

31. North (1740-2) 1826 edn., I, 277.

32. ActsPC 1623-25, 362 and 487. The request was for leave 'to carry theire coals to the said river [Wear] by the wayne and carte wayes now used by the owners and farmers of lyke coale mynes thereabouts ... which they are denyed and barred of.' The petition was refused because revenue due to the Exchequer was at stake: the Council would not allow a boost to the Sunderland coal trade, which paid no duty, at the expanse of the Newcastle, which paid 1s. per chaldron. See also Lewis 1970, 89.

33. Lease details, and evidence in the parish registers suggesting the creation of pit hamlets, support this conclusion. See the discussion in chapter 7 above, pp. 250-4, for further detail; and also Leister 1975, 17-20, where the date for the commencement of seasale coalmining is said to be 1599, plus or minus eight years.

34. NRO ZCR 6/additional survey of Chester-le-Street manor, 1647, 8-9.

35. Ibid.; DCL Hunter 22/17/'A Particular Note...' [1636].

36. NRO ZCR 6/additional survey of Chester-le-Street manor, 1647, unpaginated section.

37. Ibid.

38. Ibid.

39. The comparison is made between the mean overseas vend for 1673-8 plus 1680 (seven years in all) and the ten years 1730-9.

40. Harley Journeys, 106. A further threat to undermine the dominance of Newcastle was posed by the practice at Sunderland of giving free or 'gift' coals to the shipmasters over and above the quantities they might have been favoured with on the Tyne. This

was known as 'Sunderland measure'. For evidence of the practice, see, for instance, NRO ZCE/10/3; GPL Cotesworth CK/3/71; and E. Hughes 1952, 160. The division between the two mining districts was quite sharp and was reflected in differences in seam nomenclature (see above, pp. 78-9) and the ownership of collieries. Attempts were made to forge ownership links: in the sixteenth century the Hedworths of Harraton on the Wear had coal lands at Saltwellside on the Tyne while in the early eighteenth century the Liddells of Ravensworth established an important foothold in the Wear district, particularly through their interests in North Biddick (W4) and Birtley (W30/S30) collieries. More important were the partially successful attempts to forge alliances between the two rivers. See Manders 1973, 132; and the discussion in chapter 4 above, pp. 151-64.

41. The vend accounted for by the Wear averaged 324,975 tons per annum for the six years 1725-7 and 1729-31, or 30.06 per cent of the Tyne and Wear vends combined. The shortfall on the Tyne in 1728 appears to have been due to an interruption in shipping, and possibly coalworking, prior to the introduction of a regulation of the vend. See above, pp. 149-50.

42. Since some vend figures used in this analysis are good estimates rather than actual totals there may be a tendancy for the data to be more, or less, bunched than was the case in reality. I think it unlikely that this occurs to any significant degree, however.

43. In the context of the South West Lancashire coalfield, for instance, Prescot Hall colliery, which probably achieved an annual output of 15,000 tons by 1735, was regarded as vast. Langton 1979a, 85-9, 93, 273n. But note the exceptional achievement of Howgill colliery in West Cumberland which in 1728 raised 54,931 tons. Beckett 1981, 230.

44. See the discussion above, pp. 27-32, and appendices 1 and 5.

45. About 430,000 tons in c.1636 compared to 997,000 in 1728 (or 1,068,000 tons in c.1728 allowing for the shortfall in 1728 as such by taking the mean of the seven years 1725-31).

46. The same tendancy towards negative skewness is found if regular class intervals are used; for example, 1-10, 11-20, 21-30, 31-40, etc.

47. In fact no fewer than twenty of these locations are recorded only after 1680.

48. Twelve, rather than eleven, north-bank collieries would be the correct number if Scotswood (N20) were to be included in the calculation. Unfortunately, the sources are ambiguous about the

existence of a separate colliery at Scotswood. The settlement of Scotswood, by the river Tyne, was well served by staiths, and it may simply have been an outlet for coals from Kenton colliery (N21).

49. Elswick, Byker and Heaton were among the first collieries to apply the Newcomen engine to drainage problems in the early eighteenth century. See figure 3.9 and appendix 11.

50. Cotesworth CG/9/32/Fenwick's Report; CK/2/307-462/leadings from Gateshead leased mines, 1692-c.1709. The adoption, by 1718, of a Newcomen engine at Gateshead Park (appendix 11) met with little success.

51. GPL Cotesworth CK/2/1-23, 56-306, 463-542.

52. Although Stella Grand Lease recorded the highest vend of any Tyne colliery in c.1700, partners in the undertaking had agreed to take action to revive the colliery only as recently as 1697 because, or so it was alleged, it provided little profit being 'nearly wrought out'. NEIM Buddle 14/212/'Numbers of collieries anciently on Tyne ...' [c.1700]; DRO D/Lo/F 141.

53. GPL Cotesworth CK/3/22,31,43; CG/7/10; CK/7; E. Hughes 1952, 171.

54. Dunn 1844, 20; NEIM Buddle 14/212/'Numbers of collieries anciently on Tyne...' [c.1700]; NRO 725/F2; NEIM Johnson 4/2; Cromar 1978, 200. The surface area of Beckley estate was just 188 acres. For at least a part of its life a double shift was worked at the colliery. NRO 309 GA/memo. book 1727; NEIM Watson 10/33.

55. DCL Sharp 167/Bishop Cosin's survey, 1662, 172-6; DUPD CC/box 112/189802; CC/notitia 54001. There would appear to have been a significant, if modest, rise in the fortunes of Pittington landsale colliery in the early eighteenth century. Thus by 1724/5 the lease renewal was set at £45. DUPD (PK) DC/audit and contract books (from 1660).

56. DUPD CC/notitia 54001/547.

57. Galloway 1898, 390-1. This depth was reached at Jarrow Temple Main (S83) by 1803 and Willington (N50) by 1805.

58. For the year 1810, or thereabouts, Bailey (1810, 15) suggests that Washington Usworth sent 28,000 tons to the Tyne and 92,400 tons to the Wear. For further details of the colliery's relative reliance upon the two rivers as outlets for its coals, see NEIM Buddle 12/78 and 83-275; Buddle 18/II/1; and Buddle 23, *passim*. For evidence of spatial and economic integration on the South West Lancashire coalfield, see Langton 1979a, 130.

59. If 'possibles' are included in our calculations (as opposed to only 'certains' and 'probables', as defined in appendix 6) the figures would be fifty, sixty-five and seventy-six for the three dates respectively.

60. The case of Chapter Main is exceptional insofar as it is the only known example of a colliery classed as 'working in one decade' which in reality worked for just one year of that decade.

61. Lumley (W9), too, appears to have worked over a long period, stretching back to the early sixteenth century, but it was subject to periodic stoppages which in one instance may have amounted to more than two decades (c. 1741-66). In 1776 Lumley colliery was specifically referred to as 'an old one though sometimes unworked'. Beastall 1975, 23.

62. NEIM Buddle 5/78-80.

63. DUPD CC/notitia 54001/546.

64. Ibid., 539 and 569.

65. Flinn 1984, 26.

Chapter 3. Factors affecting colliery location patterns, 1551-1810: demand and supply considerations

1. CalSPD 1629-31, 222/Sir Edward Nicholas, secretary to the Admiralty, to Sir Henry Mervyn, 30 March 1630.

2. NUL SRMisc 10/JCLB/10-11/James Clavering to Henry Liddell, 13 June 1712.

3. For further information on the pie-charts, including calculations on which they are based, see appendix 9.

4. Clearly, it is not possible to know with absolute certainty that the data plotted in figures 3.2a-s are sufficient to reveal meaningful trends. Examination of the port books is a very time-consuming and not always rewarding experience. I have supplemented my own searches by drawing upon the findings of other scholars whose work is acknowledged in notes and appendices as appropriate. Although a more thorough investigation than any attempted so far would undoubtedly provide further valuable detail, we should still be left with an imperfect understanding of the pattern of North East trade owing to the patchy nature of document survival, especially for the earlier and later years of the study period. See Woodward 1973, 147-65; Willan 1938, 145;

and appendices 1 and 4 of this study for further comment.

5. The nature and extent of the wood shortage in England, dating from Elizabethan times, has been the subject of some debate among historians with Hammersley and Coleman, in particular, seeking to demonstrate its limited significance. See Hammersley 1973, 593-613; Coleman 1975, *passim*; Coleman 1977, 343-4; and the contrasting views of, for instance, Nef 1932, I, 190-223; Wrigley 1962, pp.1-16; Flinn 1962, 4-5; and Kerridge 1977, 340-2. On balance, contemporary evidence suggests a quite serious timber shortage. In 1590, for instance, it was claimed that 'all country villages within 20 miles of the sea are mostly driven to burn these coals, for most of the woods are consumed and the ground converted to corn and pasture' Salisbury Calendar, XIV, 330. It should be borne in mind, however, that coal was long regarded as a dirty and inferior substitute for wood so that the changeover, even when speedily made, was often seen as a matter of necessity rather than choice. In the early eighteenth century 'people of the first quality' still preferred to use wood in their domestic hearths. Willan 1938, 61, citing H. de Vaudroy Misson, Memoirs and observations (1719), 364.

6. BL Harl 7009/9. The breakthrough was, in most cases, not long delayed. It was in 1635, for instance, that Sir Nicholas Halse received a patent for using sea coales for 'sweet and speedy drying of Mault and Hoppes'. Nef 1932, I, 215.

7. London experieced rates of growth and levels of population that were not matched elsewhere in Europe; supplies of coal from the North East must represent a major factor in explaining that growth. See Wrigley 1967, 44-70; and for details of the size of London's population, see R. Lawton, 'Population and society, 1730-1900', in Dodgshon and Butlin 1978, 325, 331, 359n33; and Darby 1973, 385.

8. RepRCC 1871, III, 14-26; Ashton and Sykes 1929, 238-9.

9. For a contemporary view, see BL Stowe 326/20, where it is alleged that in 1628 London alone received six times the aggregate amount of coal reaching all other towns on the east and south coasts. For later views, see Nef 1932, I, 79-83; M.W. Hughes 1970, 230; Deitz 1986, 158. It should be borne in mind that while London acted as a distribution centre for 'the country on both sides of the Thames' it also shipped out or 're-exported' small quantities of coal from time to time. For instance, 647 and 980 chaldrons were shipped out in 1689 and 1694 respectively. The port books generally do not allow this activity to be detected for London or, indeed, any other receiving ports. Moller 1933, 329.

10. There had been an expansion in the use of coal for brick-making

even before the Great Fire but the pace accelerated thereafter despite attempts to save on fuel in the kilns by mixing coal ashes with street sweepings or clay. An increase in the use of North East coal in London arose not only from the demands of the builders and other industrial users; it also met the needs of occupants of newly-built brick houses for safe and hotly-burning fire-coals. Petty 1690, 99; Defoe 1726-38, I, 35; Nef 1932, I, 217; Finch 1973, 68; Atkinson 1965, 48.

11. The recession appears to have set in during the late 1680s and was still much in evidence in 1700. Povey 1700, 43: 'A true description of the lamentable state of the Newcastle trade would appear almost past all belief.'

12. By c.1600 Newcastle coal was already being shipped 'from thence to land's end in Cornwall'. PRO SP15/61/85. For further comment on the extent of the market area, see Willan 1938, 62; Willan 1976, 32-5, 48; Finch 1973, 67; Moller 1933, 323.

13. In 1730 Great Yarmouth received 261 shipments from Newcastle and 82 from Sunderland; in 1749 the numbers were 78 and 646 respectively. See appendix 7a. For information on Sunderland's trade in the first four decades of the seventeenth century, see Hall 1933, 110-1, 199-200, 215-7.

14. PRO Durham 4/I/533; Compounding Records, 275, 388-96; PRO SP16/502/77-8. But not all Wear coals were popular: in 1732 coals led by Allen and Hedworth (from W1/2 and W10 respectively) were regarded as altogether too soft and tender for the London market. Beastall 1975, 19. During the earliest days of exploitation in c.1590, it was believed that around Sunderland the coals in general would 'serve to none other use, than for the making of salt'. BL Lans 52/20.

15. SPLum BC/6/1.

16. Compare (in appendix 7c) the absence of shipments in 1710 with the numbers found in two years which were free from hostilities: forty-two shipments in 1682 and sixty-seven in 1721.

17. For further comment on privateering, capture of ships and attempts to protect the collier fleet by sailing in convoy, see Davis 1962, 51-2, 315; Kent 1973, 37.

18. PRO SP12/241/75: 'such coals as strangers do fetch from Newcastle ... are accompted the worst sort'; BL Lans 71/13: 'the basest that are gotten ... are only sold unto strangers, (for no English man will buy the same).'

19. Hall 1933, 123. In 1619 Newcastle hostmen who had mingled 'one

third part of low-prized ... with two thirds of their good coales ... and sold them so mingled for the best coals, and at the best prices' were 'censured, fined and imprisoned and their abuses ordered to be published by reading of the same decree two-several market days at Newcastle'. PRO SP14/162/20. There is no shortage of evidence on the practice of 'mixing'. In the summer of 1622, for instance, the shipowners, London brewers, woodmongers and chandlers maintained that great abuses existed at Newcastle 'in the mingling of good and badd coales together' while in 1623 it was claimed that coals which were 'most fowle and unmerchantable by themselves ... were therefore mingled on the wharfe with coales of the best seames and sold therewith for the best'. BL Add 12496/87-8; and BL Rawl C784. In their defence the hostmen declared that 'great and continual charges' had been incurred in employing at least two hundred persons daily to 'purge the coals'. PRO SP16/133/20. The coalowners also allegedly spend £5,000 in law suits to prevent a patent for the surveying of coal with a view to allowing the sale of only the superior grades. PRO SP14/126/20. For further comment on the practice of mixing, see Beastall 1975, 16; Moller 1933, 666; Nef 1932, II, 245-6; and NEIM Buddle 15/192 regarding complaints in London in 1807 about dirty coal from Hebburn.

20. See below, chapter 4, notes 52 and 53.

21. According to William Cotesworth, who had an eye on both the local and export market, 'as the seames are of several dipths and sortes so are the veines of each coal, some proper for smiths where only ye strongest caker is sought for, and others of a lesser strength are fittest for Brewers, Glass, Sugar Baker(s), Lime, and those that are still more open are the most coveted by the housekeeper.' GPL Cotesworth CK/3/133/'Reflections on ye Coale Trade ...'. But this still left excessive amounts of coal which were adjudged too bad even for local use. In 1623 it was claimed that 'About 58 thousand greate Chaldrons of ... bad coals' [about 122,000 tons] had been 'yearely digged more than the Salt Panns and Lyme Kells could yearely spend' and that desperate attempts had been made to vend and ship them by practising 'deceiptfull mixture'. BL Rawl C784. For further comment on the different grades of coal, see Nef 1932, I, 112-3; and II, 95, 215, 241-7.

22. Pilbin 1937, 301-14; Ridley 1962, 145-62. The balance of trade between North East ports and elsewhere was such that in normal times the majority of ships returning to the Tyne and Wear were loaded with ballast for which there was no ready market and in consequence the channels in both rivers were liable to suffer from indiscriminate dumping despite regulations forbidding such practices. See, for example, PRO SP 12/263/72; SP 16/224/17; Howell 1967, 29-32; Nef 1932, I, 31; and II, 126-7.

23. Nef 1932, I, 165-89; and for further comment, see chapter 8 of this study, pp. 299-305.

24. Inclusion in our calculations of appropriate estimates for landsale collieries, whose coals, it will be recalled, were intended solely for local consumptions, would inflate these totals yet further. In the first decade of the nineteenth century, for instance, we learn from Bailey (1810, 27) that the Durham landsale collieries produced in all some 147,080 chaldrons (205,912 tons) per annum.

25. NEIM 18/GAPB/59: '11 May 1730. Ordered that Thursday in every week be a Fire coal day at each Colliery & coales be sold to the Pittmen for 12d & the Country at 1/6d p. fother. Pittmen who are householders to be allowed 8 fothers [about seven tons] p. year and no more at above price.' By way of compensation for coals being worked beneath, or carried across, their lands, Durham copyholders were said in 1736 to have 'what fire-coal they wished in their houses at 8d per fother' whereas other people paid 18d. PRO E134 9 Geo. II, East. 11. Cheap coals for pitmen, and houses purposely built for 'the use of colliers', were a feature of Harraton colliery (W3) by the mid-seventeenth century and were probably more widely encountered. Moller 1933, 258, citing English Reports, II, 826. See also Flinn 1984, 32-5 and 424-5.

26. One coalowner calculated that it took about twenty-six tons of coal per week to run a Newcomen engine. NEIM Buddle 25(I)/21. See above, pp. 82-5, for a fuller discussion of the adoption of the Newcomen engine. For a brief but useful general survey of technological advances in coalmining, see Atkinson 1968, *passim*.

27. E. Hughes 1925, 334-50; Pilbin 1935, 22-8; Ellis 1980, 45-58; Willan 1938, 115n.; Mitchell 1919, 160; Nef 1932, I, 176-7, 207; and II, 17; Howell 1967, 21 and 288-9; Galloway 1898, 64-5. On the speed of the changeover, see Wrigley 1962, 1-16.

28. Brereton (1635) 1844 edn., 88.

29. DUPD Grey misc. book 6/Westoe manor surveys, 1535, 1564 and 1640. In 1713 there were said to be 142 salt pans at South Shields and 29 at North Shields, and a similar number twenty years later. NRO ZCE 10/2/'The number of salt pans ... 1713'; PRO T64/232.

30. Rowe 1976, 63. Contemporary accounts suggest that it took at least six to eight tons of coal to make one ton of salt at Shields. Brand 1789, II, 22; CalSPD 1644-5, 98-9; GPL Cotesworth CP 2/131 and CM 2/776; GPL Ellison B/5/1 and 4; NEIM Watson 5/9/5.

31. CalSPD Addenda 1580-1625, 327.

32. SPLum BD/2/agreement of 1727. Anyone failing to respect the arrangement was liable to a penalty of 2s. 6d. per chaldron.

33. At this time 'pancoal' could expect to fetch around 5s. to 5s. 6d. per chaldron, 'glasscoal' 8s. 3d. to 8s. 6d. and 'shipcoal' 7s. 6d. to 9s. 6d. NEIM 18/GAPB/16, 35, 39-40, 43 and 62; NEIM 18/Peck's View Book/55-6; PRO FEC1 W26/1/11.

34. Ellis 1980, 45-58; Bailey 1810, 295. The decline of the industry on both rivers can be traced in lease renewal fines paid on Dean and Chapter estates at South Shields and the Wearmouths from 1660. DUPD (PK) DC/contract books, 1660-1734 and 1734-1829.

35. PRO SP 14/162/63; Hartshorne 1897, 426-31. By 1624 Mansell was claiming that he sent nearly 4,000 cases of glass per annum from Newcastle. A probably more reliable record, in the port books, suggests that for 1655, 2,776 cases were shipped coastwise. Howell 1967, 20-1, 186 and 287n1; PRO E190/192/11.

36. SPLum BD/2/agreement of 1727; Mander 1973, 76-7; Ridley 1962, 145-62; Nef 1932 I, 181-3 and 218-9; Mitchell 1919, 152-3; Smailes 1960, 136-7; Pilbin 1936, 31-45.

37. At Adair's Main (N9) in 1804 the smallest coals, suitable for the salt industry, sold at prices ranging from 8s. to 12s. per chaldron while coal for the glasshouses or overseas customers fetched from 13s. to 18s. 3d. NEIM Buddle 23/42. For prices in the early part of the eighteenth century, see note 33 above.

38. Parson and White 1827-8, I, p. lxxxii. But note that some authorities suggest, without detailing the evidence, that growth was either halted or reversed in the second half of the eighteenth century, after which renewed expansion led to the region becoming, by the 1840s, the largest glass producer in the country. Atkinson 1968, 71; Rowe 1976, 63.

39. Bailey 1810, 289; and Ibid., 299-300 for exports in 1776 and 1779. On 30 Sept. 1789, '26,400 empty glass bottle' were shipped out from Sunderland to Amsterdam. PRO E190/289/4.

40. Though not, apparently, for want of trying. Several references to attempts at making 'coaks' survive for the eighteenth century. Nef 1932, I, 248-9; Atkinson 1968, 62-3. A trade in 'cinders' soon developed, as is evident from entries in the port books of the early eighteenth century. Moller 1933, 681-2. A map of 1737 shows 'cynder staiths' on the Wear (figure 3.11). The use to which these cinders were put is unclear but London brewers were almost certainly among the customers.

41. Bailey 1810, 288; Atkinson 1968, 71.

42. Smailes 1950, 325-31; Flinn 1953-5, 255-62; Flinn 1962, 75; Manders 1973, 66-7. There was, of course, an expansion in the local market for iron goods, especially in shipbuilding, and, for a while at least, the construction of bigger and sturdier salt pans. Nef 1932, I, 175n. The traditional abundance of beech and oak woodland in the Derwent valley was still recalled at the opening of the twentieth century, long after the coal and iron industries had depleted the reserves; old inhabitants were apparently prone to utter a piece of dogeral which began: 'From Axwell Park to Shotlee, A squirrel could jump from tree to tree'. F.W. Nicholson, 'Notes on the history, geology, and entemology of the Vale of Derwent: Shotley Bridge', Vale of Derwent Naturalist's Field Club, 5 (1905), 49.

43. In c.1710 the German sword-makers were under contract to supply the whole of their output to the Gateshead entrpreneur, William Cotesworth. Most of the company dispersed soon afterwards: in 1719 there were only twelve left and by 1754 just eight. The reason for their dispersal was alleged to be 'German laziness and arrogance'. E. Hughes 1952, 59-63; Flinn 1953-5, 259-60.

44. Young 1770, III, 13.

45. By deed of 8 April 1691, Thomas Tempest, Edward and Sir William Blackett, and Dorcas Anderson, leased to Ambrose Crowley, London ironmonger, for 99 years, a water corn mill and fulling mill, wayleaves to Swalwell and Blaydon, and four acres at Winlaton with power to 'erect smiths' shops, engines &c.' DRO CG 19/34. Among the collieries known to have supplied Crowley's works with fuel were Byermoor (S38) and Blackburn (S19). NEIM 18/GAMB/37; NEIM Buddle 14/14. The population of Winlaton rose rapidly during the early part of the eighteenth century. See above, p. 185.

46. Nef 1932, I, 192. Tyneside is said to have made great quantities of ships' metal fittings in the eighteenth century. Davis 1973, 303.

47. Defoe (1724-6) 1971 edn., 536.

48. Nef 1932, I, 173-4, 236-7, 390-4; and ibid., II, 24-27, 95-9; Rowe 1976, 65-6; Moller 1933, 666; Howell 1967, 286; Gardner Papers, 58, 60, 69, 72 and 81; Davis 1962, 35 and 91-4; Ashton and Sykes 1928, 199-200; Finch 1973, 72; Bailey 1810, 295, 298. In 1587 there were said to be 180 ships belonging to Newcastle while in 1610 the hostmen claimed that there were '300 sails of serviceable ships of 300 tons or thereabouts apiece ordinarily resorting to the port of Newcastle'. Welford 1884-7, III, 45; BL Lans 169/17.

49. Bailey 1810, 295-6; Taylor 1858, 61.

50. Manders 1973, 81-2; Nef 1932, I, 173 and 387-9; Bailey 1810, 27; Smailes 1960, 146n. Of course, not all vessels built in the region were intended solely or even mainly for the carriage of coal. In the 1780s, for instance, Sunderland was said to possess 'a number of small sloops of 20 or 30 tons burthen, that carry about 10,000 tons of lime from this port in the summer season'. Bailey 1810, 297.

51. This account of basic geology is drawn mainly from the following sources: Eastwood 1953; Hopkins 1954, 289-313; Hull 1905, 197-210; Johnson 1970, 3-25; Smailes 1960, 19; Hickling 1949, 10-30; Dunn 1844; Fordyce 1860, 8-10.

52. Dunn 1844, 2; Fordyce 1860, 9; Hull, 1905, 197-8.

53. Bailey 1810, 31. In fact, a plan of Tanfield Moor in 1761 (see figure 7.12) reveals two dykes, the 'Mounset Great Dike with a downcast to the south of 20 Fathoms or more' and, near the southern boundary of the moor, the 'Dipton dike with a downcast to the south 20 Fathoms'.

54. Bailey 1810, 29-33.

55. NRO ZAN M17/197/a-c.

56. Atkinson 1968, 11. As early as 1623 we find the Newcastle coalowners being accused of 'workeinge away the Walls and Pillers in old Pitts'. BL Rawl C784. At Bucksnook and Lintz colliery (S42) in August 1726, 580 tens of coal were said to have been taken away 'more than should have' from five working pits; at the Spring pit alone as much as six yards had been taken out to a bord rather than the recommended four yards. NEIM 18/Peck's view book.

57. NEIM Buddle 34/55.

58. As late as 1790 a speculator at Whitburn, George Brook(s), who had already squandered £3,000 in the hope of finding coal, was still being wooed by the Bishop of Durham's steward with a view to renewing his lease and continuing his boring and sinking operations. DUPD CC/notitia 54001/610; and NEIM Buddle 20/38: 'Mr Brook complains of having expended 3000£ in Borings & c.' In fact, the coal was buried too deep for exploitation until well into the nineteenth century. Evidently, Mr Brook had not availed himself of the services of one of the 'master-borers' of the North East who, according to Gabriel Jars, knew the nature of the seams in an area twenty miles around Newcastle to a depth of one hundred fathoms and were experts in exploitation. Jars 1774-81, I, 182-4.

