

**Geology, Visualization and the 1893
Hauliers' Strike: an interdisciplinary
exploration:
Vol. One**

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**Thesis submitted in Candidature for the degree of
Doctor of Philosophy
Cardiff University 2010**

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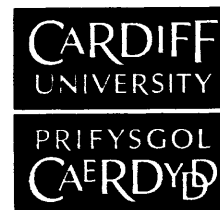
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ABSTRACT

The overarching purpose of the thesis is to explore the interaction between the geological structure of the South Wales coalfield and the development of nineteenth century coalfield society. Through a detailed study of a single event, the 1893 Hauliers' Strike, and the use of modern 3D mapping and visualization techniques, the thesis aims to explore how the geology and landscape of South Wales influenced not just the geographical extent and nature of the coal industry but also the experiences and responses of the human society which grew up around that industry.

Although Welsh historians have been aware of the implications of the coalfield's geology for the economic conditions under which the industry operated they have paid less detailed attention to its implications for unity and co-operation amongst the workforce. The emergence of modern mapping techniques, more specifically Geographic Information Systems (GIS), allows testing for the presence of divisive geological influences on human action at a particular point in time. This thesis argues that the strike of 1893 and indeed the history of the coalfield generally cannot be fully understood unless geology is considered. It also argues that GIS offers a powerful way of reimagining past events and landscapes which enhance the historical research process.

The thesis is divided into two parts. The first considers the challenges and potential benefits for historical research of the adoption of geological insights and GIS visualization techniques. The second section will provide a detailed study of the 1893 Hauliers' Strike. Chapters in this section include: an overview of the strike and its historiography; an exploration of the traditional explanations of the strike; evidence for geology as a divisive force acting on the workers' behaviour; and the role of the landscape in the promotion and maintenance of the strike.

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Introduction

This PhD is in part an exploration in interdisciplinary approaches. Within any university there is often a great deal of overlap in the areas of research or interest of disciplines – music and physics have a shared interest in acoustics for example – but there is rarely any formal co-operation in teaching much less in research. In 2005 Cardiff University set up a series of studentships, named in honour of the late Professor Richard Whipp, Cardiff's former Pro Vice-Chancellor for research, which were designed to encourage disciplines with similar or shared interests to communicate with each other to see if that communication could produce new and innovative perspectives. This is one of those projects, developed between the Welsh History department and the School of Earth and Ocean Sciences with specialist input on the use of Geographic Information Systems (GIS) from the Archaeology department.

The original idea for the project grew out of a feeling that historians have up to now failed to fully appreciate the role of geology in the development of the South Wales coalfield. There was also a concern that as the region reinvents itself as a tourist and leisure destination, the traces of its industrial heritage in the landscape are being lost and Welsh communities are consequently losing a vital link to their past. It was felt that historians would benefit from the use of modern visualization techniques, specifically GIS, which would allow them to recover and retain a sense of the physical context in which historical events were played out. These issues will therefore be explored from the perspective of an historian.

The official proposal was to explore the interaction between geology and human historical processes in the South Wales coalfield through the adoption of modern mapping and visualization techniques. Its aim was to bring the historical landscape alive thus allowing the written historical record to be placed within its landscape context. It was hoped that by doing so would enable a reappraisal of a number of existing historical interpretations and explanations of central aspects of its industrial and urban development, such as the growth and decline of the coal industry, the development of communications and patterns of urban

settlement. Initially it was intended that five areas of the coalfield with contrasting geology and historical development would be studied, suggested locations being Blaenavon, the Afan Valley, the Llanelli area, the area around Llanharan and the Amman Valley. It was then envisaged that one area would be developed further to form a definitive case study.

In some ways interdisciplinary approaches are not new for historians. History as a discipline has a long tradition of drawing on other branches of learning to help develop and enhance an understanding of past human experience. It has been greatly enriched, for example, by social sciences' insights into human organisation structures, linguistic theory's understanding of language use and meaning, and anthropology's view of cultural practices. By comparison with these, though, geology, the study of the origins of Earth and the natural processes acting on it, is not the most obvious choice for historians to turn to for insights and new perspectives on human society. Nevertheless, understanding the world and how it works is important, and is perhaps becoming increasingly important, to the way human society functions. People live in and are dependent on the Earth for survival. There is a growing awareness of the impact of human behaviour on their environment thanks to the research of earth scientists, and this is also raising contemporary awareness of the role and influence of the environment on human life and behaviour. Earth scientists besides have a unique perspective on the world, often combining knowledge of its distant past with an awareness of more recent human impact and insights into the future evolution of the landscape. Perhaps then modern earth sciences have something important to say which can be usefully adapted to understanding past environments and past human behaviour too.

Moreover, Welsh history and earth sciences have shared geographical areas of interest, not least of which is the South Wales coalfield. Wales played an important role in the development of geology as a discipline in the nineteenth century, the expansion of the South Wales coalfield as a productive industrial unit especially providing an incentive and a focus. In more recent years, following the Aberfan disaster in 1966 and subsequent efforts

to regenerate the region, earth scientists have again paid South Wales a lot of attention.¹ For Welsh historians of the modern period, of course, the South Wales coalfield is impossible to ignore. The emergence of the coal industry, stimulated by and growing out of the copper and iron and steel industries, was the defining feature of nineteenth century South Wales society and the coal trade's decline shaped the experiences of a large section of the Welsh population throughout much of the twentieth. It impacted directly and indirectly, both positively and negatively, on the demographic, social, cultural, linguistic, religious, and political landscapes of the whole country. There is potentially therefore much for earth scientists and Welsh historians to discuss.

The terms of the PhD were kept deliberately vague, so it still required a specific problem to be identified to provide a focus for research. This was not as easy it seemed initially and a considerable amount of time was spent exploring potential avenues of research which seemed to come to abrupt dead-ends. Serious conceptual conflicts also arose as soon the three disciplines were drawn together. Geology and history may have similar methodologies – they try to understand the past from the traces of the past left in the present – but they look to the past for very different reasons. Historians seek to understand past societies on their own terms for their own sake whereas earth scientists use evidence from the past to try to predict the future. And GIS, comparative newcomers on the academic scene whose worth for historical use has yet to be fully tested, do not handle time particularly well at all. They are geographic not temporal tools, so they see the world in a very different and specific way. It is therefore a major challenge to align the three perspectives and it has consequently required a slightly different approach than would be the case with a conventional history PhD.

The immediate task of course was to learn about the other disciplines. It has required the type of groundwork and new skill acquisition which is unusual at PhD level and has as a

¹ Douglas Nichol, Michael Bassett & Valerie K. Deisler (eds.), *Urban Geology in Wales* (Cardiff, 2004); Michael G. Bassett, Valerie K. Deisler & Douglas Nichol (eds.), *Urban Geology in Wales: 2* (Cardiff, 2005); Michael G. Bassett, Huw Boulton & Douglas Nichol (eds.), *Urban Geology in Wales: 3* (Cardiff, 2009).

result reduced the amount of time available for archival research. It has involved extensive reading not just of material specifically about the geology of the coalfield and the use of GIS but also of anything on the question of the relationship between these fields with history or any related subjects. So reading has included not just works on geology but also on environmental and landscape histories, not just on GIS but on cartography, geography and historical geography. Each of these in turn have to be understood well enough to identify what is significant and useful in their insights and how they may be fitted together. The guiding question underpinning the encounter has been: how does knowing this change the way historians understand and explain the historical human experience?

The adoption of an interdisciplinary approach has also necessitated an awareness of the pitfalls of such approaches, particularly assumptions about language use and meaning. There is a huge debate, for example, over the term 'landscape'. Other seemingly innocuous words like 'mountain' and 'lake' can carry specific scientific meaning which is not recognised in all disciplines. Confusion, misunderstanding and misinterpretation are therefore serious dangers. But it is easy to get bogged down in such considerations and waste time and words carefully defining each and every noun to ensure there is no doubt. Technical language has therefore been kept to a minimum. Few definitions have been offered throughout the PhD; the language used is intended to be understood at the level of its most common and basic meaning, the meaning most lay people would read.

Another potential danger is the adoption of out of date or contested ideas. No field of research stays still, ideas fall in and out of favour, disciplines fracture into sub-disciplines and specialities develop. It is not easy to keep track and with limited time not possible to follow up on every apparently established theory or new hypothesis. It will be admitted that much of the writing on landscape use which has been drawn on was produced by geographers in the 1970s and 1980s. The current fascination with the impact of globalization and internet communities seems to have sidelined such apparently parochial issues in geographical writings. But geographical theories have not been consciously adopted and there has been no attempt to engage with geographers' arguments. These works have been used primarily to stimulate thinking rather than to justify conclusions.

Indeed, historians are sometimes guilty of ignoring questions of theory and rarely seem to spend much time in monographs and articles discussing methodology. They prefer to get to the nitty-gritty, straight to the results and never mind how you got there. But an interdisciplinary study necessitates a more self-conscious, self-reflective approach. The thesis therefore moves on two levels. One is a broad discussion of the possibilities and challenges inherent in interdisciplinary research, specifically in the use of geology and GIS. The second is a demonstration of the interdisciplinary approach in action via a case study.

For clarity's sake, the PhD is divided into two parts. Since geology is not the most obvious discipline for historians to turn to for insights, and GIS are a comparatively unknown quantity to most historians, their adoption needs some consideration and justification. In Part One, Chapter One provides an introduction to earth sciences and what they can tell us about the geology of the South Wales coalfield. It then explores the problems of reconciling scientific and historical insights before highlighting some of the potential for their use in Welsh history, especially the examples offered by environmental histories. Chapter Two acts as a similar introduction to GIS, providing some definitions and a description of basic functionality. Again the challenges of using the technology in historical research will be discussed. The chapter will conclude with a look at what might be achieved in history through the use of GIS, via the examination of some recent historical GIS projects. Chapter Three outlines the course and progress of the PhD. It touches on the specific challenges faced in the early stages of the project and the reasons for the final choice of case study. In the process it will show why the final study is somewhat different to the original proposal.

Part Two consists of four chapters (Chapters Four to Seven) which contain the case study. There will be an overview of the historiography, followed by three chapters concentrating in turn on different approaches or perspectives on the 1893 Hauliers' Strike: the traditional historical interpretation; the role of geology in influencing behaviour during the strike; and the role of the landscape in the spread and conduct of the strike. At the end, the Conclusion will try to draw out the primary results of the case study, but there will also be a consideration of how much has been gained from adopting a new approach and what new insights have been uncovered. It will return to some of the issues raised in Chapters One

and Two to see how valid the concerns were and how they worked out in practice as well as highlighting some of the areas which need to be explored further.

CHAPTER ONE

Geology and History

*The broad principles of geology are very simple and easily comprehended, and a knowledge of them would prove a source of pleasure and profit to everyone: the scenery which surrounds us, the soil beneath our feet, the mineral treasures beneath that soil, the sites of our towns and villages, the occupations of the people, the nature of the water we drink, and countless other facts which meet us in our everyday life, all depend upon the science of geology for their reasonable explanation.*¹

This chapter will define geology, give overview of the development of the discipline and explain what geology tells us about the South Wales coalfield. It will then look at some of the difficulties with integrating sciences with historical research before exploring some of the potential the approach offers especially to Welsh historians.

Introduction to Geology: Definitions

The word 'geology' comes from the Greek *geo* and *logos*, 'earth' and 'word' and is literally the study of the earth. The term as applied to a discipline, however, is less frequently used now (although it will be used here when it is the more historically appropriate term). More commonly 'earth sciences' has become the umbrella term for a number of complex, highly specialised disciplines, such as geomorphology, stratigraphy, petrology, palaeontology, hydrogeology and oceanography. Put (very) simply these disciplines have two basic aims: to explain the origins and evolution of the earth's continents and oceans; and to understand the processes operating on and within the earth. In short, earth sciences describe the world and explain how it came to be the way we find it.

¹ W. Jerome Harrison, *Geology of the Counties of England and North and South Wales* (London, 1882), p. ii.

Many of the driving forces behind geological research have some economic or environmental relevance, including the exploration for mineral energy resources and the identification of environmental problems, such as finding groundwater for the ever growing needs of communities or monitoring surface and underground water pollution. Geo-engineers help find safe locations for dams, waste disposal sites and power plants and design earthquake resistant buildings. They are also involved in making short and long range predictions about earthquakes and volcanic eruptions. Palaeo-climate studies are an important component of future climate change predictions.

The Geology of the South Wales coalfield

So, what of the South Wales coalfield? How do earth scientists describe and explain the origins of this region?

Geological mapping has shown that the coalfield consists of an elongated oval shaped area of Carboniferous rocks, the main portion of which extends between Pontypool and Carmarthen Bay.² The coalfield occupies much of the old counties of Glamorgan and Monmouthshire and parts of Carmarthenshire and Breconshire, is approximately 18 miles at its widest point north to south and 40 miles east to west.

Historically, earth scientists have described the coalfield as a basin-like structure, trough or syncline, lying in a depression of the Old Red Sandstone. The strata dip from all sides of the basin towards the centre, more steeply along the southern than the northern edge. Recent computer visualization techniques, however, have allowed a full three dimensional analysis of the coalfield structure and has revealed that it more represents western, eastern and southern

² This section is based on: Peter Toghil, *The Geology of Great Britain: An Introduction* (Marlborough, 2007); M. F. Howells, *British Regional Geology: Wales* (Nottingham, 2007); Peter Brabham, 'The Rise and Fall of the South Wales Coalfield' (Unpubl. Pamphlet, 2002). The coalfield actually extends to St Bride's Bay but the Pembrokeshire section although geologically linked is geographically isolated from the rest of the coalfield and has not been considered in this study.

basins separated by a central inverted 'T' shaped ridge. The lower part of the ridge runs east and west through Pontypridd to Maesteg, bringing the lowest coal seams to the surface. To the south is a sharp syncline trough with steep dips, while to the north is a more gently rolling syncline area. There is also a series of faults, two of the most significant running north-east, south-west along the Vale of Neath and the Swansea Valley. These divide the coalfield into eastern and western portions, the downthrow side being on the north and west. The Moel-Gilau and Ty'n-y-nant are major normal faults in the central coalfield.

The thickness of the Carboniferous sequence in South Wales has also been shown not to be constant. It thickens markedly from east to west. In the central region sequences that are 880 metres thick in the north-east increase to 1900 metres around Margam in the south-west. But further west they can reach up to 2500 metres thick. The sequence includes coal seams also varying in thickness from a few centimetres to up to four metres thick. The seams comprise up to ten percent of the total thickness of the Coal Measures. Encircling the Coal Measures are outcrops of Millstone Grit and Carboniferous Limestone.

Earth scientists in addition reveal the past processes which brought about the creation of coal. Some 350 to 360 million years ago, the area of the earth's surface which was to become South Wales was basking in the tropical climates of the southern hemisphere. 'Carboniferous Limestone', the rocks now edging the coalfield, were formed in shallow warm seas from corals and brachiopods. Some fifty million years later, the sea was in retreat and the climate of 'South Wales' had become humid. The 'coalfield' became a coastal plain with swamps, mudflats and deltas which supported dense tropical forests of giant lycopods and tree ferns. The deltas were periodically covered by sands due to fluctuations in sea level, with renewal of forests after the sea level fell again. Dead vegetation turned to peat and this was gradually turned into coal by the compression and heating due to burial by the overlying sediments.

Coal mining exploitation has revealed that the South Wales coalfield produces a greater variety of types of coal than other coalfields. There are three types: the lowest grade coals, bituminous

coals, are found fairly close to the surface; steam coals are especially rich and found in the middle and lower measures; the deepest coals are the anthracite. Anthracite, which is over 90 percent carbon, for example, contains about three times as much energy weight for weight as peat, which is less than 50 percent carbon. Carbon content, together with the amount of impurities in a coal, determines its usefulness. Bituminous coals, for example, are comparatively low rank, tend to be soft and friable, have a high proportion of volatiles (non-carbon material) and a carbon content as low as 65 percent. They make good house, gas and coking coals but produce too much smoke and ash and too little heat to be useful for steam raising. Anthracite coals, the highest rank, are hard, lustrous coals, with a low proportion of volatiles (less than ten percent) and a high carbon content. Anthracite burns at a very high temperature with very little smoke and little residue. Intermediate between the two are steam coals, for which South Wales has been historically famous.

Current research attempts to explain the reasons for these variation in rank of coal seams. The rank of coal depends principally on how deep it was buried during its formation. With progressive burial, dead plant material is broken down by the action of bacteria into lignin, a woody residue. The deposit becomes compacted and volatiles such as water and methane are driven off and the amount of heat energy than can be released by burning a given weight increases. But Variscan earth movements caused major faults, such as the Neath valley disturbance, to cut the coal measures. Hot fluids rose up through these faults and heated the coal to further affect the coal rank over the area.³ Northward-directed pressure during the Variscan orogeny also formed the main syncline of the South Wales coalfield.

Finally, earth scientists help explain too the topography of the landscape. The surface of the coalfield is carved into a series of deep and narrow valleys, the coal seams of the upper series outcropping on the mountain sides. The mountains were created by strong compressive forces

³ D. H. M. Alderton, N. Oxtoby, H. Brice, N. Grassineau & R. E. Bevins, 'The Link Between Fluids and Rank Variation in the South Wales Coalfield: Evidence from fluid inclusions and stable isotopes', *Geofluids*, Vol. 4 (2004), pp. 221-36.

during the Variscan orogeny which buckled the Carboniferous and Devonian strata 280 million years ago. As the mountain chain began to rise, new sediment-rich rivers flowed across the area, laying down thick sand units, known as the 'Pennant Measures', which cap the tops of the South Wales valleys. By twenty five million years ago South Wales now lay in the middle of a vast continent but plate tectonic movements in the Mediterranean region caused the Alps to form. Ripples from this tectonic movement extended into South Wales causing crustal stretching, the formation of the Bristol Channel basin and re-activation of the major faults of the South Wales coalfield. Subsequent periods of glaciations, over the past million years, especially the Devensian glaciations, 18,000 to 10,000 years ago, and erosion by rivers over the last 13,000 years, shaped the landscape which humans were eventually to inhabit and come to exploit.

The question is: what are the implications of this knowledge for historians' understanding of the growth of the coal industry and the experiences of the human society which developed around the industry?

Challenges

There is no tradition of the writing of the history of science in Wales, possibly because there was no Welsh university until the latter decades of the nineteenth century. Nothing much has been produced since F. J. North's work in the 1930s, save for a handful of publications by the National Museum of Wales, such as Barry Thomas's brief study of the life of colliery manager David Davies, which explores Davies' contribution to the development of palaeontology.⁴ But while the history of geology may have been neglected, this does not necessarily mean that

⁴ F. J. North, 'Further Chapters in the History of Geology in South Wales; Sir H. T. De la Beche and the Geological Survey', *Cardiff Naturalists' Society Transactions*, Vol. 67 (1934), pp. 31-103; F. J. North, *Geological Maps: their history and development with special reference to Wales* (Cardiff, 1928); Barry A. Thomas, *In Search of Fossil Plants: the life and work of David Davies (Gilfach Goch)* (Cardiff, 1986). A number of general histories of geological science have however been written, although nothing very recently. See for example: Roy Porter, *The Making of Geology: Earth Science in Britain 1660-1815* (Cambridge, 1977).

Welsh historians are unaware of the influence of geology on the region's development. The pattern and timing of development are intimately connected with the geology: the impetus provided by the iron industry, the discovery of steam coal in the central coal region, the shift from drifts to pits, the delayed exploitation of the anthracite region are all linked to the geological structure of the region and all are part of the 'common knowledge' of Welsh historians. Awareness of this informs the work of historians from A. H. John to the more recent study by Ioan Matthews on the anthracite area.⁵

In addition, studies of the work of miners, like those produced by Trevor Boyns, have paid close attention to the role of geology in shaping human activity.⁶ During the interwar years, the economic uncertainties and the threat to the industry stimulated a rash of studies on the origins and development of industrial Wales amongst postgraduate researchers.⁷ The post-Second World War recovery and the nationalisation of the coal industry similarly generated interest in the industrial base of the nation and gave rise to the publication of a number of developed studies of industrial Wales, especially on the South Wales coalfield.⁸ Wales became defined by its industry, and its survival, economically, culturally and socially, was tied to the continued survival of the coal trade. Understanding the geology of the coalfield became an integral part of understanding its history, because, in the words of E. D. Lewis, '[o]f all human activities none is more influenced by geological factors than coal mining'.⁹ Lewis and economic historians such as Rhodri Walters, J. H. Morris and L. J. Williams, were fully aware of the varying geology across the coalfield and the impact this had on levels of investment and profitability,

⁵ A. H. John, *The Industrial Development of South Wales 1750-1850: An Essay* (Cardiff, 1950); Ioan Aled Matthews, 'The World of the Anthracite Miner' (Unpubl. PhD Thesis, UWC, 1995).

⁶ T. Boyns, 'Work and Death in the South Wales Coalfield, 1874-1914', *Welsh History Review*, Vol. 12, No. 4 (Dec., 1984), pp. 514-537; 'Technological Change and Colliery Explosions in the South Wales Coalfield, c. 1870-1914', *Welsh History Review*, Vol. 13, No. 2 (Dec., 1986), pp. 155-77.

⁷ See John Benson, Robert G. Neville & Charles H. Thompson (compilers), *Bibliography of the British Coal Industry: secondary literature, parliamentary and departmental papers, mineral maps and plans and a guide to sources* (Oxford, 1981).

⁸ A. H. John, *The Industrial Development of South Wales 1750-1850: An Essay* (Cardiff, 1950).

⁹ E. D. Lewis, *The Rhondda Valleys: a study in industrial development, 1800 to the present day* (London, 1959), p. 4.

the speed of development, technological change and diversity of practices.¹⁰ Indeed, occasional studies have touch on the issue in more detail. A 1975 article, for example, explored the impact of geological variation on wages in the twentieth century.¹¹ David Ingli Gidwell noted the difficulties of unified action and the sectional interests that developed as a result of varying geological conditions, which were especially problematic in relation to union activity.

Most of these studies, however, are essentially economic in perspective and it has to be acknowledged that there has been a move away from economic history in recent years especially within Welsh history. The only recent economic study relating to the South Wales coalfield is that of John Elliott who has taken a look at the Ebbw Valley. Elliott is still sensitive to the question of geology but only in the broadest terms.¹² From the 1960s onwards the 'democratization' of education and the shift to 'history from below' has changed the focus. Now attention was drawn to the ordinary working man and interest in industrial productivity was replaced by interest in industrial unrest. The shift was accelerated in the 1970s by the setting up of the journal *Llafur* and the development of the oral history project, the South Wales Coalfield History Project, and was linked to the changing contemporary scene. It reached its fullest expression in 1980 with the publication of *The Fed*, Dai Smith and Hywel Francis's detailed study of the South Wales Miners' Federation during the interwar period and especially the 1926 general strike.¹³ The society of the coalfield was under threat and *The Fed* was not intended as a study of the coal industry but as a study of the ordinary workers and their fight to protect the communities and the way of life they had created around the industry. It was to be a usable history in the fight for survival. Ironically it pushed the industry further into the background. Peter Stead, in a review published shortly after the appearance of the book, criticised Smith and Francis for ignoring the business history of the region and divorcing their

¹⁰ R. H. Walters, *The Economic and Business History of the South Wales Steam Coal Industry 1840-1914* (New York, 1977); J. H. Morris & L. J. Williams, *The South Wales Coal Industry, 1841-1875* (Cardiff, 1958).

¹¹ David Ingli Gidwell, 'Philosophy and Geology in Conflict: the evolution of wages structures in the South Wales Coalfield, 1926-1974', *Llafur*, Vol. 1, No. 4 (1975), pp. 194-207.

¹² John Elliott, *The Industrial Development of the Ebbw Valleys, 1780-1914* (Cardiff, 2004).

¹³ Hywel Francis & Dai Smith, *The Fed: a history of the South Wales Miners in the Twentieth Century* (Cardiff, 1980).

story from the rise and fall of the coal industry.¹⁴ Workers and employers were set in opposition to each other and the divisions between the two became far more important than any shared experience of the limitations imposed by the physical environment. Miners not mining became the key subject. Even so, the new generation of historians emerging in the '60s and '70s were not ignorant of what went before. They often grew up in coalfield communities themselves and were well aware of the geological issues at the heart of the industry. Historians and audience alike were thus products of the coalfield and perhaps felt that this shared experience of both industry and landscape did not need to be described or explained.

Moreover, it is difficult at first glance to see how a more detailed analysis of geology could enhance or change the historical interpretation. Firstly, historians are always likely to prioritise social, economic, political and technological developments over the geological as causal factors, despite the work of Fernand Braudel which will be discussed below. The presence of coal is necessary for an industry to develop but is not of itself sufficient to cause an industry to develop. What then can an understanding of geology actually contribute to historical research? Secondly, it cannot be said that there are any serious question marks hanging over the development of the South Wales coalfield: both the geology and the coal industry's evolution are and have been, almost from the beginning, well understood. Indeed, there is a vast quantity of documentary and pictorial evidence, widespread survival of buildings and even the continuation of institutions and activities, which means that the amount of gaps in the historical knowledge is fewer than for earlier time periods or other regions of the country.¹⁵ From the beginning of the Victorian era onwards almost every aspect of social and economic life of the nation was thoroughly investigated and recorded by the Government. Because of the centrality of mining to the British economy the coal industry is especially well covered by

¹⁴ Peter Stead, 'And Every Valley Shall Be Exalted', *Morgannwg*, Vol. 24 (1980), p. 86.

¹⁵ Geological insights have been used profitably to fill in the gaps in our knowledge of earlier periods. See for example, the research into the 1607 Bristol channel 'tsunami'; S. K. Haslett & E. A. Bryant, 'The AD 1607 coastal flood in the Bristol Channel and Severn Estuary: Historical Records from Devon and Cornwall (UK)', <http://ro.uow.edu.au/scipapers/95> [accessed 21 February 2009].

documents.¹⁶ The challenge facing many coalfield historians is usually to work out the best way to interpret and balance the wealth of detailed, albeit sometimes contradictory, material rather than of how to supplement scanty knowledge.

This is not to suggest, of course, that we have complete understanding, nor that there is nothing left to be learned about, for instance, the exact timing of the shift from iron to coal as the primary product of the coalfield. There are still gaps in our knowledge as there are gaps in the primary sources. The information about any given pit, or even any given community, for the whole of its existence is rarely available. And the type of evidence is not always what historians would like: for example, output figures for are available for the coalfield by company or region, but not at individual pit level.¹⁷ However, broad conclusions can be drawn from such data which more than adequately serve the purposes of most historians. So it is not just a question of what science can tell us that we do not already know, but also what any extra data could mean for our overall interpretation, that is, what difference does knowing this make to our understanding?

Thirdly, there have been no major breakthroughs in geological science in the past few decades which might make a difference to the way in which the coalfield is understood, no dramatically new insights into its structure and shape for instance. Indeed much of modern understanding is rooted in Victorian exploration – in other words, we only know what we know about the coalfield because the Victorians knew what they knew.¹⁸ And certainly the interpretation of the geology has evolved. We now know about the role of plate tectonics in shaping the landscape, for example.¹⁹ Certainly the technology has evolved beyond recognition: theodolites and pencil line drawings have been replaced by GPAS and sophisticated mapping software. But the

¹⁶ See Chapter Three for an overview of just some of the huge wealth of material available.

¹⁷ See T. Boyns, 'Labour Productivity in the British Coal Industry, 1874-1913', (Unpubl. PhD Thesis, UCC, 1982), pp. 213-219.

¹⁸ Even today modern Earth scientists are dependent on early mining records as many of the National Coal Board survey reports were 'lost' in the privatisation process of the 1990s.

¹⁹ K. Frodsham & R. A. Gayer, 'The Impact of Tectonic Deformation upon Coal Seams in the South Wales Coalfield, UK', *International Journal of Coal Geology*, Vol. 38 (1999), pp 297–332.

'factual' knowledge of the location of seams, faults and so on has not substantially changed. Modern earth sciences bring new techniques to the table but not a new story.

Fourthly, the focus of concern of earth scientists, it might be argued, is at best of incidental interest for historical research. One such area is the explanation for the variation in coal quality across the coalfield, a puzzle which has attracted debate for over a century. T. W. Bloxam and T. R. Owen, for example, suggest that the anthracitization of the coals in South Wales was due to the effects of magmatic heating.²⁰ Differences in vegetation, decaying processes and the varying biological actions of micro-organisms at different depths of sea water have also at different times been postulated as causes. In addition, it has been suggested that the depth of burial of seams or the influence of earth movements followed by mineralization were important.²¹ Another key area of interest concerns the location and management of landslips. In such studies, the relationship between human industrial activity and the landscape is an integral part of the research, as much of the coal industry's activities impacted on an existing unstable geology. The need to understand this relationship is an important part of landscape management and the planning of future developments, and, as Bentley and Siddle have noted, took on greater significance in the wake of the 1966 Aberfan disaster.²² But, even if the complex language used by earth scientists did not make such studies almost impenetrable to the non-specialist, it surely hardly matters to historians why the South Wales coalfield produces coal of different rank only that it does and did?

There are other issues too which may need to be taken into account. While there is often an automatic historical dimension to much modern geological research, the purpose is always present-centred and future orientated. Past mining activity, for example, can have a profound

²⁰ T. W. Bloxam & T. R. Owen, 'Anthracitization of coals in the South Wales Coalfield', *International Journal of Coal Geology*, Vol. 4 (1985), pp. 299-307.

²¹ For details of the key arguments see Susanne C. White, 'Palaeo-geothermal profiling across the South Wales Coalfield', *Proceedings of the Ussher Society*, Vol. 7 (1991), pp. 368-74.

²² For an overview of landslide research see Stephen P. Bentley & Howard J. Siddle, 'Landslide research in the South Wales coalfield', *Engineering Geology*, Vol. 43 (1996), pp. 65-80.

impact on contemporary building and development projects.²³ When looking at new infrastructure constructions it is essential to know whether and where underground workings occurred and even the mode of working. Pillar and stall workings are more prone to collapse with time due to the deterioration of the strata forming the mine pillars and the roofs of stalls. Ground collapse is likely to be accelerated if disturbed by new construction work.²⁴ Geologists need to know the past in order to predict, and help others to plan and prepare against, possible problems in the future. It could therefore be argued that this sets earth sciences at odds with history which seeks to understand the past for its own sake.

A look at the historical surveys which have been conducted by modern earth scientists suggests that there are some very real differences between the disciplines. G. H. McNally's study of the coal industry in New South Wales is perhaps typical of historical geological surveys. McNally shows the link between the local geological structure and the evolution of the coal industry in Australia, both in terms of the practices adopted and the areas exploited.²⁵ As with many 'geological histories', however, people and human choice play only a minor role. In McNally's account, for example, people only feature when their homes are threatened by a landslide or by the collapse of shallow workings. Human agency is played down and geology becomes the determining factor. Geologists, it seems, do not have the same interest in the difference between actual geology and perceived geology, that is the myriad ways in which humans read, interpret and respond to what they see. Their priority is the tangible, measurable, mappable world before us.

²³ See the various articles in Douglas Nichol, Michael G. Bassett & Valerie K. Deisler (eds.), *Urban Geology in Wales* (Cardiff, 2004); Michael G. Bassett, Valerie K. Deisler & Douglas Nichol (eds.), *Urban Geology in Wales: 2* (Cardiff, 2005); Michael G. Bassett, Huw Boulton & Douglas Nichol (eds.), *Urban Geology in Wales: 3* (Cardiff, 2009).

²⁴ L. Campton, 'Geoengineering Along the A465 Heads of the Valleys Road' in Nichol, Bassett & Deisler (eds.), *Urban Geology in Wales*, pp. 80-2.

²⁵ G. H. McNally, 'Geology and Mining Practice in Relation to Shallow Subsidence in the Northern Coalfield, New South Wales', *Australian Journal of Earth Sciences*, No. 47 (2000), pp. 21-34.

This apparent geological determinism is, however, something most historians would be likely to shy away from. This has not always been the case. For Welsh historians writing at the beginning of the twentieth century, to speak of Wales was to speak of mountains. The history of Wales was a history of a landscape which had given birth to a people of resilience, ingenuity and simplicity of spirit, a landscape which had nurtured, inspired and protected its own. O. M. Edwards repeatedly declared, 'Wales is a land of mountains. Its mountains explain its isolation and its love of independence; they explain its internal divisions; they have determined, throughout its history, what the direction and method of its progress were to be.'²⁶ Early histories of Wales were also fully reflective of and responsive to the world in which they were written.²⁷ Landscape and geography offered an identity for a land which was seeking to establish its place on the international stage but which lacked the formal structures of a nation state. Landscape offered an explanation and even a justification for the unique characteristics of the Welsh which were under threat from mass migration. For writers such as O. M. Edwards landscape was an integral part of understanding the meaning of Wales, its past and its people.

But such approaches have come to be seen as simplistic and naïve. Even the more sophisticated approach of Fernand Braudel has been regarded as problematic. For Braudel, the slow changes of geography and geology, what he called the *longue durée*, and the influence of these on human behaviour were more important in human history than economic or political trends or sudden and short term events.²⁸ He, therefore, made nature a major focus of his study of the Mediterranean world, arguing that environmental trends, which he believed occurred slowly and repeatedly, influenced the course of human history. But this emphasis, it

²⁶ Owen M. Edwards, *Wales* (London, 1912), p. 2.

²⁷ For a more detailed discussion of these themes see Neil Evans, "'When Men and Mountains Meet': historians' explanation of the history of Wales, 1890-1970", *Welsh History Review*, Vol. 22, No. 2 (Dec., 2004), pp. 222-51.

²⁸ Fernand Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II* (London, 1975). See also Fernand Braudel, *On History* (Chicago, 1980).

was suggested, caused Braudel not only to play down human choice and agency, but almost to exclude from his picture human society itself.²⁹

Indeed, it could be argued that Braudel actually failed to integrate geological perspectives within history at all. One of the most serious criticisms of Braudel's work is that study contained no central problem he wished to examine. The result was that his study was essentially a summary of a vast quantity of information rather than an integrated study of human, landscape and change.³⁰ Virtually all of the material that deals with this issue is confined to the opening of the book so that it acts chiefly as a preface to the largely social and political study that follows. The weaknesses in Braudel's approach meant that mainstream history remained unconvinced of the need to adopt a geological/landscape perspective. Indeed even the seminal work of W. G. Hoskins on the place of the English landscape in history, published a few years after Braudel's study, which was met with a great deal of enthusiasm, led to the emergence of landscape history as a sub-discipline rather than to a fundamental change in 'mainstream' historical practice.³¹ Although increasingly moving away from the largely descriptive approach of its early years to provide greater analysis of communities and societies within the landscape, landscape history remains marginal, and tends to concentrate on a narrow geographical and chronological framework.³²

²⁹ For a contemporary critique of Braudel's work see Bernard Bailyn, 'Braudel's Geohistory – A Reconsideration', *Journal of Economic History*, Vol. 11, No. 3 Pt. 1 (Summer, 1951), pp. 277-82.

³⁰ Bailyn, 'Braudel's Geohistory – A Reconsideration', p. 281.

³¹ W. G. Hoskins, *The Making of the English Landscape* (Harmondsworth, 1975).

³² There are currently just two landscape history journals published in the UK. These are *Landscape History* and *Landscapes*. Examples of the few articles which deal with industrial landscapes include Jeremy Lowe & Martin Lawler, 'Landscapes of the Iron Industry at Blaenafon, Gwent', *Landscape History*, Vol. 2 (1980), pp. 71-82; David Hey & John Rodwell, 'Wombwell: The Landscape History of a South Yorkshire Coalfield Township', *Landscapes*, Vol. 2 (2006), pp. 24-47.

Current and Potential Use

The conceptual differences between the two disciplines can sometimes, however, be exaggerated. It has been argued by educationalists, concerned about the comparative successes of sciences and humanities subjects in schools, that there are superficial agreements between history and geology, which would make geology more compatible with the aims of historical research than some other sciences. Roger Trend has argued that by unravelling the earth's past events, geology is centrally concerned with interpretation of trace evidence of past events in order to develop a narrative, thereby providing a conceptual link between science and history.³³

It is also possible that the extent to which historical and geological perspectives are incompatible has been overemphasised. Geology is especially important to military history and indeed many military histories have been written by earth scientists. Such studies look at the impact of geology and topography on tactical decision making processes, for example, in the siting of trenches or the control of higher ground, and on the outcome of individual battles.³⁴ There are also close links between archaeology and geology, since the archaeologist's primary 'source' of information about the past is from the earth itself. Archaeologists have to be able to read the ground in order to distinguish man-made traces from geological features. It is also useful for archaeologists to be able to reconstruct past landscapes, to identify likely locations of settlements and geophysics is used extensively to identify below the surface of the ground traces of human activity.³⁵

³³ Roger Trend, 'Conceptions of geological time among primary teacher trainees, with reference to their engagement with geoscience, history, and science', *International Journal of Science Education*, Vol. 22, No. 5 (May, 2000), p. 541.

³⁴ See for example Edward P. F. Rose, 'Water Supply Maps for the Western Front (Belgium and Northern France) Developed by British, German and American Military Geologists during World War I: Pioneering Studies in Hydrogeology from Trench Warfare', *The Cartographic Journal*, Vol. 46, No. 2 (May, 2009), pp. 76-103.

³⁵ Henry Chapman, *Landscape Archaeology and GIS* (Stroud, 2006).

Other disciplines also offer potential insights and pointers to reconciling and integrating the two perspectives. In the United States environmental historians have begun to examine the reciprocal relationship between humankind and nature to try to understand how the natural world has constrained and shaped the past.³⁶ In Northern Europe the main themes have been pollution or the costs of industrialization, and the history of forests.³⁷ To that end, environmental histories integrate within historical research a broad range of earth sciences and techniques, such as soil analysis, which allow a reconstruction of past landscapes and environments and their uses.³⁸ In recent years environmental historians have also increasingly addressed some of the conceptual issues historians have raised about such approaches. They argue, firstly, that the rejection of the environment or nature as a historical factor has often simply meant that historians have replaced an environmental determinism with a cultural one.³⁹ Secondly, they point out that neither the landscape nor environment are fixed or can be treated as a given.⁴⁰ The physical landscape is constantly changing, both of its own accord and as a result of human activity. River courses change, for example, and land can be reclaimed or lost to forestation. The context in which the human story unfolds is always changing. And the limits on human actions and choices are therefore always changing. Thirdly, there is a growing feeling that the dichotomy between 'human' and 'nature' is artificial.⁴¹ Humans are part of the

³⁶ Ted Steinberg, 'Down to Earth: Nature, Agency, and Power in History', <http://www.indiana.edu/~ahr/elec-projects.html> [accessed 23 July 2009]. The discipline has yet to become widespread in the UK, and is still seen by some as marginal to mainstream history even in the USA. The first British environmental history journal, *Environment and History*, was only launched in 1995 and it was as late as 1999 that a Society for Environmental Historians was founded in Europe. For an overview of the history of environmental history see J. R. McNeill, 'Observations on the Nature and Culture of Environmental History,' *History and Theory*, Theme Issue 42 (Dec., 2003), pp. 5-43.

³⁷ McNeill, 'Observations on Nature', p. 19. See also Caroline Ford, 'Nature's Fortunes: New Directions in the Writing of European Environmental History', *The Journal of Modern History*, Vol. 79 (Mar., 2007), pp. 112-33.

³⁸ Both 'landscape' and 'environment' are contested issues. The terms are used in the broadest sense rather than in any technical way here.

³⁹ Theodore R. Schatzki, 'Nature and Technology in History', *History and Theory*, Theme issue 42 (Dec., 2003), pp. 82-93.

⁴⁰ McNeill, 'Observations on Nature', p. 42.

⁴¹ See the essays in William Cronon (ed.), *Uncommon Ground: Toward Re-inventing Nature* (New York/London, 1995).

world, dependent upon it, and there are dangers, both for the way we view the past and for the way humans respond to the world in the present, in setting up humanity in opposition to it. A good illustration of what environment historians have been able to achieve by adopting a broader approach is a recent study on the boll weevil in the Mississippi delta by James Giesen.⁴² Giesen reveals the ways in which ideologies about race and labour shaped the response of southern white cotton producers to a potentially devastating natural threat. Environmental historians may therefore be right to argue that all historians should consider the environment because it impacts on all aspects of human experience.

By failing to understand the way in which the historical actors understood the land and used their knowledge of land, have Welsh historians, then, fundamentally misinterpreted their experience? An awareness of the wide range of variables acting on economic and social development, has possibly meant that historians have downplayed or even ignored environmental factors. Moreover, the landscape is mediated to a certain, and varying, extent by 'Geology' the discipline; that is, what is known or believed about the landscape shapes behaviour as much as the actual physical condition of the landscape. Knowledge and *whose* knowledge, it could be argued, is as important to our understanding of the development of the coalfield and its society. In addition environmental historians are clearly responding to contemporary concerns about the physical world and the damaged caused by human activity. If Welsh historians are to remain responsive to public need as they always have done in the past, they perhaps need to return to a more sympathetic understanding of the physical historical world.

Geology and Welsh Life

Indeed, it could be argued that the study of the role of geology in the historical life of Wales has many claims for attention which Welsh historians have failed to fully respond to. It has already been noted that Welsh historians have no tradition of writing intellectual history or the history

⁴² James C. Giesen, "The Truth about the Boll Weevil": the nature of the planter power in the Mississippi delta', *Environmental History*, Vol. 14, No. 4 (Oct., 2009), pp. 683-704.

of science; the few examples of histories of Welsh geology which exist have come from within the discipline of geology itself rather than from history proper. Louise Miskell's recent study of Swansea, *An Intelligent Town*, stands alone in analysing the scholarly environment of Victorian Wales, although even here the primary focus of her work is on the role of intellectual pursuits in the development of the town as a civic entity rather than on the town's intellectual life *per se*.⁴³ Yet a brief look at the discipline of geology and Wales's role in its historical development reveals a degree of intimacy and interdependence which deserves closer attention.

From its very beginnings geology as an academic pursuit was linked with Wales. Most general studies of geology, for example, invariably identify George Owen of Henllys and Edward Lhuyd, as founding fathers of the discipline. Owen's work, 'On the course of the strata of coal and lime in Pembrokeshire' (1603) was 'ground-breaking' in that it traced the bands of Carboniferous Limestone through southern Pembrokeshire and eastward through Glamorganshire. Lhuyd's pioneering 1699 catalogue of nearly 1800 fossils and minerals, *Lithophylacii Britannica Ichnographia*, represented the first systematic attempt to catalogue fossils. But Wales's place in geology's history is most obvious in the names of geological systems, many of which were identified first in Wales in the early nineteenth century. Wales was primarily attractive to the fledgling discipline because of the huge variation in geology occurring in a relatively compact area. From the 1830s onwards on some of the older and little known strata underlying the distinctive Red Devonian Sandstone in Wales and the borderland led to the recognition of three geological systems which were given names with distinctly Welsh associations. The oldest of the three systems, the Cambrian, is the most obvious, named as it is after the Latin for Wales. Its identification was based on the strata of north-west Wales studied by Adam Sedgwick in 1835. The youngest of the three systems, the Silurian, was named in 1835 after the Silures, an Iron Age tribe of south-east Wales, while the middle system became the Ordovician after the Ordovices, another Iron Age tribe this time of north-west Wales, following a suggestion by

⁴³ For example F. J. North, 'Further Chapters in the History of Geology in South Wales; Sir H. T. De la Beche and the Geological Survey', *Cardiff Naturalists' Society Transactions*, Vol. 67 (1934), pp. 31-103; Louise Miskell, *Intelligent Town: An Urban History of Swansea, 1780-1855* (Cardiff, 2006).

Charles Lapworth in 1879. Further Welsh names, such as the Tremadoc series, the Arenig Series, the Llanvirn Series and the Llandeilo Series, were chosen as defined subdivisions of the Ordovician system. And although the name of the Carboniferous system is not directly 'Welsh' in origin, its identification was based partly on the strata of the South Wales coalfield named by W. D. Conybeare, dean of Llandaff Cathedral, in 1822.

Wales's industries too played a part, although the nature of the relationship is a matter of debate.⁴⁴ As F. J. North pointed out, 'Geology as a science was born at the time when men were feeling the necessity for better means of transport and were actively engaged in making roads and canals. In both operations extensive excavation of the earth's crust was necessary, thus enormously increasing the range of geological observation.'⁴⁵ The discipline was evolving rapidly with the greater excavation of land for first canals, then railways and also with development of deep mining.⁴⁶

Although from its outset and throughout most of the early decades of the nineteenth century, the study of the earth's structure and origins was descriptive rather than explanatory it always had a utilitarian dimension. George Owen's object in describing the limestone strata was to 'save laboure to others in seakinge it where there is no possibilitie to finde it', since limestone was in great demand during the period and anthracite was exported to London.⁴⁷ William

⁴⁴ Geology was initially very much a 'gentleman's pursuit'. The Geological Society of London, founded in 1807, was made up of gentlemen of leisure and academics, that is no one with any significant involvement in the practical arts like mining in spite of the utilitarian rhetoric of the early years of the society's existence. Plus many early geologists expressed a preference for more 'romantic' landscapes which meant that little work was carried out on either the mining areas or the carboniferous coal measures; Colin A. Russell, *Science and Social Change 1700-1900* ([London, 1983), p. 197; Jack Morrell & Arnold Thackray, *Gentlemen of Science: Early Years of the British Association for the Advancement of Science* (Oxford, 1982), p. 232.

⁴⁵ F. J. North, *Geological Maps: their history and development with special reference to Wales* (Cardiff, 1928), p. 84.

⁴⁶ Michael Freeman, 'Tracks to a New World: railway excavation and the extension of geological knowledge in mid-nineteenth-century Britain', *BJHS*, Vol. 34 (2001), pp. 51-65.

⁴⁷ F. J. North, *Geological Maps: Their History and Development with Special Reference to Wales* (Cardiff, 1928), p. 5; quoted in F. J. North, *From Giraldus Cambrensis to the Geological Map: The Evolution of a Science* (Cardiff, 1933), p. 28.

Smith's map of 1815, developed as a result of Smith's work as a canal engineer, accurately delineated the general outline of the South Wales coalfield and was careful to show amongst other things, 'collieries, mines and canals'.⁴⁸

Real advances in the discipline of geology came with the setting up of the Geological Survey Department of the Ordnance Survey in 1835, with Henry de la Beche in charge. The Survey was aided by more accurate mapping with one inch to the mile topographical maps becoming available for the first time from 1839. Special attention was now given to the rocks of the South Wales coalfield and within a short space of time there was a geological map of the South of greater accuracy than that for any other part of the country.⁴⁹ The survey incorporated the earlier work of W. E. Logan, who was then at the copper works in Swansea and who was interested in geology. According to an article in the *Colliery Guardian* a considerable tract of South Wales, from Cwmavon to Carmarthen Bay, was mapped by Logan unaided and at his own expense.⁵⁰ By 1852 the whole of Wales had been mapped on the one inch scale by the Survey.⁵¹

But the links were not just via mapping. By the 1830s the importance of coal to Britain's development was beginning to be clear. In 1830 two of the leading geologists of the era, Sedgwick and Buckland contributed to a study into the state of the coal industry. Sedgwick was doubtful as to the viability of South Wales as a coal region. He believed there would be problems with working the coal because of the inclined nature of the seams, the general quality of the coal and the extra expense of transportation to key markets, which would make the

⁴⁸ North, *Geological Maps*, p. 23. Smith is often called 'the Father of English Geology' for his work on developing geological mapping. His 1815 map represented a major step forward in geological research as it provided the first accurate means of recording and communicating information relating to the nature and arrangement of the rocks of the Earth's crust. For a very readable account of Smith's life and work see Simon Winchester, *The Map that Changed the World* (London, 2002).

⁴⁹ North, *Geological Maps*, p. 53.

⁵⁰ *Colliery Guardian*, 4 November 1898, p. 843.

⁵¹ North, *Geological Maps*, p. 56.

region unremunerative.⁵² In spite of Sedgwick's pessimism, the link between geological expertise and industrial expansion was forged. By mid century, extensive experiments were being carried out on coal by Lyon Playfair and Henry de la Beche under the umbrella of the Museum of Practical Geology which demonstrated the superior quality of Welsh coal for steam raising and ultimately led to the adoption of Welsh coal for use by the Navy.⁵³ It was this official government backing for Welsh coal which helped stimulate the expansion of the industry especially in the central valleys region.

By the beginning of the second half of the nineteenth century geology was being lauded as vital knowledge by which society was able to prosper. In the 1860s W. S. Jevons wrote, 'If the science of geology had no other claims upon our attention it would repay all the labour spent upon it, many times over, by showing where coal may reasonably be looked for.'⁵⁴ Geological knowledge was essential, because, 'Deprive us of our coal, and no longer should we, by our commerce, convey the conjoined benefits of knowledge and civilisation to the remote regions of the globe.'⁵⁵ The big debate which dominated discussions was therefore the quantity of coal that was available and again the 'great South Wales coalfield' was central to the discussions. Accurate calculations were difficult because of the uneven shape of the coalfield and uncertainty over the depth of the measures and the number of workable seams, especially when factoring in the problems of waste associated with extraction. Edward Hull predicted in 1881 that at the current rate of production the supply of coal in the South Wales coalfield was sufficient to last 1800 years.⁵⁶ H. H. Vivian's assessment in 1860 that South Wales would serve the whole consumption of England for 500 years seems gloomily pessimistic by comparison.⁵⁷

⁵² Parliamentary Papers (PP), House of Commons (HC), 1830 663 , *Report of the Select Committee on the State of the Coal Trade*, p. 238.

⁵³ See especially PP, HC, 1849 1086, *Second Report on the coals suited to the steam navy*; PP, HC, 1851 1345, *Third Report on the coals suited to the steam navy*.

⁵⁴ William Stanley Jevons, *The Coal Question: an inquiry concerning the progress of nation and the probable exhaustion of our coal-mines* (London, 1865), p. 30.

⁵⁵ J. H. Leifchild, *Our Coal and Our Coal Pits*, 2nd ed. (London, 1968), p. 12.

⁵⁶ Edward Hull, *The Coal-fields of Great Britain: Their History, Structure and Resources* (London, 1881), p. 108.

⁵⁷ Jevons, *The Coal Question*, p. 35.

But the security of the industry too was increasingly important. Specialist geological knowledge was applied to the questions of safety and accidents and generated a number of close surveys. The 1881 inquiry into the nature of the geology in the Risca area tried to ascertain the reason for the high incidence of accidents in the area.⁵⁸ Mines inspectors were increasingly expected to have a solid background in geology and mineralogy to help with their work.⁵⁹

By end of century, the relationship was well established. The setting up of a second geological survey was directly the result of the needs of the coal industry. It was H. H. Vivian, the Swansea-based coalowner, who brought to Parliament's attention the inadequate nature of the existing maps in 1891. The survey which was subsequently established under the supervision of Aubrey Strahan set about studying the South Wales coalfield in even greater detail than before. A number of important advances in the detailed geological knowledge had been made since the area was first surveyed, advances in large measure due to the intimate knowledge of the underground arrangement of the strata provided by mining operations. This knowledge was translated into even more accurate maps. Coal-measures were previously represented by a single colour on the geological maps. They were now subdivided to illustrate the structure of the coalfield and distinguish between the Lower Coal Series, Pennant Sandstone and the Upper Coal Series.⁶⁰ Anticlinal and synclinal folds were also traced in far greater detail than had been previously possible.⁶¹ The mapping was accompanied by detailed explanatory *Memoirs*. The first survey did not have these, although general information was introduced by de la Beche in his treatise, 'On the Formation of the Rocks in South Wales and South-Western England' which formed part of the first volume of the *Memoirs of the Geological Survey of Great Britain* 1846.⁶²

⁵⁸ PP, HC, 1881 C.2742, *Joint Report ... on the coalbed or coalfield in which the workings at Risca Colliery are situated*.

⁵⁹ PP, HC, 1852 509, *Report from the Select Committee on coal mines*.

⁶⁰ North, *Geological Maps*, p. 66.

⁶¹ Archibald Geikie, preface to Aubrey Strahan, *The Geology of the South Wales Coalfield: Part I – The Country around Newport, being an account of the region comprised in sheet 249 of the map* (London, 1909), p. vii.

⁶² Henry De la Beche, 'On the Formation of the Rocks of South Wales and South Western England,' in *Memoirs of the Geological Survey of Great Britain and of the Museum of Practical Geology in London: Vol. I* (London, 1846), pp. 1-296.

Indeed there was more generally a greater degree of co-operation between the coalowners and the geological surveyors. Archibald Geikie gave thanks to the 'large number of Colliery Managers, Mining Engineers, and Surveyors for assistance given by them during the re-survey of the Coal-measures'. Whereas in the early years of the 1800s mine owners had been wary of sharing information about their works for fear of giving away valuable knowledge to their rivals, access to plans and additional information was 'freely accorded' to the Survey group.⁶³

Geologists therefore in turn benefited from the intimate knowledge of working within the earth gained through mining. The coalfield, especially the variation in the rank of the coal also presented something of a puzzle to geologists and this in turn stimulated greater attention and research. Neither the history of the expansion of the industry in South Wales nor the development of geological science can be fully understood in isolation from each other.

The rejection of the geographic determinism of O. M. Edwards has, it might be suggested, meant that Welsh historians have too often lost sight of the place in which the past has been lived. The only study of the place of landscape in Wales's history produced in the post-World War Two period has been a short article by Dai Smith and this prioritises images and representations of the Rhondda Valleys rather than the physical realities of the landscape itself.⁶⁴ Perhaps more seriously, since the gaps in landscape research have to some extent been filled by historical geographers, is that there has been a neglect of the implication and impact of geological knowledge itself on human behaviour. It should be noted that South Wales's experience of geological experts was not always constructive and the extent of geological knowledge could sometimes act as a brake on development. In some cases, expansion of the

⁶³ Geikie, preface to Strahan, *The Geology of the South Wales Coalfield: Part I – The Country around Newport*, p. vii.

⁶⁴ Dai Smith, 'The Valleys: Landscape and Mindscape' in Prys Morgan (ed.), *Glamorgan County History: Vol. 6 – Glamorgan Society 1780-1980* (Cardiff, 1988), pp. 130-50. Note also the work of historical geographers, such as: Jane Zaring, 'The Romantic Face of Wales', *Annals of the Association of American Geographers*, Vol. 67, No.3 (Sept., 1977), pp. 397-418; Prys Gruffudd, David T. Herbert & Angela Piccini, 'In Search of Wales: Travel Writing and Narratives of Difference, 1918-50', *Journal of Historical Geography*, Vol. 26, Issue 4 (Oct., 2000), pp. 586-604.

industry was in defiance of contemporary knowledge and opinion.⁶⁵ David Davies was warned by 'geological experts' in the 1860s that the Rhondda valleys were probably destitute of steam coal measures. That did not stop him from extending his works there.⁶⁶ It is essential to understand the context in which such decisions were taken when assessing the role and position of coalowners in the history of South Wales. It is, perhaps, too easy to be blinded by their later wealth and to forget how much of a risk many coal producers took to develop their concerns.⁶⁷

One of the reasons historians may shy away from emphasising the role of geology and landscape is the fear that by doing so they will be guilty of reifying them to the point of anthropomorphism. And yet it is possible that this is precisely what the historical actors historians study did. It is interesting how in oral testimony geology almost takes on human characteristics – not only do pits take on personalities, but seams can become 'sly' and the coal 'screams' as it is ripped from its place.⁶⁸ The words of Lewis Jones' fictional miner appear to be an accurate echo of the testimonies:

He came to understand the struggle between himself and the coal-face,
and he pitted his brains against the strata, using the lie of the coal and
the pressure of the roof to help him win the coal from the face with the
minimum expenditure of energy.⁶⁹

There is something very personal about the encounter. If historians are to understand the world as experienced by the people they are studying they may need to recognise that for miners coal seams and rock strata were 'players' in the dangerous game of mining not simply background or context.

⁶⁵ Although sometimes geological expertise was wilfully disregarded with less reason or hope of proving the geologists wrong. In 1928, F. J. North noted that there had been recent trial borings at Llanddowror and Llanarthney 'in the hope of finding coal in rocks where the fossils clearly indicated that the search was bound to be fruitless, and the money spent in conducting it, wasted'.⁶⁵

⁶⁶ Thomas Evans, 'The Achievement of Private Enterprise in the South Wales Coalfield', in A. P. Barnett & D. Willson-Lloyd (eds.), *The South Wales Coalfield* (Cardiff, 1921), p. 7.

⁶⁷ Some of these issues will be touched on in more detail in Chapter 6.

⁶⁸ Jim Vale quoted in Burge, 'Miners' Learning in the South Wales Coalfield', p. 73; Mary Paget (ed.), *Man of the Valleys: the Recollections of a South Wales Miner* (Gloucester, 1985), p. 77.

⁶⁹ Lewis Jones, *Cwmardy: The Story of a Welsh Mining Valley* (London, 1983), p. 122.

There has also been little consideration as yet by Welsh historians of the way in which geological knowledge was used in power struggles, whether within the coal industry or in the wider society. Some attention has been paid to the issue of formal and informal education, by historians such as Gordon Roderick and Alan Burge.⁷⁰ The provision of technical education and mechanics' institutes have been explored, as has the role of literary and scientific institutes such as that at Ebbw Vale.⁷¹ Attention has been drawn to the increasing opposition in the early twentieth century to education which seemed designed purely to prepare Welsh boys for work underground. John Davies for example has noted the struggle of the Rhondda Education Committee to ensure the teaching of Latin and French at the school in Tonypany in preference to technical subjects connected with mining, of which geology was one.⁷² Alan Burge has similarly shown that in 1907 there was opposition to the South Wales Miners' Federation's contribution to the setting up of the Mining School in Treforest from a small group of South Wales men studying at Ruskin. This was the first indication of opposition to technical education.⁷³

⁷⁰ Gordon Roderick, 'Self-Improvement and the Welsh Mineworker', *Llafur*, Vol. 7, Nos. 3-4 (1998-99), pp. 35-50; Alan Burge, 'Miners' Learning in the South Wales coalfield 1900-1947', *Llafur*, Vol. 8, No. 1 (2000), pp. 69-95.

⁷¹ Gordon Roderick, 'Educating the Worker: The Mechanics' Institute Movement in South Wales', *Transactions of the Honourable Society of Cymmrodorion*, (1991), pp. 161-74; Gordon Roderick, 'Technical Education, the Performance of South Wales Industrialists and the Haldane Commission', *Journal of Educational Administration and History*, Vol. 39, No. 2, (Aug., 2007), pp. 193-208; Gordon Roderick & Michael D. Stephens, 'The Influence of Welsh Culture in Scientific and Technical Education in Wales in the Nineteenth Century', *Transactions of the Honourable Society of Cymmrodorion*, (1981), pp. 99-108; Percy Miles, *Ebbw Vale Literary & Scientific Institute: A Hundred Years of Endeavour, 1849-1949* (Pontypool, [1949]), pp. 10-12, 26. See also John Laurent, 'Science, Society and Politics in Late Nineteenth-Century England: A Further Look at Mechanics' Institutes', *Social Studies of Science*, Vol. 14, No. 4 (Nov., 1984), pp. 585-619. There are, though, a whole other range of informal and formal means of educating the working class which have yet to find their historians. The Gilchrist Lectures, for example, held through South Wales included regular public lectures on mining and geology. Conducted by eminent academics, the lectures covered topics such as 'The Building of the Earth's Crust' and 'Coal and Coalfields'; *Pontypridd Chronicle*, 18 December 1891.

⁷² John Davies, 'Secondary Education and Social Change in Rhondda (1870-1923)', in K. S. Hopkins (ed.), *Rhondda: Past and Future* (Rhondda, [1975]), pp. 170-1.

⁷³ Burge, 'Miners' Learning', p. 85.

The implications of the centrality of the coal industry to Britain's economy, however, have yet to be fully analysed. Coal's economic significance shaped attitudes to the coal producing regions of Britain. There was a high level of insecurity about the possible loss of the industry. As early as 1822, W. D. Conybeare noted that, 'Should our coal mines ever be exhausted ... it need not be said that the effect produced on private and domestic comfort would be equally fatal with the diminution of public wealth; we should lose many of the advantages of our high civilization'.⁷⁴ Over a hundred years later T.J Parry-Jones was able to state: 'The fact is irrefutable and indisputable that this is the industry that has made it possible to build this wonderful empire of ours.'⁷⁵ It was coal which literally as well as metaphorically fuelled Britain's expansion as an industrial and imperial power. The binding of the coal industry to Britain's international status and the central importance of Wales to the export trade shaped the attitudes therefore not just of the workers, as the 1917 Royal Commission suggested, but also the owners and the state and therefore of social and industrial relations generally.⁷⁶

There were complaints in the interwar period about a new generation of mine managers, men who had certificates but no real practical experience of work in mines and who were therefore not able to adapt the theories to the varying conditions actually encountered. There was resentment at the devaluing of the knowledge of the miners, especially as increasing mechanisation was already undermining their status.⁷⁷ 'Colliery-owners,' Parry-Jones complained, 'have been too ready to under-estimate the value of mining knowledge possessed by a large number of supposed uneducated and illiterate old miners'.⁷⁸ Twentieth century industrial relations especially then need to be assessed in the light of the growing struggle over

⁷⁴ W. D. Conybeare & William Phillips, *Outlines of the Geology of England and Wales* (London, 1822), p. 234.

⁷⁵ T. J. Parry Jones, *The Other Story of Coal* (London, 1925), p. 45.

⁷⁶ The 1917 Report blamed the highly restless nature of the Welsh mining workforce on a too inflated opinion of their own importance; PP, HC, 1917-18 Cd. 8668, *Reports of the Commission of Enquiry into Industrial Unrest: No. 7 Division, Wales and Monmouthshire*, p. 21.

⁷⁷ Boyns, 'Technological Change and Colliery Explosions'.

⁷⁸ Parry Jones, *The Other Story of Coal*, pp. 57 & 68.

which knowledge, academic or experiential, was superior and best for the South Wales coal industry.

But there is more that could and possibly should be understood about the role of geology both as environment and as a discipline in Welsh life. So fundamental indeed was an understanding of geology to the way people viewed the world in which they lived that Thomas Bevan was able to write in 1928 that the general character of Glamorgan was so well known it needed no explanation.⁷⁹ A scan of the primary sources also provides evidence of widespread curiosity about mining and via that about geology. There are references in various sources to special day trips for interested individuals. Members of the Cardiff Naturalists' Society enjoyed a visit to Cymmer Colliery in 1883, and groups of school teachers from Liverpool and elsewhere obviously used the nineteenth century equivalent of 'inset' days to learn more about the coal industry and the geology of the coalfield with pit tours.⁸⁰ Public outings to pits such as these were so popular that one was used as plot device in a novel by Joseph Keating.⁸¹

There must also surely have also been a degree of curiosity amongst those working underground. Certainly there was a fascination with fossils. Willie Paget spent his break times looking for fossils in loose pebbles underground.⁸² Bert Coombes would trace by the light of his lamp the 'exquisite designs of fern leaves impressed on pieces of fallen roof' and he was fascinated by 'a perfect figure of a stone snake with a lifted head [which] seemed to indicate the way to our new working'. For Coombes, such images inspired reverence, 'a deeper and more silencing feeling than the greatest earthly cathedral can give'.⁸³ Encountering the earth

⁷⁹ Thomas Bevan, 'The Industrial Development of the Llynfi, Ogmore and Garw Valleys: with special reference to transport facilities in the area' (Unpubl. MA (Econ.) Thesis, University of Wales, 1928), p. 11.

⁸⁰ *Cardiff Naturalists' Society Transactions*, Vol. 15 (1883), p. 40; *Pontypridd Chronicle*, 4 September 1891.

⁸¹ Joseph Keating, *Son of Judith: a tale of the Welsh mining valleys* (London, 1900). See also Hywel Teifi Edwards, 'The Welsh Collier as Hero: 1850-1950', *Welsh Writing in English*, Vol. 2 (1996), pp. 22-48

⁸² Paget (ed.), *Man of the Valleys*, p. 82.

⁸³ B. L. Coombes, *Those Clouded Hills* (London, 1944), p. 4.

this way must surely have shaped an individual's sense of the world and their place within it, yet we know so little of this and its implication for social relations.

But geology played a role in the lives of the South Wales communities beyond the pits. It was not just that the landscape imposed physical limitations on the way housing for example was developed but there was a corresponding increase in the use of geological evidence to support appeals for social improvement, especially in relation to water supplies during the late nineteenth century debate over wells versus reservoirs.⁸⁴ William Williams, Medical Officer for Glamorgan, included in his *Sanitary Survey of Glamorgan 1895* an extended discussion of the geology of the coalfield and especially the impact of mining on the water tables.⁸⁵ Increasingly, it seems, political arguments and social theory were grounded in and dependent on geological perspectives.⁸⁶

If so, this raises other questions. How, for example, did a Nonconformist society negotiate the impact of geological insights on a belief in creation? The evidence for many of the scientific developments was after all coming from beneath the feet of one of the most self-consciously religious regions of the United Kingdom. Debates were widespread: an ongoing discussion on evolution was conducted by the Cardiff Naturalists' Society throughout the 1870s. What did these developments mean for Welsh religion? Were religion and science in a constant state of conflict or did they exist side by side in an uneasy state of truce? The evidence suggests that for many people there was a careful negotiation between the two. A handbook produced for the instruction of boys leaving school for the pit by Henry Davies is a curious mix of practical manual, scientific instruction and didactic devotional - images of prehistoric fossils sit alongside

⁸⁴ Richard Coopey & Owen Roberts, 'Public Utility or Private Enterprise? Water and Health in the Nineteenth and Twentieth Centuries,' in Anne Borsay (ed.), *Medicine in Wales c. 1800-2000: Public Service or Private Commodity?* (Cardiff, 2003), pp. 21-39; John Wyn Pritchard, 'Water Supply in Welsh Towns, 1840-1900: Control, Conflict and Development', *Welsh History Review*, Vol. 21, No. 1 (June, 2002), pp. 24-47.

⁸⁵ William Williams, *A Sanitary Survey of Glamorganshire* (Cardiff, 1895).

⁸⁶ Sir R. A. S. Redmayne, *The British Coal-mining Industry During the War* (Oxford, 1923), p. 142.

stories about the saving power of prayer.⁸⁷ There is also some evidence that geological perspectives fed into the theology of the period, but not how this then fed back into the wider life of the society as a whole.⁸⁸ And what were the implications for the cultural life of the country? In 1893 first prize at the National Eisteddfod was shared by two Congregational ministers for essays on Darwinian evolution.⁸⁹ But how else were cultural pursuits, literature and art, affected?⁹⁰ Understanding the physical environment may offer another context in which to place human achievement. By revealing the physical forces circumscribing human behaviour it may provide a new perspective from which to evaluate that behaviour. But historians may also need to consider the ways in which the environment was viewed by contemporaries, as well as question who possessed knowledge about that environment, what form that knowledge took, and how that knowledge was used.

There are other things historians perhaps can gain by taking a closer look at geology especially at how modern research is conducted. Earth scientists have been quick to adopt new techniques for visualizing and interpreting both the present and the past landscape. Peter Brabham, for instance, has used modern mapping and modelling techniques to recover something of the lost industrial landscape of the Rhondda.⁹¹ The techniques offer a means of representing and communicating the past to contemporary audiences which could possibly be profitably exploited by Welsh historians, who have, it could be argued, become partially

⁸⁷ Henry Davies, *Coal Mining: a reader for primary schools and evening continuation classes* (Cardiff, 1904).

⁸⁸ For a brief discussion of the impact of contemporary scientific thought on late nineteenth century Welsh theology see R. Tudur Jones, *Faith and the Crisis of a Nation: Wales 1890-1914* (Cardiff, 2004), especially pp. 210-16.

⁸⁹ Robert Pope, *Seeking God's Kingdom: The Nonconformist Social Gospel in Wales, 1906-1939* (Cardiff, 1999), p. 7.

⁹⁰ See the work of Huw Menai, for example, and especially his poem 'The Geologist' in which he sees geology as a record of 'the infinite biography of God'; Huw Menai, *Through the Upcast Shaft* (London, [pref. 1920]), p. 30.

⁹¹ P. J. Brabham, 'The Rhondda Valleys: using GIS to visualize a variety of geological issues in an intensely mined area', in Douglas Nichol, Michael G. Bassett & Valerie K. Deisler (eds.), *Urban Geology in Wales* (Cardiff, 2004), pp. 222-233; P. J. Brabham, 'The Rhondda Valleys: using GIS to visualize the rise and fall of coal mining and its industrial legacy', in Michael G. Bassett, Valerie K. Deisler & Douglas Nichol (eds.), *Urban Geology in Wales: Vol. 2* (Cardiff, 2005), pp. 193-204.

alienated from a sense of the landscape. Visualization techniques will be discussed more fully in the next chapter, but here it is necessary to point out that this loss of contact with the industry and the concentration instead on diversity of experience has had consequences for the understanding of the physical environment. Most of the dramas described by historians are played out against an indistinct backdrop of hills and valleys but are more usually set within a man-made environment. Coalfield communities are sometimes allowed out to play an identity-symbolic sport or to hold a class-significant mountain-top protest or, just occasionally, are sent on chapel outings to terrorise the 'lowlanders', in the coastal towns. But mostly they are hermetically sealed from the physical world in which they live, work and play. And the restrictions on their behaviour are those imposed by gender or class or ethnic identity not those of landscape, location and geology. In the historiography, the land and its people have become alienated from each other and possibly the history has possibly suffered as a result.

Furthermore, Welsh historians have often struggled with a way of conceiving and organising the history of the coalfield, treating it in turn as a political entity, a cultural entity or a geographic entity. These have, however, created problems. The key issue is the homogeneity of the South Wales coalfield.⁹² There have been complaints that the experience of the Rhondda has too often been seen as typical of the coalfield as a whole and that regions such as the anthracite area have consequently been neglected.⁹³ The image of Wales as a mono-industrial, mono-culture has been challenged and there have been a number of individual community studies, such as that on Senghennydd by Michael Lieven.⁹⁴ There is a danger though that the history of South Wales is so fracturing that it is no longer possible to talk of coalfield society at all. Seeing the South Wales coalfield as a geological entity, acknowledging the variations and

⁹² See for example: Nina Fishman, 'A comment on "Working-class culture and the Labour Movement in the South Wales and the Ruhr Coalfields, 1850-2000: a comparison" – by Stefan Berger', *Llafur*, Vol. 8, No. 3 (2002), pp. 107-15; Mike Lieven, 'Senghenydd and the Historiography of the South Wales Coalfield', *Morgannwg*, Vol. 43 (1999), pp. 8-35.

⁹³ For a discussion of this neglect and an attempt to rectify it see Ioan Aled Matthews, 'The World of the Anthracite Miner' (Unpubl. PhD, UWC, 1995).

⁹⁴ Michael Lieven, *Senghennydd: the Universal Pit Village, 1890-1930* (Llandysul, 1994).

distinctiveness of the regions while recognizing the shared characteristics which bound the regions together, may offer a new approach and a new way to organize historical research.

As noted earlier, it is important not to exaggerate the extent to which historians have been ignorant of the importance of the geological structure of the coalfield to the development of the coal industry. But it could still be argued that Welsh historiography has moved away from looking at the coal industry and consequently appears to have lost some sense of the physical context in which historical action took place. Moreover, even when geology's role has been acknowledged it has been primarily in relation to its economic consequences. Research on the impact of geology on industrial relations is underdeveloped and the role of geological understanding on the social, religious and cultural life of Wales has been neglected. Perhaps it is time to go back out into the field with the earth scientists and reacquaint ourselves with the world in which the people of the past lived, worked and died.

CHAPTER TWO

GIS and History

This section will provide an introduction to Geographic Information Systems (GIS). It will explain briefly what GIS are, then look at the broad challenges they present to history as: a computer technology, a geographic tool, and a visualization technique. It will then look in contrast at some of the potential GIS offer to historical research by an overview of recent historical GIS projects.

Introduction to GIS: Definitions

There is no universally recognised or standard definition of what GIS are. As Longley, Goodchild, Maguire and Rhind have emphasised, there are a variety of definitions for different audiences, depending on what they are likely to require. For Longley *et al* a GIS is 'a computerized tool for solving geographic problems'; it is 'a mechanized inventory of geographically distributed features and facilities'; 'a tool for revealing what is otherwise invisible in geographic information'; 'a tool for performing operations on geographic data that are too tedious or expensive or inaccurate if performed by hand'.¹ John Pickles likewise emphasises the point that the term 'GIS' refers to several distinct types of object: a research community that transcends disciplinary boundaries; an approach to geographical inquiry and spatial data handling; a series of technologies for collecting, manipulating, and representing spatial information; a way of thinking about spatial data; a commodified object that has monetary potential and value; a technical tool that has strategic value.²

Elsewhere GIS have been described as 'computers systems whose main purpose is to store, manipulate, analyse and present information about geographic space'.³ And again, GIS are

¹ Paul A. Longley, Michael F. Goodchild, David J. Maguire & David W. Rhind, *Geographic Information Systems and Science* 2nd ed. (Chichester, 2005), p. 16.

² John Pickles, 'Representations in an Electronic Age: geography, GIS, and democracy', in John Pickles (ed.), *Ground Truth: the social implications of geographic information systems* (New York/London, 1995), p. 3.

³ David Wheatley & Mark Gillings, *Spatial Technology and Archaeology: the archaeological applications of GIS* (London, 2002), p. 9.

'computer based methodologies for processing geographical data'.⁴ Other definitions draw special attention to the fact that GIS do not just map place but also information about place. 'GIS is computer software that links geographic information (where things are) with descriptive information (what things are). Unlike a flat papermap, where "what you see is what you get," a GIS can present many layers of different information.'⁵ Similarly,

A geographic information system (GIS) software package is basically a computer program designed to make a computer think that it's a map. ... The difference between a paper map and a GIS map is that the latter exhibits "intelligence." You can ask it a question and get an answer.⁶

Possibly the most succinct and, for non-GIS users, the most meaningful definition is that provided by Ian Gregory. Gregory defines a GIS as a 'spatially-referenced database', drawing attention to the unique feature of GIS which is the relationship between the database and the mapping function.⁷

As a database a GIS allows the storing of an almost limitless range of information about a location (where an object is or a phenomenon occurs) as well as information about its characteristics (its attributes, what type of object or what kind of event). It also allows a variety of spatial questions and analysis to be conducted on that data. Phenomenal or attribute queries, for example, can be used to identify sites that have a shared characteristic. Topological queries can identify relationships between objects: all sites that are within x county. Distance queries ask something about the spatial location of objects: all sites within 100 kilometres of x. It then displays the answers in map form. A GIS can also create new features from areas of overlap, such as areas with high rainfall, a set level of elevation and a particular type of soil. That is they allow the identification of areas which meet certain criteria and allow the creation of new features from this data.

⁴ Atsuyuki Okabe, 'Introduction', in Atsuyuki Okabe (ed.), *GIS-Based Studies in the Humanities and Social Sciences* (Boca Raton, FL, 2006), p. 2.

⁵ ESRI White Paper: 'Geography Matters', (Oct., 2008), p. 1, <http://www.gisday.com/cd2009/whitepapers/geography-matters.pdf> [accessed 21 February 2009].

⁶ Michael Kennedy, *Introducing Geographic Information Systems with ArcGIS* • 2nd Ed. (Hoboken, New Jersey, 2009), p. xli.

⁷ Ian Gregory *A Place in History: a guide to using GIS in historical research* (2nd ed.), <http://www.ccsr.ac.uk/methods/publications/ig-gis.pdf> [accessed 12 June 2007], p. 11.

As a mapping tool a GIS builds a map by combining layers or collections of geographic objects that are alike.⁸ Vector maps divide space into discrete features, primarily polygons, lines and points. Polygons are used to represent things large enough to have boundaries, such as countries, lakes, or fields. Lines represent things that are too narrow to be polygons, usually things where the length is more significant than breadth, as with rivers, roads and railway lines. Points are used for things too small to be polygons, such as cities or schools, although this depends on the scale of the map being drawn – all of these could be represented by polygons if they are being looked at in detail within a small enough area. Choropleth maps are created by displaying polygons using different colours or shading proportional to an attribute value. In proportional symbol maps the symbols are scaled in proportion to the magnitude of the attribute value of features, while dot maps use sets of points with each point representing the place of an event.

A GIS makes use of a variety of mapping images. Raster images are a way of representing the earth's surface by subdividing it into identical sized square cells (pixels), which contain measurable values for any given location on the earth's surface. Raster images are used to display phenomena such as elevation, slope, temperature, rainfall which have no distinct shape but often need to be mapped. Geographic phenomena like these are much easier and better represented as continuous surfaces rather than as features. Each cell represents a unit of surface area, say for example ten square metres, and contains a measured or estimated value for that location. The flexibility of GIS in representation allows features to be displayed at different levels, sizes and scales.

The History of GIS

GIS was developed in the 1960s and 1970s as a result of a number of ventures designed to exploit the emerging computer capabilities particularly in the USA and Canada. The development of automated cartographic procedures in the USA was motivated by the need to create a variety of maps quickly and cheaply. It was especially hoped that through the

⁸ This section contains a very brief summary of the key features of a GIS. For a good, simple introduction to GIS see Ian Gregory, *A Place in History: a guide to using GIS in historical research* (2nd ed.), <http://www.ccsr.ac.uk/methods/publications/ig-gis.pdf> [accessed 12 June 2007].

creation of digital street maps, the capability of computers could be exploited to aid census collection by allowing the automatic referencing and aggregation of census records. During the same period, the first widely recognised GIS was being developed in Canada, in response to a Government plan to map land resources and identify current land use. In the UK too there were developments. In 1973 the Experimental Cartography Unit (ECU), which had been pioneering high quality mapping, published the world's first computer made map with the British Geological Society. Advances in computer technology in the 1970s and 1980s together with a growing demand for computerised technology led to the spread of private software companies and the emergence of ESRI (Environmental Systems Research Institute) as market leaders. However, it was not until the widespread availability of personal computers and the launch of new user-friendly software compatible with PCs that GIS began to reach a wider audience.⁹

The capabilities are broad and the use of GIS is increasingly pervasive. They are present in a whole range of social and political, economic and military contexts. Their flexibility means that they are used in a variety of ways, from land use analysis to banking and insurance, from environmental management schemes to the locating and development of energy reserves, from the planning of landfill sites or schools and hospitals to crime pattern analysis, civil defence, transport, and communication. They have also been increasingly adopted by a number of academic disciplines: geography, earth sciences, archaeology, and sociology. But it is only comparatively recently that they have begun to be used in history. Indeed, they are a fairly new arrival in historical research even in the USA where their use is more generally well established. As of 2008 only three graduate programmes in history in American universities allowed PhD students to satisfy the degree skills requirement with GIS.¹⁰

⁹ For slightly fuller accounts see Ian N. Gregory & Paul S. Ell, *Historical GIS: Technologies, Methodologies and Scholarship* (Cambridge, 2007), pp, 12-13 & Longley et al, *Geographic Information Systems and Science*, p. 17. There has been a recent increase in the interest in the history of the development of GIS and a wide number of new publications have provided detailed accounts, as a simple internet keyword search will demonstrate.

¹⁰ Ann Kelly Knowles, 'GIS and History,' in Anne Kelly Knowles (ed.), *Placing History: How Maps, Spatial Data, and GIS are Changing Historical Scholarship* (Redlands, Cal., 2008), p. 18.

The first ever Historical GIS Conference held in Europe was held at the University of Essex, UK, in August 2008. The conference attracted 124 participants from eighteen different countries. It was interesting that only two fifths of participants came from the UK. Just under a third came from twelve other European countries, a fifth came from North America, and the remainder came from Japan, Malaysia and New Zealand. In all 76 papers were presented on topics ranging from technical and infrastructural issues (such as databases, gazetteers and user interfaces) to a variety of applied research on topics as diverse as transport history, art and literature, urban studies, environmental and agricultural history, historical demography, and regional studies. But only seven of the delegates present came from UK history departments.

There are a number of reasons why GIS have not as yet been embraced by historians and incorporated into history in the same way as other disciplines, some of which are practical, some conceptual. These issues will be considered in detail before a closer look is taken at some of the historical studies that have been produced and what they reveal of the potential of GIS for aiding historical research.

Computers, GIS and History

The first barrier to the widespread adoption of GIS by historians has perhaps been the fact that it is a computer technology. While computers are increasingly ubiquitous in historical research, they tend to be used primarily as a word processing tool or for internet access to online databases. There has been, and to some extent, remains a degree of indifference to their potential for more detailed examination of sources. The early enthusiasm and optimism about computer technology shown by Annales historians and others did not lead to any permanent or fundamental changes to historical research methodology and it remains the case that relatively few historians make use of software like Microsoft Access or Excel for statistical analysis. One consequence of this is there is little teaching of computer skills within humanities subjects at undergraduate level and few opportunities for full time academics to develop their knowledge of available software.

Perhaps too the definitional fuzziness of GIS militates against its ready adoption by historians. There is no consistent, simple answer to the question, 'what is GIS?'. The wide variety of definitions quoted at the beginning of this chapter is just a small sample of the definitions to be found in the literature, each one emphasising a different dimension or function of the software. GIS can therefore appear impenetrably complex or difficult to pin down – indeed whether GIS should be regarded as an 'it' or a 'they' seems to be unclear. But even this vagueness is not nearly as daunting as the sheer volume of material that has been written for and about GIS use.

There has in recent years been an endless stream of new guides, 'how-to's' and manuals for GIS, the speed of technological change rendering many obsolete almost as soon as they are published.¹¹ There is also a wide range of guides aimed at specific groups of users or particular user issues, such as map design.¹² But such manuals are often written for the commercial market, so the examples do not always have an immediate or obvious application in history. Plus, even the most basic guides are necessarily jargon heavy requiring the GIS learner to acquire a whole new vocabulary. The scene is further crowded by the development of what has come to be known as GIScience, that is the study of the theoretical issues underpinning the use of GIS (as distinct from GISystems which is use of the software itself). Key issues of concern to GIScience include the study of uncertainty and error propagation and related issues which have become recognised branches of study.¹³

Moreover, GIS has also been at times a controversial tool even within those disciplines which have more readily embraced its use and this again has generated a wealth of literature. The seminal collection of essays contained in *Ground Truth*, for example, highlighted some of the social, political and ethical implications of the use of GIS in

¹¹ See, for example, Michael Kennedy, *Introducing Geographic Information Systems with ArcGIS* • 2nd Ed. (Hoboken, New Jersey, 2009).

¹² For example Cynthia Brewer, *Designing Better Maps* (Redlands, Cal., 2005); Andy Mitchell, *The ESRI Guide to GIS Analysis – Volume 1: Geographic Patterns & Relationships* (Redlands, Cal., 1999).; Andy Mitchell, *The ESRI Guide to GIS Analysis – Volume 2: Spatial Measurements & Statistics* (Redlands, Cal., 2005).

¹³ There are a number of journals which deal extensively with GIScience, including *Cartographica* and *Cartography and GIS*.

contemporary society and sparked off a whole series of debates, counterarguments and revisions which found their way into countless journals, monographs and textbooks.¹⁴ More recently there has been increasing awareness of the gender bias of the tool, an issue addressed by Nadine Schuurman, among others. A more recent article suggests there has been some progress in countering this tendency but the discussion goes on.¹⁵ The atmosphere of debate hardly creates an inviting environment for the 'outsider'. It could of course be argued that it is not important for historians to be aware of every and all the arguments; debates about the depersonalising effect of GIS use in warfare or the exploitation of data by corporate businesses, which while of concern in the contemporary world are hardly relevant to the uses historians are likely to make of the technology. But how do (or even why would) historians, with no experience or background in the technology, plough through all the computer-speak and baffling acronyms which characterise much GIS-writing, to decide what is useful and relevant in the first place?

The alternative to grappling directly with the technology and the attendant conceptual difficulties, that of adopting collaborative approaches, is hardly any more appealing to historians used to the solitary nature of archival research. Since GIS is more than just map-producing software, collaboration involves more than simply replacing the specialist cartographers familiar to historians with GIS specialists. The technology itself shapes what questions can be asked and limits the way in which the questions can be answered. This in turn raises the question of control, of who and what the technology is for. Moreover, Michael Curry has pointed out that as technology becomes more complex it is increasingly difficult, if not impossible, for any one user to truly understand the nature of any one system. There is thus an 'element of faith' in the use of computer technology.¹⁶ Many

¹⁴ Pickles (ed.), *Ground Truth*; John Pickles, 'Commentary: *Ground Truth* 1995-2005', *Transactions in GIS*, Vol. 10, No. 5 (2006), pp. 763-72; Michael F. Goodchild, 'GIScience Ten Years After *Ground Truth*', *Transactions in GIS*, Vol. 10, No. 5 (2006), pp. 687-92.

¹⁵ Nadine Schuurman, *GIS: a short introduction* (Oxford, 2004), pp. 159-170; Sara McLafferty, 'Women and GIS: Geospatial Technologies and Feminist Geographies', *Cartographica*, Vol. 40, Issue 4 (Winter, 2005), pp. 37-45; Mei-Po Kwan, 'Feminist Visualization: re-envisioning GIS as a method in feminist geographic research,' *Annals of the Association of American Geographers*, Vol. 92, No. 4 (Dec., 2002), pp. 645-61.

¹⁶ Michael R. Curry, 'Geographic Information Systems and the Inevitability of Ethical Inconsistency', in Pickles (ed.), *Ground Truth*, p. 76.

historians may be unwilling to place their subjects in the hands of others much less take that step of faith.

The complexity of GIS may also make some historians suspicious of the role technology is beginning to play in dictating the avenues of research that are appropriate and feasible. Due to the time, and especially the cost, involved in creating them, datasets need to be as accessible as possible to the largest audience. This means that data have to be adapted to make the evidence as flexible as possible to cope with the different functionality of computers rather than produced in a format most appropriate for their use and interpretation. It is possible that the study of those issues most amenable to computerization will be prioritised while others subjects may be limited because of difficulties with data handling. Moreover, the cost of technology and software development potentially seriously threatens to compromise the research agenda. David Staley has found that 'history' projects, particularly those which employ gaming technology, tend to, for financial reasons, prioritise the entertainment element, resulting in a 'dumbed down' version of the past for the non-specialist.¹⁷ In the US, so much of the adoption of GIS within historical research is driven more by the contemporary economic and political environment than by research imperatives arising from within the discipline itself.¹⁸ That is, the need to provide history graduates with a wider range of attractive transferable skills, to maintain the profile of the discipline within the university environment and to ensure continued funding is dictating the direction of developments rather than the natural requirements of the discipline.

Poor technical training and concerns over the limitations imposed by technology are, of course, not exclusive to historians but there are other reasons why GIS might have less appeal for those engaged in historical research. The historian who decides to exploit GIS is met first by the prospect of developing a database and this in itself can cause problems. In

¹⁷ David Staley, *Computers, Visualization, and History: How New Technology Will Transform Our Understanding of the Past* (New York, 2003), pp. 110-111. See also Brian Rejack, 'Toward a Virtual Reenactment of History: Video games and the recreation of the past', *Rethinking History*, Vol. 11, No. 3 (Sept., 2007), pp. 411-425.

¹⁸ Although it is ironic that this PhD and involvement with GIS only came about as a result of a funding opportunity.

most disciplines which utilize GIS technology, the data analysed is specifically created to answer a specific question. It is designed to be compatible with the software and it can usually be supplemented or expanded quite easily. The historian, however, is dependent on a fixed, finite set of sources, created in the past, often in widely varying formats and containing data which was collected in very different contexts and for very different purposes to the one the historian wishes to use it for. The immediate consequence of all this is that historical data has to be categorised and standardized in order to make it suitable for use in a GIS database, which can cause serious concerns.

Firstly, the types of experiences historians are interested in are more frequently qualitative than quantitative. The database structure of GIS demands that the historian makes concrete and precise information that is amorphous and uncertain. It is of course possible to quantify or at least classify qualitative experiences but GIS offers limited interpretative capability. If there are too many categories, maps become confusing and unreadable; too few and they lose sensitivity rendering the results meaningless. This imposes difficulties with the kind of linear storytelling and embracing of ambiguity which historians are familiar with. Secondly, even with quantitative data the process of standardizing disparate pieces of evidence can be complicated and potentially involve a great deal of fudging. If the data are manipulated too much to conform to a database, the image on which conclusions are ultimately based can be several steps removed from the original evidence. This potentially seriously undermines the validity of any conclusion. Moreover, there is the danger that all the various processes of tweaking, shaping and normalizing of the data, is done automatically and unconsciously, so that potential problems may not be recognized.¹⁹

The time consuming nature of projects is another mark against GIS, since it can be significant from both a practical and funding perspective. The amount of time involved with the collection of data is especially problematic. Anne Kelly Knowles has suggested, as a rule of thumb, that almost 95% of the effort associated with any GIS research comes in the

¹⁹ Howard Veregin, 'Computer Innovation and Adoption in Geography: a critique of conventional technological models', in Pickles (ed.), *Ground Truth*, pp. 97-98.

preparation of a suitable database.²⁰ The ready availability of suitable datasets is one of the greatest restrictions and expenses associated with the application of GIS analysis to history. There is a wealth of information in the decennial censuses, for example, but the data are not necessarily aggregated at a level useful to research.²¹ Moreover, boundary changes make comparisons over time problematic and therefore the data requires further manipulation to allow analysis of change.²² In fact, the creation of usable datasets is so time consuming that there are increasing calls from some quarters for their creation to be recognised as research projects in themselves.²³

There is also considerably less flexibility within a database to carry out one of the most fundamental practices in historical research, that is, the referencing of source material. The need to keep the process of selection and analysis of data transparent is essential in history, since the interpretation of data is dependent on who produced it, for whom and for what purpose. GIS does offer the possibility of storing 'metadata' – good metadata includes information about when the data was collected, the time period it covers, what scale the data are applicable to and so on – and increasing emphasis is being placed in GIS literature on its importance.²⁴ But despite developments, this remains very different to the type of footnoting historians are used to. Since databases are often an agglomeration of multiple sources, the close link between data and their sources is can be lost and trust in the quality of data and argument is undermined. In a sense, while GIS allows many researchers, archaeologists, for instance, to do what they have always done only on a larger scale and more efficiently, it actually presents to historians a series of obstacles which interfere with and hinder traditional history practice.

Geography and History

Another key problem with GIS for historians is the fact that it is primarily a geographic tool, not a temporal one. Since Gail Langran's seminal 1993 study a huge amount of attention

²⁰ Anne Kelly Knowles, 'Introduction', *Social Science History*, Vol. 24, No. 3 (Fall, 2000), p. 463.

²¹ The most frequent geographic area used is the county but this is too large for more local studies.

²² Ian N. Gregory, 'Time-variant GIS databases of changing historical administrative boundaries: a European comparison', *Transactions in GIS*, Vol. 6, No. 2 (2002), pp. 161-78.

²³ Ian Gregory, HGIS Conference, August 2008.

²⁴ Schuurman, *GIS: a short introduction*, p. 66.

has been paid to the question of time in GIS, especially since 2000.²⁵ Various innovative ways of overcoming some of the problems have been developed by historical geographers, particularly Ian Gregory and Paul Ell whose work on handling the shifting administrative boundaries for use with census data has been particularly fruitful.²⁶ But as yet little real progress has been made in terms of the software itself. Indeed, in an essay published in September 2008 by ESRI, one of the leading GIS software producers, historian Jack Owens was still calling for more 'distinctly temporal forms of GIS' in order for it to be fully incorporated into historical research.²⁷ The priority of GIS, therefore, remains geographic; that is, its primary focus is on change through space over time, rather than change over time through space.

The fact that GIS are essentially a geographic analysis tool raises more fundamental questions about the relationship between geography and history. The two disciplines, historically, have been closely linked. Indeed, in France, due to the influence of the *Annales* historians, geography has effectively been absorbed by history as an integral part of the research approach. However, elsewhere, as Bennett and Earle noted, 'Geography and history, although natural companions, have as often traveled as strangers.'²⁸ As the twentieth century progressed there was a widening separation of the disciplines, geography increasingly seen, if a little simplistically, as the study of 'where' and 'how', leaving history to deal with the 'when' and 'why'. Geographers came to be concerned with questions

²⁵ Gail Langran, *Time in Geographic Information Systems* (London, 1993). Also, Donna J. Peuquet, 'It's about Time: a conceptual framework for the representation of temporal dynamics in Geographic Information Systems', *Annals of the Association of American Geographers*, Vol. 84, No. 3 (Sept., 1994), pp. 441-61. For a discussion of some of the reasons for the failure of GIS to date to handle time well see David O'Sullivan, 'Geographical Information Science: Time Changes Everything', *Progress in Human Geography*, Vol. 29, No. 6 (2005), pp. 749-756.

²⁶ Ian N. Gregory & Paul S. Ell, 'Analyzing spatiotemporal change by use of national historical Geographical Information Systems', *Historical Methods*, Vol. 38, No. 4 (Fall, 2005), pp. 149-67.

²⁷ J. B. Owens, 'What Historians Want from GIS', in *Essays on Geography and GIS*, <http://www.esri.com/library/bestpractices/essays-on-geography-gis.pdf> [accessed 1 November 2009].

²⁸ Sari Bennett & Carville Earle, 'The Geography of Strikes in the United States, 1881-1894', *Journal of Interdisciplinary History*, Vol. 13, No. 1 (Summer, 1982), p. 83.

connected with the landscape and its development, such as town growth, while historians were interested in the people who shaped that landscape.²⁹

Time and space, of course, remain important to both disciplines but the balance between the two is significantly different. This difference is illustrated most clearly by recent debates amongst historical geographers about the nature of historical geography, which has inevitably involved close analysis of the conceptual and methodological DNA of its parent disciplines, history and geography. Guelke, for example, defines history as the study of the human past, seeing at its core the exploration and explanation of people-people interactions. Geography, he suggests in contrast, is essentially the study of people-environment interactions. He questions whether it is possible to fully explore people-people relationships in a way which also acknowledge the importance of people-environment interactions, and vice versa. Moreover, he asks, is it possible to fully engage with the problems of historical knowledge and questions of the meaning in history while remaining sensitive to ideas about spatial relationships and situated development? Guelke suggests that it may be possible but that both historical geographers and geographically inclined historians have failed to do so.³⁰ As Alan Baker has argued, the geography in *Annales'* history is a simplified version, reduced to a discussion of spatial relationships rather than a consideration of more complex environmental considerations.³¹ Historical geography remains essentially the geography of the past, 'tell[ing] us stories about how *places* have been created in the past by people in their own image, while historians tell us different stories about how *periods* have been created in the past by people in their own image'.³²

The differences between the priorities of history and historical geography or geography can be illustrated further by a look at the work of one important Welsh geographer, Philip N.

²⁹ Harold Carter, 'Phases of Town Growth in Wales', in H. J. Dyos (ed.), *The Study of Urban History* (London, 1968), pp. 231-252.

³⁰ Leonard Guelke, 'The Relations between Geography and History Reconsidered', *History and Theory*, Vol. 36, No. 2 (May, 1997), pp. 216-234. See also Simon Naylor, 'Historical Geography: Geographies and Historiographies', *Progress in Human Geography*, Vol. 32, No. 2 (2008), pp. 265-74.

³¹ Alan R. H. Baker, *Geography and History: Bridging the Divide* (Cambridge, 2006), p. 24.

³² Baker, *Geography and History*, pp. 3-4.

Jones. In his study of colliery settlements, Jones sought to establish the nature of the relationship between pit and settlement, exploring the question of whether the different types of coal exploitation, that is pit and slant, produced different settlement patterns.³³ Through his research he was able to identify a series of phases which showed coalfield settlements moving away from a close symbiotic relationship with the collieries to communities only loosely tied to the industry in the immediate vicinity and shaped more by the legal requirements of government than by local need. On one level, Jones's geographical approach appears to have much in common with Welsh historiography, since it traces change over time. However, the intention of most geographers, as here with Philip Jones, is to identify patterns of human behaviour in order to create models or even 'laws' that explain change spatially. They often look at the specific experiences of localities in order to identify general trends and do so in order to facilitate present and future developments. Historians, on the other hand, look at the general experience in order to better understand the specific and are concerned about understanding the past on its own terms. Moreover, geographers may answer 'where', 'how' and sometimes 'when', but tell us little of the human 'why' which is usually the most important issue to the historian.

GIS, a geographic tool, is rooted therefore in ideas which are fundamentally different to those underpinning historical research. It lends itself well to demographics or to the study of changing landscapes but even if the focus is on past societies and landscapes, the priorities remain spatial. From the other side it might be argued with David Bodenhamer that, 'A ... significant barrier [to the adoption of GIS], perhaps the largest one, is the absence of spatial questions in history.'³⁴ While it could be argued that all history has a spatial dimension, since everything occurs somewhere, this is not always the most important attribute or even, as far as causal factors are concerned, important at all. If GIS cannot answer historians' questions, then why not simply leave it to the geographers?

³³ Philip N. Jones, *Colliery Settlement in the South Wales Coalfield, 1850-1926* (Hull, 1969).

³⁴ David J. Bodenhamer, 'History and GIS: Implications for the Discipline,' in Knowles (ed.), *Placing History*, p. 228.

Visualization and History

GIS also takes the historian into the unfamiliar world of visualization. Visualization is often fundamental to the sciences, especially earth sciences, as a means of exploring findings as well as communicating the results to others. Any accompanying text explaining the process is often pared to the minimum, as the charts, graphs and maps are intended to be self explanatory. By contrast, history, with the possible exception of economic history, is not traditionally a visual subject: its primary means of communication is the written word. Diagrams, graphs and charts tend to be viewed with suspicion and are often skipped by historians who look to the text for explanation because they are not trained to interpret the images themselves. Although graphs are particularly good at displaying change over time because, like time they are linear and can include multiple strands which can then be compared, many historians would struggle to understand the statistical niceties behind 'coefficient of variation' calculations or recognise immediately the significance of scatter graphs which show positive or negative linear correlations.³⁵ Pat Hudson may be right to suggest that this is linked to a distrust of quantitative approaches, but there may also be a more fundamental preference for the written word.³⁶

Indeed, historians of the modern world have been generally slow to adopt the use of images as sources of information much less as a means of communication. It might be argued that there has been a degree of 'snobbery' towards the use of visual imagery: it is sometimes assumed that the number of pictures in a book is in inverse proportion to the depth of analysis in the text. Peter Burke has pointed out that few journals use images. Even where texts discuss images, he notes, they are usually used to illustrate conclusions the author has already reached by other means, rather than to give new answers or to ask new questions.³⁷ Moreover, as Roy Porter has commented, '[W]hen we do resort to pictures, publishers help by keeping the illustrations at a safe, non-contaminating distance from the body of the text.'

³⁵ For a fuller discussion of the uses of graphs in history see Pat Hudson, *History by Numbers: An Introduction to Quantitative Approaches* (London, 2000), pp. 77-85.

³⁶ For a discussion of the criticism directed against quantitative approaches see Hudson, *History by Numbers*, pp. 40-4.

³⁷ Peter Burke, *Eyewitnessing: the uses of images as historical evidence* (London, 2001), p. 10.

‘Insert too much visual evidence,’ Porter continues, ‘and we commit the solecism of producing a “coffee-table” book.’³⁸

Maps, the main type of visualization created by GIS, bring their own problems. There are a number of ways of depicting change over time using maps such as multiple snapshot maps or maps with thematic symbols to represent temporal change. But most of the methods are clumsy and when manually comparing multiple maps it is difficult to follow changes as one shifts from map to map. Maps in any case tend to simplify and sanitise ‘reality’. Rivers become simply wiggly lines rather than roiling, stinking obstacles to communication or gently babbling brooks in which lovers paddle. Historians paint the world with words – maps seem so plain and limited by contrast.

Potential

Nevertheless, there are a growing number of reasons why historians might fruitfully start adopting a more positive stance in relation to GIS.

Computers

As noted earlier, there has been an expansion in the use of computers within historical research especially in terms of on-line databases and catalogues, so much so that computers are now a normal and automatic part of the research process. The increasing digitisation of primary source material is also opening out the accessibility of previously unavailable or rare sources of data. The Library of Congress has scanned and made available on line millions of images and documents.³⁹ Open access web sites like www.archive.org, sponsored by Microsoft and with contributions from major universities across the globe, for example, have in conjunction with other digitising projects like Project Gutenberg, placed millions of

³⁸ Roy Porter, ‘Review Article: Seeing the Past’, *Past & Present*, No. 118 (Feb., 1988), p. 188; though discussion of visual imagery is increasing, its reproduction and use is still limited – see the recent article by James Thompson, “Pictorial Lies” – Posters and Politics in Britain c. 1880-1914’, *Past & Present*, No. 197 (Nov., 2007), pp. 177-210. The article contains the grand total of four images to thirty pages of text (although it has to be pointed out that this may in part be linked to copyright issues).

³⁹ <http://www.loc.gov/index.html>

out-of-print texts within reach of any interested party and have even provided some for download. Texts often tucked away in archives, or in reference only sections of repositories can now be accessed from the comfort of home or office at the click of a button, rather than at the end of a long (and sometimes expensive) journey.

Especially valuable for research for this thesis have been databases such as the Nineteenth Century Newspapers, provided by ProQuest, and the House of Commons website. Again, almost everything needed in terms of published official records is available at the click of a mouse and available for printing off. Perhaps most usefully the documents are searchable by keyword which allows a greater volume of material to be checked in a considerably shorter period of time. Other web sites, such as www.ancestry.co.uk and the National Archives, are offering on-line access to the British census from 1841 to 1911. In addition, EDINA have been working to make accessible a huge range of historical maps, mainly Ordnance Survey, as well as British Geological Survey maps at several scales.⁴⁰ There is still, though, a wealth of material not yet digitized such as tithe maps, estate maps, older county maps.⁴¹ There has also been a proliferation of online mapping platforms such as Google Maps and Google Earth, Microsoft's Virtual Earth and Wikimapia making the public generally more computer and map savvy. There of course remains the ever-present danger of assumptions about the superior accuracy of computers, but most academics are sufficiently aware of the problems not to take such things at face value.

There are a number of projects worldwide looking at the greater use of IT in the humanities and social sciences and innovative uses of technology and the internet. The research unit of the University of Virginia (IATH) has as a key research objective the development of IT as a tool for scholarly humanities research.⁴² Recently *The American Historical Review* has experimented with opening up its website to provide not only a forum for online academic

⁴⁰ <http://edina.ac.uk/>

⁴¹ It is interesting that there does not appear as yet to have been any study of the impact of new technology on historical research. The sheer volume of material available is creating its own problems, not least the temptation to prioritise more readily accessible digitised material over other sources.

⁴² <http://www.iath.virginia.edu>.

debate, but also an arena for testing new types of electronic projects.⁴³ There has been an increasing using of search-tree structures on web-based projects, offering the opportunity to create more interactive website which allow readers to engage with the evidence as they see fit and to draw their own conclusions.⁴⁴ Such projects allow the presentation of vast quantities of data, not possible in a print versions, which makes the process of interpretation by the historian more transparent as it exposes the logical steps of the argument. The stated aim of Thomas and Ayers' Valley of the Shadow project is 'to open the process of scholarly inquiry, to allow readers not only to confront our argument but also to work with its evidence and its constituent parts'.⁴⁵ Again this approach is not without its problems or its critics. The structure of the websites can make following the arguments difficult, with sections or paragraphs acting more as explanatory notes on the linked primary sources rather than as parts of a coherent, overarching thesis. The freedom promised is also to some extent illusory since the texts are often extracts and in any case preselected. Plus, most seriously, this open approach can lead to chronological fuzziness if the project is not carefully structured, leading to the anachronistic linking of events. But even with these weaknesses, which careful attention to organisation and structure can minimise, they are offering new ways of seeing the past and making it accessible to wider audiences.

Although software and hardware are expensive, within the academic environment the increasing use of GIS across a variety of disciplines has meant that the sharing of equipment can and has lessened costs per department. The use of computers also opens up a whole range of new possibilities for research, for example, via 'collaboratories' which have led to the creation of much more extensive datasets covering greater geographic regions and international research.⁴⁶ Again, the practice is not without its problems – ensuring the quality of datasets, the compatibility of database designs for dataset sharing, metadata, loss

⁴³ Although it is interesting that new has been produced since February 2005; www.indiana.edu/~ahrweb/elec-projects.html [accessed 20 April 2010].

⁴⁴ Knowles, 'GIS and History', p. 5.

⁴⁵ William G. Thomas III & Edward L. Ayers, 'An Overview: The Differences Slavery Made – A Close Analysis of Two American Communities', *The American Historical Review*, Vol. 108, No. 5 (Dec., 2003), p. 1303.

⁴⁶ See for example, Tine de Moor & Jan Luiten van Zanden, 'Do ut Des (I Give So That You Give Back): Collaboratories as a New Method for Scholarly Communication and Cooperation for Global History', *Historical Methods*, Vol. 41, No. 2 (Spring, 2008), pp. 67-78.

of control over material and the potential for others to exploit work without making equal contribution are the main concerns – but with greater use, the conventions and practices can be codified and strengthened. The fact that there are problems should be seen as challenge rather than barrier.

There are not only signs of a changing attitude to the technology but also a closing of the gap between history and geography. There is, for example, a growing awareness of the human experience and perception of landscape over time among geographers and a greater sensitivity to place by historians. Recent studies by historical geographers focus on the way in which ‘seeing’ the landscape has shaped human society within that landscape. In a study of the interwar depression years, Dennis Linehan and Prys Gruffudd, for example, have explored the visual and psychological impact of the physical environment on the unemployed of the South Wales coalfield and the sensitivity of social service groups to these issues.⁴⁷ They have been able thus to present a nuanced analysis of the experience of unemployment as well as providing a more positive assessment of philanthropic activity in the period than has been traditionally offered. At the same, there has been a return to the question of ‘place’ amongst historians: a recent issue of *Urban History* was devoted to many of the issues usually addressed by geographers.⁴⁸ Historians such as Andy Croll and Paul O’Leary have begun to focus on questions of the use of public space.⁴⁹ The historical figures are being returned to the outside world, although it should be recognised that the histories, to use a phrase of Dai Smith’s, are still more an exploration of ‘mindscapes’ than they are of landscapes.⁵⁰

⁴⁷ Dennis Linehan & Prys Gruffudd, ‘Bodies and Souls: psycho-geographical collisions in the South Wales coalfield, 1926-1939’, *Journal of Historical Geography*, Vol. 27, Issue 3 (July, 2001), pp. 377-394.

⁴⁸ Peter Borsay, Louise Miskell & Owen Roberts, ‘Introduction: Wales, a new agenda for urban history’, *Urban History*, Vol. 32, No.1 (2005), pp. 5-16.

⁴⁹ Andy Croll, *Civilizing the Urban: Popular Culture and public space in Merthyr, c. 1870-1914* (Cardiff, 2000); Paul O’Leary, ‘Processions, Power and Public Space: Corpus Christi at Cardiff, 1872-1914’, *Welsh History Review*, Vol. 24, No. 1 (June, 2008), pp. 77-101.

⁵⁰ The phrase is taken from Dai Smith’s article ‘The Valleys: Landscape and Mindscape’ in Prys Morgan (ed.), *Glamorgan County History: Vol. 6 – Glamorgan Society 1780-1980* (Cardiff, 1988), pp. 130-150.

In addition, although the theoretical and conceptual basis for using imagery in history is still in the process of being formalised, there are signs that historians are beginning to take images seriously as a means of understanding the past. The emergence of the histories of mentalities, of everyday life, of material culture, and of the body, has been made possible by the use of a broader range of evidence: images have been placed alongside literary texts and oral testimonies.⁵¹ In particular there has been a growth in the use of photographs as sources of historical evidence.⁵² The South Wales coalfield is particularly well blessed with photographic coverage, as the countless published collections of colliery photographs attest.⁵³ Hundreds of photographs are also available on websites, such as the Rhondda Cynon Taff Libraries Photograph Archive.⁵⁴ The potential for coalfield research is therefore great.⁵⁵ What is more, a new generation of students (future researchers) are coming to the fore who are more used to images as means of communication, having grown up with television and computers. It seems likely therefore that the use of images will increasingly be seen as a natural medium for communication.

In fact, there are some signs that the increasing use of images as sources is beginning to make historians more open to the use of visualization not just as a research tool but also as a communication tool.⁵⁶ Historian David Staley has argued in a recent work on computers and visualization, that text has inherent limitations which restrict how historians think about and communicate their ideas about the past. Prose, he argues, is two dimensional and imposes (unconsciously) two dimensional thinking. Images, however, free the historian from these limitations:

Visualizations are useful models for historical scholarship because of their ability to shape our thoughts, to model more of the multi-dimensionality

⁵¹ Burke, *Eyewitnessing*, p. 9.

⁵² Bonnie Brennen & Hanno Hardt (ed.), *Picturing the Past: media, history and photography* (Chicago, 1999).

⁵³ John Cornwall, *Collieries of South Wales: 1* (Ashbourne: Landmark Publishing, 2001).

⁵⁴ <http://archive.rhondda-cynon-taf.gov.uk/treorchy/index.php>.

⁵⁵ For example Janet Wills Greene, 'Cameras in the Coalfields: Photographs as Evidence for Comparative Coalfield History', in Stefan Berger, Andy Croll & Norman La Porte (eds.), *Towards a Comparative History of Coalfield Societies* (Aldershot, 2005), pp. 65-85.

⁵⁶ For a discussion of the increasing use of visualization techniques in another traditionally non-visual subject, literary criticism, see Franco Moretti, *Graphs, Maps, Trees: Abstract Models for Literary History* (London/New York: Verso, 2007).

of the past, and to clearly communicate this understanding to a scholarly audience.⁵⁷

A GIS, Staley further notes, allows the simultaneous presentation of several variables of primary source information, 'meaning that the display is dense with data, not decoration'.⁵⁸ Moreover the move to using maps is perhaps less of a jump for historians than other types of visualization.⁵⁹ Maps of population density or language distribution are more likely to crop up in history monographs or articles than pie charts or scatter graphs. And maps are in any case a more familiar part of everyday life. GIS puts control of the map in the hands of the historian rather than in those of a specialist cartographer. It is also possible for all those engaged in historical research at whatever level to have access to map-making facilities in a way not previously possible.

Plus, some of the issues surrounding cartography are actually not unfamiliar to historians. Mark Monmonier warns, 'Not only is it easy to lie with maps, it's essential. To portray meaningful relationships for a complex, three-dimensional world on a flat sheet of paper or a video screen, a map must distort reality.'⁶⁰ His caution would hardly shock historians used to the problems of creating a sense of order and logic from a complex mass of often contradictory primary sources. Nor would a group so sensitive to the issue of objectivity be surprised to hear that

[m]aps are never value-free images ... Both in the selectivity of their content and in their signs and styles of representation maps are a way of conceiving, articulating, and structuring the human world which is biased towards, promoted by, and exerts influence upon particular sets of social relations.⁶¹

It is also unlikely that any historian would be unaware of the need to be careful about the way in which maps are presented or to the potential for even the title of a map to mislead

⁵⁷ Staley, *Computers, Visualization, and History*, p. 151.

⁵⁸ Staley, *Computers, Visualization, and History*, p. 124.

⁵⁹ For an introduction to the use of maps designed for historians see Richard Oliver, *Ordnance Survey Maps: a concise guide for historians* (London, 1993).

⁶⁰ Mark Monmonier, *How to Lie With Maps* 2nd ed. (Chicago, 1996), p. 1.

⁶¹ J. B. Harley, 'Maps, Knowledge, and Power', in Denis Cosgrove & Stephen Daniels (eds.), *The Iconography of Landscape: Essays on the Symbolic Representation, Design and Use of Past Environments* (Cambridge, 1988), p. 278. See also J. B. Harley, 'Deconstructing the Map', *Cartographica*, Vol. 26, No. 2 (Summer, 1989), pp. 1-20.

or distort its interpretation.⁶² Historians are well attuned to the potential dangers of taking any sources at face value and trained to be aware of the biases inherent in their own work (even if they cannot always do much to prevent them).

Also maps have one huge advantage over text: all life is here, abbreviated, selective, representational, perhaps, but the whole life of a community is represented in some way. We see houses alongside schools alongside shops and pubs and chapels and rugby pitches and hotels and hospitals and workhouses and farms and trees and rivers and railways and police stations and so on and so on. Maps are therefore a graphic reminder of the complexity of human life and the way in which things impinge on and influence each other. When writing about events historians have to do so sequentially, one theme at a time, to avoid confusion and to cope with the volume of data. But often events and change occur simultaneously. The advantage of GIS maps is that it is possible to show multiple strands of development at the same time. Indeed, so much cannot be seen at ground level. There is a limited perspective when 'mingling with the crowd', the perspective provided by most historical documents. Only by rising above, taking the 'bird's eye' view which maps provide can some patterns and trends be seen.⁶³

A closer look at recent historical GIS projects, for the most part, although not exclusively, emerging from historical geography departments, will provide further reasons why historians should perhaps consider GIS technology.

GIS Projects

GIS are capable of handling huge volumes of data. William Skinner, Mark Henderson and Yuan Jianhua, for example, exploited over twelve million records each linked to

⁶² Monmonier, *How to Lie With Maps*, p. 160.

⁶³ John Lewis Gaddis, *The Landscape of History: How Historians Map the Past* (Oxford/New York, 2002), p. 4.

georeferenced central places for their study of Chinese fertility.⁶⁴ Vision of Britain is a GIS project which aims to provide an overview of the evolving human geography of Britain over the past two centuries.⁶⁵ It combines accurate administration boundaries with an extensive database of historical statistics, on births, marriage, deaths, unemployment and Poor Law statistics, drawn from census reports and other sources. Many history projects are often handicapped by the small size of the sample on which they are based. I. M. Zweiniger-Bargielowska's study of inter-war industrial unrest concentrated on just four South Wales pits, for example, to represent the experience of several hundred.⁶⁶ Studies of language use or migration settlement patterns are often based on sampling.⁶⁷ The results are therefore partial, sometimes impressionistic and always provisional. A GIS allows an almost limitless quantity of data to be handled allowing for larger sample sets or even complete coverage which provides for greater accuracy and confidence in the results.

Moreover, Pat Hudson has made the point that quantitative analysis is in some ways more democratic.⁶⁸ 'Greater quantification,' Hudson suggests, 'can help to make best use of the documentation from the past particularly where that documentation deals with large numbers and with ordinary people.' Large datasets, which cover a range of experiences, are a way of gaining a more representative and more accurate picture of the general experience. Such quantification can provide details of patterns of experience of death, employment, trade, marriage, and so on, between different social groups, regions and cities. Hudson argues: 'The more qualitative approaches of social and cultural history which

⁶⁴ G. William Skinner, Mark Henderson & Yuan Jianhua, 'China's Fertility Transition through Regional Space Using GIS and Census Data for a Spatial Analysis of Historical Demography', *Social Science History*, Vol. 24, No. 3 (Fall, 2000), pp. 613-652.

⁶⁵ www.visionofbritain.org.uk; Ian N. Gregory, Chris Bennett, Vicki L. Gilham & Humphrey R. Southall, 'The Great Britain Historical GIS Project: from maps to changing human geography', *The Cartographic Journal*, Vol. 39, No. 1 (June, 2002), pp. 37-49.

⁶⁶ I. M. Zweiniger-Bargielowska, 'Miners' Militancy: a Study of Four South Wales Collieries during the Middle of the Twentieth Century', *Welsh History Review*, Vol. 16, No. 3 (June, 1993), pp. 356-89.

⁶⁷ See for example the studies included in Gwenfair Parry & Mari A. Williams, *The Welsh Language and the 1891 Census* (Cardiff, 1991).

⁶⁸ Indeed GIS is increasingly promoted as a democratising tool, placing power in hands of minorities, allowing their perspectives to be heard. See for example Justin Wood, "'How green is my valley?" Desktop geographic information systems as a community-based participatory mapping tool', *Area*, Vol. 37, No. 2 (2005); Christine E. Dunn, 'Participatory GIS – A People's GIS?', *Progress in Human Geography*, Vol. 31, No. 5 (2007), pp. 616-37.

investigate what it was like for people living these experiences on the ground can then be placed properly in context.’⁶⁹ GIS, which can exploit such large data collections, can help considerably in such a process. For example, Native American groups have left little documentary evidence of their past history but a recent GIS project has exploited aggregate population data to explore Cherokee town placement and population in early eighteenth century America.⁷⁰

In addition, GIS can handle a wide range of textual and visual data. If data can be expressed in spatial form (rainfall, health statistics, election results, trade routes) it can be incorporated into GIS and then, importantly, compared with other spatially referenced data for the same area. This allows for both inquiry and analysis: the identification of patterns and of potential relationships. Aaron C. Sheehan-Dean has used a wide range of data to explore the similarities and differences between antebellum North and South US counties. He plotted the economic make-up of individual communities, railway networks, land quality and voting patterns at multiple levels of perspective, from county to community. He was thus able to produce a series of maps which illustrated the complexity of life in the two places.⁷¹ Alastair W. Pearson and Peter Collier similarly combined disparate sources, this time in the shape of Tithe and census data together with soil characteristics, to explore changing agricultural practices parish of Newport, Pembrokeshire.⁷²

By combining multiple types of sources it becomes possible therefore to identify new patterns which may not be otherwise visible and potentially new explanations which can be researched further. The University of Virginia’s on-line study of the Salem witchcraft trials provides a map of the village of Salem in which the location of accusers and accused are identified.⁷³ By clicking on any identified household on the map the user can access, via a

⁶⁹ Hudson, *History by Numbers*, p. 7.

⁷⁰ Ted L. Gragson & Paul V. Bolstad, ‘A Local Analysis of Early-Eighteenth-Century Cherokee Settlement’, *Social Science History*, Vol. 31, No. 3 (Fall, 2007), pp. 432-68.

⁷¹ Aaron C. Sheehan-Dean, ‘Similarity and Difference in the Antebellum North and South’, in Anne Kelly Knowles (ed.), *Past Time, Past Place: GIS for history* (Redlands, Cal., 2002), pp. 35-49.

⁷² Alastair W. Pearson & Peter Collier, ‘Agricultural History with GIS’, in Knowles (ed.), *Past Time, Past Place*, pp. 105-116.

⁷³ Benjamin C. Ray, ‘Teaching the Salem Witch Trials’, in Knowles (ed.), *Past Time, Past Place*, pp. 19-33.

hyperlink, historical and biographical data about the individual living at that location. The Salem project allows students to link documents and data more closely to their physical location and encourages a new way of reading the sources. Thus GIS becomes a way of enhancing the intuitive and imaginative process of historical research by exposing the spatial dimension of the event under consideration. The project illustrates the value of GIS as a teaching tool and fully exploits its multi-user functionality. It also demonstrates the ability of GIS to operate as a powerful 'organizing' tool that can link together a wide variety of qualitative documents and a range of data in different formats via their shared spatial attributes.

GIS use can thus also challenge long held theories about past events or be used to test new hypotheses. Geoff Cunfer has similarly drawn on multiple data sets to reassess the causes of the Dust Bowl in America's southern plains in the 1930s. He mapped land use, rainfall and temperature data and was as a result able to challenge the long held belief that the devastating environmental problems of the period were caused by farming practices.⁷⁴ In a study of Pennsylvania's iron industry Anne Kelly Knowles and Richard Healey used a GIS to test a hypothesis on the timing of the adoption of mineral-fuel technologies across the state by looking at temporal relationships between investment in ironworks and how transport costs affected iron prices.⁷⁵

Because GIS also help expose the geographic element in data sources they offer new ways of exploiting old data as well as the opportunity for exploiting new data. GIS help bring into the reach of the historian completely new types of data or underexploited sources like tax records or health statistics.⁷⁶ One example of a previously much examined historical source

⁷⁴ Geoff Cunfer, 'Causes of the Dust Bowl', in Knowles (ed.), *Past Time, Past Place*, pp. 93-104.

⁷⁵ Anne Kelly Knowles & Richard G. Healey, 'Geography, Timing and Technology: A GIS-Based Analysis of Pennsylvania's Iron Industry, 1825-1875', *Journal of Economic History*, Vol. 66, No. 3 (Sept., 2006), pp. 608-34.

⁷⁶ Donald A. DeBats, 'A Tale of Two Cities: Using Tax Records to Develop GIS Files for Mapping and Understanding Nineteenth-Century U.S. Cities', *Historical Methods*, Vol. 41, No. 1 (Winter, 2008), pp. 17-38.

is Charles Booth's 1896 survey of inner London. In a collaboration between geographers from Leeds and Bristol University, a GIS specialist from Cardiff University and a clinical epidemiologist also from Bristol, a digitized version of Booth's map was created to allow comparisons to be made with modern statistics. The objective was to establish whether there was a link between mortality rates and poverty in twentieth century London and the extent to which this reflected nineteenth century patterns of poverty. The researchers found that patterns of social deprivation and of mortality were largely unchanged.⁷⁷ Although the primary aim in this instance was not historical research as such, the study exposed patterns of behaviour which enhanced understanding of present conditions and past experience.

Through their study of hotel registers, Fyfe and Holdsworth have revealed the everyday, non-migratory travel patterns between small towns and villages in the upper Susquehanna valleys of New York and Pennsylvania.⁷⁸ The registers were matched to census reports, business directories and local newspaper advertisements which allowed the locations from which visitors came to be traced, and patterns of commercial and social visits to be identified. Because the registers covered whole years and consecutive years, they are much more detailed and sensitive than censuses for tracing movement patterns. This allowed the authors to find answers to such questions as how many guests came from locations within a ten mile radius or within a five mile buffer corridor along a railroad route. In the process, the authors were able to look at the impact the absence or arrival of the railway networks had on movement. They were thus able to provide a vivid portrayal of movement in and out of the region in a way that was less static and confined than other regional studies.

GIS are also useful for recreating past landscapes in order to understand landscape use. This is especially exploited in disciplines such as archaeology but has potential for studying

⁷⁷ Danny Dorling, Richard Mitchell, Mary Shaw, Scott Orford & George Davey Smith, 'The Ghost of Christmas Past: health effects of poverty in London in 1896 and 1991,' *British Medical Journal*, Vol. 321 (Dec., 2000), pp. 23-30. See also Scott Orford, Danny Dorling, Richard Mitchell, Mary Shaw & George Davey Smith, 'Life and death of the people of London: a historical GIS of Charles Booth's inquiry', *Health & Place*, Vol. 8 (2002), pp. 25-35.

⁷⁸ David A Fyfe & Deryck W. Holdsworth, 'Signatures of Commerce in Small-Town Hotel Guest Registers', *Social Science History*, Vol. 33, No. 1 (Spring, 2009), pp. 17-45.

more modern landscapes.⁷⁹ David Rumsey and Meredith Williams combined a scanned copy of a late nineteenth century map of the Yosemite Valley with a modern digital elevation map. The 'three-dimensional' landscape thus created was much more recognizable and brought both the map and the terrain model to life.⁸⁰ Anne Kelly Knowles has similarly used this function of GIS to explore the question: 'What Could Lee See at Gettysburg?'. Through the use of the viewshed function, Knowles was able to gain a better sense of 'what might have gone through the minds of soldiers and commanders' during the battle. She has suggested that GIS, if applied to other battlefields, would produce 'many valuable insights into military strategy, the wisdom of command decisions, and the experience of war'.⁸¹ Using terrain models could also open up new avenues of enquiry or provide more detailed analysis. Adding terrain data to studies of population distribution, for example, might offer a different perspective. It would be possible to test not just whether there was clustering of migrant groups but whether there was clustering in certain types of locations, for example, on higher ground with better/poorer light quality, more/less accessibility and visibility to other locations, or more/less prone to flooding. GIS potentially could add an extra qualitative dimension to traditional areas of research.

Conclusion

There are a whole host of problems linked to GIS use in history: the complexity of the technology, the time consuming nature of projects, the difficulty of handling gaps in data, uncertainty and contradiction. GIS remains a spatial not a temporal tool. Perhaps therefore the reticence of historians is understandable. This certainly may reinforce a natural

⁷⁹ Joanne Watkins & Geoffrey Griffiths, *Reconstruction and Visualisation of Historic Landscapes Using GIS* (Reading: University of Reading, [n.d.]). Cf. Reuben Skye Rose-Redwood, 'Re-Creating the Historical Topography of Manhattan Island', *Geographical Review*, Vol. 93, No. 1 (Jan., 2003), pp. 124-32.

⁸⁰ David Rumsey & Meredith Williams, 'Historical Maps in GIS', in Knowles (ed.), *Past Time, Past Place*, pp. 1-18.

⁸¹ Anne Kelly Knowles, 'What Could Lee See at Gettysburg?', in Knowles (ed.), *Placing History*, p. 260. Also Alberto Giordano & Thomas Nolan, 'Civil War Maps of the Battle of Stones River: history and the modern landscape', *The Cartographic Journal*, Vol. 44, No. 1 (Feb., 2007), pp. 55-70.

resistance to 'jumping on the band wagon', of adopting the technology simply because everyone else is doing it. And while some good work has been done, there is not yet any sign of the kind of groundbreaking study which might force historians to sit up and take notice, no revolutionary interpretation of a key historical event which historians cannot ignore. Plus, much of the work done by historical geographers has not engaged directly with core concerns of current historiography: 'historical GIS' has yet to meet 'history' where it is at.

Yet GIS do increasingly appear to offer a new way of seeing the past. For historians they may present a way of analysing data in quantities previously unimagined thus providing more solid bases for arguments. Interpretations based on a handful of sample cases, with all the attendant dangers of distortion and doubts about the representative nature of the data could become a thing of the past. Moreover, the available data could be interrogated and exploited more fully because GIS make visible the otherwise hidden spatial attributes of the data. In other words, not only do GIS allow the exploitation of more data, they allow the asking of more questions of that data. They could thus help draw the eye to new ways of approaching historical problems, generating a whole new set of questions which far from being incompatible with existing ones, take the historian in a deeper, more nuanced direction towards a better understanding of the past. And with visualization, GIS offer a new way of communicating ideas about the past both to other academics and to a wider audience, helping to make history more accessible.

In a 1987 conference on the use of computers in historical research, Robert Woods commented,

With a few, notable, exceptions, the promise of powerful computational resources available in useful applications for historical scholarship has been blunted due to our weak market influence and to the developers' lack of understanding of our individual, professional needs. We are told implicitly to 'make do' with, for example, data base management programs explicitly and

overtly written for the needs of business entrepreneurs. What assumptions are built into those programs? Well, they certainly aren't historical.⁸²

Over twenty plus years and a technological/software revolution later, nothing much has changed. But if historians are not prepared to engage with the software nothing is likely to change. With greater digitization of data, much more will eventually become available in GIS compatible formats. It could be argued that historians need to be involved so that they can ensure that this is done in a way, and at a scale, that is most useful for answering the types of questions which underpin historical-temporal as well as historical-spatial research.

The growth of historical GIS may well challenge historians to think about their own discipline. History lacks spatial questions, David Bodenhamer acknowledged. It might be suggested, however, that this is not fundamental, nor immutable, characteristic of history but actually a failing of the discipline as currently practised. If the job of the historian is to fully understand past societies, to explore human experience, then possibly geographic questions should be asked as readily as any others. John Lewis Gaddis recently suggested that history was less methodologically strait-jacketed than some disciplines:

Within a single narrative we [historians] can be Rankeans, or Marxists, or Freudians, or Weberians, or even postmodernists, to the extent that these modes of representation bring us closer to the realities for which we're trying to account. We're free to describe, evoke, quantify, and even reify if these techniques serve to improve the 'fit' [with the past] that we're trying to achieve. Whatever works, in short, we should use.⁸³

Perhaps historians should at times be geographers too. GIS appear to work – at least to answer some questions about the human experience in and of the world. They could therefore be something which have the potential to enhance the historians understanding of the past.

⁸² Robert L. Woods, 'Skills for Historians: Getting Something Done', in Peter Denley & Deian Hopkin (eds.), *History and Computing* (Manchester, 1987), p. 207.

⁸³ Gaddis, *The Landscape of History*, pp. 108-109.

CHAPTER THREE

Background to the Case Study

This chapter will trace the progress and development of the research project through a number of preliminary case studies designed to test the applicability and best use of the concepts and tools outlined in the previous two chapters. It will also explain how the final choice of topic was arrived at. It will begin, however, with a discussion of the challenges of creating a basic database of mines which was both flexible and detailed enough to answer a wide variety of potential queries.

The Creation of a Database of Mines and the Problem of Primary Sources

The first job was to create a mines geodatabase which could be used to create maps of the coal industry over an extended period of time and which could serve as the starting point for running a series of queries about the industry and its interaction with the landscape and geology. There have been numerous attempts over the years to produce comprehensive lists and databases of Welsh mines.¹ But many of them, produced by ‘amateur enthusiasts’, tend to be heavy on detail about accidents and ownership but vague on location except where the largest pits are concerned. The process of identifying the whereabouts of Welsh coalmines was therefore one which had to be started from scratch.

To do this, the project drew on Ordnance Survey (OS) maps already digitised and georeferenced by Digimap and readily downloadable into ArcGIS.² This saved a lot of time and drastically reduced the amount of technical GIS work required, removing the problems of accessing hardcopies of relevant maps, the need for specialist scanning machinery, and the lengthy process of georeferencing and rectifying images. For the purposes of the database the County Series 1:10560 maps were used because they provide good coverage

¹ There are numerous websites offering information about coalmining. One of the best is www.welshcoalmines.org.

² Digimap is operated by EDINA, a JISC National Data Centre based at the University of Edinburgh. ArcGIS software is produced by ESRI.

date-wise for the latter part of nineteenth century and early twentieth century. Three editions were used: the First Edition (published between 1883 and 1898), the First Revised Edition (published 1901-1907), and the Second Revised (1920-1). The database could, perhaps should, have included post-1920s pits. The industry was, by this point, in decline but there was still some development notably in the anthracite region. It was however necessary, due to the pressures of time, to have a cut-off point and it was decided that 1920 was the most suitable date. One of the advantages of the database structure of a GIS, though, is the potential to add further data and so the post-1920 pits could easily be added in the future.

Another significant advantage of the digitised OS maps is that they can be readily manipulated and searched within in a GIS, the information about pits contained in them extracted with co-ordinates. One of the reasons maps have been underexploited and the information in them largely ignored until now is that searching manually through paper maps for location data would be a tiresome and protracted process, not least because, unlike Digimap, no single repository holds all the maps at a variety of scales for the whole period and the complete extent of the coalfield. Even with the advantages of computer technology, the systematic study of the maps and the extraction of data is very time consuming and the whole process took several weeks to complete. Each tile (about three miles square) covering the South Wales coalfield region for each of the three editions – approximately 450 in total – had to be carefully checked and a manual record made of the name of the pit and its co-ordinates (along with the name of the nearest town or village). By and large there was a high degree of consistency in location from one edition to the next; any slight misalignments were probably original though some are possibly the result of the digitising process. Tracing the industry across the three map editions, however, was worthwhile because it allowed the identification of alternative names and the changing operational status of older pits as well as providing loose dating evidence for the emergence of new pits.

The large number of tiles meant that a careful record had to be kept of which tiles had been checked.³ The process was complicated by the fact that there were often multiple tiles produced for each edition at different dates because of county overlaps. There were also occasional difficulties reading the maps, especially the First Edition where at times the ink blurs and the text becomes unreadable even at a close zoom. Where this happened, the 1:10560 maps were cross referenced with the 1:2500 editions closest in date to them. A handful of pits marked on the larger scale map which were not on the smaller were also added to the database (and identified as such) but a sampling of the 1:2500 suggests that there was not sufficient variation to justify looking at the larger scale maps in detail. In any case, these maps are made up of a significantly larger number of tiles, which would have added considerably to the time involved in data extraction, although again, this could be done at a future date. This is an intensive process, but it needs to be re-iterated that the exercise is not possible under other circumstances. A whole wealth of information previously unexploited is now available (see Fig. 2.2). Such time consuming activities are necessary at the beginning of a GIS project, as was noted earlier, but the extensive database (using Microsoft Excel) created now can be easily shared, amended, edited, supplemented and corrected.

Indeed, once the case study had been decided on, the database was cross referenced and supplemented by information from the 1873, 1893 and 1913 *Lists of Mines* to provide a context for the industry and a base for developing a strike map (Figs. 3, 4.1 & 5). About a quarter of the pits listed in the 1873 and 1893 *Lists of Mines* were not identified on the maps. In some cases it is likely that there was simply a change of name. In other cases, it is possible that pits designated 'ironstone' on the maps were worked simultaneously for coal and were therefore included as coal pits in the official lists. With other pits it appears that the only record of their existence is the entry in the *List of Mines*. For all of these it was necessary to create 'dummy locations', identified as such in the 'Notes' field of the database. These were best guess locations based in part on the location of other pits owned by same owner (where this occurred) or on other information drawn from local histories or Government reports. But the site chosen was always where there was a coal

³ This was done by creating another database of map tiles listed by edition.

level marked on the maps to ensure that even if this was not exactly the right place, at least it was a place where coal is known to have been worked. And there is little danger of exaggerating the extent of the industry's development because there remain dozens if not hundreds of levels, drifts and pits not identified at all.

Although the *Lists of Mines* are an invaluable source of information about the coal industry, they are not easy to use when trying to create a standardised database. There are a variety of problems, ranging from the mildly irritating use of multiple variant spellings of place and pit names to the more serious problem of specific, sometimes important, mines being, apparently, omitted. This could be due to the use of an 'umbrella' name for pits owned by a single owner or simply due to the pit being idle in that year. The 1873 list was particularly difficult to handle because the early lists tended to use the name of the nearest postal town or large railway for the pit's location, which often leaves a lot of scope: 'Pontypridd' for example covered a huge area from Treforest, to Cilfynydd and Trehafod. It is frustrating too that there can be variations in the information provided year on year, since this can limit the range of questions and type of study that is possible. For example, employment figures are not included in the 1893 *List of Mines*. This meant that the data for 1894 had to be used for 1893, though evidence from mines inspectors' reports suggests that there was not a dramatic fluctuation between the two years. One of the concerns is that the database becomes increasingly imperfect with each compromise, possibly to the point at which the results of any study are seriously undermined. The *Lists* cannot be taken at face value in the first place, since it is not clear how figures such as annual employment levels were calculated. This means that such data can only be used as a general guide to comparative sizes and should not be used for more specific calculations.

In order to minimize potential errors of identification the OS information was checked against a number of other maps of the coalfield. During the nineteenth and early twentieth centuries, a significant number of maps were produced which concentrate specifically on the coal industry, such as Prujean's 1843 map of Monmouthshire and Gordon's map of c.1921. These maps have not as yet been digitised and tend to be more 'impressionistic' than literal in their locating of pits, but they are nevertheless useful for cross-referencing

and elimination purposes. They are also interesting as representations of the coalfield in their own right, and worthy of far more attention than has so far been paid to them, since they reveal a lot about contemporary attitudes to South Wales. In them South Wales is clearly valued for its minerals not its population or its symbols of social/cultural identity, like castles and churches, which tend to dominate earlier, tourist-type maps of the region.

The need to standardize the data also forced a number of decisions. Place-name spellings are a particularly significant problem in Wales, Anglicised versions in the sources often bearing only a passing phonetic resemblance to the original. Large scale mapping projects often invest a great deal of time and effort in creating suitable gazetteers to handle the problem of variant names and spellings. There was no opportunity here to spend much time on the issue, though if the database is to be more widely used it needs a greater flexibility with names. As a simple contingency measure a field was added to the database to containing alternative names and some of the most important variant spellings. An attempt at uniformity was made in the main name field: hyphens were omitted; Welsh spellings rather than the Anglicised versions (*f* not *v*) were prioritised. But it is difficult to be thoroughly consistent and sometimes the most commonly occurring spelling was used instead.

The biggest challenge the database structure presented, however, was how to record the changes and continuities over time. Individual mines often started off small, changed hands rapidly, could go into long periods of idleness and then be re-opened under different names. Sometimes a mine retained its name even though it changed from being a slant to a pit or new shafts were sunk to deeper seams and the work significantly expanded. This raised the question of whether the changes were significant enough for the pit to be designated a new entity or whether geographic continuity was sufficient for it to be regarded as the same works.⁴ This is particularly important when dealing with questions about the age of workings. There is no easy solution to the problem and in the end, decisions had to be

⁴ For a discussion of these issues see Gail Langran, *Time in Geographic Information Systems* (London, 1993), p. 35.

taken on an individual basis, with the reasons for the decision documented at far as possible in the 'Notes' field, but this again increases the possibility of distortion.

The database was, nevertheless, just a beginning. The next challenge was to find an historical problem to act as a focal point for research. This meant a long trawl through the archives and primary and secondary source material. It is not unusual with most history projects to find that there is a scarcity of material; in the case of the coal industry it could be said that the opposite is true. The Mining Record Office was established c.1838 with a system of mining records begun 1854. In the decades that followed the industry became increasingly regulated, codified, examined and reported upon. Not only has a significant amount of this material survived but the bulk of it, inspectors' reports, accident inquiries, Royal Commissions and so on, has been digitised and is readily available in the form of a key word searchable and downloadable format.⁵

Supplementing the official record is a whole host of publications generated by the industry itself. Individual companies, particularly ones which were (or were becoming) large concerns generated enormous quantities of letters, financial reports and board meeting minutes. The economic importance of coal led to the setting up of a number of specialist publications, such as the *Colliery Guardian*, which often provide profiles of individual pits and coalowners, as well as updates on the industry's expansion in the various British and international fields. From 1903 a *South Wales Coal Annual* was produced which includes lots of statistical data but also some histories of individual companies and overviews of the development of the industry in specific localities. Later editions of the *Annual* also included lists of miners, and the list for 1913 was used for the database. There were also developments such as the founding of the South Wales Institute of Engineers in 1857 which produced both *Proceedings* and *Transactions* which touch on the engineering and technical side of industry.⁶ These publications provide potentially useful insights into local

⁵ <http://parlipapers.chadwyck.co.uk>.

⁶ For a discussion of the place of the Institute in South Wales society see G. W. Roderick, 'The Institute of South Wales Engineers and the South Wales Economy in the Late Nineteenth Century', *Welsh History Review*, Vol. 14, No. 4 (Dec., 1989), pp. 595-609.

topography and geological problems encountered by the industry and the steps taken to overcome them. They also provide information which can help with the chronology and dating of pits' development. There are, in addition, numerous treatises on the coal industry produced by coalowners and industrialists such as T. W. Booker, large scale studies of the economics of the industry such as those produced by W. Stanley and, later, H. Stanley Jevons and various practical handbooks designed for miners themselves such as those produced by Henry Davies.⁷ There are also a whole series of highly detailed geological memoirs from first years of twentieth century, produced under the guidance of Aubrey Strahan.⁸

The coal industry also had its early historians. Alexander Dalziel produced a detailed account of the 1871 dispute, albeit biased in favour of the coalowners, while Charles Wilkins provided a marginally more balanced overview of the development of the industry in South Wales from its beginnings.⁹ There are several studies of the industry's 'pioneers' and although highly romantic, they provide an invaluable starting point for any coalfield study.¹⁰ South Wales is also blessed with a number of local histories, both nineteenth century, such as *History of Tredegar* and Morien's *History of Pontypridd*, and twentieth century, such as Katie Olwen Pritchard's studies of Gilfach Goch, which frequently preserve otherwise lost traditions and memories.¹¹ Autobiographies of miners for the nineteenth century are rare and often not particularly well-written, like the sentimental *Little Johnny*.¹² But the

⁷ Thomas William Booker, *A Speech Delivered at the Annual Meeting of the Royal British Association, Held at Swansea, 11 August, 1848, on the Mineral Productions of South Wales* (London, 1848); William Stanley Jevons, *The Coal Question: an inquiry concerning the progress of nation and the probable exhaustion of our coal-mines* (London, 1865); H. Stanley Jevons, *The British Coal Trade* (London, 1920); Henry Davies, *How to Become a Colliery Manager* (Wigan, 1906).

⁸ For example, Aubrey Strahan, Walcot Gibson & T. C. Cantrill, *The Geology of the South Wales Coalfield: Part V – The Country around Merthyr Tydfil, being an account of the region comprised in sheet 231 of the map* (London, 1904).

⁹ Alexander Dalziel, *The Colliers' Strike in South Wales: its cause, progress, and settlement* (Cardiff, 1872); Charles Wilkins, *The South Wales Coal Trade: and Its Allied Industries, from the earliest days to the present time* (Cardiff, 1888).

¹⁰ See for example Elizabeth Phillips, *A History of the Pioneers of the Welsh Coalfield* (Cardiff, 1925).

¹¹ Evan Powell, *The History of Tredegar* (Newport, 1902); "Morien", *History of Pontypridd and Rhondda Valleys* (Pontypridd, 1903); Katie Olwen Pritchard, *The Story of Gilfach Goch, Wales* (Risca, 1973); Katie Olwen Pritchard, *Gilfach Goch in Cameo: Volume One* (Newport, 1974).

¹² J. Protheroe, *Little Johnny: A True Narrative* (Cardiff, [n.d.]).

twentieth century is much better served and include the occasional privately published story such as that of Foster Lewis, a Tonyrefail miner.¹³ Also, thanks to the work in the 1970s of First South Wales Coalfield Project, an important collection of oral testimony is available.¹⁴ Although created for a specific purpose and concentrating largely on the interwar period, the collection nevertheless provides invaluable insights into a huge range of experiences and aspects of coalfield society. If we add into the mix numerous academic dissertations, South Wales Miners' Federation records from 1898, pamphlets generated by industrial disputes, trade directories, tourist guides, local government records, newspapers (about which more will be said in the next section), poetry and literature of varying quality, then whatever other complaints could be made, the lack of information about the coalfield is not one of them.

In spite of the breadth and scope of the source material, however, identifying an historical problem which would combined the use of GIS with an examination of the influence of geology on the development of the coalfield was not as easy as it might appear at first glance, particularly when the need to engage with the existing historiography was borne in mind. Although mostly qualitative rather than quantitative, the primary sources themselves gave rise to some ideas. For example, there are a large number of trade directories available, many on line, which provide good coverage for the whole of the nineteenth and early twentieth centuries.¹⁵ It would be possible from these to plot the evolution of individual communities by showing the process and point at which a given settlement acquired the markers of community, such as chapels, pubs, schools, shops, and so on. But this root offers only limited opportunity for including geological considerations. On the other hand, there is a wealth of information about the way in which geological knowledge impinged on national, community and even individual consciousness, as discussed in Chapter One. But the 'mental' world is difficult if not impossible to combine with GIS usage

¹³ Foster Lewis, *The Miner's Tale: Recollections of Events in the Inconsequential Life of a South Wales Coal Miner 1916-1938* ([S.I., [n.d.]]). See also David Barnes, *Black Mountains: The Recollections of a South Wales Miner* (Talybont, 2002); Mary Paget (ed.), *Man of the Valleys: the Recollections of a South Wales Miner* (Gloucester, 1985).

¹⁴ <http://www.swan.ac.uk/swcc/>

¹⁵ www.historicaldirectories.org

beyond the creation of Digital Elevation Models (DEMs) largely for illustrative rather than for analysis purposes, so these could not be pursued further.

Other ideas were suggested by the different disciplines. GIS is especially useful for looking at quantitative data such as the census and is consequently a very powerful tool for providing insights into migration, language use, or ethnicity. Although usually used for county level analysis, it would be possible to look at an individual community at a level of depth previously not possible because GIS are able to handle huge volumes of material. Philip Jones's work has been largely based on sampling; with GIS it is now possible to deal with a complete community.¹⁶ But again while answering the challenge to exploit GIS, this approach would offer no opportunity to consider questions of landscape and geology. Another possible area of research, which would combine both GIS and geology, is connected with landscape use. This offered huge potential, but seemed to push in the direction of environmental history and there was no time, training or resources to do a thorough environmental project within the context of this PhD. Plus there is little in the existing historiography to engage with. Indeed, there are few real core historical questions to explore here at the moment. It was decided to begin with a case study which would at least provide an initial focus which, it was hoped, would help clarify some of these issues.

Beddau

The first case study began with a look at an area with which I am familiar, my home community of Beddau which grew up around the Cwm Colliery. Although as a mining village it is typical in some ways, Beddau was comparatively late in developing and in fact expanded at the very time the coal industry was about to take a downturn. Peak coal production for the South Wales coalfield was 1913; the Cwm Colliery, around which Beddau developed, was begun in 1909, with first coal raised in 1916. In theory, the lateness of its development should have made this a relatively simple area to research. However, up until the sinking of

¹⁶ See for example, Philip N. Jones, 'The Welsh Language in the Valleys of Glamorgan c.1800-1914' in Geraint H. Jenkins (ed.), *Language and Community in the Nineteenth Century* (Cardiff, 1998), pp. 147-80.

the Cwm, the industry had been underdeveloped in the area.¹⁷ Most workings were small scale, short lived, rarely employed more than a couple of men part-time and were remembered chiefly for their curious nicknames, such as 'Strip-and-at-it' or the 'Bug-and-Flea'.¹⁸ Few of the workings left any written record or trace in the archives. Indeed, the Ida Colliery for which there is a map of underground workings, an entry in the *List of Mines*, and a brief mention in a geological memoir is unusually well documented.¹⁹ Even here, the approximate number of men who worked there, the type of coal produced, and the name of the owner are known but little else. It is not clear, for example, when the pit was actually sunk, who sank it and why they decided to sink it in that particular location. Nor is it known how much coal was produced and whether it was sold locally or exported. Even with the Cwm, which was comparatively late and sunk by the Great Western Colliery Company, which was quite a substantial concern, there are few records concerning its sinking. The diary of the engineer survives but it is primarily a costings list and provides no insights into any problems encountered during the sinking.²⁰ The lack of records makes it impossible therefore to gain more than an impressionistic view of the development of the industry in the region.

A few interesting details about the village settlement itself did emerge. The original plans for post-Second World War development were to orientate the village to the north of the existing settlement, but there was a surface fault and a fault in the Five Feet seam which indicated the likelihood of subsidence.²¹ This meant that expansion, if it was to occur had to be limited in this direction. Even with this information, however, it was difficult to identify how GIS use could be incorporated. The date of development was too late to use census data, which might have been used to reconstruct the evolution of the community as a

¹⁷ Leonard Baden Collier, 'A Detailed Survey of the History and Development of the South Wales Coal Industry from c.1750 to c.1850' (Unpubl. PhD Thesis, London University, 1940), p. 113.

¹⁸ Dillwyn Lewis, *The History of Beddau and District* ([S.l]: [S.n.], [n.d.]), p. 19.

¹⁹ Aubrey Strahan, R. H. Tiddeman & Walcot Gibson, *The Geology of the South Wales Coalfield: Part IV – The Country around Pontypridd and Maes-têg, being an account of the region comprised in sheet 248 of the map* (London, 1903), p. 94; Glamorgan Record Office (GRO) D/D Th 138: Map of West Llantwit Colliery.

²⁰ Glamorgan Record Office (GRO) D/D Xns 2: Notebook of J. W. Davidson, Penwarden, West Town, Bristol (engineer).

²¹ Now in the private possession of Mr. H. Fowler, Tonyrefail.

community, since the census household returns are not yet accessible for 1921 much less for 1951, which would have been the ideal period to study. It also raised the question of whether understanding the origins of the physical shape of a community helps us to understand anything about its character. There is no reason to think that Beddau would have been qualitatively a different place if it had been physically a different shape. Although the study hit a dead end, it clearly demonstrated some of the compatibility problems. History is concerned with the formation of a community as a group of people, geography (and thus GIS) and geology with the formation of a community as a physical entity, that is, its shape and structure, housing and so on. There did not appear, on the basis of the Beddau study, any way of reconciling and combining the two perspectives in a way that produced new and usable insights into past human experience.

Blaengarw

Blaengarw was chosen as the second case study because it seemed more 'typical' of the region in terms of the timing of its development. Like a number of mining villages in the central valleys, it developed in the last decade or so of the nineteenth century following the expansion of the coal industry into new areas. As with places like Cilfynydd, near Pontypridd, Blaengarw sprang up almost overnight, replacing farm land with a bustling little settlement. Its experience therefore seemed representative of a widespread development. It is also in an area known to be geologically interesting. In addition, there have been a number of local studies, and a good range of primary sources concerning the village, in the form of local government records, are available. Because of the timing of Blaengarw's development the Census Enumerators Books (CEBs) covering its early years are accessible and it therefore also offered the potential to exploit census data.²² Again, however, the

²² See for example, Mark Davies, *The Valleys' Autobiography: a people's history of the Garw, Llynfi and Ogmore Valleys: Vol. 1* (Blaengarw, 1997); Wyn M. Price & Rodney W. Jones, *Reminiscences of Life in the Garw Valley* ([S. I.], 2002); Martin Downey, 'The Development of Coal-Mining in the Blaengarw Valley and Its Effect on the Community', (Unpubl. Pamphlet, Bridgend, [n.d.]); Wyn M. Price, 'Aspects of Urban History of the Garw Valley, c.1870-1914' (Unpubl. PhD Thesis, University of Wales, Cardiff, 2001); Philip N. Jones, *Mines, Migrants and Residence in the South Wales Steamcoal Valleys: the Ogmore and Garw Valleys in 1881* (Hull, 1987).

nature of the primary sources concerning the coal industry in the area made a detailed study of Blaengarw's industrial development difficult. Although the main pits in the village were eventually owned by large companies, the company records are of limited use. The Boards of Directors were not interested in the day-to-day functioning of mines, only in bottom line profits, the raising of funds for expansions and dividend payments. The primary source material is simply not detailed enough about coal production and the daily operations of the pits to match the specificity of modern Earth Science insight. And although the GIS could have been used to ask a variety of questions about the human community, such as language use or occupational clustering, it was not clear how geological insights could be incorporated here. Part of the problem of aligning all three disciplines continued to be the fact that even though there may be questions, the necessary data to answer those questions was not available. Where the data was available it did not answer questions relevant to all three disciplines.

Pontypridd

After Blaengarw, focus was shifted to a larger area, one better known and recognised as historically more significant in terms of the development of the coal industry. Pontypridd, situated at the confluence of the rivers Rhondda and Taff, was in the latter part of the nineteenth century the administrative centre for the largest population concentration in the whole of coalfield, the Rhonddas. It was also a key economic centre for the region and home to a couple of newspapers. If anywhere possessed good documentary coverage, of both community and industry, it would be here.²³ This actually makes Pontypridd atypical in many ways. Yet it is a useful focal point because many stages in the industrialization process converge at Pontypridd: iron, coal, canal, railway. It could be argued that the story of the town is the story of nineteenth century Wales in miniature.

²³ There is certainly an unusual level of documentary evidence for most of the town's existence. Pontypridd is mentioned by many of the early travellers' accounts. Visitors were drawn by talk of Pontypridd's bridge, a wonder of the modern world, and in any case the place was en route to Merthyr, that horror of the modern world.

The town's history was for a long time neglected – it was once described as 'a town with a past but no history' – although it could now be described as 'overexposed' compared with some areas of coalfield.²⁴ In some ways this makes Pontypridd an ideal case study: it is better to use new techniques and evidence to look at a place quite well-known in order to answer the question of what can be learned from adopting a different approach. Can GIS help challenge the assumption that we know all we need to know or all that can be known? It is necessary to be aware that in researching an unknown subject it can be difficult to distinguish between those revelations which come purely because of the new research and those which are the result of adopting a new technique.

The town indeed initially looked promising, opening out a wide range of potential areas of research, such as looking at the evolution of attitudes to landscape, its use and symbolism in addition to the development of the industry. Pontypridd possesses two significant symbols, landscape markers used as a way of identifying the town: the bridge and the Rocking Stone.²⁵ The town was also involved in a protracted struggle for pre-eminence with its neighbours, particularly Llantrisant from which it gradually 'stole' the region's administrative, judicial and ecclesiastical responsibilities. The importance of the shape of the landscape here became very clear: Llantrisant was constrained by location and topography from responding to the changing pattern of industry and settlement, while Pontypridd was ideally situated in relation to the valleys and able to expand to meet growing demands.