59. Galloway 1898, 390 *et seq.*; and NEIM 18/9/plan of the rivers Tyne and Wear, by W. Casson, 1801, where reference is made to the High and Low Main as 'two seams sixty fathoms apart .. each two yards thick ... of a most excellent quality'. Note, however, that at some collieries in north-west Durham in the first half of the eighteenth century -for instance, Northbanks (S57), Ewhurst (S43), Collierly (S44), and Bucksnook (S42)- the 'Top seam or best seam' was said to be that lying *between* 'ye Maine coale [the High Main] and the Brass Thill seame [the Main]'. See NRO 725/F3, 24-32; and 725/F7, 12-21; and the sources cited with figure 3.7. A report of borings at Beamish in 1738 sought to dispell one source of confusion regarding seam nomenclature thus: 'At Wear Water, the above Seam of Coal called the Hutton Seam, they call the Low Main Coal, and the above seam called the Low Main Coal they call the Hutton Seam. So that it's just the reverse twixt the Rivers Tyne and Wear.' DUPD Shafto 1450/1/4.

60. GPL Cotesworth CK/3/133/'Reflections on ye Coale Trade...' [c.1710].

61. PRO E314/111/16-19; E321/14/76; E178/5037; StaCha 8/53/10; Northumberland CH, IV, 173n.

62. GPL Cotesworth CK/3/133/'Refections on ye Coale Trade...' [c.1710]; Galloway 1898, 248; Dunn 1844, 43.

63. Jars 1774-81, I, 182-4; NEIM Watson 5/9/1 and 8/10/145-6; Galloway 1898, 282-3.

64. Galloway 1898, 309 and 390-1.

65. The failure of the coalowners to provide sufficient ventilation shafts to drive out bad air was one of the principal grievances complained of in 1662 when the miners in the Tyne district came together in what was arguably the first major organized display of worker solidarity against the owners. Fynes 1873, 9-10. About this time, at Lumley colliery (W9), the pitmen discovered that by throwing lighted coals down the shaft every morning before descending, the damp was made to 'discharge with a great noise'. This was regarded as preferable to allowing a build up of gasses and the consequent threat of a major catastrophe. Birch 1756-7, III, 441.

66. Atkinson 1968, 21; Galloway 1898, 271-3, 290-4. Failure to control the air supply to part of the workings at Lumley colliery (W9) is said to have caused the explosion in 1799 when thirty of the thirty-eight men and boys in the mine were killed. Beastall 1975, 42. Benwell colliery which fired in c.1643 is said to have burned for fifty years. Galloway 1898, 163-4.

67. Atkinson 1968, 16-18; Atkinson 1965, 432. Examples of windvanes are depicted in Hair 1844, opposite pp. 11 and 31.

68. See, for instance, NEIM 18/Peck's view book/proposals to work Gateshead Fell, 1718; GPL Cotesworth CG/9/32/Thomas Fenwick's report on Gateshead manor pits, 1697; Brand 1789, II, 290n, for the drowning of two Wear collieries in 1648; and PRO SP16/180/59 for claims that 3,000 tens of coal per annum had been lost at Whickham in the 1630s because of inundations.

69. It has been claimed that three-quarters of all patents issued in England between 1561 and 1668 were connected with coal industry, either directly or indirectly, and that one-seventh was concerned with the drainage problem alone. Mason 1953, 217.

70. Galloway 1898, 162-3 (for Delaval's opinion); Primmatt 1667, 26-7; Sinclair 1672, 298-9; Agricola (1556) 1912 edn., 188 et seq.; Atkinson 1968, 23-7; and Lewis 1970, 120, citing Sheffield City Library, Wentworth Woodhouse Muniments, BR 72/2,6,8,10,19.

71. Atkinson 1968, 23-7; Atkinson 1965, 425-34.

72. Mott 1962-3, 69-86; Atkinson 1968, 26. Farey (1827, 307-8) argued that with the Newcomen engine three-eighths of the fuel was wasted. Significantly, it was coal-deficient Cornwall which experienced a rapid replacement of the Newcomen with the Watt engine. Rolt 1963, esp. 135. A calculation of 1752 showed that over a 24-hour period a Newcomen or 'fire' engine could draw 250,560 gallons of water, a horse only 67,200 gallons; and that the Newcomen would be cheaper (by one-sixth) to maintain or keep. Raistrick 1936-7, 153-4.

73. Despite the early acquisition of a Newcomen at Tanfield the royalty does not appear to have been successfully exploited for seasale until the 1730s and '40s, and then as two separate collieries (S52 and S76).

74. BRL BW Box 3L/letter, W.H. Lambton to J. Watt, 4 June 1796: 'my agent is a very unintentional and at all events a most repentant pirate'. See also, Tann 1980-1, 95-109. It seems likely that some supposedly authentic Newcomens introduced by 1733, the date at which the patent expired, were in fact pirated copies. Raistrick 1936-7, 133; Mott 1962-3, 72.

75. Galloway 1898, 276-7, which also includes reference to a unique 'steam-and-horse-ventilating-and-winding-engine', introduced at Wallsend (N49) in 1769.

76. For further comment on the number of recorded adoptions for the

North East compared with other industrial regions, see Kanefsky and Robey 1980; Kanefsky 1979.

77. NEIM Bell 15/1; Dunn 1844, 41; Rolt 1963, 120; Farey 1827, 233-4.

78. Of thirteen collieries believed to have acquired Necomen engines by 1728, only six (or possibly seven) were among the thirty Tyne and Wear mines vending in that year. Elswick (N10), with a vend of 17,925 tons in 1728, had a very checkered history of operations being rewon in c.1712 after a long period of closure, and then suffering a further setback which was only temporarily relieved with the purchase of a first 'fire' engine in 1718. E. Hughes 1952, 153. Byker (N25), which vended 26,500 tons in 1728, had two engines by 1722 and acquired four more in the 1740s. See appendix 11a.

79. Thus while our map (figure 3.9) may be at fault in making no allowance for redundant engines, it is important to remember that there may not have been many of these anyway. Even with some of the earliest and least efficient Newcomens, it was thought worthwhile to adapt and improve rather than scrap them altogether. Mott 1962-63, 70, 72 and 85; Needham 1962-62, 3-58 but esp. 14; Stowers 1962-63, 87-96. The improved performance of the Newcomen was signalled at Walker colliery (N12) by 1763 when an engine with a 74" cylinder lifted water through 534 feet to an adit. Mott 1962-63, 82.

80. At Gateshead pits in the 1770s, for instance, it was necessary to use a Newcomen or similar pumping engine sixteen hours in every twenty-four. GPL Cotesworth (OR) Box CI/B4. The sinking of Hebburn 'A' pit in 1792-4 necessitated drawing off 3,000 gallons per minute. Galloway, 1898, 309. See also Raistrick 1936-7, 153-4; and note the comment by Hair 1839, 7n: 'the quantity of water drawn off from the mines, by their means [use of steam engines], is almost past belief ... for every bushel of coal consumed, 21,500,000 lbs. of water was raised one foot high.'

81. According to Sir Robert Southwell, addressing the Royal Society in 1675, the cost of transporting coal three hundred miles by water was normally no greater than that of carrying it fifteen or twenty miles by land, and in the case of the Newcastle-London trade no greater than the cost of carrying it three or four miles by land. Birch 1756-7, III, 207-10. In 1667, when it was proposed to fetch coal from King's Lynn to London via the rivers Cam and Lea, the connecting land link between Cambridge and Ware was to cost £1 to £1 5s. 0d. per chaldron, or three times as much as the ordinary freight from Newcastle to London. CalSPD, 1667, 268. In the mid-nineteenth century, Green (1865-6, 103n) claimed that the price of coal doubled over a distance of two miles by land.

82. Nef 1932, I, 390-1.

83. On the problems of Sunderland harbour, see DRO D/Lo/X2/report of Robert Short, 1784; and J. C. 1708, 52.

84. Newcastle claimed, and generally held, control over the river Tyne along a twelve- to fourteen-mile stretch from Sparhawk, at its mouth, to Hedwin streams, a short distance upstream from Newcastle itself. Howell 1967, 24-34. On the use of keels, see Bailey 1810, 27; Nef 1932, I, 388-9.

85. Jars 1774-81, I, 201; GPL Cotesworth (OR) BS/3/24/plan of Derwenthaugh, 1724; Lewis 1970, 161. Note the depiction of coal spouts, both with and separate from staiths, on Burleigh and Thompson's map of the Wear in 1737 (my figure 3.11). In 1666, Sir Thomas Tempest leased to Sir George Vane, for 21 years, a 'stone staith' at Stella which was regarded as superior to, and commanded a higher rent than, the more common wooden structures. DRO D/Lo/F136.

86. J. C. 1708, *passim*; Atkinson 1968, 27; Ashton and Sykes 1928, 10-11. On the employment of horses see E. Hughes 1952, 252-4; Ashton and Sykes 1928, 62. At Rainton in 1804, Ralph Arkley, then aged 75, said that he began working 'with driving horses at eleven years old' at the Dean pit, and that some pits had horses whilst others were too low and used trams instead. NEIM Buddle 5/66-77.

87. Parl. Surveys II, 82.

88. Note, for instance, the view of William Brown in 1777, when supporting plans for a new winning at Lumley colliery (W9): '... by having a Wagon way much trouble and expence will be saved and by that means Materials may at all times be got whereas it is only in Summer that carts can go on bad Roads.' Beastall 1975, 28.

89. NEIM Buddle 14/251-400/coal trade evidence, 1739.

90. Green (1865-6, 187-8) suggested that for a colliery one mile from the Tyne a waggon might daily carry from twenty-five to forty tons of coal to the staith while a cart or wain could seldom move more than five or six tons.

91. Smith 1958, 115-53.

92. For 22 October 1645 the Whickham burial registers record the deaths of two chidren of 'wedow Howborne at waggon yate in the Leige [field]' while for 9 April 1650 there is mention of John Craggs being 'slaine in the Leigh in a sinking pitt near the waggon way'. See also Compounding Records, 321, where there is reference in 1652 to a 'wayleave through Baldwyn Flatt for waggons

and horses to carry coals to the river side'. Lewis 1970, 119, suggests that this line probably disappeared during the Commonwealth but in fact it is further referred to in the enclosure documents of 1672-7. See DRO D/St 25/107/articles of agreement, 1672; DUPD HC/copy award M.6; and my inset map in figure 7.4 for the location of the line. In citing the above evidence, account is taken of the important distinction between a waggon which always meant a railed vehicle and a wain (or cart) which was a road vehicle. Lewis 1970, 92-4.

93. There were probably two built in or by this date; one to the north bank from Chester colliery (W1/2), and the other to the south bank, possibly from Penshaw (W6) and with provision for an extension to Rainton (W7). Brand 1789, II, 125; DRO D/Lo/F 338-40/wayleave leases to Jane Wharton, 1693-1703.

94. Most gauges were between 3′ 10" and 5′ 0". Lewis 1970, 181-3.

95. Lewis 1970, esp. 110-25.

96. Only one example of a triple way is known for certain; it was ordered to be built for the much-congested Tanfield Way a year after its opening in 1725. NEIM 18/GAPB.

97. On Tanfield Moor the many branch lines accounted for nearly one mile compared to the seven or so miles covered by the main waggonway which ran to the staiths at Dunston and Redheugh. See my figures 7.11 and 7.12; and NRO ZAN M17/197c/64 and 76.

98. The Tanfield way had no fewer than 490 waggons in 1727 so that one passed along every three-quarters of a minute. NEIM 18/1/6. For some other estimates of traffic density, see Lewis 1970, 204.

99. In the early days the maintenance of tracks and waggons was undertaken by the colliery operator or his agent; by the close of the eighteenth century the work was almost always entrusted to contractors or 'keepers'. A calculation of 1712, itemizing transport charges likely to be incurred by the proprietor of Tanfield Moor colliery (S10) if he used the Bucksnook waggonway, estimated the cost of repairs to 'wayes and waggons' at 14s. per ten of coals, compared to £1 6s. 3d. for the cost of leading, 6s. for wayleave and staithroom charges and £1 12s. 0d. for the actual working and raising of the coals from the mine. GPL Cotesworth (OR) A/5/18. On the costs of building and maintaining waggonways, see above, pp. 116-7, and Lewis 1970, 176-7, 192, 203, 209, and 216-24.

100. Waggonways were also employed on the longer hauls underground. NEIM Johnson 4/2/report on Gateshead Fell and Park collieries, 18 July 1782: 'we recommend at present put the coals to a crane and

from thence to the shaft by a waggonway when the distance exceeds 200 yards.'

101. See, for instance, the discussion above, pp. 145-54, regarding the activities of the Grand Allies.

102. The need for good quality coal was especially important in a 'sinking trade' such as that which typified the closing years of the seventeenth century and opening decades of the eighteenth, but this could place an extra burden of cost upon a colliery operator like James Calvering who, as William Cotesworth explained in 1714, was forced to build many branches to his waggonway in order to 'seeke out the best coal in the different partes' of his Chopwell grounds. NUL SRMisc 10/JCLB/173; NRO ZCE 10/2.

103. Towards the close of the seventeenth century there were, according to Edington (1813, 133), upward of seven hundred wains and carts employed in leading coals through Whickham parish to Derwent Gut. Dunn (1844, 19) suggests upward of six hundred. For other examples, see Galloway 1898, 156; and Hostmen's Records, 146.

104. Cited by Lewis 1970, 120.

105. The way was only built after much agonising by the proprietor. Evidently, it was believed that by allowing much greater quantities of coal to be trasported overland than had been the case with carts and wains, the waggonway might merely serve to exacerbate the problem of excess capacity at a time of sluggish markets. The decisive factor in ensuring its construction and eventual success was the realisation that there would always be a ready market for the generally high quality coals that were to be found in abundance at Northbanks. DRO D/St/v36 and St/Box 128.

106. Lewis 1970, 145, citing Encyclopaedia Britannica, 2nd edn. (Edinburgh, 1778), III, p.2043.

107. NEIM 18/GAPB/10.

108. See, for example, B.Q. Andersson, in Kongl. Swenska Vetenskaps Academiens Handlingar, 37 (Stockholm, 1776), 308 (cited by Lewis 1970, 154); Loveday (1732) 1890 edn., 172; Hutchinson 1787, II, 423; Brand 1789, II, 306n. For contemporary detail on the building of Causey Arch, see DRO D/St/v30; GPL Cotesworth (OR) BT/4/24.

109. The colliery vended well from 1772 to '77 and again between 1802 and 1808, exceeding 20,000 chadrons (53,000 tons) per annum; in 1797, however, the vend fell below 13,000 chaldrons and little profit was anticipated for 1798. NEIM Buddle 20/39; Watson 8/20.

110. Dunn 1844, 52; Atkinson 1968, 52; Bailey 1810, 34-5.

111. Loads may have doubled between 1645 and 1810. In practice, we know that the amounts carried increased, from between 33 and 40 cwts. towards the close of the seventeenth century to 53 cwts. by the opening of the nineteenth. Lewis 1970, 203; Atkinson 1968, 48-51.

112. With labour in short supply, poaching of workmen often occurred. See, for instance, pp. 193-5 above, regarding the situation in 1805-7.

113. Indeed, failure to acquire the necessary rights for building a waggonway was sometimes regarded as a serious impediment, or total bar, to seasale working. See note 128 below.

114. Bainbridge 1878 edn., 117-28; Redmayne and Stone 1920, 8-12.

115. NEIM Johnson 4/2/'A view of Lanchester Moor colliery, 12 February 1744'. In practice, the barrier had reduced in places to 40 yards or less by 1788. GPL BRA/box 19/305/15/Lanchester colliery counterpart lease, 24 December 1788. Once sublet, the area referred to in the above sources was sometimes worked as four separate enterprises (S46, S47, S49, S50).

116. In Whickham parish the peculiarities of ancient custom encouraged the making of outstrokes and, effectively, the establishment of apex concessions. PRO E317 Durham 8/87/Whickham survey, 1649: 'Their is a Costome, generally belonging to the Colemines or Collieryes in the said p[ar]ish of Wickam, that it shall be lawfull for the occupiers of any Colliery, to digg, or myne into or through, the freehold of any other p[er]son, unless hee or they shall by a pitt sunck, in his or their owne ground, Countermine, or Thurle, into their workes, and thereby let or hinder them and not otherwise.'

117. See, for instance, the discussion in chapter 7 above, pp. 264-81.

118. Encroachments into another colliery's territory could hasten its closure and prevent a successful re-opening, as appears to have happened at Bucksnook (S42) after c.1740. NEIM Buddle 3; and Buddle 21/88-90, where it is argued that 'the sole advantage seems to have been winning by stealth.'

119. J. C. 1708, 24; Birch 1756-7, III, p. 439.

120. NEIM Buddle 20/13/Edington's report on Blackburn colliery, 1789: 'The colliery was won by virtue of a Fire Engine erected in Ravensworth grounds.' In like manner the 'hitherto drowned mine' of Harraton (W3) on the Wear was, in 1645, reported to be 'drayned

... and water free and for like to be as long as Lambton shall drawe water and can work'. PRO SP16/506/59.

121. NEIM Buddle 20/45. On taking a view of Byker colliery (N25) in 1745, it was recommended that ten acres of coal should be left as a barrier to prevent water coming in from Heaton wastes (N24). Raistrick 1936-7, 140.

122. NEIM Buddle 20/45. In fact the colliery does not appear to have worked again for seasale up to 1810. See appendix 6.

123. Raistrick 1936-37, 152-3.

124. SPLum BC/5/356, 355, 357, and 358; BC/7/letter book, 1796.

125. In the lordships of Ryton, Stella and Winlaton, freeholders under the Bishop of Durham apparently relinquished all claims to ownership of minerals. PRO Durham 4/I/497. It would appear that at Lumley, at the start of Charles I's reign, three mining adventurers connived with the lord of the manor, Sir Richard Lumley, to deny yeomen the coals under their freeholds. PRO Durham 2/24/Fotherley and other v. Walker and others. Any mining adventurer without an unassailable title risked eviction without compensation. In 1610 Anthony and Roger Errington found themselves in this predicament at Denton (N6) when their right to mine was challenged by the Earl of Northumberland on the one hand, and the Crown lessees on the other. PRO SP16/58/17. Generally, it would seem that in County Durham copyholders on the Bishop's manors, and customary tenants on lands where the Crown held, or had held, important lordship rights, were not allowed to work the coals under their holdings without specific grant. DUPD CC/box 217/245030A/General view of the tenures in the Palatinate of Durham, 1887; DUPD CC/box 218/legal opinion of Mr Thos. Bootle re need of tenants to be granted licence to work coal, 1747; PRO E178/5037 (re. Crown mines, 1611).

126. See, for example, NEIM Buddle 20/13/Edington's report on Backburn colliery, 28 November 1789: 'Wayleaves are almost impossible to obtain without consent of Sir Hen. Liddell & Prs because they have all the lands of Ravensworth to the east towards the Wear and the Manor of Whickham to the Tyne'; and also NEIM Buddle 5/55-65/report on Rainton colliery, 4 June 1804: 'Sir Henry [Liddell's] and Lambton's grounds completely shut the communication between this colliery and the River Wear and I am not aware that the coals can be shipped anywhere else.' Difficulties for the mining adventurer could be exacerbated by a clause found in some early colliery leases which permitted the lessor to re-enter the premises if the lessee failed to work the colliery for as much as a year. Compounding Records, 165. See

chapter 4, note 49, for some details of wayleave costs.

127. Nowhere, it would seem, were matters more complicated than on or about Tanfield Moor. See the discussion in chapter 7, pp. 278-81.

128. NEIM Buddle 21/256-61/report on Stella Grand Lease colliery [in Ryton lordship], 24 July 1809: 'It is to be remarked that this colliery does not possess the usual facilities of working for, as the greatest part of the 1400 acres of workable coal which it contains lie under the ancient copyhold, into which no trespass can be made for the purpose of winning and working coal and over which no waggonways can be laid without agreement for wayleave and pit room from the proprietors of the said ancient copyhold, it follows that the colliery must either be wrought to a great disadvantage or that the leasee must pay a full equivalent to the proprietors of the ancient copyholds for the necessary priviledge of working and leading coals over their premises in either of which cases the ordinary working charge must be considerably increased.' On the powers of the Whickham copyholders with regard to wayleaves and carriage rights, see PRO Durham 4/I/107 and 228; PRO PC2/29/60; DRO D/CG 7/256-9; and D/St Box 25; E. Hughes 1952, 5-6, 16-8; chapter 5 above, p. 203; and chapter 7, note 17 below.

129. NCA Common Council Book 1718-43, 8, 15 and 52; ZAN M 17/197a/45; NEIM 25/2 and 8; Lewis 1970, 115-7. The matter caused much concern to the Newcastle coalowners who, from 1674, made repeated moves, but without success, to get a bill through Parliament which would 'lay or throw open' waggonways; that is, to effectively abolish or limit wayleave (and staithroom) charges. See Hostmen's Records, 134 and 151; GPL Ellison A/35; NUL SRMisc 10/JCLB/157; E. Hughes 1952, 158; Lewis 1970, 137, 141-2, and 160. The English Privy Council established a formula, adopted later by the Chancery Court of the Palatinate of Durham, for settling disputes over wayleaves and colliery drainage: appointed commissioners were empowered to procure 'just and reasonable' recompense for landowners while remembering that their chief priority should always be to safeguard the public interest for 'fewell' as well as 'his majestie in his customes'. PRO Durham 4/I/107 and 228; PC2/31/718; 32/487-8,499; 33/66; and see above, chapter 7, pp. 255-6, regarding the dispute at Whickham in 1619-21.

130. The term coalowner was so widely used to describe the coalmining entrepreneur in the North East that it has been adopted in preference to any other for use in this text.

Chapter 4. Factors affecting colliery location patterns, 1551-1810: economic structures and spatial strategies

1. Gardner (1655) 1796 edn., 205.

2. Except where otherwise referenced, this survey of the marketing system is drawn from the sources listed with figure 4.1.

3. Defoe 1726-38, II, 11.

4. Keelage and fittage charges assumed importance from the end of the sixteenth century when coal could no longer be loaded at the staith directly into sea-going vessels.

5. In 1675 Sir Robert Southwell went so far at to maintain that 'one year in three is time of war'. Birch 1756-7, III, 207-10.

6. As early as 1590, 'excessive gains' by the Newcastle coalowners were causing resentment in London. BL Lans 65/11. It would seem that the woodmongers also faired well in these early days. In 1618, for example, they were said to make a clear profit of 8s. per London chaldron, buying it at 14s. from the shipmaster and retailing it to the customer at 22s. BL Lans 162/53.

7. GPL Cotesworth CK/3/60; and CJ/3/15 which shows there to have been thirty-four fitters owning 338 keels on the Tyne in c.1710.

8. 11 and 12 William III c. 12.

9. At the end of Queen Anne's reign a lighterman admitted gaining an additional £300 per annum by the combination with the fitters. A letter from a Master of a Collier (cited by Nef 1932, II, 100). In the generally stagnant, over-capitalized conditions which prevailed in the coal trade during the closing years of the seventeenth century and opening decades of the eighteenth, 'overmeasures' or 'gift coals' were essential elements of trade all along the marketing chain. Thus the fitters, having received 'extra measure' from the producers, could pass on a part of this amount to the shipmasters in order to safeguard or enhance their own interests. During the period 1682-92, the following gift coals to masters of ships on the Tyne were reported to be 'allowed and given away ... in every score':

1682 - 1 chaldron	1688 - 3 at first then none
1683 - 2 ..	1689 - none
1684 - 1 or 2	1690 - 4, some gave 5 or 6
1685 - 1.5 and two	1691 - 3 at first then none
1686 - 2, sometimes 3	1692 - 2 & 3 at first then 5 & 6
1687 - 3	

Source: GPL Cotesworth CK/3/46/'An Inspection by Edwd. Grey ...'.

There is evidence of 'gifting' at other dates. In 1630, for instance, shipmasters were said to receive 'ten, twelve, sixteen or twenty chaldrons of coal in a ship over and besides that they paid for'; in c.1656 twenty-seven chaldrons were said to be given for the price of twenty. PRO SP 16/180/59; Hostmen's Records, 110; and ibid., 94, 147, 149.

10. Flinn 1984, 276-8.

11. NEIM Watson 5/9/1; and 8/10/145-6.

12. 'Observations on the Coal Trade in the Port of Newcastle', Gentleman's Magazine 60 (1790), 442-4. By the close of the study period very few coalowners engaged in 'freighting', that is, the speculative shipment of coal at their own risk to London or elsewhere. For those few collieries freighting on the Tyne in 1804-06, see figure 4.7; and for early 1807, see NEIM Watson 13/97. The extent to which sales were negotiated for in advance of shipment in earlier times remains uncertain. In the sluggish market conditions which prevailed in the late seventeenth and early eighteenth centuries, the safegaurding of markets was no less vital than in later times; and indeed we know that the coalowners attempted to have a 'settled Intrest at the Gate', that is, they attempted to strike a bargain at the coal market in Billingsgate with the chief dealers upon whom they ultimately depended for the sale of their coals. NRO ZCE 10/3/letter, Cotesworth to Nicholson, 12 July 1718; ZCE 10/4/letter, Cotesworth to Nicholson, 29 May 1720. Were it to be shown that such relationships were both widespread and successful for the coalowners, some adjustment to the linkages as currently depicted in figure 4.1 would be required.

13. Westerfield (1915, 238) maintains that 'each business [i.e. stage] was usually clear-cut and differentiated. Indeed this almost total lack of integration is easily the most salient characteristic of the trade', and he speaks of a 'straightforward succession of independent middlemen'. Similar sentiments are expressed by E. Hughes (1952, 201-2) when he speaks of 'incontestable evidence that at that date [c.1729] the shipping interest was quite distinct from the coal-owners'; and by Beckett (1981, 110) when, with regard to the West Cumberland coal trade, he argues that 'generally speaking ... the merchants and coal owners were remarkably detached in their interests'.

14. On the Wear in 1727, the Earl of Scarborough had 64 ships 'belonging' to him, while John Hedworth and Thomas Allan were part owners of 113 and 69 ships respectively. SPLum BD/2/agreement of 1727. On the Tyne, the Liddell family and their fitters often had an ownership interest in colliers which regularly shipped their coals. GPL Cotesworth CP/1/3/letter, 20 December 1717. See also

J. C., 1708, 49: 'these said fitters ... many times, nay generally have parts in the shipping'; JHC 21 (1729-30), 369, 372-3 and 516-7 (for references to the interests of coalowners, fitters and dealers in the ownership of ships and attempts by producers to negotiate advanced sales with the chief dealers); Davis 1962, 91-4; E. Hughes 1952, 201-2.

15. BL 669/10-11/'Artificiall Fire, or Coale for Riche and Poore' (1644); PRO PC2/55/571-2; CalSPD, 1629-31, 222; and ibid., 1664-5, 154: 'many poor people were starved to death from the unreasonable price of fuel.'

16. Taxes at Newcastle amounted to a few pence only until 1600 when a 1s. levy was imposed on each chaldron. Originally intended as a 'bribe' to prevent the Crown from seriously challenging the coalowner's monopoly of coal on the Tyne, it was used from 1677 to make provision for the son of Charles II's mistress, the Duchess of Portsmouth, and became known as the 'Richmond Shilling'. Sunderland escaped this 1s. levy despite attempts to introduce it. Taxes of only a few pence generally prevailed in London until 1667 when a 'Church duty' was introduced. Originally intended to help rebuild London's churches after the Great Fire of 1666, it became a perpetual tax which varied in amount from 1s. to 3s. per London chaldron. In 1695 the 'King's duty' of 5s. per London chaldron (and sometimes more) was introduced. At first intended as a war tax it was later extended to service the public debt. The 'orphan's duty' of 1694, amounting to 10d. per London chaldron, was intended to rescue the City of London from mismanagement of the orphan's fund but from 1767 the tax was used to service public buildings. Moller 1933, 623-51; Nef 1932, II, 236-8, 313-4; Flinn 1984, 281-5. Taxes on coals shipped overseas were even more onerous at times, especially for those carried in foreign owned vessels. In 1620 the tax on coals carried in English bottoms was 6s. 8d. per chaldron, 3s. in 1710, and 14s. in 1765 while for foreign vessels the respective charges were 8s. 4d., 12s. and 25s. Davis 1962, 311. In 1710 manufacturers of glass complained that the duties on coal at London were 9s. 2d. per chaldron whereas on exported coal they were only 3s., so making a difference in favour of the foreigner of 6s. 2d. Willan 1938, 60.

17. For 1736 a similar relationship is indicated. Coals sold, on average, at 30s. per London chaldron with taxes accounting for 10s. of this sum and the pithead price of coals about 5s. By the late eighteenth century the tax on coal represented approximately ten per cent of total customs and excise collections, and over sixty per cent of the total revenues, of London. Hausman 1980, 10.

18. Gray (1649) 1883 edn., 86. And see Smith 1958, 115-53.

19. North (1740-2) 1826 edn., I, 281. At Elswick (N10) in c.1680 'the fortunes of several considerable familys were greatly impaired' by their attempts to win the colliery. E. Hughes 1952, 153. There were also casualties on the Wear in the seventeenth century: in 1662/3 it was reported that the undertakers at Harraton (W3) had quickly 'mispent for want of skill and careless neglect a thousand pounds and upwards'. PRO E134, Charles II, Trinity 6, (Durham).

20. E. Hughes 1952, 165.

21. NEIM Buddle 3/139-42; NEIM Forster 49/13/1-4.

22. NEIM Buddle 3/193-207/report on Lambton collieries, 1810. The uncertainties of the industry were such that in 1829 Sykes maintained that nearly £2,000,000 was then invested by the coalowners of the North East and that none of it could be insured. Sykes 1829, 19.

23. Compounding Records, 273.

24. PRO SP14/162/20.

25. DCL Sharp 167/Bishop Cosin's survey, 1662, 170. A twelfth share in Whickham Grand Lease was estimated to be worth £1,000 in 1587. It would have yielded an annual return of £150 in 1592, of £260 on the eve of the Civil War. Welford 1884-7, III, 43; Compounding Records, 123.

26. BL Add 40747/176.

27. M.W. Hughes 1963, 413-4. Another indication of the profitability of coalmining is provided by the valuation of William Peareth's shares in collieries at the time of his death in August 1810: a quarter share in Hebburn, £10,175; the whole of Urpeth, £19,224 15s. 0d.; one-third value of Leefield's maudlin seam, £2,029 13s. 5d.; one quarter Walker (stock only valued), £3,794 2s. 2d.; and the whole of Harraton (stock only valued), £3,160; making in all £38,383 10s. 7d. NEIM Buddle 3/208-13.

28. In 1800, Francis Thompson, in evidence to a parliamentary select committee, reported with satisfaction that Washington colliery (W14 or W31), at which he was manager, had returned 'better than 15 per cent upon the capital of £15,000 expended'. In 1809 John Buddle calculated that at Elswick (N10) a vend of 10,000 chaldrons per annum would yield a return on investment of only ten per cent which was too low, while a vend of £14,000 chaldrons would produce the necessary fifteen per cent return. RepCCT 1800a, 542; and NEIM Misc. 63 ZC/48/1 (cited by Flinn 1984, 325-6). In 1807 John Buddle reported that total profits on all Tyne collieries in that year stood at £150,000, which represented nearly seventeen per

cent of total investment. NEIM Buddle 23/44.

29. With the possible exception of circulating capital, such as stocks of unsold coal, which, other sources suggest, rarely amounted to more than ten per cent of total fixed capital. The model's unknown author (probably a well-informed colliery viewer or manager) openly admits to the difficulties of making 'average' statements about something so beset with uncertainty as a colliery, and while the model is not necessarily free from some bias or special pleading, it does appear to be a careful and faithful attempt to give a true picture. For further comment on the difficulties of making meaningful calculations about colliery profits, see Flinn 1984, 314-5.

30. The first few years of a colliery undertaking were clearly an especial drain on finances. In 1727, for instance, Lady Clavering's collieries at Baker's Close (S55) and Crookbank (S39) were expected to take from two to four years 'to winn', that is, make ready for production; and this was probably a quite common length of time . NEIM 18/GAMB/10.

31. There are, perhaps, good reasons for the discrepancy. Not least it must be noted that detailed information tends to survive for the profit-making rather than the loss-making collieries. Could this last group be adequately accounted for, the figure of twenty-eight per cent might be reduced considerably. The collieries concerned do in any case display, individually, wide variations of profitability as well as costing procedures. They range from an actual return of profit over costs of 3.6 per cent at Bucksnook in 1720 to an estimate of 54.0 per cent at St Anthony in 1790. Flinn 1984, 324-5

32. The following annual profits or 'gains over and above charges' are given for Crown seasale mines in 1611:

	Annual Rent paid	'Gain'
	£ s d	£ s d
Benwell [N9]	20 0 0	120 0 0
Elswick [N10]	21 0 0	120 0 0
Tynemouth [N17]	3 0 0	50 0 0
Chopwell [S2]	4 0 0	20 0 0
Greenlaw Freehold in Whickham [S14]	5 0 0	400 0 0
Brinkburne Freehold (if work) [S18]	1 6 8	20 0 0
Gateshead [S29]	17 7 0	150 0 0

Sources: PRO SP 14/58/19/survey of King's mines, 1611; BL Lans 156/109/'Toucheing ...Greenlawe, June 1st, 1611'; DUPD CC/box 206/244378/depositions of witnesses, 1611.

Judging from the experience of other Crown mines in the region at

about this time (those omitted from the 1611 survey) the above figures for annual profit are probably well short of the true amounts, except in the case of Greenlaw. In 1610 Denton (N6), rented at £10 per annum, was considered to be worth £1,200 to the operators. In 1621 some of the King's mines were said to be rented for less than £100 when their true 'value' was from £3,000 to £4,000. PRO SP 14/58/17-18; PRO SP 14/116/74. The values given in 1636 (see appendix 5a) appear to represent a more conscientious attempt to assess the true worth of collieries, based upon their vend capabilities and profit levels.

33. The cost of raising seventeen chaldrons, which after deductions for fittage sold at £7 13s. 0d., was £6 17s. 6d., leaving a profit of only 15s. 6d. It was suggested that a return on investment of twenty per cent would be a not unreasonable expectation for 'hazard of monies'. GPL Cotesworth CK/3/133/'Reflections on ye Coale Trade ...' [c.1710].

34. Whatever the shortcomings of Armstrong and Gibson in accurately mapping working seasale collieries in 1768-9 and 1788 respectively (see figure 1.1), they did at least succeed in pointing to an essential ephemerality of pattern which is borne out by figures 4.4 and 4.5.

35. The colliery could yield a profit of £15 per day, or £5,475 per annum, and in 1660 attract an offer of £3,000 per annum to farm it; but periodically, it suffered great losses from fire, inundation and incompetent management. See, for instance, NEIM Bell 16/103; PRO E134, 1660, Easter 19; Compounding Records, 388-96, esp. 395; Compounding Calendar, III, 2127; and The true state of the case of Josiah Primatt, (1644), *passim*.

36. See above, note 9.

37. Flinn 1984, 291-4. A stocktaking of pits at Stanley (S78), Shield Row (S61) and Lanchester (S47 or S49) in 1784 valued the corn for feeding horses at £1,262, which was equivalent to forty-four per cent of the grand total recorded. Swan 1943-4, 109-12. In 1800, when the Lambton collieries' coals were sold to shipmasters for around 25s. per chaldron, 1s. of total costs per chaldron was accounted for by oats for the horses. NEIM Buddle 13/10.

38. The 'fire' engine was to cost £800 out of an estimated total of £3,452. NEIM 18/GAPB. Other evidence suggests that in the early eighteenth century the cost of purchasing and erecting a Newcomen was between £1,200 and £1,500 with a further £400 per annum needed for running expenses. Raistrick 1936-7, 146 and 153. A new Boulton and Watt engine for Murton colliery (W13) cost £2,376 in 1800 (and a further £1,733 to erect in 1801), while at Gateshead in 1805 a 'smaller type' was to cost £1,050. NEIM Buddle

3/193-207; and 13/97. In or about 1763, 'an engine of monster size' was applied at Walker (N12); the colliery is said to have cost £20,000 to win of which £4-£5000 was spent 'on the pumping apparatus'. Galloway 1898, 265-6.

39. This provided some operators with a valuable bargaining ploy. See above, chapter 3, p. 99.

40. Forty-two miles of waggonway belonging to the Grand Allies partnership (see above, pp. 141-54) in 1739 were said to have cost £1,190 per mile to build. NEIM Buddle 14/353. Buddle recorded costs of £1,129 6s. 8d. per mile at Twizzell colliery (W23) in 1792 while Bailey gave a more general estimate of £1,056 per mile for c.1810. NEIM Buddle 13/96; Bailey 1810, 34. Instances of lower costs are recorded: in c.1726, £500 per mile was the rate for two stretches of waggonway on Tyneside, while at Lumley (W9) on the Wear, in 1776, a charge of just over £350 per mile was encountered. E. Hughes 1952, 155; Beastall 1973, 27.

41. Lewis 1970, 163-83. Waggonways were often reported to be in a bad state of repair. In 1710, for instance, the Calvering-Stella Way was, according to Anne Clavering, 'in a most miserable conditon and the stock of rails of 12000 yards .. the worst was ever seen, tho' I'm sure we've paid the best price for them.' Clavering Corres., 79/letter to James Clavering, 27 April 1710.

42. NEIM 18/GAPB/48; NEIM Forster 49/4/171-2. Despite the high level of expenditure, especially for inland collieries, a waggonway was an eminently worthwhile investment, as calculations for Tanfield Moor colliery (S10) in 1712 make plain. The cost of carriage by wain was three-and-a-half times as much as the cost of getting the coal above ground whereas by waggonway it was to be only one-and-a-half times as great. More pointedly, it was calculated that by road only 350 tens of coal could be moved per annum at a profit of £656 whereas by rail 1,200 tens could be transported with an annual profit of £6,345. GPL Cotesworth A/5/18. Nef (1932, I, 446n) suggests that in the reign of Charles I (1625-49) the colliery proprietors in the Tyne district must have paid altogether nearly £20,000 per annum in 'leading' charges alone.

43. On the meaning of these terms, see appendix 3.

44. Nef 1932, I, 322-7. Before 1750 Welsh landlords are said to have received by way of royalty payments between one-twelfth and one-third of the receipts of a coal mine. D.W. Howell, 'Landlords and estates in Wales', in Thirsk 1985, 292.

45. By 1610, the coalowners in Newcastle were already alleging that 'the Rent of wayleave and staithroomes is of late so far inhanced

by the freeholders ... that the prices of coles is therby the rather occasioned to be raised'. Hostmen's Records, 59. In 1628 Sir Richard Lumley charged £40 per annum for a short wayleave to the Wear. PRO Durham 2/29/Lumley v. Chambers and others. In 1676 Roger North declared that 'the owner of a rood of ground will expect £40 per annum for this leave'. North (1740-2) 1826 edn., I, 281. Whickham copyholders in 1678 were said to charge 5s. for every 'rigg' of meadow and 6s. 8d. for every 'rigg' of arable spoilt by the working and carriage of coals, as well as fire coal at cost price. PRO E134 Charles II, Michaelmas 43.

46. In 1722 William Dent, a leaseholder of Swalwell paying £40 a year rent, was offered £500 a year for wayleave over his ground. E. Hughes 1952, 154. In 1717 a survey of Lord Widdrington's forfeited estate at Stella revealed all but £167 19s. 0d. of the £522 4s. 0d. rental to be accounted for by the staith and wayleave charges. PRO FEC1 W26/1/4,11. In 1720 wayleave charges across Winlaton manor varied from 1s. to 2s. 6d. per ten of coals transported while a keelroom, of which there were at least thirty-eight, cost about £3 per annum to rent. DRO CG7/237. In 1720 William Bowes claimed that his Northbanks estate and colliery were 'prodigiously encreased by a wayleave'. BL Add 40747/176.

47. NEIM Buddle 20/39.

48. Compounding Records, *passim*, but esp. 319n., where it is noted that when the Scottish Covenanters invaded the district in 1640 they seized Sir Thomas Riddell's coals, broke his colliery engines, and drowned and destroyed the best part of his mines.

49. NEIM Buddle 23/42; and Watson 8/9/29-30.

50. NEIM Buddle 21/256-61/report on Stella Grand Lease, 24 July 1809: 'the welfare of the colliery depends in a great measure upon an export trade which owing to the unsettled state of the continental powers, has for some time past, been extremely uncertain and for the present is almost totally suspended.' On Washington's dependence upon foreign markets, see NEIM Buddle 3/145-54.

51. Compounding Calendar, III, 1805. There were also other serious disruptions to trade in the seventeenth century -in 1625, 1626-8, 1637-8, 1648-9, 1658, 1665-7, 1672-3 and 1690- occasioned by continental wars or the operations of Dunkirk privateers. Nef 1932, II, 76 and 83. Most mining leases after the Civil War included clauses allowing their normal provisions to be waived in the event of war disputing trade for more than a specified period (usually three months).

52. Flinn 1984, 306-7; Hausman 1980, 1-14. In accounting for the upward trend in coal prices between 1775 and 1781 (see figure 4.2)

account must also be taken of other factors, of course, most notably the operation of restrictive practices, as explained above, pp. 154-64. In 1810, during the Napoleonic Wars, the navy bought 27,200 tons of North East coal for delivery at dockyards on the Thames and south coast. NEIM Buddle 14/151/'Newcastle coals required at naval establishments, 1810'. On balance, Hausman believes that as far as the London trade was concerned, wars had a detrimental rather than beneficial affect. Hausman 1980, 1-14.

53. M.W. Hughes 1963, 413-4; Galloway 1898, 312-3, 397-8, 401-3.

54. NEIM Buddle 5/54-7; and Buddle 14/79: 'the last [lease renewal] fine [£6,000] paid nine years ago was enormous ...the person who conducted business on behalf of Sir Henry [Vane-Tempest], not realising that the High Main coal was nearly wrought out.'

55. Beastall 1975, 42-3; Nef 1932, II, 105; Flinn 1984, 299. Even quite modest climatic events could cause concern for colliery proprietors whose coals were geared to a particular market. See, for example, the entry for 22 March 1774 in DRO CG6/1405/LWLB: 'Mr Warner acquaints me that coals sell but heavily at [Billings] Gate, and fears that as the Brewers are not likely soon to begin Brewing, and warm weather comes on apace, coals will not sell so readily and find so good a market as I could wish.'

56. M.W. Hughes 1963, 413-4.

57. See above, chapter 5, pp. 207-9.

58. Nef I, 379. Between 1621 and 1626 the expense of operating Benwell colliery (N9) is said to have added £4,500 to the original sum invested. Ibid., I, 378.

59. NEIM Watson 8/11/110; Buddle 23/44.

60. NEIM Buddle 14/8. This would probably have been regarded as a considerable sum on the South West Lancashire coalfield, however. For the period 1740-99, Langton tells us that between two and four thousand pounds was needed to open 'a large colliery with ten pits'. Langton 1979a, 214-6

61. NEIM Buddle 14/27-8, 52-6.

62. M.W. Hughes 1963, 413-4.

63. In assigning a major role to ploughed-back profits, I am favouring the view expressed by Flinn rather than Langton. Compare Flinn 1984, 207 and 211, with Langton 1979, 216.

64. In the case of the Cole family, for instance, the first notable

riser from obscurity was James, a Gateshead blacksmith, who, in addition to trading in fish, sold grindstones to foreign shipmasters who came to the Tyne with grain and other commodities. Before the Civil War his two grandsons had become major coal traders and colliery proprietors with interests in six major Tyne seasale collieries and in six colliers. In 1636 Ralph Cole purchased Brancepeth, the former seat of the earls of Westmorland, for £7,000. For details of these and other early coalmining adventurers, see Welford 1884-7 *passim*, but esp. vol. III; Welford 1895, *passim*; Compounding Records, *passim*.

65. Through kinship and marriage, the Liddells and Marleys, both leading Tyneside families, had interests in Wear collieries by 1623 and 1637 respectively, and perhaps sooner. PRO PC2/31/718; PRO C3/419/38; On the investment of Durham capital in the Wear district, see DRO D/Lo/F 338-41, 381-93 and D/Lo/D 871-4; and Surtees 1816-40, IV (pt 2), 53-4.

66. E. Hughes 1952, 158, 163; Flinn 1984, 208-9.

67. Phillips 1894, *passim*. John Baker of the third Newcastle bank (the 'Tyne Bank' of 1777) also had important coal interests. In the nineteenth century the fifth Newcastle bank, founded in 1788, passed into the hands of the Lambtons, one of the richest coalowning families of County Durham. Ibid.

68. Brereton (1635) 1844 edn., 89: 'This town unto this country serves instead of London, by means whereof the country is supplied with money; whereas otherwise so much money is carried out of the country to the lords and landlords, as there would be neither sufficient money to pay the tenants rents, nor would the country be supplied with money.'

69. Nef 1932, II, 10, citing PRO Duchy of Lancs. Pleadings, 146/F/20.

70. Welford 1884-7, III, 13, 170 and 181; BL Lans 8/87; Nef 1932, II, 11; PRO SP16/502/78; Cliffe 1969, 62; E. Hughes 1952, 163; Sweezy 1938, 27n.

71. DRO CG 6/Bute inheritance (catalogue notes).

72. E. Hughes 1952, 163.

73. Welford 1884-7, III, 172, 197; PRO SP14/58/19; BL Lans 156/109. With Willaim Court, a Crown retainer, Lyons also attempted to take a lease of Denton mines (N9). A serious dispute arose because the property was already leased to two Newcastle merchants. PRO SP14/58/17.

74. Nef 1932, II, 32. And for further reference to the involvement of

London capital in the area, in the reign of James I, see PRO C33/ B23/71, 181, 186 and 548.

75. Our authority for this information, William Gray, was clearly contemptuous of their involvement. Gray (1649) 1883 edn., 86-7: 'Some Londoners of late, hath disbursed their monies for the reversion of a lease of a colliery, about thirty yeares to come of the lease: when they come to crack their nuts, they find nothing but the shells; nuts will not keep thirty yeares; there's a swarme of wormes under ground, that will eate up all before their time.'

76. PRO SP16/502/78.

77. PRO Durham 4/I/533; Compounding Records, 275, 388-96.

78. DRO D/X 487/3/84/Bill of complaint (to Lord High Chancellor) of John Conyers of London, mercer, v. Charles Atherton Esqr.

79. E. Hughes 1952, 163-4.

80. Primatt 1667, 28.

81. E. Hughes 1952, 163-4.

82. See above, pp. 120-1.

83. At Whichkam Grand Lease (S15), admittedly the greatest concern on the coalfield at this date, a one-twelfth share in the colliery was already valued at £1,000 by 1587. See above, note 25. It is debateable as to whether these partnerships can be viewed as joint-stock enterprises. See the comments in Nef 1932, II, 44-9.

84. PRO StaCha James I, 245/6; Hostmen's Records, 6.

85. Nef went so far as to maintain that one could hardly ever find 'exactly the same list of owners associated with one mine in two successive years', and that well before the Civil War it was 'rare to find any of the larger mines ... in the hands of a single capitalist'. Nef 1932, II, 60 and 51.

86. The following detail regarding shares in Stella Grand Lease Colliery in 1793 is given in DUPD CC/notitia 54001/559 (inserted paper):

	Shares	Parts (480)
Sir Henry Vane Bt	6/24	120
	1/60 [really=1/160]	3
	1/45	near 11/134
Mr Silvertop	6/24	near 120
	1/192+1/320+1/480	5

list continued

	Shares	Parts (480)
Mr Beaumont	2/24	40
Mr Simpson	2/24	40
Mr Gray	1/24+1/60	28
Mr Fenwick	1/24	20
Mr Carr Ibbetson	1/24	20
Mr Lamb	1/16 [really=1/60]	8
Mr Heath	1/24	20
Bishop of Edonfort in Ireland	2/24	40
Mrs Montague (now let by her to Mr Crawford)	1/96	5

A similar situation was encountered in the ownership or funding structure of some other mines on the coalfield at about this time. For instance, in c.1800, it was noted that the Marquis of Bute and Hereford owned a one-twelfth of a one-eighth share in Blaydon colliery (S8) and that the Earl of Kerry had formerly held a moiety, or one-half, of this one-twelfth (that is, he had held one 192nd part). NEIM Buddle 14/5-6. Even a small colliery like Fawdon Field (S11) in the early eighteenth century was held in 64th parts, though run by a partnership of seven. GPL Cotesworth CK/6/10.

87. Jars 1774-81, I, 185. On the spreading of funds among several colliery enterprises, see note 27 above regarding William Peareth's interests in 1810. In the Wear district, the early coal industry encouraged the Lambtons to engage in salt manufacture at Sunderland and the Lumleys to manufacture alum at Hartlepool. Nef 1932, II, 17. On the mobility of funds on the South West Lancashire coalfield, see Langton 1979a, 125-7.

88. On the South West Lancashire coalfield after 1740, gentry families, which had been in coalmining for a century or more, abandoned, leased or sold their collieries while they were still small. By 1799 there were just six gentry collieries left in the total population of thirty and of these the biggest produced only c.6,500 tons a year. Langton 1979a, 217. For comment on gentry involvement in coalmining elsewhere, see Beckett 1986, 211-21

89. In 1804, for instance, the Lambtons (of Lambton) held Pelton Fell colliery (W24) -which covered an extensive area of Chester parish- from the Bishop while the Vane-Tempests held Rainton (W7) from the Dean and Chapter. Many of the Bishop's mines were, in fact, sublet, perhaps several times over, so that it is not always easy to know precisely who had what: there was usually a queue of the Bishop's relatives, friends and supposedly deserving followers waiting in expectation of a lucrative mining lease. See, for instance, the comments in Spearman 1729, esp. 83-92.

90. Colliery records (for instance, among the Watson collection in NEIM) show an increasing number of new names appearing in the industry towards the close of the eighteenth century and yet more dramatically at the opening of the nineteenth. But, as yet, a full appreciation of the origins of these new sources of adventure capital remains wanting. For an indication of Lambton's growing power and interest in the Wear district, see figures 4.10 and 4.12.

91. As far as one can tell from the sources, the Lumley mines were leased in 1609, again in the mid-seventeenth century and from late 1783; they were 'in hand' from the late seventeenth century to c.1740. SPLum MTD/E2/7; MTD/A/29-36; BD/1/1-6; BD/3.

92. Of the 440 apprentices enrolled in the Company of Hostmen between 1603 and 1749, at least 180, or 40.9 per cent, were the sons of yeomen. Hostmen's Records, 285-96. In the Wear district, Jeffrey Walker, yeoman, appears to have had a direct financial involvement in coalmining at Lumley (W9) by c.1610, while Ralph Marley, also described as a yeoman, was similarly connected with Harraton (W3) by 1637. PRO Durham 2/24 and 2/29; PRO C3/II/419/38.

93. Nef 1932, II, 18: 'Within the counties of Northumberland and Durham ... overwhelmingly the greater portion of capital invested in colliery plant came from the merchant class.'

94. See above, chapter 7, pp. 258-61, for a fuller and referenced discussion of Cotesworth's activities. For further comment on social mobility within the region, see James 1974, 86-90; and for particular reference to the difficulties of classifying sources of investment capital, see Langton 1979b, 126.

95. On rents, see above, pp. 227-37, and on the scale of investment needed, see pp. 120-1.

96. Beastall 1975, 34.

97. M.W. Hughes 1963, 413-4.

98. Flinn 1984, 206-8.

99. As far as the early eighteenth century is concerned, Hughes paints a different picture from Flinn, suggesting that the landed gentry were 'hard run' for cash and needed to borrow heavily. E. Hughes 1952, 158; Flinn 1984, 206-8. And see also Dickson 1967, 483.

100. Beckett 1986, 70-87 and 171-83; Turner 1980, 116-7; Clay 1974, 173-89; Raybould 1973; White 1972, esp. 25-51.

101. Phillips 1894, 363; M.W. Hughes 1963, 413-5.

102. Russell bought Brancepeth manor from Sir Henry Vane-Tempest for £75,000 in 1796. NEIM Buddle 2. Cole is said to have paid £7,000 for it in 1636. Welford 1884-7, III, 340; Howell 1967, 15-6.

103. 21 Henry VIII, c. 18.