Pontypridd also suggested another potential avenue of research. The villages around Pontypridd underwent rapid expansion in the 1890s which placed severe pressure on the

²⁴ Tim Williams, 'Patriots and Citizens. Language, Identity and Education in a Liberal State: the Anglicisation of Pontypridd 1818-1920' (Unpubl. PhD Thesis, University of Wales, Cardiff, 1989), p. 421. Numerous local histories of the town have been published of varying quality and scope. See for example, Don Powell, *Victorian Pontypridd and Its Villages* (Cardiff, 1996); David James Rees, *Pontypridd South: Past and Present* (Risca, 1983). Meic Stephens, *Pontypridd: a Town with no History but one Hell of a Past* (Pontypridd, 2001). During a conversation with Professor Gwynfor Jones it was mentioned that the focus of this PhD had shifted to Pontypridd. The response was: 'Pontypridd! Pontypridd! Is there anything left to say about Pontypridd?'

²⁵ The Rocking Stone will be discussed in more detail in Chapter 7.

existing infrastructure, especially water supplies.²⁶ At the same time the expansion of the coal industry was having an impact on the water tables. The problems in the 1890s were compounded by a series of long dry summers.²⁷ The result was intermittent, sometimes non-existent water supplies, causing endless problems for the women of the area.²⁸ The situation here was not unique and suggested a number of more widely applicable questions about the historical human experience in rapidly expanding areas. How did people cope with the conditions they found themselves in? And to what extent did they contribute through interaction with their environment to those problems? Again however, there were difficulties following through on these topics. Even with somewhere as well covered by the primary sources as Pontypridd there were difficulties matching the detail of the geological map with historical data. It was possible to talk in general terms of the influence of landscape and geology but not in a specific way. Either the historical information was too vague, answered questions that were not being asked or was simply non-existent. Other issues left little room for the use of GIS except for illustrative purposes. And the issue of water supplies, which would have involved looking at the very complex area of hydrogeology, proved too complex to be dealt with within the time constraints.

Conclusion

It became apparent that one of the central limitations of the project as first envisaged was that it was essentially methodology led rather than problem or data led. We were not beginning with a conundrum or a hotly contested interpretation or with a source which we wanted to exploit more fully. Rather, we had some general questions about the relationship between history and geology and a new technology which needed to be applied to *something*. The other major frustration was that each of the 'disciplines' had its own set of

²⁶ Richard Coopey & Owen Roberts, 'Public Utility or Private Enterprise? Water and Health in the Nineteenth and Twentieth Centuries,' in Anne Borsay (ed.), *Medicine in Wales c. 1800-2000: Public Service or Private Commodity?* (Cardiff, 2003), pp. 21-39; John Wyn Pritchard, 'Water Supply in Welsh Towns, 1840-1900: Control, Conflict and Development', *Welsh History Review*, Vol. 21, No. 1 (June, 2002), pp. 24-47.

²⁷ The Cardiff Naturalists' Society provided monthly records of the rainfall in the region in their *Transactions*.

²⁸ See various articles throughout August 1895 in the *Pontypridd Chronicle*.

questions and concerns which pulled in specific, often opposing directions. A GIS led project seemed to involve satisfying the demands of spatial considerations to the detriment of temporal ones, while a geology led one seemed to leave little room for human society and agency. The priorities of the PhD therefore had to be established. It was to be a history project first and foremost. Historical questions, not geographic or geological ones were to be the motive force. The project also had to engage with the existing historiography if it was to demonstrate the potential contribution of the other two disciplines and avoid the creation of some strange hybrid which had elements of all three disciplines but which failed to engage satisfactorily with any one of them. The main concessions to the other disciplines involved the recognition that studies had demonstrated that: since 'new' historical data cannot be generated to meet the questions the questions had to be changed; and the influence of geology is easier to see at a large scale, when comparing across areas rather than when looking at individual communities, so the scale had to change.

It was eventually decided therefore to look at a strike, since industrial action is key to understanding coalfield regions. Periods of industrial unrest tend to generate huge amounts of documentation. Strikes also have a geographic dimension and the movement of a strike from pit to pit allows mapping. We see too geographic variation in terms of the responses to the strike. Such an approach would open up the possibility of exploring two issues: firstly, it allows an exploration of the various characteristics of pits, including geology, and the analysis of their potential impact on the stance adopted during the strike; secondly, the impact of the landscape on the process of the spread (the mechanics of conducting the strike) could also be investigated. In so doing, it would help us understand both the motivation behind the strike and modes of communication, issues which are central to the understanding of industrial action, and key concerns within Welsh history.

The 1893 hauliers' strike was chosen because there has not been much written about it previously. Perhaps this was a risky choice because it would not then be so clear how much new insight is the result of the new approach and how much could/would have been exposed anyway by any detailed study. On the other hand, enough has been written about strikes generally to provide a context and a point of comparison. Plus, this particular strike

was reasonably short-lived which means that the timescale is manageable and yet it was sufficiently long lasting to see a variation over time. It was also widespread, with the whole of the coalfield being forced to take a stance of one kind or another. The geographical variation allows the testing for possible local influences, including geological, on different responses.

The case study will be covered in the next section. There will be a brief overview of strike literature and the sources used. There will then be a look at the strike using a more 'traditional' historical approach to the subject before the different insights afforded by adopting GIS and geological perspectives are addressed.

Part Two – 1893 Hauliers’ Strike

CHAPTER FOUR

Introduction to the Case Study

This chapter will offer an introduction to the hauliers’ strike. It will provide, first, a detailed summary of events before looking at how the strike has been understood and represented in the historiography. It will then discuss the primary sources used for the study before outlining the structure of the rest of the section.

The 1893 Hauliers’ Strike

Week One

On 1 August 1893 W. Gascoigne Dalziel, secretary to the Monmouthshire and South Wales Coal Owners’ Association (MSWCOA), received a telegram from North’s Wyndham Colliery, at the top of the Ogmore Valley, stating that the workmen at the pit had ceased work.¹ It was not immediately apparent why, although it was speculated that the hauliers were unhappy at the delay to the announcement of the results of the bi-monthly sliding scale audit which was expected to bring a pay rise. The sliding scale was the formula by which wages within the South Wales coalfield were regulated. Introduced following the disastrous strike in 1875 which had brought about collapse of the miners’ union, the Amalgamated Association of Miners, the scale was operated by a Joint Committee, made up of members of Monmouthshire and South Wales Coal Owners Association (MSWCOA) and workers’ representatives.² During 1893 the Committee was chaired by Sir William Thomas Lewis of the employers’ side and the vice-chairman was William Abraham, more commonly known by his bardic name Mabon, on behalf of the mineworkers. The underlying principle behind the scale was the belief, accepted at the time of its establishment by workers as readily as owners, that wages should be dictated by the selling price of coal. Its primary aim was to

¹ W. Gascoyne Dalziel, (comp.), *Records of the Several Coal Owners’ Associations of Monmouthshire and South Wales, 1864 to 1895* (London, 1895), p. 180; *South Wales Daily News*, 3 August 1893.

² For more information on the setting up of the sliding scale see E. W. Evans, *The Miners of South Wales* (Cardiff, 1961).

bring an end to the cycle of strikes which had characterised industrial relations in the early 1870s. Under the agreement, miners would accept without complaint reductions in wages when coal prices were low, as long as wages were then automatically increased without the necessity of the miners taking action when prices were high.³ The belief was that this was the fairest system, and it appeared to work: the coalfield had not seen any large scale or severe disruption to production for nearly eighteen years. This was to change with the action of the Nantymoel hauliers.

On 2 August a deputation marched from Nantymoel, over the hills into the Rhondda and persuaded the workers there to join in the action. Within a couple of days almost all the major pits in the Rhondda Fawr were at a standstill. On 4 August a mass meeting of hauliers was held in the Drill Hall, Pentre; all other mine workers were excluded.⁴ At the meeting it was decided to extend the movement by sending deputations to all parts of the coalfield and to issue a letter to the coalowners calling for a twenty percent increase in wages. There would be no return to work until the request had been met with. The next day, this request together with a letter from William Brace, the leader of the South Wales branch of the Miners' Federation of Great Britain (MFGB or Federation), were read at the Joint Sliding Scale Committee meeting but the Committee refused to acknowledge it, arguing that 'the conditions laid down in the Sliding Scale agreement were a sufficient answer'.⁵ Mabon admitted the action of the hauliers was a breach of the Agreement and made it very plain that the workmen's representatives on the Committee were in no way responsible for it.⁶ The same day, all the wages of the hauliers were retained in the Colliery Offices, only other workmen being paid. This caused widespread anger, although there is no evidence of any

³ The scale established a standard wage rate based on the level of the wages paid in 1879 plus five percent. The equivalent selling price of coal was fixed at twelve shillings per ton for steam coal and eleven shillings per ton for house coal. A rise in the selling price of coal above the standard would convert to an agreed percentage increase in wages above the standard. Advances and reduction were determined by a bimonthly audit which computed prices during the previous period; Richard Keen & Michael Keen, 'The Coal War in South Wales, 1893', *Glamorgan Historian*, Vol. 10, p. 40.

⁴ Ness Edwards, *The History of the South Wales Miners* (London, 1926), p. 110.

⁵ Dalziel, (comp.), *Records of the Several Coal Owners' Associations*, p. 181.

⁶ Edwards, *The History of the South Wales Miners*, p. 110.

outbreak of violence.⁷ The action of the owners did however serve to strengthen the resolve of the strikers, and this was further reinforced when the audit was finally announced giving the men an insignificant one and a quarter percent increase.⁸

Week Two

By Monday 7 August, Mabon's Day, some 40,000 men were out of work due to the strike and were being joined by more on a daily basis. This was partly a result of the operations of the 'marching gangs' of strikers sent to appeal for support to other pits, but was also helped to a degree by fact that the National Eisteddfod had opened in Pontypridd on 5 August and many coal workers were in attendance.⁹

The serious nature and extent of the unrest became more apparent when on Wednesday, 9 August a mass meeting was held at Crumlin where, it was estimated, 10,000 men were present. The colliers at this meeting voted to support the hauliers in their demand for a twenty percent increase.¹⁰ By Friday, 11 August attitudes to the strike within the workforce were clearly polarising, and the first indications of tensions were made apparent at a meeting addressed by Mabon at the Griffin Field in Pentre. Mabon was shouted down by a gang of men from the Ogmore and Garw valleys and had to be escorted home by bodyguards to prevent the strikers from following through on some of their more colourful threats.¹¹ At the same time, a mass meeting of strikers was being held at Tredegar Junction addressed by Opton Purnell, one of the hauliers' leaders in the strike. The following day real violence broke out for the first time. Men from the Rhondda and sections of the Monmouthshire strikers marched on Ebbw Vale, but the Ebbw Valians were prepared for an invasion and a brutal clash ensued, the strikers on the receiving end of the worst of it. The Ebbw Vale pits were briefly forced into idleness but the men remained determined to work and soon production in the upper Ebbw valley had returned to normal.

⁷ *South Wales Daily News*, 7 August 1893.

⁸ Edwards, *The History of the South Wales Miners*, p. 111.

⁹ Keen & Keen, 'The Coal War in South Wales, 1893', *Glamorgan Historian*, Vol. 10, p. 43.

¹⁰ *Pontypool Free Press*, 11 August 1893.

¹¹ *South Wales Echo*, 11 August 1893.

Week Three

On 14 August a conference of hauliers held at the Clarence Theatre, Pontypridd resolved to co-operate with the colliers for a twenty percent advance although they declared that in future they would hold separate meetings. The conference was followed by a mass meeting at the Rocking Stone. Newspapers reports suggested that some 40,000 to 50,000 men gathered on Coedpenmaen Common to hear the debates and to discuss their plan of attack.¹² A special committee of thirteen men was elected to act on behalf of the hauliers and to wait upon the coalowners. By 17 August it seemed as if the strike was on a solid footing: all the collieries owned by Association members were stopped except those in the Swansea district.

As the strike spread, however, the coalowners became more single-minded and unresponsive to the men. The letter from the Rocking Stone Committee asking for meeting with the Coalowners' Association was pointedly ignored, the MSWCOA making it clear that not only would they not negotiate but that they would not even recognise this group as official or legal representatives of the workmen.¹³ The newspapers were in some doubt as to the advisability of the stance adopted by the owners. 'This persistent refusal [to meet the strikers] no doubt is one of principle,' commented a columnist in the *Central Glamorgan Gazette*, 'but they must be cognizant of the fact that this is the only way out of the difficulty.'¹⁴ But if the strikers had the dubious support of the press they did not have the support of their own leadership. At the same time a manifesto was issued by the workmen's representatives on the Sliding Scale Committee, reminding the workforce that they, the leaders, had been given full authority to negotiate terms which they had done to the best of their ability and in good faith and that, 'Therefore, we cannot honourably encourage any attempt to violate the Agreement we have signed at your request.'¹⁵ The

¹² The figure was hotly disputed both at the time and subsequently. Edwards gives a figure of 12,000 in attendance; Edwards, *The History of the South Wales Miners*, p. 113.

¹³ Dalziel, (comp.), *Records of the Several Coal Owners' Associations*, p. 185.

¹⁴ *Central Glamorgan Gazette*, 25 August 1893.

¹⁵ Dalziel, (comp.), *Records of the Several Coal Owners' Associations*, pp. 188-9.

owners' position seemed to strengthen further when a group of non-Association coalowners came forward to offer their help in bringing about a resolution of the dispute.¹⁶

Indeed, the determination of the owners not to concede even the smallest allowance or modification to the sliding scale agreement became more explicit the following day. On 18 August a telegram was dispatched to the Home Secretary requesting the presence of extra troops to strengthen the police presence in order to maintain the peace.¹⁷ Thousands of men, it was claimed, were marauding across the district and unless troops were dispatched immediately no one in South Wales would be safe. The Home Office duly obliged and 2,000 troops descended onto the coalfield.

Week Four

On 21 August a mass procession was organised to march on Ebbw Vale to try to bring out the remaining pits but the weather had changed and the turnout was poor. By the time the marchers from Pontypridd reached Merthyr the procession consisted mostly of a few footsore youths, some soggy banners and a trumpet. Four days later the eastern valleys' men began returning to work and the marching gangs could not keep pace with the drift.

The focus of the strike then shifted briefly west. The men at Neath although late in joining the fray, did so with enthusiasm and energy. Several attempts were made to 'encourage' H. H. Vivian's workmen to join in but the use of some questionable interpretations of the law and the presence of troops brought most attempts to a swift and unsuccessful end. Attention transferred to the anthracite district but here the men simply refused to listen. By the end of August no real headway had been made in the western districts and the limited support there began to crumble.

Week Five

On 28 August a second mass meeting was called at the Rocking Stone, although this time the crowd was more modest in size. Ben Tillet, the dockers' union leader, tried to rally and

¹⁶ Dalziel, (comp.), *Records of the Several Coal Owners' Associations*, p. 186.

¹⁷ Dalziel, (comp.), *Records of the Several Coal Owners' Associations*, pp. 187-8.

re-inspire the crowd, advocating the formation of a strong trade union in order to obtain a minimum wage. A considerable portion of his speech was devoted to advocating the wisdom of joining the MFGB. But although the belief in the rightness of their claim was still strong, the unmistakable signs of disillusionment and defeat were beginning to show on the men and within three days the greater part of the strikers had returned, or were about to return to work.¹⁸

Week Six

The first week of September saw the final act of the strike with a general return to work in many areas, especially in east Glamorgan and Monmouthshire. A third Rocking Stone meeting was held on 2 September and called, rather optimistically, for the resignation of members of sliding scale committee and for a new mode of establishing wages. There was also an appeal for all those present to join the MFGB 'in order to protect ourselves from further oppression; that this organisation is so far the best and most ideal one to look after the interests of the labour party'.¹⁹ But the strike now had no potency and on 10 September, the troops were sent back to their depot, the crisis over.²⁰ The following day the Wyndham and Western pits were fully operational.

Historiography

The reason a description of the strike has been placed at the outset, and one of the reasons the 1893 strike appeals as a topic of research, is that it is an episode in the history of Welsh industrial unrest which has, as yet, attracted little in depth attention from historians. What little has been written suggests that the strike's relative obscurity may well be deserved. It was comparatively short-lived and was, at a superficial glance at least, not only sectional but involved the 'less interesting' part of the mining workforce, the hauliers. In the general historiography of miners' industrial action it understandably barely registers when set

¹⁸ Keen & Keen, 'The Coal War in South Wales, 1893', p. 46.

¹⁹ Dalziel, (comp.), *Records of the Several Coal Owners' Associations*, p. 193.

²⁰ Dalziel, (comp.), *Records of the Several Coal Owners' Associations*, p. 194.

alongside the significance of the strike occurring simultaneously in England and Scotland. This stoppage, led by the Miners' Federation of Great Britain (MFGB) in response to swingeing wage cuts, began at the end of July 1893 and lasted to mid November, eventually involving some 300,000 miners in England and Scotland.²¹ The scale of this strike in itself would have marked it out as important but equally significantly, if not more so, was that with the appointment of Lord Rosebery to mediate in negotiations it represented the first time that Government intervened in industrial relations. The strike in South Wales was not directly connected with these events and, although widespread, did not involve the complete cessation of coal production within the region. Moreover, the strike was a failure in relation to its immediate goals, and it did not lead to any immediate change in labour organisation within the South Wales coalfield. It has consequently also been overshadowed by the events of 1898 which led to the creation of the South Wales Miners' Federation (SWMF) and its contribution to the evolution of a working class consciousness has therefore, again understandably, been regarded as marginal.

The absence of an extended study of events in the South Wales coalfield has not meant, however, that the strike has been completely ignored. On the contrary, there are frequent if brief references to the hauliers' strike in a wide variety of historical studies.²² With a detailed picture of its nature unknown, though, its image changes shape, colour and meaning depending on which context it is placed within. Two main interpretations nevertheless dominate. The first focuses on the sectional nature of the strike. In a short paragraph in his exploration of the 'myth' of miners' solidarity, John Williams has identified 1893 as an example of sectional tensions caused by the organisation of the workforce and divisive wage structures.²³ Similarly, Chris Williams has commented that,

Within the mining work-force, hewers on piece-rates and hauliers or surfacemen on day-rates could find their interest diverging, the clearest expression of this being in the 1893 'Hauliers' or 'Rocking Stone' strike, when

²¹ The classic account of the strike is that of R. Page Arnot, *The Miners* (London, 1951), although there have been numerous reassessments of both the strike and Arnot's work since.

²² See for example Jon Parry, 'Trade Unionists and Early Socialism in South Wales, 1890-1908', *Llafur*, Vol. 4, No. 3 (1986), p. 46.

²³ John Williams, *Was Wales Industrialised? Essays in Modern Welsh History* (Llandysul, 1995), pp. 322-323.

marching gangs of hauliers striking for a twenty percent wage increase brought out miners across the coalfield.²⁴

David Gilbert, taking the sense of division one step further, identifies it as an example of the growing comparative strength of the hauliers in relation to the hewers.²⁵

The second approach has involved placing the events of 1893 within the story of the evolution of coalfield working class organisation. E. W. Evans inserts the strike, albeit in a succinct three pages, into a detailed and colourful account of the growing tensions over the sliding scale and the place of the MFGB in Wales. It takes its place as a kind of abortive dress-rehearsal to 1898.²⁶ Ness Edwards, in one of the earliest and fullest assessments of the strikes, identifies the events of 1893 as 'the first active indication of the rise of the new feeling regarding *bona-fide* trade unionism since the stormy period ended in 1876'.²⁷ His account is a lively, passionate defence of the hauliers' action, and an angry condemnation of the period of the sliding scale as one 'fruitless of both effort and progress'.²⁸ A more recent essay by Richard and Michael Keen provides a more balanced overview of both the course and cause of the strike, but similarly identifies within the struggle a fight between the competing claims of rival unions in South Wales: Mabon's Cambrian Miners' Association, Welsh in origin, conciliatory in approach and the more radical English MFGB led by William Brace.²⁹ There has been the tendency to view the setting up of a union as a natural, inevitable outcome of working class evolution. And the 1893 strike has accordingly been forced to take a place within that story.

The existence of contradictory representations of the strike would perhaps be justification enough for a fuller assessment of the hauliers' strike. But it also worth noting here that

²⁴ Chris Williams, *Capitalism, Community and Conflict: the South Wales Coalfield 1898-1947* (Cardiff, 1998), p. 12.

²⁵ David Gilbert, *Class, Community, and Collective Action: Social Change in Two British Coalfields, 1850-1926* (Oxford, 1992), pp. 75-6.

²⁶ Evans, *The Miners of South Wales*, pp. 155-157. He also refers to it, again briefly, in his study of Mabon; E. W. Evans, *Mabon (William Abraham 1842-1922): A Study in Trade Union Leadership* (Cardiff, 1959), pp. 54-6.

²⁷ Edwards, *The History of the South Wales Miners*, p. 108.

²⁸ Edwards, *The History of the South Wales Miners*, p. 80.

²⁹ Keen & Keen, 'The Coal War in South Wales, 1893', pp. 35-49.

there is some evidence that mainstream historians may have undervalued the experiences of the conflict for those involved. It may be one of those occasions that local historians have been more sensitive the experiences of ordinary people, rather than just concentrating on those events which represent developments of a national significance, and have paid the strike far more attention. The memories of events were evidently still strong enough to prompt Arthur Gray-Jones writing in the 1970s to defend the actions of the Ebbw Vale men.³⁰ Although R. Page Arnot wrote little of the strike himself, he was aware that memories of the strike were long lasting – even in the 1950s it was still talked of. Arnot also suggests the reason the strike was not commemorated as others were was because the older officials of the later union ‘had been busy in an endeavour to quench this tumultuous outburst’.³¹ In other words, there were many who preferred the strike to be forgotten. This alone should be sufficient to prompt historians to remember.

There are of course many questions which could be asked about the events of 1893. There is a vast quantity of literature, by historians, sociologists and economists on the question of miners and industrial action. Studies of large scale, iconic strikes, most notably the Cambrian Combine Strike of 1910-11 and the General Strike of 1926, which focus on the role of unions in instigating, organising and sustaining communities during the period of struggle, have unsurprisingly dominated.³² These were strikes which raised issues of fundamental importance to the trade union world.³³ But there are also numerous analyses of the multiple short term strikes which characterised the early twentieth century experience.³⁴

³⁰ Arthur Gray-Jones, *A History of Ebbw Vale* 2nd ed. (Rogerstone, Gwent, 1992), pp. 181-4. In other regions, ‘[t]he miners were shattered by its consequences. The seeds of discontent were sown’; Katie Olwen Pritchard, *The Story of Gilfach Goch, Wales* (Risca, 1973), p. 59.

³¹ R. Page Arnot, *South Wales Miners/Glowyr De Cymru: a History of the South Wales Miners’ Federation* (London, 1967), p. 38.

³² David Smith, ‘Tonypandy 1910: definitions of community’, *Past and Present*, No. 87 (May, 1980), pp. 158-84; Dai Smith, *Wales: A Question for History* (Bridgend, 1999); Gilbert, *Class, Community, and Collective Action*.

³³ L. J. Williams, ‘The New Unionism in South Wales, 1889-92’, *Welsh History Review*, Vol. 1, No. 4 (1963), p. 413.

³⁴ One of the most thorough analyses of miners’ strike propensity is provided by Roy Church & Quentin Outram, *Strikes and Solidarity: Coalfield Conflict in Britain 1889-1966* (Cambridge, 1998).

Such studies adopt so many different conceptual, methodological and theoretical approaches that they cannot be covered in any depth here.³⁵ Suffice to say they often concentrate on explaining the higher propensity to strike amongst miners compared to other occupational groups and the regional variation in strike propensity within miners as a group.

However, there is rarely any attempt to explore the link between strike propensity and the behaviour of individual pits during large scale strikes. And, surprisingly, few of the main approaches, though concerned with the geographical variation in the strike pattern, make any attempt to map strike distribution. The sole exception is *An Atlas of Industrial Protest in Britain 1750-1990* and here the writers readily accept that labour historians are reluctant to think about the geography of their subject matter.³⁶ Even fewer studies make any concession to the geological variations between and within coalfields beyond a superficial acknowledgement.³⁷ Church and Outram are unusual in recognising that localised geological problems could significantly influence the readiness or otherwise of particular groups of miners to take strike action. Rather than try to understand the extent and significance of this influence, however, they seek other 'non-structural' explanations for variant strike propensities. To minimise the influence of geology, they therefore

³⁵ The most influential, though now largely discredited, theory is Kerr and Siegel's 'isolated mass' hypothesis whereby miners form 'almost a race apart' and 'strike ... is a kind of colonial revolt against far removed authority'; quoted in I. M. Zweiniger-Bargielowska, 'Miners' Militancy: a Study of Four South Wales Collieries during the Middle of the Twentieth Century', *Welsh History Review*, Vol. 16, No. 3 (June, 1993), p. 361. See also: Roy Church, Quentin Outram & David N. Smith, 'Essays in Historiography: Towards a History of British Miners' Militancy', *BSSLH*, Vol. 54, No. 1 (Spring, 1989), pp. 21-36; Roy Church, Quentin Outram & David N. Smith, 'British Coal Mining Strikes 1893-1940: Dimensions, Distribution and Persistence', *British Journal of Industrial Relations*, Vol. 28, No. 3 (Nov., 1990), pp. 329-49; Roy Church, Quentin Outram & David N. Smith, 'The "Isolated Mass" Revisited: Strikes in British Coal Mining', *The Sociological Review*, Vol. 39, No. 1 (Feb., 1991), pp. 55-87. For an overview of general strike literature see Church & Outram, *Strikes and Solidarity*, pp. 1-16. For an example of an early attempt to exploit computer technology to analyse strike propensity in Wales see Deian Hopkin, 'Strikes in Wales 1888-1958: A Case for Computing', *Llafur*, Vol. 5, No. 1 (1988), pp. 81-90.

³⁶ Andrew Charlesworth et al, *An Atlas of Industrial Protest in Britain 1750-1990* (Basingstoke, 1996), p. xii.

³⁷ One of the exceptions is Zweiniger-Bargielowska, 'Miners' Militancy', pp. 356-389.

concentrate their study on comparing and contrasting the strike histories of pits operating under (apparently) similar geological conditions. Such studies leave unanswered a wide range of questions about the geography of strikes and the influence of geology on strike action.

In addition to the strike literature it is important to be aware of a body of material dealing with the question of the nature of coalfield society. During the past twenty years Welsh historians have sometimes angrily debated the issue of the extent to which the coalfield can be regarded as a homogeneous 'entity'.³⁸ There has been growing concern over the idea, which for a while seemed to dominate Welsh historiography, that someone could put a pin in a map anywhere and it would tell the story of the whole. More especially the idea that the Rhondda is and was representative of coalfield experience generally – a kind of 'Everymine', so to speak – has come under increasing attack. Nina Fishman has raised concerns about the image of the coalfield as a monoculture based on a single industry and drawn attention to the lack of research on issues such as occupational mobility between coalmining and other occupations in, for example, the steelworks, the railway and engineering.³⁹ Joe England has similarly questioned the degree of homogeneity and has emphasised the place of the iron industry in South Wales's economy.⁴⁰ The concern about coalfield identity has been raised in response to a number of community and valley-based studies, most notably Ioan Matthews' important study of the anthracite district, which have drawn attention to the different experiences of sections of the coalfield.⁴¹ Question marks still remain over the level of variations but especially over the implications of those

³⁸ See the debate about coalfield identity that followed Stefan Berger's comparison of South Wales and the Ruhr in the pages of *Llafur* journal in 2002: Stefan Berger, 'And What Should They Know of Wales?: why Welsh history needs comparison', *Llafur*, Vol. 8, No. 3 (2002), pp. 131-9; Nina Fishman, 'A comment on "Working-class culture and the Labour Movement in the South Wales and the Ruhr Coalfields, 1850-2000: a comparison" – by Stefan Berger', *Llafur*, Vol. 8, No. 3 (2002), pp. 107-15; Joe England, 'Working-class culture and the Labour Movement in South Wales Reconsidered', *Llafur*, Vol. 8, No. 3 (2002), pp. 117-30; Mike Lieven, 'A "New History" of the South Wales Coalfield?', *Llafur*, Vol. 8, No. 3 (2002), pp. 89-106.

³⁹ Fishman, 'A comment', p. 110.

⁴⁰ England, 'Working-class culture', pp. 120-1.

⁴¹ Ioan Aled Matthews, 'The World of the Anthracite Miner' (Unpubl. PhD, UWC, 1995). See also, Michael Lieven, *Senghennydd: the Universal Pit Village, 1890-1930* (Llandysul, 1994).

variations for understanding the region's social, economic and political development and character.

Primary Sources

There are plenty of reasons therefore why a fuller study of the events of 1893 might be worthwhile. There is, though, a major obstacle to such a study, which may also account in part for the poor attention paid to the strike by historians so far, that is, the sparse nature of the sources. The strike was unofficial and did not formally involve any of the established miners' leaders or any of the local unions. It was also, of course, before the formation of the South Wales Miners' Federation. There was therefore no representative organisation to generate or maintain written records of proceedings from the strikers' perspective.⁴² The records of the Monmouthshire and South Wales Coal Owners' Association (MSWCOA) by contrast have survived in both manuscript and published form. During the course of the strike there were numerous meetings between the coalowners and the workers' representatives on the Sliding Scale Committee, and these are recorded in some detail in the records. But while these are undoubtedly important and might provide some useful incidental information, they reflect the anti-strike position of the established miners' leaders and provide no insight into the thinking of the mass of the men actually involved in the action.

These records have therefore only been exploited in the published form, which includes a day-by-day account of the course of the strike.⁴³ Indeed, the manuscript records of the MSWCOA were an unexpected victim of the adoption of an interdisciplinary approach. Interdisciplinary studies, especially those involving the use of GIS, are very time consuming and in order to cover as much material as possible in the time allowed, it became necessary

⁴² Although a committee was appointed to represent the striking men and to issue official manifestos and letters to the press and Coalowners' Association, there does not appear to have been much additional written documentation produced from the strikers' perspective – at least not any that has survived.

⁴³ Dalziel, (comp.), *Records of the Several Coal Owners' Associations*.

to prioritise records likely to provide the maximum amount of information for the effort put in. As the MSWCOA records essentially only deal indirectly with events on the ground and are concerned only with Association pits, the amount of work involved in searching through the mass of material was disproportionate to the potential gains. On the other hand, thanks to the use of GIS, it was possible to exploit the published records far more fully than has previously been possible, so the potential losses due to non-consultation of the manuscripts have been offset to a degree by the gains in the use of the published account. More will be said on this in Chapter 6.

Frustratingly, many of the sources which have been interrogated profitably in other strike studies are grudging with their information on the 1893 strike. The minutes of individual coal companies, for example, refer only obliquely to 'the current difficulties', the main concern being with the impact of the reduced output on share values. There is also no evidence in the records of the Poor Law Unions that the suffering during 1893 reached a level where people were forced to appeal for help to 'the parish', although admittedly this may be more a reflection on the contemporary nature of Poor Law provision than an indication of the actual level of want. In addition, the survival rate of school board logs for the early 1890s is patchy and, in any case, the main part of the strike occurred during the summer vacation period so there is little direct reference even in the records which are available.

As a result, the main sources of information are newspapers. The South Wales coalfield was fortunate to have five daily newspapers, the *Western Mail*, the *South Wales Daily News*, the *South Wales Argus*, the *South Wales Echo*, and the *Cambrian Daily Leader*, which together effectively cover the key sections of the coalfield from Swansea to Newport. There were also a numerous local weekly newspapers which have survived more or less complete although their geographic coverage is patchy. Some areas had no local paper at all while others were almost over-provided for. Glyncoirwg and Gilfach Goch, for example, do not appear to have had a local paper in the 1890s and were only of peripheral interest to the larger local or regional press. Pontypridd, by contrast, had the *Pontypridd Chronicle*, the

Glamorgan Free Press, and the *Pontypridd Herald*.⁴⁴ There are serious 'blind spots' in the geographic coverage of the newspapers, therefore. In addition to the English language newspapers, two Welsh language newspapers, *Tarian y Gweithiwr* and *Y Tyst*, were also consulted with help of Dr Bill Jones.

Newspapers are notoriously unreliable sources of information, and it should come as no surprise that they contain conflicting opinions about the causes and origins of the strike, reflecting the biases of the various proprietors. Indeed, local papers, which tended to be more sympathetic to the aims of the strikers, published several complaints that the dailies were guilty of seriously misrepresenting the cause and aim of the strike. There were repeated complaints against the *South Wales Echo* and *South Wales Daily News* for 'being guilty of publishing things likely to mislead our workmen and upholding Mabon in his failure to lead the Labour cause'.⁴⁵ Reporters were also excluded from numerous meetings and seem to have made free with their interpretations of events as a result.⁴⁶ Accounts are often contradictory, sometimes even within the same newspaper, and even within same page.

Nevertheless, there is little reason to question some of the factual data about the timing of pit closures, for example. Accurate information about this was essential to both sides of the argument, even if there was still some dispute about the degree of the support for the strike which had brought about the closure. There are also a sufficient number of papers with varying political biases to develop a fairly thorough understanding of the issues and arguments involved. Moreover, newspapers can provide the kind of detail which cannot be obtained elsewhere, incidental information, unconscious references to shared ideas or the apparently insignificant details of everyday life which were added to provide colour and context to reports. There is no apparent reason for reporters to have exaggerated or

⁴⁴ Some of the local papers also simply repeat word for word articles published in the dailies, so there is a lot of duplication of information.

⁴⁵ *South Wales Gazette*, 1 September 1893; *South Wales Argus*, 4 September 1893. See also Isaac Evans' complaint of press 'misrepresentation and misconstruction' in *Herald of Wales*, 26 August 1893.

⁴⁶ *South Wales Echo*, 8 August; 11 August 1893.

misrepresented the state of the weather, the mode of transport used by strikers, or the choice of venue. And concerns about the strike are juxtaposed with articles and letters about other political, economic and social concerns and reveal what was current in people's thinking, and how contemporaries made connection between events. Newspapers provide colour on a whole range of social activities which help put the strike in context.

The Structure of the Case Study

The difficulties with the primary sources are not the only drawback to studying the hauliers' strike. There are, as has been seen, contradictory representations of the strike but these hardly constitute a debate within the historiography which can form the basis of a critical study. The conflict arises primarily out of a lack of real information about the strike rather than from opposing interpretations of the evidence. The absence of a fully developed study means that the basic story needs to be recovered first, before we can see how much further the use of GIS and geological perspectives can take us. On the other hand, the need to, in effect, 'start from scratch' does at least allow the opportunity to demonstrate the limits as well as the advantages of a different approach. There are some areas of historical research which simply do not lend themselves to either geographic or geological perspectives; here only good old-fashioned archival and text-based research has any chance of recovering anything worthwhile. These issues will be discussed in more detail in the relevant sections. Indeed, the study will begin with a standard document-based, narrative approach. It will examine in turn some of the key explanations of the origins of the strike. In the process it will seek to answer whether 1893 should be understood primarily as a sectional strike and where, indeed even whether, it should be placed on the path to full unionisation. It will also consider an issue of primary concern to contemporaries, namely the influence and role of English migrants. Because a primary goal of the PhD is to explore the influence of geology these more usual areas of historical research are, however, only touched on comparatively briefly; it has not been possible to go into the depth of discussion about ideology and attitudes to unionism, for example, which would be included in a more traditional history PhD.

This will be followed by an extended section looking at the influence of the geological structure of the coalfield on behaviour. It will be suggested that to fully appreciate the pattern of events in 1893 it is necessary to look beyond the more obvious causes of the dispute and to set the strike within both a physical and wider historical context. This approach does admittedly need some justification. As was noted in Chapter One, historians are usually reluctant to give more than a passing nod to the environment for fear of falling into a kind of environmental, or in the case of the South Wales coalfield, a geological determinism. Nevertheless, to ignore those influences which shaped and formed the coalfield itself, is to misunderstand not just the circumstances in which the industry developed but to misrepresent the experiences of many coalfield communities. The nature of the geology set the tone for relations amongst the workforce and created, directly and indirectly, a whole series of divisions between men within the same industry in a way which did not and would not occur in any other type of industry.

Moreover, the physical environment provides a different context within which to place industrial relations, since both employers and employees were subject to the vagaries of the geological conditions. Industrial relations need to be understood within the context of the state of the industry at any given point in time – the two should not be divorced from each other. It is more than just a question of economics: location, mode of working, productivity, safety and a whole host of other factors, all have a bearing on relations between employer and employee.

The final section of the case study will look beyond the ‘why’ of the strike and explore something of the ‘how’. It will seek to understand the interaction between the shape of the landscape and the pattern of the strike. It will explore how the landscape was used and how it impacted on and influenced communications. In the process, it will hopefully expose how the landscape shaped the decision making processes of the historical actors and thus made a significant, and too frequently ignored, contribution to the outcome of the strike.

CHAPTER FIVE

Causes of the Hauliers' Strike

This chapter will look at three of the main explanations offered by contemporaries for the events of August 1893. The first section will look at the part played by the men after whom the strike is named, the hauliers. It will look at the evidence for the role of the hauliers in propagating, spreading and maintaining the strike and will assess the response of other sections of the workforce in order to establish the extent to which the 1893 strike can and should be seen as a sectional strike. The second section will look at the extent to which the 'hauliers' strike' can be regarded as a struggle between competing ideologies. It will look at the role of the MFGB in the spread of the strike and whether opposition to the strike can be interpreted as support for the sliding scale. It will also look at the role of the official miners' leaders in proceedings, especially the role of William Abraham and William Brace. In the third and final section, the role of migrants in promoting the strike and the place of racial, linguistic and generational tensions will be addressed.

(a) The Hauliers

The hauliers as a group are less well-known than the more iconic colliers and, in some respects have suffered an even lower profile in mining literature than their 'colleagues', the pit ponies. Amongst contemporaries, however, certain images of hauliers were popular. Newspaper representations of hauliers tended to depict them as a peculiar, sometimes brutal, class, ready to strike over the smallest perceived injustice and so widespread was this image that they seem rarely, as a group, to have won widespread support or public sympathy.¹ There was, in fact, more than a little truth in the newspaper allegations. Board of Trade reports from the 1890s tell of a strike of twenty one hauliers at Merthyr over a purely temporary shortage of corn below ground to feed the horses.²

¹ *Western Mail*, 7 July 1879.

² Parliamentary Papers (PP), House of Commons (HC), 1896 [C.8231], *Report by the chief labour correspondent on the strikes and lock-outs of 1895*, pp. 39-40.

Despite their peculiarities as a group, however, hauliers were vitally important to the operation of the pit. The haulier's job involved supervising the horses, the distribution of empty trams, the transportation of full trams of coal to pit bottom, and the carrying of pit props.³ Without the hauliers the pits could not function as there was no space underground to stockpile extracted coal. Unfortunately, there are no accurate statistics for the number of hauliers in 1893. The Board of Trade Report for 1893, however, stated that hauliers constituted ten percent of those employed in mines, which would give an approximate figure of 12,000. But there could be sizeable variations in numbers from pit to pit. Thirty three hauliers worked at the Garth Merthyr Colliery where a total of 250 men were employed on the surface and underground. At Llest Colliery, by contrast, there were 300 men but only 13 hauliers, much of the hauling there unusually being 'done by steam'.⁴

As a job, hauling possessed a certain amount of appeal especially for young boys first entering the mine. Indeed the job was frequently identified with the young. In his novel *Bidden to the Feast*, Jack Jones noted the draw of working with horses:

It was the horses Will was most excited about this evening. Like all the other boys of his age made men at fourteen in all the pits, he admires the hauliers for their independence, the way 'they tells the bosses straight,' but it is the fact that tomorrow morning a horse in the pit named 'Captain' will be known henceforth as 'Will Davies's horse', that is what makes him he can hardly sleep for excitement.⁵

³ As late as 1913 there were 73,000 horses and ponies in British mines. In the South Wales coalfield the horsepower-per-million tons ratio was 295, the second highest figure for a British coalfield; Roy Church, *The History of the British Coal Industry: Volume 3, 1830-1913: Victorian Pre-eminence* (Oxford, 1986), p. 365.

⁴ *Central Glamorgan Gazette*, 25 August 1893.

⁵ Jack Jones, *Bidden to the Feast* (London, 1938), p. 115. Lewis Jones similarly emphasised the glamorous appeal of working with horses for the young; *Cwmardy: The Story of a Welsh Mining Valley* (London, 1983), p. 119.

By having his own horse to work, a boy was effectively his own boss, his own man, right from the outset of his working life. There would be, in most cases, a supervisor, a 'gaffer' haulier who oversaw the shift but who did not work a horse himself, and a 'turn' haulier who would direct each haulier to which stall he needed to go to next.⁶ But a young haulier did not have to serve a long apprenticeship alongside an older miner as he did if he wanted to become a collier.⁷

Against this level of independence had to be weighed lower wages and sometimes appalling working conditions. Hauliers were paid by the day wage and this fluctuated with the price of coal. By 1893, wages were especially bad for hauliers, in some regions amounting to barely three shillings a day. Hauling was also hardly less dangerous than hewing, and hauliers were frequently faced with conditions over which they had little say or control.⁸ 'Swampy' conditions were the worst, as the men had to drive through water occasionally deep enough to reach a horse's belly. But even dry pits were not much better. Hauliers often worked in great clouds of dust kicked up by the horses and they sometimes had to shovel the dust from the roadways to keep the rails clear. They could easily be crushed by journeys either as they negotiated points and sharp corners or as they attempted to hold trams back on steep inclines.⁹ Poor track lines, distorted by the 'squeeze' of the rock strata or by careless initial laying meant that trams would bounce around, knocking into the sides of the roadway and even on occasions bringing down roof supports, causing a fall that could kill the haulier. Derailments were frequent, dangerous and dirty work, especially if the tram had to be unloaded in order for it to be straightened up.¹⁰ The pressure to maintain a steady movement of trams in and out of the pit often led hauliers to

⁶ This latter job was apparently not an attractive position. The 'turn' haulier would have to locate full trams waiting to be moved and while he was doing this, the others could take a break – South Wales Miners' Library [SWML] AUD/195 & AUD/196: Interview with William 'Box' Thomas.

⁷ SWML AUD/195 & AUD/196: William 'Box' Thomas.

⁸ In 1904, Mr Martin, the mines' inspector for the South Western Division, stated: 'I consider haulier's work exceptionally dangerous under the conditions existing at many of the Monmouthshire collieries'; PP, HC, 1905 Cd. 2506, *Reports of Joseph S. Martin, H. M. Inspector of Mines for the Southern District No. 12, for the year 1904*, p. 17.

⁹ 'Journey' is the term for a chain of trams.

¹⁰ Bill Richards, *Cambrian Colliery and Connections* (Bridgend, 2006), p. 2.

try to restore derailed trams single-handedly rather than wait for others to help. These attempts were met too often with fatal consequences.¹¹ Twelve men were killed in South Wales in tram related accidents in the first seven months of 1893 alone. There were some so called 'compensations' for working in poor conditions: the custom at some pits was to give hauliers notes for beer on the way home at night. But this practice was hated and there were those during the strike who would have endorsed Jack Jones's bitter comments:

So if the hauliers were what the bosses called 'a drunken lot', then the bosses were largely responsible for making them so by giving them notes for beer instead of overtime money for driving through water all day in the dark.¹²

Relations with Colliers

Their role placed hauliers in ambiguous position in relation to colliers. On the one hand, hauliers and colliers shared similar dangers and of all the underground workers probably were the ones that came into most regular contact with each other. Katie Olwen Pritchard suggested that the hauliers' reputation for 'extraordinary wit and humour' was developed through 'their daily contact with men of different temperament [which] encouraged ready and spontaneous retorts'.¹³ On the other hand, as Ioan Matthews found for the anthracite region, hauliers were regarded as outside the community of the mine since they were not actually involved in the cutting of coal.¹⁴ The hauliers remained 'a group apart'.

Nor was hauling highly rated as a job by many colliers. As one miner caustically commented the only qualification necessary to be a haulier was the ability to tell the horse to move!¹⁵ Part of the problem with hauliers was that in South Wales, in contrast to, for example, the north of England, hauling was not seen as a step on the route to the ultimate goal of hewing. The Welsh

¹¹ For a fuller discussion of these and other dangers faced by hauliers see T. Boyns, 'Work and Death in the South Wales Coalfield, 1874-1914', *Welsh History Review*, Vol. 12, No. 4 (Dec., 1984), p. 528.

¹² Jones, *Bidden to the Feast*, p. 112. See for example *Glamorgan Free Press*, 2 September 1893.

¹³ Pritchard, *The Story of Gilfach Goch*, pp. 157-8.

¹⁴ Ioan Aled Matthews, 'The World of the Anthracite Miner' (Unpubl. PhD, UWC, 1995), p. 131.

¹⁵ SWML AUD/195 & AUD/196: William 'Box' Thomas.

system lacked the rigid hierarchical structure of many English coalfields and offered the haulier 'no inducement to cast aside his boyish occupation', at it offered no hope of advancement or betterment.¹⁶ Martin Daunton has suggested that this meant that relations between hauliers and colliers in South Wales were likely to be strained, since it implied 'once a haulier, always a haulier', that is, they were never going to be able to improve or advance their position.¹⁷

At the same time, as Daunton has also pointed out, the day-wage pay structure meant that unlike the piece-rate colliers, hauliers had no opportunity to maintain their earnings during wage-reductions by increasing their workload, as could colliers. A haulier was paid the same however many trams he hauled.¹⁸ And if the colliers increased their output to compensate for low wages it increased work for the hauliers at precisely the time their wages were at their lowest.¹⁹ Relations could be further strained because hauliers were notoriously unreliable in turning up for work. If hauliers were too few in number, a collier could be called from his place of work to help with the trams and this was understandably disliked by the colliers because it meant a reduction in wages.

All workers, especially the hauliers themselves, were moreover very conscious of their importance in the operation of the mine. As Jack Jones observed,

The hauliers were the 'pivotal' workmen of the pits their actions so often rendered idle. They were, these men who drove the horses underground, the most indispensable section of a pit's workers, and what was more,

¹⁶ *Proceedings of the South Wales Institute of Engineers*, Vol. 5, No. 1 (1866/7), p. 20.

¹⁷ M. J. Daunton, 'Down the Pit: Work in the Great Northern and South Wales Coalfields, 1870-1914,' *The Economic History Review*, N.S. Vol. 34, No. 4 (Nov., 1981), p. 591. This is actually questionable. Occupational mobility is not something that has been studied in any detail, and some autobiographies and oral testimony suggest that there could be movement from hauling to hewing, and sometimes back again depending on age, family circumstance and health.

¹⁸ Daunton, 'Down the Pit', p. 591.

¹⁹ Philip Cooke sees this as an issue behind the 1893 strike; 'Class Practices as Regional Markers: a Contribution to Labour Geography', in Derek Gregory & John Urry (eds.), *Social Relations and Spatial Structures* (London, 1987), p. 227.

they knew it.²⁰

One way of compensating for low wages seems to have been the demanding of 'tips', 'trumps' or 'rent' for priority delivering of props or empty trams. Henry Davies reported to the Royal Commission on Mines in 1907 that safety was being compromised by hauliers who were giving the first empty trams and the best props to the men who were regular in paying 'rent':

When a man in Monmouthshire has not paid his 'rent' this is what happens: the examiner comes round and finds a man has not stood a post where it ought to be stood, and then the poor collier complains that he had no post Then the examiner turns to the haulier and says, 'Why did you not bring this man a post?' and he replies, 'He did not pay his rent last month.'²¹

If the hauliers were not handled carefully they would walk, and then, 'No hauliers – no work, no, not for anybody'.²² This invested the hauliers with a certain amount of power within the pit which was frequently resented. It is clear then that the occupational structure of the South Wales coal mines forged an uneasy bond between hauliers and colliers. The groups were dependent on each other, but what was best for one group was often at odds with what was best for the other. It is hardly surprising that co-operation between the two during this period has been regarded as unlikely by historians.

Hauliers and the Strike

There can be little doubt that the strike began amongst a narrow section of the workforce, namely the hauliers of the Ocean and Wyndham Pits, Nantymoel. It was clearly they who on 1 August downed tools and brought the pits to a standstill. And they too who formed the processions that marched into the Rhondda and brought the stoppage to the pits there. Moreover, it is clear that the blame for the stoppage was laid squarely on the shoulders of the

²⁰ Jones, *Bidden to the Feast*, p. 109-10.

²¹ PP, HC, 1908 Cd. 4349, *Royal Commission on Mines: Minutes of Evidence*, Vol. III, p. 194. It is not clear how long standing such practices were or how widespread, though by the inter-war period Ron Berry viewed 'trumps' as 'legitimate bribery ... part of our socio-economic fabric'; Ron Berry, *History is What You Make It* (Llandysul, 1998), p. 41.

²² Jones, *Bidden to the Feast*, p. 109-10.

hauliers by contemporaries, both in the heat of the conflict and in the immediate aftermath.²³ As the strike spread and the coalowners were faced with trying to counter the action, it was the hauliers who had their wages stopped and were the ones who faced prosecution.

In addition, the aims of the strike appear to have been focussed on improving the condition of the hauliers as a distinct group. The strike seems to have been prompted initially by a demand for better wages but as time went on it also became clear that there was an underlying frustration at the status of hauliers within the workforce. One speaker addressing a mass meeting declared the hauliers' 'were waging battle ... for things calculated to ameliorate their position in the mines'.²⁴ There were complaints from strikers that the hauliers were now 'everybody's servant' because they were expected to fill timber, repair roads and do other odd jobs, not just drive the horses as 'in years gone by'.²⁵ But the real root of their anger seemed to lie in the fact that their concerns were too frequently ignored. There were complaints that they could not get funding from colliery committees' to send hauliers' delegates to meetings, unlike the colliers' representative.²⁶ And, in any case,

[T]hey [the hauliers] had found, if they had any grievance to remedy and went to 'Mabon' or any of his gang for support, a mass meeting of colliers and hauliers was called, and they were always in such a minority that they had no chance.²⁷

Throughout the course of the strike this frustration was translated into a refusal by the hauliers to abide by the results of any ballots.²⁸ Indeed, the argument was frequently made by the strikers that since it was a strike of hauliers, their action could not be regarded as illegal, as the coalowners and miners' leaders claimed. The hauliers had no official representative on the sliding scale committee and therefore they had not, as a group, ever entered into an

²³ *South Wales Echo*, 2 August 1893; *Merthyr Express*, 2 September 1893.

²⁴ *Western Mail*, 26 August 1893.

²⁵ *South Wales Echo*, 22 August 1893.

²⁶ *Western Mail*, 7 August 1893.

²⁷ *Merthyr Express*, 12 August 1893.

²⁸ *South Wales Echo*, 16 August 1893; *Tarian y Gweithiwr*, 17 August 1893.

agreement. How then, they argued, could they be acting illegally when there was and never had been any contract to break?²⁹

Quite clearly too there was a huge amount of resentment against the hauliers for their action. Criticisms mounted at the proliferation of hauliers-only meetings, colliers increasingly frustrated at their exclusion from the decision making processes. At some pits the colliers took the unusual, and divisive, action of allowing other underground workers and even officials to do the job of hauling. Dalziel recorded that at Llynypia, for instance, all the hauliers, underground enginemen, riders and shacklers were on strike but the colliery continued operating by calling on managers, under-managers, firemen, overmen and surveyors to shift the trams.³⁰ It would appear from this that it is not unreasonable to maintain that the strike was a sectional one.

Nevertheless, the evidence needs to be handled with a degree of caution. It was in the best interests of both the coalowners and the miners' leaders to present the strike as the work of a minority. If the trouble could be blamed on a small section, and a section with a reputation of being 'idle, reckless, drunken men' at that, then not only would the legitimacy of the strikers' complaint be undermined, but the refusal of the coalowners to negotiate and the condemnation of the strike by the miners' leaders could be defended.³¹ The troublemakers, it could be argued, were not representative of the bulk of honest, loyal workers. For the miners' leaders especially to acknowledge any widespread disaffection would be to acknowledge dissatisfaction with their own leadership.

²⁹ See the various speeches and arguments presented throughout the first two weeks of August in all the daily newspapers. See especially the arguments used in defence of their actions by hauliers summonsed by coalowners in *Central Glamorgan Gazette*, 25 August 1893.

³⁰ W. Gascoyne Dalziel (comp.), *Records of the Several Coal Owners' Associations of Monmouthshire and South Wales, 1864 to 1895* (London, 1895), p. 180; E. W. Evans, *The Miners of South Wales* (Cardiff, 1961), pp. 156-7.

³¹ Morgan Thomas, one of the hauliers' leaders protested strongly at this image; *Western Mail*, 26 August 1893.

In reality it appears that quite quickly the degree of support for the strike became more widespread. Despite the best efforts of the coalowners and miners' leaders, evidence of mass support for the strike in fact began to appear in the newspapers. The picture is admittedly confused and confusing, contradictory reports of the extent and scale of the stoppage appearing side by side. Part of the cause for the confusion, however, was the widely varying responses of individual pits to the crisis. In some places, the hauliers were quickly followed into the strike by the colliers, especially in the central coalfield valleys. At a meeting at Crumlin, it was declared to great enthusiasm that, 'the hauliers had taken the bull by the horns, and now the colliers had come out to help the hauliers "chuck" the bull over the hedge'.³² At several pits in Monmouthshire, the workforce came out *en masse* while the colliers and hauliers at a number of pits in the Aberdare valley were united in their condemnation of the strikers, claiming that they were only out under compulsion.³³ In other places, the hauliers, notably at Penrhiwfer, stood alone against the strike.³⁴ At Loughor the hauliers were sympathetic but chose not to respond to the call for action; they were happy with their rate of pay, which was significantly higher than that elsewhere.³⁵ At Aberaman, 'the colliers are even more determined than the hauliers not to resume work until the 20 percent. is conceded'.³⁶ The action of the men at Llwynypia in taking over hauling duties should also not be accepted as typical, in the way E. W. Evans has suggested. The managers of the Powell Duffryn collieries tried to persuade the colliers to do the hauliers' work but received a categorical refusal.³⁷ And even at Dowlais,

³² *Pontypool Free Press*, 11 August 1893.

³³ *South Wales Daily News*, 19 August 1893.

³⁴ *Western Mail*, 25 August 1893.

³⁵ Hauliers in the Rhondda were apparently receiving only 2s 10d to 3s 2d per day compared with a standard of 3s 9d in the Loughor pits; *Cambrian Daily Leader*, 22 August 1893.

³⁶ *South Wales Daily News*, 19 August 1893.

³⁷ *South Wales Echo*, 18 August 1893. Similarly the colliers at a mass meeting at Crumlin resolved that 'no collier would undertake to usurp the haulier's position'; *South Wales Argus*, 9 August 1893.

where there was real opposition to the strike, there was a determination that no colliers would take on the job of hauling.³⁸

Indeed, it was acknowledged by the MSWCOA and the newspapers, albeit reluctantly, that by the second week the South Wales coal industry was experiencing a general strike. On 11 August the Monmouthshire members of the Coalowners' Association conceded that in their district 'the Hauliers were distinctly supported by the Colliers and in the instance of one colliery the only workmen who had presented themselves for work were the Hauliers'. Just one day later the whole of the Coalowners' Association were forced to accept that 'in many instances the colliers were equally responsible with the Hauliers for the stoppage'.³⁹ As the strike was reaching its peak, the newspapers began to talk more explicitly about the general nature of the stoppage, the *Central Glamorgan Gazette* asserting, 'Hauliers and colliers appear in the majority of the South Wales districts to be working hand-in-hand'.⁴⁰ From 11 August onward most of the strike was co-ordinated between hauliers and colliers. The Rocking Stone committee, appointed to represent the strikers, seems to have been made up of hauliers and colliers, though the exact balance between the two is not clear.⁴¹ Mass meetings and processions were all joint affairs. And those arrested for intimidation, as opposed to those prosecuted for leaving work without notice, were a mixture of hauliers and colliers.⁴² So the two groups were clearly working together.

At the same time, however, it needs to be recognised that while it was not simply a strike of hauliers, the co-operation between the two groups of workmen was limited, and some sections of the mining workforce were barely involved at all. The *Aberdare Times* pointed out that 'no mention is made in the present struggle of the labourers' wages, which at many of the collieries

³⁸ *Merthyr Express*, 19 August 1893.

³⁹ Dalziel (comp.), *Records of the Several Coal Owners' Associations*, p. 183.

⁴⁰ *Central Glamorgan Gazette*, 25 August 1893.

⁴¹ *South Wales Argus*, 15 August 1893.

⁴² *Central Glamorgan Gazette*, 8 September 1893.

here are only 2s 7d per day'.⁴³ Enginemen and stokers had their own union and categorically refused to join in the strike.⁴⁴ There continued to be separate meetings throughout the strike, and an uncompromising determination by the hauliers to retain a separate identity and have a separate say. The hauliers insisted they would not accept less than twenty percent; even if the colliers accepted ½ percent less they would not agree with them and would stay out.⁴⁵

The colliers, moreover, can hardly be said to have struck work in support of the hauliers. The Board of Trade report suggested that 'though idle by no action of their own many of the miners were not sorry to have an opportunity of protesting against the sliding-scale arrangement' and many were more concerned about gaining the advance for themselves than for other sections of the mining workforce.⁴⁶ It might even be argued that we should speak of two strikes, one by hauliers and another simultaneously by colliers, with similar but distinct purposes. Whether we talk of a single or double strike, however, the evidence of the more widespread nature of unrest calls into question some of the assumptions and claims historians have made for the events of 1893. Clearly support or opposition to the stoppage was not simply delineated along occupational lines. There is little evidence to support David Gilbert's claim that, 'The solidarity and strength of the hauliers' strike was a clear indication that the hauliers were becoming more powerful as the privileged status of the collier in the work process was eroded'.⁴⁷ There were undoubtedly divisions across the coalfield but they were never purely occupational and can hardly therefore be interpreted as evidence of a conflict of interest. The issues were perhaps more fundamental, rooted in widespread dissatisfaction with pay, conditions, organisation and representation which overrode occupational differences. Some of these will be addressed in the next section's discussion of the role of the Miners' Federation of Great Britain in the strike.

⁴³ *Aberdare Times*, 26 August 1893.

⁴⁴ *South Wales Echo*, 21 August 1893.

⁴⁵ *South Wales Argus*, 14 August 1893.

⁴⁶ PP, HC, 1894 C.7566, *Report by the chief labour correspondent on the strikes and lock-outs of 1893*, p. 24.

⁴⁷ David Gilbert, *Class, Community, and Collective Action: Social Change in Two British Coalfields, 1850-1926* (Oxford, 1992), p. 76.

(b) The Role of the Miners' Federation of Great Britain

There was little doubt in the minds of many onlookers that the strike was the result of an MFGB plot. It seemed inconceivable to contemporaries that Welsh miners would choose to strike precisely at the time the trade was recovering and pay increases guaranteed, unless there was some ulterior, more sinister, motive. The secrecy surrounding the initial strike meetings – '[t]he whole movement is enveloped in a thick and impenetrable veil of mystery' one reporter complained – and the delay in issuing a public statement of intent by the strikers gave free hand to the newspapers to speculate as to the cause of the stoppage.⁴⁸ Hardly surprisingly they looked to events in England for an explanation.⁴⁹ The *Rhondda Chronicle* concluded that:

the action of the strikers really is attributable indirectly to the tactics of some of the leading Federationists, whose object is to diminish the supply of coal to help the Midland and the other English Federated districts to win the fight.⁵⁰

In spite of the repeated claims that the stoppage came as a surprise, moreover, the immediacy of the response of officials at Nantymoel suggests that there had been some expectation of impending trouble linked to the situation in England and a clear determination to 'nip it in the bud'.⁵¹ There was no attempt at negotiation or meeting with the men and summonses against the workmen were issued almost immediately.⁵² W. G. Dalziel, secretary to the MSWCOA, later admitted that the owners had 'fully recognized ... that a strike was inevitable' and confessed that they had been 'prepared to meet an even longer stoppage than actually occurred'.⁵³

⁴⁸ *South Wales Echo*, 10 August 1893. See also *Y Tyst*, 11 August 1893.

⁴⁹ R. Page Arnot, *The Miners: A History of the Miners' Federation of Great Britain: Vol. One, 1889-1910* (London, 1951).

⁵⁰ *Rhondda Chronicle*, 4 August 1893.

⁵¹ Many daily English newspapers confidently predicted throughout July that there was little danger of the English strike spreading to Wales because the region did not belong to the Federation; *Birmingham Daily Post*, 20 July 1893. See also *Colliery Guardian*, 4 August 1893.

⁵² Dalziel (comp.), *Records of the Several Coal Owners' Associations*, p. 180.

⁵³ Dalziel (comp.), *Records of the Several Coal Owners' Associations*, p. 205.

In addition, it was hardly a coincidence, as far as contemporaries were concerned, that the strike followed on so quickly after a major conference involving the Federation branches of South Wales and miners' representatives from across the coalfield.⁵⁴ The conference unanimously resolved to protest against further wage reductions and drew up a letter to the coalowners which asked for a meeting and for an advance of wages to improve the current rates which were 'inadequate to maintain ourselves and families'.⁵⁵ It was the fact that an advance of twenty percent was to be asked for at the meeting, the exact same figure demanded by the strikers, which seemed proof positive of Federation involvement.⁵⁶

It was also apparent that the strike broke out first at collieries which had recently joined the Federation.⁵⁷ Just weeks before the strike a mass meeting held in the Ogmore Valley had unanimously resolved to join the Federation and about two-thirds of the 1800 miners in the valley were alleged to have followed through on the resolution.⁵⁸ This would be one instance where a map of union activity would be invaluable.⁵⁹ The general impression from the newspapers is that the Federation was making significant headway throughout the South Wales coalfield. Monmouthshire had had Federation presence for some time, but there were also branches at Ton Pentre, Porth and Pontypridd. In June 1893 the National Colliery at Wattstown

⁵⁴ The meeting was held at the Grand Hotel, Cardiff, on 24 July 1893.

⁵⁵ *Western Mail*, 25 July 1893.

⁵⁶ Ness Edwards, *The History of the South Wales Miners* (London, 1926), p. 109.

⁵⁷ Evans, *The Miners of South Wales*, p. 156. In 1893 no effective organization existed for the coalfield as a whole. Instead seven district unions, described by E. W. Evans as being of purely local importance, acted to safeguard the workmen's interests in dealings with the owners. These unions had no common policy regarding structure and organization, although all were characterised by an emphasis on the peaceful settlement of disputes. The lack of co-operation between the unions and their pacific nature were increasingly felt by many miners to be a barrier to improving the workers' position. Many felt that a South Wales coalfield unified under the MFGB was the only way forward. See Evans, *The Miners of South Wales*, pp. 133-7.

⁵⁸ *Central Glamorgan Gazette*, 4 August 1893.

⁵⁹ It also needs to be remembered that there was only limited membership of unions at the time. During the 1892 Royal Labour Commission, David Morgan gave evidence that the Aberdare and Merthyr's Miners Association had 8,000 members with a further 7,000 men in the district not members; PP, HC, 1892 C.6708-IV, *Royal Commission on Labour: Minutes of evidence, Vol. I: Mining*, p. 236.

voted by an overwhelming majority of 544 votes to 94 to join the Federation.⁶⁰ And there was some encroachment further west: at the end of July, the colliers of Pwllbach Colliery, Pontardawe, voted to become Federation members.⁶¹ If the locations of Federation branches and the number of members could be established they could be plotted and compared with a map of strike duration to test for possible union influence.

Unfortunately, this is also one of those occasions when there is an absence of reliable, sufficiently detailed primary data.⁶² No official records of Federation membership have survived from this period and the numbers cited in the sources and by historians are simply too vague or contradictory to allow a reconstruction of support from these sources. The Cardiff conference in July 1893 was told that the Monmouthshire delegates represented 4,700 miners, although supporters of the Federation ejected from the sliding scale conference in the same year were said to represent 5,495 men.⁶³ The 1893 Board of Trade report suggests that while there were 77 lodges in South Wales they were made up of just 3059 members.⁶⁴ Subsequent historians of the period have also conjured up a variety of figures. Ness Edwards claimed that by January 1893 there were 48 lodges with a paying membership of over 10,000.⁶⁵ E. W. Evans in contrast suggested that in 1891 lodges of the Federation contained between two and three thousand, although he acknowledged that one source placed membership as high as eight thousand.⁶⁶

⁶⁰ *Western Mail*, 20 June 1893.

⁶¹ *South Wales Echo*, 1 August 1893.

⁶² See Appendix C for Chris Wrigley's regional map of MFGB membership in 1893. Wrigley, it appears, based his calculations on evidence from R. Page Arnot but the figures quoted by Arnot were for Monmouthshire only not the whole of South Wales. Wrigley's map is therefore very misleading. See R. Page Arnot, *The Miners: A History of the Miners' Federation of Great Britain: Vol. One, 1889-1910* (London, 1951), p. 228.

⁶³ *Western Mail*, 25 July 1893; Evans, *The Miners of South Wales*, p. 150.

⁶⁴ PP, HC, 1895 C.7808, *Seventh annual report by the chief labour correspondent on Trade Unions, 1893*, p. 64.

⁶⁵ Ness Edwards, *History of the South Wales Miners' Federation: Volume I* (London, 1938), p. 6.

⁶⁶ Evans, *The Miners of South Wales*, p. 150.

The picture for August 1893 is further complicated by the fact that in some instances the districts alleged to be Federation had indeed discussed joining the MFGB and even voted in favour of a move but had not as yet followed up the decision. On 5 August, for example, Aberaman, Fforchaman and Treaman pits voted by a majority of nearly four hundred to join the Federation, sever all connections with the Aberdare and Merthyr District of Miners and withdraw from the sliding scale agreement.⁶⁷ But they still had not actually joined the Federation by the end of August. Indeed, the readiness to join the union itself needs explaining. GIS would allow other factors to be analysed alongside union membership to explore this issue. This potential heightens the frustration at the absence of data. Support for the MFGB was clearly on the increase but we have to be satisfied with a general statement to that effect rather than a detailed, geographically specific representation.

It should, however, be recognised that promoting the strike as a Federation plot helped justify the coalowners' hard-line stance.⁶⁸ Newspaper interviewees who denied that they were willing to strike may well have been offering up a politic response to reporters or, perhaps more likely, have been the result of a careful selection of witnesses. Nevertheless, the conviction of contemporaries that the strike was the result of Federation activity has consequently led to the belief that 1893 symbolised a clash between different ways of organising labour and regulating wages.⁶⁹ Certainly the public debates in the months leading up to, during and in the immediate aftermath of the strike suggest that two distinct ideologies were competing for the minds of the Welsh miners. Column after column of newspaper print were filled with arguments and convoluted calculations designed to show which system of organisation brought the best return

⁶⁷ *Aberdare Times*, 5 August 1893.

⁶⁸ Although he stops short of direct accusation, Dalziel repeatedly implied that the strike was the result of the activities of Federation agents. See Dalziel (comp.), *Records of the Several Coal Owners' Associations*, pp. 195 & 198.

⁶⁹ Michael Keen & Richard Keen, 'The Coal War in South Wales, 1893', *Glamorgan Historian*, Vol. 10, pp. 35-49.

for the men.⁷⁰ On the one side were the sliding scale supporters determined to maintain the system which they believed had ensured eighteen years of 'peace' in the coalfield.⁷¹ And it had not just brought stability. The sliding scalers pointed out that until December 1892 the wage rate in South Wales had been 6 ¼ percent higher than in the English coalfields controlled by the Federation. Nor, it was further asserted, had the MFGB been able to prevent substantial wage reductions in the Forest of Dean, Bristol and Radstock coalfields. Indeed, the pay rise of August, although small, was proof of the power of the scale. The system seemed to be serving them well so why abandon it? Besides, it was argued, the sliding scale was essential to South Wales because it alone was responsive to the peculiarly sensitive nature of the South Wales trade.⁷²

The MFGB representatives, on the other hand, were fundamentally opposed to the scale. From 1890 the concerted efforts to bring the South Wales coalfield into the MFGB fold had repeatedly faltered on the question of self-determination on wages issues. They pointed to the fact that wages had been falling steadily between January 1892 and June 1893, translating into an overall decline of 47 ½ percent and exacerbated by short-time working in many pits.⁷³ For the Federation representatives the sliding scale robbed the men of the initiative to organise and thus any power to challenge this decline. The scale 'completely killed the men's independence of action, they being compelled like an ox to the slaughter'.⁷⁴ Wages, they argued, should not

⁷⁰ *South Wales Daily News*, 21 August 1893; *South Wales Echo*, 28 August 1893; *South Wales Daily News*, 23 August 1893; *South Wales Echo*, 31 August 1893.

⁷¹ This claim of 'peace' was, it seems, based on a very broad definition of the term. In his published collection of MSWCOA papers, Dalziel included a list, extending over eleven pages, of disputes at collieries owned by Association members. Only three years between 1876 and 1893 (1876, 1879 and 1881) had no disputes at all; Dalziel, *Records of the Several Coal Owners' Associations*, pp. 109-19.

⁷² *South Wales Daily News*, 12 August 1893. See Evans, *The Miners of South Wales*, pp. 145-55, for background details.

⁷³ *Western Mail*, 6 June 1893.

⁷⁴ Sam Woods, MFGB vice-chairman, *Western Mail*, 29 July 1893. David Morgan outlined the reasons for his opposition to the MFGB in a speech at Trecynon at the end of September. Morgan acknowledged the need for the miners to be better organised but dismissed the Federation's objectives as 'unchristianly and contrary to the laws of equity'; *Aberdare Times*, 23 September 1893.

be tied to fluctuations of coal prices but the workers should instead have a standard living wage, which should in turn dictate conditions on the coal market.⁷⁵

Yet the link between these broad themes and the strike are at times ambiguous. On the one hand, there is no doubt that a real resentment of the system existed in South Wales. It was becoming apparent that the scale operated in favour of the owners since it meant they could undercut others knowing that any reduction in price could be offset by a reduction in wages.⁷⁶ And they had entered into large contracts with steamship companies at low prices the previous year which were still having a retarding effect on coal prices, and thereby wages.⁷⁷ Strikers complained that 'our auditor has not proper access to the colliery books. The increase of wages at the last audit would have been very much larger if the audit were properly done'.⁷⁸ And there were clear echoes of MFGB demands for wages to dictate coal prices in the demands of the strikers to have 'a voice in settling this question of wages' and the call to be allowed 'to follow the market themselves'.⁷⁹

At the same time there was a growing feeling that the situation was allowed to continue because the men were too disorganised to challenge it effectively. The only way forward, as far as some were concerned, was for the South Wales miners to unite with their brethren in the rest of Britain. Indeed, there is little doubt that there was a strong inclination towards the Federation amongst strikers; strikers' meetings like that on Llwynypia Mountain, 10 August, frequently ended with a vote against the sliding scale principle and the resolution, that on the

⁷⁵ Edwards, *The History of the South Wales Miners*, p. 88.

⁷⁶ This was a regular complaint made during strike; see for example *Central Glamorgan Gazette*, 25 August 1893.

⁷⁷ *Colliery Guardian*, 11 August 1893. Isaac Evans, the leader of the Neath, Swansea and Llanelli Miners' Association, was particularly vitriolic in condemning the owners' practice of undercutting each other; *Herald of Wales*, 26 August 1893.

⁷⁸ *Cambrian Daily Leader*, 22 August 1893.

⁷⁹ *Merthyr Express*, 2 September 1893; *Herald of Wales*, 26 August 1893. See also *Merthyr Express*, 2 September 1893.

settlement of the strike, 'We as a body of workmen in South Wales and Monmouthshire will join the MFGB, seeing it is to our interest to do so'.⁸⁰

On the other hand, there was no official role for the MFGB. No financial help was offered from that quarter, although the Federation had supported a recent struggle in Risca over the Five Feet seam.⁸¹ It was accepted that the strikers could not expect support from the MFGB because the action was taken outside the rules of the union, and it was asserted that the Federation leaders had tried to persuade them back to work and would not subsequently offer any advice.⁸² An Abertillery man at a meeting at Crumlin 9 August, while admitting he was a staunch Federation member, declared the men were taking action independently of the Federation and the sliding scale.⁸³ Indeed throughout the strike there was no neat equation between support for the strike and a pro-Federation, anti-sliding scale stance. Nor did opposition to the strike translate directly into support for the sliding scale and an anti-Federation attitude. Firstly, it should be noted that strike action was not automatically a challenge to the sliding scale. There was a precedent for securing a pay rise independently of the scale by industrial action. In 1888 the workers of the Ocean Coal Pits had struck for a five percent increase which they got.⁸⁴ Secondly, while there were certainly those who hated the sliding scale and wanted everything the MFGB had to offer and those who whole-heartedly supported the sliding scale and wanted nothing to do with the MFGB, there were also those who disliked the sliding scale but who did not feel that the MFGB was the way forward, those who felt the MFGB had something to offer but wanted to retain the sliding scale, and those who were not interested in either the sliding scale or the Federation but simply wanted a decent day's pay for their labour. Others, like the Ynysybwl checkweigher interviewed by the *South Wales Echo*, believed in the principle of the sliding scale but not in its current

⁸⁰ *South Wales Daily News*, 11 August 1893.

⁸¹ *South Wales Argus*, 12 August 1893.

⁸² *South Wales Echo*, 9 August 1893.

⁸³ *Pontypool Free Press*, 11 August 1893.

⁸⁴ Andy Croll, 'Mabon's Day: The Rise and Fall of a Lib-Lab Holiday in the South Wales Coalfield, 1888-1898', *Labour History Review*, Vol. 72, No. 1 (Apr., 2007), p. 55.

application.⁸⁵ Still more argued that the time to debate which system offered the best future for South Wales should be left until a living wage had been won.⁸⁶ Any and all of these could be, and were, on the side of the strike.

Equally opposition to the strike did not necessarily equate to opposition to the Federation, nor, it should be noted, to support for the sliding scale. Many supporters of the Federation felt that the strike was actually doing their cause a disservice. One of the 'leading men of the Valley' lamented the fact that the Ogmore valley had given valuable support to the MFGB, 'none more so', but it had by the current action done it great harm.⁸⁷ Others felt that the demands of the strikers were justified but balked at the way they had gone about making them known. There were many who did not oppose the principle or rightness of the strike but who wanted legal action. They wanted the men to return to work, give a month's notice and then come out. This course of action, it was repeatedly stated, would guarantee mass support.⁸⁸ The evidence of opposition to the strike is itself difficult to quantify. The *Western Mail* was, naturally perhaps, keen to emphasise the scale of the vote to return to work in ballots taken towards the end of August. But the *Cambrian* was careful to point out that '[w]hile the ballots have shown in every case a majority in favour of resuming operations, it is noticeable, as a rule, that the votes recorded bear no comparison to the number of men employed at the pit where the feeling is tested in this manner'.⁸⁹ At some ballots, in fact, such as those at Lletty Shenkin and Cwmaman, barely a quarter bothered to make their opinions known.⁹⁰ At Plymouth only 593 voted out of 1500 while at Penrhiwceiber only 200 out of 1500 eligible to vote turned up for a ballot on a possible return to work.⁹¹

⁸⁵ *South Wales Echo*, 1 September 1893.

⁸⁶ *South Wales Argus*, 11 August 1893.

⁸⁷ *Central Glamorgan Gazette*, 4 August 1893.

⁸⁸ *Western Mail*, 24 August 1893; *Cambrian Daily Leader*, 22 August 1893.

⁸⁹ *Cambrian*, 1 September 1893; *Western Mail*, 23 August 1893.

⁹⁰ *Western Mail*, 22 August 1893.

⁹¹ *South Wales Daily News*, 23 August 1893; *Western Mail*, 26 August 1893.