104. Hostmen's Records, pp. xxx-xxxi, xxxix-xlii; Compounding Records, *passim*; Welford 1884-7, *passim*.

105. DCL Sharp 167/Bishop Cosin's survey, 1662, pp. ii and 170; Salisbury Calendar, IV, 208-10; BL Lans 66/84 and 87; Welford 1884-7, II, 481, and III, 18; Galloway 1898, 93. In 1621 it was claimed that the Mayor and Corporation of Newcastle rented the King's mines at one-thirtieth of their true value. SP14/116/74.

106. An extract is printed in Hostmen's Records, 10-17.

107. Ibid., pp. xxxii-xxxiii, xliii-xlv, 43-7, 51-5, 63-7, 67-74; PRO SP16/180/58 and 59; Galloway 1898, 141. In 1637 the King entered into an agreement with the hostmen whereby he was to receive an extra shilling on every Newcastle chaldron shipped from the Tyne in return for the right to form a selling combine to market their coals. The scheme was thwarted, mainly by the shippers who refused to go to Newcastle thereby throwing out of work a great number of miners and seriously disrupting the coal supplies of the capital. Nef 1932, II, 279-82.

108. It was alleged that in the first nine months of 1622, when the coalowners' combination was in operation, the number of 'base pan Coale-pits' in the Tyne district rose from twelve to forty-two. In 1637 the coalowners admitted shipping about 125,000 tons of inferior coals mixed with 275,000 tons of best but said this was because they wanted to make the mines 'continue the longer, which is a matter of great consequence'. PRO SP14/162/20; SP16/180 /58,59. But see Hostmen's Records, 63, where it is shown that in the agreement of 1617 eight leading hostmen attempted to maintain a high quality of coal for shipment.

109. In fact, it was one of the exceptions named when monopolies as a whole were made illegal by the Statute of Monopolies in 1624. Hall 1933, 255.

110. Hostmen's Records, 63-7.

111. PRO E134, 3 Charles I, East. 19.

112. In 1576 Newcastle was said to be 'all papists, save Anderson'. The Civil War in particular marked the beginning of a sharp decline in the fortunes of Catholics, especially as many were also

Royalist sympathizers. Welford 1884-7, II, 481; Clavering 1982, 16-24. In 1690, Brandling, a non-hostman and Catholic coalowner, was said to have 300 horses available for pulling coal wains or waggons but he was not able -the implication is that he was not allowed- to get coals out. Hostmen's Records, 146. For the misfortunes of Papist Royalists in South West Lancashire in the seventeenth century, see Langton 1979a, 77.

113. Hostmen suspected of 'colouring coals', that is, dealing in 'unfreemen's coals', were threatened with fines and disenfranchisement. Hostmen's Records, pp. xxxiv-xxxv, xxxviii, 79-80, 90-3, 96, 99-100, 121, 130, 135, 150, 154 and 160.

114. Nef 1932, II, 128-31; Gardner (1655) 1796 edn., *passim*; Gardner Papers, *passim*.

115. PRO SP16/388/62; Welford 1884-7, III, 343; Hostmens' Records, p. xxxii.

116. The Scottish army effectively occupied Northumberland and Durham for periods totalling over three years between 1638 and '47, and the costs of their maintenance fell on the local population. As a result of their depredations, and those of the English armies which succeeded them, tenants 'suffered very much', having their meadows destroyed and hay, horses, cattle and servants 'taken away for service, to the great dammage of their husbandry'. Most of the mining interests of Royalists in the Wear district, and a large portion of their parts in collieries in the Tyne district, were leased out during the winter of 1644-5 to 'well-affected' persons. Compounding Records, *passim*, but esp. xi-xxxiv, 272-4 (re Sir Thomas Liddell's delinquency) and 319-22 (that of Sir Thomas Riddell); Brassley 1984, 44-5. On the problem of worked out mines by the river, see Hostmen's Records, 110 and 151; and CLRO Guildhall broadsides 4.24/'Reasons offered ... to Parliament for their not laying any further Imposition upon Coals imported into London from Newcastle, 1689: 'The Coal-Pits nearest the Water are almost quite exhausted and decayed.'

117. For expansion of coalmining in the Wear district, see the vend data in appendix 4 and figures 2.2 and 2.3. The extent to which the two coal districts were linked by common ownership and investment appears to have been fairly modest, but there was certainly some overlap. For instance, two Newcastle hostmen, Timothy Draper and William Bonner, were leasing pits at Lumley (W9) by 1609; and it is clear that the Liddells of Tyneside had interests in Wear collieries from at least 1623 and that these continued into the eighteenth century. PRO PC2/31/718; SPLum MTD/E2/7; Hostmen's Records, 266; NEIM Buddle 14/251-412 /coal trade evidence, 1739.

118. Hostmen's Records, 96, 147, 150, 157, 160-1, 166; and on the concept of 'foreign bought and sold' (that is, involvement of outsiders), see ibid., pp. xxx, 93, 125, 142, 153, 157. A further symptom of the changing role of the Hostmen's Company is shown by the relaxing of the rule whereby apprentices should have only masters who possessed a 'viable colliery'. Ibid., 119, 159, 133, 137, 145, 164, 167. On the role and status of fitters, see ibid., xlviii.

119. Nef 1932, II, 95, 207-8. But note that prices to London customers may have achieved a generally higher level than in the previous two or three decades thanks to the operation of the lightermen's combinations. See figure 4.2 and the discussion above, pp. 105-7.

120. E. Hughes 1952, 163; DRO D/St/v36/copy lease of Gibside [Northbanks] colliery, 30 May 1692.

121. Hostmen's Records, 137-8, 143, 146 and 151.

122. Ibid., esp. 263-4; and 258-9 (for details of the 1787 and 1790 vends of John Erasmus Blackett, Governor from 1787 to 1814). And see DRO CG 6/1450/LWLB/253, for reference to John Baker, Mayor of Newcastle, becoming 'an agent ... to vend Townhead [S77] coals' for Lady Windsor in 1769.

123. The office appears to have functioned mainly as a marketing outlet for the vend of just eight collieries belonging to six of the leading proprietors on the Tyne. NRO ZCO IV/47/19/'Coale Office ...1701'; NEIM Buddle 14/212/'Number of collieries anciently on Tyne' [c.1700].

124. On the lightermen's combination, see above pp. 105-7. A broadsheet of 1703 declared that 'whereas Billingsgate ought to be a free market ... it is plain the same is now restricted by a small number of Lightermen who are Sole Buyers, to whom all Consumers of Coal apply themselves'. Cited by Flinn 1984, 276. On delays in the despatch of convoys, see NCA Common Council book 53/740, 744.

125. GPL Cotesworth CK/3/43/'Articles of Agreem[en]t Trip[ar]tite, 1708'. The size of the ten varied, as explained in appendix 3, but at this time the *vending ten* probably amounted to a little over thirty tons. The planned vend of about 500,000 tons for coastal shipments in 1709 can be compared with the actual vend, as recorded in the port books (see appendix 4), of 516,949 tons

126. Quoted by E. Hughes 1952, 176. The Liddell's were certainly involved with coalmining in the Wear district at this date and, indeed, had held interests there since 1623 if not sooner. See

above, note 117

127. 9 Anne c.28.

128. Only in 1800, when abuses in the coal trade came under especially close scrutiny by a parliamentary select committee, did its provisions cause some concern. The vend regulation, then in force, was suspended for a while. See above, pp. 154, 161.

129. GPL Coteswth CK/3/64/:'Cotesworth's statement ... 1711'; CK/3/57 /'Querys on the Coal Trade' n.d; CK/3/161/letter from John Wilkinson, 14 April 1711.

130. In evidence to the Common's select committee in 1711, Thomas Brumell, a Newcastle fitter and coalowner, accused proprietors within the regulation of buying up wayleaves and refusing them to anyone outside so that the quality and quantity of coal available to the market was effectively reduced; the regulation had thereby succeeded in raising the London price of coal from 11s. 6d. to 12s. per London chaldron. There seems little doubt from the evidence of participants in the regulation that this was indeed the case. GPL Cotesworth CK/3/63/'T. Brummell's statement...'; CK/3/5 and 35/minutes of meetings, 14 Sept. and 22 July 1713; NRO ZCE 10/1/letter, William Cotesworth to Henry Liddell, 23 Oct. 1712.

131. See, for example, PRO C5/363/14/Clavering and others v. Ramsay and others, 1714.

132 In or about 1711, 'Contracted' collieries (that is, those within the regulation) vended 127,000 chaldrons out of 189,500 on the Tyne while a further 65,000 chaldrons were accounted for by Sunderland. In addition, 15,000 chaldrons were recorded for Cullercoats, Blyth and Seaton on the Northumberland coast. GPL Cotesworth CK/3/135/'A list of collieries...' [n.d., but c.1711].

133. GPL Cotesworth CK/3/31/'An Acct of the Short Coales ...1711; CK/3/7,12 and 13/minutes of 30 Sept., 20 Dec., 10 Jan., 1710; and correspondence in CK/12/17 and 157. Some insight into the means by which Clavering Stella's inferior coals could be disposed of to coastal markets, including London, is given in Clavering Corresp., 116/letter, Anne Clavering to James Clavering at ?Lamesley, 10 April 1711: 'You are therefore desired to propose to Capt. Liddell, that our fitters take part of Team top coal [coal from Ravensworth colliery and generally of a better quality] and mixt with ours so, and all goes by the name of Cla[vering] Stella. That if the mixture should not give content Sir H[enry] woud be no sufferer, if otherwise, both partys will thereby receive an advantage, their woarse coals going of with our good ones.'

134. GPL Cotesworth CK/3/73, 146; Ellison A/35/18, 41.

135. Quoted by E. Hughes 1952, 195.

136. GPL Cotesworth CK/3/26; NRO 725/F2.

137. Their policies were detailed and attacked at some length in an anonymous pamphlet of 1739, An Enquiry into the Reasons of the Advance of the Price of Coals this Seven Years Past.
The records of the Alliance which have substantially provided the evidence upon which this account of their activities is based (but note also the secondary works cited below) are mainly to be found in the following repositories: DRO (Strathmore and Clayton-Gibson manuscript collections); GPL (Cotesworth and Ellison collections); NRO (Armstrong collection); and NEIM (various documents but especially the Grand Allies' Partnership book of views and minutes, 1727-38).

138. GPL Cotesworth CK/5/Bucksnook colliery and waggonway, 1715-27.

139. Spearman 1729, 112; GPL Ellison A/35/49, 51; Cotesworth CN/1/433; CP/4/85.

140. Cotesworth was appointed a J.P. in January 1715. He reported to the government on the activites of the Jacobites. GPL Ellison A/36/29; Cotesworth CM/2/260 and CM/2/715/letter to commissioners of Forfeited Estates, 30 March 1718. For details of Roman Catholic estates, 1717-90, see DRO Q/R/R,1-11; and for 1722/3, see DUPD Shafto 1445.

141. NRO ZCE 10/1/letter to W. Carr, 6 Feb. 1720.

142. Spearman 1729, 112.

143. GPL Cotesworth CK/2/26/articles of agreement, 27 June 1726. William Cotesworth died within six months of the agreement, in December 1726, and so derived little benefit from the arrangement he had fought to bring about.

144. GPL Cotesworth CK/5, passim; Cotesworth (OR) BV 1/9; E. Hughes 1952, 16-17. Animosities soon resurfaced, however, with law suits flying thick and fast, and it was not until April 1726 that some accommodation between the parties was reached. Ibid., 1952, 10n, 235. During my inspection of the Cotesworth manuscripts, a fragment of an irreparably damaged letter came to light. Written by George Bowes to William Cotesworth in 1721, its opening remarks readily convey the strained relations between the two families: 'Your letter of 16th Inst. to my Lady was communicated by her to me which I would not have given myself the trouble of answering as not thinking it worth my while, but [for] knowing your[?] boasting

temper and manner of representing things in a false light (of both which you are a perfect master) would induce you to endeavour to make people believe that what you alledge is so plain it was not in my power to contradict ... I believe if you will produce the copy of you own letter ...to my answer, any one of moderate capacity will form a true judgement of it, that [it] is a piece of bombast insinuating and [? ?]cating stuff from the beginning to the end. You think you gain a mighty point in obtaining an Injunction, it is true it will prove so if it continues long, but whether it will be so or no leave to the judgement of them that are more experienced in the law than yourself.'

145. The battle between general interest and private greed was neatly expressed by Sir James Lowther in a letter written in July 1725: 'There are great disputes among the coalowners at Newcastle, and so there must be when there are several coal owners joining together with great purses'. Quoted by Beckett 1981, 52.

146. BL Add 40747/184-6.

147. GPL Cotesworth (OR) CA/1,13; CB/1, CL/1.

148. NUL SRMisc JCLB/178, 182-3.

149. NEIM 18/GAPB(minutes)/10-11.

150. NRO 725 F2/lease enrolments, 1722-9; and NRO 309 G4/3, which shows that Clavering expected the colliery 'to yeild abt. £3 per ten cleare' or £40,000 over a twenty year period.

151. NEIM Johnson 4/2/'1739: Beckley colliery nearly wrought out'. A double-shift pattern of working appears to have aided its rapid exploitation. NRO 309 G4/3.

152. Cromar 1978, 200-01.

153. NEIM 18/GAPB(minutes)/26-9.

154. Ibid.; Cromar 1978, 202.

155. NEIM 18/GAPB(views)/1. The vend was restricted in both 1728 and '29 with the apparent connivance of the fitters and shippers. See GPL Ellison A/32/36/letter, G. Liddell to H. Liddell, 13 Feb 1729.

156. NEIM 18/GAPB(minutes)/82; DRO NCB/I/X/143-5.

157. E. Hughes 1952, 236-44; NEIM 18/GAPB(minutes)/71; NRO 725/F49 /minute book, 1729-31. In 1728 Stella coals had made a profit of £2. 0s. 5d. per ten, by 2 December 1730 a mere 7s. 2d. was forecast. NEIM 18/GAPB(minutes)/62.

158. Quoted by E. Hughes 1952, 244-5.

159. NEIM 18/GAPB(minutes)/71.

160. NEIM 18/GAPB(minutes)/32; SPLum BD/2/memo. of agreement, 27 Nov. 1727.

161. Quoted by E. Hughes 1952, 241.

162. SPLum BA/5/25/copy agreement between coalowners of Tyne and Wear, 6 January 1731; BA/5/26/draft heads of agreement among Wear owners, 4 Feb. 1731.

163. The coal shipment data (appendix 4) suggest that something in the region of the planned vend may have been achieved from 1733 to '35. The difficulty in interpreting the information arises from not knowing the extent to which the quantities anticipated by the agreements may differ from those given in the port books simply because of the overmeasures or 'gift coals' which went unrecorded in the official shipment record.

164. NEIM 18/Peck's view book, 1710-35; NRO ZRI 20/13; NRO 725/F50 /minute book, 1731-5.

165. NRO 725/F1,3-6,8,50-2.

166. While figure 4.11 gives no indication that the Allies, or anyone else for that matter, had begun working on Lanchester common (they had held the lease since 1726), the records of the Alliance suggests that at least one pit was working for the vend by this date and that in 1740 a second pit was being 'laid with all speed'. NRO 725 F52/minute book, 1738-49. It will be noted (and see figure 4.9) that the Allies' rivals were using a new outlet for their coals by this date: the New Western Way. The Allies had forced closure of the Old Western Way in 1738 and, according to Cromar (1978, 204), Clavering, Ridley and Simpson had spend around £10,000 on funding the New Western.

167. NEIM Buddle 14/215-412/coal trade evidence, 1739 (esp. Millett's evidence).

168. NRO 725/F52/minute book, 1738-49 and F50/minute book, 1731-5; Hostmen's Records, 203. Complaints about Silvertop's conduct were still causing concern in 1763. See, for instance, the comments of Lady Windsor, owner of collieries at Collierley (S44) and Pontop (S45), to William Gill, in DRO CG 6/1406/171: 'I have often wished that some means could have been found out to prevent his underhand dealings, and to put a stop to his coming down our [waggon]way which he has no right to do.' On the unrest of 1740, see chapter

5, pp. 207-8.

169. NRO 725/F52; NEIM Watson 8/10/54. In August 1744 Ridley tried to sell the Allies his considerable interests in collieries (these included Byker, Bushblades, Tanfield Leigh and Winlaton) but the offer was rejected. NRO 725/F52/minute book, 1738-49. Ridley appears to have first borrowed from his chief creditor, Joshua Douglas, in 1725; by 1734 he was owing £1,700 in interest alone and in 1744 the sum stood at £3,287. NRO ZRI 20/13. Ridley also borrowed from the London dealer, Maltis Ryall. See text above, p. 126.

170. The price of 5s. was reported for 20 July 1750. By November 1751 trade had picked up again and in the spring of 1752 prices were back at 13s. or 14s. per chaldron even without a regulation. In January 1749, William Brown had alleged that 'by this regulation their is as much profit arrises at the vending ten thousand chalders as their is at thirty when their is a fighting trade'. NEIM Brown 16/1/letter book, 1749-56. The same source shows that at least one coalowner, a Mr Humble, had refused to join the regulation of 1747-50. An estimate of costs and profits for Longbenton colliery (N23) in 1749 suggested that 'In a Regulation profit is £1 11s. 2.25d. per ten. In a contesting trade there is a loss of 16s. 9d.'. NEIM Watson 10/54.

171. E. Hughes 1952, 248n. Ridley's animosity towards the Allies resurfaced in 1763 when he allowed his pumping activities on the north bank of the Tyne to flood and force closure of the Allies' colliery at Friar's Goose (S81) on the south bank. See above, chapter 3, pp. 98-9.

172. From 1805 the Limitation was yet more formally known as the Joint Durham and Northumberland Coal Owners' Association.

173. During the present century the operation of the Limitation of the Vend has attracted the attention of several scholars, particularly those interested in exploring and debating the role of monopoly capital in the process of industrialization. See especially, Sweezy 1938; and also Ashton and Sykes 1929, esp. 213-6; Levy 1927; Cromar 1777; and Hausman 1984.

174. See above, chapter 3, pp. 84-7, 89-94.

175. Atkinson 1968, 37-41. Edington regarded screening as 'a practice so blameable that nothing can justify it except the plea of self-preservation'. Edington 1813, 57.

176. PRO SP37/77/47 and 48; Ashton and Sykes 1929, 89-91. A good deal of poaching of workmen had been going on in the year prior to the strike. DRO CG 6/1406/9 Sept. 1764: '... what distractions

everybody is in, in the North, in regard the hiring one anothers Pitt-men and Waggonmen and am glad you have bound so many of the Pittmen for me, for the next year'; and ibid, 16 Oct 1764: 'Everybody is so selfish, and endeavouring to ingross the Trade to themselves, by giving allmost all their profit away in seducing and hiring their neighbours workmen.'

177. This is, perhaps, not suprising, bearing in mind that any such agreement was, strictly speaking, illegal. But proof of it being entered into in 1771, and that it was concerned to regulate the vend prices, is clear from the statement of Francis Thompson, colliery manager, who gave evidence to the parliamentary committee on the coal trade in 1800. RepCCT 1800a, 541-2. See also Sweezy 1938, 31-6.

178. Sweezy 1938, 56-8; and NEIM Easton 17/4: 'It is understood that unless the absentees agree these resolutions and the coalowners upon the Wear resolve to regulate their vends, the Regulation on the Tyne is not to take place.'

179. Edington 1813, 57.

180. The Allies' Tyne collieries in 1804 (N24, N42, S49, S57, S80) vended 211,999 tons or just 12.57 per cent of the vend. But note that from c.1770 (figure 4.10) the Liddell's had held Birtley Fell (W30) which in 1804 contributed 45,326 tons or 5.75 per cent of the Wear vend (appendix 5c). They were also heavily involved, to the tune of £130,000, in sinking Killingworth colliery (N43) at this time. M.W. Hughes 1963, 424.

181. NEIM 725/F53/minute book, 1762-6; and F54/minute book, 1767-78. 17 January 1771 saw the Allies battling against the elements in north-west Durham, in order to get their poor quality coals on the market as early as possible. Ibid.: '... agreed to shovel the snow on the waggonway to South Moor.'

182. DUPD CC/notitia 54001/551.

183. See appendix 15 for further detail. In 1804 the Lambton collieries accounted for 29.24 per cent of the Wear vend.

184. SPLum BD/3. John Parkinson, who surveyed and valued the Lumley estate in 1808, asserted that 'these coals are perhaps the best in the kingdom'. Beastall 1975, 41.

185. Flinn 1984, 262.

186. According to R.W. Brandling, in evidence to a parliamentary committee of 1831, it was 'in the interest of the low-priced collieries to get the high-priced collieries to raise the price of

their coals' because it would 'enable them to do the same'. Cited by Levy 1927, 125. And note Buddle's reasoning in 1835: 'The true spirit and principle of a regulation is that it should benefit all classes, and make the whole trade move harmoniously...'. Flinn 1984, 266-7, citing DRO D/Lo/C142.

187. For an indication of the amount of capital sunk in collieries at this time, see above, pp. 120-1.

188. NEIM Watson 8/19; Cromar 1977, 88.

189. Beastall 1975, 33, 36-9. In fact, considerable variations in the sizes of measures persisted on both rivers. At the opening of the nineteenth century the number of coal bolls to a ten ranged from 418 to 440 at Wear mines and from 418 to 550 at Tyne collieries. NEIM Buddle 14/425.

190. RepCCT 1800a, 541.

191. Ibid., 572; NEIM Easton 17/104.

192. The coalowners were largely successful. The committee's report of 1800 was of little consequence insofar as it refused to say that the Limitation was illegal or advocate its prosecution. But it did cause renewed nervousness among the producers by advocating further legislation to suppress the regulation. RepCCT 1800a, 538-639; Sweezy 1938, 131.

193. Unfortunately, it is not always easy to disentangle the activities of the regulation from the several other variables, such as weather, wars and labour disputes, which might have had a bearing upon the vend and price data observed at any particular time (figure 4.2). Clearly, it is also important to make some allowance for the time which elapsed between actions taken at one stage in the marketing chain and responses, by way of quantity and price changes, at another. These time-lapses might have ranged from a few days to many months. It should also be borne in mind when examining figure 4.12 that it includes data for the overseas vend which was not necessarily subject to the Limitation.

194. NEIM Buddle 15/250, cited by Flinn 1984, 262. By this date the designation 'best collieries' appears to refer to those vending over 30,000 chaldrons (79,500 tons).

195. Note, for instance, the case of Elswick (N10). In 1805 the colliery had been reopened but by 1809 when the total amount of capital sunk stood at £17,582 10s. 6d. and it was recorded as a 'second class' colliery, it had not been able to obtain a sufficient basis to allow profitable operation. Buddle reported that the colliery needed to vend 14,000 chaldrons in 1809 to give

a return of 15 per cent per annum on investment and redeem the capital in 37.5 years. A vend of 10,000 would redeem the capital in the same time but with only a 10 per cent return. NEIM Buddle 3; Easton 17/4; and Misc. 63 ZC/48/1. Crawcrook (S3) provides another example: in 1801 it was calculated that the colliery needed a minimum annual vend of 14,000 chaldrons (the implication is that this might not be allowed) if it was to work and make an acceptable annual profit of £2,250. NEIM Buddle 21/49-50.

196. Data cited by Cromar 1977, 86.

197. Russell incurred heavy charges for overworkings at the Dean and Chapter's Wallsend colliery (N49), though in this case he probably judged it worthwhile. M.W. Hughes 1962, 133 and 413. In 1776, when a new winning was being made at Lumley (W9), Tempest decided, under the terms of a wayleave agreement, to limit to 16,000 the number of chaldrons which the colliery operator could carry across his land to the Wear. Beastall 1975, 27.

Chapter 5. Population patterns and the factors affecting them, c.1551-1810.

1. Grey (1649) 1883 edn., 83.

2. See above pp. 21-3.

3. Between the mid-sixteenth century and the date of the first official national census (1801), a number of counts of particular communities in specific years were undertaken. The actual or potential uses of most of these, as aids to demographic inquiry, have been outlined by Thirsk 1959, 129-32 and 182-4. They tend to vary greatly with regard to completeness, reliability and spatial coverage. Some, notably the Chantry Certificates of 1547 and the Compton Census of 1676, simply do not exist for County Durham, while others, such as the Protestation Returns of 1642, provide information which cannot be readily compared with any other population data sources.

4. The concepts of 'family' and 'household' cannot have had a precise meaning, certainly not a consistent precise meaning, attached to them over time and space. For comment on both, and the related concept of 'houseful', see Laslett and Wall 1972; Arkell 1982, 51-7; and Bradley 1978, 10 and 12.

5. DUPD DR/XVII/1. Unfortunately the diocesan survey does not include a systematic listing of family sizes for each Durham parish. From the census of 1801 it is possible to calculate a mean for the county as a whole of just 4.21 persons per family,

the lowest for any English county save Middlesex with 4.09 and well below the national mean (England including Monmouthshire) of 4.68. At the same time the county had more families per house than any other county of England outside London. I should like to thank Tom Arkell for providing me with a ranking of counties in 1801. For 1795-6, Eden suggests an average family size of around 4 at Monkwearmouth and 6 at South Shields. Eden 1795-6, II, 161 and 164.

6. Where the boundaries of the ecclesiastical parishes of 1563 and grouped townships of 1674 and 1801 do not coincide or cannot be precisely determined, township totals for 1674 and 1801 have been assigned to that parish in which the greater proportion of its population was likely to be found. Usually this was also where the greater proportion of the township area lay.

7. In the preparation of figures 5.1-5.3, some of the local variations in population density were smoothed out and the general patterns constructed by calculating average densities for squares of 6 km sides and drawing isopleths accordingly. For a similar application of the technique, see Smith 1955, 139-75.

8. The writer's experience has been shared by others. I thank John Smith, Malcolm Smith and Keith Wrightson for their comments. It should be noted that the Cambridge Group for the History of Population and Social Structure, in its national survey of registers from which to reconstruct the population history of England, chose Whitburn as one of its sample parishes. This may have been a wise choice given the nature of the exercise being undertaken, but it will be realised that within the context of significant and often rapid industrial change which eventually affected most parishes wthin the Tyne and Wear districts, Whitburn was somewhat anomalous: an enduringly rural and distinctly tranquil community until well into the nineteenth century.

9. DUPD DR/XVII/1.

10. M.W. Hughes 1970, 231.

11. In figures 5.4a-q, the use of a five-year moving average eliminates some of the more violent fluctuations which might obscure our interpretation of trends. However, it also means that incidents of 'crisis mortality' (identified as 'high mortality' in figures 5.4a-q) can be slightly mislocated graphically, although the appropriate symbol and letters 'P' and 'F' are assigned to the correct years. The use of a semi-log scale permits the fluctuations in smaller parishes (Boldon and Whitburn in particular) to be more readily seen without too much distortion to the magnitude of change in larger parishes (for instance, South

Shields). For purposes of calculation, it has been assumed that the year began on 1st January for the whole period 1551-1810. It will be noted that prior to the changeover from the old style to the new style calendar in 1752, the year actually began on 25th March. For some research purposes, as when relating demographic events to grain price trends, there can be merit in adopting the 'harvest year' (August to July). Bradley 1978, 11.

12. For notes on omissions and errors in 1563, and their method of treatment, see appendix 17.

13. The figure of nine households per square mile is probably about half that of the national mean for this date. Thus in c.1600, when the size of County Durham's population can have been little different from what it was in 1563, the mean density for England was 87.6 persons, or about eighteen to twenty households, per square mile. Darby 1973, 251-2. On the acreage of the county used for calculations in this study see chapter 1, note 58.

14. Attempts to draw comparisons using baptisms only, or baptisms plus marriages, in order to eliminate the effect of expected erratic fluctuations in burial totals, were not very helpful in providing a closer correspondence of fit. In making comparisons it needs to be borne in mind that small fluctuations in the accuracy or representativeness of either source might have a significant impact on the results, especially for smaller parishes. It will be noted that very few registers begin prior to 1563 (figure A16.1) so that some distortion of real trends will almost inevitably follow from an analysis based upon the eleven-year periods actually chosen. Moreover, that distortion might be especially marked for a parish experiencing rapid industrialization.

15. In the case of Boldon, the registers make it clear that the parish was severely affected by plague in the 1590s and it may be that the population was roughly stable thereafter at a slightly lower level than before. In the cases of Whickham and Gateshead, errors in one or both categories of source must be to blame for the discrepancies.

16. At his Visitation in 1797, Bishop Shute Barrington sent out instructions to all the clergy of Durham and Northumberland to keep a detailed record of demographic events in the manner specified on a sample printed form. Between 1798 and 1812 there was probably a marked improvement in registration for most North East parishes. Barrington had pursued a similar policy in other English counties before his translation to the See of Durham in 1791. Falla 1981, 46-7.

17. In 1767, for instance, 39 pitmen were killed in an explosion at

Fatfield colliery (W13) on the Wear. The appropriate burial register, for Chester-le-Street parish, reflects this fact (along with some other unusual events perhaps): in 1767 there were 250 burials recorded, in comparison with just 170 in each year on either side. The Fatfield explosion of 1708, on the other hand, is less adequately covered. The burial register is defective for the beginning of 1708, but among the seventy-four entries which cover the period of the accident we find only one seemingly relevant entry: 'Aug 18. Seven buried was lost at Fatt Field att Harraton.' Perhaps the bodies of the remaining sixty-two victims of the 1708 explosion were never found or recovered and so went unrecorded in the register. On the numbers of pitmen involved in some other coalmining accidents, see appendix 10d.

18. Obviously, the citeria adopted for identifying crises will, to a large extent, determine the results: the number of crises found, their length and severity. My method has been to regard any year as one of 'crisis mortality' (designated 'high mortality' in figures 5.4a-q) if the number of burials exceeded those in a 'normal' year by more than 100 per cent in a parish with a low population total (i.e., one normally averaging up to 35 burials per annum), by more than 75 per cent in a parish with a moderate population total (36-70 burials per annum on average) and by more than 50 per cent in a parish with a large population total (over 70 burials per annum on average). A 'normal' year was represented by the average (mean) annual frequency of burials over a ten-year period centred upon, but excluding, the 'crisis' year. For all its apparent simplicity, such a procedure can be difficult to apply at times of defective registration and/or frequent crises, and under such circumstances common sense judgements must suffice. In attempting a more sensitive measure than that adopted here, it would probably be helpful to pay greater attention to months, rather than years, of crisis. See Wrigley and Schofield 1981, 646-9; Bradley 1978, 9; R. Schofield, 'Crisis mortality', in Drake 1982, 97-108; and D. Turner, 'Crisis mortality in nine Sussex parishes', in ibid., 109-12.

19. See the discussion on this interesting matter in Wrigley and Schofield 1981, 645-93, but esp. 663 and 668-9.

20. On the terrible devastations of 1596-7, see CalSPD, 1595-7, 347 and 420, in which it is reported, *inter alia*, that 500 ploughs had been laid down in a matter of a few years and that of 8,000 acres formerly under cultivation only 1,600 remained.

21. The consequences of an outbreak of plague for individual families is chillingly demonstrated in two register entries for Whickham: 'July [1610]: The plague at Storey's in the South Field, whereof died Storey and his three children'; and 'August [1626]. George Watson's three children of the plaig this month.'

22. Brand 1789, II, 446; PRO E126/10/104d.

23. It will be realised that localized outbreaks such as these might

have had serious consequences for particular communities and yet, unless specifically mentioned in the register, gone undetected in the aggregated data of a large parish.

24. Unlike some village commons, however, Whickham Fell was also intensively used for coalmining so that those afflicted with plague might have had a double risk to contend with, as an entry in the parish register reminds us: 'Robt Morris and a child that was drowned in a pitt on the Fell, the time they were in the Fell in lodges.'

25. Wrigley and Schofield 1981, 645-93.

26. Such composite crises appear to have been quite widespread throughout England in the 1720s, especially between 1725 and '29. Ibid., 1981, 663-4, 667.

27. Utterstrom thinks typhus (spread by body lice) was the culprit in 1740/1 while Wrigley and Schofield favour dysentery (a fly-borne disease), though without totally rejecting typhus as a factor. Utterstrom, 1955, 257-88; Wrigley and Schofield 1981, 663 and 669-70.

28. Periods of coalmining and other industrial expansion and colonization have been identified mainly from the sources assembled for Part I of this study, but valuable additional detail, relating to occupations and locations in particular, has been culled from the registers.

29. For further information on this important relationship in accounting for the demographic record of the eighteenth century, see Wrigley 1983.

30. See appendix 4 for full details of trends.

31. Ellis 1980; and see above, chapter 3, p. 68.

32. For evidence of coalworking at this time see the sources for particular collieries listed in appendix 6. Although the burial register for 25 April 1605 records the demise of 'Anna, Fil Johanis Bennett de Urpeth cooll pitts', Urpeth colliery was probably not yet a seasale mine.

33. For further discussion on the significance of these pit hamlets, see chapter 7, pp. 251-2.

34. See chapter 3, pp. 66-74. Copperas (green vitriol or ferrous sulphate, used as a mordant) was made from iron pyrites found in the coal seams. Smailes 1960, 130n.

35. See above, note 16.

36. NCL L253/Chandler. The survey is an imperfect one with some parishes simply omitted and others assigned household numbers which, as in the case of Gateshead, look suspiciously rounded.

37. A footnote to the 1801 census mentions an expansion of population in the township over the previous sixty years as a result of the opening of two collieries (W14 and W31 in figure 2.4).

38. These particular settlements must have originated, I think, in the period of full-scale exploitation which really began with the arrival of the waggonway on the moor in c.1710. An earlier origin is possible, however: permission to erect hovels on the moor had been granted in a colliery lease dating from the reign of Charles I. NRO ZCR/6/additional survey of Chester-le-Street manor, 1647.

39. Quoted by Bourn 1893, 37; and see VCH Durham, II, 64-6.

40. NCL L253/Chandler; Hutchinson 1787, II, 441.

41. See figure 2.5 and appendix 4.

42. Bailey 1810, 97; Eden 1797, II, 171.

43. Ibid., 162.

44. Ibid., 164 (report of October 1795). In 1725, when South Shields was 'the chief place for making of salt', Lord Harley described the houses as 'poor little low hovels ... in perpetual thick nasty smoke', two hundred salt pans were at work, each employing three men 'and besides, women and children ... in a very extraordinary plenty'. Harley Journeys, 105.

45. Bailey 1810, 295-6; Eden 1797, II, 164-7.

46. For additional information on the numbers of underground workers in the opening decade of the study period, see Hair 1955, 27c-d, where it is shown, for instance, that in 1804 there were 2,428 hewers on the Tyne and 1,589 on the Wear.

47. PRO SP16/408/57.

48. See above, chapter 5, pp. 196-8.

49. M.W. Hughes 1970, 230. See also M.W. Hughes 1962, *passim*. Most of the lead produced in the dale was shipped out via Newcastle. Weardale also produced quantities of iron which, *inter alia*, were used for making swords at Shotley Bridge and Winlaton. Hunt 1970, 151.

50. Eden 1797, II, 152.

51. Bailey 1810, 293-4; Chapman 1975, 2.

52. Defoe (1724-6) 1971 edn., 533.

53. Bailey 1810, 293-4.

54. Ibid., 293.

55. For maps which show these towns in a wider regional context, see Thirsk 1967, 468; and Thirsk 1985, 422.

56. The relationship between village depopulation and enclosure of townfields in the sixteenth century is still not properly understood, especially with regard to its scale and extent. But see further comment in chapter 6, pp. 215-6, 221-3, 238-9; and the list in appendix 18.

57. For further details, see chapter 6, pp. 221-6, and appendix 18.

58. For detailed consideration of the Lanchester Fell enclosure, see chapter 7, pp.262-76.

59. On the growth of 'onsteads' and the dual economy in Weardale, see Roberts 1977, 187-8.

60. Ingleson 1970, 5-10.

61. See above, p. 180; and Wrigley and Schofield 1981, esp. 454-84; Wrigley 1983, esp. 134, 141-4.

62. NEIM Watson 5/9/16; Buddle 14/197-9; and see also Sill and Barke 1987, 35-54; Flinn 1986, 343-4, 363.

63. As an indication of the turnover in the labour force by the late eighteenth century, Hair (1955, 38) cites the example of Walker colliery (N12) where, of fifty-six miners named in 1781, only ten remained in 1791 and just one by 1796. Although parish registers provide some evidence of mobility, they appear to seriously under-represent the true amount involved simply because a large proportion of the workforce consisted of children and teenagers who were the least likely members of the community to be recorded in the registers unless marrying early or meeting an untimely death. For further comment on this point, see Leister 1975, 55-7. Evidence of mobility in the 1760s and '70s, involving change of workplace and possibly home, is revealed in the letters of Lady Windsor who had ownership rights in a group of collieries in north-west Durham. See, for example, DRO CG 6/1405/LWLB/'27 Aug

1769: I propose to take one-third of the pitmen and stock from Pontop Pike to carry on Townhead ...'; and see above, chapter 4, note 176, regarding the poaching of workmen. In the late sixteenth century there were miners dwelling in Newcastle who moved considerable distances each day to work rather than settle wherever coal was being exploited; by the mid-seventeenth century, however, this was regarded as a wasteful practice, though not yet totally abandoned. Welford 1884-7, II, 385; Gardner 1655, 30.

64. 'Few are the instances of Pitmen changing their mode of life. If they are dismissed from one colliery, they generally find employment in another....A Pitman is ill-qualified to pursue any other course of labour....They seldom change their employment but when they do, I can see no difference in their work to the labouring people.' Hair 1955, 63-69, citing The state of the pitmen, (1795).

65. Leister 1975, 40 and 58; and see Flinn 1984, 429-34. At Lumley in the 1770s, newly-built pitmen's houses were single-storey, ten feet high and just 72 square feet in area. Beastall 1975, 28. Whatever its shortcomings (and not all cottages were necessarily as meagre as those at Lumley), housing provision clearly constituted a significant element of colliery investment. In 1791, for instance, workmen's houses belonging to the Grand Allies were listed as being worth £2,280 16s., which represented 6.3 per cent of total fixed assets in colliery undertakings. DRO D/St/117. It is not clear just how common tied housing was prior to the nineteenth century, but probably quite widespread, even from the outset. A mid-seventeenth century reference to houses specifically 'for use of the colliers' suggests that this was the case at Harraton (see English Reports, II, 826, cited by Moller 1933, 258-9); and indeed it was usual in mining leases to find a clause providing for the lessee to erect hovels for the pitmen. For a late sixteenth century reference to tied housing see PRO Durham 2/1.

66. In 1757 the average size of a miner's family at Hartley in Northumberland was 4.3 while in 1815 at Jarrow it was 5.1 and at Hebburn 4.5. Flinn 1984, 433-4.

67. See Haines, 1979, 155-204, esp. 203, regarding his discovery of 'many of the expected characteristics of mining and industrial districts' for the period 1851-1871: 'heavy differential adult-male net immigration, high wages for males, lack of employment for females (esp married females), early and extensive marriage for females and high marital fertility' and 'no distinctive high mortality pattern except high accidents among married males'. See also Sill 1982, *passim*. Wrigley stresses the potential impact of earlier marriage in extending the child-bearing period of women but also, and more significantly for

our argument perhaps, the tendancy for a larger share of the population to get married as a response (though a lagged response) to rising real incomes. Wrigley 1983; and see also Wrigley and Schofield 1981, 438-43. Leister (1975, 61) suggests that an improved survival rate of children contributed significantly to population growth on the coalfield. Clearly, there is a need for a more thorough and systematic examination of the relationships involved prior to the nineteenth century than has been possible in this study.

68. NCL L253/Chandler.

69. On this point, see Leister 1975, 63-7.

70. NRO 263/minute book 1805-15.

71. J. C., 1708, 47: 'you get upon Coals cheaper Wrought in Winter time, then in Summer, or time of Trade, because Labourers or Miners are then more Numerous thereabouts, being Land-Sale Collieries are most commonly laid idle for that Season of Ill Weather, and rather than those Labourers will lye Idle, they are prevailed on generally, and as it is customary to lower their Wages during the Winter Season.'

72. Around 1800 there may have been just five immigrant colliers -four from Scotland, one from Somerset- living in the three North East coalfield parishes of Houghton-le-Spring, Earsdon, and Gosforth. There were probably a few from Cumberland too, but the numbers of non-natives at work seem to have remained relatively small until the strikes of 1831/2 and 1844. Hair 1955, 31 and 34.

73. Hair 1955, 28-9; Flinn 1984, 342.

74. 'Our peculiar race of pitmen...can only be kept up by breeding. It never could be recruited from an adult population' Letter, J.Buddle to H. Lambton, 16 May 1842, quoted in Flinn 1984, 339.

75. On manpower productivity in coalmining, see Nef 1932, II, 136n; Wrigley 1987, 83n; Flinn 1984, 361-66.

76. I owe this information to the late Mr C.P. Neat of Sunderland who spent many years compiling data for the Society of Genealogists' National Index of Parish Registers.

77. Eden 1797, II, 169.

78. Hair 1955, 59-60. In Hair's survey, one-quarter of miners' wives came from non-colliery parishes.

79. Examination of the records of Newcastle trade companies such as

the Merchant Adventurers' and Hostmen, shows that, in sharp contrast to what has been discovered for the port of Bristol, apprentices were recruited from a fairly limited area. Merchant Adventurers, 184-381; Hostmen's Records; Howell 1967, 19-20.

80. CalSPD, 1640, 81-2 (29 April 1640).

81. There is specific mention of 'a collyer of Whickham' in the burial register as early as 31 March 1588.

82. A survey of Houghton-le-Spring registers provides the following information on the origin of marriage partners:

5-year period	Percentage of marriage partners from Houghton parish	Other Durham parishes	Outside County Durham
1582-3,89-91	78.4	18.7	2.9
1668-72	84.7	12.5	2.8
1720-24	78.4	10.5	1.1
1770-74	89.8	9.5	0.7

An entry in the burial register for 1625 mentions 'Wm Scotsirish being a gardener'.

83. Nef's extensive researches on the coal industry revealed just two foreigners in the North East coalfield: a Frenchman, working as a sinker at Gateshead in 1548, and a Pole who held the responsible position of overman at Whickham Grand Lease colliery (S15) in 1609. Nef 1932, II, 145-6.

84. PRO SP16/408/57. And see also CalSPD 1638-9, 260; 1640, 81-2; and 1650, 299. For another contemporary view on the great number of Scottish subjects who were supported by the coal industry, see J. Spruel 1705, 17.

85. Fewster 1957, 28-9.

86. Eden 1797, II, 165. Scots were employed at the South Shield's salt pans in the mid-sixteenth century. CalSPD 1650, 299.

87. There were 138 baptisms recorded for 1642 and 165 for 1643; the previous highest total had been 106 in 1638. There were 35 marriages in 1642, 28 in '43 and 63 in '45; the highest pre-war number had been 26 in 1634. In the decade 1631-40, baptisms averaged 89.5 per annum and marriages 19.7; in the following Civil War decade, affected by troop movements at the Wearmouths, baptisms averaged 125 per annum and marriages 27.6.

88. Note, for instance, the comment by Flinn 1984, 374: 'The determination of levels and trends [is] difficult, if not impossible'; and Wrigley and Schofield 1981, 441: 'To treat the Phelps Brown and Hopkins real-wage index as a reliable measure of the changing fortunes of the nation is to carry over-simplification to the point of charicature'; and see also Wrigley 1983, 140-1. But note a valiant attempt to make sense of wage rate trends, in Kussmaul 1981, *passim*. For an indication of just how complicated miners' remuneration could be by the opening of the nineteenth century, see NEIM Buddle 3/95-6.

89. Between 1792 and 1800, 4,600 men were recruited at Newcastle and Sunderland for the navy. Some at least must have been pitmen. RepCCT 1800b, 649. And note NRO ZDE 35/A/10/letter, 20 Sept. 1803: 'The pitmen are certainly not in plenty, many having gone out of the County of Durham in particular into the Militia and Armey of Reserve, and no doubt a great many young men to sea.' In the last decade of the eighteenth century pitmen's wages are said to have risen by fifty per cent. Dunn 1844, 69.

90. NRO ZDE 4/27/86, cited by Flinn 1984, 394. But note that 1805 was probably a year in which miners were in shorter supply than was usual for the later decades of the study period.

91. Eden 1797, II, 166 and 175.

92. Young 1770, III, 12. In 1765 average earnings at Walker (N12) were said to be 2s. to 2s. 6d. a day while for Tyneside miners in general 12s. to 14s. per week was common. In 1786 average wages at Pontop Pike colliery (S46) were said to be 1s. 9d. per day for hewers, which may have been below the average for Tyneside at this date. In 1800 Newcastle colliers were said to make 2s. 6d. to 3s. per day or 16s. per week. Ashton and Sykes 1929, 135-7 and 140. Taylor argues that between 1780 and '90, that is, before the inflationary trends of the Napoleonic Wars set in, the daily earnings of hewers rose by 12.5 per cent, the cost of horses by forty per cent and the cost of their feed by twenty-five per cent. A. J. Taylor, 'The sub-contract system in the British coal industry', in Pressnell 1960, 227.

93. J. C. 1708, 29; Hughes 1952, 253. In 1745 hewers at Lumley were paid 1s. 9d. per day and at Byker 1s. 6d. Ashton and Sykes 1929, 134-5. Wages in the salt industry in 1725 -5d. per day for pumpers, 6d. for watchers of pans- must have been well below those in coalmining. Harley Journeys, 105.

94. Nef 1932, II, 180-95, esp. 192n. For 1672-9 information survives on *maximum* rates of pay allowed certain workers by the Durham Justices of the Peace. These rates were enrolled at Quarter

Sessions. Unfortunately earnings in coalmining were excluded from the reckoning but it seems reasonable to assume that if the stated maximum rates were actually paid from time to time -for instance, 12d. per day plus meat and drink for master masons and carpenters- then these must have compared favourably with the earnings of pitmen and allied workers. DRO Q/R/W1-6. Woodward has suggested that the wages of many building craftsmen may have faired well during the sixteenth and seventeenth centuries. Woodward 1981, 41. And see Woodward 1980, 32-44, on attempts to regulate wages nationally.

95. Eden 1797, II, 163; Bailey 1810, 262. Any advantage which farm servants possessed over the pitmen by way of their annual hiring was, of course, gradually diminished as the yearly bond became more widespread in coalmining; but agriculture did retain a degree of predictability in its employment needs, especially for particular localities, which was not found in coalmining.

96. Kussmaul 1981, *passim*, but see esp. 135.

97. Eden 1797, II, 152, 163, 168 and 175; Bailey 1810, 262-3. John Hasty, who took a lease of a holding at Lyerdean near Durham in 1687, not only supplemented his income by working for his landlord but also by working in a local coal mine from time to time. He was probably relatively well off. By contrast, labourers at Wolsingham Park in 1768 were probably less favourably placed, with earnings of only 8d. per day to live off -the typical rate encountered at Gateshead Park and Shipcote forty years earlier. Brassley 1984, 57; DUPD CC Box 143/220551A/work done in Wolsingham Park, 1768; GPL Cotesworth (OR) box I/4.

98. Eden 1797, II, 168-7; Roberts 1977, 182-3 and 187. For further comment on the advantages of the dual economy, or 'by-employment', as some degree of protection against the full forces of inflation in the period 1500-1640, see A. Everitt, 'By-employments', in Thirsk 1967, 425-9.

99. Although there is mention of women being employed in some pits on Tyneside in 1586, and underground at Fatfield colliery on the Wear in 1708, their involvement in the coal industry, either above or below ground, seems to have been fairly limited; especially in comparison with what has been suggested for some other coalfields. Nef 1932, II, 167-8; Flinn 1984, 333-4.

100. Quoted by Brassley 1984, 57.

101. A strong reliance upon female day-labourers during the harvest season was also found at Spindleston in north Northumberland in the 1680s. Brassley 1984, 57.

102. Eden 1797, II, 166.

103. During the time when the Lambtons held the lease of Lumley colliery (from late 1783) the Earl of Scarborough's tenants complained vigorously that the obligation to provide horses and waggons for the carriage of coals kept them from their more urgent agriculture work. Despite earnings of £84 per annum for a man and a horse set to work on leading coals throughout most of 1805 and 1806, resentment mounted. The Earl's surveyor proffered the view that 'as these coals are perhaps the best in the kingdom they should support their own expences', and in 1814, when the colliery lease was renewed, the obligation was dropped. Beastall 1975, 40-1. It was more usual, however, to find tenants both welcoming and benefiting from the arrangement. For some it eventually meant a permanent move out of farming to become waggonwaymen, vulnerable to the vagaries of production; for others it became a part-time activity which was pursued to the detriment of their farm holdings; but, overall, there seems little doubt that earnings in the 'land carriage' were a main contributory factor in the survival of small farms on the coalfield. See above, chapter 3, pp. 100-1; chapter 6, pp. 236, 240, 249; NRO 725/abstract of farms of John Clavering; and Bourn 1893, 29 (re. Marquis of Bute's estate farms). At Newburn, on the north bank of the Tyne, in 1685, the tenants were said to be 'better enabled to pay their rents by reason of their carrying coales from his Grace's severall collieryes'; in 1755 there were still many small farms of 25 acres or less in the township. Brassley 1984, 51.

104. DUPD CC/box 79/'Account of William Askby, Clerk of Mines and Approver of Mines of Coal at Whickham, April-August 1459'. And see also DUPD CC/box 80/221700, where it would appear from a case brought against three workmen for not performing their allotted seven days work at Thomas Surtees' pit between 24 May and 20 June 1616, that the dual economy of the coalfield extended to the involvement of the tenantry in the part-time mining of coal, even in the most technically advanced and intensively mined parish of the day.

105. DUPD/probate inventories.

106. E. Hughes 1952, 139-42; DUPD CC/notitia 54001/893.

107. GPL Ellison C/15/1/suit in Bishop's Chancery Court, 1 Dec 1619; and C/15/5/depositions of witnesses, Brummell and other v. Clavering and others, 21 March 1720; DUPD CC/box 205/244238/ judgement re. Whickham coalmines, 6 Sept. 1621. When, in 1635, Sir Thomas Liddell compounded with the Whickham copyholders to carry coals through Whickham manor from Blackburn colliery (S19), he also promised to pay extra charges for all wains and carriages he should 'hire, gett, or imploy' other than his own and those of

his children. PRO Durham 4/1/228.

108. The collier fleet was usually greatly diminished or laid up entirely from November to February to escape the winter gales, and the masters sometimes extended the close season in an effort to strengthen their bargaining position viz-a-viz the producers. The waggon-men, like the keelmen, could be especially hard hit by this; though provided the weather locally was not too severe, adequate storage remained at the staiths, and the appropriate management decisions prevailed, it was possible to carry on leading. At Stella Grand Lease in 1679, 1,918 waggons were led between 8 November and 26 December, compared with 15,080 for all twelve months. NRO ZCO IV/47/8a; E. Hughes 1952, 251-2; Lewis 1970, 210. In January 1771 the Grand Allies sent out instructions to have snow cleared from their waggonway so that their poor quality South Moor coals could be sent early to market (see chapter 4, note 181). A good deal of work could be done underground during the winter provided the coals were not exposed too much to the elements. See above, note 71, regarding the movement of workers to the Wear district mines in winter.

109. On the variable impact of these factors, see chapters 3 and 4. In the regulation of 1710, leadings were restricted at certain pits to two or three days a week with a specified number of waggons allowed on each day. E. Hughes 1952, 255

110. On the development of the binding system, see Flinn 1984, 352-8. On the lack of job security for miners and keelmen before the eighteenth century, see Nef 1932, II, 75-6, 154 and 184.