These debates were part of the general atmosphere of the strike but played a shifting role in its course and cause. In a sense, the debate between the sliding scalers, as represented by Mabon, and the Federationists, as represented by Brace, was a mere sideshow to the main event. It is true that both sides were trying to make political capital out of the strike, with Brace and Mabon careering around the countryside making speeches to anyone who cared to listen.⁹² But these should not be confused with meetings organised by strikers, or even their opponents. They were essentially different to the mass meetings organised and led by the ordinary workmen, the ones at which they debated the issues and made decisions about the course of action they would adopt.⁹³ Indeed, of fundamental importance in understanding the 'hauliers' strike' is that it was instigated, organised and maintained by grass roots activists and represented a rejection of the existing leadership. The strikers themselves refused to be led by 'personalities' or 'names', in spite of the newspapers' attempts to focus on charismatic individuals like the Pentre haulier Morgan Thomas.⁹⁴ When a speaker at a meeting at Tredegar referred to the strike's leaders the cries went up 'No leaders' and 'No they're only fellow-workmen'.⁹⁵ This stance reflected a growing disillusionment with the existing leadership which was rooted only in part in the controversy surrounding granting of plenary powers to the leaders the previous year which had resulted in a new scale with worse terms for the men.⁹⁶

⁹² They often seemed to be following each other around. Mabon addressed the men at Cilfynydd on Friday, 11 August, Brace on Saturday, 12 August; *Glamorgan Free Press*, 19 August 1893.

⁹³ In most strike meetings, Federation and sliding scale representatives were explicitly, sometimes physically, excluded from the proceedings. The sole exception was the Neath miners' leader, Isaac Evans, who retained a close relationship with the men in his district. Ben Tillet also appeared at a meeting at the Rocking Stone towards the end of the strike; see for example *South Wales Echo*, 24 August 1893.

⁹⁴ Strike meetings frequently expressed the determination to have nothing to do with the existing leadership and demanded that all decisions should be made 'by the men' alone. 'This was the beginning of the end of the reign of leaders', one speaker declared; *South Wales Echo*, 28 August 1893. See also *South Wales Echo*, 19 August 1893; 30 August 1893.

⁹⁵ *Pontypool Free Press*, 18 August 1893; *South Wales Gazette*, 18 August 1893.

⁹⁶ There were repeated references to what was seen as betrayal of trust; *Western Mail*, 25 August 1893; letter to *South Wales Daily News*, 21 August 1893; *South Wales Echo*, 28 August 1893. See Evans, *The Miners of South Wales*, for more information.

Many colliers felt that too many years of working alongside the owners had made the miners' leaders 'soft' and out of touch with the reality of the daily hardships faced by working men. There was a feeling that the leadership was not listening, that they were too busy 'feast[ing] upon the luxuries of Pharaoh's table' to hear the cries of hunger.⁹⁷ At a mass meeting of strike supporters at Hopkins' Field, Aberaman, the unnamed chairman launched a vitriolic attack on Daronwy Isaac.⁹⁸ It is interesting that the attempt to defend Isaac reminded the crowd that unlike the other miners' leaders Isaac 'is one of us, and cuts coal like the rest of us'.⁹⁹ The assault on Mabon at the Griffin Field, Pentre, which will be discussed in more detail in Chapter 7, was only the most visible and violent expression of a widespread frustration at what was seen as an alienation of the miners' leaders from the workforce they claimed to represent.

If the mainstream miners' leaders were not having an easy time of things, it could not be said that William Brace and the Federation leaders were in any better a position. In fact, Brace was caught in a tricky predicament. Not only was the strike illegal under the terms of the sliding scale agreement, but it also violated the rule of the MFGB itself.¹⁰⁰ Brace therefore had to tread a delicate line between promoting the Federation's cause and being seen to support a strike which could not be sanctioned under the terms of the union he was promoting. Both Brace and Ben Davies were forced on numerous occasions to emphasise that they were not responsible for the current action.¹⁰¹ And the *South Wales Daily News* conceded that while it was plausible to see the strike as Federation-led, 'it is fair to point out that so far not one of the

⁹⁷ *South Wales Echo*, 26 August 1893. For a discussion of prevailing attitudes to leadership in the South Wales coalfield in the late nineteenth, early twentieth centuries see Peter Stead, 'Working-Class Leadership in South Wales, 1900-1920', *Welsh History Review*, Vol. 6, No. 3 (June, 1973), pp. 329-53; Dai Smith, *Aneurin Bevan and the World of South Wales* (Cardiff, 1993), p. 67-89. Relations between the miners' leaders were also poor. Arnot claimed that Isaac Evans, Neath, felt that Mabon was too friendly with the owners: 'They give him [Mabon] a "good feed", some good wine and good cigars and then they can do what they like with him', Evans is alleged to have said; R. P. Arnot, *South Wales Miners/Glowyr De Cymru: a History of the South Wales Miners' Federation* (London, 1967), p. 37.

⁹⁸ *Aberdare Times*, 2 September 1893.

⁹⁹ *Western Mail*, 11 August 1893.

¹⁰⁰ *Central Glamorgan Gazette*, 4 August 1893.

¹⁰¹ Edwards, *The History of the South Wales Miners*, p. 111.

recognised Federation agents in South Wales has actively participated in any of the incidents of the battle'.¹⁰² Brace was no more able to influence the outcome or the action of the strikers than Mabon.

It is possible then to exaggerate the extent to which the strike represented a conflict between two competing ideologies since there were more than two positions adopted during the course of the strike.¹⁰³ It is also important not to reduce the strike to another episode in the troubled relationship between Mabon and Brace, since neither was really at the heart of events.¹⁰⁴ It is important not to dismiss this relationship completely, however. At 28 years old, Brace was some 23 years younger than Mabon and his youth, enthusiasm and brashness may well have irritated Mabon. At the beginning of the strike, they had just come out of a rather nasty libel case.¹⁰⁵ The attack on the Englishness and youthfulness of the strikers' which will be discussed in the next section could have been an unsubtle dig by Mabon at Brace.

It could be argued then that the failure of the strike was neither a victory for the sliding scale and Mabon, nor a rejection of Federationism and Brace. Rather it seems that the strike was a spontaneous, knee-jerk reaction to the economic difficulties in the South Wales coalfield. The immediate goal of the strikers was to secure a pay rise, to secure a living wage. The demand for a twenty percent advance was consistent throughout the strike and there was no piling up of claims upon claims. For some the best way to achieve this was via the Federation but many would have been happy just to get the money. Ultimately the determination of the strikers to eschew leadership and to allow the men to choose for themselves created a fatal flaw in the movement – there was no one with the personality strong enough to hold all the disparate elements together. What the strike certainly did was expose to public view the tensions,

¹⁰² *South Wales Daily News*, 5 August 1893.

¹⁰³ Keen & Keen, 'The Coal War in South Wales, 1893'.

¹⁰⁴ *Western Mail*, 4 August 1893.

¹⁰⁵ For more on Mabon's relationship with Brace see E. W. Evans, *Mabon (William Abraham 1842-1922): A Study in Trade Union Leadership* (Cardiff, 1959).

conflicting ideologies and disillusionment fracturing South Wales coalfield society, but the role of these in causing the strike was partial at most.

Moreover, there were not just tensions caused by occupational conflict and ideological differences. The strike exposed other fracture lines within Welsh society. The final section of this chapter will look at some other widespread divisive issues, namely ethnicity and language.

(c) Ethnicity, Language and the Younger Generation

As persistent if not more so than the claims that the strike was a Federation plot were the accusations that the strike originated with and was concentrated amongst English migrants to the coalfield. In a speech to his workmen at Swansea, Sir Hussey Vivian was reported as saying that the discontent 'had not been created by Welshmen, but by strangers, who had, within the last few years, come into our eastern districts from England'.¹⁰⁶ "The present strike," said Mabon, "is not due to Welsh colliers, but a minority of Englishmen at the collieries who have coerced the majority."¹⁰⁷ In his usual understated manner, David Morgan described the strike as 'this huge blunder having originated with English miners brought down to Wales by scheming wirepullers'.¹⁰⁸ An anonymous collier in a letter to the *South Wales Daily News* alleged that 'the most prominent men at the mass meetings, and those that create terror by hooting up and down the valleys, are "aliens" from the other side of the Bristol Channel'. The writer added, 'If these men are not willing for us to lead in our own country, let them go back to their own'.¹⁰⁹

¹⁰⁶ *Cambrian*, 25 August 1893.

¹⁰⁷ Quoted in Edwards, *The History of the South Wales Miners*, p. 115.

¹⁰⁸ *Western Mail*, 25 August 1893.

¹⁰⁹ *South Wales Daily News*, 18 August 1893.

Of course, it is possible that such accusations were simply linked to the perceived role of the MFGB in the strike: the Federation was, after all, known in Wales as the 'English union'.¹¹⁰ Once again the absence of statistical information concerning Federation membership becomes very frustrating. Not only is it not possible to know where support was concentrated but also it is not known amongst whom it was concentrated. If Federation membership within South Wales was confined primarily to migrants, it might then be argued that the terms 'English' and 'Englishmen' were, for contemporary Welsh observers, merely synonyms for 'Federationists' and the accusations just another way of claiming MFGB influence. Equally annoyingly it is not currently possible to map even ethnic distribution within the coalfield, or at least it cannot be done at anything like a useful level of detail.¹¹¹ The place-of-birth data available in the 1891 census has only been aggregated at county level and recent studies on migration have collated the information for only a handful of individual communities.¹¹² It is not possible therefore to test the idea that the strike was essentially a Federation plot, much less to see if a correlation existed between support for the strike with concentrations of English migrants.

What can be stated with certainty, though, is that the latter decades of the nineteenth century were a period of mass migration. There is no question that the English, especially those from the western counties, were attracted to South Wales *en masse*, and the trend was accelerating. Between 1891 and 1901, nearly 41,000 people moved into Glamorgan from English counties.¹¹³

¹¹⁰ Like the allegation of MFGB influence, this was hotly denied by the strikers – see the interview with a striking haulier *Western Mail*, 24 August 1893.

¹¹¹ The smallest unit at which even simple population figures are available is at civil parish level. Some parishes are simply too large to provide useful information about ethnic diversity in relation to the strike, especially Ystradyfodwg which includes most of the Rhondda. Even so a lot could be learned about ethnic distribution if the data was available at this level.

¹¹² Many of these studies tend to concentrate primarily on the impact of migration on the Welsh language and are not concerned with ethnicity *per se*. See the various essays in, for example, Gwenfair Parry & Mari A. Williams, *The Welsh Language and the 1891 Census* (Cardiff, 1991); Geraint H. Jenkins (ed.), *Language and Community in the Nineteenth Century* (Cardiff, 1998), pp. 147-80.

¹¹³ Based on figures provided by Brinley Thomas, 'The Migration of Labour into the Glamorganshire Coalfield (1861-1911)', in W. E. Minchinton (ed.), *Industrial South Wales 1750-1914: essays in Welsh Economic History* (London, 1969), pp. 51-2.

However, while the newspapers refer to the 'recent' arrivals as the source of trouble, the term is relative and it is not clear whether it was measured in months or years. If the former, the 1891 census would by 1893 already be out-of-date, but it has to be borne in mind that the coal trade was in a slump and the Mines' Inspector's Report for 1893 shows a decline in employment for the South Wales district on the previous year. This does not necessarily mean that migration stopped – indeed, the Medical Officer of Health for Glamorgan estimated that the population of the county increased some 54,000 between 1891 and 1893 – but it does make it less likely that pits were taking on 'outsiders' in any significant numbers in the years between 1891 and 1893.¹¹⁴ The census data should therefore still provide a good guide to the ethnic makeup of workforce at least.

Although it cannot be mapped, therefore, and although there have to be some reservations linked to the time gap between 1893 and 1891, it is worth looking at the 1891 census to see if it can provide any indication of the nature of the ethnic balance of the mining workforce and possible influence on the strike of 1893. The first place to look is Nantymoel where the strike began. It might be expected that if English migrants were primarily responsible for the strike they would be most visible here. Yet when birth place origins of the total population are analysed it shows that nearly 90 percent of the 2541 people listed for this enumeration district were born within Wales, over half from within Glamorgan. Barely nine percent were immigrants from England, the remainder from elsewhere. When the mining workforce alone is analysed, the balance shifts only marginally: 87 percent of miners were Welsh born, twelve percent came from England and just one percent from elsewhere.¹¹⁵

¹¹⁴ *Glamorgan County Council, Annual report of the County Medical Officer for the year 1893, p. 6.*

¹¹⁵ The figures quoted here were counted manually from the Census Enumerators' Books (CEBs) available online via www.ancestry.co.uk. Although just two locations were checked, and both those locations were comparatively small settlements, the process of counting was hugely time consuming, taking up at least a couple of days. The results are provisional because some hauliers may have been identified as miners.

Of course, the strike was initially begun by a small section of the working population and the balance here might be very different to that of the population generally. Indeed, many newspaper reports implied that a large number of Englishmen were hauliers, or rather that a larger number of hauliers were Englishmen. However, when the data for hauliers alone is examined it is clear that the overwhelming majority, some 94 percent, were born within Wales, and only three out of the fifty three hauliers living in Nantymoel were English migrants. If anything, English migrants were therefore underrepresented amongst the hauliers. Moreover, the statistics argue against any idea that migrants were being forced into hauling because of its lower status and poorer pay, and that therefore they had greater grounds to be discontent.

It is interesting that when Nantymoel is compared with Maerdy, which remained opposed to strike, there is only a marginal difference between the two, with Maerdy actually having a slightly higher non-Welsh born percentage of hauliers: 92 percent were born in Wales, eight percent were born elsewhere. More interesting, perhaps, is that Mari Williams found that twenty percent of miners living in Ferndale were English born, although she did not distinguish between the various occupational groups.¹¹⁶ As this figure is somewhat higher than for Nantymoel and as Ferndale offered some resistance initially to the strike, it suggests that the presence of large numbers of Englishmen did not necessarily mean a greater likelihood of support for the strike. Indeed, if we look at mine labourers as an occupational group, a much higher percentage of Nantymoel labourers were English (16 percent) and a substantial 39 percent of Maerdy labourers were non-Welsh born. This group had the most grounds for complaint, since they were the lowest status and poorest paid of all, and yet they were not especially active during the strike nor was their condition a matter of much concern. Exactly how this state of affairs should be interpreted – it possibly indicates a varying degree of protectionism in different communities – and the implications for ethnic relations and co-ordinated industrial action is not clear, especially when only a couple of communities have

¹¹⁶ Mari A. Williams, 'Ferndale (Glamorgan)' in Parry & Williams, *The Welsh Language and the 1891 Census*, p. 120.

been analysed.¹¹⁷ But it suggests that relations between the native Welsh and English migrants, while lacking the kind of racial tensions which occasionally characterised encounters with other ethnic groups such as the Irish, were by no means straightforward.¹¹⁸

The question of the Englishness of the strikers and/or the strike is something which is therefore difficult to quantify. Perhaps the accusations against outsiders should in any case be understood as a reflection of attitudes to change rather than a reflection of real developments. It should be noted that the image of the strike as an 'alien' import led by 'outsiders', as with the claim that hauliers and/or the MFGB were responsible, was one which lent itself readily to exploitation by the coalowners. If troublemakers were outsiders then the owners were justified in refusing to negotiate with them; the strikers were not representative of the mass of workers and no right to demand to be heard. However, there was an added dimension to the owners' claims, which was based on the exaggeration of racial differences between the native Welsh and migrant Englishmen. H. H. Vivian called on Welshmen to 'no longer consent to be kept out of work by the action of ... a minority'. They should resist intimidation, maintain the law, order and peace the Welsh were noted for, and in so doing do 'good service to your country, for which the country will be grateful to you'.¹¹⁹ As good Welshmen, the owners asserted, miners should not adopt the belligerent and aggressive stance of their English cohorts: they knew better and were better than that. The press, too, emphasised the 'un-Welshness' of the

¹¹⁷ See Hywel Francis, 'The Secret World of the South Wales Miner: the relevance of oral history', in Dai Smith (ed.), *A People and a Proletariat: essays in the history of Wales 1780-1980* (London, 1980), pp. 176-7.

¹¹⁸ See for example Paul O'Leary, *Immigration and Integration: the Irish in Wales, 1798-1922* (Cardiff, 2000). Little work has been done on the largest group of immigrants, the English. There has been a tendency to concentrate on the impact of migration on language, rather than relations between Welsh-born people and English-born people. A recent PhD by John Francis, however, has begun to address some of the issues with a look at the extent of English migration in the mid-nineteenth century. Francis covers questions such as the extent of inter-marriage and settlement patterns; John Francis, "'Invisible in-comers?': Migration from the West Country to Glamorgan in the mid-19th century' (Unpubl. PhD Thesis, Cardiff University, 2010).

¹¹⁹ *Cambrian*, 25 August 1893.

strikers' behaviour.¹²⁰ When Mabon was manhandled by the crowd at a meeting at Pentre, the *Herald of Wales* warned, that 'Such conduct tends to show sharply the line between Welshmen and Englishmen, and a racial conflict may very possibly arise out of the present strike'.¹²¹ These were clearly attempts to heighten divisions between the two nationalities in order to undermine co-operation amongst the workforce. But they appear to have been playing on real fears and concerns which existed in contemporary society about the possible disintegration of communities and the loss of Welsh identity as the result of the swamping of the coalfield by outsiders.

The representation of the strike as an alien import also, of course, served a similar purpose for the official miners' leaders opposed to the strike.¹²² It was far easier for the leaders to blame outsiders than to acknowledge that their position was under threat or that the strikers had a genuine grievance, since that would imply failure on the part of the leaders. But again the claims were couched in racial terms. Indeed, relations between the South Wales coalfield and other coal districts had for some time increasingly taken on racial overtones. Isaac Evans, of all the miners' leaders the one most sympathetic to the principles of the Federation, was nevertheless forced to complain that 'racial prejudices existed' making it difficult to get the Northern districts to understand the position of Welsh colliers.¹²³ Sam Woods, the MFGB vice-

¹²⁰ *Cambrian Daily Leader*, 21 August 1893; *Merthyr Express*, 2 September 1893.

¹²¹ *Herald of Wales*, 19 August 1893.

¹²² It should be noted that there was nothing new about this accusation. Henry Richard claimed the Chartist troubles in 1839 were 'almost entirely of English inspiration'; Henry Richard, *Letters and Essays on Wales* (London, 1884), p. 81. It is interesting that parallels were drawn between the events of 1893 and the days of Chartism in both of the Welsh language newspapers consulted but not in any of the English language newspapers. For *Tarian y Gweithiwr* and *Y Tyst* both periods of unrest were clearly the work of English troublemakers; *Tarian y Gweithiwr*, 24 August 1893; *Y Tyst*, 25 August 1893. Dai Smith has pointed out in reference to the Tonypany riots of 1910, that '[t]he accusation against 'strangers', like that against youths, seems common to the aftermath of most riots as a way of pinning guilt to those with no real stake in what is considered the day-to-day reality of local life'. Such accusations allow communities to recover quickly after traumatic events: it is easy to forgive and forget, because the real fault lies elsewhere; Dai Smith, *Wales: A Question for History* (Bridgend, 1999), p. 117.

¹²³ *Western Mail*, 13 February 1892.

chairman, would hardly have endeared himself to the mass of Welsh workers by calling on the South Wales miners 'like their brethren in other parts of the Empire, [to] throw away their images and fads'.¹²⁴ 'I do hope,' Woods wrote on another occasion, 'that the time is drawing near when geographical position, language, racial customs, or sentimental affectation will not be able to keep large bodies of workmen having one common object in view from organising in the strongest possible form for legitimate and protective purposes'.¹²⁵ The determination of the Welsh leaders to stand 'all alone in their glory advocating local option, isolation, and trade protection' was thus seen to be due not so much to the peculiar character of the Welsh coal trade as to the peculiar nature of the Welsh, their devotion to old fashioned social notions and to an archaic language.¹²⁶

From the Welsh leaders' perspective the MFGB's more aggressive stance seemed to hit at the very heart of national identity.¹²⁷ The MFGB represented not just an ideologically different position but one which appeared to pose a challenge to the conciliatory ideals of a distinctively Welsh Nonconformist, Liberal society of order, co-operation and loyalty to the state. And again the exploitation of the image suggests that there were genuine concerns which could be exploited. For observers there was a close parallel between the English approach and the actions of the strikers. The intimidation tactics employed were not regarded as a legitimate weapon of an oppressed working class, but were a challenge to the image of the Welsh collier as a peaceful, 'music-loving meditative being, eminent for his piety, his scriptural religiousness, and his deep-seated regard for freedom of conscience'.¹²⁸ Intimidation seemed to strike at the

¹²⁴ *Western Mail*, 27 July 1893.

¹²⁵ *Western Mail*, 1 February 1892.

¹²⁶ *Western Mail*, 27 July 1893.

¹²⁷ Compare this with the Welsh miners' high propensity to strike in the 1870s. See also an earlier manifestation of tensions between trade unions caused by national identity and linguistic divisions in Aled Jones, 'Trade Unions and the Press: Journalism and the Red Dragon Revolt of 1874', *Welsh History Review*, Vol. 12, No. 1(Dec., 1984), pp. 197-224.

¹²⁸ *Merthyr Express*, 2 September 1893. See also *South Wales Echo*, 25 August 1893. Ben Tillett, the dockers' union leader also warned the strikers at a meeting at the Rocking Stone at the end of August, that 'As Welshmen they had for twenty years fed on patriotism and cant – chiefly cant. ... He wanted to

heart of the notion of self-determination which underpinned so much of contemporary Welsh thought, especially that concerning Home Rule. The linking of Englishness, the MFGB, disorder and the 1893 strike by opponents, therefore, was more than simply rooted in differences of opinion over organisation but was an outworking of genuine concerns over the nature and future of Wales as a nation.

Some of the fears were possibly linked to the question of the survival of the Welsh language. Certainly, there had been a resurgence of interest and concern for Welsh national identity in the years prior to the strike. The contentious issue of the disestablishment of the Anglican Church in Wales and the activities of Cymru Fydd dominated press coverage in the early 1890s. The general atmosphere which was generating a heightened sensitivity to issues of all things Welsh was further fuelled by the recent census which was the first to ask about language use.¹²⁹ Clearly the language question was causing tensions amongst the miners. It was repeatedly noted by the press that the English language was heard most frequently. At a number of meetings the gathered crowd objected to the use of Welsh by speakers, and would demand a translation or even prevent the speaker from continuing until he changed to English.¹³⁰ At meetings where Welsh-speakers attempted to address the crowds in Welsh there were repeated calls for 'no soap' and Mabon especially found his attempts to repeat his speeches 'in the vernacular' frequently curtailed.¹³¹ For some, the frustration at not being allowed to express themselves in the language in which they were most fluent often made them more reluctant to participate.¹³² The traffic was not all one way: at a meeting at Pentre

put an end to slavish nationality. If they were the chosen people, they had been twenty years in the wilderness without a Moses or an Aaron. He wanted them to pledge themselves to organise. Organisation alone would kill the sliding-scale.' *Merthyr Express*, 2 September 1893.

¹²⁹ For a full analysis of the results of the census see Parry & Williams, *The Welsh Language and the 1891 Census*.

¹³⁰ See for example the meeting at Aberdare, *South Wales Daily News*, 15 August 1893.

¹³¹ *Cambrian Daily Leader*, 12 August 1893.

¹³² *Western Mail*, 12 August 1893.

the Welsh speakers were heard to make 'unkind references to the "Saeson"'.¹³³ But the language was by 1893 plainly a bone of contention and increasingly seen as a barrier to easy communication and co-operation.

Although recent studies have shown that a great deal of the pressure placed on Welsh language use within the coalfield actually came from English speaking migrants from other parts of Wales especially Pembrokeshire, the extent to which language was a marker of ethnic identity may be crucial.¹³⁴ The term 'Englishman', as used in newspaper reports, is ambiguous. It seems at times to have been used to define an individual linguistically – that is, he is an 'English-speaking man' – rather than simply a reference to his geographical origins. The question is confused even more by the identity of Monmouthshire as an English county, especially as by 1891 almost 85 percent of Monmouthshire spoke only English.¹³⁵ It should be noted that as late as the 1950s some strongly Welsh language communities in the anthracite area regarded non-Welsh speaking Welshmen from other parts of the coalfield as English and such men would have difficulty in obtaining work.¹³⁶ Newspaper reports which emphasise the Englishness of the strikers cannot, therefore, be taken at face value. It could be argued that while the ideas and the language in which they were expressed may have originated across the border they were not necessarily promoted and accepted solely or even primarily by English-born men. In addition it should be noted while it is assumed that Brace was described as the 'English agent' because he belonged to the 'English union', his colleague Ben Davies was known as the 'Welsh

¹³³ *Western Mail*, 12 August 1893.

¹³⁴ See for example Philip Jones's study, 'The Welsh Language in the Valleys of Glamorgan c.1800-1914' in Jenkins (ed.), *Language and Community in the Nineteenth Century*, pp. 147-80.

¹³⁵ It was still classified as an English county in *Kelly's Directory of Monmouthshire and South Wales*, 1895. A discussion of the status of the Welsh language in Monmouthshire in the nineteenth century is provided by Sian Rhiannon Williams, 'The Welsh Language in Industrial Monmouthshire c.1800-1901', in Jenkins (ed.), *Language and Community in the Nineteenth Century*, pp. 203-29.

¹³⁶ Francis, 'The Secret World of the South Wales Miner', pp. 176-7.

agent', because he was a Welsh-speaking native of Glamorgan.¹³⁷ Brace himself most frequently described himself as a 'freeborn Welshman'.¹³⁸

It is possible, though, that 1893 revealed the first signs of a new, emerging society. Firstly, the trouble-makers were frequently described as 'young hotheads', with the emphasis on the 'young'. Mabon repeatedly condemned his 'young friends' as green while another 'experienced' collier dismissed them as 'brats'.¹³⁹ A short article in the *Western Mail* noted that: 'It is a singular fact in connection with some of the collieries in the Aberdare Valley that the pit committees are composed of a majority of beardless youths'.¹⁴⁰ The strikers readily acknowledged their youth, although they did not see it as a handicap. 'It was alleged that the strike was the work of a lot of small boys,' the Rocking Stone chairman noted, 'but a babe could tell the taste of bad eggs as well as an older person'.¹⁴¹ The problem lay with 'the old men with grey locks who hung to the pernicious Sliding-scale'.¹⁴² The census data reveals that 56 percent of the hauliers of the parishes of Llangeinor and Llandyfodwg were under twenty-five years of age. At Maerdy nearly 64 percent were under 25. However, it seems that a number of newspapers designated anyone under the age of 30 as a youth, pushing the figures even more in favour of the young.¹⁴³ The accusation that the strikers were youthful is the one accusation which really seems to bear any real weight.

Secondly, the lists of hauliers prosecuted for striking contain a significant number of 'English' surnames: of 26 men prosecuted by North's Navigation Collieries, for example, only 16 had traditional Welsh names, like Jones and Williams. These lists have to be used with caution. A

¹³⁷ *Western Mail*, 6 June 1893.

¹³⁸ *South Wales Echo*, 21 August 1893.

¹³⁹ *South Wales Echo*, 22 August 1893; *Cambrian Daily Leader*, 19 August 1893.

¹⁴⁰ *Western Mail*, 24 August 1893. Compare with accusations made in *Tarian y Gweithiwr*, 24 August 1893.

¹⁴¹ *Western Mail*, 25 August 1893.

¹⁴² *South Wales Gazette*, 1 September 1893.

¹⁴³ *Western Mail*, 28 August 1893

Blaengarw haulier with the surname 'Horridge' was a monoglot Welsh speaker from Cardigan.¹⁴⁴ But more typical seems to be George Cryer, who was born at Skewen to Gloucestershire parents and William Hicks, Risca born to an Oxfordshire father. Bilingual Richard Lang, who was also born in Skewen, had a Welsh mother but a father from Devonshire. Opton Purnell, one of the strike leaders from Monmouthshire, was Abertillery born to a Somersetshire father.¹⁴⁵ William Brace was then perhaps more representative of the new coalfield society which was emerging: young, English speaking, sons of immigrants.¹⁴⁶ These were not outsiders, not mobile or itinerant. Indeed, many newspapers pointed out that many of the migrant English colliery workmen were returning to their homes across the border to await the outcome of the dispute.¹⁴⁷ No, the strikers were men born in the coalfield and born to the coal industry. This was a new generation flexing its muscles, one which had no memory or experience of the traumas of the 1870s.¹⁴⁸ They may have had no real history in the coalfield but they had a clear vested interest in its future.

We need also to be careful not to overstate the extent of the change. While the language of the strike may have been increasingly English, much of the 'personality' of the strike remained decidedly Welsh. The Rocking Stone meetings on all occasions presented 'in all respects the characteristics of a typical Welsh cymanfa'.¹⁴⁹ Many of the strikers too were outraged at the

¹⁴⁴ www.ancestry.co.uk, CEBs 1891; *Central Glamorgan Gazette*, 25 August 1893.

¹⁴⁵ Opton Purnell is identified as one of the hauliers' leaders by Ness Edwards but his name does not appear in any of the newspaper accounts. At the time of the strike Purnell was twenty-five years old. See Edwards, *The History of the South Wales Miners*, p. 112.

¹⁴⁶ David Morgan was one of the few miners' leaders to express an awareness of the growing generational gap between the leaders and the led. See David A. Pretty, 'David Morgan (Dai o'r Nant), Miners' Agent: a Portrait of Leadership in the South Wales Coalfield', *Welsh History Review*, Vol. 20, No. 3 (June, 2001), pp. 495-531.

¹⁴⁷ *South Wales Daily Star*, 21 August 1893.

¹⁴⁸ This was a point made in an editorial of the *Merthyr Express*, 2 September 1893: the young men had played no part in the setting up of the sliding scale and therefore had little sympathy with it and no experience of the consequences of strike action.

¹⁴⁹ *South Wales Echo*, 17 August 1893. Writers to the *Tarian y Gweithiwr*, however, regarded such shows of religiosity as little more than hypocrisy. To strike without notice and thus to break a solemn

introduction of troops into the coalfield – why, they asked, had troops been sent ‘into the little country which was governed by Scripture and the Voice of the Supreme’?¹⁵⁰ Speakers at mass meetings focused on the Christian element of definitions of Welshness, claiming Biblical support for the rightness of their actions.¹⁵¹ One ‘speaker of advanced age’ was so frustrated at the distorted image being presented of the strikers that he stood before the crowd speaking in Welsh to prove that the strikers were neither just youths nor just the English.¹⁵² Moreover, the level of violence and intimidation was itself exaggerated. ‘Taken all in all,’ one newspaper editor conceded, ‘the strike has been conducted very peaceably’.¹⁵³ The only real conflict was that at Ebbw Vale on 12 August and on other occasions the violence originated with those who were working rather than the strikers.¹⁵⁴

While the Englishness of the strike seems therefore to have been exaggerated, Welsh society was undoubtedly changing and this was creating anxieties. But they were hardly a cause of the strike. At heart the strike was a strike for money – the demand for a twenty percent advance was the only consistent demand throughout. Individuals and groups attached to this other ideas, especially about organisation, but these were never consistently demanded and only occasionally explicitly cited as concerns of the strikers themselves. Indeed, there are glimpses in the action of the strikers of a new identity being forged across the divisions. It was not just a hauliers’ strike, it was a miners’ strike. English and Welsh fought alongside each other. Ideas about the future and what was best for the mining workforce were confused but though the men might disagree they could still combine. The uneven response of the workers to the call for action in 1893 cannot therefore be slotted simply into traditional categories of divisions. It was not a strike of English-born, English speaking, Federation supporting hauliers. It was

contract with the owners was unchristian and asking for God’s blessing on such activities was, in the eyes of some observers, tantamount to blasphemy; *Tarian y Gweithiwr*, 24 August 1893.

¹⁵⁰ *Western Mail*, 25 August 1893.

¹⁵¹ *South Wales Echo*, 28 August 1893; *Aberdare Times*, 2 September 1893.

¹⁵² *Merthyr Express*, 2 September 1893.

¹⁵³ *County Observer*, 19 August 1893.

¹⁵⁴ *South Wales Argus*, 14 August 1893.

simpler than that: it was a strike of the workforce for more pay. And yet it was also more complex than that too. It was a struggle to make sense of a rapidly changing society, to create a sense of shared identity in the face of multiple divisions and which no longer seemed to be personified by the miners' leaders. Moreover, it is possible that there were other, 'hidden' fracture lines below the surface of coalfield society creating other less obvious, unconscious divisions. If these were shaping choices and patterns of behaviour, it is vital to a full understanding of the strike that they are also taken into account. In the next section, GIS mapping will be used to test for the possible influence of the geological variations and structure of the coalfield on human decision-making processes and activity during the events of August 1893.

CHAPTER SIX

Geology and the 1893 Strike

It has long been recognised by historians that geological variations caused fundamental problems for co-operation between miners. Both John Williams and David Ingham have drawn attention to the divisive nature of different working practices and wage differences caused by the vagaries of the geology of the South Wales coalfield.¹ Ioan Matthews and Michael Lieven have also revealed something of the complex variation in occupational structures growing out of the distinct circumstances of the valleys and their communities and the diverse industrial histories and political traditions to which they have given birth.² There is a tendency though to speak in generalised terms about the impact of geological variation rather than to seek to establish the extent, strength and significance of the divisions in the context of a specific action at a specific point in time. This chapter will provide an overview of the broad influence of geology on the development of the coalfield in the twenty years before the strike. It will then turn to look in more detail at a number of specific themes to see if it is possible to identify any influence on behaviour during the 1893 strike. It will look at: the impact of geology on workforce solidarity due to differing working conditions, especially the variations in the rank of coal; the age of pits; accident rates; and, finally, the presence of other industries. It will begin also to explore some of the contribution to an understanding of the 1893 strike which can be gained by the use of GIS mapping. It will, therefore, begin with a description of the how the maps were created.

¹ See for example John Williams, *Was Wales Industrialised? Essays in Modern Welsh History* (Llandysul, 1995), pp. 310-333; David Ingham, 'Philosophy and Geology in Conflict: the evolution of wages structures in the South Wales Coalfield, 1926-1974', *Llafur*, Vol. 1, No. 4 (1975), pp. 194-207.

² Ioan Matthews, 'Before the Federation: Trade Unionism in the Anthracite Coalfield c. 1870-1898', *The Carmarthenshire Antiquary*, Vol. 32 (1996), pp. 80-91; Ioan Aled Matthews, 'The World of the Anthracite Miner' (Unpubl. PhD, UWC, 1995); Michael Lieven, 'A Fractured Working-Class Consciousness? The Case of the Lady Windsor Colliery Lodge, 1921', *Welsh History Review*, Vol. 21, No. 4 (Dec., 2003), pp. 729-56; Michael Lieven, *Senghennydd: the Universal Pit Village, 1890-1930* (Llandysul, 1994).

Maps

In order to explore both the influence of the underlying geology and the surface topography on the strike a series of maps were created based on the main geodatabase referred to in Chapter Three. The idea was to identify the stance of each pit in the strike and duration of the stoppage where there was one in order to identify areas of high levels of support and then to test for possible influences to explain the picture. Secondly, it was intended to look at the geographic spread of the strike to answer questions such as: how did the strike spread across the coalfield? Did it follow a valley by valley pattern or radiate out from a central point? What does this tell us about patterns and modes of communication in the coalfield? The latter set of questions will be discussed more fully in the next chapter. In addition a map was created of the mines listed in the official Government *List of Mines* for 1893 (Fig. 4.1).³ Another map (Fig. 3) was created from the 1873 *List* to identify changes in the geographic distribution of the coal industry during the twenty year period prior to the strike.⁴

The process of creating a strike geodatabase to create the maps was not straightforward. W. Gasgoyne Dalziel, secretary to the MSWCOA, provided a list of Association pits hit by the strike in his published compilation of MSWCOA records and this proved to be an invaluable starting point. But it is not without its problems; there are clearly typological errors with the published list. The misspelling of pit names is not a significant obstacle to its use but there are concerns over more serious errors with the dates of stoppage given. The Holly Bush and New Holly Bush Pits, for example, are listed as idle from 2 August. These pits were situated near Blackwood in Monmouthshire, some distance from the origins of the strike. Although technically not impossible, it is highly unlikely that these pits came out that early and it is more likely that they

³ Parliamentary Papers (PP), House of Commons (HC), *List of Mines 1893*.

⁴ The twenty year time gap was chosen for comparison purposes but 1873 also happens to be the earliest date for which a list of mines was available; PP, HC, *Reports of the inspectors of mines, to Her Majesty's Secretary of State, for the year 1873*. A third map of pits in existence in 1913 was also created for context (Fig. 5); *South Wales Coal Annual 1913*. It has been included in the map volume but has not formed part of the study. The digital terrain model used as a background to the maps was created using GlobalMapper© and then imported as a tiff file into ArcGIS 9.2.

did not come out until 6 August or even later.⁵ Also some Association pits which are known to have been operational at the time have been omitted for Dalziel's list while others marked as idle in the *List of Mines* are included.

It is in fact very difficult to establish when exactly the strike began at any given pit.⁶ The MSWCOA records concentrate on pit closure dates, as the owners' main concern was with the impact on production. Since most pits, as was noted earlier, were dependent on their hauliers, however, a strike by that section would almost automatically render a pit inoperable, so that, in theory at least, the date of a pit's closure is a good indication of the onset of the strike. The picture, though, is not that straightforward. At a handful of pits, particularly in the early stages of the strike, other underground workers took on the task of hauling so that sometimes there was a time-lag of several days from the point at which the hauliers struck work and the pit was actually forced to close. Similarly sections of the workforce returned to work before the end of the strike so that some pits were partially operational earlier than the stated end of the strike at those pits. This makes pinning down the exact dates and duration of the strike extremely difficult and raises the question of how exactly we measure and define a strike. What percentage of the workforce, for example, needs to be on strike for it to be significant? Probably the best answer is to use pit closure and reopening dates as these were the dates regarded by contemporaries as significant. Indeed, strikers had no real bargaining power if pit production was close to normal.

To try to offset some of the errors and to supplement the list with information about non-Association pits, Dalziel's record was cross referenced with newspaper reports. The newspapers brought their own set of problems and irritations, in addition to the ones outlined earlier. Sometimes reporters refer to pits by their location, at other times by the name of the

⁵ 6 August is the date that the newspapers first make reference to any involvement in the strike by Monmouthshire pits and has been adopted as a more likely date for the start of the strike at the two Holly Bush pits.

⁶ Some of these issues have already been discussed in the introduction to the case study.

owner or company and sometimes by a nickname, frequently all variations being used within the same paragraph. The National Colliery at Wattstown could appear as Wattstown Colliery or 'Cwtch', while Ocean's Eastern Pit was on occasions referred to as Ton Pit or, more confusingly, as Bwllfa, which was in fact a small house coal level close to the Eastern Pit but not actually operating in 1893. It can be a challenge to follow the logic of a given account therefore and particularly difficult to be certain that different newspapers are talking about the same pits. Moreover, there is a prioritising of information about Association pits even in the newspapers since these tended to be the most economically important.⁷ Consistent and accurate information about non-Association workings therefore was difficult to find and a large number of pits had to be disregarded because while the date the men struck work could be established there was no indication of when the strike ended. In other cases, there were datable references to the return to work of some workforces but only vague references to the length of time they had been idle. Phrases like 'for some time' or 'since last week' are especially common in reports about non-Association pits.

When dealing with small pits, the newspapers could be particularly vague. It was clear that many small concerns were in fact involved with the strike but the newspaper reports tend to generalise about these, referring to the pits 'around' Machen, for example, or all the pits 'in the vicinity' of Abersychan. It was almost impossible to establish the stance taken by individual small pits except where they were explicitly referred to by name, as was the case with the pits around Caerphilly, so these had in most cases to be excluded. Of the 593 pits named in the 1893 *List of Mines*, therefore, there was little chance of establishing the status of the 103 pits which each employed less than 30 men. When the pits marked as idle in the 1893 *List* were also discounted, the total number of pits for which it was possible that information was available was 421. Full strike data was in fact only available for 261 pits, that is 62 percent of

⁷ By the 1890s MSWCOA owned collieries were producing over 70 percent of the total output of the South Wales coalfield; Finlay A. Gibson (comp.), *A Compilation of Statistics (Technological, Commercial, and General) of the Coal Mining Industry of the United Kingdom, the various coalfields thereof, and the principal foreign countries of the world* (Cardiff, 1922), p. 6.

the 'possibles' and 44 percent of the total number of pits listed for 1893. Although this may not appear a particularly good result, it should be remembered that the Association pits were the most economically important in part because they were also the largest in terms of workforce. So although the picture is incomplete in terms of pit numbers and is skewed towards MSWCOA pits, which limits the range of questions that can be asked, it does at least mean that the experiences of the bulk of the workforce can be accounted for.

Two sets of maps were then created from the 1893 geodatabase to answer the twofold purpose outlined earlier (Fig. 6 & Figs. 15.1-15.8), although in order to produce meaningful maps the data had to be manipulated in slightly different ways in the two. Some pits suffered enforced closure, that is, the stoppage was the result of threats to the safety of the workmen not as the result of a decision to support the strike. In the first set of maps, that of strike duration, which was created to identify areas of strong support, these pits are classified as non-striking in spite of the suspension of work. In the second set, they are included as 'striking pits' since the aim is to understand the movement, maintenance and extent of the spread of the strike message. Whether the men came out willingly or not is then in a sense irrelevant. The strikers had brought their message and it had produced the desired effect: the cessation of coal production.

The map of strike duration, then, theoretically at least, identifies those pits most in support of the strike and reveals a very uneven distribution over the coalfield. There are, more importantly, a significant number of pits where there was high degree of resistance to the strike. This raises a number of questions about the reasons for the very different stances taken by the various pits. As has been seen, some of the variation was attributed by contemporaries to the comparative influence of the Federation or the differing ethnic make-up of communities, although unfortunately none of these can be tested by mapping. There is also the possibility that there are less obvious causes of the pattern the strike duration map exposes.

To test for possible influences on the pattern of behaviour revealed a series of layers of data were produced to overlay the strike maps. One layer identifies pits according to the date sunk (Fig. 11). Another draws on data concerning the output of pits belonging to Association members (Figs. 12.1-12.3). A third layer identifying the concentration of accidents and fatalities was produced based on Mines Inspectors' Reports from 1884 to 1893 (Figs. 13.1-13.3). In each case there were difficulties, most of which will be discussed in the relevant sections. Suffice to say here that ensuring the correct information was attached to the right pit was a very time consuming process. The inconsistent nature of the sources (either because of varying levels of identifying details or because of the use of non-official names), for example when trying to identify pits where accidents occurred, made tracing the experience of any given pit even over comparatively short periods of time an extremely demanding task. The other important layer of data was not created specifically for this project. The layer depicting the coalfield divided into five parts was provided by Dr Peter Brabham of Cardiff University's School of Earth and Ocean Sciences (Fig. 8.1). This layer divides the coalfield into sub-regions reflecting the historical economic character of the regions and loosely reflecting the underlying geological conditions. This was used to test whether this way of representing the coalfield provided a better structure for understanding and explaining the extent and pattern of the strike.

Geology and the Expansion of the Coal Industry 1873-1893

The GIS maps (Fig. 3 and Fig. 4.1) show the geographic extent of the coalfield in 1873 and 1893. Unfortunately neither the 1873 nor the 1893 *List of Mines* provides data about employment levels, although figures are available for 1894 and these have been used in some calculations (Fig. 4.2). The maps therefore offer limited potential for answering other questions about changes to the industry. Because there are no employment figures for the earlier period, the shift in distribution cannot be understood automatically as the expansion and corresponding contraction of the industry at any given location. Simple point maps, while useful for showing the location of industrial activity, say little about the scale of that activity. Without

employment figures, it is impossible to know the size of the new pits or the pits which were closing. It is theoretically possible, for example, that twenty mines each employing twenty men were replaced by a single mine employing five hundred. There would be fewer 'dots' on the map but the situation can hardly be interpreted as a contraction in the industry. Similarly a proliferation of mines cannot automatically be taken as expansion, particularly if these mines were small and their opening coincided with the closure of a number of large pits.

Nevertheless, a comparison of the two maps can help identify the location of previously unexploited areas which were being opened to the coal industry over the twenty year period.

It is clear from a comparison of the 1873 and 1893 maps that the eastern section of the coalfield and the Swansea region remained heavily exploited although there appears to be a slight contraction in pit numbers in the far eastern section. There is evidence though of significant new developments in the upper Rhondda Fach and the heads of the Garw valley and Afan valley. By 1893 a handful of pits are also beginning to appear along the southern outcrop. But the most obvious development is the opening up the Gwendraeth and Aman valleys and the head of the Tawe valley in the western half of the coalfield. The real extent of the workings by 1893 becomes more apparent when we look at the same map showing pits by the size of the workforce (Fig. 4.3). The workforce in the South Wales division had almost doubled in size in the previous twenty years, from 45,272 in 1873 to 86,781 in 1893.⁸ Output had increased from around sixteen million tonnes of coal to over 30 million tonnes in the same period.⁹ It is clear that mining activity was still concentrated in the eastern half of the coalfield, the western half containing only two pits employing more than five hundred men. It is also apparent that there

⁸ The South Wales coalfield was divided into two districts for inspection purposes: South Wales, which included Glamorgan, Carmarthenshire, and Pembrokeshire and the South Western which was made up of Monmouthshire, parts of Brecon, some bits of Glamorgan and sections of the west of England; PP, HC, 1894 C.7339, *Report of Joseph T. Robson, H. M. Inspector of Mines for the South Wales District (No. 13) for the year 1893*, p. 4.

⁹ John Williams, *Digest of Welsh Historical Statistics: Vol. 1* (Cardiff, 1985), p. 300. See also Appendix B, Fig. 3.

was considerable variation even in the eastern half. Along the southern and far eastern edges there were mostly small pits, each employing less than a hundred workers, the exceptions being at Risca and Cwmbran. These changes will be covered here using the five-part division mentioned above to organise the discussion.

The Eastern and Western Metallurgical Regions

The coalfield first developed around the Swansea area and along the northern outcrop at the end of the eighteenth century.¹⁰ In Swansea's case it was the expansion of the copper industry which led to the exploitation of coal in the region for smelting. In the eastern coalfield it was the presence of rich seams of ironstone between Pontypool and Merthyr, together with easy access to limestone, to act as flux in furnaces, and Millstone Grit, to use for lining furnaces, which stimulated the development of an iron industry (Fig. 7.1).¹¹ When the technology became sufficiently advanced to allow a move away from the use of charcoal for smelting, the numerous coal seams in the region, many close to the surface or outcropping on the hills around the ironworks, were exploited. As demand for coal increased, pits were sunk in the valley floors and coal production moved further out from the iron towns. Nevertheless, as the 1873 map shows, large numbers of pits remained clustered along the northern edge reflecting the original development of the region.

By 1893 copper production had passed its peak and iron and steel production were in decline. Although some of the 1873 pits continued in existence, the number was reduced in the eastern region. Many were comparatively small and remained linked to metal production. Despite

¹⁰ A detailed study of the South Wales coal industry up to the 1870s can be found in J. H. Morris & L. J. Williams, *The South Wales Coal Industry, 1841-1875* (Cardiff, 1958). For an account of the history of coal mining in the Neath-Swansea-Llanelli see Ronald Rees, *The Black Mystery: Coal-mining in South-West Wales* (Talybont, 2008).

¹¹ For a more thorough analysis of the evolution of the South Wales coalfield at the end of the eighteenth and in the first half of the nineteenth centuries see A. H. John, *The Industrial Development of South Wales 1750-1850: An Essay* (Cardiff, 1950).

some expansion and the opening up of larger mining concerns further down the eastern valleys, the balance of coal production had shifted to the central coalfield.

The Central Coalfield

In fact, the central region of the coalfield had been expanding since the mid nineteenth century. Government-instigated research in the 1850s was instrumental in stimulating demand for Welsh coal. Welsh steam coal from the central coalfield region was found by Henry de la Beche and Lyon Playfair to have high evaporative power, to give off little smoke and to require a minimum of stoking.¹² It was less fragile than coals from elsewhere and produced little residual ash which meant that it travelled well, as well as burned well. In other words, it was ideal coal for use by the Royal Navy. By the mid 1870s, the Rhondda Fawr was being extensively worked, the exploitation made possible to the Pontypridd anticline which brings the most important steam coal seams closer to the surface. In the whole length of the Rhondda Fawr the lowest workable seam, the Gellideg, is no deeper than 1,800 feet below the valley floor.¹³ But the 1873 map reveals there was only limited development of the Rhondda Fach, and that was mostly concentrated at Ynyshir and Ferndale. The later development of the Rhondda Fach was due to two reasons. Firstly, the Fach was more isolated than the Fawr because of its narrowness, extensive woods, and limited access. It was surrounded by hills broken only by a succession of cliffs without any through valley road. Secondly, the No. 2 and No. 3 Rhondda seams, the valuable bituminous seams which had first attracted industrial speculators to the Lower Rhondda, are poorly represented and thinner in the Rhondda Fach and profitable working on large scale was therefore impossible.¹⁴

¹² PP, HC, 1851 1345, *Third Report on the coals suited to the steam navy*.

¹³ P. J. Brabham, 'The Central Valleys of South Wales: using GIS to visualise the geology, landscape and coal mining legacy', in M. G. Bassett, H. Boulton & D. Nichol (eds.), *Urban Geology in Wales: 3* (Cardiff, 2009), p. 157.

¹⁴ E. D. Lewis, *The Rhondda Valleys: a study in industrial development, 1800 to the present day* (London, 1959), p. 7.

By 1893, however, demand especially for Rhondda coal had stimulated a push into the Fach. The Rhondda was regarded as 'special' because of the great variety and rank of its coking and steam coals. Plus the seams occur relatively near each other, in some cases close enough for them to be worked together. At Lady Lewis Colliery in the Rhondda Fach, for example, there is only two foot of rock between the Red Vein and the Nine Feet seams, although they are usually separated by a couple of hundred yards.¹⁵

The same demand for coal had also led to the opening out of the Ogmore and Garw valleys by the early 1890s. There had been some earlier development in the Llynfi Valley around Maesteg, apparent on the 1873 map, most of the coalmines in the region owing their existence to the iron companies established at Maesteg and Tondy in the first half of the nineteenth century. But there was not the same level of local demand for coal as the iron industry was never as fully developed as further east. In the Maesteg region the ironstone bands become thicker but are poorer in iron, making it less economic to use. The Llynfi valley also developed before the neighbouring Ogmore and Garw valleys because of its greater accessibility.¹⁶ Both the Garw and Ogmore were densely wooded, steep-sided valleys which offered little incentive for exploration until the demand for coal became sufficiently great. Transport up and down the valleys was difficult and there was no natural place to site a port south of the three valleys' converging point. As Thomas Bevan explained, Ogmore, for example, faces the open Atlantic with its prevailing south-westerly winds. Huge sandbanks just outside make the approach difficult: Scarweather Sands lie on one side, the Nash Barrier on other, with the Tuscar Rock in the centre. Traffic coming down the valleys has to then turn eastwards to Cardiff and Barry or westward to Port Talbot and Swansea, making transportation of extracted coal an expensive business.¹⁷

¹⁵ Lewis, *The Rhondda Valleys*, p. 8.

¹⁶ Brinley Richards, *History of the Llynfi Valley* (Cowbridge, 1982).

¹⁷ Thomas Bevan, 'The Industrial Development of the Llynfi, Ogmore and Garw Valleys: with special reference to transport facilities in the area' (Unpubl. MA (Econ.) Thesis, University of Wales, 1928), p. 18. A brief discussion of the attempt to turn Porthcawl into an export dock can be found in Leonard

The maps also show a clear contrast in 1893 between the state of development at the heads of the Ogmore, Garw and Llynfi valleys and that lower down.¹⁸ Towards the south of these valleys the geological structure becomes very difficult with steep dips on the southern limb of the Maerdy-Pontypridd anticline. Mining here is further complicated by the presence of the 'Jubilee Slide' structure, a series of faults, and the Moel-Gilau fault, which with a downthrow of over 2,000 feet causes the coal seams to abruptly disappear (Fig. 7.2).¹⁹ Nantymoel, however, is north of the anticlinal ridge and at this point there is considerable flattening of the seams, making for smooth working.²⁰ At the Ocean Pit in the Garw Valley it was noted that 'the folds have been so flattened that long level underground roads have been made. The district is very free of faults and a good "top" is secured.' Indeed, so good is the area for mining that, '[a]n inspector of mines, once on a visit to these Works was able to travel through large areas of the workings on horseback'.²¹ By the 1890s the heads of the Afan and Corrwg valleys were similarly being opened out although the western extension of the main Afan valley remained undeveloped. The coal seams of the Middle Coal Measures dip down to depths which made mining uneconomic towards the west.

The Southern Outcrop

In stark contrast to the saturation of pits along northern edge and the rapid expansion in the central region, the southern edge of the South Wales coalfield – that is, the area extending from Kenfig eastwards to Caerphilly – was largely undeveloped in 1873 and remained undeveloped, or at least underdeveloped in 1893. If we look at the Southern outcrop by

Higgins, 'The Brogden Pioneers of the Early Industrial Development in Mid-Glamorgan', *National Library of Wales Journal*, Vol. 20 (1978), pp. 240-52.

¹⁸ Bevan, 'The Industrial Development of the Llynfi, Ogmore and Garw Valleys', pp. 14-15.

¹⁹ Brabham, 'The Central Valleys of South Wales', p. 157; David Lewis, *The Coal Industry in the Llynfi Valley* (Stroud, 2006), p. 13.

²⁰ Bevan, 'The Industrial Development of the Llynfi, Ogmore and Garw Valleys', p. 187. See also Figs. 7.3 & 7.4.

²¹ Bevan, 'The Industrial Development of the Llynfi, Ogmore and Garw Valleys', p. 193.

employment figures, it is very apparent that pits in this region remained small.²² The geological structure of the coalfield here acted largely as a brake on rather than an aid to the region's development. Here the beds form a steep V shaped syncline with dips of up to 60 degrees south of Caerphilly, in contrast to the northern edge where the coal seams pass underground at a smaller angle, the dip being only about 9 or 10 degrees near Merthyr.²³ The sinking of the South Llanharan Colliery, for example, was abandoned when it was found that the dip in the seam was ten inches to the yard near the bottom of the shaft.²⁴ At Cardiff Navigation Colliery, the measures dip at 35 degrees to the north. The structure in the west is further complicated by thrust faults which deform the seams. Working such steep seams was thus technologically challenging and usually economic unremunerative: southern outcrop collieries for most of the nineteenth century tended to be commercial failures and were therefore only short-lived affairs.²⁵

The Anthracite Region

The biggest area of expansion between 1873 and 1893, however, appears at first glance to be in the anthracite area. The 1873 map shows a handful of pits at the head of the river Tawe and an isolated development alongside the river Loughor. By 1893, both the Gwendraeth and the Aman had seen significant changes. But as the 1893 employment map shows these remained small workings, concentrated on the northern edge where the seams come comparatively close to the surface. Output, by the mid 1890s, was still only one and a half million tons, less than

²² Indeed it was not until the years immediately preceding the First World War that some of the bigger coal and iron and steel companies began to sink pits and drive slants in the area between Tondy and Llanharan; Bevan, 'The Industrial Development of the Llynfi, Ogmore and Garw Valleys', p. 198.

²³ F. J. North, *Coal and the Coalfields in Wales* (Cardiff, 1926), p. 61.

²⁴ Aubrey Strahan & T. C. Cantrill, *The Geology of the South Wales Coalfield: Part VI – The Country around Bridgend, being an account of the region comprised in sheet 261, 262 of the map* (London: H.M.S.O., 1904), p. 19. It was not until the post-Second World War period and the adoption of German horizon mining techniques, where horizontal tunnels are driven and the dipping coal seams exploited between the tunnels, that the area was really developed.

²⁵ Aubrey Strahan, R. H. Tiddeman & Walcot Gibson, *The Geology of the South Wales Coalfield: Part IV – The Country around Pontypridd and Maes-têg, being an account of the region comprised in sheet 248 of the map* (London, 1903), p. 39.

five percent of the total output of the South Wales coalfield.²⁶ Development of the area was delayed partly because demand for anthracite was limited. It was not suitable for iron and steel smelting and the experiments of de la Beche and Playfair found that despite its smokelessness and its high evaporative power, when alight it generated so intense a heat that it ate away at boilers and was therefore of little use for raising steam.²⁷ In addition it had little appeal as a domestic fuel; when burnt in an open grate it produces only a dull, flameless fire.²⁸ It was not until the discovery in the latter decades of the nineteenth century that it was ideal for use in Continental closed stoves that the industry was given the necessary impetus to begin expanding.²⁹

But there were also problems because of the degree of fracturing in the region which made working difficult. The disturbance of strata by faulting increases in a westerly-northern direction until in the anthracite region it becomes severe.³⁰ Seams rise and fall so roads had to be driven up and down hill to follow the jumps in the seams and this made haulage very expensive. Where anthracite was worked it was mainly by levels or slants which were smaller, cheaper and provided a quicker return on capital expenditure than sinking pits. As H. S. Jevons noted:

Anthracite mining in South Wales is a particularly difficult and risky business for colliery proprietors, as the strata are so much disturbed that the seams are constantly disappearing through small local faults, and much expenditure on cutting through dead-rock is necessary to reach the coal again.³¹

Production costs were therefore considerably higher than in the central area and this also acted as a brake on development.

²⁶ Based on figures provided by H. Stanley Jevons, *The British Coal Trade* (London, 1920), pp. 116 & 665.

²⁷ J. H. Morris & L. J. Williams, *The South Wales Coal Industry, 1841-1875* (Cardiff, 1958), p. 45.

²⁸ Jevons, *The British Coal Trade*, p. 39.

²⁹ For a fuller discussion of the development of the anthracite region of the coalfield see Matthews, 'The World of the Anthracite Miner', especially pp. 1-33. Also A. E. C. Hare, *The Anthracite Coal Industry of the Swansea District* (Cardiff, 1940).

³⁰ Jevons, *The British Coal Trade*, p. 30.

³¹ Jevons, *The British Coal Trade*, p. 671.

The comparison of the 1873 and 1893 maps therefore indicate a number of changes in the geographic extent of the coal industry in South Wales. As has been seen, the influence of geology in shaping the pattern is apparent in broad outline, in the timing and type of development. But it raises the question of whether it is also possible to see geological influences at work in closer detail, whether it can be seen shaping individual and group action in the midst of a specific action at a specific point in time.

Geology and the Workforce

As was noted at the beginning, historians have been aware of the implications of geological variations for workers' co-operation. This has usually been expressed in economic terms, however. Piece work has been seen as one of the fundamental practices undermining the potential solidarity within the workforce. There is plenty of evidence of its divisive nature. Bert Coombes pointed out that productivity was no guide to how hard a given individual had worked because geological conditions could vary so greatly underground. One man could produce four tons in a good seam while his neighbour struggled to produce three, but the second man had to work harder because of the conditions.³² W. H. Taylor, who worked in various pits during the early twentieth century noted that:

some days you could be fortunate ... if you had a pretty active roof and there was an amount of subsidence the coal would crush and it would be easy to mine, and your chief worry would be the control of the roof. But other times you would have to hole it ... or undercut it. You would lie on your side and hack away and hole it under as much as a yard.³³

Foster Lewis, a miner working in the Ely valley, commented on the different conditions in the steam coal colliery he moved to compared with the ones he had known in house coal pits. In the house coal seam at Coedely the 'roof', that is the geological bed above the mined seam,

³² B. L. Coombes, *Those Clouded Hills* (London, 1944), p. 16.

³³ Quoted in Alan Burge, 'Miners' Learning in the South Wales coalfield 1900-1947', *Llafur* Vol. 8 No. 1 (2000), p. 74.

was formed of solid sandstone which provided a strong and stable platform less liable to failure and therefore needing few roof supports. The roof of the deeper steam coal seam at Cilely was of shale-like quality and required frequent propping, a hugely time consuming but non-remunerative activity.³⁴

Conditions could also change suddenly in a seam. When working a high quality six foot seam of steam coal at Cilely, Foster Lewis found that the coal could be removed easily without any tedious undercutting. All a miner had to do, he remembered, was to use his mandrel to break up the coal. But he also found that the seam and conditions changed completely when the workers hit a fault. The seam was on a higher level on the other side and the roof structure, previously hard rock, was replaced by shale.³⁵ Previously ideal coal-getting conditions suddenly became serious hard work.

Some seams could be especially friable, producing large quantities of 'small coal' for which the miners were not paid. Other seams could be dangerously volatile. The Aberdare Four Feet and Black Vein were notorious and the frequent explosions caused by working them led to a Government enquiry in 1881.³⁶ Moreover, compensation for working difficult seams also varied. The Six Feet seam at the Navigation Colliery varied in thickness in different parts of the workings and a system of compensating the men for working the portions where the thickness was less than that of the ordinary was operating. But compensation rates were not consistent from pit to pit. When workmen's representatives from Navigation visited the Powell Duffryn collieries in the district they found that the system there was to pay 1d per ton allowance for every inch thickness of seam of coal below that of the ordinary or the recognised thickness of the general strata, a considerably more generous arrangement than at Navigation.³⁷

³⁴ Foster Lewis, *The Miner's Tale: Recollections of Events in the Inconsequential Life of a South Wales Coal Miner 1916-1938* ([S.l.]: Margaret Lewis, [n.d.]), p. 19.

³⁵ Lewis, *The Miner's Tale*, p. 53.

³⁶ T. Boyns, 'Technological Change and Colliery Explosions in the South Wales Coalfield, c. 1870-1914', *Welsh History Review*, Vol. 13, No. 2 (Dec., 1986), p. 157.

³⁷ *Pontypridd Chronicle*, 2 October 1891.

Different prices were besides negotiated at pit level for each seam. Apart from the regional variation, which will be discussed below, the seams at any locality show a general increase in rank with increasing depth. They could command different prices on the market and workers were consequently paid at different rates according to the seam. At the Ffaldau Colliery in 1893, for example, men working on the Two Feet Nine Inch seam were paid 1s 10 ½d per ton of large coal, those working the Two Feet seam were paid 1s 9d while those on Six Feet seam earned only 1s 4½d.³⁸ Moreover, special skills were required to work low seams and low seam colliers were not as numerous as others who worked the thicker seams in steam pits. Their expertise was highly valued and they could secure better pay or conditions as a result. Although he offered no extra payment, the manager of the pit at which Robert Morgan worked was so keen to retain Morgan's experience in working low seams that he allowed Morgan to finish his shifts an hour early.³⁹

With no standard payment for a day's work and no guarantee that the same amount of effort would produce the same financial return, the working conditions were therefore more conducive to creating an 'every man for himself' mentality rather than any sense of common cause. But while piece work was evidently a problem it is almost impossible to measure the impact of such a divisive force on behaviour, precisely because geological conditions varied so considerably from pit to pit and within pits at any given point in time.

Rank of Coal

One feature which it may be possible to discern via mapping as having an influence on behaviour, however, is the variation in rank of coal. Variation in the rank of coal is a key characteristic of the South Wales coalfield, one which sets it apart from the rest of the British coalfields. It was also the cause of one of the most divisive characteristics of the South Wales

³⁸ *Central Glamorgan Gazette*, 1 September 1893.

³⁹ Robert Morgan, *My Lamp Still Burns* (Llandysul, 1981), p. 134.

coal industry, since the quality of the coal dictated the market and this in turn dictated the level of investment and exploitation. As has been noted, although the anthracite trade was dependent on specialist demand and therefore enjoyed limited, though by the 1890s expanding, investment, it faced little overseas competition. By contrast, most steam coal was exported and that section of the coal industry was dependent, as a result, on overseas demands and faced stiff competition for markets from other coalfields. Moreover, foreign demand could fluctuate fairly widely causing major difficulties.⁴⁰ The house coal section, on the other hand, was dependent on the home market and was more predictably hit by seasonal fluctuations.

These variations had serious implications for the workforce. Dependent as they were on the vagaries of different markets, it was often the case that miners across the coalfield were hit by busts and booms at different times. Fluctuations occurred in the different markets at different rates, times and sometimes in different directions and since wages were linked to the price of coal it meant that miners were often not ready to take action over wages at the same time.⁴¹ In 1893 there were marked disparities between hauliers' pay rates across the coalfield. At Loughor the men enjoyed a respectable 22 to 24 shillings per week which compared very favourably with the 15 to 18 shillings paid in the Rhondda.⁴² The men at the Plymouth Collieries, Merthyr, were working on a standard which was 3d to 9d lower than that even of the Rhondda hauliers.⁴³

In addition, separate standards were in operation for house and steam coal under the sliding scale agreement. Indeed co-operation between the house and steam coal men had been rare prior to the 1890s. It was not until 1885 that a first attempt was made to organise a joint

⁴⁰ Michael Asteris, 'The Rise and Decline of South Wales Coal Exports, 1870-1930', *Welsh History Review*, Vol. 13, No. 1 (June, 1986), pp. 33-5. By the 1890s, approximately 16 percent of total UK coal production was by South Wales but by 1891, 35 percent of UK shipments of coal were via South Wales ports; Jevons, *The British Coal Trade*, pp. 113-6.

⁴¹ Williams, *Was Wales Industrialised?*, pp. 310-33.

⁴² *Herald of Wales*, 26 August 1893.

⁴³ *Merthyr Express*, 19 August 1893.

conference of the steam and house coal delegates and such meetings had remained rare occasions.⁴⁴ The Rhondda House Coal Miners' Association, established in 1888, had been set up in distinction from the Cambrian Miners' Association because the house coal men, in a minority in the valley, felt that their interests were being neglected.⁴⁵

It is clear that in 1893 the different regions of the coalfield were experiencing different trade conditions. Merthyr, especially Cyfarthfa, was enjoying something of a boom. Demand was so high that old house coal levels were being reopened, the *Colliery Guardian* commenting with satisfaction that, 'The Cyfarthfa collieries may be instanced as doing exceedingly well.'⁴⁶ Other areas too were taking on extra men: Ferndale in May of 1893 was apparently 'crowded with men ... and the general output of coal is higher at the present time than it has ever been previously'.⁴⁷ Yet, just a few miles away, at Nantymoel, the men were working short time and at Aberdare, Abercwmboi Colliery was standing idle.⁴⁸ In some parts of Monmouthshire the situation was especially grim, with many pits dormant; one speaker at a mass meeting complained that he had not had any work for over four months.⁴⁹

It might be possible therefore that underlying the uneven pattern of support for the strike of 1893 apparent from the strike duration map were divisions rooted in differences in the rank of coal being produced. A map of pits by coal type was therefore produced (Fig. 10). It clearly shows a solid block of opposition to, or at least no support for, the strike in the anthracite district. Elsewhere the map shows no simple or clear cut split between house and steam coal producing pits. Although the strike began at predominantly steam coal pits and spread initially to the major steam coal producers, there appears to be no uniform or consistent response

⁴⁴ Ness Edwards, *History of the South Wales Miners* (London, 1926), pp. 79- 86.

⁴⁵ E. W. Evans, *The Miners of South Wales* (Cardiff, 1961), p. 135.

⁴⁶ *Colliery Guardian*, 4 August 1893.

⁴⁷ *Western Mail*, 30 May 1893; *Central Glamorgan Gazette*, 4 August 1893.

⁴⁸ *Central Glamorgan Gazette*, 4 August 1893; *List of Mines 1893*.

⁴⁹ *Pontypool Free Press*, 11 August 1893.

along coal-type lines. This suggests that no significant separation of the workforce was caused in 1893 by variations in rank of coal.

Even where there appeared to be uniformity of response, as in the anthracite district, it was not necessarily that it was because of differences of experience in trade. In fact a strike was occurring at Tumble simultaneously with the hauliers' strike.⁵⁰ The issues here were swingeing pay cuts and the importation of cheap outside labour which suggests that the anthracite region was facing similar problems to elsewhere even if the immediate causes were slightly different. And yet despite numerous attempts to get the men of the district to join in the strike with the rest of the coalfield, these met with no success. Possibly contributory factors here were the size of the pits. Anthracite mines tended to be small and locally owned and Ioan Matthews has demonstrated that the relationship between the workmen and owners could be crucial in determining the response of individual workforces to industrial action.⁵¹ Moreover, the region was intensely loyal to Cwmavon born Mabon, who they regarded as one of their own.⁵² Elsewhere too local disputes were actually getting mixed up with the strike. At the Upper Cwmbran Colliery complaints about the great deal of rock coal found in the pit for which the men were not given any allowance fuelled resentment at the pay scale generally.⁵³ At Rhymney the hauliers had been engaged in a seventh-month long struggle to get a 7d improvement on the standard pay of 2s 11d per day. They had been working since 1 July on day-to-day contracts.⁵⁴ For them, the strike provided welcome support and publicity for their cause

⁵⁰ Matthews, 'The World of the Anthracite Miner', pp. 149-65; Noel Gibbard, 'The Tumble Strike, 1893', *The Carmarthenshire Antiquary*, Vol. 32 (1996), pp. 77-85.

⁵¹ Matthews, 'The World of the Anthracite Miner', p. 96.

⁵² Mabon addressed several meetings in the anthracite district and raised the issues of the strike; for example at Cross Hands, *South Wales Daily Press*, 26 August 1893; Cwmtwrch, *South Wales Daily Press*, 28 August 1893.

⁵³ *South Wales Argus*, 10 August 1893.

⁵⁴ *Merthyr Express*, 19 August 1893.

The picture outside the anthracite district may be due, though, in part to the fact that, as already indicated, coal quality not only varies across the coalfield it also alters between higher and lower seams. In the vicinity of Nantymoel the volatile matter of the No.2 Rhondda, the Nine Feet and the Gellideg seams is 26.0, 19.5 and 17.0 percent respectively.⁵⁵ This meant that it was not only possible to have neighbouring pits producing different coal but also single pits producing different coals from different seams. Aberbeeg Colliery, Monmouthshire and Garth Merthyr Pit at Maesteg, for instance, produced both house and steam coal, while Crynant Pit near Neath is listed as working steam and anthracite seams.⁵⁶ It is therefore impossible to designate some mines as just steam coal or house coal and it is not always clear from the records whether those who struck work were from one section or the other, or both.⁵⁷ The nature of the data together with the highly variable nature of the geology set limits on the value and potential of the mapping.

The newspaper evidence does, however, suggest a degree of fracturing between house coal and steam coal workers. Workmen in particular regions seem to have acted in concert with those operating in the same type of mines. The house coal men of Dinas Main, Gilfach, Penrhiwfer, Penygraig, Dinas Isaf, Cilely and Glyn mines all voted to return to work *en masse* towards the end of August and appointed representatives to look after their interests as a group.⁵⁸ The house coal pits of the Rhymney Valley had returned to work by 26 August, but the steam coal pits at the head of the Valley were still strongly supportive of the strike.⁵⁹ At Cymmer 'the Cymmer house coal men – those of the Upper Cymmer Colliery – were at work

⁵⁵ H. F. Adams, 'Economic Geology: Coal Mining', in Austin W. Woodland & W. B. Evans, *The Geology of the South Wales coalfield: Part IV – The Country around Pontypridd and Maesteg* 3rd Ed. (London, 1964), p. 295.

⁵⁶ PP, HC, *List of Mines 1894*.

⁵⁷ House and steam coal pits have been distinguished separately from house-only and steam-only pits in the map.

⁵⁸ *Pontypridd Chronicle*, 25 August 1893.

⁵⁹ *Western Mail*, 26 August 1893.

while their steam coal colleagues were out'.⁶⁰ But it was not automatic that those working in particular types of pits would respond to the strike in a consistent way. It was the house coal men who appeared to take the leading part in the Rhondda, disrupting a meeting at Tonypanydy Hall which Mabon was due to address.⁶¹ At Llwynypia the steam coal men worked the horses in place of the hauliers while the house coal pit stood idle.⁶² Evidently there was no insurmountable division between house coal and steam coal workers at the general level and clearly the issues at stake in 1893 were of universal concern since they appealed to men from both sides of the divide. But at local level there was a degree of separation between the two branches of the coal industry which created distinct group identities and led to independent, sectional rather than co-ordinated action.

Age of Pits

Several other questions are raised by the uneven pattern of support for the strike of 1893. As a comparison of the 1873 and 1893 maps demonstrated, the industry was not developed to the same extent at the same time everywhere. Was it the case that the areas undergoing expansion, where new seams were being opened out, were more likely to be compliant than older, established areas where the easiest, most accessible coal had been worked out and productivity therefore in decline? It is possible that in newer regions there would be a general atmosphere of optimism and a greater willingness, therefore, to sit out difficult periods.

Zweiniger-Bargielowska has argued in relation to twentieth century pits: 'There is a positive correlation between a colliery with few faults and geological problems, good working conditions, high levels of productivity and quiescent industrial relations; and *vice versa*.'⁶³

There is some evidence which seems to support this contention. The newest area in 1893 (Fig. 4.1) was the anthracite region and this was clearly anti-strike. The Rhondda Fach was also more recently developed and displayed less overall support for the strike than the Rhondda Fawr (Fig.

⁶⁰ *Western Mail*, 5 August 1893.

⁶¹ *South Wales Echo*, 14 August 1893.

⁶² *South Wales Daily News*, 5 August 1893.

⁶³ I. M. Zweiniger-Bargielowska, 'Miners' Militancy: a Study of Four South Wales Collieries during the Middle of the Twentieth Century', *Welsh History Review*, Vol. 16, No. 3 (June, 1993), p. 371.

6). On the other hand the Garw displayed high level of loyalty to strike. Similarly the pits at the head of the Afan alley had to be coerced into joining the action. But we would also expect the converse to be true, that is, that the older regions would be more supportive of the strike. While this is true of the eastern edge of the coalfield it is not the case with the heads of Ebbw, Rhymney, Taff or Cynon valleys.

The general picture is therefore contradictory. But what of individual pits? Could it be that workers at older pits were more (or alternatively less) likely to strike than those at newer ones? It might be assumed that older pits were more prone to problems as the distance to the coal face increased and the better seams were worked out.⁶⁴ The age of pits is, unfortunately, another one of those issues difficult to map because of the nature of the sources. As was noted in Chapter Three, it is difficult to accurately trace a given pit through its whole lifespan, due to numerous changes of owners and subsequent name changes. But more importantly, many early pits began as small affairs, employing a handful of men, operating only seasonally and experiencing long periods of closure as a result of accidents or difficult economic conditions. In time, they might then be bought by a new company, which would sink new shafts and work new seams. There might therefore be continuity in terms of geographic location and sometimes even in the name of pits, but it is questionable to what extent they can be regarded as the same entities during the whole period.⁶⁵ Even with pits sunk in the latter part of the nineteenth century, there is some confusion in the sources over dates. Some records list the date that sinking began, others date the life of a pit from the first raising of coal. With problems with sinking and finances, there could actually be several years between these two dates. A late example is the Cwm Colliery, Tynant. Sinking began in 1909 and was completed on the Margaret Pit in July 1914. Both dates regularly crop up in secondary sources. But in fact

⁶⁴ See, however, T. Boyns, 'Labour Productivity in the British Coal Industry, 1874-1913', (Unpubl. PhD Thesis, UCC, 1982), especially pp. 99-100. Boyns suggests that the age of a pit was not a significant factor in productivity levels.

⁶⁵ For a discussion of the problem of handling such changes using GIS see Gail Langran, *Time in Geographic Information Systems* (London, 1993), p. 35.

first coal was not raised until 1916.⁶⁶ It is difficult therefore to be certain that we have an accurate date. We are not, admittedly, talking about huge variations and by grouping together pit ages by decades it limits the impact of errors, but this again is an indication of the uncertainties we are dealing with in the primary sources.