111. Hair 1955, 24-6. On the activities of the keelmen (in 1699), see Hostmen's Records, 154; and on the 'Crowley Crew', Flinn 1962. On his visit to Winlaton, Hutchinson (1787, II, 441), reported 'an eye of jealousy on enquiry, and the traveller can reap little information as to the various articles manufactured, or quality produced'.

112. See, for instance, DUPD Ryton calls (court rolls)/nos. 1-26, esp. no.10; NRO 578/321/plan of East and West Rainton, 1777; GPL Cotesworth (OR) box CI/15/'A Rental of ye Cottage Houses on Gateshead Common for ye year 1713'; NRO 404/188/commissioners' papers for Gateshead Fell enclosure; Whickham parish registers; DRO CG16/1250/list of occupiers of cottages on Blackburn Common with notes on rents payable to Thomas Liddell, 1613 and 1634; DUPD (PK) CC 235423/renewal and contract books, 1660-1829 (including cottage leases on Heworth Common); DCL Sharp 113/64/cottages at Eighton and Blackburn, 1634; DUPD CC/box 218/220632-5 and CC/notitia 54001/781-811 (re. Eighton cottages). At the close of Elizabeth I's reign, the Bishop of Durham was forced to go to law against a powerful colliery partnership of William Gascoigne,

Henry Chapman and Lionel Maddison. They were charged with having unlawfully enclosed part of his waste of the great manor of Chester-le-Street in order to build cottages for workmen at their coalpits. PRO Durham 2/1/Attorney-General v. Gascoigne and others.

113. GPL Cotesworth Box CI/B15/'A Rental of ye Cottage Houses ... 1713'. The rental contains the names of 82 (or 83) cottagers of whom 74 (or 75) paid a total of £5 4s. 0d.

114. NRO 404/188/commissioner's papers for Gateshead Fell enclosure.

115. Eden 1797, II, 162.

116. Clavering Corres., 68; Hair 1955, 265-6.

117. Eden 1797, II, 170.

118. At the opening of the nineteenth century Durham City had a large weekly market and four fairs to which horse and cattle dealers came from all parts of Britain. Bailey 1810, 279, 282. Contemporaries consistently commented upon Newcastle's prowess. In 1725 Lord Harley noted that 'three thousand sheep, besides other meat in proportion' were slaughtered and sold 'betwixt August and Christmas'. Precise figures for the period 15 October to 1 January 1708/9 show 5,453 sheep and 1,442 beasts to have been killed by 'county butchers at Westgate and Gallygate'. In 1635 Brereton declared Newcastle a 'mighty market' with 'an infinite store of poultry'. Harley Journeys, 106; DUPD Grey misc. book 6/146; Brereton (1635) 1844 edn., 86. In 1769 the 'largest and fattest oxen' were said to be 'commonly sold to butchers of North Shields 'for the ships of the coal trade, and the contractors of the navy'. Wallis 1769, I, 31.

119. See chapter 6, pp. 239-40.

120. Eden 1797, II, 169. Oats and rye were favoured in the lead dales, and maslin (a mixture of wheat and rye) as the staple or 'general bread' grain over the remainder of the county, but the usual regional contrasts could be break down, of course, at times of surplus or shortage. Bailey 1810, 124, 127, 136; and see ibid., 357-8, where the simple diet of the (agricultural) labourer is stressed: maslin bread, milk, pudding, and potatoes and less beer and ale than his counterpart in the south of England.

121. On grain imports, see Gras 1915, 53-4, 104, 277, 321-2, and his app. A and D; and ibid., 308-9, which shows that in 1663-4, 1671-2, 1684-5 and 1688-9 more shipments of corn were sent from King's Lynn to Newcastle than to any other port, not excepting London. See also Hostmen's Records, 179; PRO SP12/263/55;

Salisbury Calendar, VII, 296; Howell 1967, 136; Brassley 1974, 18-19. Witnesses in a law suit of 1651 relating to the trade of the Tyne, deposed with some regularity that the masters of ships 'using the [coal] trade doe bring all sorts of graine all sorts of fruites rootes & the like provission of victuall from the Southerne parts of England'. One witness referred to 'that great suply of Corne & other victualls which are Constantly brought' and 'give not only reliefe to the Towne but also to the foure Counties Adjacent'. Gardner Papers, 55 and 66. Wilcock (1979, 5) notes that grain was brought in from the Fen country in Roman times to service military depots along the Tyne valley, while Blake (1967, 14) cites the case of the French merchant, Thomas Rente of Poutoise, bringing corn to Newcastle in 1325.

122. GPL Cotesworth CK/3/133/'Reflections on ye Coale Trade'. When colliery agents submitted their bids to the coalowners for what the enterprise was likely to cost they normally included provision of corn for the pitmen. A sudden rise in grain prices, therefore, meant that the agents were usually the first to be placed in dire financial straits. The corn crisis of 1709 was not confined to the North East; that year was probably the worst nationally for bread cereals in over half a century. P.J. Bowden, 'Agricultural prices, wages, farm profits, and rents', in Thirsk 1985, 57-9.

123. In 1800 the Lambtons purchased 7,645 bolls and 62 pecks of rye for £6,495 9s. 9d. (inclusive of leading and sacking) and susidized its subsequent sale to the pitmen to the tune of £2,377 6s. 9d. -a sizeable loss, equivalent to 7d. for every chaldron of coal sold. A similar arrangement for oats for the horses incurred a loss of 1s. per chaldron. NEIM Buddle 13/11. See also, NEIM Buddle 5/54-6, 14/8, 18/91; and DRO D/Lo/X62/sixth report from the parliamentary committee considering the high price of provisions; Granger 1794, 59. The high price of corn during the Napoleonic Wars was one of the factors said to have caused losses to the Grand Allies' colliery venture at Killingworth (N43). M.W. Hughes 1963, 413-4.

124. The Newcastle Courant of 9 January 1740 reported that the Tyne was frozen and hard enough for a 'grand entertainment' including the roasting of a fat sheep.

125. Clavering Corres., 226/letter, James Clavering to George Clavering, 24 June 1740: 'The Newcastle mob ... chiefly consist of pit-men, waggonmen and keelmen, who all complain of hardships and I am truly afraid not without just reason. Yet had the grand allies performed their agreement with Alderman Ridley on Saturday they would have been entirely suppressed. The working of my collierys give great offence yet my pit men does not joyn theres, but keep constant at work; they are not starved.'

126. NUL 338.1/'A Charge, Delivered to the Grand Jury... by Edward, Lord Bishop of Durham'. It was quite usual to have accusations about the engrossing of corn at times of shortage, and usually with good reason. See, for instance, CalSPD, 1595-7, 429, for complaints in 1597; and Howell 1967, 291, regarding the shortage of 1649. For some detail on grain shortages and disturbances in Sunderland in March 1801, see Whellan 1856, 658-9.

127. GPL Cotesworth CK/3/133/'Reflections on ye Coale Trade ...'; NUL 338.1/'A Charge, Delivered to the Grand Jury..'. And for purposes of viewing Durham's experience in a broader context, see Jones 1964, 133, 138-9; Creighton 1965 edn, II, 71-4; Appleby 1979, 865-87; Wrigley and Schofield 1981, 354, 651, 662-3 and 669; Post 1976, 14-27; Post 1984-5, 1-30.

128. Wrigley and Schofield 1981, 454-84, esp. 457-66.

129. See above, note 20. The evident association between high mortality and food shortage in the 1590s appears to be in marked contrast to the high burials without apparent food shortage just a few years later in 1600-04. While arguing for the disappearance of the positive check cycle nationally, Wrigley and Schofield (1981, 354-5, 440-1, 475, 645-93) suggest, nonethless, that by the seventeenth century there may have been two Englands, one pastoral and remote and so susceptible to high mortality in bad harvest years, the other more specialized in its economy, with ready access to good communications at times of food shortage but also by that means vulnerable to the spread of disease. And note also their warning (ibid., 354): 'the fact that when using national data the impact of high food prices on death rates appears limited and uncertain is not to deny ... that much more clear-cut examples of devastating effects of food shortages may be found locally or regionally.'

130. For the seventeenth century, too little is known about harvests and price trends to draw any firm conclusion about their association with high burials, but a fairly weak relationship seems likely. We can certainly find examples of food shortages which had no apparent impact on the burial registers, as, for example, in January 1629, when the Justices of the Peace in Durham complained that corn prices had risen steeply so that wheat was costing £8 per quarter compared to just 8s. in 1550. PRO SP16/132/17. In an attempt to resolve the issue more satisfactorily, it might be helpful to undertake a more thorough investigation of the registers than is attempted here by defining mortality crises on the basis of monthy rather than yearly totals.

131. This view is supported by Wrigley and Schofield 1981, 359; H.J. Habbakuk, 'English population in the eighteenth century', in Glass and Eversley 1965, 269-84; Ohlin 1961, 190-7.

132. On balance, this appears to be a reasonable conclusion to arrive at, once the following somewhat patchy primary sources have been examined in the context of suggested broader trends: DRO Q/S/OB/ April 1686-July 1700 (data for June 1698) and October 1700-January 1732 (data for June 1710); NRO Q/S/OB/8-86 (various dates between 1696 and 1742); DRO Q/R/W/1-6/enrolment of wage rates for servants, labourers and artificers, 1672-9; DUPD Baker-Baker 15/5, 84, 16/7,36a,44d; GPL Cotesworth CN/2. For broader trends, see Nef 1932, II, 182, 196; E. Hughes 1952, 173; Kussmaul 1981, 102, 112; Wrigley and Schofield 1981, *passim*. Thirsk 1967, *passim*; Thirsk 1985, *passim*.

133. DRO/Lo/F 769/corn exports from Stockton and Hartlepool, 1740 M.W. Hughes 1970, 229; Brassley 1974, 48, citing PRO E190/173/12,13 and 174/1,2,6,9; Brassley 1984, 43.

134. Bailey 1810, 358. An indication of Bailey's expertise is given by D.J. Rowe in Bailey and Culley (1805) 1972 edn., pp. xviii-xx.

135. This is essentially the argument advanced by Wrigley and Schofield, 1981, and in the absence of information of a local or regional nature sufficient in quality to construct more than an impressionistic view of events, it is the one that has been tentatively accepted here. It argues that fertility was the main determinant of population growth during the period of study so that the level of agricultural output (reflected in prices) was regulating population growth. For a similar argument relating to the middle ages, see Postan 1966, 549-632.

136. See above, pp. 191-2.

137. For an interesting study which pursues this idea with particular reference to East Anglia, see Overton 1986, *passim*.

Chapter 6. Enclosure patterns and the factors affecting them, 1551-1810

1. Bailey 1810, 98.

2. Where not separately referenced, information in the text and notes relating to specific enclosures is taken from the appropriate sources listed in appendix 18. This chapter is a much revised and extended version of a published article. See Hodgson 1979.

3. Note, in particular, the invaluable Bell Collection of enclosure commissioners' papers held at Northumberland Record Office, details of which appear in appendix 18.

4. See, for example, the arbitration awards (cited in appendix 18) relating to the enclosure of commons at Chester-le-Street, 1794-1800, and Framwellgate and Witton Gilbert, 1801-9. See also Drury 1977, 13-18. Dr John Chapman, who has undertaken a sample survey of parliamentary enclosures in England, informs me that Durham may have been one of a minority of counties where arbitrators were used to any great extent. With Durham Chancery decree enclosures it was quite normal to have umpires or arbitrators who, *inter alia*, received into their safe-keeping the surrendered copyholds prior to the re-allocation of properties.

5. Lapsley 1900, passim.

6. It is possible that other examples of Durham enclosures confirmed at Westminster are still to be discovered among the 2,257 Chancery decree rolls in the Public Record Office. Beresford (1979, 4) comments upon this invaluable but impenetrable source: 'Had the Chancery clerks conspired to keep the contents privy until Domesday they could hardly have done better'.

7. Stainton-le-Street (1586) provides an example of an early but well-documented general agreement; Eldon (1625) an example of a general agreement to which reference is made incidentally, by a witness giving evidence of title. DRO D/Ch/C 860 and E 207; DUPD DR V/11/deposition of Thomas Simpson.

8. See below, note 28.

9. In most cases the dates cited in appendix 18 provide only an indication of the time which elapsed between obtaining the act of Parliament and making the award. In practice much activity often pre-dated or post-dated this period. At Framwellgate and Witton Gilbert serious attempts were being made to secure an act as early as 1771 although nothing was really achieved until 1801. DUPD CC/box 218/35-6; CC Box 187/22-6. In the case of Gateshead townfields, enclosure was not sanctioned by act of Parliament until 1814 and the award not made until 1818, yet they had effectively ceased to be common before this; by 1792 we find portions being leased out for building purposes. Manders 1973, 31-5. Delays could be especially long where enclosure affected extensive tracts of upland waste, and some areas allocated in the awards as 'less improveable' might, in practice, be never taken up at all, as happened, for instance, at Wolsingham and Weardale Park and Forest (see above, p. 226).

10. As occurred, for example, at Murton (see above, p. 242). In the case of Chancery decree enclosures, the first date cited in appendix 18 is that at which a general agreement for the enclosure of a substantial acreage occurs (though some dissent and removal

of fences might have subsequently taken place) while the second date is that of the decree award.

11. DUPD Extract from PRO surveys and rentals: SC 12/21/28 f.227. (Bishop Hatfield survey). At the time of the enclosure of Whitburn in 1718, we are informed, but without further explanation, that 'old measure is always good measure'. Surtees 1816-40, I, 52.

12. Bailey 1810, 8.

13. Ibid., 8-9; Granger 1794, 31-2.

14. For a useful discussion of the great variety of soils within County Durham, see J.H. Stevens and K. Atkinson, 'Soils and their capability', in Dewdney 1970, 46-67.

15. DUPD CC/box 217/254030A/General view of the tenures in the Palatinate of Durham, 1887; Butlin 1973, 111-20.

16. DRO D/Sa/E217/lease of 1669.

17. Bigg was a hardier variety of barley, with four rows of grain on each ear rather than six. Its cultivation appears to have been quite extensive in Northumberland and Durham until the early years of the eighteenth century after which it declined sharply and had probably all but disappeared by the opening of the nineteenth century. Bailey and Culley (1805) 1972 edn., 81-2.

18. On these important distinctions, see Dodgshon 1975, 327-34.

19. Thirsk 1967, 27; PRO E134, 20 James I, East. 18; E134 8 James I, Trin. 1.

20. James 1970, 218-20; James 1974, 4-8; C.M. Fraser, 'The medieval period', in Dewdney 1970, 207-13 and esp. 208.

21. It is assumed for purposes of calculation that the size of the county was 649,433 acres. See chapter 1, note 58.

22. Dobson 1973, 251-296; Lomas 1973, *passim*.

23. For population totals, see chapter 5, pp. 171-3; and for coal output trends, chapter 3, pp. 34-42, and appendix 4.

24. PRO SP15/32/83(1)/presentment by a Durham jury, 1593.

25. For the exceptions, see appendix 18.

26. DCL Sharp 167/Bishop Cosin's survey, 1662, 86.

27. DUPD CC/notitia 54002; CC/enrolment book 184957B/28.

28. See, for example, DUPD CC/notitia 54001; HC VII/box 12/38 (re 'grants *de novo*', esp. 1706-22); HC books: Ryton calls 1-26 (encroachments on Ryton wastes); HC/Stewards' minute books 6/70v and 7/5v (Lanchester encroachments to c.1714); GPL Cotesworth (OR) X/2/23 and 24; DRO D/Br/E6 and E8 (Brancepeth 'intacks' and encroachments); E. Hughes 1952, 131-6. A lull in formal enclosure activity in the late seventeenth and early eighteenth centuries may have been due in part to the difficulty of borrowing money for general divisions. See Dickson 1967, *passim*.

29. The enclosure commissioners' papers suggest that in the case of Weardale Park and Forest there was feverish activity soon after the act of 1799, but the scale of the task to be undertaken and the raising of necessary initial finance meant that the award was delayed until 1815. NRO 404/244-5.

30. DUPD HC/misc. box 11/18.

31. See above, pp. 121-63.

32. Trevor-Roper 1945-6, 45-58; James 1970, 214-26; James 1973, 49-83; Hughes 1952, xiii-xxi, 1-38; Nef I, 30 and 324.

33. See above, pp. 177-80, 208-9.

34. Although I have not had time to undertake a thorough investigation of trends, it is evident from an exploration of several appropriate sources that a century characterized by a fair number of decayed holdings and rent arrears gave way around 1600 to a period in which there was a brisk traffic in holdings with the overall number of tenants probably rising. DUPD (PK) DC/ Receivers' books, 1584-1620; HC books 5-77; HC/M.64/survey of the Bishopric of Durham, 1588; Parl. Surveys I and II, *passim*.

35. Cliffe (1969, 47-8) suggests that in Yorkshire, a more favoured agricultural county than Durham, the 'normal trend' was for rents to rise five- or six-fold between 1558 and 1642.

36. The presentment of 1593 makes particular mention of rents being 'racked' in the wake of depopulation. PRO SP15/32/83(1)/ presentment of a Durham jury, 1593. For further information on engrossments and depopulation in Durham, see the sources cited in appendix 18; and for some Northumberland examples, see Kerridge 1969, 96-8.

37. A special study of Crown possessions in south Durham in the sixteenth and seventeenth centuries has been made by Dr David Reid

of the Department of Extra-mural Studies, University of Durham. I thank him for his useful comments.

38. The main sources of information for the process include: PRO E164/37 and 38; PRO E178/various Elizabethan and Jacobean surveys and inquisitions, including nos. 766, 3755, 3767 PRO LR 2/192 and 193/Crown estates' surveys, 1607; PRO LR 6/116/Crown Receivers' accounts; CLRO RCE 5/3,4,5/surveys, 1629; DUL Mickleton 6 and 33. And see also Ingleson 1972, 78-83; Alexander 1972, 310-3.

39. PRO E164/37; James 1974, 39-40.

40. CalSPD, 1611-8, 238/Henry Sanderson to Sir Ralph Winwood, 12 Nov. 1615. Further reorganization was to occur over a century later, in the 1730s, when the Belasyse family formed a number of compact farms out of their estates at Brancepeth, though possibly without making many fresh enclosures as such. Ingleson 1972, 77; DRO D/Br/P4.

41. James 1974, 80-5; Halmote Rolls, xliii and 249; DRO Lo/F/987. Weardale was an especial stronghold of 'tenant right' in the county. For a useful discussion on 'tenant right', see Bouch and Jones 1961, 74-6. Although in comparison with leases for years leases for lives yielded a very uncertain income, they could also afford a very sizeable income to any bishop lucky enough to be in office at the time of renewal. In 1634 an order was sent to all bishops and cathedral chapters forbidding the recent practice of converting leases for years into leases for lives and advocating the instigation of a reverse trend. In the period 1743-51, however, we still find that 76 out of 248 grants by the Bishop of Durham were for lives. CalSPD 1634-5, 88; Clay 1980, 128-57.

42. Compare, for instance, the entries in DUPD HC books 5-16 with those in HC books 73-6.

43. Middridge affords one of the most instructive examples of how difficult it was to proceed without the backing of all interested parties. Recalcitrant tenants, fearful of the cost of hedging their small allotments and the general expenses of anticipated improvements, were reported to be 'crewelie dealt with'. For further details, see references cited in appendix 18.

44. Several warrants were issued between 1634 and 1637 to allow tenants to enclose parcels of common land. A warrant of 13 December 1637, for instance, granted permission for the dividing of Coundon townfields. That of 15 April 1634 allowed the Bishop's steward to improve the moors within the parishes of Lanchester, the Boldons, Bishop Auckland, Whitburn and Cleadon, and Sedgefield, and to grant the same to persons of his choosing, for purposes of defraying his expenses at the Halmote courts. The

precise legal standing of these waste enclosures, even when sanctioned by warrant and entry on the court rolls, so troubled the minds of Bishop and tenantry alike that in the mid-seventeenth century an act of Parliament was prepared -though not proceeded with- to enable 'Bishops of Durham to grant parcels of common by surrenders to be inclosed, *Ut de novo incremento*'. The preamble to the act alleges that there had been a particular surge in piecemeal enclosure activity by copyholders since the accession of James I in 1603. DUPD CC/box 211/221334; Spearman 1729, 123-4.

45. Thirsk 1967, 200-55; Beresford 1961, 40-69.

46. The Bishop could exact a sizeable lump sum in recognition of lordship rights and for his sanctioning the enclosure. For instance, at East and West Boldon in 1667 it amounted to £20, at Newbottle in 1671 to £26, and at Ryhope in 1680 a fine of £50 was imposed. Sources as in appendix 18.

47. VCH Durham, II, 226-8, 230-1; James 1970, 219-20; James 1974, 39, 80-4; Spearman 1729, *passim*; M.W. Hughes, 1970, 117-22. In the late fourteenth and early fifteenth centuries the Priory estates had moved over to short-term leases (often of three, six or nine years), but in 1577 the Council in the North attempted to revert to earlier practice by conferring a custom of inheritance upon the Dean and Chapter tenants in order to prevent heavy rent increases and so allow them to equip themselves for Border service. Lomas 1977, 37; Halmote Rolls, xxxvii.

48. In 1668 Bishop Cosin stated that he had actually received £19,800 in leasehold renewal fines since the Restoration and abated a further £12,000. Cosin Corres., 173-4.

49. Sixty gentry families were affected by acts providing 'For the sale of Lands and Estates forfeited to the Commonwealth for treason' passed in 1651 and 1652. Only one family, the Ridleys of Willimondswick, lost their land permanently, however. The remainder recovered their estates by paying large composition fines which often necessitated heavy borrowing. Compounding Records, *passim*, but see esp. xi-xxxiv; Compounding Calendar, I-V, *passim*; Brassley 1984, 44-5. And see above, chapter 4, note 116.

50. Compounding Calendar, I, 404.

51. Ibid.

52. See, for example, the rentals of various North East estates in GPL Cotesworth CN/1-5, 7, 11; and PRO FEC 1/R.14A/47; 1/W.26/6; and FEC 2/82 and 83. Evidence for rent advances is particularly impressive for Northumberland, (though it should be borne in mind that a good deal of 'catching up' needed to be done on

previously under-rented acres): on the Swinburne estates, around Capheaton, rents trebled between 1670 and 1750; the Allgoods estates in the highlands saw a sixty per cent rise between 1705 and 1751; and on the Howard family estates in the lowlands they quadrupled between 1670 and 1750. Brassley 1984, 45-6.

53. NRO ZSW/200/1.

54. In 1650 the annual rent of seventy-two and one-half oxgangs in the possession of ten individuals, was £29 4s. 3d.; at enclosure in 1659 the same were let at £248 15s. 10.5d. DRO Lo/F/190/6 and 13. For further detail, see Hodgson 1979, 91-2.

55. Laurence 1726, 78-9.

56. Bailey 1810, 99.

57. DUPD HC/misc. box 11/18/calculations and observations of John Mowbray (enclosure commissioner) regarding corn tithe of Crawcrook townfields.

58. Calculations based upon information contained in enclosure commissioners' papers suggest the following cost structure for eight enclosures undertaken towards the close of the study period:

	Date of act & award	Acreage	Cost per acre (in £s)
Beamish	1803-10	478	4.05
Escomb & Etherley	1804-16	365	6.21
Framwellgate & Witton Gilbert	1801-09	2380	3.91
Gateshead Fell	1809-22	631	13.46
Gilesgate	1816-17	300	4.51
Ryton & Winlaton	1823-29	521	8.08
Weardale	1799-1815	15148	0.53
Whickham	1811-21	451	9.84

Sources: NRO/404/194,196,204,218,231,236,242,244-5,255,259,307 and 312.

59. Bailey 1810, 360.

60. DRO D/Lo/D/667-77; Lo/F/190, 192, 193(7), 194(4); Lo/P/1.

61. DUPD HC/M.64/survey of Bishopric of Durham, 1588; and rental of 1640; Parl. Surveys I and II, *passim*; DUL Mickleton 7/1; James 1974, 75; Brassley 1984, 37, 51.

62. E. Hughes 1949, 185-99.

63. NRO 309/G3 (Bute) and G4 (Clavering).

64. See above, chapter 4, p. 132.

65. Granger 1794, 39; and DRO D/Sa/E217, where the 'two crop and fallow' is specifically referred to in 1669 as 'the custom of the count[r]y'.

66. PRO Durham 4/I/262-8; DUPD HC/copy award 41; PRO Durham 4/I/631. At Middridge it was made clear what may also have been true elsewhere; that it was not simply the persistence of tillage as such which was the problem but also the fact that, in practice, parcels of openfield land were often judged too distant for the carriage of much-needed manure. DUPD HC/original award; HC/copy awards 29a and 29b; and CC/boxes 204, 206, and 207; PRO Durham 4/I/374-5, 426-8, 507-11, 525-6 and 757. On the other hand, we learn in 1610/11 that some farmers around Newcastle were at great pains to improve the fertility of their townfields by carting large quantities of dung over considerable distances. PRO E134, 8 James I, Trin. 1.

67. DUPD HC/copy award 38; DRO D/Sa/E580-2; DUPD HC/copy awards 31 and 39; PRO Durham 4/I/469. It was virtually impossible for a substantial enclosure to go ahead in the face of stern opposition from the incumbent.

68. On the operation of the tillage acts and related legislation, see Thirsk 1967, 213-38; and Beresford 1961, 40-69.

69. DRO Q/S/I/1-4.

70. DRO Ch/C/860.

71. DCL Hunter 44(b)/'Certaine Observations Touching the Estate of the Commonwealth ...' (1634); PRO SP15/32/83(1)/presentment of a Durham jury, 1593; Roberts 1972, 36; Roberts and Austin 1975. And see above, chapter 5, p. 191.

72. PRO E164/37-8; Harrison 1969, 6-8.

73. Wills and Invs. I, II, III and IV; DUPD/probate inventories; James 1974, 73-4.

74. The increasing demand for horses, and also for draught cattle, was such that the price of pasture land was greatly advance (by threefold according to an account of 1595), and severe winters which killed off large numbers of livestock, as in or about 1609, could have drastic short-term consequences for the coal industry.