With these problems borne in mind, a map was produced of those pits where the date, however questionable, was available (Fig. 11). There appears, however, to be no clear link between old/new pits and the strike. Mardy, at the top of the Rhondda Fach, was a comparatively young pit, dating from the mid 1870s, and yet it represented the main opposition to the strike in the central valleys. It was in fact approximately the same age as the Western Colliery, at which the strike began. The Wyndham pit was only marginally older, having been opened in 1868. As communities Maerdy and Nantymoel were very similar in many ways. Both were isolated at the heads of dead-end valleys, the industry developed in both at broadly the same time, and both had experienced recent new investment and expansion. Mardy No. 3 was in the process of being sunk, while at Nantymoel the Western Pit had seen a significant increase in investment in the area following the takeover of pits by North's Navigation Collieries in 1889. In 1891 the upcast and downcast shafts were completed eighty yards below the old sinkings to tap the most important steam coal seams.⁶⁷ In spite of the recent downturn in trade, the long term future of both areas appeared secure – as much as it did anywhere.

⁶⁶ See the records of the engineer: GRO D/D XnS 2: Notebook of J. W. Davidson, Penwarden, West Town, Bristol, p. 122.

⁶⁷ The company owned by the Brogden family which controlled a number of pits in the Ogmore, Garw and Llynfi valleys went into liquidation in 1886. The intervening period was one of extreme poverty in the district. See Bevan, 'The Industrial Development of the Llynfi, Ogmore and Garw Valleys', pp. 170-80.

Indeed, coal mining was a very hit and miss enterprise, what John Williams has described as ‘a “bingo” industry’.⁶⁸ Huge profits were undoubtedly possible – it would hardly have been worth having a coal industry if this had not been the case – but sinking pits was an expensive business fraught with risks and uncertainties. The main problem was that while the general outline of the coalfield was well known even at the beginning of the nineteenth century, the geological structure at any given point was only confirmed with sinking and this meant that failures were not unknown. In the early 1880s the Glamorgan Coal Company abandoned the sinking of a shaft near Gilfach Goch when it had gone 332 yards with no sign of coal.⁶⁹ Heavy costs during sinking were also common. When Deep Navigation Pit was being sunk, there were serious difficulties found in penetrating the Pennant rock owing to its excessive hardness. The sinkers had to use very expensive diamond drills and even then progress was slow, at a rate of just seven feet per week.⁷⁰ The initial capital for the sinking of the Universal Pit at Senghennydd, which was ongoing in 1893, was £100,000, but the shareholders were asked for a further £95,300 and by 1894 costs had risen to £248,071.⁷¹ Work on a third shaft at Blaengwynfi had to be suspended due to a series of unexpected obstacles. In the fifteen months since sinking had begun, the contractors had already sustained losses of £1600.⁷²

Even if sinking went well, there were still frequent problems with working seams prone to faults and wash-outs. Faulting could displace a seam by anything from a few feet to a few hundred feet – the Tymawr fault in the Rhondda causes a downthrow east of 209 to 220 yards – and the cost of locating the coal beyond the fault was potentially vast.⁷³ It was sometimes sheer guesswork whether the seam had disappeared upwards or downwards and huge amounts of

⁶⁸ L. J. Williams, ‘The Coalowners’, in David Smith (ed.), *A People and a Proletariat: Essays in the History of Wales 1780-1980* (London, 1980), p. 100.

⁶⁹ Meirion Davies, *Glynogwr and Gilfach Goch: A History* (Cowbridge/Bridgend, 1981), pp. 149-150.

⁷⁰ R. A. S. Redmayne, *Modern Practice in Mining: Vol. II – The Sinking of Shafts* (London, 1909), pp. 75-6.

⁷¹ Lieven, *Senghennydd*, p. 11.

⁷² *Pontypridd Chronicle*, 4 September 1891.

⁷³ Lewis, *The Rhondda Valleys*, p. 10-1.

time, money and effort could be wasted on new excavations in the search.⁷⁴ Engineers could also find seams narrowing or becoming unworkable. Three headings driven from the shaft at Cardiff Navigation Colliery with view of ‘proving’ the North and South Fawr and the Brodwr Veins, for example, found that in each case the coals ‘were squeezed out and worthless’.⁷⁵ Flooding, too, was a serious problem. In 1891, after some coal had been worked off from the newly opened Elliott Pit, the floor burst up and 60,000 gallons of water per hour poured out for three weeks requiring the use of expensive pumping equipment. After a year it was still running at a rate of 16,000 gallons per hour. There continued to be problems in the years following, with fresh outbursts raising the total quantity to 72,000 gallons per hour.⁷⁶ Clearly, the geology of the South Wales coalfield meant the business of mining was not for the fainthearted or for anyone looking for a fast return on their investment.⁷⁷ Nor was it one which offered any degree of certainty or security for the long term – there were simply too many things that could, and frequently did, go wrong for even those involved with the newest pits, with the most advanced technology, whether they were owners and shareholders or workers, to be complacent.

One variation which might be worth considering is the difference between pits and slants, drifts or levels. Slants, which exploited the coal outcropping on hills by driving a passage into the hillside, had lower working costs than deep shaft pits because they sidestepped two basic

⁷⁴ The 1892 Labour Report suggests as late as the 1890s miners’ expertise was often preferred over trained geologists in identifying likely location of ‘lost’ seams; PP, HC, 1892 C.6795-IV, *Royal Commission on Labour: Minutes of evidence, Vol. II: Mining*, p. 162.

⁷⁵ Aubrey Strahan, R. H. Tiddeman & Walcot Gibson, *The Geology of the South Wales Coalfield: Part IV – The Country around Pontypridd and Maes-têg, being an account of the region comprised in sheet 248 of the map* (London, 1903), p. 39.

⁷⁶ Aubrey Strahan & Walcot Gibson, *The Geology of the South Wales Coalfield: Part II – The Country around Abergavenny, being an account of the region comprised in sheet 232 of the map* (London, 1900), pp. 46-7. See also A. P. Barnett & D. Willson-Lloyd (eds.), *The South Wales Coalfield* (Cardiff, 1921), p. 24.

⁷⁷ R. H. Walters, *The Economic and Business History of the South Wales Steam Coal Industry 1840-1914* (New York, 1977).

problems of mining: drainage and ventilation. Because they required little outlay, it was much easier to abandon slants when working became difficult and simply open new ones. Their short-lived nature and the fact that they employed a comparatively small number of men have been shown to have impacted on the type of settlements dependent on them. The fact that the anthracite area was worked predominantly by slant therefore may have led the workers in the region to feel a lower level of commitment to the industry because there appeared to be no long term investment or guarantee that the industry was there to stay.⁷⁸ This possible influence on behaviour has not been followed up in this study because of time constraints, but it may be worth at some future point further subdividing the reaction of house coal pits according to the mode of working to see if there is any discernible difference along these lines in the stance adopted.

A more reliable indicator of the success and economic stability of a pit – and also a better reflection of the geological conditions – might be output statistics. Yet again there is the problem of primary sources.⁷⁹ Output figures for most of the nineteenth century are either absent, or aggregated by company or region rather than by pit and by periods rather than by year. We do, though, have figures for MSWCOA pits for 1894.⁸⁰ These are problematic on a lot of levels, not least as far as this project is concerned because they are for the year after the strike, which could itself have impacted on output. They are also only available for Coalowners' Association pits and Dalziel's printed record is not, as has been noted, totally reliable.⁸¹ The figures were mapped anyway on the basis that they are the best available indication of comparative productivity and they at least offer a general guide (Fig. 12.1-12.3). The evidence

⁷⁸ See Philip N. Jones, *Colliery Settlement in the South Wales Coalfield, 1850-1926* (Hull, 1969), pp. 19-21.

⁷⁹ For a fuller discussion of the problem of primary evidence of output and productivity see T. Boyns, 'Labour Productivity in the British Coal Industry, 1874-1913', pp. 213-9.

⁸⁰ Output figures are available for an increasing number of MSWCOA owned mines from the 1870s but employment figures per mine were not published until 1894, so that is the first year for which it is possible to calculate output per person employed.

⁸¹ There are some exceptionally low figures, such as those for Lady Margaret and Hendreforgan. This may indicate that the pits were operating only part-time that year or may simply be due to errors in publication.

from the maps suggests that contra Zweiniger-Bargielowska, pits with average or above average output were more likely to support the strike in 1893 than to oppose it. It could be that, in the absence of union backing, the workforce at pits where productivity was low or in decline were concerned about the future and less willing to risk any stoppage which might damage in any way an already vulnerable concern. Those where productivity was high and the future apparently more secure possibly felt in a stronger position to bargain and try to force the owners' hands. The picture provided by the GIS maps is therefore suggestive although it is by no means clear cut.

Accidents

Industrial action may not just have been a problem because of the difficulties of establishing a sense of unity amongst the workforce. The volatile nature of the geology in South Wales made industrial action itself a risky business. Unlike a factory, where machinery could be stopped for an indefinite period of time and restarted with little more than a quick squirt of oil, a pit would begin to deteriorate as soon as work ceased. While the Morfa men were out the pit suffered several roof falls and many other pits quickly flooded.⁸² Industrial action under these conditions, therefore, always presented something of a predicament for miners. Allowing pits to flood could be a useful tactic to ensure that the workforce at a given pit was unable to work for the duration of the strike. The enginemen of Aberdare, for example, were concerned that an attempt was going to be made to stop them from working with a view to drowning the pits and enforcing 'support' in an otherwise ambivalent region.⁸³ On the other hand, unless a mine was regularly checked and carefully maintained, there could be a multitude of problems which would delay the return to work once the dispute was settled. At Daranddu Colliery, the men were ready to return to work by 24 August but were unable to do so immediately because the accumulation of water required several days pumping in preparation.⁸⁴ Similarly the Cymmer men found that a massive fall of roof during the period of closure meant that there would be a

⁸² *Western Mail*, 26 August 1893.

⁸³ *South Wales Echo*, 22 August 1893.

⁸⁴ *Western Mail*, 24 August 1893.

wait of a further month following the cessation of the strike before the pit would be fully operational again.⁸⁵ This in turn meant a further loss of wages.

Later fictional accounts of strikes, such as that in Lewis Jones' *Cwmardy*, suggest that miners were perpetually plagued by the dilemma of the best policy to adopt with regard to the maintenance of pits during periods of industrial action.⁸⁶ Repairmen were allowed to attend to work at a number of pits, including Tewgoed, but the decision to grant access by strikers was not one which was taken easily or without disagreement.⁸⁷ Similarly, although a public meeting agreed to allow the night shift at New Tredegar No. 1 and No. 2 pits to keep the roadways clear of falls, the wives of some strikers hooted the repairmen and pelted them with stones in an attempt to prevent them from entering the pit.⁸⁸ In relatively safe mines, repairmen could potentially be diverted by the owners to coal cutting and it was therefore a sensible precaution to prevent them going down. There is evidence that there was some unease in 1893 that the repairmen were being used as 'scab' labour. A serious confrontation was just averted at the International Colliery, Blaengarw, when it appeared that the fifty or so repairmen working at the pit had been employed cutting coal. The military had to be called in to disperse the crowd which gathered at the pithead to protest.⁸⁹ Allowing repairmen to continue working in any case weakened the position of the strikers because it undermined solidarity amongst the men. Moreover, a major concern was that the owners would import outside labour under the

⁸⁵ *Pontypridd District Herald*, 16 September 1893.

⁸⁶ This was evidently a perennial problem and is often included in fictional accounts of strikes. The *Cwmardy* men discussed the issue of leaving safety men in the pit, eventually deciding to withdraw them all; Lewis Jones, *Cwmardy: The Story of a Welsh Mining Valley* (London, 1983), p. 159. Huw Morgan warned strikers trying to interfere with pumping: 'You are cutting your own throats ... If the strike ends to-morrow you will have weeks of waiting while they take water from the levels. More waiting, more idleness, more going without'; Richard Llewellyn, *How Green Was My Valley* (London, 2001), p. 438.

⁸⁷ *Central Glamorgan Gazette*, 25 August 1893. There was similar discontented rumblings at attempts to prevent officials from carrying out their duties at Maesteg Merthyr Colliery; *Western Mail* 21 August 1893. Enginemen and stokers remained 'loyal' to the scale during the course of the strike: Dalziel (comp.), *Records of the Several Coal Owners' Associations*, p. 206.

⁸⁸ *South Wales Argus*, 26 August 1893.

⁸⁹ *Western Mail*, 26 August 1893.

'maintenance' banner. Elsewhere, however, the withdrawal of safety men could have catastrophic results.

There was always the risk that if a pit became too damaged, owners might decide to cut their losses, particularly if the pit had proved to be unremunerative. As the strike headed towards its fourth week, there were several announcements of pit closures. The Garw Llantwit Company was declared insolvent at the beginning of September, the stoppage of the colliery during the strike having exacerbated problems the company was already facing due to the slump in trade and geological problems, especially flooding.⁹⁰ There was real concern amongst the miners that if Morfa was left idle for a month 'not one-third of us will be wanted back there again ... If the Morfa Colliery is not kept going it will not pay to reopen some parts of it again.'⁹¹ The *Western Mail* reported that the owners of Llanbradach Pit, which was still in the process of sinking a second shaft, had decided to abandon the pit. The opening out of the Little Rock Seam, a house coal, worked from March 1893, had proved disappointing: in the weeks before the strike it was producing only 150 tons of coal per day instead of the anticipated 700 tons. Work there was stopped during the strike and the decision to suspend operations was announced when the strike was still some way off settlement.⁹² Ferndale No. 4 pit was threatened with the same fate. That pit had been running at a loss for some time and owing to the serious expense involved in re-opening, it was announced that operations would not be resumed regardless of the outcome of the strike. The closure threw out of work some eight hundred men.⁹³

It should be noted, though, that the closure of neither Llanbradach nor Ferndale No. 4 proved to be permanent. Ferndale No. 4 was listed as working the following year in the official *List of Mines* and work continued on the sinking of a second shaft at Llanbradach, which eventually opened in 1894. It is tempting to see such threats of closure, therefore, as a simply part of the

⁹⁰ *Central Glamorgan Gazette*, 1 September 1893.

⁹¹ *South Wales Echo*, 18 August 1893.

⁹² *Western Mail*, 17 August; 21 August 1893. Sinking of the second shaft at Llanbradach was completed in 1894 and the pit was soon producing 4,000 tons per week: Dennis G. Sellwood, *Llanbradach 1887-1914: Chapters in the Early History of a Pit Village* (Caerphilly, 1998), p. 24.

⁹³ *Cambrian*, 1 September 1893.

normal verbal exchange of industrial warfare. Certainly, there were instances when coal companies used rumours of closures to good effect. When a *Western Mail* reporter attempted to establish whether it was true that the Powell Duffryn Company intended to shut Treaman Colliery at the conclusion of the strike, the Company spokesman he interviewed was careful to avoid any official confirmation or denial but ensured that the public understood that the ultimate decision lay in the hands of the men. 'The company have decided nothing definitely as to the closing of the pit,' he stated, 'but if the men remain out long the pit will close itself.'⁹⁴ Even if ultimately the threat was baseless, strike action could thus be depicted to the public as irrational, short sighted and self-destructive and the strikers presented as 'wantonly' wrecking the very industry on which they and their families were dependent.⁹⁵

Nevertheless, it is important not to exaggerate the degree of manipulation intended by these announcements. The claim that pits would quickly become unworkable was hardly an idle threat, and no one knew better than miners the amount of work, and related expense, involved in restoring pits to a workable condition. There was a genuine danger that pits could simply deteriorate beyond recovery if a strike was too protracted. Strikers, therefore, had to carefully consider all the consequences of their action, not just the immediate loss of wages and it was frequently disagreement over the relative risks involved versus the potential gains which divided the workforce in 1893. Indeed, the conciliatory approach adopted by the miners' leaders also needs to be set within this context. Their attitude and concern about the consequences of industrial action were in part based on a very realistic understanding of the physical conditions under which the South Wales coal industry operated, even if their position appears naïve in industrial relations terms.

The safety of mines may also have contributed to the pattern of the strike in another way. A 1921 study of the health and wellbeing, both physical and mental, of the working population of Britain speculated that the high level of industrial unrest current amongst mine workers was linked in some way to the high rate of accidents within the mining industry. The authors noted

⁹⁴ *South Wales Echo*, 16 August 1893; *Western Mail*, 26 August 1893.

⁹⁵ *South Wales Echo*, 21 August 1893; *South Wales Daily News*, 22 August 1893.

that the percentage of voters in favour of a strike in a ballot of August 1920 was largest in coalfields such as Lancashire and South Wales where the rate of fatal accidents had been highest and smallest in coalfields such as Nottingham, Derbyshire, Durham and Northumberland where it had been lowest. 'Any community subjected to an unduly high accident rate,' they suggested, 'may be expected to suffer unduly from psycho-neuroses, just as do soldiers in wartime.' These neuroses may, in turn, be expected to manifest themselves in the form of industrial unrest.⁹⁶

There has been no analysis of this possible relationship either by historians or sociologists of strikes, and indeed, K. G. Knowles noted that there is no reason to expect a link.⁹⁷ There is moreover no evidence from any of the Board of Trade records of strikes, collected from 1888 onwards, that strikes within the South Wales coalfield were ever a direct reaction to dangerous conditions or accidents and they certainly were not amongst the stated complaints or claims of the 1893 strikers. Nevertheless it could be argued that activists in a strike are not always aware of all their own reasons for striking. As Knowles has noted: 'Many strikes take place on a multiplicity of immediate issues, the relative importance of which may change during the strike itself.' What is more, deep rooted tensions, not initially apparent, can subsequently surface changing both the aim and motivation of the strikers. 'It is,' Knowles argues, '... often hard to say what causes a strike; in practice, the cause may be no more than a last straw.'⁹⁸ While the study of 1921 was very much a product of its time, the idea of a link between industrial unrest and accidents is, then, worth exploring, not least because South Wales's safety record was very

⁹⁶ Edgar L. Collis & Major Greenwood, *The Health of the Industrial Worker* (London, 1921), p.76. H.V. Morton described the atmosphere of a pit as similar to 'a front-line trench at zero hour!'; H. V. Morton, *In Search of Wales* (London, 1952), p. 254.

⁹⁷ K. G. J. C. Knowles, *Strikes – a study in industrial conflict: with special reference to British experience between 1911 and 1947* (Oxford, 1952), p. 187. Dai Smith has noted that in the lead up to the 1910-11 strike there were repeated complaints that lives were being endangered by the drive for profit and at Ely Pit there had been a number of worrying accidents. David Smith, 'Tonypany 1910: definitions of community', *Past and Present*, No. 87 (May, 1980), pp. 176-7.

⁹⁸ Knowles, *Strikes*, p. 228.

much a matter of concern throughout the industry's existence and its strike history a matter of considerable debate amongst historians.

When dealing with the question of accidents in the context of the 1893 strike a couple of points need to be emphasised from the start. Firstly, it needs to be reiterated that the geological structure of the South Wales coalfield made mining in the region difficult and dangerous. Contemporary descriptions noted that while seams in South Wales were often very thick and as a rule 'very free', they were also 'dry and fiery' and subject to discharges of gas and firedamp. While many pits in the Rhondda area had to be watered to damp down the coal dust, Llanerch Colliery in Monmouthshire was for the most part naturally damp, with water running along the roadways and dripping from the roof in several places.⁹⁹ Park Slip Colliery, near Tondur, on the other hand, was dry and dusty in some parts, wet or damp and free from coal dust in others.¹⁰⁰ The 'roofs in the steam coal strata are generally brittle and uncertain, and liable to disturbance by "bumpers" and "blowers"'.¹⁰¹ H. Stanley Jevons observed in 1915, that '[l]oose jointed coal, and loose or rotten roof, are ... frequent in South Wales' causing falls of the face of coal as well as falls of the roof.¹⁰² Perhaps the most important characteristic, however, was the 'squeeze' or 'pressure', that is, the tendency of the roof to subside with the removal of coal at the face and after the excavation of roadways through shales and seams.¹⁰³ Usually the 'squeeze' was gradual but occasionally it could bring a sudden collapse. Foster Lewis recalled an occasion

⁹⁹ This dampness did not of course protect Llanerch from explosions. The disaster which occurred there in 1890 originated in one of the few dry and dusty sections of the pit. PP, HC, 1890-91 C.6346, *Report of Joseph S. Martin, H. M. Inspector of Mines for the South Western District (No. 12) for the year 1890*, p. 20. It should also be borne in mind that there would be seasonal fluctuations in conditions as the temperature and pressure at the surface had an impact on underground conditions. It tended to be dustier underground during winter and spring because the drier air entering the pit picked up more moisture underground; see John Sinclair, *Environmental Conditions in Coal Mines (including fires, explosions, rescue and recovery work)* (London, 1958), p. 55.

¹⁰⁰ PP, HC, 1893-94 C.6942, *Reports on an explosion in the Park Slip Colliery, in the South Wales District, on the 26th August 1892*, p. 7.

¹⁰¹ Evidence of Jacob Ray in *Royal Commission on Labour 1892: Minutes of evidence, Vol. II: Mining*, p. 116.

¹⁰² Jevons, *The British Coal Trade*, p. 122.

¹⁰³ Lewis, *The Rhondda Valleys*, pp. 8-10.

when he heard a terrific ‘pounce’, a loud bang which shook the workings, followed by a series of smaller ‘pounces’. The men rushed from the area. When they felt it was safe to return, they found that where previously there had been a six foot gap between the floor and the roof it was now only three foot.¹⁰⁴ Not only did the geology vary significantly across the coalfield and from pit to pit, it varied even from seam to seam within a single pit. At Waunclawdd Colliery, Ystradgynlais ‘in the four foot seam, the top is ... kinder. But you work in the brass vein and the top is slyer, slants, and it’s very dangerous in the vein, different from the four feet.’¹⁰⁵ In short, the geology was frequently unpredictable, often deceptive and too regularly volatile.

Secondly, the South Wales coalfield consistently registered a high rate of accidents.¹⁰⁶ In the ten years between 1882 and 1891, 2021 mine workers lost their lives in the region. In the year before the hauliers’ strike, in the South Wales district, one fatal accident occurred for every 506 persons employed, and, since such accidents often claimed the lives of more than one individual, this translated into the death of one worker for every 291 employed.¹⁰⁷ Moreover, the region averaged just over 24 percent of all deaths in mines during the period, translating to 2.9 persons killed per 1,000 employed compared with 2.1 per 1,000 for the whole of the United Kingdom.¹⁰⁸ The average figure, of course, obscures serious fluctuations in the rate: in 1890, 42.1 percent of all mining fatalities occurred within the South Wales coalfield.¹⁰⁹ By 1893, while only eighteen percent of the mining workforce of Britain was located in the South Wales

¹⁰⁴ Lewis, *The Miner’s Tale*, pp. 53-54.

¹⁰⁵ Jim Vale, interview transcript SWML, quoted in Burge, ‘Miners’ Learning in the South Wales Coalfield’, p. 73.

¹⁰⁶ See Appendix B, Fig. 1.

¹⁰⁷ PP, HC, 1893-94 C.6986, *The Report of Joseph T. Robson, H. M. Inspector of Mines for the South Wales District (No. 13) for the year 1892*, p. 6.

¹⁰⁸ Based on the Mines’ Inspectors’ Reports for the period 1882 to 1891.

¹⁰⁹ Calculation based on figures from Williams, *Digest of Welsh Historical Statistics: Vol. 1*, p. 332.

region, nearly 26 percent of the total number of accidents occurred there.¹¹⁰ South Wales was not just dangerous it was significantly more dangerous than any other coalfield in Britain.¹¹¹

It should be noted that while all these facts and figures were well known in 1893, there was no explicit reference by strikers either to conditions or to the high accident rate, no attempt to justify their claims with allusions to the risky nature of their work. 'Starvation' was a key word, 'safety' was not.¹¹² Nevertheless, it is possible that accidents were, albeit indirectly, having an influence. It is important to remember that the strike of 1893 was just one of a whole range of disputes and disagreements over wages, working conditions and work practices which characterised mining employer-employee relations in the latter part of the nineteenth century. Within the broader context of industrial relations discussions about geology and accidents were not only important but often central. The battles over the Eight Hour Day and attempts to introduce the double shift system to Welsh pits, two of the most contentious issues of the period, were fought over the question of safety.¹¹³ Complaints about the rising tide of unskilled men flooding the coalfield and the consequent devaluing of the skills of the miner were likewise

¹¹⁰ Statistics from Williams, *Digest of Welsh Historical Statistics: Vol. 1*, p. 332 and the PP, HC, 1896 C.7953, *First annual general report upon the mineral industry of the United Kingdom of Great Britain and Ireland, for the year 1894*, pp. 109-10.

¹¹¹ The South Wales inspector's report of 1893 reveals that South Wales was three times more dangerous than Durham, for example; *Report of Joseph T. Robson, the South Wales District 1893*, p. 5.

¹¹² No special attention has been paid to the specific dangers that hauliers faced, though the conditions under which they worked were noted earlier in the chapter. A fuller discussion of this issue can be found in T. Boyns, 'Work and Death in the South Wales Coalfield, 1874-1914', *Welsh History Review*, Vol. 12, No. 4 (Dec., 1984), pp. 514-37. It should be noted, though, that many observers recognised the dangerous nature of the hauliers' job and there was some degree of sympathy for their position even if there was a high level of disapproval of the strike. See for example *Cambrian Daily Leader*, 22 August 1893; *Merthyr Express*, 9 September 1893.

¹¹³ An Eight Hours Bill was brought before Parliament in 1888 and again during 1893. A number of meetings just prior to and during the early weeks of the strike, though not directly linked to it, raised the issue and meeting on 6 August in the Ogmore Valley passed a resolution in support of the Act: see *South Wales Echo*, 9 August 1893. Coalowners objected to it on the grounds of reduced productivity and proposed to introduce a double shift system if the working day was shortened. A third Bill which was designed to apply to Wales only was introduced in 1894, but it was not until 1908 that an eight hour working day for miners was established by law.

reinforced by evidence of a mounting death toll. The crux of the matter was the question of the relationship between the difficult geology of the South Wales coalfield and the high incidence of fatal accidents. That is: were the special physical difficulties of the South Wales coalfield sufficient in themselves to explain the appallingly high rate of deaths? If they were not, then it meant that something was going horribly wrong in the industry. So what was it, and who was responsible? The coalowners or the miners?

Evidence from the 1892 Royal Commission on Labour suggests that coalowners, mine managers and even mines' inspectors, while accepting that the geological conditions were hazardous, firmly placed responsibility for the markedly high accident figures at the door of the workers. Welsh miners took too many risks, they claimed. The men flouted the rules which had been introduced, at much expense it might be added, for their protection and were wilful, reckless and careless of each other's wellbeing.¹¹⁴ They were indifferent to the necessity of properly maintaining their workplaces and relied far too heavily on their own judgement instead of consulting with properly qualified officials. More legislation, better supervision and a more disciplined workforce were therefore the answer.¹¹⁵ No, said the miners, the problem was that South Wales was a dangerous coalfield. It required careful handling, a high degree of practical experience and skill and a constant alertness to the risks. A good miner could 'read' the roof or the lay of a coal seam, knew how best to work the coal in order to extract it with the minimum of disturbance and how to prepare timber and chose the best locations for the props. There would always be accidents because the geology was unstable and fickle – and to a certain extent miners were ready to accept this. No, the problem was not with the geology nor even with the way the miners worked it, but with the way the owners worked the miners. No man, however capable, could be expected to maintain the necessary levels of concentration needed

¹¹⁴ It was an expensive business improving safety and owners were usually prepared to do so, although of course this varied. Sometimes opposition to changes came from the men. Safety lamps were objected to by the men of Llanerch Colliery; PP, HC, 1890 C.6098, *Report of the Inquest arising out of the Llanerch Colliery Explosion, 1890*, pp. 6-7.

¹¹⁵ See the various testimonies in the *Royal Commission on Labour 1892: Minutes of evidence, Vol. II: Mining* and the various Mines' Inspectors' Reports for the late 1880s, early 1890s.

to deal with such a difficult environment through ten long hours or more every day. Was it not the case, Mabon asked, that 'nervous' exhaustion set in long before physical exhaustion? This was why most accidents occurred at the end of the day: when the miner was mentally tired he was less alert to the subtle sounds and movements of shifting rock strata, his reactions were slower and his judgement likely to be compromised.¹¹⁶ Alfred Onions was adamant that it was 'in those districts where the greatest number of hours are worked per day [that] the largest number of accidents take place'.¹¹⁷ A reduction of the working day was therefore not just reasonable but essential to stem the rising tide of fatalities in an unpredictable and hostile environment. Moreover, a double shift system might be the logical response to reduced productivity and it might work perfectly well in more stable coalfields, but in South Wales it would only make matters worse. There would not be enough time for repairs or for the pits to be properly ventilated and there would be arguments between shift workers over the 'dead work' fundamental to mine safety: they were more rather than less likely to be neglected.

In addition, the coalowners were accused of risking not just the lives of the miners but their own economic welfare by employing inexperienced young men. David Morgan, the miners' representative, claimed that in the Aberdare and Merthyr region almost a quarter of mine workers had less than two years experience underground, the minimum amount of time necessary to be regarded as skilled. Morgan complained:

They fill up the labour market for us, and further, when unskilled labour comes to work underground – because they do not know anything of the operations – I have seen it hundreds of times when such men are put in places when they are not fit to be there ... not having had the experience which is necessary in order to hold up the

¹¹⁶ *Royal Commission on Labour 1892: Minutes of evidence, Vol. II: Mining*, pp. 134-5. Mr. Martin, the inspector for the South-Western District collected evidence in 1891 to dispute this claim. His records showed that accidents were fairly evenly distributed throughout the day and were actually fewer during the last two hours of the day. PP, HC, 1892 C.6625, *The Report of Joseph S. Martin, H. M. Inspector of Mines for the South-Western District (No. 12) for the year 1891*, p. 4.

¹¹⁷ Evidence of Alfred Onions; PP, HC, 1892 C.6708-IV, *Royal Commission on Labour: Minutes of evidence, Vol. I: Mining*, p. 278.

roof – which differing from the other parts of the country is so tender in Wales, they draw the place down.¹¹⁸

It was these ignorant young men, who knew little of mining and even less of mining in South Wales, who caused havoc in the pits, made stupid and expensive mistakes, and who were responsible for the mounting death toll. These men knew no better – the coalowners did.

‘Safety’ was, therefore, very much a watchword of contemporary discussions over working conditions and practices between owners and workers. But it also coloured relationships between Welsh coalminers and those from other coalfields. Whereas an eight hour shift would radically improve the condition of Welsh miners, its introduction elsewhere would actually extend the working day. The miners of Northumberland and Durham already worked less than eight hours a day and were totally opposed to any legislative interference.¹¹⁹ Whenever there was a clash of interests the argument for the Welsh miners was the distinctiveness of the South Wales coalfield: the uniquely difficult geological conditions under which the Welsh industry operated and the high price in fatalities Welsh colliers were paying for their jobs. But this argument often evolved into a claim for special treatment based on the assertion that what applied to other coalfields could not and should not apply to South Wales. This, in turn, reinforced and underlined the belief of South Wales miners’ leaders that they should maintain the right to self-determination in industrial matters and fuelled some of the opposition to the centralising stance of the MFGB that was evident in the early 1890s and especially in 1893. The special difficulties of the South Wales coalfield could be used by miners in arguments as a defence against attacks by the coalowners, but they also marked and set them apart from miners elsewhere.

In addition, it needs to be recognised that disquiet over accidents was often only the most emotive part of more fundamental anxieties over the status and nature of the work of the

¹¹⁸ For David Morgan’s complaints over the employment of unskilled men see *Royal Commission on Labour: Minutes of evidence 1892, Vol. I: Mining*, pp. 249-251. See also the testimony quoted in Michael Bloor, ‘No Longer Dying for a Living: collective responses to injury risks in South Wales Mining Communities, 1900-1947’, *Sociology*, Vol. 36, No. 1 (Feb., 2002), pp. 95-6.

¹¹⁹ Williams, *Was Wales Industrialised?*, p. 325.

miner. In relation to the double shift system, for example, there was much concern that it would involve too radical a departure from customary working practices. Martin Daunton has demonstrated that a more complex occupational structure operated in the Durham coalfield than existed in South Wales as a result of double shifts, and that this had consequences for industrial organisation within the pit and social relationships beyond it.¹²⁰ For South Wales, then, the double shift meant, potentially, a major re-organisation of traditional working relationships and a complete revision of the relative status of various working groups, which in turn could have ramifications for community relationships in general. Similarly, attitudes towards inexperienced workers were never purely a matter of the menace they posed. But such sensitivity to the safety issue was mixed up and confused with insecurities over the depressive effect on wages that the employment of raw labour produced and the consequent devaluing of the miners' skill.¹²¹ Unskilled labour was cheap and the steady supply of migrants from the agricultural districts meant that there were always men ready to work for whatever wages they were offered.¹²² Their employment also implied that mining was little more than a matter of brute force: anyone with a mandrel and a strong arm could hew coal. This attitude hit at the very heart of many miners self-identity. Later oral testimony reveals that miners were intensely proud of their work and of the skills demanded of them. They carefully developed and honed their craft over years, learning from an older generation of men, and regarded the right to work a stall as just rewards for those skills.¹²³ It was perhaps then only natural that there should be a degree of anger at the handing out of stalls to all and sundry.

Much of the anger was directed at mine managers for employing these men in the first place, but some of it was inevitably directed at the men themselves. In 1891 there was widespread disquiet in the Cynon Valley when it became known that two sixteen year old boys had been recently employed as colliers at the Navigation Colliery, Mountain Ash. The local newspaper

¹²⁰ M. J. Daunton, 'Down the Pit: Work in the Great Northern and South Wales Coalfields, 1870-1914,' *The Economic History Review*, N.S. Vol. 34, No. 4 (Nov., 1981), pp. 578-97.

¹²¹ *South Wales Echo*, 22 August 1893.

¹²² *South Wales Argus*, 10 August 1893.

¹²³ See Burge, 'Miners' Learning', for a full discussion of the craft of mining and miners' attitude to work.

complained that 'the employment of such inexperienced persons jeopardised the lives of all employed in the colliery'.¹²⁴ Nor was this likely to have been an isolated case. There is some reason to doubt David Morgan's claim that 25 percent of the workforce was unskilled: most mine managers set the figure at no more than five percent.¹²⁵ But, R. H. Walters certainly found that it was during the period 1888 to 1892 that the percentage of the total labour force which had entered the industry within the previous two years was on the increase and was on average higher than in subsequent years to 1914.¹²⁶ During a period of unprecedented influx of 'green' labour, concern over accidents was thus also fused to divisions and insecurities within the workforce itself.

Accidents and arguments over the special geological conditions of the South Wales coalfield, therefore, were caught up in a complex, interlinked and interdependent host of issues impacting on the mining workforce by 1893. They were both the focus of concern in themselves and a weapon in the defence of the right of the Welsh miner to control his own work without excessive pressure from coalowners or the interference from uninformed others, elsewhere or at home. So, although neither accidents nor conditions were an immediate or explicit concern of the 1893 strikers, they did heighten divisions and strains, setting the tone of the general atmosphere within which the dispute was conducted. The question now is: if working relations were shaped in this way at the general level, were they also affected this way at the individual pit or community level? And if they were, did different experiences of accidents at the local level create different attitudes to industrial relations at the local level and thus influence some of the varied reactions to the 1893 strike? As was noted earlier, neither the geological conditions under which pits operated nor the accident rates were consistent across the coalfield. Some pits were highly prone to problems, while others could enjoy years without facing any serious incidents. It might be expected therefore that these different experiences would colour attitudes to other issues, such as wages and working conditions. Pits with high

¹²⁴ *Pontypridd Chronicle*, 2 October 1891.

¹²⁵ Evidence of Jacob Ray; *Royal Commission on Labour 1892: Minutes of evidence, Vol. II: Mining*, pp. 113-114.

¹²⁶ Walters, *The Economic and Business History of the South Wales Steam Coal Industry*, p. 193.

accidents rates might be expected to support more enthusiastically than 'safe' pits measures which would improve their position. Equally, although the psychological impact of fatalities is difficult to assess, it is possible that the cumulative effect of repeated and frequent injuries and fatalities produced a greater sensitivity and willingness to protest against any changes which worsened their position. The experience of high accidents rates could as a result become the impetus behind a whole range of actions, aggressive and defensive, against any injustice, real or perceived, which a pit faced. It seems plausible, in that case, to suggest that some communities or pits become 'predisposed' to industrial action and that this predisposition explains the varying degree of support for the strike witnessed in 1893.

To explore this idea further a new layer was created in the GIS strike duration map of the accident histories of the 261 mines whose stance during the 1893 strike is known (Fig. 13.1). The information was drawn from the annual Mines' Inspectors Reports and covers the period January 1884 to August 1893. This is not a particularly large timescale but any longer would have involved a prohibitive amount of work and a (nearly) ten year period does at least provide a large enough sample to demonstrate the extent to which the rate of accidents varied across the coalfield. As accidents also varied in severity a second layer was created showing the total number of fatalities (Fig. 13.2). No distinction has been made in either layer between surface and underground accidents, nor between those which were 'clearly' the result of mechanical failure or human error and those which may have linked to the geology, since, as may be inferred from the earlier discussion, no such easy distinction can be made. It should however be noted that Trevor Boyns has argued that miners were mostly concerned about explosions.¹²⁷ This concern was perhaps understandable. When an explosion took place it often did so without warning and to devastating effect. Between January 1890 and August 1893 just three explosions – at Morfa, Llanerch, and Park Slip – claimed a total of 374 lives. At Llanerch more men were killed in that colliery in that single disaster than had been killed there in the whole of

¹²⁷ T. Boyns, 'Technological Change and Colliery Explosions in the South Wales Coalfield, c. 1870-1914', *Welsh History Review*, Vol. 13, No. 2 (Dec., 1986), pp. 155-77.

the previous twenty years.¹²⁸ A third layer was therefore created based on a 1894 list of explosions killing ten or more persons and covering a longer period, 1854 to 1893 (Fig. 13.3).¹²⁹ These layers were then all compared with the strike duration map to see if any correlations in the patterns could be identified.

It was clear when the maps were analysed that while there is some correlation across the coalfield it is by no means consistent. The western coalfield appears to be low risk in terms of accidents and fatalities, especially those caused by explosions, and offered no or limited support to the strike. Contradictorily, support for the strike was strong along the north eastern end of the coalfield, and although more pits in this area experienced above the average number of accidents, many of those which showed the greatest commitment to the strike were those with the lowest numbers of accidents and fatalities, the exception being Llanerch.¹³⁰ The central coalfield valleys were both highly dangerous and strongly supportive of the strike, but there are anomalies even here. Mardy, at the top of the Rhondda Fach, had both a high accident total and a high fatality total but was strongly opposed to industrial action in 1893. Interpreting the evidence is in any case problematic. The layers are based on cumulative totals and take no consideration of levels of employment in each area or pit.

On the one hand, it could be argued that a community which loses fifty men in a single accident or even over a decade does not stop to consider that those men may represent only five percent of the total workforce: the degree of misery is not reduced by a statistical nicety. Cumulative accident figures and especially total fatalities therefore, while statistically clumsy, are then much more meaningful when dealing with human responses.¹³¹ On the other hand, it remains the case that high accident totals may reasonably be expected to occur where there

¹²⁸ Brian Foster, *A Book of Remembrance: Eastern Valley Mining Fatalities 1829-1899* ([S.I.], [n.d.]).

¹²⁹ *First annual general report upon the mineral industry 1894*, pp. 109-10.

¹³⁰ The GIS maps display the standard deviation. That is, the accident rates are placed in classes based on how much their value varies from the mean.

¹³¹ The concern over fatalities did not diminish in the early twentieth century even though the death rate per 1,000 person employed declined dramatically from 2.9 at the beginning of the 1890s to 1.6 in 1909-12 for South Wales, as the statistic disguised a growing death toll. Boyns, 'Work and Death', p. 514.

are higher rates of employment and production. The apparent lack of support in the western district is just as likely to be due to the undeveloped nature of the industry there as to the low number of accidents: both accidents and strike action could be a function of pit size. A more useful map would show average annual deaths per number employed for the period or deaths per million tons of coal produced. Unfortunately, once again, it is not possible to create such a map because of the patchy nature of the records in relation to employment and production figures. Productivity, as noted earlier, tended to be analysed by coalfield, district or company not by pit and accurate employment figures for any given pit for every year of the whole ten year period being dealt with do not exist. Even if they did, it would be a complex and time consuming process to work out an average figure for the ten years. Moreover, pits often closed for extended periods of time following serious accidents again complicating the statistical calculation.

While the maps graphically illustrate the extent to which the South Wales coalfield was a dangerous place to mine, then, they offer no support for the suggestion that accidents were significant in the 1893 strike as a 'hidden' influence on the stance adopted by individual pits. It might be argued that the problem with the GIS model is that the impact of accidents in shaping the collective psyche of pits and communities is simply too complicated an issue to be reduced to a single representative symbol on a map.¹³² Accidents, especially those in which men were killed, were community experiences. When a death occurred, a pit stopped work and all the men accompanied the body home.¹³³ When large scale disasters hit, people from the neighbourhood and sometimes from great distances rushed to the stricken area to help.¹³⁴

¹³² Industrial action was of course not the only possible reaction. Religious faith, superstitions, and even a morbid humour were all to lesser or greater degrees means of coping with disaster. Their role is however far too complex and amorphous to attempt to reduce to definitions which are measurable.

¹³³ Many miners' autobiographies and much coalfield literature testifies to this practice. See for example Wil Jon Edwards, *From the Valley I Came* (London, 1956), p. 8.

¹³⁴ Mr. Martin's report on the Llanerch Colliery explosion noted that, 'As soon as the disaster was known, willing help was rendered from the neighbouring and even distant mines, and as usual on such occasions, each vied with his neighbour in attempts of rescue'; PP, HC, 1890-91 C.6346, *Report of Joseph S. Martin, H. M. Inspector of Mines for the South Western District (No. 12) for the year 1890*, p. 15.

When in 1893, the men at Morfa Colliery joined in the strike there were those who felt that the strikers' action was inappropriate: 'If you come to Morfa' the pit's manager warned, 'you will do violence to the feelings of many whose afflictions have been heavier than fall to the common lot.'¹³⁵ Work at the pit in August 1893 was concentrated on recovering the bodies of those lost in the 1890 explosion; it was felt wrong to involve a still grieving community in a strike over pay. On the other hand, it is possible that the incomplete nature of the original data and problems with creating a conceptually and statistically accurate map for this particular point in time are at fault. Only fatalities have been taken into account here, but there were annually hundreds of serious and not so serious non-fatal accidents which could temporarily and even permanently disable a man from work.

In addition to these there were thousands of near misses. While miners tended to become inured to these 'hard-lines', as they were sometimes known – Edmund Stonelake, for example, noted that '[m]iners have narrow escapes from death daily, and they take them as a matter of course, having given silent thanks for a "narrow shave" they just shake themselves, take a drink of cold water and get on with the work' – they also contributed to attitudes towards the value and nature of the work.¹³⁶ The difficulties created by gaps in the data do not negate the importance of the exercise. Perhaps, taking a longer time span, including extra data about injuries, and comparing accident data with strike-frequency through the same period, rather than looking at a single strike, would prove more valuable. It should be remembered that concern over the deaths, injuries and general health of the mining workforce dominated much of the activity of the South Wales Miners' Federation following its founding in 1898, which suggests that this is an issue which was of central concern to the workforce and one which warrants more attention.

The question of safety and health could be extended to embrace wider questions about the health of the mining communities. The coal industry carried a variety of dangers less obvious than accidents, respiratory diseases being the most common and a priority for the medical

¹³⁵ *South Wales Echo*, 18 August 1893.

¹³⁶ E. Stonelake, *Autobiography of Edmund Stonelake* (Bridgend, 1981), p. 95.

profession and union in the first half of the twentieth century.¹³⁷ But it is easy to forget that the influence of the mine extended way beyond the workforce, into the lives of all members of the community. There have been studies of health during strikes, but little consideration of the role of health in motivating strikes.¹³⁸ Dot Jones has shown the impact of the work-day on the lives of women in the home and impact of the daily demands on their health.¹³⁹ Periods of wage reductions also inevitably increased the pressure on resources and the diet of women was often the first area to be hit. While opposition to strikes was frequently couched in terms of the potential impact on women and children – ‘remember the children’ Mabon pleaded – in 1893 the issue for the strikers was the starvation wages which families were forced to live on. A Monmouthshire delegate called for ‘a living wage to sustain those they loved’.¹⁴⁰ And at a meeting at Tredegar it was claimed that it was loyalty to their families which had compelled the colliers to action.¹⁴¹ It might be, then, that the catalyst which transformed festering discontent into all out rebellion was less concern for their own safety than anxiety over the welfare of dependents and loved ones.

¹³⁷ See for example Michael Bloor, ‘The South Wales Miners Federation, Miners’ Lung and the Instrumental Use of Expertise, 1900-1950’, *Social Studies of Science*, Vol. 30, No. 1 (Feb., 2000), pp. 125-140; ‘No Longer Dying for a Living’, pp. 89-105. Regional variations linked to changes in geology were highlighted by many studies in the interwar period such as that of Enid M. Williams, *The Health of Old and Retired Coalminers in South Wales* (Cardiff, 1933). For a discussion of Medical Research Councils studies 1937-1942 see P. D’Arcy Hart, ‘Chronic Pulmonary Disease in South Wales Coal Mines: An Eye-Witness Account of the MRC Surveys (1937-1942)’, *Social History of Medicine*, Vol. 11, No. 3 (1998), pp. 459-468. There was a whole host of problems miners could face, not necessarily fatal but often debilitating, such as nystagmus, ‘beat diseases’, dermatitis, Weil’s disease; see John Sinclair, *Environmental Conditions in Coal Mines (including fires, explosions, rescue and recovery work)* (London, 1958), p. 65.

¹³⁸ See Steven Thompson, ‘“That Beautiful Summer of Severe Austerity”: Health, Diet and the Working-Class Domestic Economy in South Wales in 1926’, *Welsh History Review*, Vol. 21, No. 3 (June, 2003), pp. 552-574.

¹³⁹ Dot Jones, ‘Counting the Cost of Coal: Women’s Lives in the Rhondda, 1881-1911’, in Angela V. John (ed.), *Our Mothers’ Land: Chapters in Welsh Women’s History, 1800-1939* (Cardiff, 1991), pp. 109-33.

¹⁴⁰ *Glamorgan Free Press*, 19 August 1893.

¹⁴¹ *Pontypool Free Press*, 18 August 1893.

Infant mortality rates, for example, could be plotted and compared with the strike map to see if areas of strong support for the strike corresponded to areas suffering high loss rate.¹⁴² A superficial glance at the medical reports for 1893 suggests that the infant mortality rate for the Garw and Ogmore Valleys was very high even for the central coalfield region: there were 233 deaths per 1000 births, compared with Merthyr at 219 and Ystradfydwg at 224 deaths respectively.¹⁴³ Even accepting the fact that the figures for 1893 are for the whole year and the strike itself undoubtedly contributed to the problems, there may be more to investigate here, especially as there are multiple environmental factors to be considered. Overcrowding, inadequate sewage facilities, the proximity of housing to rivers and the degree of interference of mining with the water tables could, with sufficient time, be mapped and taken into account.¹⁴⁴

The Presence of Other Industries

The uneven level of support for the strike across the coalfield cannot then be fully explained by variations in rank of coal, age, output or different experiences of accidents, although they were possibly contributory factors. Perhaps looking at the coalfield regionally rather than as a whole

¹⁴² Infant mortality rates could be plotted at a suitable level of detail they could be compared with the strike map to see if areas of strong support for the strike corresponded to areas suffering high loss rate. Compare with Ian N. Gregory, 'Different Places, Different Stories: Infant Mortality Decline in England and Wales, 1851-1911', *Annals of the Association of American Geographers*, Vol. 98, No. 4 (2008), pp. 773-94.

¹⁴³ *Glamorgan County Council, Annual report of the County Medical Officer for the year 1893*, pp. 44, 51, 62.

¹⁴⁴ This would, however, probably require a more collaborative approach involving environmental specialists, hydrogeologists, epidemiologists as well as more specialised GIS practitioners to provide affective analysis and to avoid simplistic causal identification. But as suggested, in view of how important health issues were to coalfield communities, it is something which perhaps historians should pay more attention to than they have done up to now. See William Williams, *A Sanitary Survey of Glamorganshire* (Cardiff, 1895), p. 80 for a discussion of mining's impact on water supplies. For an overview of the variety of water sources coalfield communities were dependent on see Malcolm Fisk, *Housing in the Rhondda 1800-1940* (Cardiff, 1996), p. 77.

would provide a different perspective and offer some alternative explanations. It was noted at the beginning of the chapter that the varying geology of the regions significantly impacted on the timing and nature of the developments in each. The early exploitation of the northern edge of the coalfield, initially due to the presence of iron ore, and the concentration of the copper trade first at Neath and then around Swansea, due to the abundance of readily accessible coal for smelting, created unique communities with distinctive economic bases. By the 1890s both copper and iron and steel production were in decline compared with coal production. But did that difference in early development, rooted firmly in the geological character of the regions, continue to exert an influence at the end of the nineteenth century?

When the five-part economic layer, used by modern earth scientists to describe the coalfield, is added to the strike duration map it reveals very different experiences in the regions. Apart from a handful of cases, there was almost solid support for the strike in the central coalfield, and solid opposition in the anthracite area. Unfortunately there is not enough evidence available from the southern outcrop to be dogmatic but the indications are that many of the pits there were supportive. The areas which display the most confused response are the two metal producing regions, along the northern outcrop and the Swansea area. To understand the 1893 strike fully the responses here need to be explained. Was the presence of iron and steel, tinplate and copper works a factor in some way?¹⁴⁵

Before that question is addressed it is worth taking a wider look at the potential of other industries to shape the decision to strike or not of individual locations. It needs to be

¹⁴⁵ For an overview of the histories of these industries see Trevor Boyns, 'The Iron, Steel and Tinplate Industries, 1750-1914', in Arthur H. John & Glanmor Williams (eds.), *Glamorgan County History – Volume V: Industrial Glamorgan, from 1700 to 1970* (Cardiff, 1980), pp. 97-154. See also Stephen Hughes, *Copperopolis: Landscapes of the Early Industrial Period in Swansea* (Aberystwyth, 2005); Paul Jenkins, *"Twenty by Fourteen": a History of the South Wales Tinplate Industry 1700-1961* (Llandysul, 1995). Note the complaint of Louise Miskell of the tendency to study the metal industries in isolation from each other which has tended to ignore the interdependency of the trades; Louise Miskell, 'Separate Spheres? Rethinking the History of the Metalliferous Industries in South Wales', *Welsh History Review*, Vol. 21, No. 2 (Dec., 2002), pp. 249-70.

remembered that coalfield did not just produce coal. There was an abundance of clay, both fire and brick, which was easily extracted by levels. Since clay often existed alongside coal, it led to the rapid creation and expansion of brick manufactories within the coalfield, particularly in areas like Risca.¹⁴⁶ Indeed the coal industry itself stimulated the demand for bricks for building and shaft lining. Local coke and gas works also needed firebricks for furnace lining. In addition to the brick industry, the coal industry required a vast number of men who in turn needed to be fed and watered so there were countless breweries and bakeries sprouting up in every valley. Many of these works owned their own small mines, usually levels, which exploited the poorer quality seams outcropping along the hills and produced coal solely for their own consumption. The influence of these is difficult to measure as identifying the location of every brickwork, bakery or brewery-owned mine would be a prohibitively time consuming process, since many pits are listed simply under an individual's name with no indication of the owner's other economic interests. So here mapping cannot easily help.

Documentary evidence, however, suggests that as far as the press was concerned, there was a clear distinction between these mines, which tended to be regarded more as subsidiary branches of the other industries or trades, and pits producing coal for sale. It was the export trade, the trade on which the great wealth (and 'civilising power') of Imperial Britain depended, which especially concerned the newspapers although there were also repeated complaints about the rising cost of coal for house fuel. In 1893 42 percent of the coal mined in Wales was exported, compared with just eleven percent for the rest of Britain, setting it apart from the other UK coalfields.¹⁴⁷ A strike at the sale coal pits especially the export branch was a serious threat, then, to the position of the South Wales coalfield both at home and on the international stage. A stoppage at other pits, while irritating, was hardly of the same consequence. Moreover, there was little value, as far as contemporaries were concerned in the men working

¹⁴⁶ By the second half of the nineteenth century Risca was widely recognized as an important brick producing centre; Alan Victor Jones, *Risca – its industrial and social development* (Bognor Regis, 1980), pp. 4-6.

¹⁴⁷ PP, HC, 1905 Cd. 2362, *Final Report of the Royal Commission appointed to inquire into the subject of the Coal Resources of the United Kingdom – Part X*, pp. 155-6.

in the coal industry proper in securing a stoppage in the private consumption sector. The *Western Mail*, for example, was greatly puzzled by what the men hoped to achieve by stopping work at the Great Western Pit at Abergwynfi. When work here was resumed, it was noted that the coal was used only for the railways 'so that the export trade will not be affected by the resumption of work at Abergwynfi'.¹⁴⁸

It is difficult to know exactly to what extent the industry was viewed like this by the workmen themselves. As was noted it is not possible to include the evidence from smaller mines in the strike duration map (Fig. 6) precisely because they were unimportant to the press. But the general impression is that the attitude of the workers reflected that of the newspapers, that is, that the strikers differentiated between 'private-consumption' workers and those involved with the sale-coal trade. Isaac Evans, the miners' leader who was for the most part a supporter of the strikers, expressed uncertainty over the benefit to the strikers' cause of stopping pits not directly involved with the selling of coal.¹⁴⁹ In many instances private workings were allowed to negotiate their own wages and continued working without censure from the strikers. As long as the men were happy with their terms it was felt no-one had the right to meddle in their affairs. Undoubtedly this was due in part to the fact that most small mines operated outside the sliding scale agreement. The men were able to negotiate for themselves, which the strikers felt to be a fundamental right of which, they felt, they themselves had been robbed. Also, there was some sympathy amongst strikers for the small mine owners. The men at small concerns like Plum Tree, Cwmffrwdoer and Gwrhay, Blackwood were allowed to work without interference as it was felt that the owners could not sustain a protracted strike and it would mean closures and loss of jobs if the pits were stopped.¹⁵⁰

Elsewhere, however, there were enforced closures of small workings. The Rhiwgarn and the Eglwysilan mines, neither employing more than a handful of men and producing coal for

¹⁴⁸ *Western Mail*, 25 August 1893.

¹⁴⁹ *Western Mail*, 21 August 1893.

¹⁵⁰ *South Wales Echo*, 22 August 1893.

domestic consumption, were prevented from continuing production.¹⁵¹ The Crown Level, Treorchy, employing just twenty men, only became involved with the strike as the result of threats and intimidation.¹⁵² The action of the strikers does not appear to be due to any sense of shared identity with workers at smaller pits. The decision to prevent a small colliery in Pontypridd, which supplied the Pontypridd Gas Company, from working does not appear to have arisen from any sense that their continued productivity was seen as a betrayal or a threat to the fight.¹⁵³ Rather the aim of the strikers here was to generate the maximum amount of disruption to Pontypridd, a key economic area within the coalfield, in order to exert pressure on the authorities and via them the coalowners.

In some cases the response to small pits was a reaction to the behaviour of the individual coalowners. Coal was so scarce that small coal producers were prepared to suffer a minor shortage themselves in order to make a massive profit in the short term.¹⁵⁴ At the beginning of the strike the newspapers were excited at the prospect of 15 shillings per ton of best steam coal; by 18 August, a ton at Swansea could command the figure of £1.¹⁵⁵ At Newport the price of best house coal had risen from 18s 6d per ton to 35s a ton in the same period.¹⁵⁶ And some coalowners were clearly taking advantage of the strike to sell their coal on the open market for grossly inflated prices. The workmen of a brickwork level in Pwllgwaun were prevented from working clay to keep the kilns going because a local man had seen coal being raised from that level which was subsequently sold about town. It was increasingly apparent to some strikers that any coal which found its way onto the open market, domestic or export, 'imperill[ed] a settlement of the dispute in the South Wales coal trade'.¹⁵⁷ Clearly the presence of small mines was forcing the strikers into a contradictory and inconsistent pattern of behaviour.

¹⁵¹ *Western Mail*, 23 August 1893.

¹⁵² *Western Mail*, 24 August 1893.

¹⁵³ *Glamorgan Free Press*, 19 August 1893.

¹⁵⁴ *South Wales Echo*, 17 August 1893.

¹⁵⁵ *Cambrian*, 18 August 1893.

¹⁵⁶ *South Wales Argus*, 19 August 1893.

¹⁵⁷ *Western Mail*, 23 August 1893.

If even small concerns could thus complicate workforce relations and actions, what of the larger industries? This then brings us back to the question posed earlier about the possible influence of the iron and steel and copper industries on the pattern of support for the strike. As noted, the maps show that the regions with the most confused, uneven response were the western metallurgical and eastern iron regions. These regions display a mixture of stances ranging from the strongly supportive, to the moderately positive to open hostility. When a layer identifying the locations of metal works is added to the strike duration map it is strongly suggestive that the presence of metal industries was complicating the response to the strike (Fig. 14.1 & 14.2). Coincidence is not of course itself proof of a causal connection but the maps do at least indicate that there was something going on in these regions which mark them out from elsewhere and which needs to be explained.

The newspaper reports suggest an immediate conflict of interest between tinsplate workers and striking miners. The miners found that initially the tinsplate workers were more than a little annoyed at the timing of the stoppage. The tinsplate industry had been badly hit at the beginning of the 1890s by the USA's introduction of the McKinley tariff which severely handicapped the export trade to that market; prior to its introduction America had taken three quarters of Welsh tinsplate exports.¹⁵⁸ When the mineworkers struck in August 1893 the tinsplate workers had only been back in work a short time following their own protracted strike and the prospect of another, possibly long, stoppage was hardly an attractive proposition. Almost from the outset of the strike in the western half of the coalfield the tinplaters sought to influence the course of events. On Friday 18 August tinsplate workers from the Margam and Mansel works approached the men of Tewgoed Colliery for an assurance that they would not strike. This assurance was apparently readily given so there was widespread surprise and anger when the following day the Tewgoed men downed tools following an appeal from strikers from the Morfa Colliery. So annoyed were the tinplaters in fact that relations between the two

¹⁵⁸ Davies, *A History of Wales*, p. 471.

groups threatened to deteriorate into violence. Thanks to the intervention of William Brace and a pointed reminder that the miners had provided financial support to the tinsplate workers in previous disputes, however, the tinplaters agreed to adopt a neutral stance.¹⁵⁹ The Tinsplate Union resolved:

That we hereby advise all tinplaters not to interfere with the miners in the present Labour crisis. If unable to help, they should not hinder them, but rather stand patiently and peaceably in enforced idleness if need be, remembering that the miners are brethren in the cause of Labour.¹⁶⁰

In fact following the resolution many tinplaters actually joined in mass meetings and marches in support of the strike. Tinplaters were prominent at a meeting to consider whether the strikers should target Swansea or Gwaun-cae-gurwen.¹⁶¹ Some of the Pontardawe tinplaters had in any case already been idle for some time due to a disagreement over the dismissal of a colleague at Gilbertson's tinsplate works and these may well have joined their cause with that of the miners.¹⁶² Even in the eastern half of the coalfield, the expectation amongst observers was that the tinplaters would oppose the strike, but the *South Wales Gazette* noted, with some surprise, that they were 'supporting them [the strikers] by their presence and council, and offering the right hand of fellowship'.¹⁶³ It is possible too that the tinplaters, who were strong unionists, for all their own problems sympathized with the miners' cause. The tinplaters had managed to secure a minimum wage (unlike iron and steel workers who still operated a sliding scale) and they were frequently cited by Brace as an example of successful labour organisation.¹⁶⁴ Of course, the presence of the tinsplate industry workers did not mean that a region would

¹⁵⁹ *Western Mail*, 21 August 1893.

¹⁶⁰ *Cambrian*, 25 August 1893.

¹⁶¹ *Central Glamorgan Gazette*, 1 September 1893.

¹⁶² *Cambrian*, 1 September 1893.

¹⁶³ *South Wales Gazette*, 18 August 1893.

¹⁶⁴ *Cambrian*, 25 August 1893. For a discussion of unionism in the tinsplate industry see J. H. Jones, *The Tinsplate Industry: with Special Reference to Its Relations with the Iron and Steel Industries – A Study in Economic Organisation* (London, 1914), p. 180-5. For a more recent overview of the industry see Paul Jenkins, *"Twenty by Fourteen": a History of the South Wales Tinsplate Industry 1700-1961* (Llandysul, 1995).

therefore strike. There were a large number of tinplate works in the anthracite area. But when there was a strike if it had the support of another class of workers, it seems to have been sustained and supported for longer.

It needs to be remembered, however, that the coalfield originally developed to produce iron and that in the early years many mines owed their existence to the iron trade. As the nineteenth century progressed, coal was increasingly exploited for its own sake and tensions arose between metal manufacturers and coal only producers. The metal works were not just producers of coal but also major consumers so it was in their best interests to keep the price of coal to a minimum. There were frequent spats between the two groups over undercutting on coal prices and tensions over wages, as ironworks tended to pay their miners less than sale-coal pits. Indeed the MSWCOA was set up in the wake of two major disputes, in 1871 and 1873, during which the employers failed to present a united front and the workmen were thus able to achieve a degree success. In the first stoppage the strike was confined to the coalowners and the ironmasters continued to work pits and sell coal, while in 1873 the positions were reversed.¹⁶⁵ Eventually, following these disputes, the coalowners and ironmasters decided to join forces and the MSWCOA was set up to try to co-ordinate selling prices.

It is often assumed that with the formation of the MSWCOA and the signing of the sliding scale agreement, together with the decline of the metal industries and the increasing dominance of the steam trade, that by the 1890s the earlier problems with price undercutting and pay differences had disappeared. Indeed, the presence of other industries, especially the metal ones, is often neglected by historians looking at the post 1870s period. A typical statement to be found in the historiography is that of Leighton James: 'The mining valleys of South Wales were virtually mono-industrial in character. Other industries, such as iron and tinplate, were present, but the former, at least was in decline by the time the coalfield began to be exploited

¹⁶⁵ Williams, *Was Wales Industrialised?*, p. 131.

extensively.¹⁶⁶ Certainly, by the beginning of the 1890s coal was the pre-eminent industry of the coalfield. Census figures show that there were over three times as many men employed in coal mining than in iron, steel or tin manufacturing in Monmouthshire and over seven times as many miners as metal workers in Glamorgan. But the image of the coalfield as dominated by coal production needs to be qualified. Occupational statistics by urban sanitary district highlight significant regional variations. While Ystradyfodwg had 25747 miners and only 122 tin and metal workers, in Merthyr there were 9052 coal miners, and 2505 iron, steel and tin workers and Swansea had only 761 coal miners compared with 1158 iron and steel and 2842 tin workers.¹⁶⁷ Indeed it was widely acknowledged by contemporaries that Swansea could be considered 'a colliery district only in a very minor sense', many of the earlier small mines having closed by the 1890s.¹⁶⁸

Moreover, wages in the coal industry continued to be influenced by conditions in the iron, steel, copper and tinplate industries long after the setting up of the MSWCOA and the signing of sliding scale agreement. Just three years before the hauliers' strike coal workers at H. H. Vivian's mines at Swansea had been forced to engage in a fourteen week struggle to gain the same rate of pay as the rest of the coalfield.¹⁶⁹ And problems in one industry could have serious ramifications for others. In 1892, during a discussion on a proposed reduction in the working hours to reduce output, David Morgan noted that a similar restriction on output had been introduced by the metal industries which had seriously impacted on the coal trade because it lessened consumption.¹⁷⁰ It must not be assumed therefore that simply because at a coalfield wide level the position of the metal industries was overshadowed by the expanding coal industry that they ceased to be a factor in the coal industry's operation.

¹⁶⁶ Stefan Berger, Andy Croll & Norman La Porte (eds.), *Towards a Comparative History of Coalfield Societies* (Aldershot, 2005), p. 254.

¹⁶⁷ PP, HC, 1893-94 C.7058, *Census of England and Wales, 1891 – Ages, condition as to marriage, occupations, birth-places, and infirmities*, Vol. III.

¹⁶⁸ *Western Mail*, 17 August 1893.

¹⁶⁹ *Cambrian*, 25 August 1893.

¹⁷⁰ *Western Mail*, 11 February 1892.

Throughout the 1893 strike we see the copper and iron masters attempting to exploit traditional ties to influence the behaviour of the men. In a speech to his miners Lord Swansea commended the men on their loyalty and

expressed his great confidence that they would not permit strangers to intervene between them and their employments, to the detriment not only of the colliers themselves, but also of the very large body of smelters, with the wives and families of both, who would, if the workmen were thrown out of employment, eventually, no doubt, have to suffer great privations.¹⁷¹

At Blaenavon the owners achieved some degree of success by pointing to the impact the actions of the miners would have on dependent industries. Although the Blaenavon pits were amongst the first in Monmouthshire to join in the strike, they went back to work early on following a warning from R. W. Kennard, one of the Blaenavon Iron Company's managing directors, 'that in case the colliers refused to resume work ... all the works were to be brought to a standstill, and all the blast furnaces were to be blown out at least for six months'.¹⁷² The men returned to work but although representatives from the Varteg men eventually persuaded them to come out on strike again, the strike was always fragile.¹⁷³

There was a genuine concern that the coal strike would damage an already fragile industry. By 1892, the Ebbw Vale Company was in severe financial difficulties and on the verge of bankruptcy. The improvement which came after 1892 had been achieved by developing the coal trade side of the business.¹⁷⁴ As John Elliott has recently shown, the coal concerns were therefore effectively subsidising steel production.¹⁷⁵ Dowlais too was under threat.¹⁷⁶ In 1891

¹⁷¹ *Herald of Wales*, 26 August 1893.

¹⁷² *South Wales Daily Star*, 10 August 1893.

¹⁷³ *Pontypool Free Press*, 18 August 1893.

¹⁷⁴ Gray-Jones, *A History of Ebbw Vale*, p. 90.

¹⁷⁵ John Elliott, *The Industrial Development of the Ebbw Valleys, 1780-1914* (Cardiff, 2004), pp. 25-98.

¹⁷⁶ An account of the early history of the Dowlais Iron Company can be found in M. J. Daunton, 'The Dowlais Iron Company in the Iron Industry, 1800-1850', *Welsh History Review*, Vol. 6, No. 1 (June, 1972), pp. 16-48.

the Dowlais works had been removed to Cardiff nearer coastal outlets and the old works at Dowlais was as a result becoming less and less important.¹⁷⁷ The iron and steel trade at Tredegar was stagnant and observers in the town watched the events unfolding with increasing anxiety. They hoped they could escape the strike, as they felt it would be 'inopportune for the interests of the town at any rate whatever may be the effect on the interests of the men themselves'.¹⁷⁸ When the individual towns are looked at more closely it becomes apparent that connections with the metal industries drew the workers from those industries into the dispute.

Metal workers in were understandably jittery and were as determined as the owners to keep the pits working. In the short term coal strikes usually had little impact on most industries because manufacturers and railway companies stock piled coal supplies. Some of the small scale metal working sites around Newport, such as the Uskside Engineering works which employed a couple of hundred men, for instance, were initially untroubled by the coal stoppage and were able to carry on production for some time because had they had sufficient supplies. However, larger concerns, such as the Isca Foundry, which consumed vast quantities of coal daily, depended on regular supplies of coal and rapidly used up any existing stocks. By the end of the second week of the strike Uskside was still operational while Isca had been forced to close.¹⁷⁹ It was hardly surprising that the *Western Mail* believed that:

The iron and steel workers are even more bitterly opposed to the intimidators than are the colliers themselves. Their wages are low enough, and the damping down of the furnaces, coupled with the stoppage of mills and forges, has awakened in them a spirit of wrath, that bodes ill for any gangs of strangers who may seek to intimidate

¹⁷⁷ Merthyr in fact was split between coal-only coal workers and metal industry coal workers. The most ardent supporters of the strike in the Merthyr area were the Plymouth workers, who were the first out and last in. Penydarren and Plymouth works had both closed by the 1880s, Penydarren in 1859 and Plymouth in 1880. For a discussion of the impact of the decline of the industry on Merthyr see Andy Croll, *Civilizing the Urban: Popular Culture and Public Space in Merthyr, c. 1870-1914* (Cardiff, 2000), pp. 29ff.

¹⁷⁸ *Merthyr Express*, 12 August 1893.

¹⁷⁹ *South Wales Daily Star*, 14 August 1893.

the colliers.¹⁸⁰

One thousand six hundred men, drawn largely from the smelting department volunteered to defend the Pentre Pit in Swansea, allowing the Pentre Pit to be kept open. The newspapers claimed that the general manager called for help and the men, who 'realised' that the stoppage of the pit would mean a stoppage of the works, decided to help defend the colliers from the intimidation of the strikers. Similarly, some 268 men from the Copper Works were sworn in as special constables.¹⁸¹

At Merthyr, when the Dowlais men decided to return to work they were accompanied to Caeharris station by a gang of steelworkers who had sworn to protect them from intimidation. And when a rumour reached the town that the Bedlinog men had been attacked it was the steelworkers who rushed to their defence.¹⁸² On Tuesday, 15 August, an evening meeting was held near the bandstand in Ebbw Vale consisting of steelworkers and mechanics. The newspapers provide an attendance figure upwards of 10,000. 'A resolution was adopted, with cheers, to protect the colliers when at work in the event of another visit of the mob to-day'.¹⁸³ For Dalziel the reason the Ebbw Vale and Dowlais stoppages were short lived was undoubtedly due to the firm attitude of the owners 'and to the support which the Ironworks men afforded the men who were willing to work, in resisting the coercive measures adopted by the strikers'.¹⁸⁴

We must not assume, however, that the colliers in these towns felt threatened into working by the combined strength of the coalowners and metal workers. It is interesting that the Ebbw Vale men insisted on the right to chose for themselves whether to strike or not and this was not a decision they felt outsiders had the right to try to dictate. The Ebbw Vale miners 'being very indignant at the intrusion of the others, maintain[ed] that if they, as a body, chose to resume

¹⁸⁰ *Western Mail*, 19 August 1893.

¹⁸¹ *Cambrian*, 25 August 1893.

¹⁸² *Western Mail*, 21 August 1893.

¹⁸³ *South Wales Echo*, 16 August 1893.

¹⁸⁴ Dalziel (comp.), *Records of the Several Coal Owners' Associations*, p. 189.

work they had a perfect right to do so'. One Ebbw Vale man demanded to know, 'What right have them fellows to come interfering with us? If we don't want to strike we'll make it pretty plain that they won't make us.'¹⁸⁵ Interestingly the cry of the strikers as they descended on the town was 'We'll give the b***ds Home Rule!'¹⁸⁶ Evidently miners had a different sense of identity and a different set of loyalties which could override any sense of shared cause with their fellow mineworkers.

It seems the complex interdependence of industries within some regions meant that workers at individual pits had to think long and hard about the position they adopted. If they struck work they would draw into their dispute men who had nothing to gain by action and an awful lot to lose. Once a blast furnace was blown out it could take weeks or even months to relight. Even a short term coal strike could therefore mean a major loss of work, and all the attendant hardships that meant, for the metal workers. If these were sons, family, neighbours, the decision to strike was not one which could be taken lightly. It has not been possible in the time available to map the occupations of heads of household in Ebbw Vale, which would have helped determine the degree of interaction between the different occupations. A cursory look at the census enumerator's data for Ebbw Vale suggests, however, that there was no clustering of occupational groups, and that in some households there were sons working in steel and coal.

The issues at stake in the strike were therefore more than just those of organisation and more serious than a question of wages. In essence, for metal producing areas, it boiled down to a more fundamental choice between an identity based on occupation and one based on community and location. During the strike there were plenty who would have readily echoed Isaac Evans' sentiments. While stating that he had no wish to harm other, 'I am not willing,' he admitted, 'to work for less than I can live upon, in order that other people might earn double the amount I earn.'¹⁸⁷ But there were still areas of the coalfield where it was felt that:

¹⁸⁵ *South Wales Echo*, 16 August 1893.

¹⁸⁶ *Merthyr Express*, 19 August 1893.

¹⁸⁷ *Central Glamorgan Gazette*, 18 August 1893.

We, as colliers, ought to consider the disastrous effects it would have on other trades such as tinworks, steelworks, ironworks, and so forth, if we go in for advances, such as would be the means of advancing coal for those employees, and, therefore, make the carrying on of their concern much more costly.¹⁸⁸

Metal town miners had to decide if their brothers were those they worked alongside, in the broadest sense, or those they lived alongside, in a literal sense. If the potential cost of loyalty to their fellow miners was the loss of their community and their traditions it was too high a price to pay. It certainly appears that was true for many in 1893 at least.

The buzz word of the strike was 'unity', for 'Unity was indispensable for success'.¹⁸⁹ But clearly coal was not a uniform product and the coal industry was therefore not a unified, single industry, meaning in turn that the experiences of the workforce were far from uniform. The strike maps reinforce the impression given by the documentary sources that responses to the strike were uneven and sometimes contradictory. They also make it possible to test for the first time a number of hypotheses about factors influencing behaviour. It has long been argued that differences in the type or rank of coal were a divisive force acting on workforce relations and making unified action difficult. By comparing the stance adopted during the strike with the type of coal produced it is possible to begin to measure how strong a divisive force the differences were. It is apparent that in 1893 at least that while on a local basis rank of coal production created divisions within the workforce, at coalfield level it was not a sufficiently strong force to significantly prevent co-operation amongst the men.

Nor does it appear from the maps that the miners working at older pits, which might be expected to provide poorer, more difficult working conditions, were any more or less likely to strike than those at newer pits. Indeed the historical geological evidence suggests that pits of all ages could at any time hit geological problems which could hamper or permanently damage coal production. Then again, there is some evidence, albeit questionable, that workers at pits

¹⁸⁸ *Central Glamorgan Gazette*, 18 August 1893.

¹⁸⁹ *Western Mail*, 24 August 1893.

facing declining productivity, which was in part at least likely to be rooted in geological conditions, were reluctant to support industrial activity. The workforces at these pits were perhaps less willing to risk action which would threaten already fragile concerns. Where working was good and productivity high the men may have felt they held a stronger bargaining position in relation to the owners. This raises doubts about arguments concerning the causes of strike propensity based on twentieth century case studies.¹⁹⁰

In addition to these issues it has been possible to use the GIS maps to test for the influence of accident history on workforce strike status. This is a vitally important area for historians to understand in view of the priority miners gave to safety issues. The maps here found no clear, definitive link between high accident rates and the willingness or otherwise to support the strike in 1893, suggesting that geologically volatile conditions did not necessarily produce volatile workforces. In some ways this reinforces the picture suggested by the productivity maps that it was the workers at 'good' pits which were more likely to strike than those at 'bad' pits and raises further questions about the arguments based on twentieth century evidence. It also suggests that further research, using a longer time frame and taking into account strike propensity not just a single strike, might produce some interesting insights.

Finally, the maps provide a new way of seeing and understanding the coalfield. The five part regional structure recognises the unique geological and historical experiences of each of the regions. By analysing the strike according to region it becomes possible to see deep rooted and long standing influences on attitudes which produced markedly different patterns of behaviour. If taken as a whole, the coalfield strike pattern becomes diffuse and the significant concentrations of types of responses can be lost. The regional structure, however, focuses attention on the variations and also suggests some explanation. In 1893 the continued existence of the metal industries, those industries which led to the exploitation of coal in the first place, complicated and confused responses. Unified action across the coalfield was

¹⁹⁰ Zweiniger-Bargielowska, 'Miners' Militancy', pp. 356-89.

hindered because the coalfield was not and never had been a single unified entity. Moreover, recognising the historical and geological diversity of the coalfield in this way not only offers a better way of understanding the strike of 1893 but provides for the future a more solid foundation and better organisational structure to explore other issues of unity and diversity within coalfield society. The maps have not provided any definitive answers to the question of the cause of the pattern of strike support. They are, however, suggestive of fractures within the mining workforce shaping choices which were caused by different working conditions and the different historical development of the areas. They also reveal that it is important to remember that these differences were ultimately rooted in the diverse geological conditions and character of the South Wales coalfield.

CHAPTER SEVEN

The Landscape and the 1893 Strike

Introduction

I have a South Wales view of mountains. I want them of a size I can live and walk on. We have them in Glamorgan. One after another, small, smooth ranges of classic line, shortish and utterly accessible.¹

The aim of this chapter is to look beyond the 'why' of the strike to the 'how'. That is, it seeks to answer the question of how it was possible for a group of young, apparently inexperienced men to bring almost the whole of the coalfield to a standstill in a matter of a few days. It will look at how they spread the message, co-ordinated action and attempt to maintain solidarity in the face of multiple forces pulling the workforce apart. This is essentially a question of communications but the chapter also aims to touch on how the landscape helped and/or hindered the progress of the strike.

It is, indeed, an unquestioned 'truth' of Welsh historiography that the physical structure of the coalfield created problem for communications. In his 1928 thesis on the industrial development of the Llynfi, Ogmore and Garw valleys, Thomas Bevan suggested

the difficulty of communication between these several valleys has been a great hindrance to social progress, so that for many years we find large numbers of people engaged in the same industry, living precisely under the same conditions quite near one another, and yet having very little common intercourse.²

In 1980, Smith and Francis confirmed that, 'Inter-valley communication was poor, so that opinion tended to flow up and down a particular valley instead of being exchanged and altered

¹ Gwyn Thomas, *A Welsh Eye* (London, 1984), p. 160.

² Thomas Bevan, 'The Industrial Development of the Llynfi, Ogmore and Garw Valleys: with special reference to transport facilities in the area' (Unpubl. MA (Econ.) Thesis, University of Wales, 1928), p. 8.

at a common meeting-place.’³ The topography of the region, therefore, acted to inhibit the development of a coalfield-wide identity and the operation of co-ordinated industrial activity. At the same time, there is a wealth of oral testimony, autobiographies, novels and local histories which points to the importance of the hills as part of the cultural and social life of coalfield communities. These almost paradoxical images have been allowed to stand by historians with little attempt to reconcile the two. The chapter will also therefore touch on the extent to which cultural practices were utilised in industrial activity.

GIS Mapping

One possible way of examining the influence of the topography of the coalfield on industrial action is to map the spatial and temporal spread of the strike - that is, to look at the strike on a day by day basis to measure its geographic development – and to compare it with a digital terrain model of the region (Figs. 15.1 – 15.8). This, it seems, is a somewhat unusual approach in historiographical terms as most histories are concerned with causes and outcomes, rather than with the mechanics of industrial action. Where strike maps are produced they usually take the form of frequency distributions rather than spread, so there is little existing writing on the ‘shape’ or process of strikes and no clear indication of what might be expected for 1893.⁴

The very first appeal for support made by the Nantymoel men was to the men of the Rhondda. This initial move was a rational choice on a number of levels. The national and international reputation of the name ‘Rhondda’ would ensure the immediate attention of the public, something which the lesser known ‘Ogmore’ and ‘Garw’ could not guarantee to do. The Rhondda also contained many of the largest pits in South Wales and certainly had the highest

³ Hywel Francis & David Smith, *The Federation: a history of the South Wales miners in the twentieth century* (London, 1980), p. 4.

⁴ Compare the maps in Andrew Charlesworth, *An Atlas of Industrial Protest in Britain 1750-1990* (Basingstoke, 1996).

concentration of miners anywhere in the coalfield. The pits here also produced the most valuable coal and were therefore of central importance to the industry. If a strike could be promoted here it would quickly paralyse the trade and put huge pressure on the owners to come to a quick settlement. The GIS maps suggest that there was indeed a concentration of effort here in the first week with some expansion westward into the Garw and Llynfi valleys. But the maps reveal a sudden jump from the Rhondda to Abersychan in the far eastern edge of the coalfield. There then appears to be gradual, valley by valley movement back towards the centre of the coalfield. There does therefore appear to be some conformity to the valley system, but there is no evidence of 'down and up' spread which might be expected.

One possible explanation is that great icon of Victorian progress and expansion, the railway.⁵ To test for any possible influence, the South Wales network was digitised, the date of each line checked to ensure that it was in existence by 1893 (Fig. 16). Clearly the railway system by the time of the strike was extensive and, in theory at least, there was no reason why the whole coalfield could not be covered in a comparatively short period even if only a handful of strike advocates was sent out. This might certainly explain the unexpected move from the Rhondda to Abersychan. The railway network was therefore compared with the strike map to see if there was a discernable link between this and the development of the strike. However, the extent of the railway network makes it difficult to identify any clear correlation. Almost every single pit within the coalfield either lay on a main line or was linked to one: large sections of the railway network were built, after all, to serve the coal industry. In addition, the lines conform closely to the valley structure, with a strong north-south orientation towards the sea ports and

⁵ GIS studies which have analysed the impact of railways on migration patterns and population movement include Robert M. Schwartz, 'Railways and Population Change in Industrializing England: an introduction to historical GIS', http://www.mtholyoke.edu/courses/rschwartz/rail/chap1_2.html [accessed 1 November 2006]; Melissa Joyce, 'Industrialisation and Environmental History in Victorian England: Wolverhampton, Wolverton and the Railroad', *International Journal of Humanities and Arts Computing*, Vol. 1, No. 1 (2007), pp. 19-33.

only very limited, if important, east-west connection. Since there is no clear up-and-down spread to the strike it would suggest that the structure of the railway network cannot explain the pattern of the strike anymore than the valleys' structure can since they were essentially and necessarily the same.

Moreover, the newspaper accounts of the strike suggest that although there was some use of the trains early on, especially in the eastern part of the coalfield, there seems to have been a conscious rejection of the railway network as a mode of transport and means of communication. One newspaper reporter expressed surprise that a group of men had walked all the way to the Rocking Stone meeting from Blaina, a distance of some 20 miles.⁶ This does need explaining in view of the potential trains offered to cover the whole coalfield quickly. It is likely that the lack of an organised union was fundamental here as there were no funds to draw on to send the men out.⁷ As the strike progressed economic necessity meant that the strikers were likely to avoid the expense of train travel. Oral testimony from later strikes suggests that even with union funds many did not want to waste money precisely at the time when resources were likely to be sparse.⁸ In addition, the ambiguous relationship between the coalowners and railway owners may also have played a part in the decision. Railways were a major consumer of coal, and some railway companies had vested interests in individual mines; it has already been noted that some pits, such as Tewgoed, supplied exclusively to railway companies. Plus, as the strike progressed there was close collaboration between the coalowners, the authorities and the railways companies to ensure the rapid movement of troops. Finally, there was at one point a faint hope that the miners could persuade the railway workers to support them.⁹ Though ultimately this proved futile due to the resentment of the railwaymen at the lack of support shown to them by the miners during their own struggle a few years earlier, it

⁶ *Western Mail*, 15 August 1893.

⁷ Indeed towards the end of the strike one Welsh language newspaper commented that the lack of money was at the root of the decision to avoid the railways; *Y Tyst*, 1 September 1893.

⁸ South Wales Miners' Library (SWML) AUD/220: interview with Henry John.

⁹ *Western Mail*, 26 August 1893.

nevertheless meant that the strikers were unlikely to actively keep in employment men they wanted to come out on strike.

The pattern exposed by the GIS maps is therefore not easily explained, at least not by the railway network. Indeed it seems necessary to move away from the 'bird's eye view' perspective of the coalfield map and look in more detail at what was going on at ground level. To do this and to understand the process of the spread, the strike will be divided into three loose, and overlapping, 'phases': spread, consolidation and defence and collapse. In each phase, the different types of communication employed will be looked at and the influence of the landscape on each stage of development will be identified.

First Phase – 'The Spread'

The strike was spread initially by 'marching gangs', small bands of representatives from Nantymoel who visited neighbouring pits to explain their grievances and to ask for support. As each new region joined in, they in turn sent out their own gangs to the next region sometimes accompanied by representatives from the original striking pits, thus spreading the message like passing on the baton in a relay. By 5 August, for example, hauliers from Rhondda were in the Aberdare Valley conferring with hauliers and miners at pits there.¹⁰ This practice went on for some time until the message had reached the whole coalfield.

The rejection of the railways meant that the gangs had to walk to circulate their message – hence, doubtlessly, the 'marching' part of their name. Mrs Annie Davies, talking in the late 1960s, remembered the very beginnings of the strike:

They climbed up the mountain here that they call the new road [the A4061 from Nantymoel to Cwmparc] and all of us children followed them. They was playing the

¹⁰ *South Wales Echo*, 5 August 1893.

band and carrying the drum and all up there, with bread and cheese to eat and have when they got over there.¹¹

Seen in isolation, it would be easy to interpret the march over the hills as a spontaneous, heroic, response to the crisis, the very challenge and effort demanded by the chosen route reinforcing the sense of urgency and seriousness of the situation. Yet this behaviour is exceptional only if it is separated from the wider historical, social and cultural life of the community which was now directing its energies towards industrial action.

To understand the importance of hills to communication in coalfield society, however, it is first necessary to understand something of the region's topography. The high plateau of Pennant sandstone is carved into narrow, parallel valleys created by glaciations and river erosion. Although the hillsides in consequence are in places steep, they are by no means sheer, and the hills are of a fairly uniform height, although there is a tendency for the whole country to gain elevation northwards. Even some of the greatest elevations in the central coalfield region, do not reach 500 meters; the ridge between the two Rhondda valleys peaks at 481 meters. Moreover, once the top has been reached, the hills open out into fairly flat areas of moorland. The plateau is largely infertile as, due to the underlying geology, the soils are generally poor. Around the Merthyr region, for example, the soils are shallow and in the main acidic 'gley soils' and blanket peat, creating poorly drained moorland conditions and supporting mainly low growing plant cover such as coarse grasses, bracken, sedges, cotton grass rushes, white gorse and heather.¹² This means that the hills are not suitable for growing crops and this in turn meant that by the beginning of the nineteenth century there was a concentration on sheep and cattle farming. The hill tops were therefore left open for grazing, only the lower levels enclosed by hedges or dry stone walling. When the clearance of large sections of woodlands is added to the picture, all this meant that the hills were relatively easy to climb, provided occasionally

¹¹ Michael Keen & Richard Keen, 'The Coal War in South Wales, 1893', in *Glamorgan Historian* Vol. 10, p. 43.

¹² G. Mervyn Howe, 'The South Wales Coalfield' in E. G. Bowen (ed.), *Wales: a physical, historical and regional geography* (London, 1965), p. 359.

boggy but generally solid conditions under foot and offered few barriers to movement along the ridge when the tops were reached. In short, to return to Gwyn Thomas's words quoted at the beginning, the hills of the South Wales coalfield were and are 'utterly accessible'.

More to the point, they have been utterly accessed. It should be remembered that while the main expansion of the population in the South Wales coalfield occurred in the late nineteenth century, the region had seen human activity for millennia. There had been many changes in purpose and use, but each had left its own unique and indelible mark. But what was significant about these remnants of the past was that they were located on the hilltops where the broad open expanses of moorland lent themselves, in past less 'sophisticated' ages, more readily to ritual, stock raising or travel than the narrow confines of the valley floor. Bronze Age funerary monuments, Roman roads, medieval ditches and cross-dykes, monastic settlements, shrines and parish churches, and long houses dotted the high ground and rough tracks worn by generations of pilgrims and herders, were etched into the landscape all across the hill ridges. It was into this landscape, a landscape which was orientated 'up' towards high ground that the waves of new migrants came to work and live and although both settlements and especially work forced their focus 'down', the hills and their history did not simply disappear. There is too often a tendency to readily equate industrialisation with urbanisation and in turn with an alienation from the landscape. As John Williams has pointed out, both industrialisation and urbanisation are problematic concepts when applied the South Wales coalfield.¹³ And it is equally doubtful whether it could ever be said that the Welsh ever lost touch with the physical world in all its various forms which they occupied.

Indeed, when the various pathways, bridleways and sheep walks identified on the historic maps are digitised and draped over a terrain model of the landscape it becomes clear how closely the Ogmore and Rhondda Valleys were interlinked with the surrounding areas (Fig. 18). Some of the routes, especially those covering extensive distances, were probably ancient, while others

¹³ John Williams, *Was Wales Industrialised? Essays in Modern Welsh History* (Llandysul, 1995), pp. 17-18.

appear to have resulted from more recent activities such as the exploitation of coal outcrops and the quarrying of rocks for house building. Certainly the old tramways which connected the valley floor with the higher ground were linked to the expansion of the coal industry. But both recent and ancient pathways were still regularly used. Sheep walks were popular routes for leisure. Quarries, once abandoned, provided a whole host of wild creatures with suitable habitat and children with an exciting playground for hunting newts or collecting creepy-crawlies.¹⁴ Many paths lead to hillside springs or spouts which, despite improvements in sanitation and extensive reservoir building, were still periodically exploited in the 1890s by women dependent on them for their water supplies.

And these were not just paths that led into the hills but ones which also took people out of the valley too. Even where a path appears to come to a stop, as was noted earlier, the terrain was such that movement was relatively easy across or along the hill tops, so that the absence of a marked pathway on the maps does not mean that these areas were not walked. There is plenty evidence that hill routes were used regularly by travellers to attend meetings at chapels or *eisteddfodau*, to visit fairs or to go courting. Katie Olwen Pritchard, in her history of Gilfach Goch, remembered the small boy who was employed as a messenger to take post and parcels from Gilfach over the hills into the Rhondda. Moreover, they were not just used for socialising. Thomas Bevan, in his 1928 study of the coal industry in the Ogmere, Garw and Llynfi valleys, noted that '[b]etween the Ogmere and the Garw, Mynydd Llangeinor may be crossed on foot in an hour, and many workmen do it twice every day'.¹⁵ When P. J. Matthews moved to the Rhondda in the late 1890s he lived at Pontygwaith but worked at Penygraig, walking daily over the hills.¹⁶ And when the Ocean Coal Company collieries struck work in 1891 over the employment of inexperienced men in the sorting screens, the meetings held regularly in the Rhondda were attended by representatives from Nantymoel who invariably took the hill route.

¹⁴ For example, David Barnes, *Black Mountains: The Recollections of a South Wales Miner* (Talybont, 2002), p. 67.

¹⁵ Thomas Bevan, *The Industrial Development of the Llynfi, Ogmere and Garw Valleys* (1928), p. 7.

¹⁶ [SWML] AUD/300: interview with P. J. Matthews.

The rejection of the railway network as a means of communication, therefore, simply meant that the strikers fell back on more traditional means of getting from one place to the next. The hills were, in other words, an integral part of people's experiences and were woven into the daily routine of work, leisure and communications.¹⁷

Second Phase – 'Consolidation: meetings and processions'

The dissemination of the call to strike did not, of course, always or immediately translate into pit stoppages. There were areas which were far from receptive and in some cases downright hostile to the marching gangs. The pattern revealed by the GIS maps does not therefore necessarily reflect the pattern of communication networks. In addition, once the message had been sent out via the marching gangs, it was necessary to arrange large scale meetings at which the men from pits in a valley or a given region, both those who supported and those opposed the strike, could discuss the issues, share concerns and co-ordinate the next stage of the action. In a sense there was a reversal of the movement of information: instead of the message being taken to the men, the men came to the message. Arranging meetings, however, was not always straightforward. The need for meeting rooms large enough to hold several hundred men limited the number of locations suitable as assembly points. The narrowness of the valley floors, the lack of flat land and the prioritising of colliery developments in the little space available meant that there were, throughout the latter part of the nineteenth century and the early decades of the twentieth century, repeated complaints at valleys' communities lack of civic centres, central meeting spaces or halls able to accommodate large crowds. The Clarence Theatre, Pontypridd, was one option, which was used on 8 August, but indoor accommodation was generally limited to rooms in public houses and on occasion tensions over space could

¹⁷ In spite of the long hours there was still much use of the landscape especially on the monthly holiday known as 'Mabon's Day'. For a discussion of the importance of Mabon's Day for the social and political life of Wales see Andy Croll, 'Mabon's Day: The Rise and Fall of a Lib-Lab Holiday in the South Wales Coalfield, 1888-1898', *Labour History Review* Vol. 72 No. 1 (April 2007), pp. 49-68.

aggravate already strained relations. However, the gradual strengthening of support meant that after the first week or so of the strike, indoor meetings had to be abandoned altogether. Rooms, in any case, had to be hired and paid for, and this posed an unavoidable problem for the strikers of 1893 who were without the backing of union funds.

One result of the lack of large public buildings was that the men were driven outdoors in search of suitable meeting spaces. Although the railway network was rarely exploited, many meetings especially in Monmouthshire were held in fields alongside railway stations. But many more shifted to fields attached to pubs or into the hills. Numerous groups gathered for informal and formal discussions of events on the hills across the central and eastern part of the coalfield, lazing on the slopes in the glorious summer sun. Sometimes, here, the shape of the landscape could be a positive advantage. The *Glasgow Herald* was very impressed by a meeting at Blaenavon, which was held

in a deep gorge with sloping banks. It was an admirable spot for an outdoor assembly. The miners congregated on each of the sides of the ravine, where they rose in lines one above the other as if they occupied so many tiers of well-arranged seats. The chairman and vice-chairman occupied higher ground.¹⁸

This use of the hills was, again, hardly a new development. Certain locations clearly had reputations as traditional locations for mass meetings: the names Waunypound, Tredegar Junction and Crumlin seemed, for the 1893 strikers, to resonate with memories of earlier disputes. Fields were the locations people met to debate and to decide. They became sites of collective memory, collective identity, collective action. That they were not recognizably village greens may have blinded contemporaries to their existence but it did not prevent these locations from playing the same role. And other new 'traditional' locations were being

¹⁸ *Glasgow Herald*, 30 August 1893. Outside spaces were not ideal, especially in the Welsh weather. A number of meetings in the latter part of the strike had to be curtailed or temporarily suspended until rain stopped, although in some places the landscape could come to the rescue. A meeting of non-strikers on a mountain near Aberdare mountain adjourned to a local quarry where they sheltered under overhanging rock; *South Wales Echo*, 21 August 1893.

identified during the strike as convenient meeting points.¹⁹ The Gladstone Field, Aberaman rapidly became the location of choice for the Aberdare valley men, a newspaper reporter commenting that it was 'a field which bids fair to become noted as the locale of mass meetings in the lower part of the valley'.²⁰

These outside spaces, while practical, were not, however, easy to regulate. There was an expectation that such meetings were inviolable but it was difficult to keep spies away from outdoor meetings or at least out of earshot: the first half hour or so of many mass meetings were spent identifying potential troublemakers, interlopers, or 'gaffers' men' and sending them packing. Moreover, such meetings remained vulnerable and when tensions and the stakes were high, they could be and, in 1893, were gate crashed. A mass meeting at the Griffin Field, Pentre was disrupted when a gang of Ogmore and Garw men, angry that the Rhondda men had gathered without inviting them, crossed the hills and rushed the assembled crowd. The meeting had been a fairly quiet, orderly affair up to that point, the men listening respectfully to each of the speakers in turn, but with the storming of the field by the strikers, it descended into chaos and disorder. In addition, it subsequently led to serious intimidation of Mabon who had been one of those addressing the meeting.²¹ The disruption of open air gatherings, therefore, became a useful method of closing down opposition to the strike.

It is important to realise, however, that while meetings could be driven to the hillsides for practical reasons, there was a lot of symbolic meaning attached to hills, meaning which was utilised in various ways by both observers of the strike and the participants themselves. As was noted earlier, the hills were used frequently for leisure and relaxation, as an escape from the restrictions of life in the valley floor. But they were an escape in more ways than one, as they were in practice regularly places of behaviour which was deemed unacceptable within the

¹⁹ Compare: 'For over half an hour the people of Cwmardy poured through the square which was their ancient battle-ground into the field where most of their vital decisions had been taken ...'; Lewis Jones, *We Live: The Story of a Welsh Mining Valley* (London, 1983), p 242.

²⁰ *South Wales Echo*, 16 August 1893.

²¹ *South Wales Star*, 25 August 1893.

community environment. The hills were a common setting for illegal gambling, gambling which was often combined with other reprehensible practices such as boxing. As a young boy, Willie Paget would often watch bare fist fighting on the mountains above Risca, where a natural amphitheatre was exploited as an arena.²² Paget also remembered his father helping the local Justice of the Peace 'to clean up the district when the women were going up the mountain to earn extra money for hats and bonnets,' although not all those who were drawn into the hills to indulge in 'ritual sexual relaxation' did so on the basis of a financial transaction.²³ Many courting couples were brought to the altar sooner than they had intended as a result of hillside encounters. Hills were also dangerous and mysterious. Ghosts and spectres howled with the wind across the open moors. The wise avoided the sheltered, secluded spots which were the haunts of the *tylwyth teg*, fairies or 'little people'.²⁴ The corpse candle, or *canwyll corph*, was believed to have lured more than one unsuspecting traveller to his death. Superstitions were easy to laugh at in the light of day but even the most sceptical beings thought twice about venturing out alone onto the hills at night.²⁵ Besides, the more corporeal dangers to lone women walking the hills after dark were all too real. David Jones identified a number of rape cases where the victims were returning across the hills from work or from market late at night.²⁶ Hills came therefore to represent figuratively as well as literally, wild and untamed places. They were places where the rules of polite, respectable society did not apply, where disorder and chaos prevailed and where, thus, men by association reverted to a primitive state.

²² Mary Paget (ed.), *Man of the Valleys: the recollections of a South Wales miner* (Gloucester, 1985), p. 58.

²³ Gwyn A. Williams, *The Merthyr Rising* (Cardiff, 1988), p. 29; Paget (ed.), *Man of the Valleys*, pp. 50 & 54.

²⁴ Hilda M. Evans, *New Tredegar in Focus* (Risca, 1977), p. 65.

²⁵ For a recent study of the place of superstitions in Welsh life see Russell Davies, *Hope and Heartbreak: A Social History of Wales and the Welsh, 1776-1871* (Cardiff, 2005). The 'Valleys' continued to be 'demonised' well into the twentieth century. Will Paynter recalled that when he moved from Whitchurch to the Rhondda in 1925, 'local folk were apprehensive of the people of the valleys'. Going to live among the miners, 'they considered a terrible fate, a sort of irrevocable step towards hellfire and damnation'; quoted in Dai Smith, *Aneurin Bevan and the World of South Wales* (Cardiff, 1993), p. 101.

²⁶ David J. V. Jones, *Crime in Nineteenth-Century Wales* (Cardiff, 1992), p. 79.

This image of the hills was exploited by contemporary observers of coalfield society and was utilised to colourful effect during the 1893 strike. The descent of the Ogmore and Garw men from the hills onto the meeting at Pentre provided the newspaper reporters with an opportunity for imaginative story telling which they did not pass up. Several writers described the 'invaders' as little better than the 'savages of Africa' while the writer for the *Western Mail*, a key supporter of the coalowners, drew on the famous imagery of Buffalo Bill and his Wild West show, to describe the attackers as akin to Native American warriors. Like the 'Indians' descending from the high ridges onto the beleaguered settlers of the plains, the strikers descended on the honest, good men of the Rhondda: their 'howling and the sudden rush towards the mass meeting strongly suggested Indians on a scalping expedition'.²⁷ The association of the strikers with the hills identified them clearly with all that was uncivilised, barbaric and lawless. And therefore, with a leap of logic only journalists could achieve, the strikers' claims were unjust and should be summarily rejected.

Yet hills were contradictory places. The very absence of societal conventions meant, for some, not disorder but freedom. They were ideal meeting points since they offered a place where men could meet as equals, away from the material symbols of their relative economic, social or political position and power. They were, in short, democratic places. Hills were equally symbols of spiritual refuge and renewal, possessing clear Biblical resonances. The hill was the site of Mosaic law-giving, the Psalmic image of Israel, the New Testament place of temptation and transfiguration.²⁸ In a strongly Nonconformist country like Wales, the hills played a real part in the nation's spiritual identity.

Some places had more universal 'meaning' which reached beyond the locality to act as a focal point for the whole of the coalfield. One of the most important traditional meeting places, which was used repeatedly throughout the strike was the Rocking Stone, Pontypridd, which had

²⁷ *Western Mail*, 12 August 1893.

²⁸ For an example of an English language sermon which reveals some of the religious significance of mountains see the sermon of Revd. R. Hughes, reproduced in D. Davies, *Echoes from the Welsh Hills; or, Reminiscences of the Preachers and People of Wales* (London, 1883), pp. 424-434.

a rather mixed spiritual heritage.²⁹ Set in the heart of Coedpenmaen Common, perched on the side of a hill, this logan stone had been both a regular assembly place for prayer meetings and the focus of a 'druidic revival' in the earlier part of the century. It was said to have been 'a burial-place of the ancient Welsh princes' and 'the unhewn rock on which the Druids of old held their ceremonies'.³⁰ This pagan-Christian association gave the Rocking Stone significance as a truly spiritual place – 'Morien', the *Western Mail* reporter and archdruid, described the Common as 'our Holy Hill' – but also as a uniquely Welsh place.³¹ Indeed, it had taken a key role in the rituals of another of the defining elements of Welsh culture and society, the National Eisteddfod, precisely at the same time as the strike was beginning. The choice of setting by the strikers was therefore more than just practical. True, Pontypridd was logically the most accessible location for a meeting of Glamorgan and Monmouthshire men, sited as it is and was at the central southern edge of the coalfield and at the convergence of several of the main central valleys. But it was also essential for the strike to appropriate some of the meaning of the place, to present the strikers as the legitimate heirs of the land and true Welshmen. In this they were following in the footsteps of earlier mass meetings. In May 1879 some 9000 colliers from South Wales and Monmouthshire gathered at the Rocking Stone to discuss the trade depression, the stone itself serving as the platform for the speakers. 'Several speakers referred half jocularly to the spot as being *cyssegredig* (sacred), but one bearded miner said earnestly that probably thousands of years ago barefooted bards had administered justice where they then stood.'³² Certainly, the symbolism was not lost on the press in 1893, even if they chose to present a rather different interpretation: 'the bards of Ynys Prydain [who days earlier] assembled on this self-same spot and awoke the echoes with their cries of "Peace"' were

²⁹ See Appendix C for images of the Rocking Stone.

³⁰ Sykes, *Rambles and Studies in Old South Wales*, p. 45; *South Wales Daily News*, 15 August 1893.

³¹ It was also the site of the presentation of medals to rescuers of the Tynnewydd Disaster in 1877. A tongue-in-cheek article in the *Glamorgan County Magazine* in 1949 claimed the Rocking Stone, along with Pontypridd's bridge and the whirlpool in the Taff at Berw, as one of 'The Seven Wonders of Glamorgan'; *Glamorgan County Magazine*, Vol. 1, No. 4 (Summer, 1949), p. 42.

³² *Western Mail*, 25 July 1879.

contrasted sharply with the 'multitude of militant miners marshalled in battle array' who congregated on the Common on 14 August.³³ But the use of the Stone was still an important means of reinforcing the message of the strikers and claiming legitimacy for them as a group and as a cause by linking them with a traditional and indisputably Welsh past. In a sense, the 'meaning' of the location thus became part of the message the strikers wished to communicate.

Processions

The meeting arranged at the Rocking Stone for 14 August marked the next stage in the development of the strike. It was here that men from the whole of the coalfield gathered to discuss the key issues, to draw up a resolution to be submitted to the coalowners and to plan the next phase of action.³⁴ A committee was appointed to oversee and co-ordinate activities and to negotiate on behalf of the strikers. It was subsequently resolved that those pits which had resisted the calls of the marching gangs would be individually targeted. The method of choice was the mass procession, usually involving hundreds if not thousands of men from the neighbouring valleys targeting individual pits. The primary aim was to demonstrate the strength of purpose amongst the strikers and to win agreement rather than to force obedience, though they were prepared to do this if absolutely necessary.³⁵ The marches were usually arranged to begin at an early hour of the morning, the time chosen so that the group would reach the target pit just as the bulk of the workforce arrived for the start of the day shift. If they arrived too late it would be difficult and potentially dangerous to demand that the men leave work in the middle of a shift. It was also unlikely that those who were strongly opposed

³³ *South Wales Daily News*, 15 August 1893.

³⁴ *South Wales Daily News*, 11 August 1893.

³⁵ Compare the description of a march in *We Live*: sides of the valley 'looked like a gigantic ant-hill, covered with a mass of black waving bodies ... The people seemed overwhelmed with the mighty demonstration of their own power, which they could now see so clearly'; Jones, *We Live*, p. 243.

to the strike would in any case be willing to return to the surface to talk. So a carefully timed arrival would ensure a collective face to face meeting of workers and strikers and provide an excellent opportunity for each side to state their case.

But there was far more to processions than simply providing the opportunity for mass communication between opposing groups. On 15 August, there was an attempt to call out Maerdy by strikers from the Rhondda Fawr, Ogmore and Garw. If the sole objective had been to meet with the Maerdy men and stop them from descending the pit to work, the processionists could have easily used the hills to come down quickly on the workforce at the appropriate time. As was seen with the disruption of the Griffin Field meeting, the sudden arrival of hordes of men down a hillside could be an impressive and intimidating sight and could potentially have been a useful tactic to disrupt the working of pits. Fig. 18 shows that there were certainly plenty of pathways to Maerdy over the hill, including one from Pentre, which was the usual meeting and rendezvous point for other types of combined action. It would also have taken considerably less time and effort to cover the one and a half miles over the hill rather than the nearly eleven and a half miles from Pentre to the Maerdy pits. The extra effort involved suggests that there something more significant about the very act of processing as a group which was as much a part of the message the strikers wished to deliver as the arguments they presented at the culminating meeting.

Firstly, the marches were public events taking in the main streets of the valley settlements. As historians such as Andy Croll have demonstrated, processions were familiar and important social and cultural events in nineteenth century societies.³⁶ They took many forms: from religious or military parades and political rallies to carnivals or pageants to celebrate the visit of

³⁶ See for example Andy Croll's discussion of Whit walk; Andy Croll, *Civilizing the Urban: Popular Culture and public space in Merthyr, c. 1870-1914* (Cardiff, 2000), pp. 200-215. Note also Neil Evans, "'South Wales has been Roused as Never Before': Marching Against the Means Test, 1934-1939", in David W. Howell & Kenneth O. Morgan (eds.), *Crime, Protest and Police in Modern British Society: Essays in Memory of David J. V. Jones* (Cardiff, 1999), pp. 176-206; Paul O'Leary, 'Processions, Power and Public Space: Corpus Christi at Cardiff, 1872-1914', *Welsh History Review*, Vol. 24, No. 1 (June, 2008), pp. 77-101.

important dignitaries. Death too had its processions: when a man was killed in a pit accident the whole workforce trailed the body to its home, while funerals would involve long parades of hymn singing on the road to the churchyard. Each different type of procession served a slightly different purpose, but they were always communal acts, which drew in both those processing and those observing the action. Andy Croll has demonstrated in relation to the Whit Walks of the late nineteenth century, that the public parades of chapels and Sunday schools forced observers into a relationship with the Nonconformist cause. 'Individuals were obliged to fix their position *vis-à-vis* the Chapel, either as sympathetic onlooker or as disgruntled outside'.³⁷ Similarly, the strike marches demanded a response from the workers, to support or to set themselves in opposition. When one procession leader was confronted by the police over the marchers' intentions, he explained that 'the procession was not one of intimidation, but of example'.³⁸ Another explained that, '[t]heir march through the country had been to gather and to obtain unity amongst themselves'.³⁹

For the strikers, indeed, the act of marching along the main thoroughfares of the valley floor brought all those living in the settlements they passed into the debate in multiple ways. The strike processions were always great spectator events, even those that began in the early hours of the morning. Newspaper reporters were amused by the sight of men and women watching events from their doorways, only recently awake and sometimes only half dressed. But this did at least allow the opportunity for an informal exchange of ideas. There was always a degree of bantering between the marchers and the observers; calls for people to join in mixed with subtle warnings to those thinking of work to stay at home, usually, though not always, offered with good humour.⁴⁰ Thus the purpose the march served could change according to the audience. Marching through Wattstown the men were greeted with cheers. Here the volume of marchers was a graphic illustration of the strength of feeling and level of support and was something to

³⁷ Croll, *Civilizing the Urban*, p. 208.

³⁸ *Western Mail*, 10 August 1893.

³⁹ *Cambrian*, 1 September 1893.

⁴⁰ *Western Mail*, 16 August 1893.

take hope from. At Ferndale, however, although the pits were closed, support for the strike was muted and sections of the population were threatening to return to work. The public show of strength as the marchers wended their way to Maerdy served as warning to anyone with doubts to stay out. Indeed, there is some evidence that processions were exploited for actively intimidatory and aggressive purposes. It seems that when men had to be compelled to come out on strike they were subsequently marched around at the head of a procession. One Evan Powell, a smith, was forcibly removed from his workshop at the Llantwit and Merthyr Colliery and 'was ordered to march in from of them [the strikers] the whole of the day'.⁴¹ This enforced, doubtlessly humiliating, public display of 'support' for the strike ensured that reluctant men did not attempt to defy the strikers in future. The processions, therefore, could represent a statement of unity and strength, a statement of intent and also a warning.

In addition, some marches were not directed at the workforce or intended as a means to extend and strengthen the strike. Rather they were PR exercises designed to communicate something of the strikers' grievances to the public at large. They therefore differed from pit-focused processions in a number of ways. Firstly, they were always daytime marches. Whereas the Maerdy marchers set out at 2am, the march to Neath from Skewen was scheduled for a 10am start. Secondly, women were much more actively involved in the daytime marches than those which were aimed at the workforce. Generally women were expected to offer support to their men folk from the sidelines, to boo or to cheer appropriately, and to provide sustenance along the route.⁴² But marches such as that to Skewen were designed to raise the profile of the strike and this time the wives and daughters of miners marched at the head of the parade. Their involvement was a reminder to observers that the men were not just fighting for a living wage for themselves but for their families too. If the aim was also to add an air of refinement to events by including the fairer sex, however, it did not always pay off. During a march around Pontypool, the women evidently seized the opportunity to express their own frustrations, the

⁴¹ *Central Glamorgan Gazette*, 8 September 1893.

⁴² *South Wales Daily News*, 19 August 1893.

local newspaper commenting that they 'were really the noisiest and most obstreperous of the gang'.⁴³

All processions, though, regardless of their immediate goal needed a high degree of organisation, which belied the newspapers' claims that the strikers were youthful hotheads. The marchers in fact invariably displayed a high degree of self discipline. The two thousand people on a march to Neath were marshalled by a single collier and the arrival at the Corporation Field was achieved with military precision.⁴⁴ The processionists marched around the field and then at a signal advanced from all sides to the centre, thus forming a ring into which a wagon was brought to be used as a stage. The effect, it seems, was impressive. Isaac Evans was able to point out that their actions countered accusations that the men were 'rebels'.⁴⁵ And even some of the most antagonistic newspapers were forced to accept that processionists were usually orderly and well behaved.⁴⁶

Processions were also characterised by spectacle and colour. The strikers firstly distinguished themselves by their clothes. All processionists wore their holiday attire, their 'Sunday best', which both set them visually apart from and sent a challenge to those in working clothes. Banners and symbols were also used extensively to communicate the men's message. Some banners carried basic summaries of the strikers' demands. Others, such as that carried by men from Penrhiwceiber during a march to Aberdare, utilised inscriptions in Welsh based on Biblical texts.⁴⁷ Still others were clearly designed for the general public and intended, the newspapers suggested, to reassure them: 'Don't be afraid; we are only demanding our rights.'⁴⁸ There were other banners which caused some amusement in the newspapers though. On one march, banners belonging to the local temperance society were carried at the front. It seemed almost

⁴³ *South Wales Argus*, 21 August 1893.

⁴⁴ *Cambrian*, 25 August 1893.

⁴⁵ *Western Mail*, 26 August 1893.

⁴⁶ *County Observer*, 19 August 1893.

⁴⁷ *Merthyr Express*, 2 September 1893.

⁴⁸ *Western Mail*, 24 August 1893.

incongruous for men ostensibly striking against a starvation wage to be carrying a condemnation of the evils of drink. But banners, because of their bright colours and size, drew the eye regardless of the message and it may have been simply that any banner available would serve that purpose. The men on the march to Maerdy cut branches from trees along route and attached hankies, 'which were of every hue and shade', to serve as makeshift bannerettes.⁴⁹ In addition, temperance banners did provide an air of respectability. They suggested that these men now demonstrating were not men who would squander their wages but honest men who simply wanted a fair return for a hard day's work. On other occasions, symbols rather than banners were used. A procession which marched on Tredegar to hear the prosecution of striking hauliers carried, at the head, half a loaf impaled on a stick.⁵⁰ Bread and fish on a pronged fork were also occasionally used.⁵¹ Bread was obviously a basic food stuff and its use reinforced the message that the fight was against starvation wages. But again there were Biblical resonances, especially in the use of bread and fish, which would have spoken loudly to a Nonconformist audience.⁵²

Processions were furthermore very noisy affairs. Large processions were almost invariably accompanied by bands, either brass bands or fife and drum bands. The music again served several purposes, not the least important of which was, as noted by the newspapers, that it relieved the boredom on some of the longer marchers. Gwyn Thomas noted that in the interwar period political marches were great musical occasions: 'It was as if the darkening industrial context inspired a wish to react loudly.'⁵³ Possibly music did allow a way of burning off energy and giving expression to pent-up anger and frustration. It also, though, helped to generate a sense of camaraderie, keeping people moving together in time and unified in purpose. It helped at times to keep a light-hearted feel to marches and there is almost a

⁴⁹ *South Wales Echo*, 15 August 1893.

⁵⁰ *Western Mail*, 23 August 1893.

⁵¹ *Glamorgan Free Press*, 2 September 1893.

⁵² Although the illustration in a newspaper cartoon suggests there was a play on words, the fish representing a 'scale-y' dinner. See the *Illustrated London News* cartoon in Appendix 3.

⁵³ Gwyn Thomas, *A Welsh Eye* (London, 1984), p. 21.

festival atmosphere to some of the processions. Martial music was perhaps unsurprisingly the most popular form of music played: 12000 men marched through Blaenavon to the strains of 'See the conquering hero come', and 'Men of Harlech' and the 'Soldiers Chorus' from *Faust*, were also repeatedly heard. But these were interspersed with popular musical hall tunes, to which the marchers sang along 'in lusty, practised voices'. The words of some of the songs were adapted to the immediate circumstances. 'Skewen' had a rather less exotic ring to it than 'Monte Carlo' but the 'independent air' of the marchers no doubt matched if not excelled that of 'The Man who Broke the Bank'.⁵⁴

The noise, however, also served to warn of the procession's approach and where a pit was being targeted it could prove quite intimidating. William Harris of Bargoed, remembered a group marching on the George Pit, near Brithdir:

... but they heard they was coming, and they went from work. ... but news came that this gang was coming, bands with them there. Brass bands going like blazes and they walked to Darren but when they got there everything was placid. [When asked if the village was frightened on hearing the gang's approach he replied] Oh, definite, definite. Well, you have four hundred bloody men going mad, you could say, then you'd be frightened too butty, but everything went off peaceful ...⁵⁵

Indeed, even when there was no band, the processionists always made sure they were heard as well as seen. Often groups would shout out the names of miners' leaders and Federationist men as they marched, hooting and cheering accordingly, and police were often on the receiving

⁵⁴ *Cambrian Daily Leader*, 22 August 1893. 'The Man Who Broke the Bank at Monte Carlo' was published the previous year and was one of the most popular contemporary songs. Its inclusion in the strikers' repertoire is not necessarily an indication that the strikers were English, but is more likely evidence of the extent to which Welsh culture was becoming linked to the wider British culture. However, an editorial in *Tarian y Gweithiwr* argued that the fact that music hall songs and not hymns were sung during the processions was proof positive that the troublemakers were foreigners. The Welsh, it was claimed, knew nothing of the music hall; *Tarian y Gweithiwr*, 24 August 1893. For a discussion of music in Victorian Wales see Gareth Williams, *Valleys of Song: Music and Society in Wales 1840-1914* (Cardiff, 1998).

⁵⁵ Keen & Keen, 'The Coal War in South Wales, 1893', p. 47.

end of howls of derision. Following the meeting at the Rocking Stone on 14 August, a large group of young miners processed around the town centre, making the main thoroughfares impassable and hooting at various shops as they went on their way. It seems likely that this was a special targeting of the 'shopocracy'. There had been a note of anger at the Rocking Stone meeting when it was learned that Rhondda shop owners had vowed not to give credit during the strike and a man distributing advertising leaflets for a local grocer was unceremoniously removed from the Common at the start of the meeting.⁵⁶ The noise, however, was not just a way of attracting the attention of spectators but was also a useful way of coordinating action. During a march to Maerdy, the strikers' repeated hooting was sent up 'in the hope of attracting a response from a similar body of strikers who were expected to join them en route'. The men would stop periodically to call out to other strikers, to make sure that they were on their way.⁵⁷

Processions then were an essential means of communicating the message of the strike to the public and of extending and maintaining it amongst the workforce. They were as a result always concentrated on the main access routes along the valley floor, although short cuts were often taken across the hills to reach rendezvous points. One consequence was the men found that they had to walk considerably greater distances than would otherwise be the case. And, as will be seen in the next section, both the need to ensure that their action was public and the distances which they had to cover were to have a major influence on the outcome of the strike.

Third Phase – 'Defence and the collapse of the strike'

In spite of the claims of many processionists that marches were for example rather than intimidatory purposes, there were clearly a number of pits which were closed as a result of force rather than conviction and where, if left alone, the majority of men would quickly return to work. 'Yes, yes,' admitted one Swansea miner, 'come out quietly when we can't work, and

⁵⁶ *South Wales Daily News*, 15 August 1893.

⁵⁷ *South Wales Echo*, 15 August 1893.

work again when they [the strikers] leave us. That is the easiest way to settle it.⁵⁸ The uncertain nature of the support for the strike meant, then, that a huge amount of energy had to be expended by the strikers simply ensuring a sufficiently disruptive level of pit idleness. Again the terrain was to play a part. Repeatedly throughout the early weeks of the strike, gangs of men were spotted in the hills surrounding potentially disloyal communities, keeping an eye out for any changes in the valleys below. The hillsides were ideal vantage points because the whole sweep of a valley could be taken in within a very short distance. This allowed the strikers to keep a regular eye on developments, to respond quickly if there was any sign of a return to work and to target the key locations. Figs. 19.1 & 19.2 demonstrate that just under a mile needed to be walked along the eastern ridge overlooking the Ebbw valley to keep an eye on pits that were over three miles apart. Moreover, the hills were useful for sending messages. There were frequent newspaper references to the men using flags to signal from one hill ridge to the next, presumably arranging the next move or passing on reports on the working status of pits.⁵⁹ This method of communication reduced the necessity of face to face meetings and meant that information could be conveyed quickly over great distances. The men's own visibility on the hillsides also worked in their favour since it meant that the people in the valley below were made aware of their presence. There is evidence that the mere sight of gangs moving around on the hills created a degree of nervous tension in communities which was enough to discourage the men from going to working. And, before the arrival of troops in the coalfield, rumours were current that the strikers were carrying revolvers, which helped to heighten the tension even further. Only the very bravest or most determined would venture out to work knowing that there were armed gangs watching every move. Control over the high ground therefore gave the strikers a distinct advantage over those confined to the valley floors.

But it was not simply that the hills provided a useful vantage point. What was equally important, as far as carrying on the strike was concerned, was that the hills were essentially habitable. Gangs were able to live rough for extended periods of time without needing to

⁵⁸ *Herald of Wales*, 26 August 1893.

⁵⁹ *Western Mail*, 26 August 1893.

return home for sustenance because, firstly, there was an abundant supply of water, and, secondly, there was plenty of wildlife which could be exploited. Again, there was little new or unusual in this behaviour: the strikers were simply drawing on customary practice. Robert Morgan remembered spending many days of his childhood in Cwm Clydach where there was 'a stretch of clear water with trout... There were woodlands, thick bracken, wild flowers, rabbits, birds, coal-dust-free grass'⁶⁰ Blackberrying and whimberry picking were common activities, with the fruit used to supplement diet or sold to supplement income.⁶¹ Hills were also, of course, home to sheep, and if a stray one just happened to wander across the path of a gang of strikers, well it was not really stealing, was it?⁶² All this meant that the men could cover longer distances and remain in other localities to help support those districts where the strike was vulnerable, or they could simply stay put in the hills to act as communicators or intimidators. But it also seems to have been a means of relieving some of the pressure on resources at home during a difficult time by reducing the number of mouths which needed feeding. Much of the 'hill-dwelling' was done by young single men, which might account, at least in part, for their higher profile during the strike. For some living rough was without doubt fun, a bit of a holiday, but it served an important purpose both for co-ordinating the strike and for helping families to withstand the attendant hardships for longer.

Strikers were, then, drawing on traditional practices and an intimate knowledge of the landscape developed in leisure times, but they also drew on skills that many had learned as soldiers. The militia were a familiar part of Welsh life, especially their bands which were often in attendance at social events, such as the opening of the 'People's Park', in Pontypridd in

⁶⁰ Robert Morgan, *My Lamp Still Burns* (Llandysul, 1981), p. 14-5.

⁶¹ *South Wales Daily News*, 18 August 1893.

⁶² One speaker at a meeting at Clydach Vale, arguing that it was better to stay on strike during the summer, joked they would survive better because 'there was on the mountain side the occasional sheep they could slaughter'; *South Wales Echo*, 17 August 1893. There were indeed numerous complaints in the newspapers about the 'mysterious' disappearance of animals; see, for example, *Central Glamorgan Gazette*, 1 September 1893. Lewis Jones also provides a fictionalised account of strikers luring a sheep into an abandoned drift mine; Lewis Jones, *Cwmardy: The Story of a Welsh Mining Valley* (London, 1983), p. 209.

1891.⁶³ Plus, the South Wales coalfield was a favourite region for recruiters as there was always a steady supply of young men who were for the most part very fit.⁶⁴ Edmund Stonelake recalled how the Recruiting Sergeant would do his rounds on pay day and secure a good haul of new volunteers. Admittedly, according to Stonelake, a lot of the men who signed up were barely sober at the time and the attraction was more the lure of a shiny shilling and the six pints of good beer it could buy than the honour of serving Queen and country.⁶⁵ But South Wales was clearly fertile ground and one newspaper pointed out that ‘the Volunteers in South Wales, the majority of whom are miners, are all “on strike.”’⁶⁶ Strike periods themselves were often fruitful recruitment periods for the Volunteers and the Regulars and 1893 was no exception. The *Cambrian* noted that: ‘Numbers of fine, strapping, well-grown young Welsh miners, finding that the regiment [the Grenadier Guards] wanted men, have preferred earning their pay in the Queen’s service to loafing about idly on strike pay.’⁶⁷ But it was the skills the men learned in the army which were significant.⁶⁸ They learnt the proper methods of attack, how to watch their flank on both the offensive and defensive, how to control small divisions, the proper methods of advancing in loose order, the use of bugles, as well as shooting.⁶⁹ In addition, while training often took place in the Vale of Glamorgan, the historic maps show the extent to which the coalfield itself was used for training. Several rifle ranges had been established within the coalfield by the mid 1880s, such as those close to Tredegar, Aberdare, and above Cefn-Coed-y-

⁶³ *Pontypridd Chronicle*, 8 May 1891. For recent studies of the role of the volunteers and regulars in Welsh life see Paul O’Leary, ‘Arming the Citizens: the Volunteer Forces in Nineteenth-Century Wales’, in Matthew Cragoe & Chris Williams (eds.), *Wales and War: Society, Politics and Religion in the Nineteenth and Twentieth Centuries* (Cardiff, 2007), pp. 63-81; Neil Evans, ‘Loyalties: State, Nation, Community and Military Recruiting in Wales, 1840-1918’, in Cragoe & Williams (eds.), *Wales and War*, pp. 38-62.

⁶⁴ *Western Mail*, 1 May 1869.

⁶⁵ Anthony Mor-O’Brien (ed.), *The Autobiography of Edmund Stonelake* (Bridgend, 1981), p. 25.

⁶⁶ *South Wales Daily News*, 15 August 1893. A reporter in the *Western Mail*, 22 August 1893, also commented on the success of the recruitment sergeant.

⁶⁷ *Cambrian*, 25 August 1893.

⁶⁸ Note the reference to ‘military experience from the Great War’ used by strikers in the interwar period in Hywel Francis & David Smith, *The Fed: a History of the South Wales Miners in the Twentieth Century* (London, 1980), p. 65.

⁶⁹ *Western Mail*, 24 March 1887.

Cymmer near Merthyr.⁷⁰ So the volunteers trained within their own locality. It is clear that some of the methods of organising and promoting the strike were adapted by the strikers from their military experiences. The use of signalling has already been noted, but there were occasions when the men of Garw co-ordinated activity using bugle calls and the precision and order of marches owed a lot to the discipline imposed by old soldiers. The Skewen to Neath march was conducted by a collier who proudly displayed his medals on his chest.⁷¹

With the arrival of extra police and especially the introduction of regular troops in South Wales, from the middle of August onwards, however, the whole strike began to take on a different complexion.⁷² The attitude of the authorities in introducing the military was particularly galling for the strikers as they had been careful to pledge themselves to keep the peace and stay within the law at almost every public meeting held, including the Rocking Stone meeting. There is, indeed, very little evidence of any attempt at violence or sabotage directed at colliery property in the first two weeks of the strike, in spite of the persistent rumours in the newspapers. The troops' presence could then only be interpreted as a deliberately provocative measure and certainly many observers, even those otherwise opposed to the strike, argued that the move could only incite trouble where none had yet existed. Their introduction, therefore, tipped public sympathy in favour of the strikers, but it brought a change in control over the landscape and communication networks which required the strikers to adopt more defensive and evasive measures which were more difficult to sustain.

Ironically, it was the very determination of the strikers not to cause any disturbance or illegal act which led them into confrontations with the troops or police. The immediate consequence was the closing down of public spaces by the authorities. As was noted earlier, mass meetings

⁷⁰ OS First Rev. Ed. 1:10,560: Tredegar (so10ne, 315050/209509), Aberdare (sn90se, 299178/201970), Merthyr (so00nw, 302814/208664).

⁷¹ *Cambrian*, 25 August 1893.

⁷² For a discussion of the role of police in strikes see Jane Morgan, *Conflict and Order: The Police and Labour Disputes in England and Wales, 1900-1939* (Oxford, 1987).

were important not just for miners to confer with each other, but to present their arguments to the wider community. However, open spaces, such as parks or playing fields, where such public displays could be conducted, were of a premium in the valleys because of the lack of flat land. By the end of the nineteenth century, public parks were still few and far between in the coalfield but they had become increasingly amenities to aspire to as they were symbols of gentility and civilization. Even though Pontypridd had the Common, there was a great deal of agitation throughout the 1890s for a 'proper' park, which many Pontypriddians felt was essential if the town was to be taken seriously as a respectable civic centre.⁷³ Parks were places for genteel and civilised recreation and consequently behaviour there was carefully controlled and monitored. The local authorities, many of whose members were linked to the coalowners, had the final say on which type of activity they considered acceptable for their public spaces. The meeting at the Corporation Field in Neath could only be held with the permission of the Mayor, and it came with the proviso that the demonstrators allow reporters and the police to be present. The arrival of the troops and the increase in the police presence allowed the authorities to begin closing down some of these public spaces completely. When the processionists attempted to enter the town park at Aberdare they found the gates locked and their way barred by the military.⁷⁴ Similarly processionists were refused permission to use the public field in Swansea.⁷⁵ Both these important centres of coal production were largely opposed to the strike but the cutting off of access to them ensured that the strikers could not take their message to either workers or the general public. There was no chance, then, that the pits in these localities could either be persuaded or forced to strike work and their continued operation severely weakened the position of the strikers. The processionists' exclusion from public space also served, figuratively as well as literally, to set the strikers outside respectable and proper society and thus undermined the justice of the strikers' claims.

⁷³ *Pontypridd Chronicle*, 3 April 1891.

⁷⁴ *Aberdare Times*, 2 September 1893. Meetings in public parks were especially important in towns where the class make-up was more complex and where there were, therefore, 'neutral' observers who needed to be won over.

⁷⁵ *Cambrian*, 1 September 1893.

A similar problem for the continuation of the use of processions was linked to the narrowness of the valley floors. There were a few places where the valleys opened up to provide reasonable expansion and the development of more complex settlements, but there were also a number of places where valleys became very narrow indeed. At various points along its length, the Rhondda Fawr for example, is barely a quarter of a mile wide. The necessity of locating pits in the valley floor to access the deep seams, and the concentration there of the industry's support infrastructure such as railways meant that in some places important thoroughfares had to pass through colliery property. At Mountain Ash, for example, the crossing over the railway went through the yard of Nixon's Navigation Colliery; it was an established and accepted right of way. On Friday 18 August, however, colliery officials, supposedly for the better protection of the company's property, gave instructions that the crossing was to be closed and police were located there to prevent anyone passing through the colliery yard. When the decision became known, hundreds of strikers gathered at the spot to protest and as darkness set in they began hurling stones at the police, who responded with a baton charge.⁷⁶ The closure of the path did not completely cut off access to the upper part of the valley, since the main road ran alongside the pit, but it did upset the normal flow of movement from one side of the valley to the other. Furthermore, the removal of customary rights was clearly intended as a reminder of the authority and power which came with land ownership in the valleys and the closing of Nixon's Crossing was only the first of a series of attempts by the coalowners to disrupt the activities of the strikers in which the landscape seemed to be complicit.

As August wore on, rivers became a problem for the strikers with bridges becoming increasingly sites of conflict with the authorities and military.⁷⁷ In the period prior to industrialisation most of the movement through the coalfield had been across the hills. This of course provided the

⁷⁶ *Western Mail*, 21 August 1893.

⁷⁷ The Mayor of Swansea attempt to prevent a march on the Copper Pit by heading off the procession at a bridge, claiming by-laws prevented large congregations entering the borough on the other side; *Western Mail*, 24 August 1893; *Cambrian Daily Leader*, 24 August 1893; *Glasgow Herald*, 30 August 1893.

network of hill paths which the strikers regularly exploited. But one negative consequence was that there were few bridges built across the rivers in the valleys below and those that were built were often wooden and frequently in poor repair. By 1893, many of the better, more substantial, valleys' bridges had been built as a result of the expansion of the iron or coal industries and the railway network and were as a result, technically, privately owned. Some of the potential significance of this for the strikers can be illustrated by an account of the march on Merthyr Vale, which the newspapers recorded in detail.⁷⁸ Early on the morning of 18 August a gang of several hundred men set out from the head of the Rhondda Fawr towards Pontypridd and on to Cilfynydd to join up with the Albion men. They passed through Treharris, making sure that pits there were 'healthy', and headed on for Merthyr Vale. But as they approached the colliery they realised that the main road ran up the valley on the right hand side of the river, while the colliery and its associated village lay on the left hand side. The only way of crossing at this point was a bridge which spanned the Taff Vale Railway and which carried a disused tramway into the colliery yard. When the processionists reached the bridge they found that thirty five policemen, drawn from county and Cardiff forces, had been stationed there in readiness.

The newspaper reports suggest there was a brief hesitation on the part of the strikers. They could quite easily have forced their way passed the policemen who they greatly outnumbered. However, it became apparent during the course of a somewhat strained discussion that the bridge was privately owned.⁷⁹ The men, who had vowed at the Rocking Stone meeting to keep the peace and maintain order, were now in a difficult position. They could not proceed without violating their pledge and breaking the law, but to delay would mean that they would not arrive at Merthyr Vale to meet with the men on their way to work. Forced to a decision, the strikers

⁷⁸ See, for example, *South Wales Echo*, 18 August 1893.

⁷⁹ A number of women at Gelli were prosecuted for intimidation. In their defence they argued that the bridge they had picketed had been built jointly by the workmen of Gelli Colliery and local tradesmen and the man they had refused to allow across had not subscribed towards the sum for its construction; *Western Mail*, 4 September 1893.

left a contingent at the bridge to meet with any workmen attempting to cross there, while the rest of the processionists carried on up the valley to another crossing two miles higher at Troedyrhiw. This added nearly an hour to the journey and meant that the strikers did not arrive at the target pit until seven o'clock, by which time the workers, it was assumed, had already gone down and the chance to solicit support from the Merthyr Vale men, and to prevent another day of coal production, was lost. As it turned out, it was found on arrival at the pit that news of the intended march had reached Merthyr Vale in advance and a decision had been taken the previous day not to work on Friday. A subsequent meeting was held with the Merthyr Vale men on Aberfan Field at which they agreed to join the strike.⁸⁰ But while the march was not a complete failure as far as the ultimate goal that day was concerned, it does demonstrate how easy it was becoming for the authorities to interfere with the strikers' activities by closing down access routes.

It also suggests that rivers rather than hills could present a more serious barrier to movement and communication. Crossing the hills required an expenditure of effort but they did not represent an insurmountable obstacle. Rivers, on the other hand, were not such an easy proposition. There were places where the rivers were could be forded but they were few and by the 1890s even rivers like the Afan which flowed through comparatively low population areas were so heavily polluted that most people would have thought twice about wading through.⁸¹ The strikers were therefore dependent on bridges, for both formal processions and informal movement, and if these were closed to them, east-west progress across the coalfield became more difficult. Instead of having communities separated from each other by hill ridges, the rivers actually sliced individual communities in half, dividing the valley down the middle. Communications under these circumstances were potentially easier with the neighbouring

⁸⁰ *South Wales Daily News*, 19 August 1893.

⁸¹ The river at Porth had had so much rubbish dumped in it that the bed of the river had been raised by several feet; *Pontypridd Chronicle*, 6 November 1891. See also Jack Jones's memories of the Morlais Brook; Jack Jones, *Unfinished Journey* (New York, 1937), pp. 16-18.

communities on the other side of the hill ridge, than with the section of the same community which lay on the other side of the river.

The arrival of troops therefore allowed the authorities to control activity in the built environment. But, more seriously for the strikers, they also began closing down activities on the hillsides too. Within a matter of days, the anti-strike side had their own 'pickets' posted along the hill ridges and a sophisticated network of communications was set up between the high ground and the valley floor.⁸² Around Maerdy, men from the colliery were 'stationed upon the neighbouring hills with torches to notify the approach of the strikers, and should any arrive the police will call up the military'.⁸³ The groups of fifteen to twenty men which were stationed in the Aberdare and Rhondda hills 'which command a view for miles around' had 'a perfect system of signalling, and rockets are in readiness'.⁸⁴ Not only was it progressively more difficult for the strikers to keep a close eye on the pits but their own movements were now readily known by the authorities. Special trains were kept in readiness to convey troops and police to where they were needed to cut off processions or prevent meetings.⁸⁵ The troops were also armed. Even if a handful of strikers did have revolvers these were no match for bayonets and rifles, particularly in a terrain like the valleys. 'An amusing story' indicative of the problems the strikers now faced was told by a *Western Mail* correspondent. A gang of about forty encountered one picket on the hill ridge holding a flag. In the valley below the infantry were clearly visible. The picket warned the strikers that the dropping of the flag would mean their being shot dead. Needless to say, they did not hang around to put this claim to the test.⁸⁶

With the hills increasingly in the hands of the 'enemy' the use of flag signalling had to be limited. This coupled with the fact that the military had access to both telegrams and

⁸² In the 'paper reports of 1893 the term 'pickets' was more often used to describe those protecting workers than those preventing workers from going to work.

⁸³ *Western Mail*, 21 August 1893.

⁸⁴ *Western Mail*, 22 August 1893.

⁸⁵ *Cambrian Daily Leader*, 19 August 1893.

⁸⁶ *Western Mail*, 23 August 1893.

telephones meant that the strikers were severely disadvantaged as co-ordinated action became more and more difficult to arrange. It is not surprising that the telegram wires and poles were the primary, in truth the only, real targets of sabotage.⁸⁷ It also meant that the strikers had to fall back on the use of the crier or bellman to disseminate information throughout the community. But this again could pose problems. The crier could be instructed to deliberately avoid certain parts of the community or some communities so that opponents did not know about meetings. The spreading of false information via the crier was also used occasionally by the strikers. An attempt was made to deceive the Bwllfa and Nantmelyn men living in Aberdare into staying away from work. The crier was sent out with a bogus message to the effect that there would be no hauliers in work on Wednesday with the result that a number of Aberdare men stayed home the following day.⁸⁸ However, the same tactic could be used against the strike. Hauliers returned to work at Cyfarthfa but 'did so under a misapprehension caused by a deceptively constructed proclamation of the town crier'.⁸⁹ With other means of communication being cut off from them, it was difficult for the strikers to know exactly what was going on and who was telling the truth. The confusion this generated began to eat away at the little solidarity the strikers had managed to forge.

All these various elements, the use of the hills for observation and messaging, the closing down of routes through the valley floor, the sending out of false information, combined together on 22 August to deal the fatal blow to the strike. There had already been a violent clash between strikers and Ebbw Vale workers on 12 August when the first lot of processionists attempted to persuade the men out.⁹⁰ They had, on that occasion, been met with open hostility and unceremoniously sent packing. There was a huge level of resentment at this action and a greater determination that the town would be brought in line. It was in any case essential if the strikers were to exert any real pressure on the coalowners that Ebbw Vale should be brought to

⁸⁷ *Merthyr Express*, 26 August 1893.

⁸⁸ *Aberdare Times*, 26 August 1893.

⁸⁹ *Western Mail*, 24 August 1893.

⁹⁰ *South Wales Argus*, 12 August 1893.

a standstill. The Ebbw Valians, on the other hand, were determined to stand out against the pressure, but in the days following the clash, groups of strikers were seen moving about the hills evidently preparing their next move and tension within the town began to mount. They knew another attack would come, probably involving greater numbers than on the previous occasion, but no one quite knew when. Hundreds of special policemen were appointed, identified by a white arm band.⁹¹ The workers, men and boys, steelworkers and colliers, were armed with sticks. As a precautionary measure access into the valley was blocked by troops stationed at the entrance. According to one account written a year later, scouts on horseback were set in the hills all around Ebbw Vale. They had been told that when they saw the mob, they were to rush to the fire station and sound the alarm. When the alarm was heard every man in work was to down tools and aid the military and the police to keep the mob out.⁹²

The first step in the attack on Ebbw Vale was actually taken by the women of Brynmawr who ensured that movement out of the valley was a dangerous prospect. On the previous Saturday, the women of Brynmawr furious at the treatment their husbands had received on the twelfth had forcibly blockaded access to the market.⁹³ Neither housewives nor hucksters were allowed out of Ebbw Vale to Brynmawr to buy or sell – those that made the attempt were pelted with fruit and howled out of town. So successful were the women in getting their message across to the Ebbw Valians that the local board of trade at Brynmawr began complaining about the effect on local shops.⁹⁴ All of a sudden, Ebbw Vale found itself in an effective state of siege.

The plan of the strikers was then to have two co-ordinated processions, one from the east and the other from the west which would meet at central place and march together on Ebbw Vale. The Rhondda men were to set out the evening of 21 August.⁹⁵ That night a large crowd gathered in anticipation at the Cymmer Bridge, Porth, the expected rendezvous, at 9.30 pm. By

⁹¹ *South Wales Argus*, 14 August 1893.

⁹² H. Joshua Phillips, *History of the Ebbw Vale Works and Collieries* (Unpub. MSS, 1894), p. 13.

⁹³ *South Wales Argus*, 12 August 1893.

⁹⁴ *South Wales Weekly Argus*, 2 September 1893.

⁹⁵ The events were covered in detail in all the dailies. See *Western Mail*, 21 & 22 August 1893.

10.30 pm there was still no sign of any procession, although a number of small groups, each of no more than a couple of dozen men were seen heading in the direction of Pontypridd. Everyone was in a state of high alert, 'Morien' preparing himself with his usual enthusiasm for the duties of 'war correspondent'. There was though huge disappointment and some hilarity when eventually a group was seen approaching the town. The expected intimidating invasion force was little more than a ragged collection of youths and boys, described as 'straggling groups of scarecrows' led by a youth known as 'Mother Lee', who was described euphemistically as having been recently released from 'a large institution at Cardiff'. Morien was delighted and confidently predicted that the night would end in farce. Within short time, however, it became apparent that vast majority of processionists had been aware that the military intended to stop them at Pontypridd, so they had taken a different route, across Llanwonno mountain to Quakers Yard. 'It now appears,' Morien was forced to confess in a telegram, 'that the sending of youths through Pontypridd was a dodge with a view to mislead the authorities.' There was momentary panic and the authorities rushed to reorganise the troops, the Hussars leaving Aberaman promptly for Merthyr in an attempt to intercept the marchers.

While the Rhondda men were playing hide and seek with the military in Glamorgan, in Monmouthshire the men from Blaenavon and Blaina were getting ever closer to their target. But now the picketing of the hillsides was about to pay off for the Ebbw Valians. About three thousand men, apparently armed with clubs, pikes, iron bars and 'other formidable weapons', were spotted while still a few miles outside the town.⁹⁶ The alarm was sounded and the Ebbw Vale men collected their heavy sticks and rushed out to meet the approaching mob. There was a violent and protracted clash on the hillsides overlooking the town, fists, sticks and stones flying all in all directions. The 'invaders', outnumbered and caught by surprise, were sent bloodied and bruised back to where they came from.

⁹⁶ Phillips, *History of the Ebbw Vale Works*, p. 14.

At the same time the expected mass march of Glamorgan men was grinding to a halt. For all their careful planning and use of 'short cuts' over the hills, the necessity of daily marches through the valleys and night time surveillance were beginning to take their toll on the strikers. In the first flush of enthusiasm the huge distances demanded by the shape of the coalfield seemed to have exhilarated the marchers more than tiring them, but the cumulative effect of days on the road in unusually hot weather meant that many Rhondda processionists were forced to turn back well before reaching the rendezvous points due to sheer fatigue.⁹⁷ The turn-out was in any case already reduced, the newspapers speculating that rumours of armed troops ready to fire at the first signs of trouble had led many wives to persuade their men folk to remain home.⁹⁸

But the final blow to the proposed march was delivered by a sudden and dramatic turn in the weather. There had been those at the outset of the strike who dismissed the strikers' complaints as an excuse to get a few extra days of holiday while the sun shone. Nevertheless, the importance of climate should not be simply dismissed. The weather was always a factor which had to be taken into consideration in decisions to strike. In 1893 the unusually good summer was seen initially as a sign of divine support and prayerful thanks were offered.⁹⁹ There was, too, real opposition to the proposal to return to work in order to give the legal month's notice because this would push the strike further into the winter months. A Garw man pointed out that if they were going to starve it was best to do it during the summer not in the winter when they would have to deal with snow, sleet, wind and rain.¹⁰⁰ When the Plymouth

⁹⁷ Some men must have been covering distances of well over twenty miles a day. The march on Merthyr Vale referred to earlier began at the head of the Rhondda Fawr and involved a ten mile walk to Pontypridd, followed by a twelve mile trek to Troedryhiw before the marchers doubled back another two miles to Merthyr Vale. Many of the men on the procession had already walked at least six miles from the Ogmore and Garw Valleys to reach the Rhondda Fawr rendezvous in the first place. And then there was the journey back home!

⁹⁸ *Pontypridd Chronicle*, 25 August 1893.

⁹⁹ Newspaper reporters kept a close eye on the weather during the strike, noting that any change could alter the outcome of the action; *South Wales Echo*, 21 August 1893.

¹⁰⁰ *South Wales Daily News*, 11 August 1893.

Collieries came out in January 1891, the *Western Mail* commented that a strike taken in mid-winter was not taken casually: 'only a very deep conviction that they are in the right could possibly actuate fifteen hundred men to face the ordeal of a strike in the very depth of an unusually severe winter'.¹⁰¹ The timing of a strike could thus reinforce the message and draw in public support but this had to be carefully weighed against the extra hardships it entailed. But coalfield weather, because of the terrain, was always unpredictable. Rain started falling early on the evening of 21 August. It soon became torrential, turning the ground sodden and streams into torrents. Great gusts of wind added to the problems and made hill climbing difficult. The hills could be dangerous at the best of times especially when trying to pass during night. One hundred and fifty men lost their way in the dark on Llanwonno Mountain, getting briefly stuck in a bog, during an earlier march to Merthyr Vale.¹⁰² By the time the Rhondda group reached Merthyr they numbered only 250 and by Dowlais only a handful remained.¹⁰³

The failure to bring out Ebbw Vale marked the beginning of the end of the strike. Maerdy remained resolutely opposed and those areas where support had always been muted began to drift back to work. There were simply not enough strikers to cover the ground and ensure the continued inactivity of pits. The momentum swung briefly westward, focussing on the Swansea region but by this time the troops were well established and organised enough to be able to close down formal and informal movement across the landscape quickly. The strike stalled at Neath. By the end of August the strike was pretty much all over, in spite of the determination of the Nantymoel men to stay out. The presence of troops and access to more modern modes of communication meant that the authorities could target key areas and prevent the men from reaching working pits. And the landscape, which had facilitated the strike at the beginning, appeared gradually to collude with the coalowners in the closing down of the strikers' main avenues of communication.

¹⁰¹ *Western Mail*, 1 January 1891.

¹⁰² *Merthyr Express*, 26 August 1893.

¹⁰³ *Western Mail*, 22 & 23 August 1893; *Cambrian*, 25 August 1893.

In spite of the long held belief that the shape of the South Wales coalfield created problems for communication, there is no evidence of any feeling that the landscape represented a problem. It was the unwillingness of the various groups within the workforce to join forces rather than the valleys' structure which was seen as the main barrier to coalfield co-operation.¹⁰⁴ In the initial stages of the strike the landscape indeed was a useful weapon in the strikers' armoury, providing them with a vantage point from which to co-ordinate action, observe the activities of the 'enemy', intimidate the vacillating and escape reprisals. The message was spread quickly and influence gained because of the presence of hills and valleys. But the landscape could just as easily be used against the men. The arrival of the troops in the coalfield led to the loss of control of the high ground, restricting movement from valley to valley and cutting the men off from their main means of communication. Without access to the hills the men could not exert any pressure on or control the behaviour of those in the valley floor. And as access to the valley routes themselves became limited there were fewer and fewer opportunities for the strikers to share their message with their fellow miners. An already faltering action was swiftly brought to an end with the loss of control of the landscape.

The nature of the terrain clearly had to be factored in to the planning and organization process. The familiarity with the landscape displayed by the strikers suggests that those co-ordinating the action were not strangers to the region. Processions especially needed to be carefully timed and could only be organized effectively with a good level of local knowledge of routes and terrain. The choices that were taken, therefore, were fully informed and shaped by the specific physical environment the strikers were faced with; actions arose as much out of practical considerations as they did from ideological ones. Moreover, it might be argued that the tactics employed by the strikers could not have worked in a different, flatter terrain. Nor does it seem likely that an area as extensive as the South Wales coalfield could have been

¹⁰⁴ *South Wales Daily News*, 18 August 1893.

brought so quickly and so effectively under control by such a comparatively small number of troops, rifles or no rifles. The landscape did not of course choose to support one group over another nor did it actively participate in events, but it was much more than just the backdrop against which the action was played out. Both the course and the outcome could have been significantly different in different topographical circumstances. The hills and the valleys, therefore, played a vital role in the 1893 strike.

CONCLUSION

‘[A] more futile and foolish strife has never before occurred in the South Wales coalfield’ was how the writer in the *Central Glamorgan Gazette* described the events of August and September 1893.¹ It is an assessment some historians might agree with since did not represent any major step forward in terms working class organisation, it barely dented the sliding scale, and did not even bring about the much needed pay rise. The owners refused to budge and they threw all the forces available to them at the strikers to bring the strike down. Even the weather seemed to turn against the men at the very worst time. The men eventually shuffled back to work, heads bowed, disillusioned, frustrated, hungry and defeated. It was not a strike serious enough to galvanise the men into further action nor heroic enough to warrant a central place in the annals of great industrial actions. It was, as best a mistake, at worst simply a waste of time.

The real significance of the strike for historians is however the glimpse it provides of the fractures and fault lines hiding just beneath the surface of Welsh society but also of a nascent identity struggling to form. The coalfield was riven along occupational, ideological, ethnic, linguistic and generational lines. Tensions existed between the poorly paid day-wagers and the higher earning piece-workers, between those who looked to the Federation for answers and those who preferred the familiar comfort of the sliding scale, English and Welsh, English-speaking and Welsh-speaking, young and old. But while these clearly divided the society, they did not divide the strikers. Men of different occupations, men of strong opinion and those of unformed thinking, men of all nationalities and linguistic competencies and, those of all ages marched across the coalfield, protesting and demanding a twenty percent advance. For all the tensions these were not the divisions which turned the men against themselves.

Whether the divisions can be blamed on other forces and what those forces were is less easy to establish. Different rates of pay, different working and trading conditions, different levels of productivity certainly created different experiences of mine working and perhaps

¹ *Central Glamorgan Gazette*, 8 September 1893.

contributed to different attitudes to strike action. The varying rates of accidents too may have made some communities more sensitive to the injustice of low pay at times of big profit. These are differences which are difficult to quantify but they are differences which need to be understood to fully explain the mixed reactions to the events of 1893. Moreover, they need to be understood alongside evidence that mining was not the only industry in the coalfield, and that coal, though of pre-eminent importance, was not the sole produce. The continued presence of metal industries in the late nineteenth century acted as a barrier to the formation of workforce identity across the whole length of the coalfield. For metal working regions, regions with longer histories and older communities, the choices were more complex as the potential costs were greater. Issues of organisation or pay had to take on a far more serious aspect than they possessed in 1893 to warrant action here. And the miners' actions must be measured according to the decisions they faced not measured against the behaviour of men elsewhere. They cannot be fully understood or appreciated otherwise. The very different responses apparent in 1898 also need to be reassessed in the light of the evidence from 1893. What had changed in just five short years to bring about such a shift in attitude? A clearer understanding of 1893 can provide a better context and draw attention to new questions that can be used about later developments.

The strike too affords the historian the opportunity to see the conduct of a strike in close detail. The landscape so often blamed for separating the workforce into insular communities, played a vital role in spreading and maintaining the message of the strike. Hill tops offered vantage points for sending messages, for observing the valley floor and for shorter routes from place to place. But the indifference of the landscape to the events being played out on it meant that it could be used against the men as much as they could use it. The control of the higher ground and of key access points in the valley floors by the troops meant that the men were indeed cut off from each other. Unable to co-ordinate action or to keep in line recalcitrant workers, they could not hope to keep coal production at a standstill and without that leverage the strike had no chance of success. The landscape therefore was a barrier but not quite in the way that has been imagined.

It is necessary to return to the matter of whether an interdisciplinary approach was worthwhile for an historian to adopt and answer the question of what was learned about the history of the South Wales coalfield that could not be learned from a more straightforward archival, document based study. To do that we must therefore return to some of the points raised at the beginning of the thesis and discuss the challenges that have been faced. The extent to which the approach has provided new perspectives on coalfield society, challenged long held interpretations and opened up new avenues of research will also be assessed.

It was, as expected, a time consuming process learning the basics of both geology and GIS. It was necessary to understand each well enough to form an opinion about what is useable in each and how the different insights change historical perspective. This involved a lot of reading around the subject and consequently left less time for archival research, although to certain extent this has been offset by the greater availability of documentary sources in digitized form and accessible via the internet. But in both cases the time spent in becoming familiar with what each discipline had to say was well worth the effort. It helped to shape thoughts not just about the strike but about the South Wales coalfield generally, opening up new ways of seeing the world and generating new questions. Geological insights were probably the easier of the two to adapt to. Once through the technical language, the basic story of the coalfield is relatively simple to understand. The implications for the historical actors is more difficult to draw out but once you start looking it is one of those topics which seems to open out into an almost limitless range of avenues for research. The encounter with geology revealed how little is known in detail about the impact of the landscape and the structure on the human experience of the South Wales coalfield. This project has just scratched the surface, so to speak, and has probably raised more questions than it has answered.

It has certainly raised a number of issues that would repay further research. There is still more to learn about the impact of the variations in the coal industry, both in terms of working conditions and modes of operation, so that it can become possible to quantify the extent to which these divisions really were problematic for people. It is impossible to fully

assess periods of co-operation if we do not fully understand all the forces acting against the workers. There is also more that needs to be known of the influence of accidents on workforces and their related communities, for example. And there are the various themes raised in Chapter One which were barely touched on in the case study about the use of geological knowledge in social evolution and class struggles.