BL Harl 6850/40; Hostmen's Records, 59. In 1639 particular attention was drawn to the 'many horses' in use at the coal mines around Newcastle; by 1696 there were said to be 20,000 at work in the coal trade there. CalSPD 1638-9, 481-3; Edington 1813, 133, 116-8.

75. PRO E190/188/6,8,9, 189/6, 190/2, cited by Hall 1933, 173-5, 211-14, 217.

76. PRO E190 192/2,3 and 192/6. Hall 1933, 185-6, 212-4.

77. GPL Cotesworth CN/2, CN/3, CP/2, CP/5; Ellison A27/46; DUPD CC Notitia 54001/893; Newcastle Courant, February 1729; Laurence 1726, 78-81; Surtees 1816-40, I, 17; E. Hughes 1952, 143; Brassley 1984, 53-4. And see my figure 7.5a-d.

78. Willan 1938, 113-8; E. Hughes 1952, 140 and 142; Brassley 1984, 40, citing Sir William Temple, Observations on trade between England and the Netherlands, p. 208.

79. PRO E190/236/7. The amount in 1731 was probably a reduction on the previous year when, according to one authority, London received 15,705 firkins from the Tyne. Willan 1938, 84, 116. A firkin was a quarter of a barrel, or about 9 gallons, or 56 lbs of butter. Hall 1933, 181. Arthur Young reported that in 1769 butter was often 2d. or even 3d. per pound cheaper in the North East than in the Midlands or London. Young 1770, IV, 426-32.

80. For clear evidence of this being the case, see GPL Cotesworth CK/3/133/'Reflections on ye Coale Trade...'; and see above, p. 207, for a quotation from the same source.

81. Bell 1856, 106.

82. Bailey 1810, 267-74; Granger 1794, 50-1.

83. DRO D/St/124/93-7; DUL Clavering/letter of 7 March, 1751. For an earlier outbreak, in 1715, see DRO D/St/348. The 'pestilential distemper' also raged in Yorkshire and Lancashire in 1747-9. See Thirsk 1984, 64n.

84. Bailey and Culley (1805), 1972 edn., 174n-175n.

85. See above, p. 210.

86. Bailey 1810, 108; DUPD BRA/1118; Laurence 1726, 80-1; Surtees 1816-40, I, 17. There were exceptions, however, especially in coalmining parishes where, soon after 1600, manure was sometimes used; and by the closing years of the seventeenth century, coal ashes and soot as well. Near towns such as Newcastle, night soil

was perhaps used in limited amounts too by c.1700. PRO E134 8 James I, Trin. 1; Nef 1932, I, 237.

87. DRO D/Lo/F190-4; and Lo/L3; DUPD HC/copy award 40; PRO Durham 4/I/273-7; DUPD HC/copy award 30. Changing land use of this kind -periodic conversion of tillage to pasture and pasture to tillage- was quite commonly experienced in Northumberland and it may have been something of a tradition in Durham too. Kerridge 1967, 159-65, 219-20; Butlin 1973, 93-144. Egglestone townfields, which were probably mainly enclosed in a piecemeal fashion in the eighteenth century, contained several meadow and pasture closes by 1614, according to Richard Danes' map of Egglestone manor. DRO D/Bo/A945.

88. DUPD HC/copy award 18.

89. PRO Durham 4/I/633-4.

90. DUPD HC/copy awards 14, 15, 16, 17; and HC book 51. A similar regime of experimentation had evidently occurred at Middridge. For sources, see appendix 18.

91. As seen most strikingly at Easington in 1656 and at Newbottle in 1671: DUPD HC/copy awards 14 and 30.

92. Kerridge 1967, 181.

93. See, for instance, the variations recorded or recommended in Granger 1794, opp. p. 40; and Bailey 1810, 108-9.

94. DRO Lo/F/192(1). The difficulty relates to the important distinction, originating in earlier, formative centuries of settlement and colonization, between lands regarded as *within* the township and those *without*. See note 18 above. It was not unknown, in both Northumberland and Durham, for tenants to refuse to pay tithes on pieces of ploughland which had formerly been part of the common wastes. See, for example, Compounding Records, 243, for a case relating to Lanchester wastes in 1652; and NRO ZCR/6/additional survey of Chester-le-Street manor, 1647, for another concerning Boldon parish.

95. Thirsk 1985, 330-4; E. Hughes 1952, 137. According to Bowden, a further encouragement to grow more corn may have been the bad weather of the period 1692-1713 which resulted in grain shortages and high prices. P.J. Bowden, 'Agricultural prices, wages, farm profits, and rents', in Thirsk 1985, 57-9.

96. Simpson 1898; NEIM Buddle 13/11, 5/54-5, 14/8, 18/91; DRO D/Lo/X62.

97. PRO HO/67/8; DUPD Baker-Baker 40/15; CC/boxes 123,124,125,130, 131,158; HC/box 8/2; Shafto 590-2,594,606; Granger 1794, 43-4; and Bailey 1810, 86-99, but esp. 97-9, where it is noted that 114,071 acres of commons had been enclosed 'within the past 50 years' of which 'in round numbers 74,000 acres' were thought 'capable of improvement by the plough, the greater part of which has undergone that operation, and continues in a regular system of cultivation'.

98. PRO HO/67/8/75 and 108.

99. DRO Q/D/B/6/enrolled award; Alexander, 1972, 281-5.

100. DRO Lo/F 195, 904, and 907-10, Ch/E 202, Sa/E 198-248, CG7/700 and 703; DUPD Baker-Baker 14/60, 123, 180 and 188, 15/92, 16/18 and 44, 40/15, 16, 25, 31 and 36; DUPD BRA 1260/283. These are the main sources only. The ploughing of old grassland at Bryan's Leap farm in c.1761 was roundly condemned as 'contrary to all usage and custom'. DRO CG 6/1406/LWLB/3. Kerridge (1967, 191) suggests that penalties of £5 per acre for ploughing up pasture were not meant to prevent the practice, but rather to regulate it (that is, prevent over-ploughing) and at the same time ensure an increased rent for the landlord. This may sometimes have been the case in Durham, but I am not convinced that either landlords or tenants commonly entered into agreements merely to break them, especially when those agreements were backed by schemes of husbandry which, in some cases at least, had been carefully worked out.

101. Wallis 1769, I, 36-7.

102. Bailey 1810, 108. Lime is better regarded as a soil conditioner than a fertilizer and as such was most useful for reclaiming commons and waste with low PH values, as indeed some contemporary opinion would seem to indicate. See, in particular, Bailey 1810, 205-9; and also Laurence 1726, 80-1; Surtees 1816-40, I, 17.

103. Letter of Silas Angus, land agent, to Sir William Appleby, June 1794. Cited by Ingleson 1972, 71.

104. See, for instance, the scheme for Dewell's farm, Layton (DUPD Baker-Baker 14/180a) detailed in Hodgson 1979, 97; and also Ingleson 1972, 72. On the need for longer leases in promoting a more progressive attitude, see Bailey 1810, 71.

105. Rowe 1971, 157; Macdonald 1979, 5-21; Bailey 1810, 108-9; Beastall 1975, 45.

106. Bailey 1810, 53.

107. See above, pp. 232-3.

108. In part, of course, the rise in rents might be attributed to the fact that in earlier times there had been severe under-renting of tenancies; and a further proportion of the increase could simply be accounted for by an expansion in the acreage under cultivation. But the indications are, surely, that there was a considerable increase in productivity per man and per acre.

109. See below, chapter 7, note 7.

110. Granger 1794, *passim*; Bailey 1810, *passim*; Bell 1856.

111. Ibid., 95-6. Caird (1852, 331) pointed to the widespread practice of bare-fallowing to be found in the county and put it down to 'the indolence of the farmer'.

112. Granger 1794, 40.

Chapter 7. Coalmining and enclosure: lordship and landscape in Northern Durham, 1551-1810.

1. Denman 1969, 13.

2. See appendix 5 and chapter 2, pp. 40, 49, 55-6.

3. DRO D/Lo/D/196, 197.

4. The hamlet of Offerton Pitts is first mentioned in the registers in 1586, Penshaw Pitts in 1597. By the second decade of the seventeenth century the related industrial settlements of Biddick Staiths and Penshaw Staiths had appeared.

5. At least four of the eleven heads of households at Rainton Pitts between 1607 and 1623 had surnames distinctive enough to show that they had brothers in West Rainton. Leister 1975, 41n.

6. DRO Q/S/OB 5/331/'1 April 1668: Resolved that Rainton Low Pitthouses is within the parish of Houghton in the Spring and that they pay all taxes with the said parish'.

7. The clause read: 'And shall perform all such orders as the said Dean and Chapter ... shall set down concerning and touching good neighbourhood'. DUPD (PK) DC/lease registers.

8. DRO Lo/D/888; and see also DRO Lo/D/856 for similar provision in a lease of 1803 at Hetton-Moorsley.

9. DRO D/Lo/D/857,859,871-4,888 and 890.

10. The sequence of events suggested by Leister (1975, 22) appears somewhat at variance with what is implied in NEIM Buddle 5/66-77/evidence of Ra[lph] Arkley and John Stone on the history of Rainton colliery, June 1804.

11. See above, chapter 4, p. 136. From 1684 to 1712 the lease of the two manors was in the hands of absentee lords, the Gerards of Yorkshire and Francis Bassett, a Cornishman, and the property was repeatedly mortgaged to London merchants. GPL Cotesworth (OR) CA/1/7.

12. In the last decade of the sixteenth century Whickham Grand Lease colliery, which was but the largest of several mines operating within the leased manor, was already producing at least one-fifth (30,000 tons) of the Tyne vend. BL Harl 6850/39.

13. At the same time, however, the transport of coal across Whickham manor, and its handling at the staiths at Dunston and Derwenthaugh, increased so that settlements such as Swallwell, also involved in the Derwent valley iron industry by this time, tended to expand. When William Gould, curate of Whickham, conducted a survey of the parish in 1835, he discovered that in 141 cases out of 787 the heads of families were keelman. In all, over ninety different occupations were recorded. DRO EP/Wh/*Speculum Gregis* of Whickham parish, 1835.

14. DUPD CC/box 164/23386/survey of Whickham manor, 1647.

15. GPL Ellison C/XV/1-3; DUPD CC/box 205/244238/judgement of 6 Sept. 1621. In 1617, as the crisis mounted, the rector of Whickham had refused wayleave to the colliery operators. PRO PC2/29/60.

16. DUPD CC/box 205/244238/judgment of 6 Sept. 1621. The outcome appears to have been no more satisfactory than that afforded the farming community at Elswick on the north bank of the Tyne when they had made similar complaint in 1609. PRO E178/4355. In 1634 colliery operations were said to have caused damage to the houses of 'numerous poor tenants' in Lamesley parish. PRO Durham 4/I/130-2.

17. DRO D/St 25/107/articles of agreement; DUPD HC/copy award M.6.

18. Though this tendancy may not have been as marked as E. Hughes (1952, 128-9) suggests. What does seem abundantly clear is that among copyholders, both old and new, there was, in the absence of direct opposition to coalworking, a resolve to exploit the situation to the full. Thus in 1678, in the immediate wake of enclosure, we find them alleging that it was the custom in the neighbourhood for landowners (themselves included we may assume)

to prevent carriage of coal, with force if necessary, by those in default of payment for wayleave and spoil of ground. The copyholders demanded 5s. for every 'rigg' of meadow and 6s. 8d. for every 'rigg' of arable land spoiled, besides fire coal at cost price. PRO E134 29 Charles II, East. 20; and 32 Charles II, Mich. 43.

19. NRO 725/F1/lease, Tomlinson to Wortleys, 24 March 1723: wayleave through Whickham for 32 years from 1 April 1724. See appendix 14, lease abstract no. 11, for further detail.

20. E. Hughes 1952, 133-4; GPL Ellison C/XV/5/depositions of witnesses, March 21, 1720.

21. Especially useful in revealing Cotesworth's activities are his business papers in GPL Cotesworth CM/2 and NRO ZCE 10/1-3; and his estate papers in GPL Cotesworth CN/1,2,7,11. See also E. Hughes, 6-10, 55-6, 65.

22. Cotesworth claimed that he had been denied perusal of some of the deeds by the Riddell family. E. Hughes 1952, 115-6.

23. DUPD CC/notitia 54001/893

24. GPL Cotesworth (OR) CL/1/47/letter, William Cotesworth to John Watson, 31 August 1722: 'yw know corn is no further our Intrest than to improve the Ground.'

25. GPL Cotesworth CN/2, and (OR) X/2/24; E. Hughes 1952, 141.

26. E. Hughes 1952, 10.

27. But note that Bailey (1810, 170) suggests, without specifying a date, that the first person in the county to grow clover was a Mr. Easterby at a farm near Herrington.

28. Laurence 1726, 80-1;

29. GPL Ellison A27/46. About this date (1737) George Gray of Southwick in Monkwearmouth parish wrote to his brother Zachary, then residing beyond the county: 'our soil at Southic is part stiff clay, and other part limestone, but they do not find that lime succeeds well where the ground has been long in tillage. Have you any new grasses, or any particular kind of grain that is not commonly used here ... the country is greatly improved since you were here, that you could not know it again'. Surtees 1816-40, II, 17-8.

30. DUPD CC/notitia 54001/893.

31. GPL Cotesworth (OR) CL/1/87/ letter, William Cotesworth to Thomas Sissons, 24 Jan. 1723. As late as 1770, however, Arthur Young was lamenting the fact that around Raby in south Durham, 'they know nothing on the Earl of Darlington's lands of clover'. Young 1770, II, 493.

32. Smollett (1770) 1966 edn., 202/letter, Mathew Bramble to Dr Lewis, from Tweedmouth, 15 July 1770. Hutchinson (1787, II, 418) described Gateshead Fell as 'wild and shaken, with a multitude of hovels and cottages' while Hair (1839, 37) remembered it prior to enclosure (in 1809-22) as 'a wide spongy dark moor', strewn with pit waste and 'studded with miserable mud huts, inhabited by tinkers, doggers, travelling potters, besom-makers, egglers, and others of that worthy race called Faws'.

33. The act (13 Geo. III) speaks of 'certain moors, commons, or tracts of waste land, which in various parts thereof are called by several distinct Names, but which are most commonly called or known amongst others, by the several names of Lanchester Fell, Medomsley Fell, Ebchester Fell, Rowley Fell, Butsfield and Satley Fell, Knitchley Fell, Newbiggin Fell, containing together by Estimation Twenty Thousand Acres or Thereabouts'.

34. Cases of joint-ownership are regarded as single for purposes of calculation. In fact there are just two cases of joint-ownership: Witham and Swinburne, and Stevenson and Farquharson (figure 7.7a).

35. Hutchinson 1787, II, 368-9.

36. PRO HO/67/8.

37. DUL Clavering/letter, Christopher Johnson to Bishop Butler, 23 Nov. 1750.

38. Clavering Corres., 186/letter, John Eden to James Clavering, 27 Jan. 1718.

39. Ibid.

40. Ibid., 187-8/letter, John Eden to James Clavering, 22 Nov. 1718.

41. Ibid., 188-9/letter, John Eden to James Clavering, 13 Dec. 1718.

42. Ibid., 189-90/letter, John Eden to James Clavering, 20 Dec. 1718.

43. Ibid., 190-1/letter, John Eden to James Clavering, 25 Dec. 1718.

44. Ibid., 192-3/letter, John Eden to James Clavering, 28 Sept. 1719.

45. DRO D/CG 7/711/proposed agreement for division of Lanchester Fell

under Chancery Court decree at Westminster or Durham, 12 Oct. 1719. Bishop Crewe gave his signature to the document on 26 Oct. 1719.

46. Clavering Corres., 194/letter, Ralph Gowland to James Clavering, 4 March 1720.

47. Ibid.

48. Ibid., 198/letters, Ralph Gowland to James Clavering, 28 April and 5 May 1721.

49. Ibid., 193/letter, John Eden to James Clavering, 4 Jan. 1720: 'My Lord Wm Pawlett has been often with me'.

50. Ibid., 202/letter, Robert Spearman to James Clavering, 25 Feb. 1720.

51. Ibid., 205-6/letter, Robert Spearman to James Clavering, 5 May 1721; HLRO box 200 (LP)/675a-c/petitions, 19 and 26 April and 5 May 1721; Lords' minute book 65 (11 May 1721); JHL, 1721, 520. It will be noted (plates 7 and 9) that Francis Nicholls was eventually persuaded to petition *for* enclosure on 19 April, only to change his mind again and support the counter-petition of 5 May.

52. Clavering Corres., 205-6/letter, Robert Spearman to James Clavering, 5 May 1721.

53. Ibid., 206/letter, Robert Spearman to James Clavering, 9 Sept. 1721.

54. As is made evident from an inspection of the journals of both the Commons and the Lords; and see Lambert 1971, esp. 129-31.

55. DUL Clavering/letter, Christopher Johnson to Bishop Butler, 23 Nov. 1750.

56. Ibid.

57. DUL Clavering/letter, Thomas Clavering at Benson Street, London, to his brother 'in the country', 7 March 1751.

58. In fact by the time the lease was renewed, on 6 June 1751, the Bishop had been persuaded to forego the renewal fine. DUPD CC/notitia 54001/250: 'Sir Thmas and Mr Geo Clavering: wayleave over ye fell from Ive[s]ton and Greencroft Pits to Tyne and Derwent Rivers. 21 years. 14 yards wide. [Annual] Rent £10. No fine.'

59. DUPD HC VII/box 14/70/explanation of the plan of Lanchester Fell,

1754; HC/misc. maps and plans, 48/'Eye plan of Mr. Lambton's pretended boundaries'; DRO D/X 487/3/55/ 'Joint and several answers ... to bill of Henry Lambton Esq.' [n.d. but c.1759].

60. DUPD CC/notitia 54001/554; and see also DRO D/X 487/3/59.

61. For detail of what areas had been claimed for the Bishop but rejected in favour of Pitt, see my enclosure map of Tanfield Fell (figure 7.15d).

62. The two cases are dealt with quite extensively, though far from exhaustively, in DRO D/X487/3/1-80.

63. DRO D/X487/3/53.

64. DUL Clavering/letter, Thomas Clavering to George Clavering [n.d., but probably autumn 1759].

65. He kept the minerals in his freehold, of course; the Bishop's rights related to coals in the 'moors, wastes and copyhold lands of Lanchester Manor'.

66. DUPD CC/notitia 54001/779.

67. Ibid.; and CC/notitia 54002/237.

68. DUPD CC/notitia 54001/769,799.

69. DRO D/X 487/3/51-80; DUPD HC/misc. maps and plans, 48 and 64.

70. Under the provisions of an amending act of 1779, the allotment was sold to a Mr. Thomas White of Retford, Nottinghamshire, in return for a certain and perpetual fee farm rent of £30 per annum. HLRO Lanchester enclosure, amending act, 19 Geo. III.

71. The calculations relate to enclosures of commons and wastes for which both an act had been obtained and an award made by 1810. The Bishop's rights to minerals were reserved in the following cases: Hamsteels (1,397 acres), Hamsterley (8,928 a.), Hunwick (1,007 a.), Railey (2,011 a.), Ushaw (896 a.), Witton-le-Wear (1,380 a.), Wolsingham (11,128 a., of which 6,106 a. were not taken up but in which the Bishop's rights were established), Byers Green (450 a.), Chester-le-Street (2726 a.), and Framwellgate (2380 a.). See appendix 18 for further detail.

72. For further consideration of some of the relationships involved, including the efforts of seventeenth-century bishops to form close links with the monarchy, see James 1970, 214-26. In 1744 rents on the Bishop's estates were said to have 'run on uncollected' owing to the 'unskilfulness or negligence of some late Bishops & the

carelessness, to say no worse, of some of their Officers'. DUPD CC/box 129B/195828.

73. BL Lans 8/87; PRO Durham 2/1 (Attorney General of Bishopric v. Gascoigne *et al.*); DRO D/CG 16/747/respondent's case re. Blackburn Fell boundary dispute, 21 Jan. 1718; GPL Bell BP/3/241; Harley Journeys, 104. In 1789 John Buddle reported that one of the difficulties thwarting the leasing out and working of a southern portion of Backburn Fell was that while 'most people suppose that this last mentioned part of the Common to be the Bishop's, others say it is Sir John Eden's'. NEIM Buddle 20/13.

74. Parl. Surveys II, 113, 140; DUPD HC/original award and plans. Attempts to bring about a general division of the fell had been made in 1691. GPL Cotesworth (OR) AK/1/22; Manders 1973, 31-5.

75. DUPD CC/box 217/245030a/General view of the tenures of the Palatinate of Durham, 1887, 15; GPL Cotesworth CG/7/1-35/'The Bishop's Bill' and Blackburn colliery, 1723-5.

76. Spearman 1729, 57-92, esp. 83-92; DUPD CC/notitia 54001/560.

77. DCL Sharp 167/Bishop Cosin's survey, 1662, 176; DRO Q/D/E/32/award and plan; NRO 404/251-2/act and claims.

78. There were many actions at law concerning rights to the moor. See, for instance, DRO D/CG 7/1916; CG 16/1083; and CG7/256-9.

79. See above, chapter 4, pp. 141-54.

80. See, for instance, DUPD Shafto 294, 326, 491-3, 517-8, 535-6, 538, 545, 555; NRO 725/F6/303-5.

81. DRO D/CG 6/1406/LWLB/1.

82. A substantial enclosure had been made on Tanfield Moor between 1622 and 1633 but was pulled down soon afterwards. Tate 1943, 123.

83. Although enclosure commissioners were not normally empowered to determine title, effectively they must often have come very close to doing so, for without discovering existing rights and, with the help of surveyors, valuers and arbitrators, adjudicating upon the merits of the various claims and counter-claims, no successful enclosure could go ahead; but the existence of valuable minerals beneath common land was undoubtedly an added complication, sufficient perhaps to thwart the efforts of even the most conscientious commissioner.

84. DRO D/CG 6/1675-9 & 1978. Problems also arose regarding

provisions in the Lanchester act and award: see DRO Q/D/EC1-12/judgement made at Quarter Sessions under Lanchester Common enclosure act, 1773, for damage caused to certain allotments by mining, 1881-1902.

85. DRO NCB/I/SC/697-777; NEIM Watson (MP) 39/29.

86. Hutchinson 1787, II, 423.

87. In January 1796, Eden (1797, II, 175-7) reported: 'Of the Poor, about 20 are received into, and maintained in the workhouse: other distressed families, which are very numerous, are relieved at home'.

88. The tower, which survives, is dated 1800.

89. DRO Q/D/E/15-20/award, plan and arbitrations; and D/St/v656/claims and accounts, 1801; NRO 404/256.

90. Bailey (1810, 360) maintains that the £600 to £700 which it cost to obtain an act was a 'total bar to those [enclosures] of a small size'.

91. Hutchinson 1787, II, 451.

Chapter 8. Conclusion

1. Nef 1932, I, 24-36; Ashton and Sykes 1929, 249-51;, Flinn 1984, 25-35, 216-20 and 225-29; Pollard 1980a, 212-35.

2. Smailes 1960, 131.

3. But note its consideration in the following: Osborne 1978; Raybould 1968 and 1973; Richards, 1973; Martin 1978; Cromar 1977; White 1969 and 1972.

4. Westerfield 1915, 111-445.

5. For trends in the middle decades of the nineteenth century, see Haines 1979, 155-204; Sill 1979, 44-50; and Sill 1982.

6. Wrigley and Schofield 1981, 354-5, 440-1, 475, and 645-93.

7. Kerridge 1967, 181; Broad 1980, 77-89; Overton 1984, 119-39; Thirsk 1987, 56-61.

8. M.W. Hughes 1970, 231.

9. Appleby 1975, esp. 592-3; and see also Searle, 1986, 106-33.

10. Riden 1977, 442-59; Deane and Cole 1967, 182-5; Pollard 1980a, 212-35; Flinn 1984, 23-9.

11. Nef 1932, 165-89. For criticism of Nef's views, see, especially, Coleman 1956; Coleman 1975, 46-9, 58; Coleman 1977, 343-4; Kerridge 1977, 340-2; Musson 1978, esp. 26-77; Grant 1982, 327-32. Nef was, perhaps, more cautious than he is generally given credit for. In one of his most pointed comments, he warns against an over-zealous regard for 'modern' attitudes and values when judging past issues and developments: 'To the modern mind accustomed to thinking of production in terms of millions, an output of 25,000 tons will seem insignificant. But the historical student must divest himself of present-day habits of thought. He must measure early developments, not by the standards current in his age, but by those current in the age he strives to recreate'. Nef 1932, I, 362.

12. Dodgshon and Butlin 1978, 151-237; Overton 1984; Clarkson 1975.

13. Nef 1932, I, 165: 'the late sixteenth and seventeenth centuries may have been marked by an industrial revolution only less important than that which began towards the end of the eighteenth century.'

14. Wrigley 1987, 1-17, esp. 3.

15. Wrigley 1987, 2-3. See also Crafts 1985; and Fores 1981.

16. Wrigley 1962, 1-16. After 1810 the industrial inorganic system embraced another important element as 'mineral-derived inputs from outside the farms ... passed through the local ecological system in such quantities as to completely transform the productivity and character of farming'. Wrigley 1987, 10.

17. Even as late as 1838, waterwheels provided twenty-one per cent of power in British cotton mills and forty-three per cent for woollen mills. P. Laxton 'Wind and water power', in Langton and Morris 1986, 69-71.