Indeed, it has become clear that the fear of falling into geological determinism has meant that historians have ignored a vital part of human experience. To ignore the influence of environment in its broadest sense is to remove the context in which decision-making takes place – it is a removal of part of the equation. Environment and geology are part of people's work and daily life experience, not something which occurs in the background disconnected from their lives. It is something that impacts on choices and is shaped in turn by human action. Study of the role of the landscape in 1893 strike has raised doubts about the way historians have represented coalfield life in the past. There has been a tendency to be overly negative about the valleys structure, to see it as stunting the development of Welsh working class identity and cutting the region off from the outside world. Too often the landscape is dismissed as an irrelevant or unfortunate phenomenon over which humans had no control. Yet it clearly played a large part in the social life of workers and became an integral part of industrial action. Its shape, terrain and extent had to be factored into tactics and timings. It set limits people had to negotiate, which they had to take into consideration and weigh against other factors. If history is about human choices these limits have to be taken into account when those choices are interpreted. Historians must then be sensitive to the landscape and need to understand all the considerations influencing behaviour, not just the political, ideological or economic ones.

Discussion of the use of the landscape also raised a number of questions it was not possible to explore in any detail. It was clear that the landscape was not an unchanging backdrop to life. It varied with the seasons and especially with the weather. In addition, reaction to the landscape was personal, it was shaped by background, experience, age, and so on. How did people from the flat open countryside of parts of the west of England respond and adapt to the valleys? How did age and illness change people's perceptions? Did hills which were

exciting playgrounds in youth become oppressive as prison walls in old age?² And what impact did this change in perception of their environment have on the way people saw the world more generally, on their place within it and on religious or political beliefs? Did it have implications for way the people viewed the coalfield, the relationship of village to village, valley to valley, and their own place within it? It was briefly noted that hills could be dangerous places for women. The gendered nature of landscape is yet another thing we do not know enough about.

Using GIS was a comparatively more difficult process to adapt to not just because of the technicalities of the software, although there are enough challenges in that. GIS also provide a different way of looking at the world and it takes time to allow the shift in perspective to produce a solid shift in thinking and to produce new insights. Actually the way the GIS was used in this project was not the best way to first encounter the software. It is not a good idea to begin with a tool and then go looking for something to apply it to. It is far better to come to GIS with a set of data that needs looking at in spatial terms or a set of queries GIS has the potential to answer.³ Of course it is necessary to know something of GIS to know that it has the potential. This highlights the need for greater teaching of GIS at undergraduate level within history departments.

Moreover, the most time consuming aspect of the project was the creation of a geodatabase, which was at times a fiddly and frustrating process. There were a whole range of decisions which had to be made about the data, for example. The extent of manipulation varied according the format of the original source and in order to ensure a level of consistency in interpretation careful notes had to be taken. Even so, when handling information for over 1400 mines in the main database it was difficult to be absolutely certain that each one had been treated in exactly the same way. Furthermore, each new layer created several days, sometimes weeks of extra work. The fact that no maps were

² See the writings of Gwyn Thomas and accounts of life in South Wales by 'outsiders' such as Montagu Slater; Gwyn Thomas, *A Welsh Eye* (London, 1984); Montagu Slater, *Stay Down Miner* (London, 1936).

³ Compare this approach with the various projects described in Anne Kelly Knowles (ed.), *Past Time, Past Place: GIS for history* (Redlands, Cal., 2002), pp. 117-30.

available specifically for 1893 meant that layers such as the railway network layer and the metal works data had to be checked against other sources to be certain nothing was added anachronistically. One advantage of the database structure of GIS is that errors can be easily corrected and where there are doubts about accuracy they can be noted in a separate field. But there is such a multitude of anomalies and contradictions that the amount of time spent cross checking with sources cannot be exaggerated.

But for all the challenges of using a GIS again its use was worthwhile for a lot of reasons. Yes there are major problems with the availability of data (although this is not a GIS problem *per se* but a problem arising from using GIS with historical data sources) but the whole experience of collecting, organizing and collating data created a degree of familiarity which would not normally be gained. In part this was due to the need to convert raw evidence to a more useable format and this forces closer attention to what the sources are actually telling us and how it can be used. The process itself stimulates questions about the past, highlights anomalies, contradictions and blanks in our knowledge which only very close scrutiny can provide. So the very act of compiling and constructing a geodatabase was a useful part of the historical research process.

GIS use also introduced a new source of data. It cannot be emphasized enough that the extraction of the wealth of information about coal mines embedded in maps, such as those produced by the Ordnance Survey, is not possible on a scale that has been done here without the aid of computer technology.⁴ The range of information available is not just about location but also about alternative uses of the mine, that is whether they began life as ironstone or clay works, alternative names which helps the tracking of information in other sources, and a loose indication of whether certain mines were operating at a particular time. The geodatabase created contains information not available elsewhere, new

⁴ The best that has been achieved up to now is the list of mines produced by Ray Lawrence which provides invaluable information about the history of individual mines but which often provides only vague references to location; Ray Lawrence, *The Mines of the South Wales Coalfield* (Blackwood, 2005).

information, more accurate than other lists and potentially useable in whole range of other research projects because it is capable of endless adaptation and supplementing.

Again the process of interacting helped stimulate the imaginative process in a way texts cannot always do. Maps are a vivid reminder that human life is not compartmentalized in the way it tends to be in the historiography. Everything in coalfield society was interconnected. The pits stood alongside houses which were interspersed with chapels, hotels, pubs, schools, brickworks and bakeries, backing on to cemeteries and railway lines, and all were surrounded by hills and trees and rivers. The maps provided evidence of things that perhaps would not automatically have sprung to mind or be considered. For example, the frequent appearance of shooting ranges on the edges of towns and villages drew attention to the place of the volunteer army in communities (Chapter Seven). Maps, though by no means problem free, are an invaluable source of historical data but they are too often neglected.

GIS are especially good at raising questions about past human experience. Because they reveal the geographic extent of events or phenomena they highlight inconsistencies, anomalies as well as congruencies which can be easily missed on the written page. The strike maps were very revealing because they showed not just the mixed reaction of the workers, which was clear enough in the documentary sources, but identified areas of strong support, or strong opposition or indeed areas where people apparently were uncertain how to respond. Relationships and movements which are not apparent or significant in text form take on a different complexion when mapped. The strike maps drew attention to the things that needed to be explained, which needed to be looked at more closely. GIS do not always help answer the questions but they do help refine the questions, sending the historian back to the sources for further and more focussed explanation.

GIS use also broadened the range of questions that could be asked, questions which do not replace existing concerns nor which are incompatible with them. Rather they supplement research to provide a deeper, more nuanced, more all-embracing approach. Some issues are perhaps neglected by historians not so much because they are not interested in them

but because they have no means to deal with them. GIS use offered the opportunity to test for a range of invisible forces acting on and constraining human behaviour. Because often people are not conscious of these forces they leave little trace in the documentary sources. By reading data in a slightly different way, however, and analysing it geographically it is possible using GIS to test for links. GIS maps will not necessarily produce any startling results and no earth shattering discoveries have been made by looking at the 1893 strike. Although the maps produced here for testing for the divisive strength of rank of coal variations or differing experiences of accident rates suggested there was no correlation, a negative result is nevertheless a result and it does not mean that the questions were not worth asking nor that the result was not useful.

Because GIS can handle huge quantities of data it has also been possible to test ideas more fully. In the process the use of GIS has raised some doubts about long held beliefs. The output map, for example, undermines the argument that pits with low productivity were more prone to industrial action.⁵ The evidence of 1893 suggests the opposite was true. That particular map was problematic for a lot of reasons and many of the arguments about productivity relate to pits of the twentieth century when miners were strongly unionised and the power of the large coal companies was growing. But the map is at least a good indication of the contribution GIS could make to Welsh history as similar maps could be produced for the twentieth century, especially as data for this period is more readily available.⁶ In addition, the map takes into account the experiences of a large number of mines, if not all then certainly a significant percentage, and not just a sample or a handful of select locations. This potentially at least provides a much more solid and reliable basis for arguments. And, it provides stronger foundations for future comparisons with other coalfields, which could also be analysed by GIS.

⁵ I. M. Zweiniger-Bargielowska, 'Miners' Militancy: a Study of Four South Wales Collieries during the Middle of the Twentieth Century', *Welsh History Review*, Vol. 16, No. 3 (June, 1993), pp. 356-89.

⁶ T. Boyns, 'Labour Productivity in the British Coal Industry, 1874-1913', (Unpubl. PhD Thesis, UCC, 1982).

This brings us to the issue of visualizations. The images have been very useful precisely because they enable us to take in the whole of the coalfield experience at once. This has always been a problem for historians. It has been commented on several times that there is a tendency to look at the Rhondda, the most densely populated section and industrially most active, and assume that the experience of coal here is representative of the whole coalfield.⁷ The big concern for historians in recent years has been that the belief in the homogeneous nature of the coalfield is a distortion. Taking a coalfield wide approach means that no single region is examined to represent the rest but all sections are equally considered, all sections are given an equal voice.

The application of the five part coalfield division was especially interesting. It has perhaps not been fully exploited in the case study but is a potentially powerful way of understanding the coalfield and its historical development. It is certainly a much more sophisticated representation than the type of basic map most frequently seen in historical works, where there is a single region bounded by single line.⁸ The implication of such maps is that the area within the boundary is a unified whole. The five part division is a way of keeping at the forefront of thinking about the coalfield the different timing and origins of the development of regions, different experiences of differing geology and different trading conditions. All of these together worked to create differing communities which need to be understood on their own terms. In actual fact historians tend to divide the coalfield in this way unconsciously, or without explanation, anyway. They recognise that the old iron towns had a distinct history; they note the special nature of the anthracite district and the underdeveloped industry of the southern outcrop. Swansea of course equals copper to

⁷ Dai Smith is often condemned as being responsible for much of the Rhondda-centric image of the coalfield, although in much of his work he does actually emphasise the distinctiveness of the coalfield regions. See Dai Smith, 'The Valleys: Landscape and Mindscape' in Prys Morgan (ed.), *Glamorgan County History: Vol. 6 – Glamorgan Society 1780-1980* (Cardiff: Glamorgan History Trust Ltd., 1988), pp. 130-50. Cf. Mike Lieven, 'Senghennydd and the Historiography of the South Wales Coalfield', *Morgannwg*, Vol. 43 (1999), pp. 8-35; Mike Lieven, 'A "New History" of the South Wales Coalfield?', *Llafur*, Vol. 8, No. 3 (2002), pp. 89-106.

⁸ See Appendix C for a typical map image of the coalfield reproduced from Kenneth O. Morgan, *Rebirth of a Nation: a history of modern Wales* (Oxford, 1981).

many historians not coal and it barely registers as a coal producing region at all. Statements about the coalfield may pay lip service to such differences but the result is prioritizing of the central region, so much so that it is the central region that in effect constitutes 'the coalfield' of much historiography. The five part map makes concrete and visible these mental divisions but also provides a formal structure for organizing research properly which gives equal weight to all regions and recognizes that the central coalfield is not a picture of the whole but merely a part.

Terrain models too make maps more realistic, more recognizably a landscape.⁹ They help bring to life and give shape to those frequently repeated words 'hills' and 'valleys'. GIS are capable of much more than has been exploited here. The project has used just a couple of 2.5 dimensional images in the landscape section and these are really more illustrative than analytical. Similarly the viewshed of the Ebbw valley was more demonstrative of what was already known than an attempt to test a theory. One of the main reasons for this was that this type of representation did not seem to answer any questions that needed to be asked. Plus the printed 'flat' images lose so much of the depth gained when creating and working 'live' with them. Interacting with the landscape via a GIS does, however, help to stimulate the imagination, it creates a stronger sense of the physical context in which events were played out in and again inspires questions which perhaps would not have been asked if it had not been possible to 'see' the context. The description of the invasion of the meeting at Griffin Field, discussed in Chapter Seven, for example takes on a much more lifelike quality when it is possible to see field in situ, surrounded by hills and houses. More importantly using GIS images creates a sensitivity to information in the sources which would otherwise be passed over as incidental and unimportant. Terrain models are then less useful for answering questions in history but take the historian a step closer to an understanding of the real experiences of the historical actors. This can only benefit historical research.

⁹ Cf. Trevor M. Harris, 'GIS in Archaeology', in Anne Kelly Knowles (ed.), *Past Time, Past Place: GIS for history* (Redlands, Cal., 2002), pp. 131-43.

Still it has to be acknowledged that GIS are not the answer to history. There are so many things that they cannot help with. There was no room for their use in the discussion of the hauliers' relationship with the colliers, for example. Problems with the data made it impossible to use a GIS in the MFGB and ethnicity/language sections, although those sections highlight two different problems. In the latter case the data was available but not collated at a useable level. This is not a permanent, insurmountable problem. If GIS use becomes more widespread, there will be an incentive to create geodatabases which can be shared and used for a wide range of research projects. Advances in technology may also in the future make data collection automated. The problems highlighted by the MFGB section are however never going to be overcome. If the data does not exist, it is never going to exist and this sets limits on the areas in which GIS can be exploited. The fears that GIS use will change the study of history are therefore perhaps just a manifestation of the panic over the 'end of history' which seems to periodically grip historians. GIS usage is too specific in focus to completely replace traditional research methods and imperatives. Nevertheless GIS can supplement traditional approaches and contribute to a better understanding of the past. If their contribution is comparatively small in the overall historiography it is no less valuable for that.

One final point should be made. Welsh historians have long prided themselves on a close relationship with the general public; Welsh historiography is primarily designed as a history of the people for the people. GIS are very powerful communication tools and a very effective means of sharing the results of research to the public at large.¹⁰ Some disciplines have regarded this use of GIS negatively, but if GIS have nothing else to recommend them the accessibility of their output should surely be sufficient to demand attention from Welsh historians.¹¹ The 'people's remembrancers' of the twenty first century need new methods of communicating the truths about the past. They are dealing with a generation which has grown up in an image saturated society thanks to the ubiquitous presence of television and

¹⁰ David J. Staley, *Computers, Visualization, and History: How New Technology Will Transform Our Understanding of the Past* (New York, 2003).

¹¹ For a discussion of the use of GIS in archaeology, for example, see Henry Chapman, *Landscape Archaeology and GIS* (Stroud, 2006).

the internet. And traces of the world historians wish to talk about are rapidly disappearing from the land. GIS may be the very thing they need.

Drawing together history, geology and GIS is not a simple process. The disciplines are very different in focus, have different conceptual and epistemological bases and very different purposes and objectives. It may never be possible to combine the three in perfect harmony in way which meets the methodological and conceptual demands of each discipline and feeds back into each equally. One discipline will always have to dominate, the others taking a subordinate role. Here history has been the master, setting the frame of reference and establishing the research agenda. But both geology and GIS have contributed. Geological and GIS insights have helped bring alive the historical landscape and drawn attention to the physical context in which past events have been played out. They have allowed the asking of new questions and the new perspective has helped challenge some preconceptions and key explanations of past human historical actions. Although the case study in its final form is not at all what was envisaged when this project was set up, it has demonstrated that historians need to understand the geology of the South Wales coalfield to understand more fully its history and has shown that visualization can be an invaluable tool in historical research.

APPENDIX A

Name of Pit	Location	Strike Start	Strike End	x co- ordinate	y co- ordinate
Abedare Works No. 9 Pit	Aberdare	15-Aug	10-Aug	301680	202402
Aberaman Clay Level	Aberaman	14-Aug	06-Sep	302221	200084
Aberaman Colliery	Aberaman	14-Aug	05-Sep	301438	200257
Abercanaid Colliery	Abercanaid	15-Aug	25-Aug	305388	204093
Abercrave Colliery	Abercrave	No strike	No strike	282600	212000
Aberdare Merthyr Colliery	Hirwaun	17-Aug	22-Aug	296300	204707
Abergorkie Level	Aberdare	16-Aug	24-Aug	302108	204615
Abernant Colliery	Markham Village	12-Aug	22-Aug	317033	201500
Aberpergwm Collieries	Glyn Neath	21-Aug	23-Aug	286476	207625
Aber-Rhondda Colliery	Porth	02-Aug	05-Sep	302365	191924
Albion Colliery	Cilfynydd	08-Aug	06-Sep	308661	192623
Ammanford Colliery	Ammanford	No strike	No strike	263944	212417
Arail Griffin Colliery	Aberbeeg	08-Aug	05-Sep	321890	202870
Aral & Llandafal Levels	Cwm	08-Aug	05-Sep	319000	203868
Bedlinog Colliery No. 1 & No. 2 Pits	Bedlinog	15-Aug	18-Aug	309731	201643
Bedwellty No. 1 & No. 2 Levels	Tredeggar	11-Aug	06-Sep	315323	205818
Bedwellty Pits	Tredeggar	11-Aug	06-Sep	315470	206309
Bertie Pit	Trehafod	05-Aug	07-Sep	303956	191129
Big Pit	Blaenavon	16-Aug	05-Sep	323893	208775
Big Pit	Blaenavon	08-Aug	12-Aug	323893	208775
Birchgrove Pit	Llansamlet	23-Aug	31-Aug	270353	198821
Black Band Level	Sirhowy	No strike	No strike	314543	210020
Black Vein Drift	Merthyr Tydfil	15-Aug	18-Aug	307351	207132
Blaencaegurwen Colliery	Brynaman	No strike	No strike	273222	213821
Blaennant Colliery	Aberdare	16-Aug	24-Aug	302092	204524
Blaensychan Colliery	Abersychan	05-Aug	07-Sep	324436	202038

Bodringallt Colliery	Ystrad,Rhondda	02-Aug	05-Sep	298208	195330
Box Colliery	Llanelli	No strike	No strike	251642	200655
Braichycymmer Pit	Pontycymmer	04-Aug	06-Sep	290173	191732
Brazil & Saron Levels	Merthyr Tydfil	15-Aug	25-Aug	307874	202605
Brithdir & Cwmdu Colliery	Skewen	17-Aug	07-Sep	271662	197629
Broadoak Pit	Loughor	No strike	No strike	257036	198605
Bryn Morgan Colliery	Upper Cwmtwrch	No strike	No strike	275685	210996
Bush Level	Crumlin	No strike	No strike	320638	197509
Bute Coal Pit	Cross Inn	No strike	No strike	306598	184057
Bwlfa Dare Colliery	Aberdare	No strike	No strike	296980	202423
Cae Colliery	Llanelli	No strike	No strike	251744	200344
Cae Duke Colliery	Loughor	No strike	No strike	258171	197885
Cae Martin Colliery	Loughor	No strike	No strike	258038	197980
Caepontbren Colliery	Pontyates	No strike	No strike	247444	208308
Cae'r Defaid Colliery No. 9 Level	Maesteg	04-Aug	08-Sep	286338	191924
Caerau Colliery No. 1 Pit	Maesteg	14-Aug	06-Sep	286616	194444
Caerau Colliery No. 2 Pit	Maesteg	11-Aug	06-Sep	286590	194552
Cae'r-bryn Colliery	Llandybie	No strike	No strike	259438	213564
Cambrian (Navigation) Colliery No. 1 Pit	Clydach Vale	09-Aug	31-Aug	297066	192752
Capel-Ifan Colliery	Ponytberem	No strike	No strike	249289	210608
Castle Pit	Merthyr Tydfil	15-Aug	24-Aug	306460	202624
Cawdor Colliery	Glanamman	No strike	No strike	267536	211509
Cefn-Brithdir Colliery	Brithdir	15-Aug	22-Aug	315345	201532
Cefngyfelach Colliery	Llangynfelach	No strike	No strike	264716	197898
Cethin Pit No. 2	Merthyr Tydfil	15-Aug	24-Aug	305590	203420
Cilely Colliery	Tonyrefail	15-Aug	28-Aug	301179	189589
Cinder Pit	Blaenavon	16-Aug	05-Sep	324031	209347
Cinder Pit	Blaenavon	08-Aug	12-Aug	324031	209347
Clay Level	Blaenavon	16-Aug	05-Sep	324600	208989
Clay Level	Blaenavon	08-Aug	12-Aug	324600	208989

Clay Level	Rhymney	17-Aug	21-Aug	312473	207154
Clydach Merthyr Colliery	Clydach, nr. Swansea	21-Aug	31-Aug	267861	202866
Clyngwernen Pit	Llanelli	No strike	No strike	253783	202149
Clynhebog Colliery	Pontyberem	No strike	No strike	251801	212426
Coedcae Colliery	Trehafod	05-Aug	06-Sep	303801	191076
Coedcae-Tillery Colliery No. 1 Level	Abertillery	09-Aug	05-Sep	320785	206482
Coedcae-Tillery Colliery No. 2 Level	Abertillery	09-Aug	05-Sep	321131	205958
Coedcae-Tillery Colliery No. 3 Level	Abertillery	09-Aug	05-Sep	320962	205668
Coegnant Colliery	Maesteg	05-Aug	08-Sep	285573	193282
Colliers Row Pit	Merthyr Tydfil	15-Aug	24-Aug	304330	205044
Court Herbert Colliery	Neath	17-Aug	07-Sep	274019	197563
Cross Hands Colliery	Cross Hands	No strike	No strike	256648	212871
Crown Level Colliery	Treorchy	08-Aug	11-Aug	295209	197444
Crynant Colliery	Crynant, nr. Neath	No strike	No strike	279791	205412
Cwm Bargoed Pits	Merthyr Tydfil	15-Aug	18-Aug	308554	205980
Cwm Colliery	Cwm	08-Aug	08-Sep	318942	204422
Cwm Farm Level	Abertillery	08-Aug	08-Sep	320526	204698
Cwm Pit	Merthyr Tydfil	15-Aug	24-Aug	304374	204301
Cwmamman Colliery (including Bedlwyn Level)	Aberdare	15-Aug	29-Aug	299376	199482
Cwmavon Oakwood Levels	Pontrhydyfen	15-Aug	19-Aug	279551	193839
Cwmbran Colliery	Cwmbran	05-Aug	28-Aug	328081	196085
Cwmcapel Colliery	Burry Port	No strike	No strike	245183	202085
Cwmcynon Colliery	Mountain Ash	14-Aug	01-Sep	305946	197931
Cwmmawr Colliery	Cross Hands	No strike	No strike	254176	213450
Cwmnantygroes Level	Abertillery	08-Aug	08-Sep	322685	203493
Cwmsychan Colliery	Talywaun	05-Aug	06-Sep	324971	204344
Cynllwyndu Colliery	Tylorstown	11-Aug	29-Aug	301051	195025
Dare Colliery	Cwmparc	02-Aug	06-Sep	295058	195915
Darran Fawr Colliery	Blaengarw	03-Aug	08-Aug	289999	192354
Darran Pit	Deri, Darran Valley	15-Aug	22-Aug	313030	201285

Darranddu Colliery	Ynysybwl	14-Aug	17-Aug	306638	192848
Deep Duffryn Colliery	Mountain Ash	14-Aug	01-Sep	304534	199531
Deep Navigation Colliery	Treharris	14-Aug	23-Aug	310125	197359
Dinas Isha Colliery	Penygraig	11-Aug	28-Aug	300580	190316
Dinas Main Colliery	Gilfach Goch	14-Aug	28-Aug	298045	190137
Dinas Main Level	Gilfach Goch	14-Aug	29-Aug	297833	190480
Dodd's Slope	Blaenavon	16-Aug	05-Sep	323670	208800
Dodd's Slope	Blaenavon	06-Aug	12-Aug	323670	208800
Dunraven Colliery	Treherbert	03-Aug	22-Aug	292693	198952
Dynevor Duffryn Main Colliery	Pontardawe	17-Aug	07-Sep	273848	200367
East Elliott Colliery	New Tredegar	15-Aug	05-Sep	314699	202566
Eastern Pit	Ton Pentre	02-Aug	06-Sep	297090	194362
Ebbw Vale Marine Colliery No.1 & No. 2 Pits	Llandafal	12-Aug	19-Aug	318860	203937
Ebbw Vale No. 15 Pit	Ebbw Vale	12-Aug	18-Aug	316993	209170
Ebbw Vale No. 22 Pit	Ebbw Vale	12-Aug	18-Aug	317116	208673
Ebbw Vale No. 5 Pit	Ebbw Vale	12-Aug	18-Aug	315390	211063
Ebbw Vale No. 6 Pit	Ebbw Vale	11-Aug	18-Aug	315581	210791
Elled Pit	Varteg	08-Aug	05-Sep	325998	205965
Elliott Colliery	New Tredegar	15-Aug	05-Sep	314711	202684
Ely Pit	Penygraig	02-Aug	28-Aug	299886	190991
Ferndale No. 1 Pit	Ferndale	14-Aug	31-Aug	300230	196893
Ferndale No. 2 Pit	Ferndale	14-Aug	31-Aug	299041	197582
Ferndale No. 4 Pit	Ferndale	14-Aug	31-Aug	298935	197644
Ferndale No. 5 Pit	Ferndale	14-Aug	31-Aug	298643	197735
Fernhill Collieries No. 1 & No. 2 Pits	Treherbert	02-Aug	22-Aug	292689	200440
Ffaldau Pit (including Gellyron Level)	Pontycymmer	04-Aug	06-Sep	290374	191601
Fforchaman Colliery	Cwmaman	14-Aug	05-Sep	299961	199430
Fochriw Colliery No. 1 & No. 2 Pits	Merthyr Tydfil	15-Aug	18-Aug	310312	205159
Forge Level	Blaenavon	16-Aug	05-Sep	324291	208956
Forge Level	Blaenavon	08-Aug	12-Aug	324291	208956

Garn-yr-erw Colliery	Blaenavon	16-Aug	05-Sep	323027	210049
Garn-yr-erw Colliery	Blaenavon	08-Aug	12-Aug	323027	210049
Garth Merthyr Colliery	Maesteg	10-Aug	05-Sep	286687	190008
Gelli House Colliery	Gelli	03-Aug	06-Sep	298298	194909
Gelli Steam Colliery	Gelli	03-Aug	06-Sep	298099	194901
Gellyceidrim Colliery	Glanamman	No strike	No strike	267937	213382
George Pit	Mountain Ash	15-Aug	30-Aug	304167	201719
Gilfach Colliery	Pengam	15-Aug	22-Aug	315968	198212
Gilfach Goch Colliery	Gilfach Goch	11-Aug	01-Sep	298093	190429
Glyn Colliery	Tonyrefail	09-Aug	29-Aug	302515	188929
Glyndyrys Pit	Merthyr Tydfil	15-Aug	24-Aug	304546	204693
Glynea Pit	Bynea, Llanelli	No strike	No strike	254800	199157
Glyngwyn Level	Mountain Ash	14-Aug	01-Sep	304932	198579
Golynos Colliery	Abersychan	05-Aug	06-Sep	325439	204541
Graig Fawr Colliery	Cwm	07-Aug	21-Aug	319082	203277
Gray Pit	Abertillery	08-Aug	07-Sep	321792	204565
Great Western Coal & Coke Works	Pontypridd	08-Aug	07-Sep	305404	190938
Griffin Colliery No. 1 Pit	Blaina	08-Aug	05-Sep	319674	208526
Griffin Colliery No. 2 & No. 3 Pits	Blaina	08-Aug	05-Sep	319991	206559
Gwaelod-y-waun Colliery	Nr. Pengam	12-Aug	22-Aug	316197	198913
Gwaun-Cae-Gurwen Colliery New Pit	Gwaun-Cae-Gurwen	No strike	No strike	271018	211789
Gwaun-Cae-Gurwen Colliery Old Pit	Gwaun-Cae-Gurwen	No strike	No strike	271390	212051
Gwaun-y-clawdd Colliery	Ystradgynlais	No strike	No strike	281463	212080
Hafod Pit	Trehafod	05-Aug	07-Sep	304045	191292
Hafod Van Colliery	Aberbeeg	05-Aug	07-Sep	322132	202914
Hendreforgan Colliery	Upper Cwmtwrch	No strike	No strike	274925	211624
Henllys Colliery	Cwmbran	14-Aug	21-Aug	325936	194394
Henwaun Colliery	Blaina	08-Aug	05-Sep	320419	207046
Hill Pit	Blaenavon	16-Aug	05-Sep	323932	210265
Hills Merthyr Colliery	Clydach, nr. Swansea	23-Aug	31-Aug	267722	203489

Holly Bush Colliery	Holly Bush	06-Aug	28-Aug	316561	203621
International Colliery	Blaengarw	03-Aug	05-Sep	289715	193240
Kay's Coal Slope	Blaenavon	16-Aug	05-Sep	322871	210085
Lady Margaret Colliery	Treherbert	No strike	No strike	293969	197945
Lady Windsor Colliery	Ynysybwl	04-Aug	05-Sep	306238	194280
Llandyry Pit	Kidwelly	No strike	No strike	243735	205204
Llanerch Colliery	Pontypool	05-Aug	07-Sep	325213	202381
Llanhilleth Collieries Old & New Pits	Llanhilleth	05-Aug	08-Sep	322046	200242
Llantwit Red Ash Colliery	Llantwit Fardre	No strike	No strike	306131	183792
Llwyncelyn Colliery	Trehafod	05-Aug	06-Sep	303425	191014
Llwynhendy Colliery	Bynea, Llanelli	No strike	No strike	254285	199746
Llwynypia Colliery No. 1 Steam Coal	Llwynypia	11-Aug	30-Aug	299469	193379
Llwynypia Colliery No. 3 House Coal	Llwynypia	11-Aug	02-Sep	299469	193416
Lower Deep Coal Pit	Blaina	08-Aug	05-Sep	320300	208142
Lower Duffryn Colliery Lower Pit	Mountain Ash	14-Aug	31-Aug	304112	200183
Lower Duffryn Colliery Upper Pit	Mountain Ash	14-Aug	31-Aug	304123	200422
Lower Navigation Colliery	Abersychan	05-Aug	06-Sep	325660	203848
Lower Varteg Colliery	Varteg	08-Aug	05-Sep	325438	205205
Maesteg Deep Colliery	Maesteg	05-Aug	08-Sep	285769	191900
Maindy Pit	Gelli	02-Aug	06-Sep	296526	194973
Mardy Colliery No. 1 & No. 2 Pits	Maerdy	14-Aug	21-Aug	297325	198872
Mardy Colliery No. 3 Pit	Maerdy	14-Aug	21-Aug	296384	199936
Mardy Pit (includes Rhymney & Duffryn Rhymney)	Rhymney	17-Aug	21-Aug	311655	206733
Meiros Colliery	Llanharran	10-Aug	05-Sep	300424	184006
Merthyr Vale Colliery No. 1 & No. 2 Pits	Merthyr Vale	15-Aug	24-Aug	307386	200056
Milfraen Colliery	Blaenavon	16-Aug	05-Sep	321808	210029
Morfa Colliery	Port Talbot	18-Aug	01-Sep	277449	186147
Mountain Colliery	Gorseinon	No strike	No strike	259207	199314
Mountain Level	Merthyr Tydfil	15-Aug	24-Aug	305854	205795

Mynydd Newydd Colliery	Fforestfach	No strike	No strike	263932	196534
Nantgwyn Coal Pit	Penygraig	02-Aug	28-Aug	299040	191860
Nantmelyn Colliery	Aberdare	16-Aug	23-Aug	297467	202762
Nantwen Colliery	Gelligaer	15-Aug	18-Aug	309918	200560
National Colliery	Wattstown	03-Aug	06-Sep	302076	193753
Navigation Colliery	Mountain Ash	14-Aug	01-Sep	305061	198833
New Duffryn Colliery	Rhymney	17-Aug	21-Aug	311140	206887
New Holly Bush Colliery	Holly Bush	06-Aug	28-Aug	316647	203689
New Slope	Varteg	08-Aug	05-Sep	325882	206832
New Tredegar Colliery	New Tredegar	15-Aug	29-Aug	313633	204506
New Tredegar Level & Brickworks	New Tredegar	14-Aug	05-Sep	313802	204575
Newbridge Rhondda Colliery	Pontypridd	09-Aug	05-Sep	306640	189409
No. 7 Pit	Tredegar	11-Aug	06-Sep	314564	209486
Ocean Garw Colliery	Blaengarw	03-Aug	05-Sep	290639	193087
Old Drift	Merthyr Tydfil	15-Aug	18-Aug	307552	207413
Onllwyn Colliery	Onllwyn	No strike	No strike	284169	210437
Pandy Pit	Penygraig	02-Aug	28-Aug	299853	192011
Pantycelyn Colliery	Brynamman	No strike	No strike	271359	213707
Pantyffynon Colliery	Ammanford	No strike	No strike	262101	211328
Park Colliery	Treorchy	02-Aug	05-Sep	294424	195620
Park Colliery	Ystradgynlais	No strike	No strike	278334	211131
Park Pit	Aberdare	16-Aug	25-Aug	298738	203329
Park Slip Colliery	Tondu	17-Aug	31-Aug	287897	183524
Patch Level	Rhymney	17-Aug	21-Aug	312499	207477
Pendyrri Colliery	Tylorstown	11-Aug	29-Aug	301106	195886
Penlan Colliery	Penclawdd	No strike	No strike	253373	195635
Penrhiwfer Colliery	Penygraig	15-Aug	28-Aug	300536	189895
Penrikyber Navigation Colliery	Penrhiwceiber	14-Aug	05-Sep	306086	197101
Pentre Colliery	Ystrad, Rhondda	03-Aug	06-Sep	297194	195898
Pentre Pit	Morriston	No strike	No strike	265503	196015

Plasbach Colliery	Pontyates	No strike	No strike	246887	207820
Plasycod Colliery	Cwmfrwdoer	05-Aug	08-Sep	325883	201030
Pochin Colliery	Tredeggar	10-Aug	06-Sep	316213	204610
Ponthenry Colliery	Ponthenry	No strike	No strike	248118	209620
Prince of Wales Colliery (including Quarry Pit)	Abercarn	08-Aug	05-Sep	321524	194599
Pwllbach Colliery	Ystalyfera	No strike	No strike	276510	208370
Pwlldu Level	Blaenavon	16-Aug	05-Sep	324609	211446
Pwlldu Level	Blaenavon	08-Aug	12-Aug	324609	211446
Pwllfaron Colliery	Glyn Neath	No strike	No strike	285982	205924
Rhos Colliery	Llandybie	No strike	No strike	260144	211488
Rhymney Merthyr Colliery	Pontlottyn	17-Aug	21-Aug	312133	205557
Risca Colliery	Risca	07-Aug	06-Sep	321343	191609
River Level Pit	Abernant	16-Aug	24-Aug	300944	203673
Rock Castle Colliery	Llandybie	No strike	No strike	261561	215009
Rock Pit	Varteg	08-Aug	05-Sep	324975	205481
Rock Slope	Varteg	08-Aug	05-Sep	326105	206577
Rose Heyworth Colliery	Cwmtillery	08-Aug	07-Sep	320538	205690
Rudry Colliery	Machen	15-Aug	20-Aug	318914	187232
Seven Sisters Colliery	Seven Sisters	No strike	No strike	282113	209165
Sguborwen Colliery	Aberdare	16-Aug	23-Aug	299902	204175
Sirhowy Level & Engine Pit	Ebbw Vale	12-Aug	19-Aug	315503	210347
Sirhowy No. 7 Pit	Ebbw Vale	11-Aug	18-Aug	315640	210474
South Duffryn Pits	Merthyr Tydfil	15-Aug	25-Aug	307062	203165
South Wales Colliery No. 1 & No. 2 Pits	Cwmtillery	08-Aug	07-Sep	321673	205925
St George's Pit	Llanelli	No strike	No strike	251984	199670
Standard Colliery	Ynyshir	03-Aug	05-Sep	302439	193235
Taff Llantwit Colliery	Llantwit Fardre	No strike	No strike	308897	185386
Taibach Pit	Merthyr Tydfil	15-Aug	25-Aug	306749	203759
Terrace Pit	Rhymney	17-Aug	21-Aug	311285	206571
Tillery Colliery	Abertillery	08-Aug	08-Sep	321774	204884

Tir Edmund & Bryn-Dewi Colliery	Clydach, nr. Swansea	17-Aug	07-Sep	273394	199061
Tirisaf Coal Pit Colliery	Pontardulais	No strike	No strike	259346	200578
Tirpentwys Colliery	Pontypool	08-Aug	05-Sep	324703	199964
Tophill Colliery	Llancaiach	15-Aug	22-Aug	311600	197328
Tower Colliery	Hirwaun	16-Aug	18-Aug	294427	204644
Treaman Colliery	Aberaman	14-Aug	06-Sep	301693	201155
Trimsaran Colliery	Trimsaran	No strike	No strike	246648	205294
Tunnel Pit	Aberdare	16-Aug	25-Aug	302545	202657
Tunnel Pits	Merthyr Tydfil	15-Aug	18-Aug	309457	206118
Tymawr Colliery	Pontypridd	08-Aug	07-Sep	305898	190916
Tynewydd Colliery	Ogmore Vale	02-Aug	11-Sep	293075	190971
Tyntyla Colliery	Ystrad, Rhondda	No strike	No strike	299207	195299
Tynybedw Colliery	Pentre	03-Aug	06-Sep	296659	196418
Tytrist Colliery	Tredeggar	11-Aug	06-Sep	314672	207665
Upper Cymmer Colliery	Porth	11-Aug	06-Sep	302141	191581
Varteg Coal Pit	Varteg	05-Aug	06-Sep	325990	205967
Varteg Colliery	Ystalyfera	No strike	No strike	278141	208513
Victoria Colliery No. 1, No. 5 & No. 6 Pits	Ebbw Vale	11-Aug	18-Aug	317069	208032
Vivian Pit	Abertillery	08-Aug	08-Sep	322029	203518
Wauanceirch Coal Slant	Neath	17-Aug	07-Sep	274017	198172
Waunlwyd Colliery	Ebbw Vale	11-Aug	18-Aug	317695	206688
Werfa Colliery	Aberdare	16-Aug	24-Aug	302031	203170
Western Colliery	Nantymoel	01-Aug	11-Sep	293752	192617
Whitworth Coal Drift	Tredeggar	11-Aug	06-Sep	314297	208200
Whitworth Coal Pits	Tredeggar	11-Aug	06-Sep	314457	208066
Windsor Level	Aberdare	15-Aug	25-Aug	301754	202730
Wyndham Coal Pit	Nantymoel	01-Aug	11-Sep	293356	192198
Yniscedwyn Colliery	Ystradgynlais	No strike	No strike	279791	210686
Ynys Merthyr Colliery	Ystradgynlais	No strike	No strike	279512	210006
Ynysfeio Colliery	Treherbert	03-Aug	05-Sep	294522	197771

Ynyshir House Coal Colliery	Ynyshir	11-Aug	05-Sep	302550	192642
Ystradgynlais Colliery	Ystradgynlais	No strike	No strike	279406	209738
Ystradowen Colliery	Upper Cwmtwrch	No strike	No strike	275450	212015

APPENDIX B

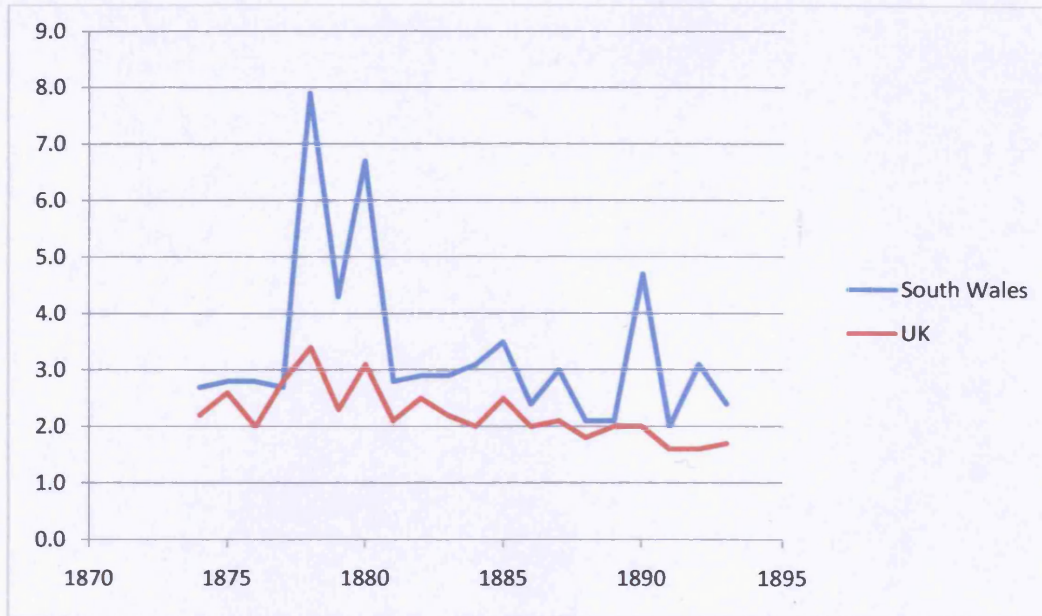
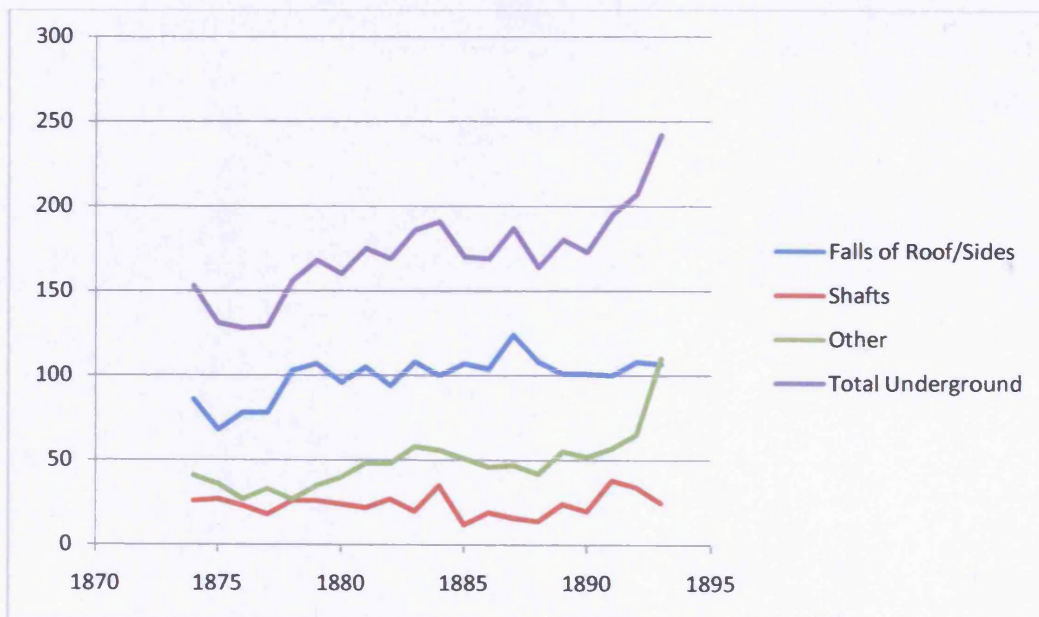
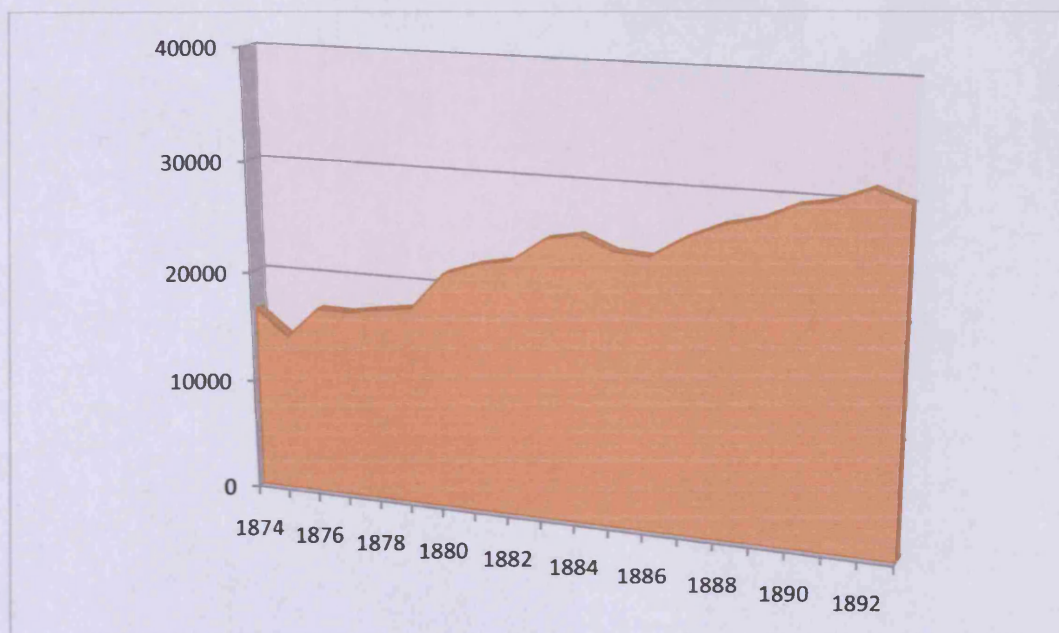


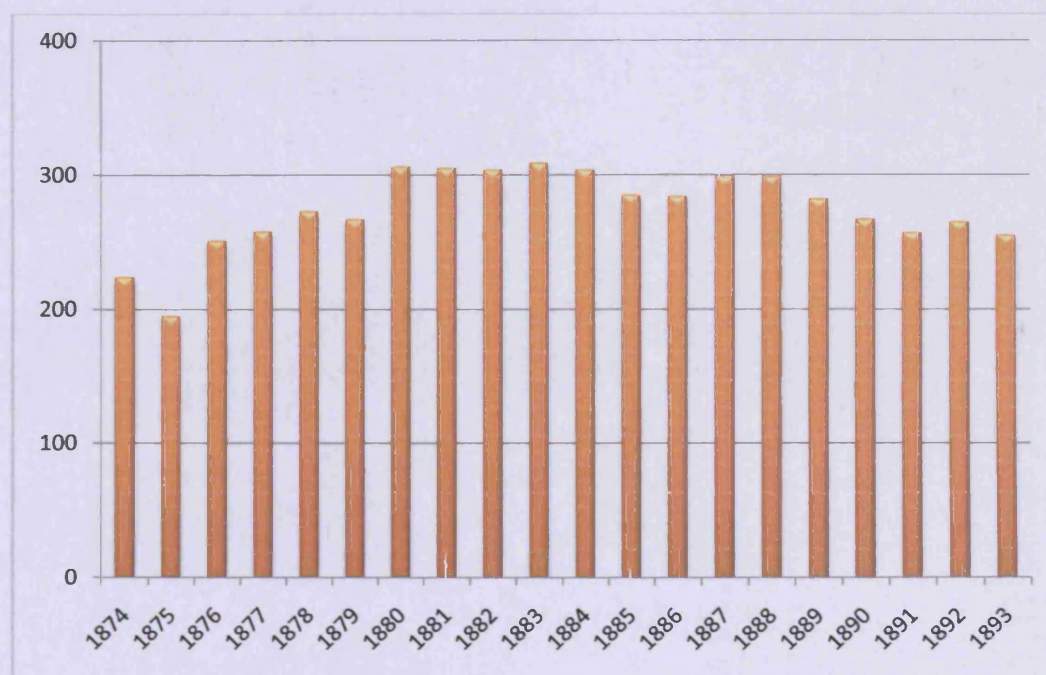
Fig. 1: Accident Rate per 1,000 Employed



**Fig. 2: Accidents by Type
South Wales Coalfield 1874-1893**



**Fig. 3: Output (000 tons)
South Wales Coalfield**



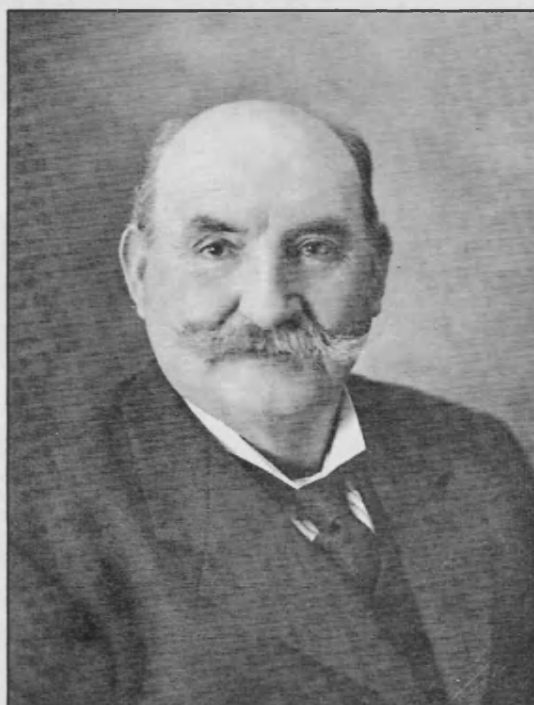
**Fig. 4: Output (Tons) Per Person Employed
South Wales Coalfield**

APPENDIX C



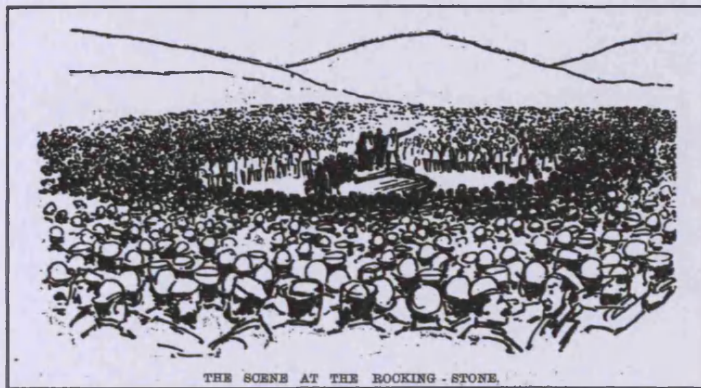
William Abraham (Mabon)

Source: R. Page Arnot, *The Miners: A History of the Miners' Federation of Great Britain 1889-1910* (London, 1951).



William Brace

Source: R. P. Arnot, *South Wales Miners/ Glowyr De Cymru: a History of the South Wales Miners' Federation* (London, 1967).



**The Rocking Stone Meeting, Monday
14 August 1893**

Source: *Western Mail*, 15 August 1893

**A later labour demonstration at the
Rocking Stone in support of
C. B. Stanton**

Source: Rhondda Cynon Taf Libraries
Digital Archive,
<http://archive.rhondda-cynon-taf.gov.uk>



The Rocking Stone 2009

Source: Catherine Preston



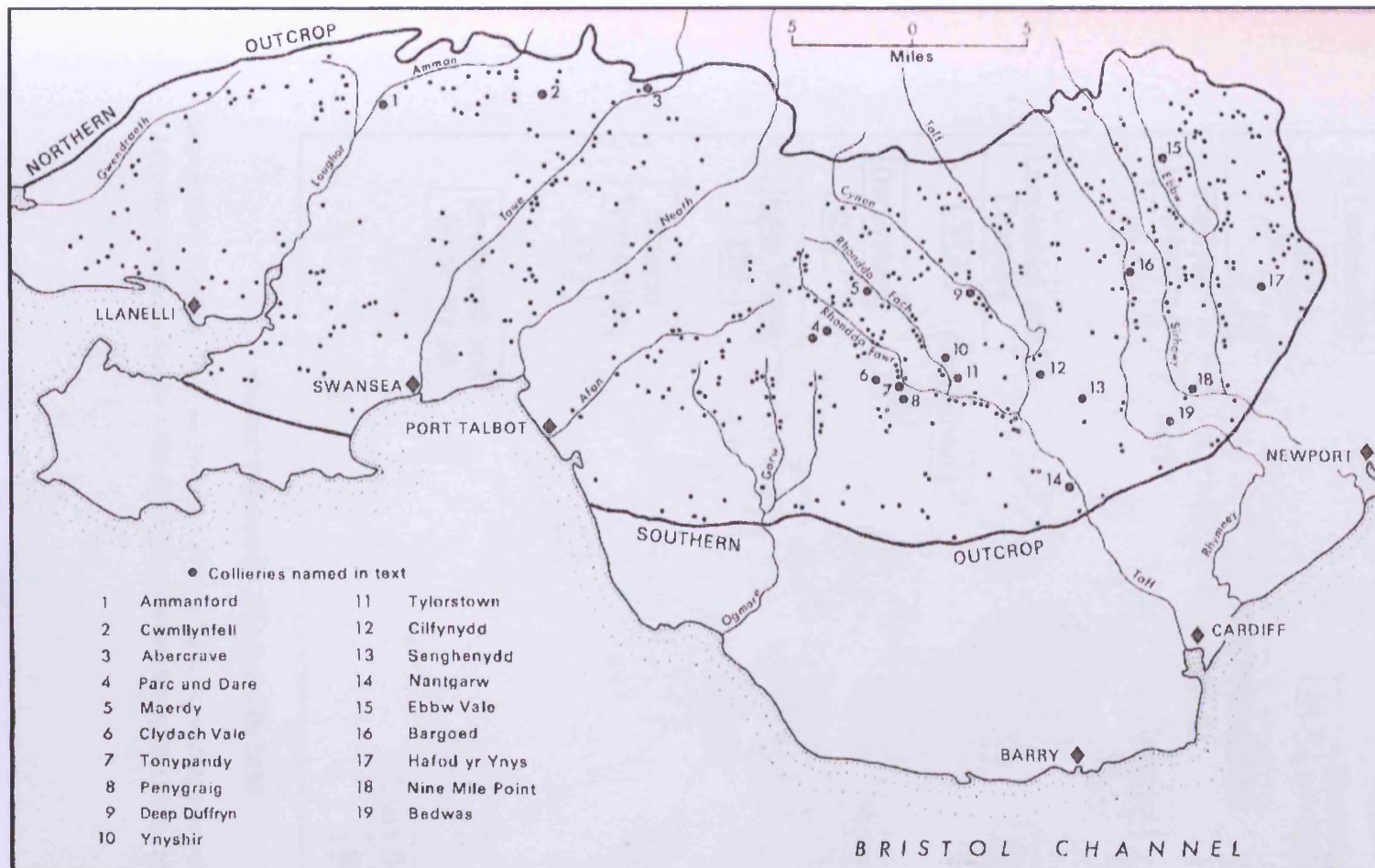
A 'Scaley Dinner'

Source: *Illustrated London News*, 9 September 1893



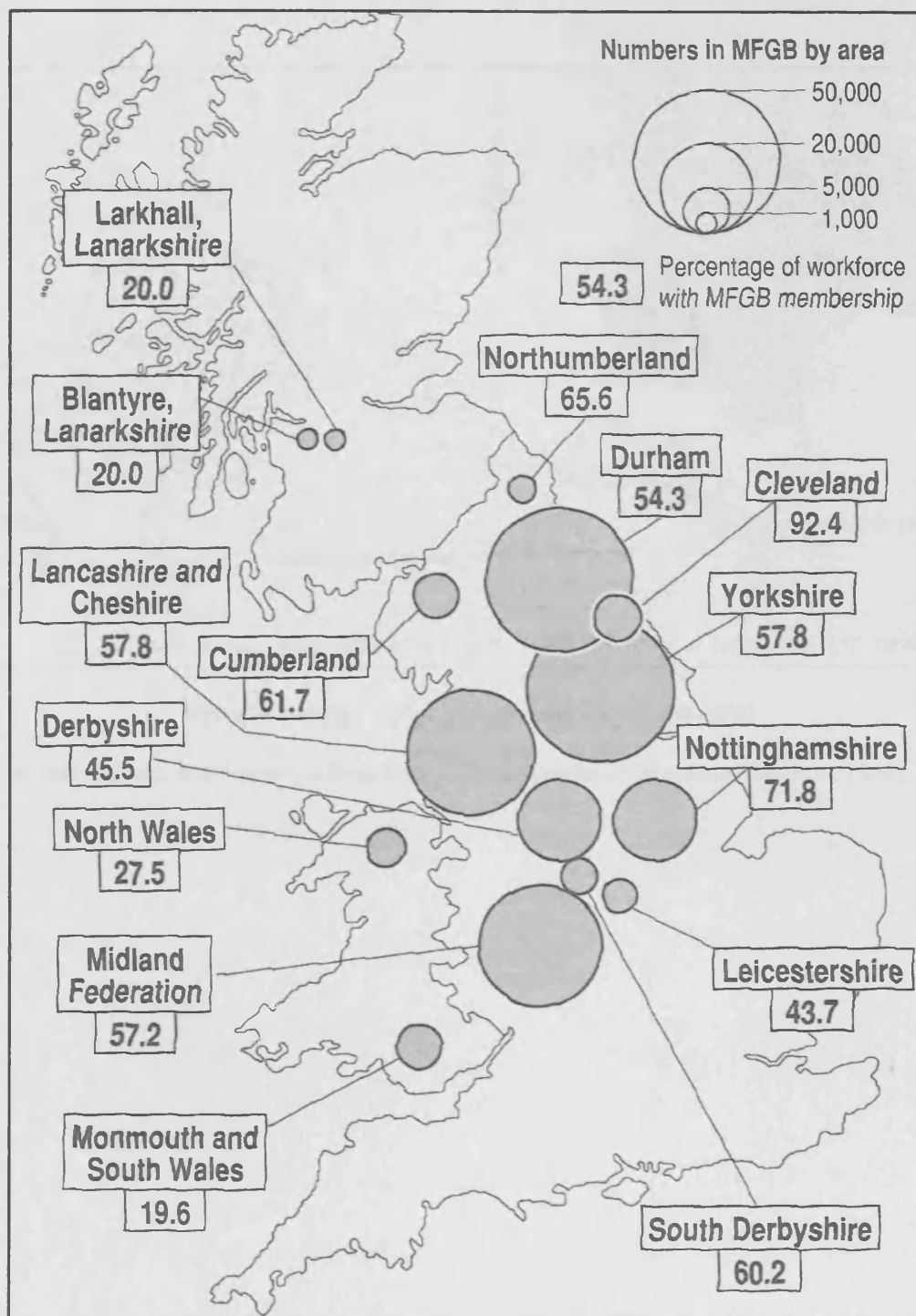
Stopping the Parade at Pontygwaith Bridge

Source: *Illustrated London News*, 9 September 1893.



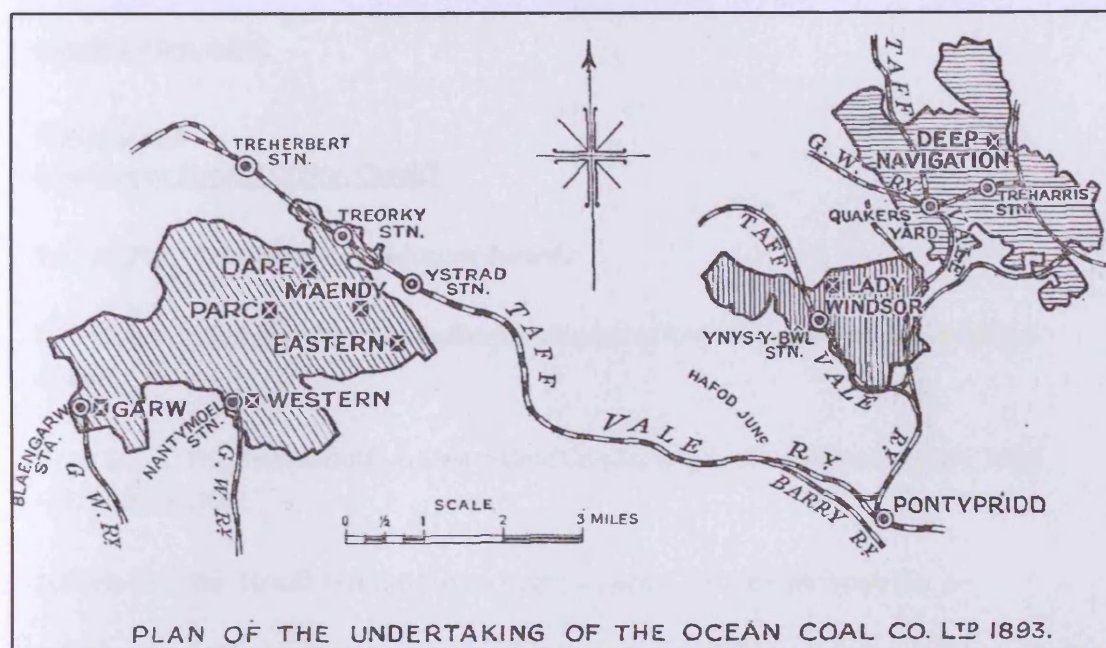
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D/D PD 1/8: The Powell Duffryn Steam Coal Company Ltd. Minute Book No. 8.

D/D PD 1/9: The Powell Duffryn Steam Coal Company Ltd. Minute Book No. 9.

D/D PD 2/1: The Powell Duffryn Steam Coal Company Ltd. Minute Book of the Managing Committee.

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D/D Th 100/i: Map of No.3 Llantwit, Common & Llwynyrwn.

D/D Th 138: Map of West Llantwit Colliery.

D/D Xng 2: Photocopy of original map showing the area of the coalfield 1750-1865.

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<http://parlipapers.chadwyck.co.uk>

<http://www.swan.ac.uk/swcc/>

www.visionofbritain.org.uk

www.welshcoalmines.org

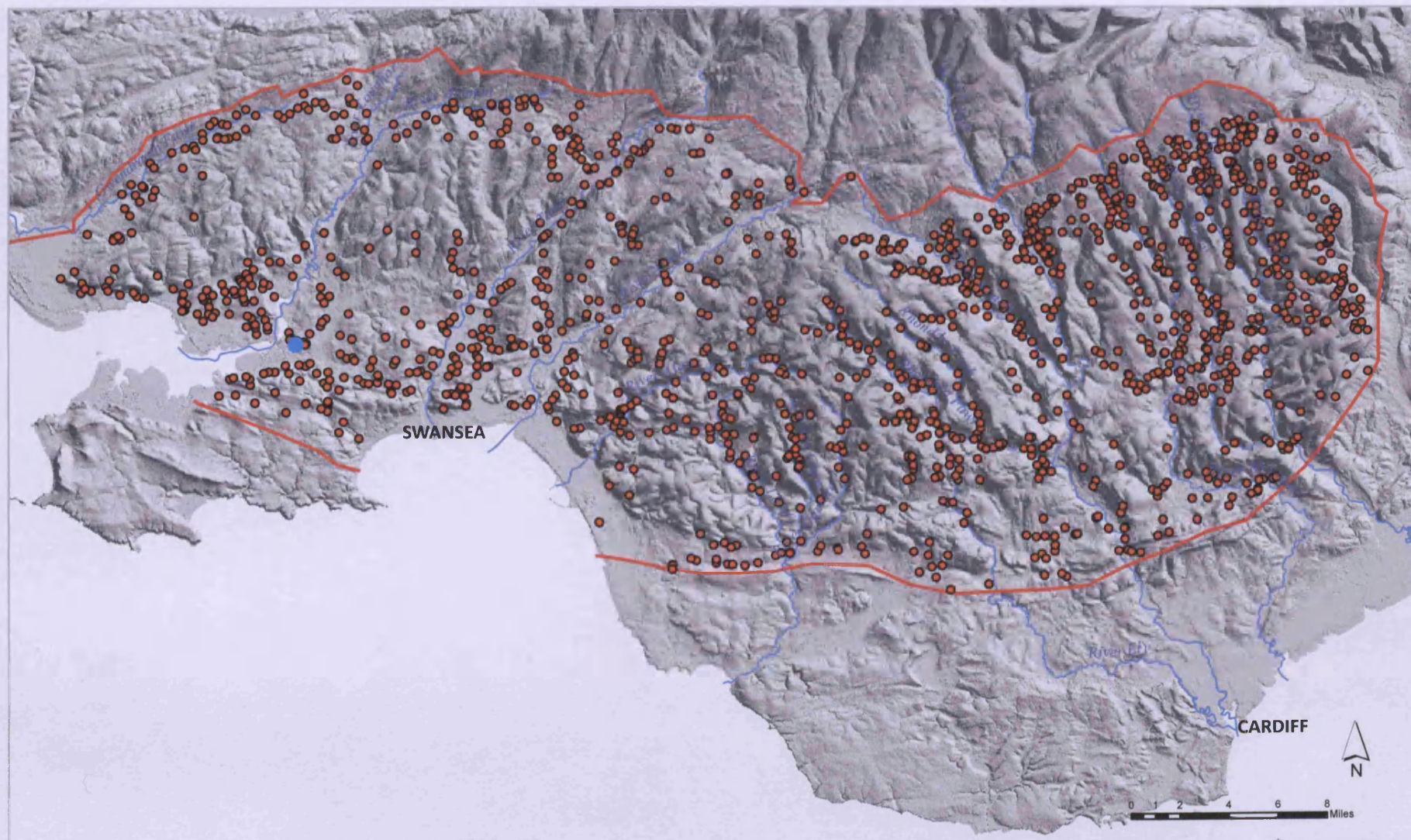
**Geology, Visualization and the 1893
Hauliers' Strike: an interdisciplinary
exploration:
Vol. Two**

Catherine Preston

**Thesis submitted in Candidature for the degree of
Doctor of Philosophy
Cardiff University 2010**



Fig. 1: South Wales Valleys



**Fig. 2.1: South Wales Coalfield
Pits 1880-1920**

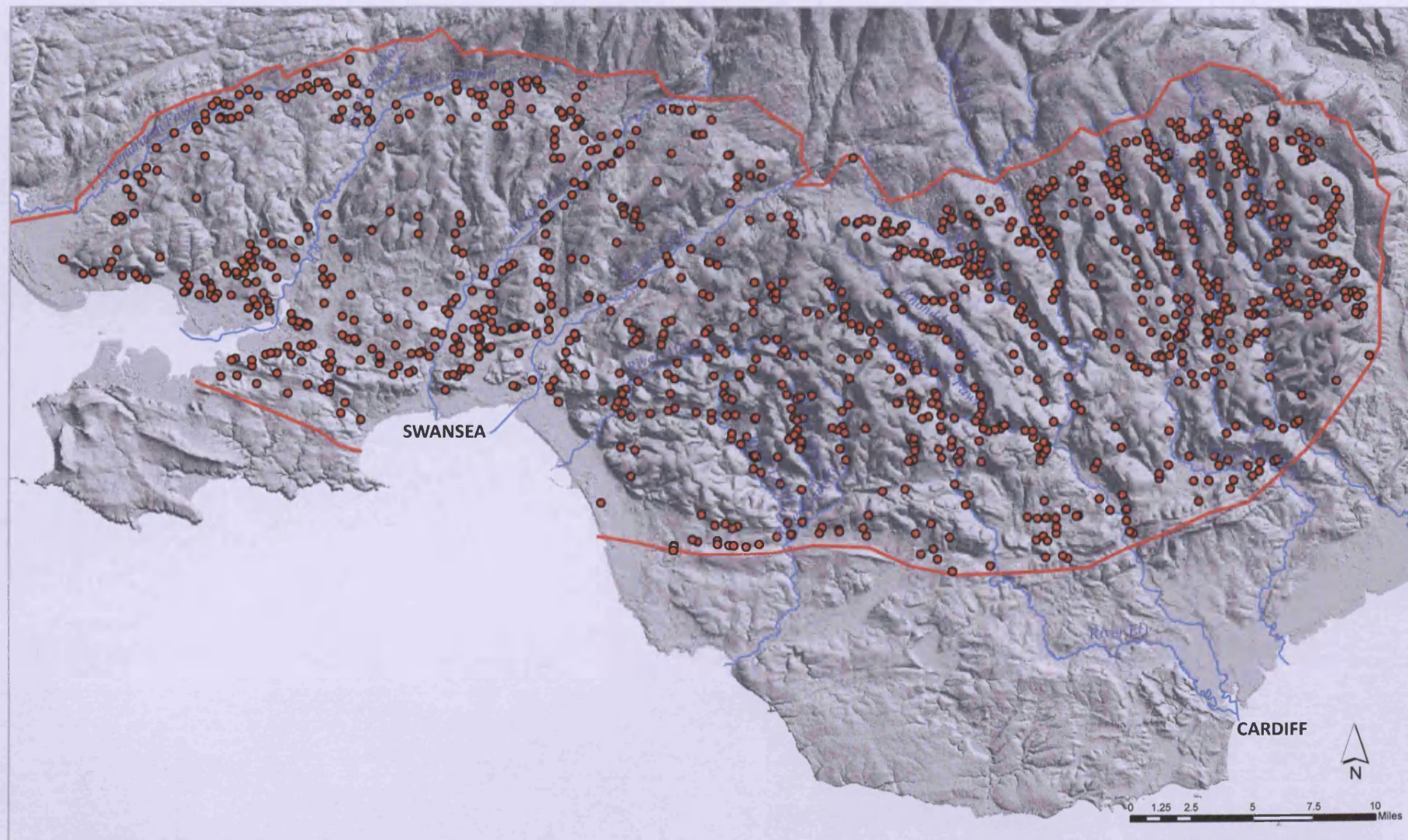


Fig.2.2: South Wales Coalfield

Pits Identified on Ordnance Survey Maps
First Edition, First Revised Edition, Second Revised Edition 1:10,560

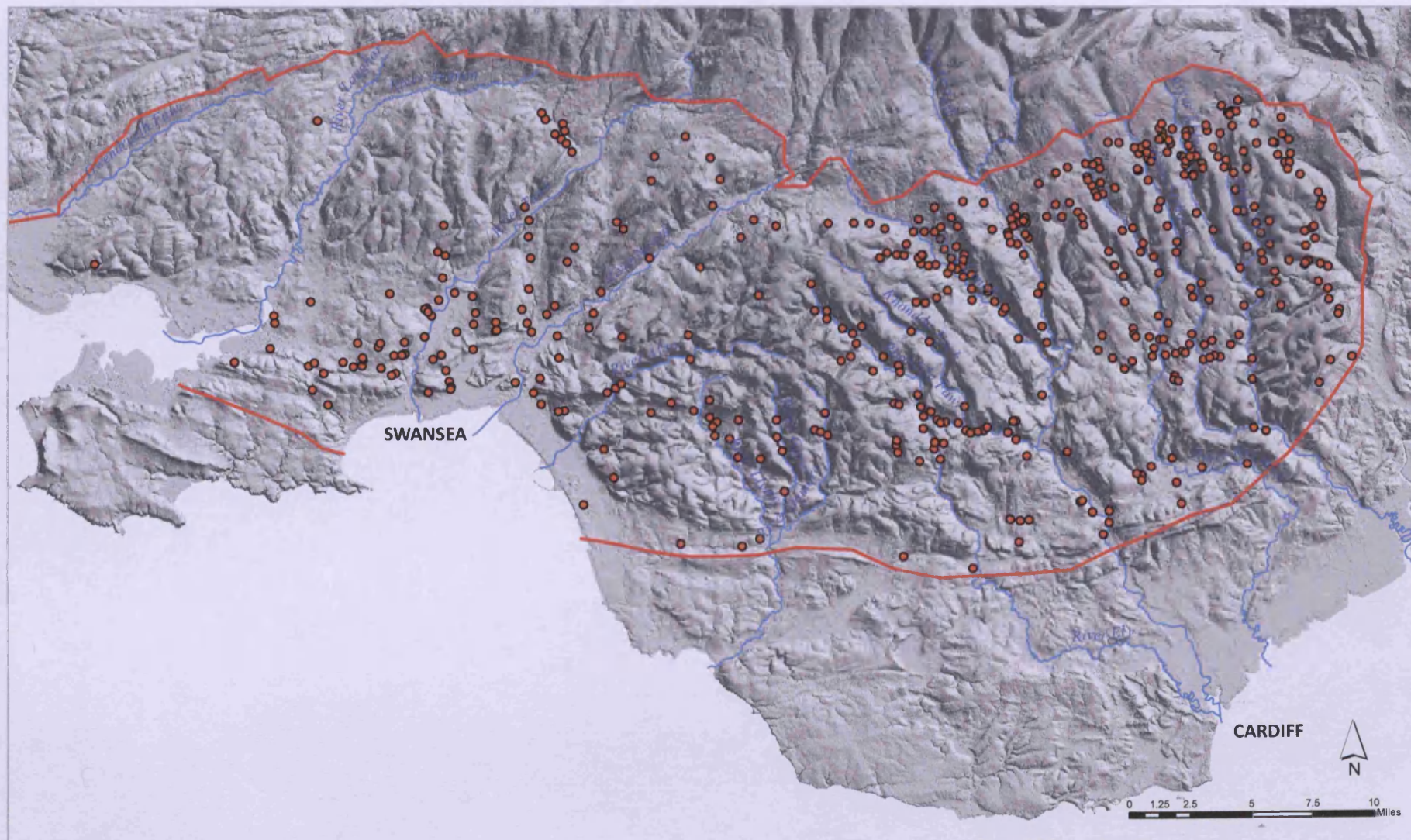


Fig. 3: South Wales Coalfield 1873

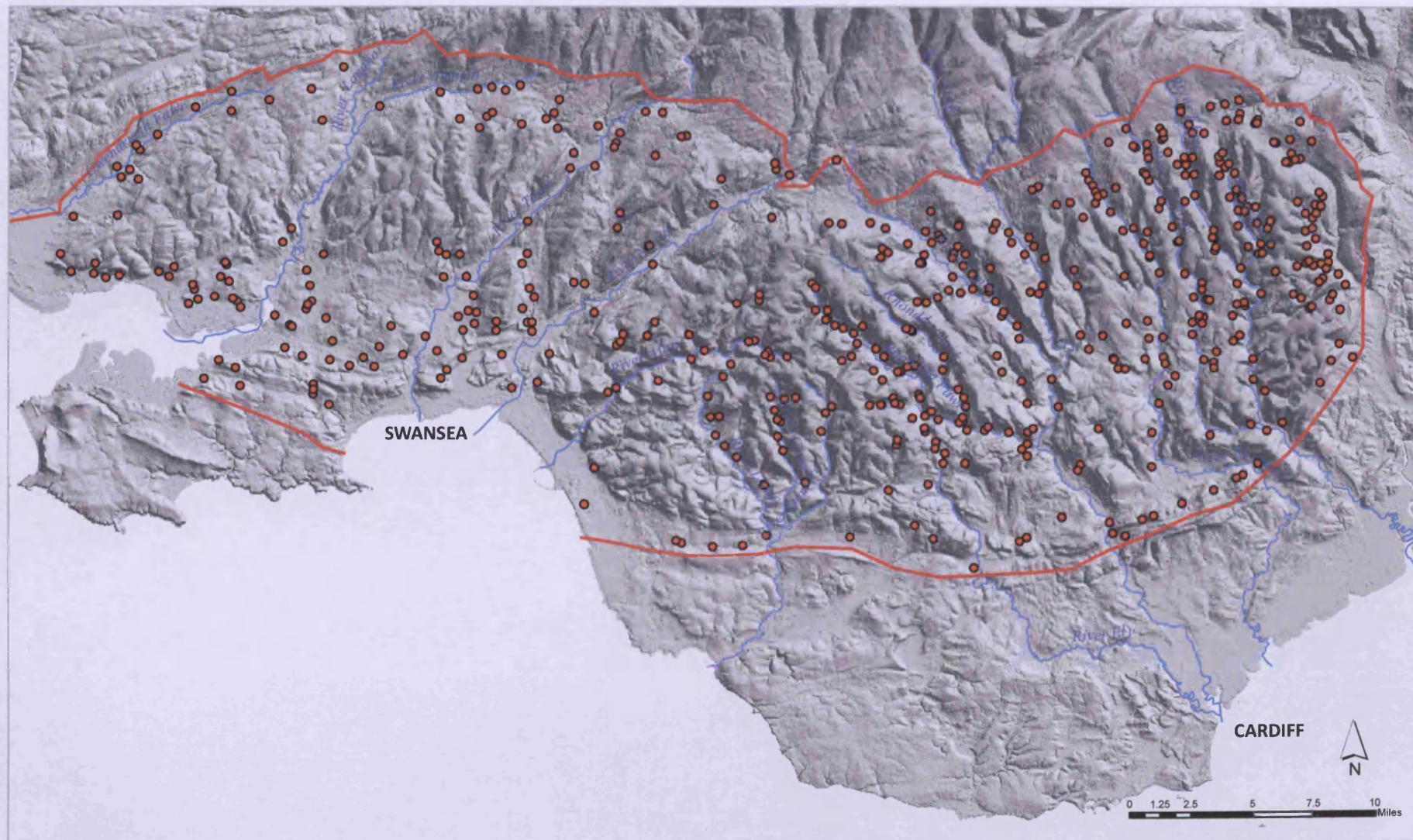
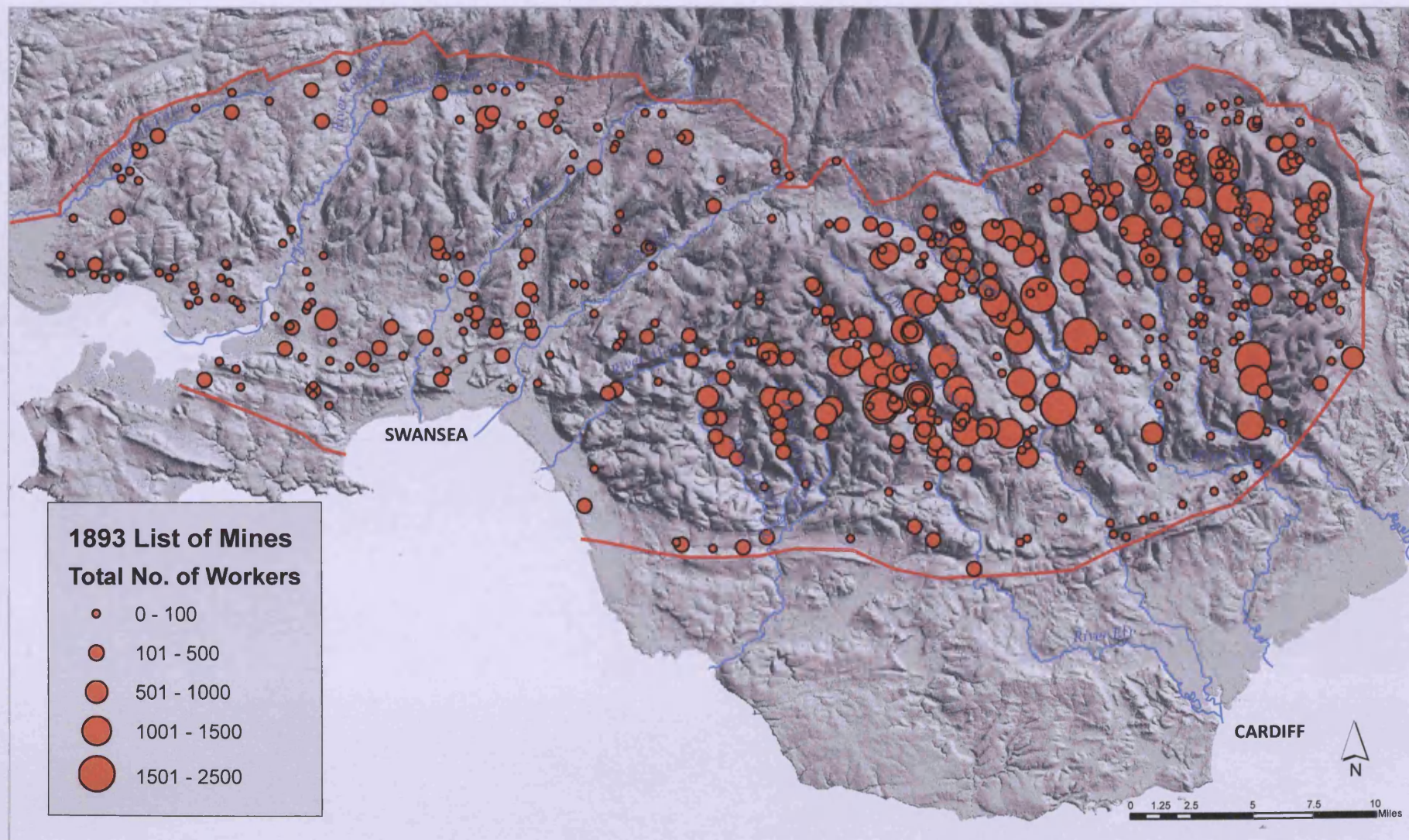