18. Lewis 1970, 296-7.

19. Ville 1987, 602; in response to Hausman 1987, 588-96.

20. In 1618, for instance, a scheme to limit the amount of poor quality coal leaving the Tyne had to be suspended 'forasmuch as the business had relation to the State of the Navy, and the puissance of the Kingdom by sea, whereof this trade to Newcastle

is a principal nursery'. ActsPC, 1618-9, 276

21. R. Lawton 'Population and society, 1730-1900', in Dodgshon and Butlin 1978, 325, 331, and 359n; Darby 1973, 385.

22. Nef 1932, II, 381; Ashton and Sykes 1964, 249-51; and see figure 4.2.

23. See Wrigley 1962; Wrigley 1967; and Fisher 1971, 3-16.

24. Thomas 1980, 1-15. And see also Thomas 1985, 729-53.

25. Flinn 1984, 456.

26. Wordie 1983, 483-505.

27. Beckett 1981; Coleman 1969. Note the comment by David Hey in Palmer 1976, 24: 'One has only to read Daniel Defoe to find that most of the great Victorian industrial regions were already considerably industrialized (in the sense that a majority of their inhabitants had industrial occupations) by the 1720s, if not well before'. And that by Marie Rowlands in ibid., 29: 'the seventeenth century saw the extension of Midland industry from regional to an international market'.

28. Langton 1979, 237.

29. Brereton (1634-5) 1844 edn., 86-91; Laurence 1726, *passim*; Defoe (1724-6) 1971 edn., 516-539; Harley Journeys, 103-06; Atkinson 1965, 425-34; Rowe 1976, 61-6.

30. M.W. Hughes 1970, 230: 'between the early 1730s and c.1800, lead production in Weardale rose more than sixfold.'

31. Wrigley 1967; Deane and Cole 1967, 113; Dodgshon and Butlin 1978, 267-429; Darby 1973, 302-526. Rowe 1976, 61-6; Langton and Morris 1986, pp. xxii-xxx.

32. NRO ZCE 10/6/letter, William Cotesworth to C. Sanderson, 15 April 1722.

33. Clarkson 1985, esp. 28-38.

34. Smailes 1960, 161-234; McCord 1979, *passim*.

35. Langton and Morris 1986, p. xxiv.

36. Clarkson 1985; Coleman 1983; Hechter 1975; Wallerstein 1974, 1979, 1980 and 1983.

PLATES

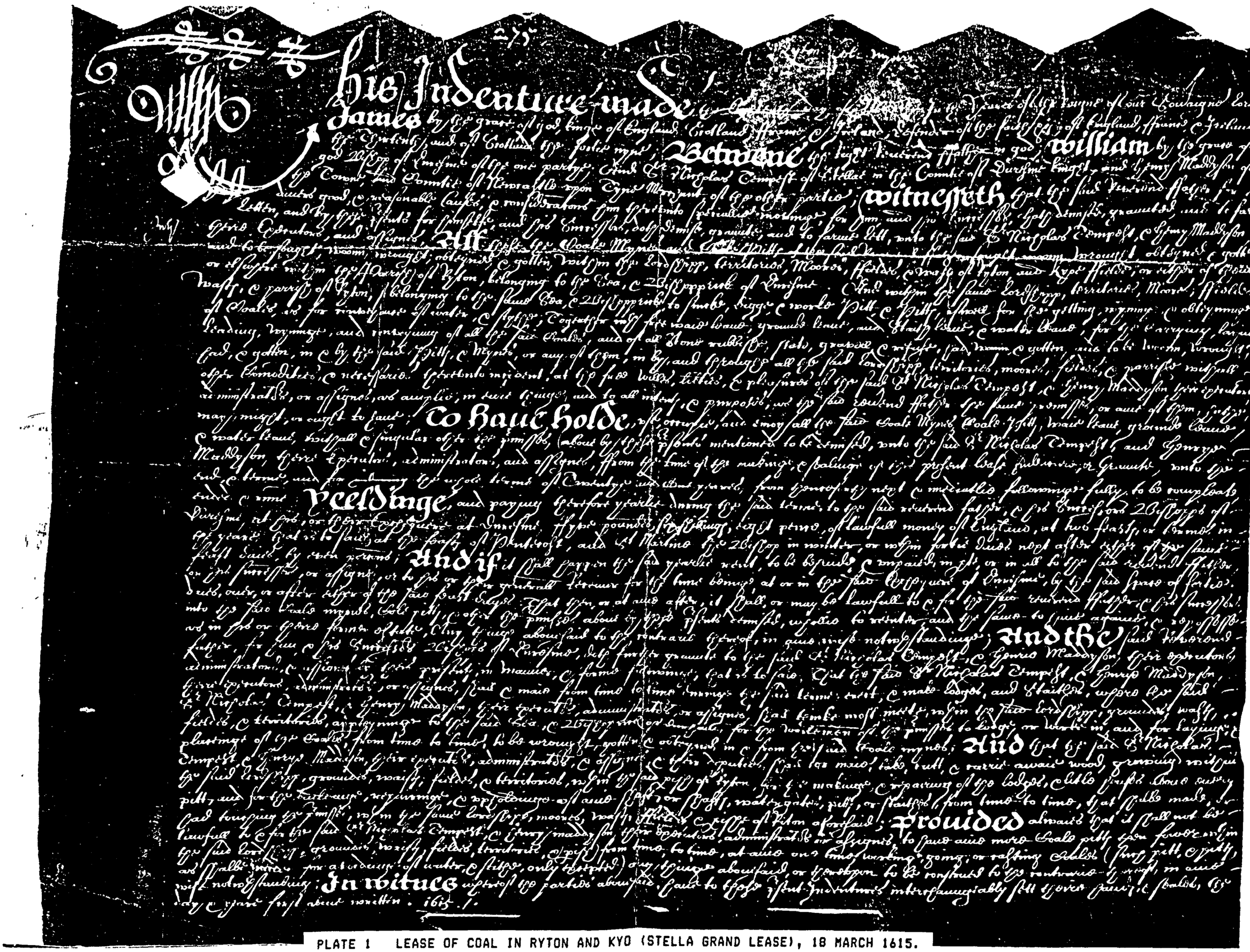

PLATE 1 LEASE OF COAL IN RYTON AND KYO (STELLA GRAND LEASE), 18 MARCH 1615.

Bishop William [James] grants to Sir Nicholas Tempest of Stella, knight, and Henry Maddyson of Newcastle upon Tyne, merchant, all the coals within the lordship, territory, moors, fields and wastes of Ryton and Kyo Field, and all wayleave and staithleave, for a term of twenty-one years, at a rent of £5. 6s. 8d p. a., and with permission to erect lodges for the workmen to 'lodge or work in'. Note the provision (beginning sixth line from bottom): 'provided always that it shall not be lawfull to & for the said Sr Nicholas Tempest, & Henry Maddyson ... to have anie more Coale pitts then fower w[i]thin the said Lordshipp... (such pitt & pitts as shalbe made for avoidinge of water and stithe only excepted)'. *Source:* DUPD CC 186598/2.

5° Augt 1726

Pd The Sound of Coals Load from Bucksnook from the South of St James Clavering which is supposed to be the 18th May to the time the Way was Stopd up by St Francis's order — — —

Collieries gone off within this 45 or 50 Years

1 Felton Colliery Brandling Coun.
2 Park D.° ..... Coun
3 Swards . . Blackett
4 Claptons Whele & Peareth
5 Sall Meadows Clavering Hurtenbe
6 Bencham Liddell Laine
7 Parsons Flat Milburne
8 Fieldhouse S.r Ra. Lane
9 Pandenhill Riddle
10 Clavering Chapple
11 Byermoore S.r James Clavering
12 Fawdonfield Clavering
13 Nydon field D.°
14 Hells field Laine
15 Gelsfield house D.°
16 Washing Wells Liddell
17 Whitteham Gorendleas Lodg.r Laine
18 Stella Grandleas Blackett
19 Barley fell . . . D.°
20 Struther close Emmerson
21 Crackrock field . D.°
22 Hepedfield . . . D.°
23 Silliocan Blackett Laine
24 Shrackley Rodgers
25 Henton . Bldchell
26 Denton . Rodgers
27 Whorlton Moore Blackett
28 Brunton Heselrige
29 Gosforth Brandling
30 North Banks Montague
31 Buckinnook Sparman Wright
32 Benwell Montague
33 Elswicke D.°
34 Readheugh Emmerson Laine
35 Tapehills D.°
36 Salwell Side Liddell Laine
37 Buckinmoore Clavering
38 Dipton Alds. Ridley
39 Berkley Montague
40 Pelt head Simpson
41 Monrasfield Lain Rodgers
42 Salwell Rodgers
43 Fenham Colliery Simson
44 Cawsey Montague
45 Billa Mill Can.r Vicherstaf
46 Hollingside Harding

This paper was sent us by Mr Ridley ——
Several Errors in this paper.

PLATE 3 LIST OF 'GONE OFF' COLLIERIES, SENT TO GRAND ALLIES, 1738.

Note the comment, bottom right, in a different hand: 'This paper was sent us p [by] Mr Ridley. Several Errors in this paper'. *Source:* DRO D/St box 72.

September 1597

James Jogeson was buried the 2[d]
October.
Joane the daughter of Richard Pearsa
was buried the third day
Agnes the wife of Thomas Grimsla
was buried the 8[th] day
Jogen the sonne of Edward Pearsa
was baptized the 9[th] day
Nicholas Jogeson was buried the
13[th] day
Jogen Davidson was buried the 15[th] day
Robt Burnop was buried the 17[th] day
Agnes Pearson was buried the 26[th]
day
November
Jogen Jamison was buried the 7[th] day
Jogen Bygate was buried the 10[th]
day
December.
Jane Stonks was buried the 5[th] day
the daughter of Geo: Thomps
was baptized the 13 day
Jane Kirkby was buried the 27[th]

January 1597

James Watson was buried the 3[rd] day
Robt Watson was buried the 16[th]
Richard Pearsa was buried the 13[th] day
Jogen Darnell was buried the 29[th]
February
Jane the daughter of Richard
Pearsa was buried the 11[th] day
Robert Pearsa of Shotley was
baptized the 13[th] day
Richard Erasmus and Elizabeth
Atkinson were married the 16[th]
Robt Dar and Agnes Watson
married the 22[d] day
James Atkinson and Jane
Swan married the 27[th] day
Nicholas Kirkby was buried
Agnes Kirkby was buried the 28[th] day
Robert the sonne of Richard Pearsa
was baptized the 1[st] day
Jane the daughter of Robert Lang,
was baptized the 19[th] day

Anno Dom:
1598

PLATE 4 EXTRACT FROM LANCHESTER PARISH REGISTER, 1597-8.

Source: DRO EP/La 1-21.

February the 3 Anno Domini 1684.

A true Inventory of all the Goods and Chattles of John Rawling of Thomas his Close within the parish of Whickham and County of Durham Yeaman late deceased taken and apprized by us whose Names are here Subscribed the day and yeare above said.

Imprimis in the Hall a Cubbord a presse & other lumber dishes, other Lumber			
other Earthen Ware & Candlesticks & pott & other Kitchen, other Lumber			
as Tables, one Chest & Chaires & other dishes & Cushy & other Lumber			
& things & Spoons & Gridirons & Spitts & Like goods			
one Iron Candlestick			04 : 10 : 00
more in Bedchamber wch the Furniture & Table & Forms & Chaires			01 : 00 : 00
& Cony Feather Bed two Chaires & Cradle			
more in the Same Room: & Dishes & Trenchers & Knives & other Lumber			
& Fish & Hammer & Hatchet & Broad Axe & Iron & Chaires & Chaire			
of Cloaths & Iron Rimes & Chaires & Stoole & Spade & Chaire & Cradle			01 : 10 : 00
Cradle & Barrow Cloaths & Chest & Trunck & Hatt & Chaire & Cradle			
Item in the Parlour & Chaires & Table & Carpett			02 : 00 : 00
one Bedstead & Furniture & Press & Chaire & Chaires & Cushion			
& Stoole & Chaire & Table & Cushion & Hanging Shelves & Looking Glass			
& Iron Rimes & Fire Irons & Chaire & Table & dozen of Knives &			02 : 10 : 00
3 Table Cloaths & a dozen & Chaire & Stoole & Carpett			
More in the Chamber & dozen & Trenchers & Boules			00 : 03 : 06
Two Mares & a Horse & Colt & Cowe & Thirty & Six			12 : 10 : 00
Three Carts & Cart & Cart with Furniture			03 : 00 : 00
two Sheep & Lamb			00 : 12 : 00
Bearing Sheep			02 : 11 : 00
Item the House the Barnes & Kiln & Stable & Mowing			25 : 15 : 00
Crawforth, Called by the Name of Rawling his Close			11 : 11 : 10
Summa			£52 : 03 : 06.

John. Emmerson
Tho: Hennikes
John: Emmerson
Rob: Walton

PLATE 5 PROBATE INVENTORY OF JOHN RAWLING OF THOMAS HIS CLOSE, WHICKHAM, YEOMAN, 1684.

Source: DUPD/probate inventories.

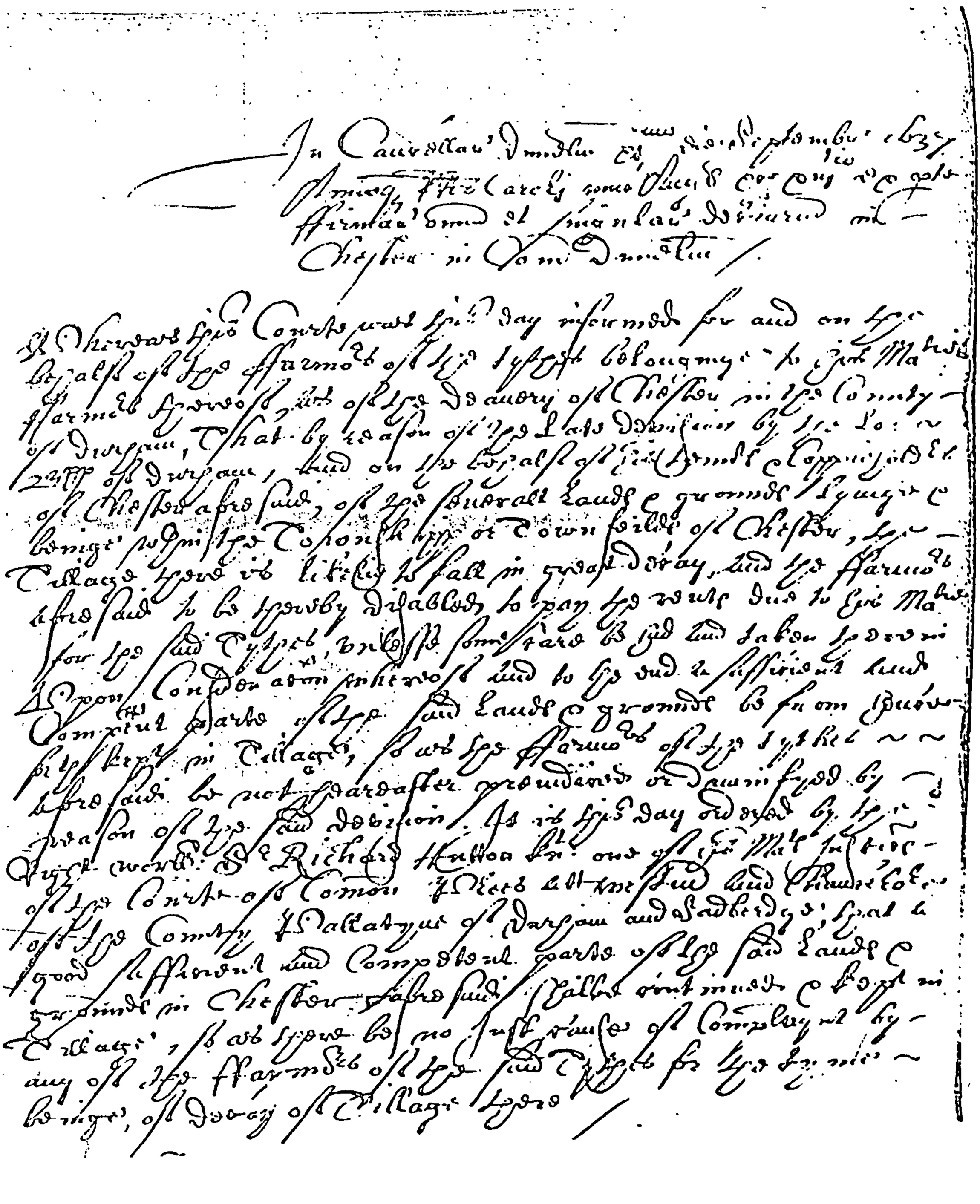

PLATE 6 ORDER IN CHANCERY, 11 SEPTEMBER 1637, TO SAFEGUARD THE INTERESTS OF CHESTER-LE-STREET TITHE OWNERS FOLLOWING ENCLOSURE OF TOWNFIELDS IN 1635-6.

Source: PRO Durham 4/I/469.

To the right honourable the Lords Spirituall and Temporall in Parliament assembled.

The humble peticion of James Clavering of Newhouse in the County of Durham Esq^r, Francis Nicholls of Cossierly in the said County Esq^r, John Tarrell of the city of Durham in the said County Esq^r, Ambrose Appleason of Maiden house in the said County Esq^r, Robert Spearman of the city of Durham aforesaid Gentleman, John Mowbray the younger of the same Gentleman, John Hunter of Headinsley in the said County Gentleman, John Nicholls of Ryton in the said County Gentleman, and Robert Mason of Iveston in the said County Gentleman, on the behalfe of themselves and of several other persons intitled to, or interested in, a certaine Moore or Fell in the parish of Lanchester in the said County of Durham, and who have Common of pasture upon the same.

Humbly sheweth.

That the said Moor or Fell called Lanchester Fell, contained about nine or ten Thousand acres of ground and lyes waste and unenclosed and capable of great improvement, and employing a great number of persons in husbandry, in case the same were divided and inclosed.

That the right Honourable Nathaniel Lord Crew Lord Bishop of Durham (in right of his Church and See of Durham) claimes to be seized and intitled of in and to the same and parcell of and within the said Manor of Lanchester, subject to such right of Common of pasture and other privileges as have been held and enjoyed in and upon the same, by your Petitioners and severall other Freeholders, Copyholders and Leaseholders, intitled thereunto. And that James Clavering of Greenwell Esq^r and James Clavering Esq^r his Son are (in right of two other Manors or estates called the Manor of Greenwell and the Manor of Ivestell) claimes a great part of the said Moor or Fell, to lye within their said Manors of Greenwell and Ivestell, and to be part and parcell thereof; and that by reason of such different claimes to the said Moor or Fell (or to the greatest part thereof) there have been several suites occasioned for the space of forty years last past and upwards, several of which are still depending. And that the said right honourable Nathaniel Lord Crew Lord Bishop of Durham and his said James Clavering the father, and James Clavering the Son, and your Petitioners, and other the Freeholders, Copyholders and Leaseholders, having Common of pasture, and other privileges, in and upon the same Moore or Fell, for the determining all the said Suites and differences aforesaid are (towards an agreement about the dividing of the said Moore or Fell, which said Agreement is reduced into writing and signed by the parties concerned therein). And for accomplishing and compleating the dividing and inclosing of the said Moore or Fell cannot be accomplished and compleated but by act of Parliament.

Your Petitioners therefore humbly pray that they may have leave to bring in a Bill into this honourable house, to be passed into an Act of Parliament, for the dividing and inclosing of the said Moors or Fell, pursuant to the said Agreement. And your Petitioners shall ever pray &c.

Witnesses to the signing hereof
Tho^s Hunter
Ste Surtees

Ja: Clavering jun^r
Fran: Nicholls
J: Tarrett
Amb: Appleyard
Rob: Spearman
Jo: MacGregall
Jos Simpson
Jo: Hunter
Rob Mason

PLATE 7 PETITION TO ENCLOSE LANCHESTER FELL, 19 APRIL 1721.

Source: HLRO box 200 (LP)/675c.

To the Right Honourable the Lords Spiritual and Temporal of the House of Lords in Parliament assembled

The humble Petition of Thomas Hunter and Robert Hunter both of Meddomsley in the County of Durham Gentlemen Charles Collinson Clerk and Cuthbert Johnson gentleman both of Meddomsley aforesaid

HOUSE OF LORDS

Sheweth

That your Petitioners Thomas Hunter and Robert Hunter are seised to them and their heires of and in the Antient Manour of Meddomsley in the said County and also of and in Several Messuages Lands Tenements hereditaments and large Waste Comons and Moors lying and being within and part and parcell of the said Manour within the Parish of Lanchester in the said County of Durham and that they and all those whose Estates they have of and in the said Manour and premisses have severally held and enjoyed and ought to hold and enjoy Comon of pasture and other Rights and privileges within and upon a large Comon Fell called Lanchester Fell part of the Manour of Lanchester aforesaid and your said Petitioners Charles Collinson and Cuthbert Johnson are also severally seised to them and their severall heires of and in severall Freeholds Messuages Lands Tenements and hereditaments with the appurtenances Situate lying and being in Meddomsley aforesaid and holden of the said Manour of Meddomsley and that they and all those whose Estates they severally have therein for all the time aforesaid have held and enjoyed Comon of pasture for all their Commerable Cattle and other Liberties and Privileges as appendant or appurtenant to their said Severall Freeholds Messuages and premisses in and upon the said Moors Waste and Comons part of the Demesnes of the said Manour of Meddomsley as also in and upon the said Lanchester Fell and your Petitioners further Shew That the Right Honourable and Right Reverend Nathaniel Late Lord Bishop of Durham being seised to him and his Successors in right of his Church and See of Durham of and in the said Manour of Lanchester and of the said Fell called Lanchester Fell which lies contiguous to or adjoining upon the said Manour of Meddomsley and Several of the Freeholders Copyholders and Leaseholders within the said Manour of Lanchester have without and against the consent of your Petitioners agreed to inclose and divide not only the said Waste or Comons lying within the said Manour of Lanchester wherein your Petitioners are entitled to Such Comon of Pasture and other rights and privileges as aforesaid but also the said Waste or Comons lying within the said Manour of Meddomsley and have lately caused a Bill to be brought into this Honourable House for that purpose with Such Description of a Boundary as includes the said Waste and Comons lying within the said Manour of Meddomsley which belongs to your Petitioners Thomas Hunter and Robert Hunter Subject to Such right of Comon and other privileges as your Petitioners and other the Freeholders and Tenants have and ought to have within the same without making any Satisfaction or recompence to your Petitioners and against their consents

And Forasmuch as the same is a manifest Invasion of your Severall Petitioners Rights Estates privileges and properties and is likely to turn to their Severall very great injuries and Damages

Your Petitioners doe therefore humbly pray That they may be heard by their Counsel against the said Bill at Such time and place as this Honourable House Shall think fit to appoint

And your Severall Petitioners as in duty bound Shall ever pray &c

Thomas Hunter
Charles Collinson Minister.
Cuthbert Johnson
Robert Hunter

PLATE 8 FIRST PETITION AGAINST ENCLOSURE OF LANCHESTER FELL, 26 APRIL 1721.

Source: HLRO box 200 (LP)/675a.

To the Right Honorable the Lords Spirituall & Temporall in Parliament Assembled.

The Humble Peticon of Sir Nicholas Crispe Barr.t Francis Nicholls Esq.r & John Sampson Esq.r on behalfe of themselves Diverse other ffreeholders & Copyholders within the Manor of Lanchester in the County Palatine of Durham, against the Bill for the Division of Lanchester ffell or Common.

Sheweth

That your Petitioners are Seized of diverse ffreehold & Copyhold Estates within the Parish & Manor of Lanchester. And are Severally Entituled to a Right of Common on that large Waste called Lanchester ffell in the County of Durham.

That a Bill being brought into this Honorable House for the Division of the Said Lanchester ffell or Common, without your Petitioners Consent or privity. Which Bill is not only Prejudiciall to, but Utterly destructive of your Petitioners Right & Property in the Said ffell or Common.

Therefore your Petitioners on behalfe of themselves & diverse other ffreeholders & Copyholders within the Said Manor of Lanchester. Most humbly Pray that they may be heard against the Said Bill at this Honorable House Shall please to direct.

And your Petitioners Shall ever pray

Nic. Crispe
x Fran. Nicholls
Jno Sandford
x Edward Colburne
x Wm. Colburne
John Hutton
Peter Hunter
William Threadcat
x Thomas Hunter
x John Briggs
Thomas Watson
x Arthur Watson
John Hornsby
Timothy Hull
Elizabeth Slack
x Richo. Greenwell
x Fra. Kirkley
Wm. Watson?

PLATE 9 SECOND PETITION AGAINST ENCLOSURE OF LANCHESTER FELL, 5 MAY 1721.

Source: HLRO box 200 (LP)/675a.

Lanchester Fell Inclosure Bill

Die Jovis 11.° Maij 1721.

The Ord.r of the day for the 2.d Read.g the Bill [illegible] being Read for Hearing Council of Sedale Pet.rs for & ag.st the said Bill being read.

Council were called in & the Bill read a. 2.d time.

Mr.r Reeves } were Heard on y.e behalf of Tho.s Hunt.r
Mr.r Broade } & others Pet.rs ag.st the Bill

Mr.r Serj.t Darnell was Heard for s.r Nicholas Tempest & others Pet.rs also ag.st y.e said Bill

An Agreem.t in Writing dat.d y.e 12.th Oct.r last and.d y.e Hands & Seals of Sedale Persons Interested in y.e said Bill or Common Inclosed by y.e Bill was read

Mr.r Chevenings Cad Their Petition to y.e House for & Case for y.e Bill read agen at the Bar; & the Hands to it proved

Mr.r Hazerkeley was heard on y.e Same side with y.e Sol.r

Sedale Witnesses were Exam.d upon Oath to Sedale Particulars in y.e Bill & in relation to y.e Execution of the aforementioned Agreem.t

Gurham & Forbes,

S.r Cons.l Phipps Heard on behalf of y.e Pet.rs for & ag.st the Bill

Mr.r Hunter Exam.d touching the Boundary of y.e said Common &c

Mr.r Reeves, Broade & Darnell & Hazerkeley Heard in Reply & withdrew

The Lord Chancell.r Opened y.e Case between the Pet.rs for & ag.st the Bill.

The Quest.n was put whether y.e s.d Bill shd be Committed

Resolved in y.e Negative

Ord.d The said Bill be rejected

PLATE 10. HOUSE OF LORDS' REJECTION OF LANCHESTER FELL ENCLOSURE BILL, 11 MAY 1721. Source: HLRO Lords' minute book 65.