Fig. 4.1: South Wales Coalfield 1893



**Fig. 4.2: South Wales Coalfield 1893
By Size of Workforce**

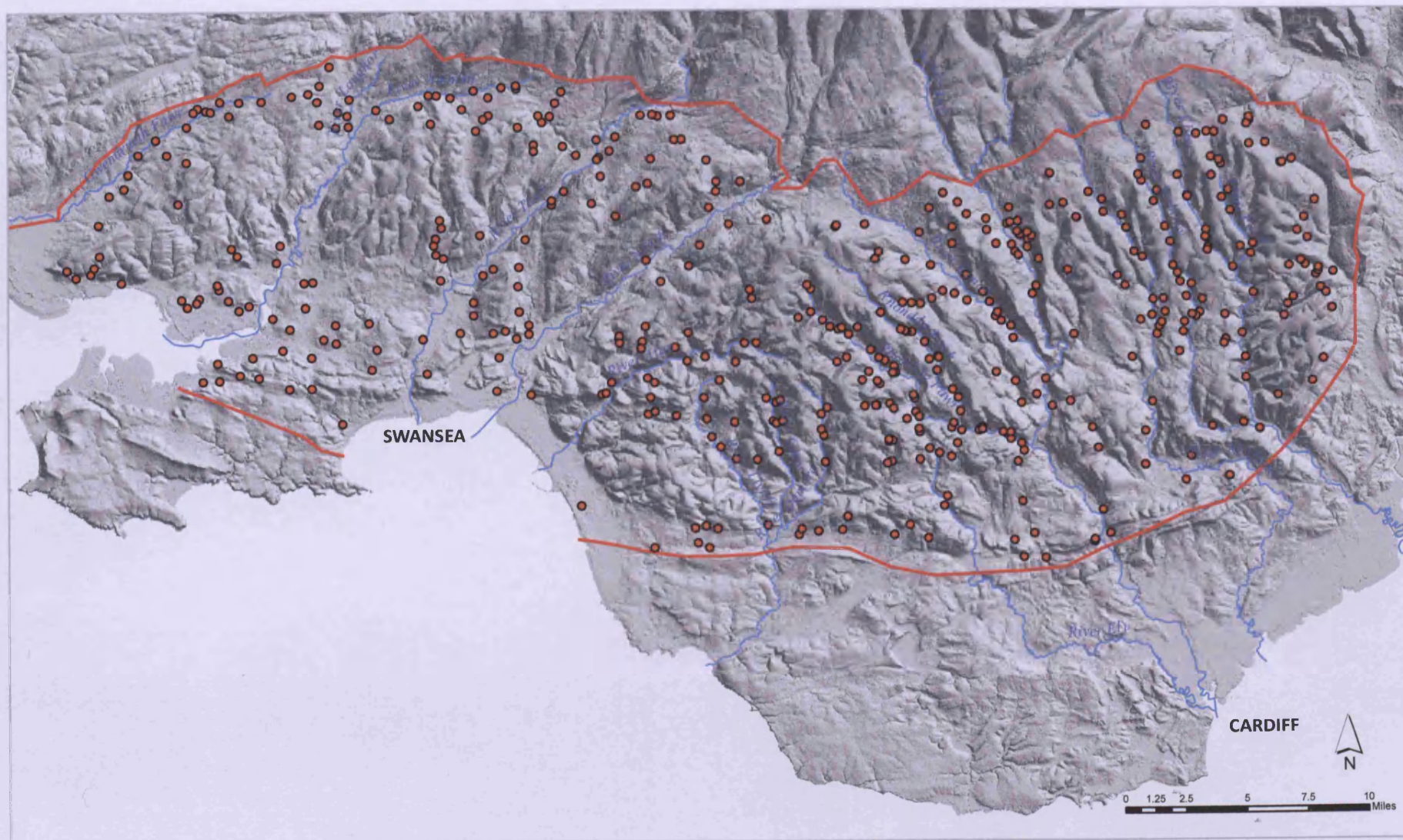
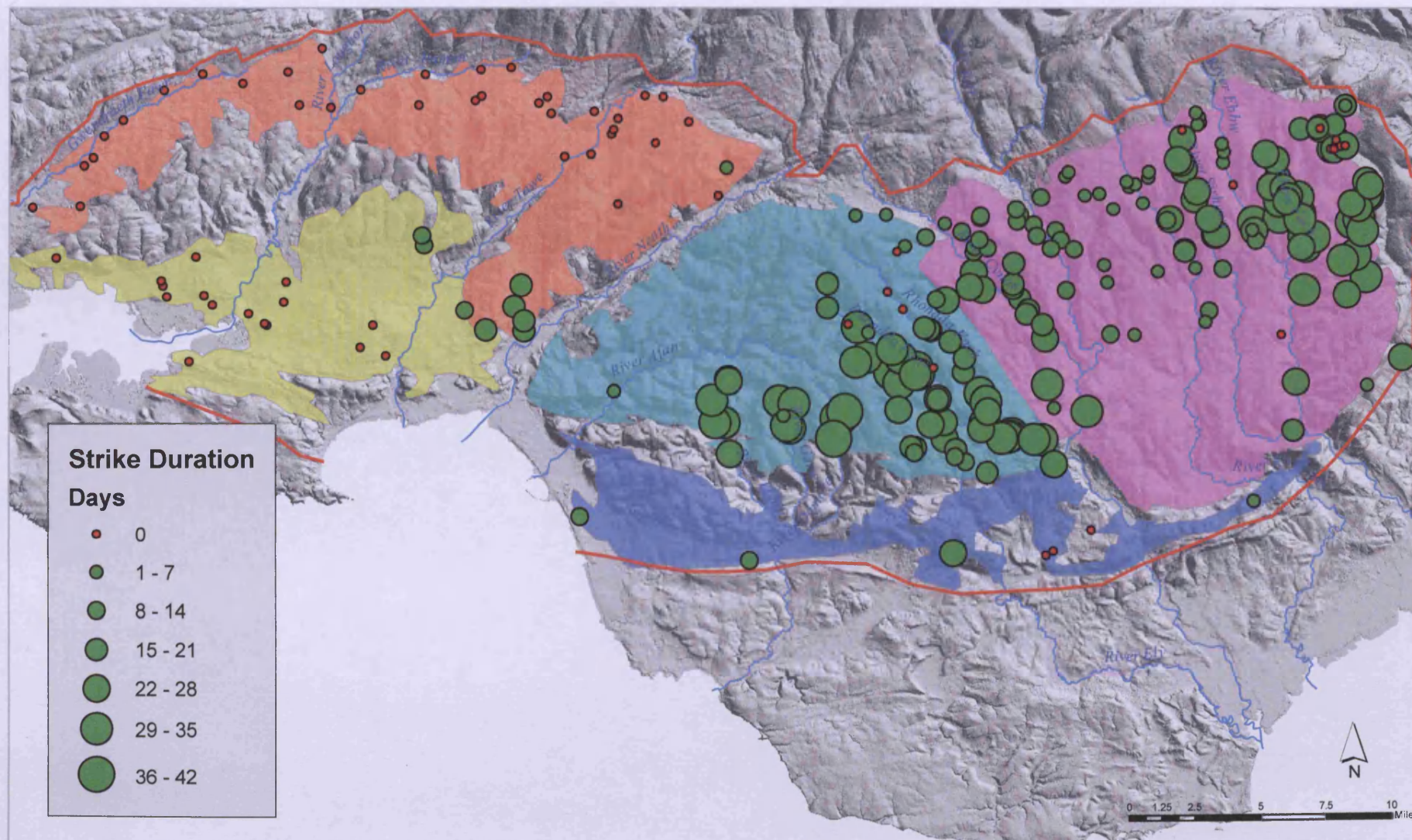


Fig. 5: South Wales Coalfield 1913



**Fig. 6: Strike of 1893
Duration**

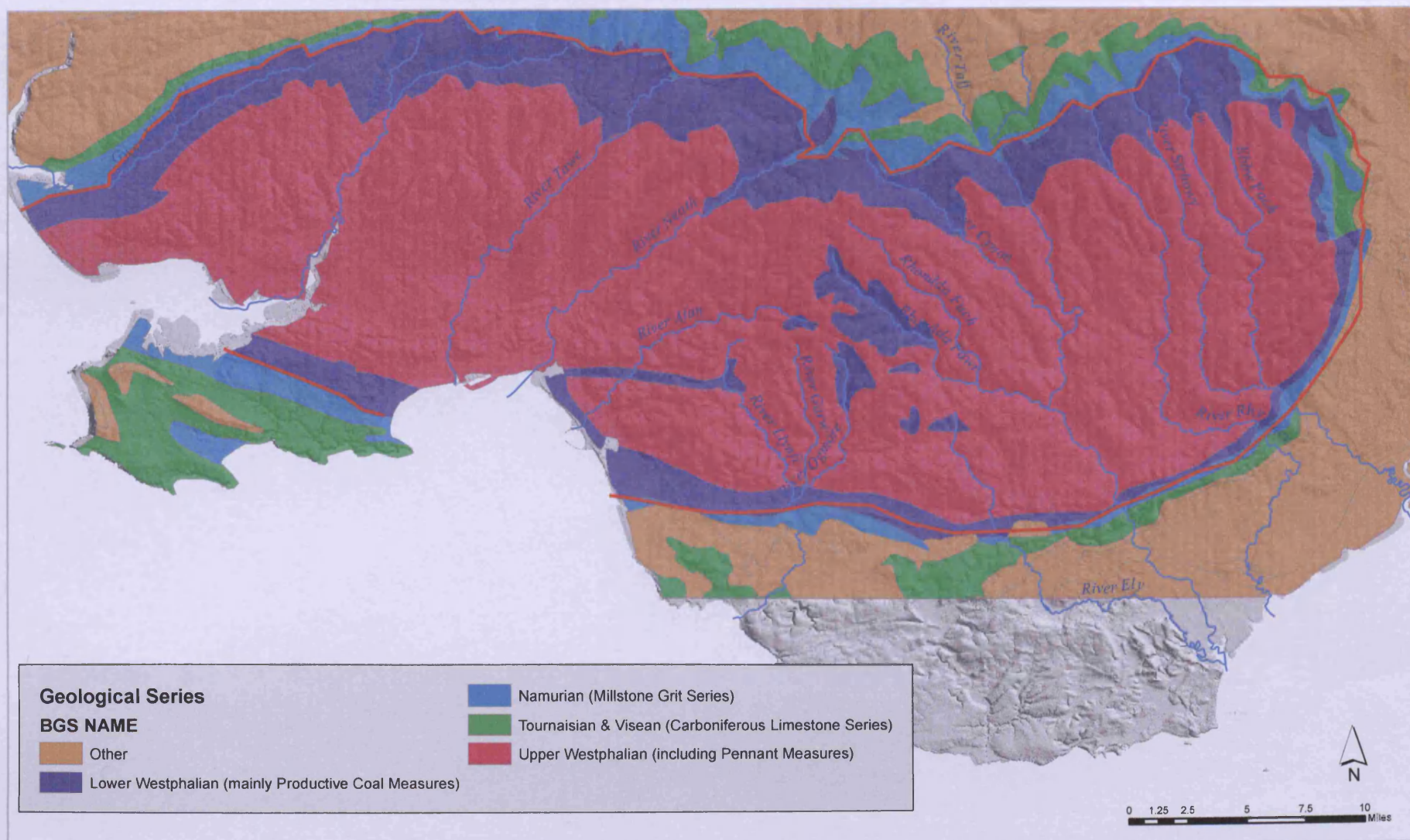


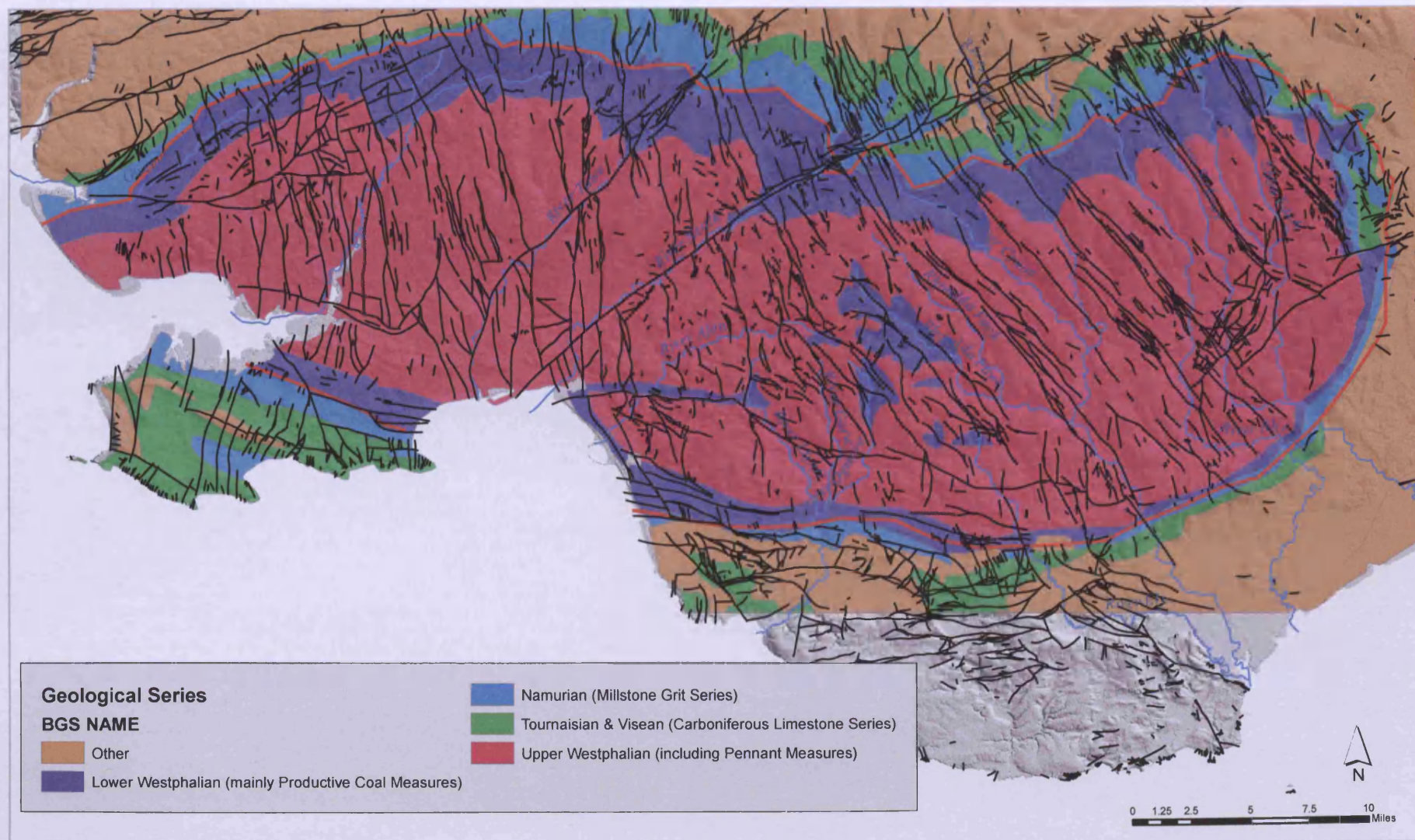
Fig. 7.1: Simplified Geological Series

Based on BGS 1:625000

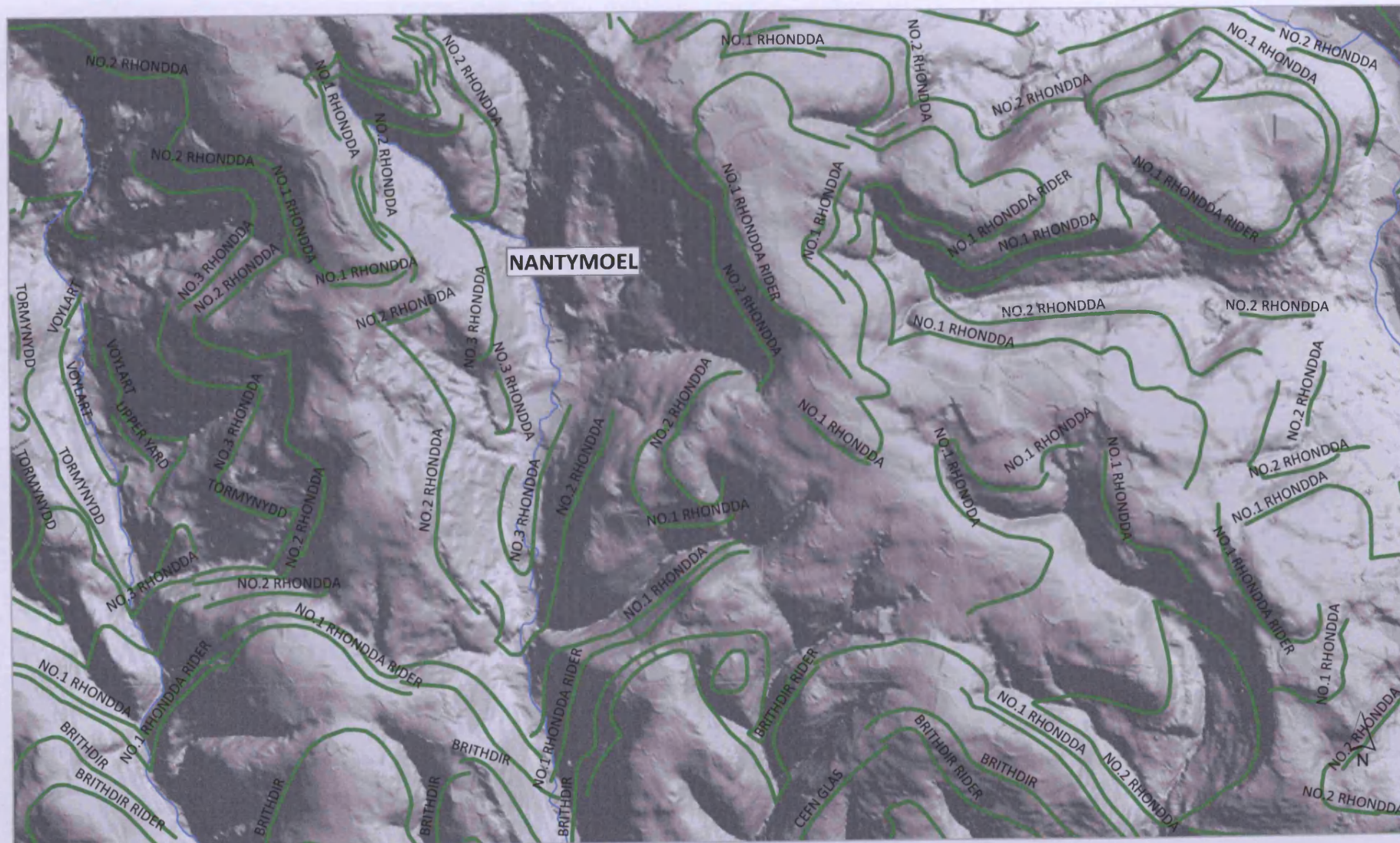
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**Fig. 7.2: Simplified Geological Series
with faults and folds**
Based on BGS 1:250000



**Fig. 7.3: Principal Coal Seams
in the Ogmore Valley**

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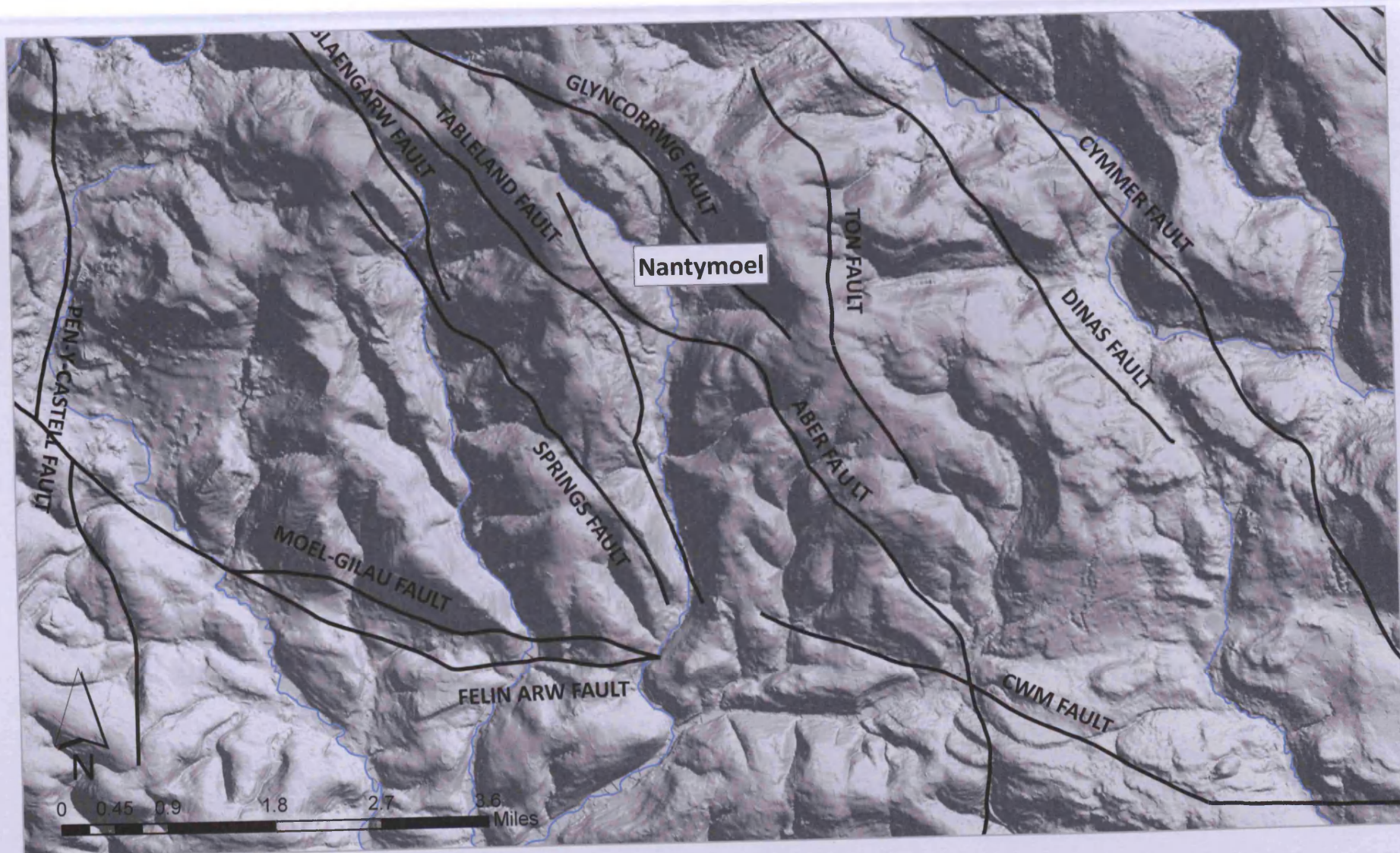
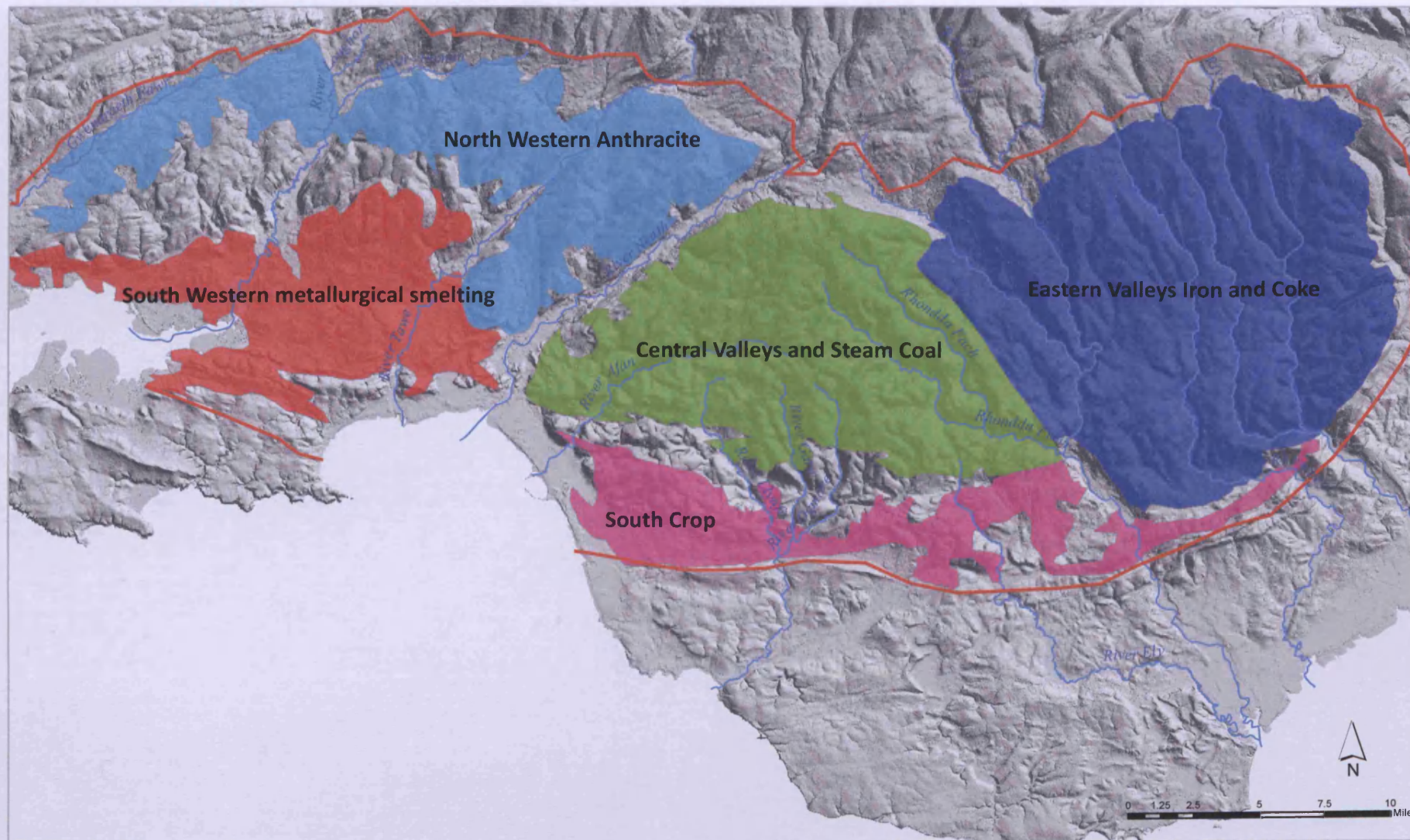
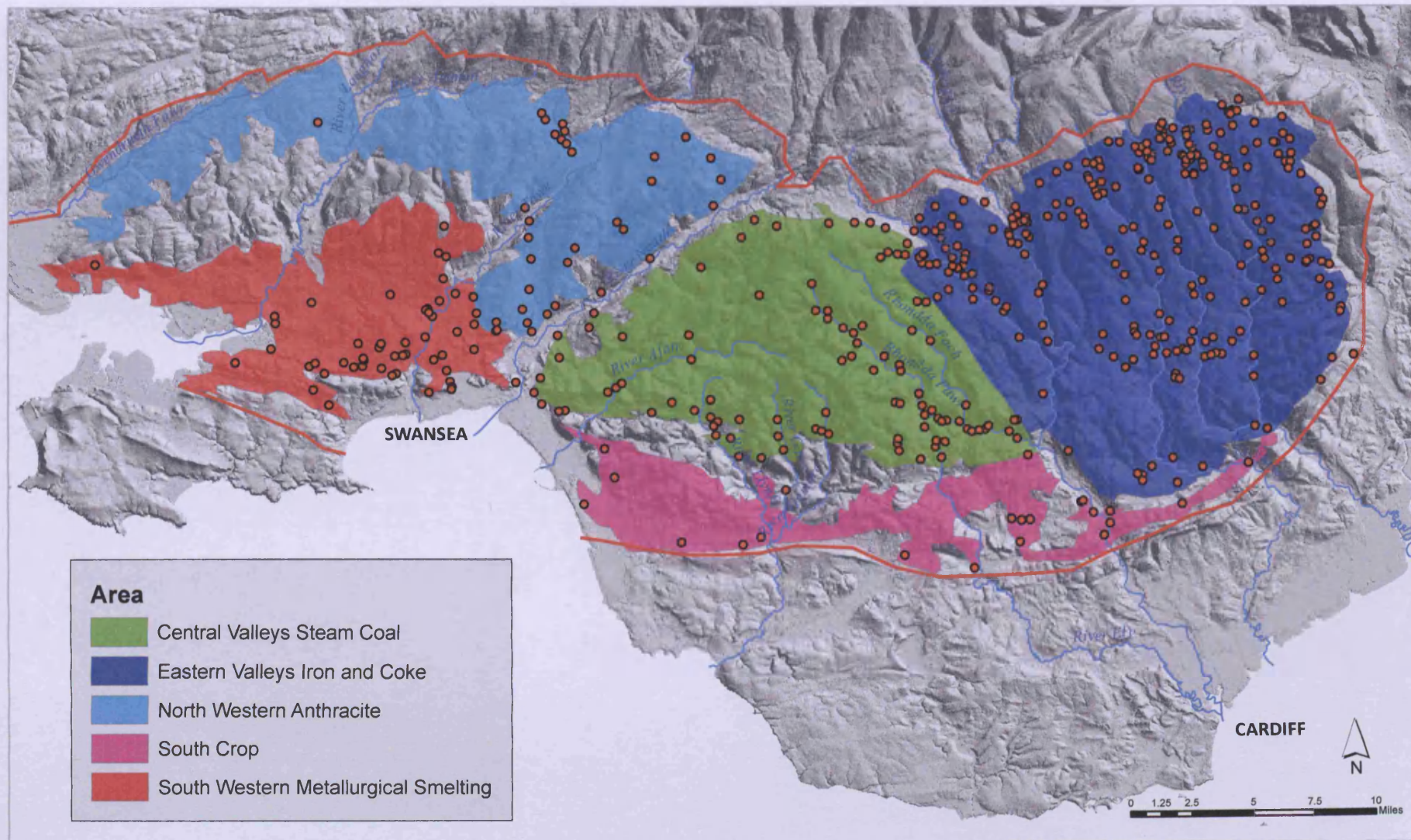


Fig. 7.4: Major Faults in the Ogmore Valley Region

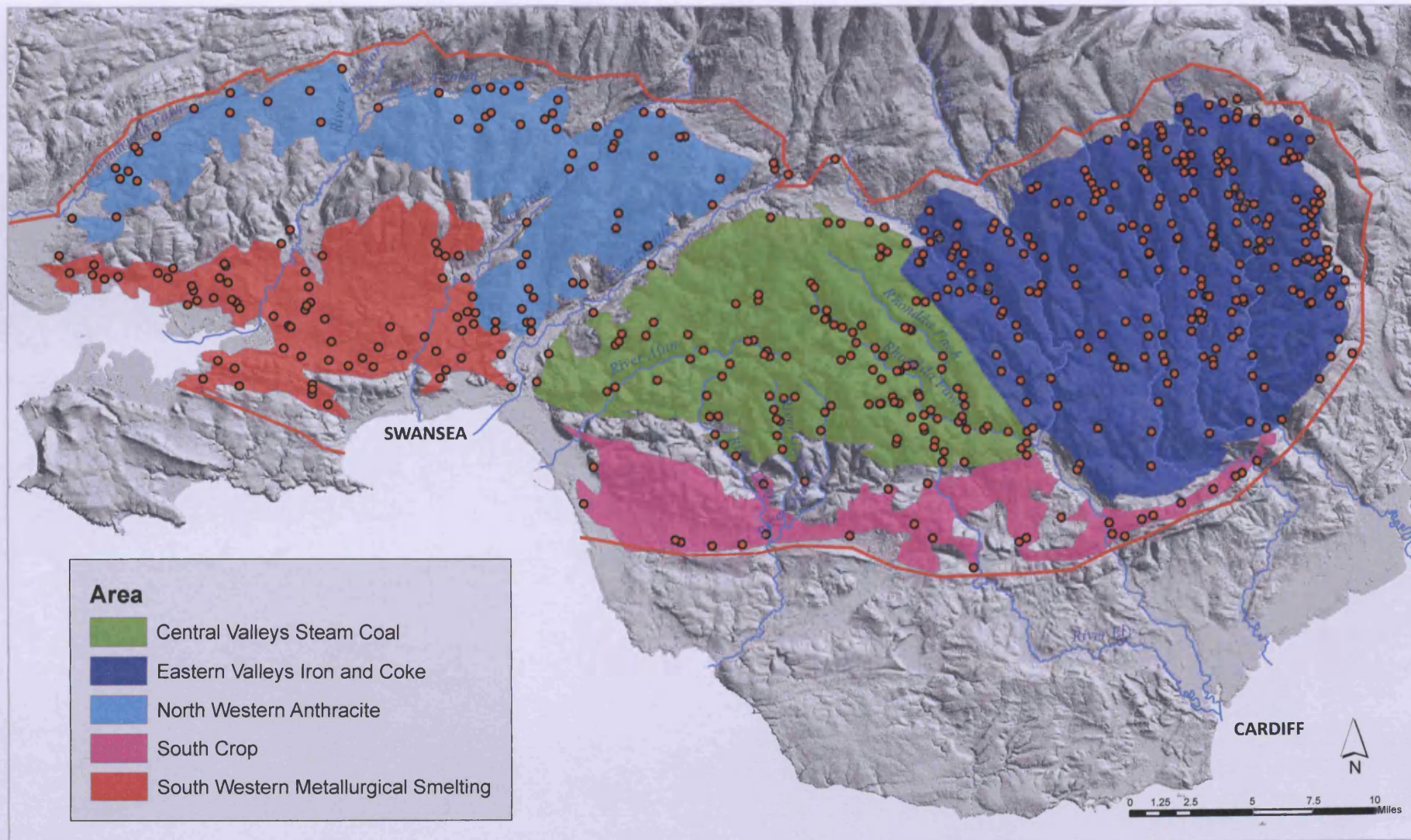
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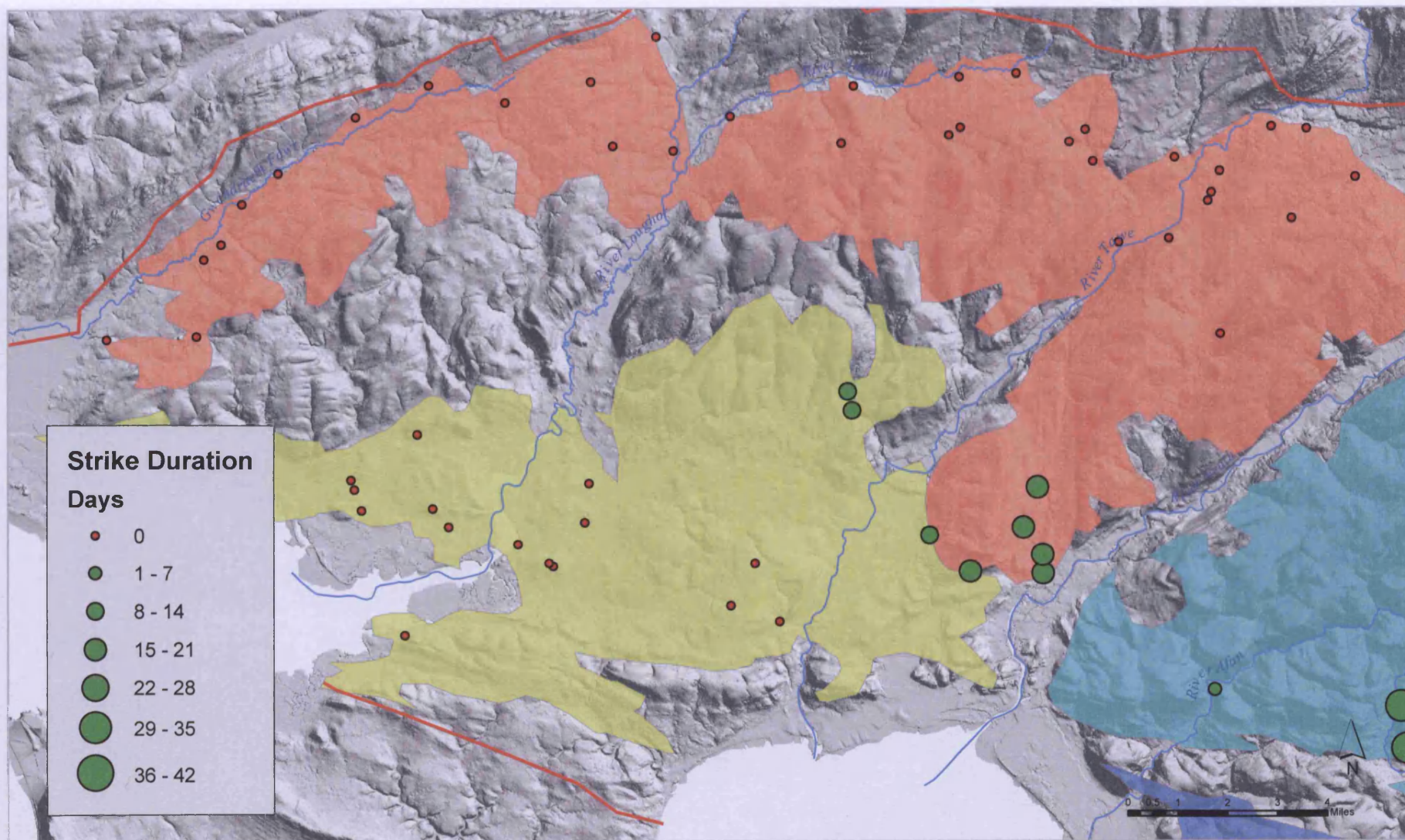
**Fig. 8.1: South Wales Coalfield
Economic Regions**



**Fig. 8.2: South Wales Coalfield 1873
plus Economic Divisions**



**Fig. 8.3: South Wales Coalfield 1893
plus Economic Divisions**



**Fig. 9.1: Strike of 1893
Western Valleys**

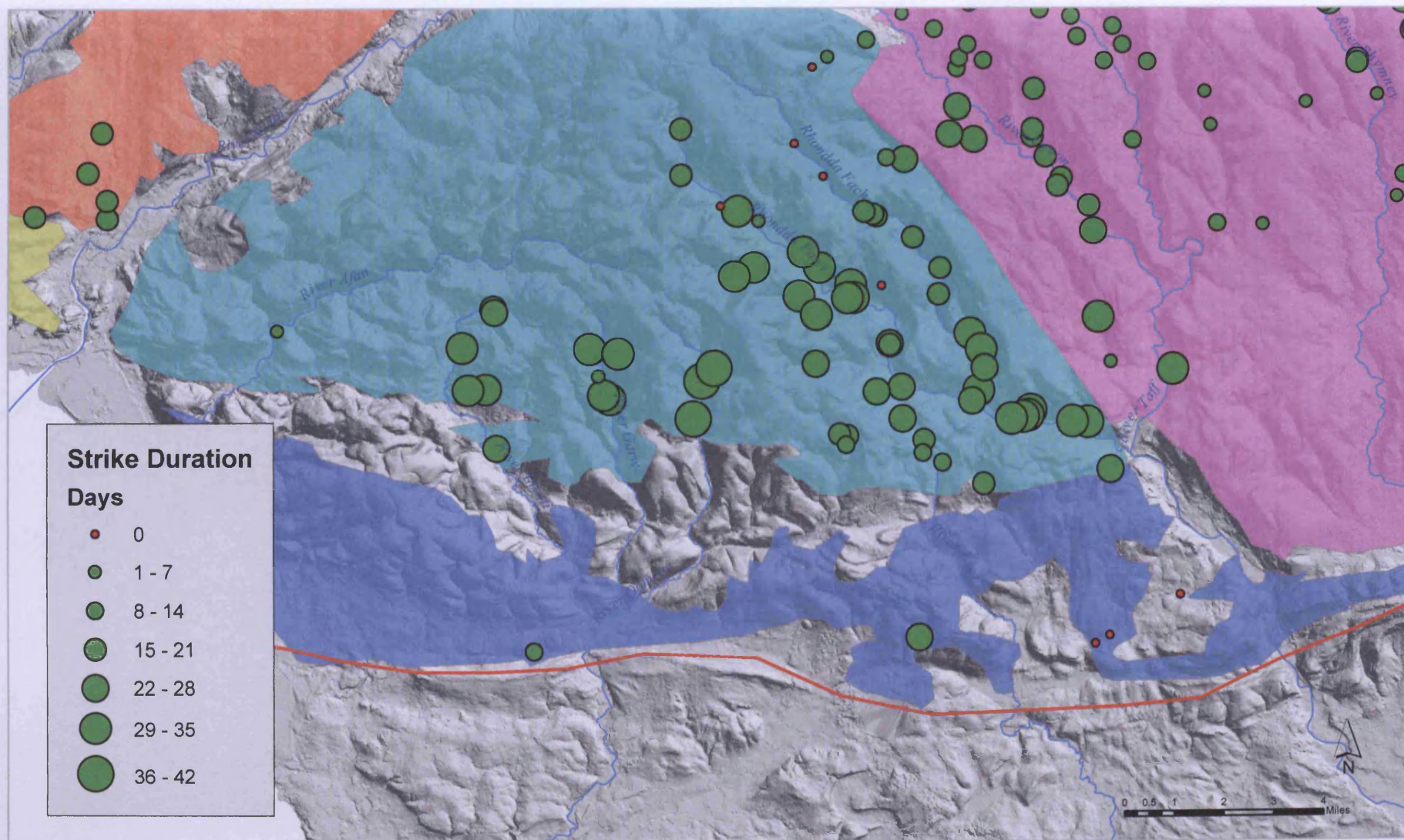
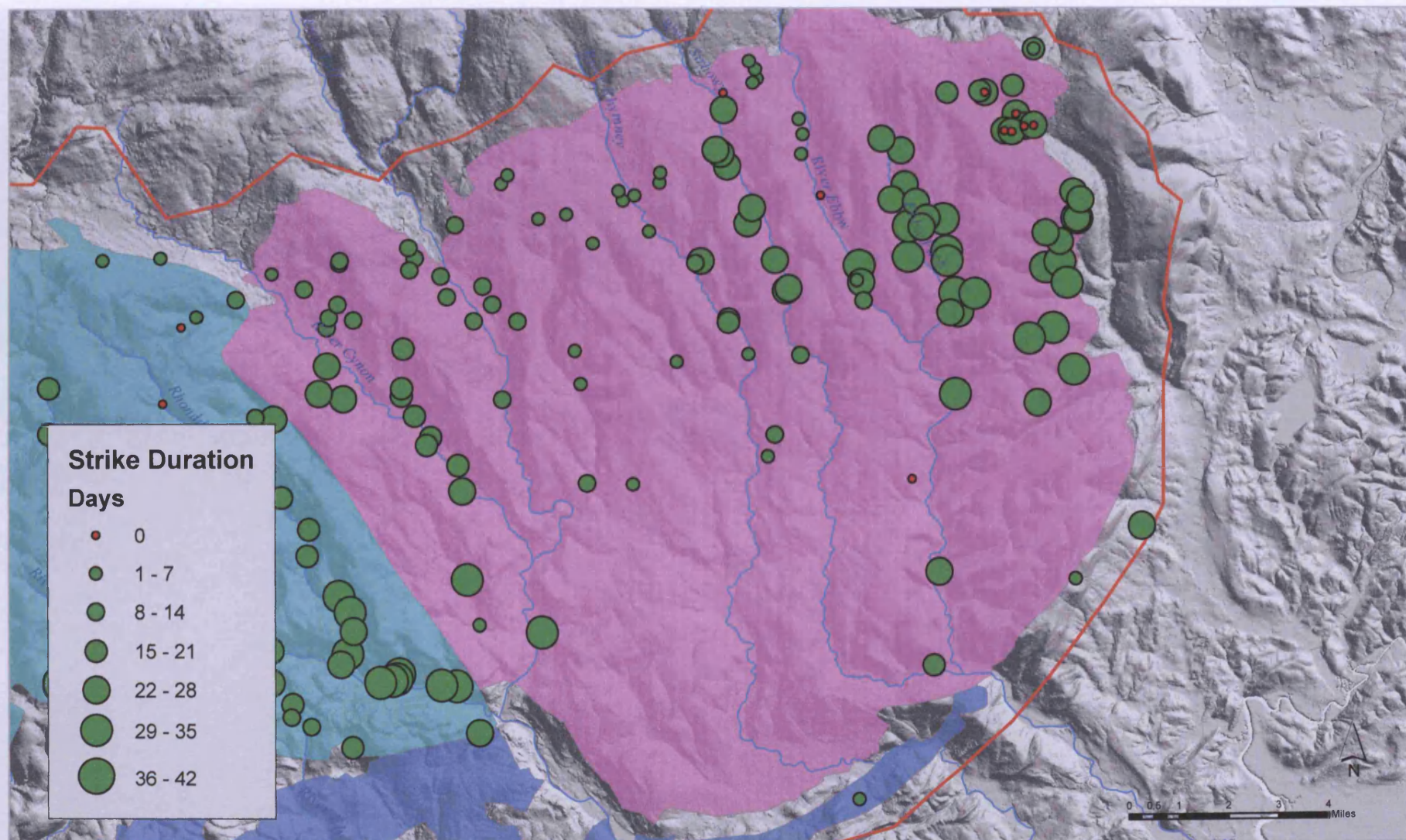
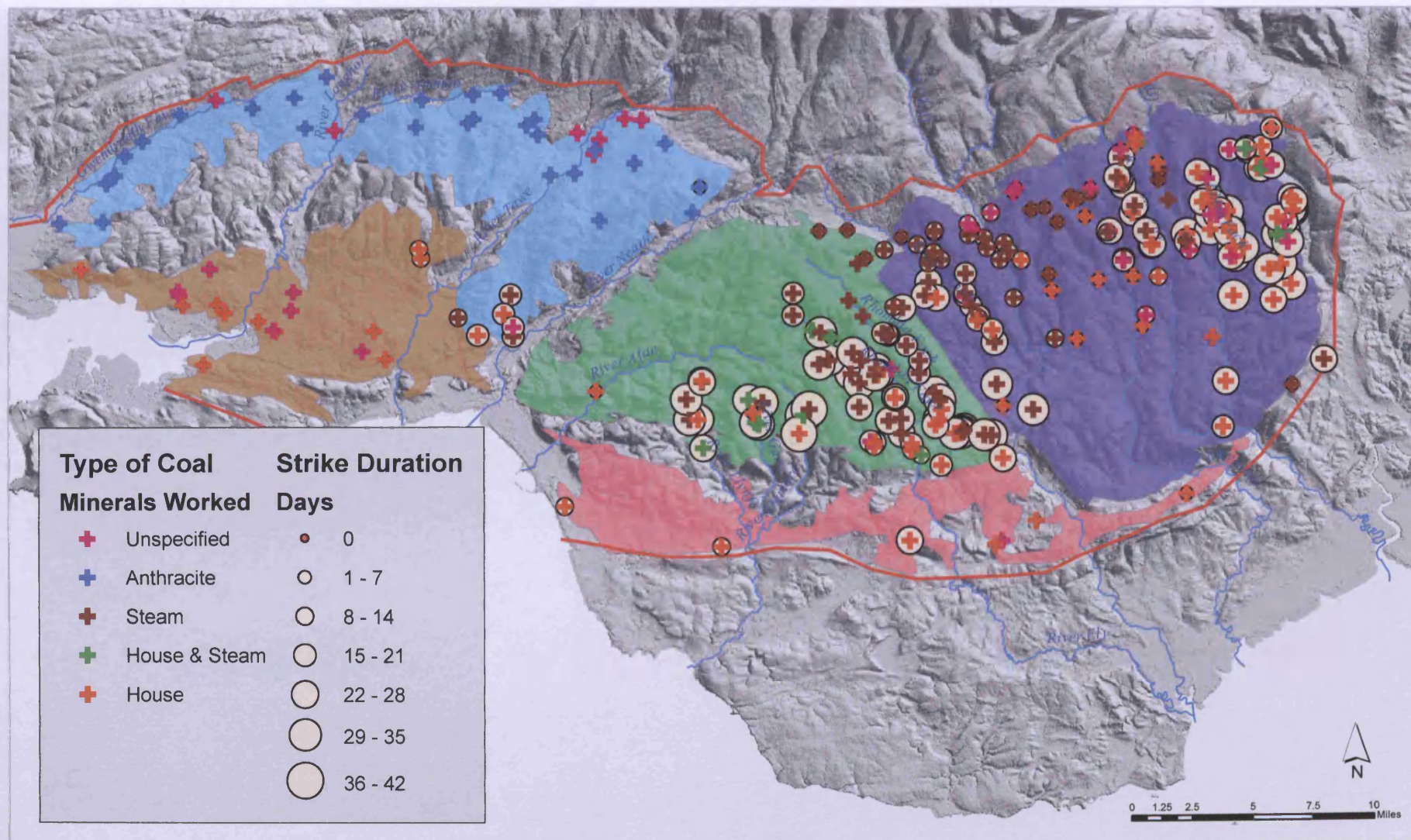


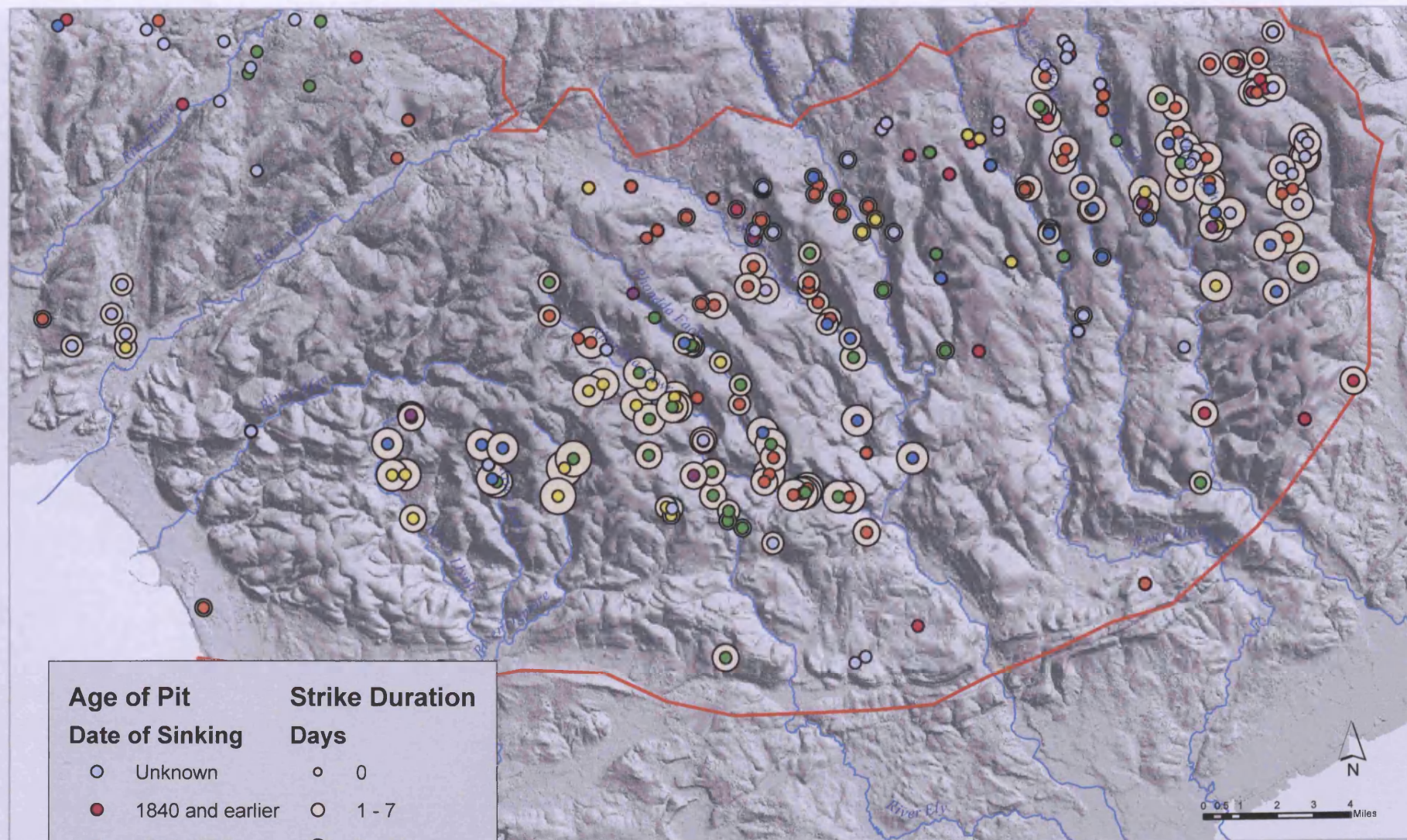
Fig. 9.2: Strike of 1893
Central Valleys & Southern Outcrop



**Fig. 9.3: Strike of 1893
Eastern Valleys**



**Fig. 10: Strike Duration
Pits by Coal Type**



**Fig. 11: Age of Pits and Strike Duration
Central & Eastern Coalfield**

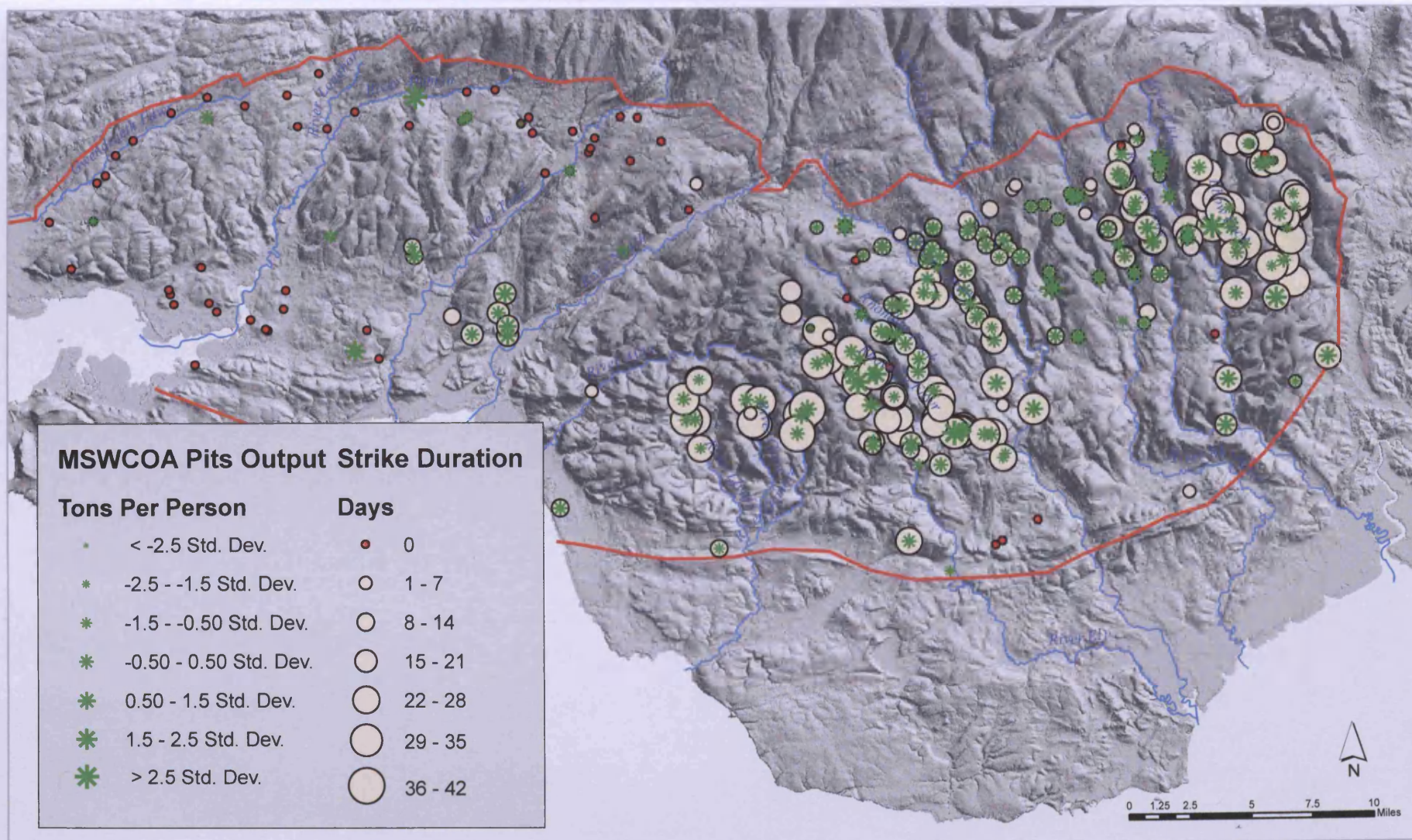


Fig. 12.1: MSWCOA Pits and Strike Duration

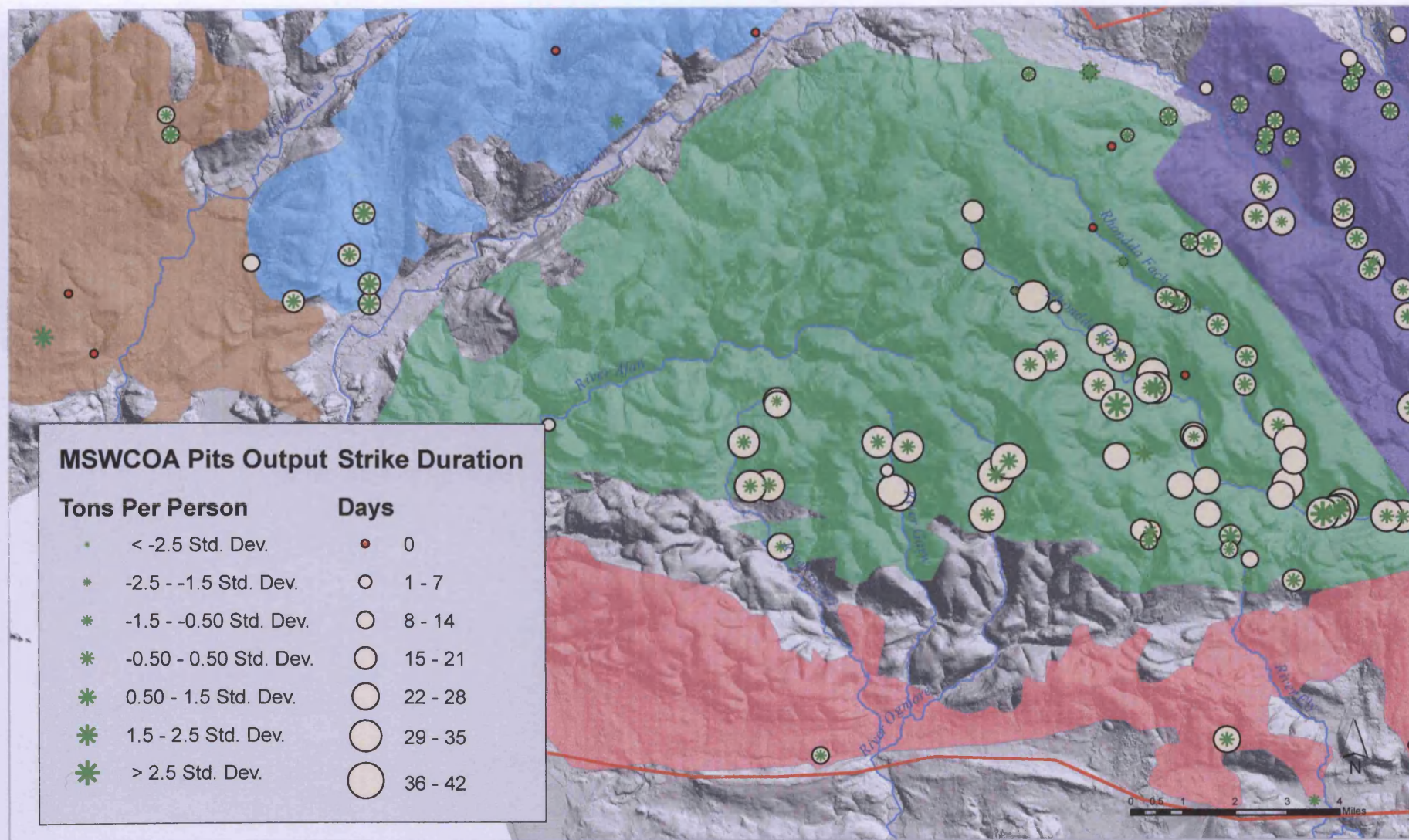


Fig. 12.2: Output Central Valleys

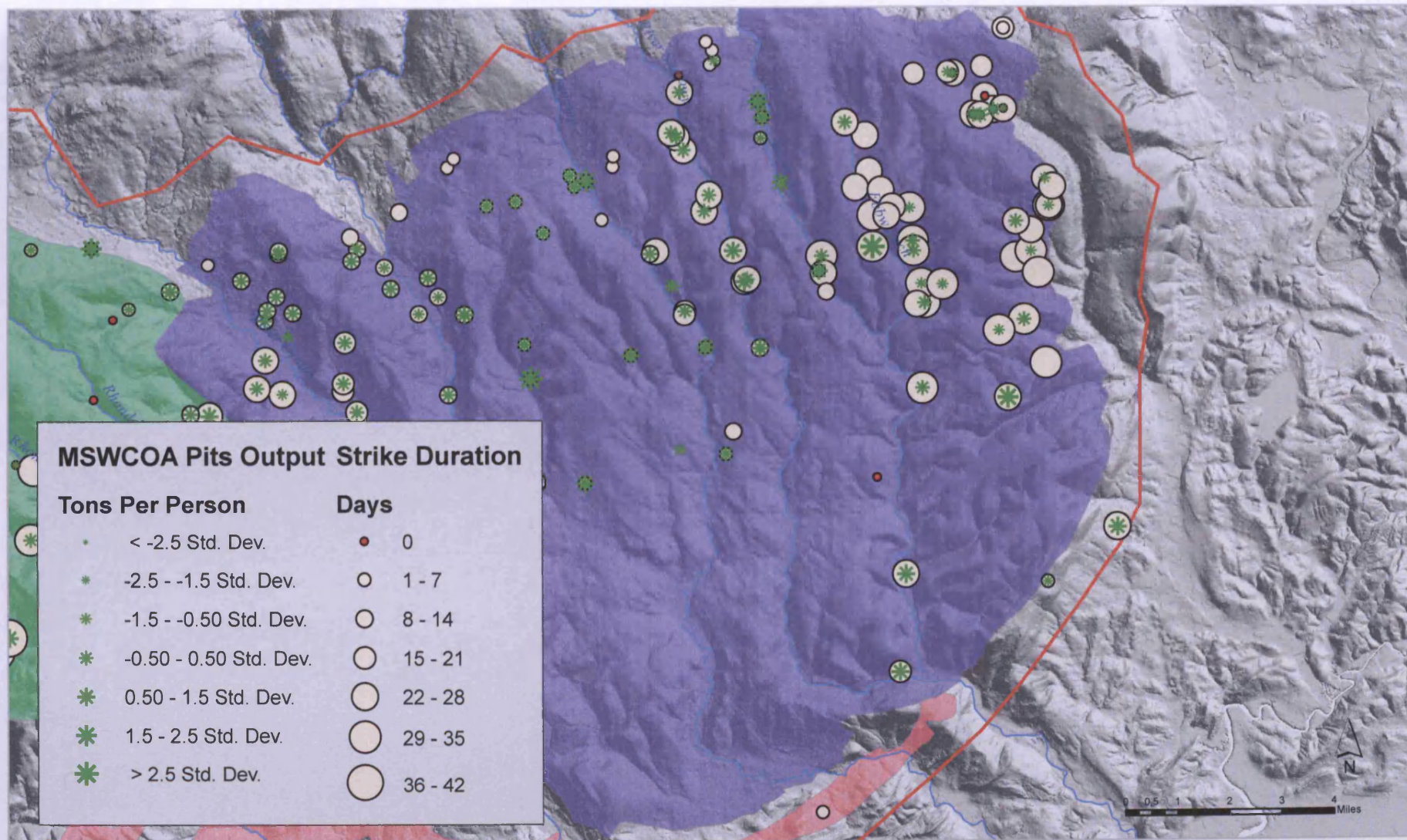


Fig. 12.3: Output Eastern Valleys

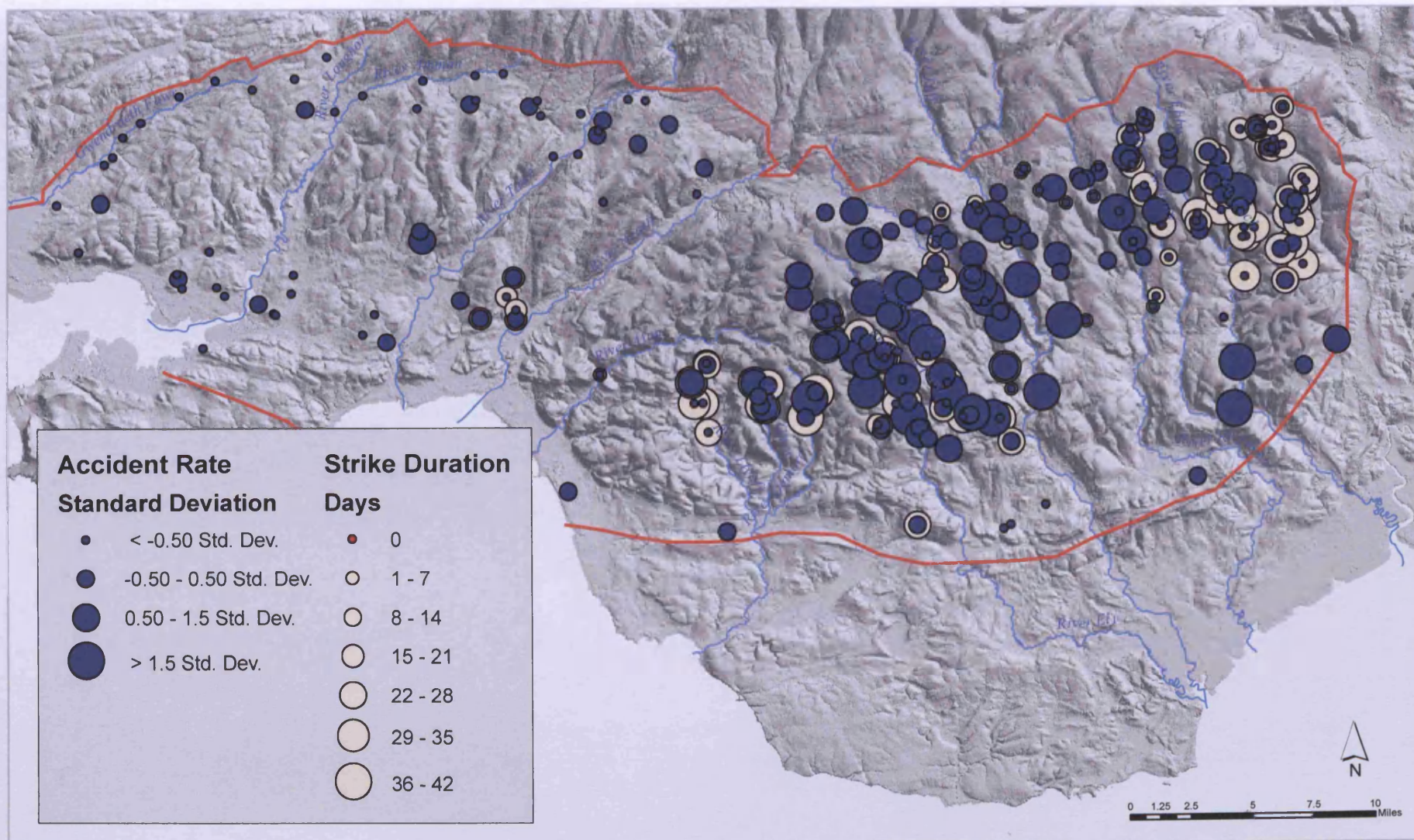


Fig. 13.1: Accident Rate and Strike Duration

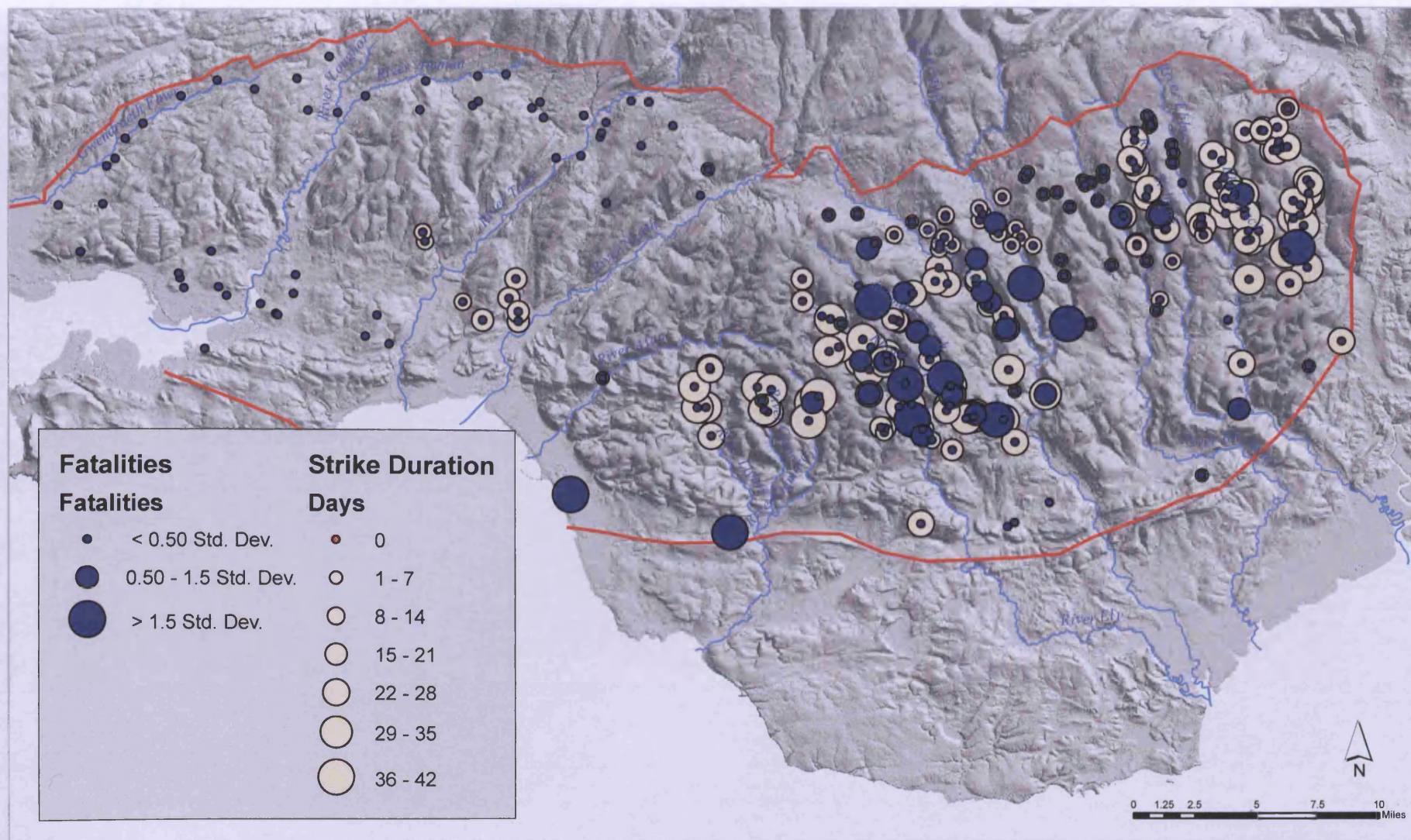
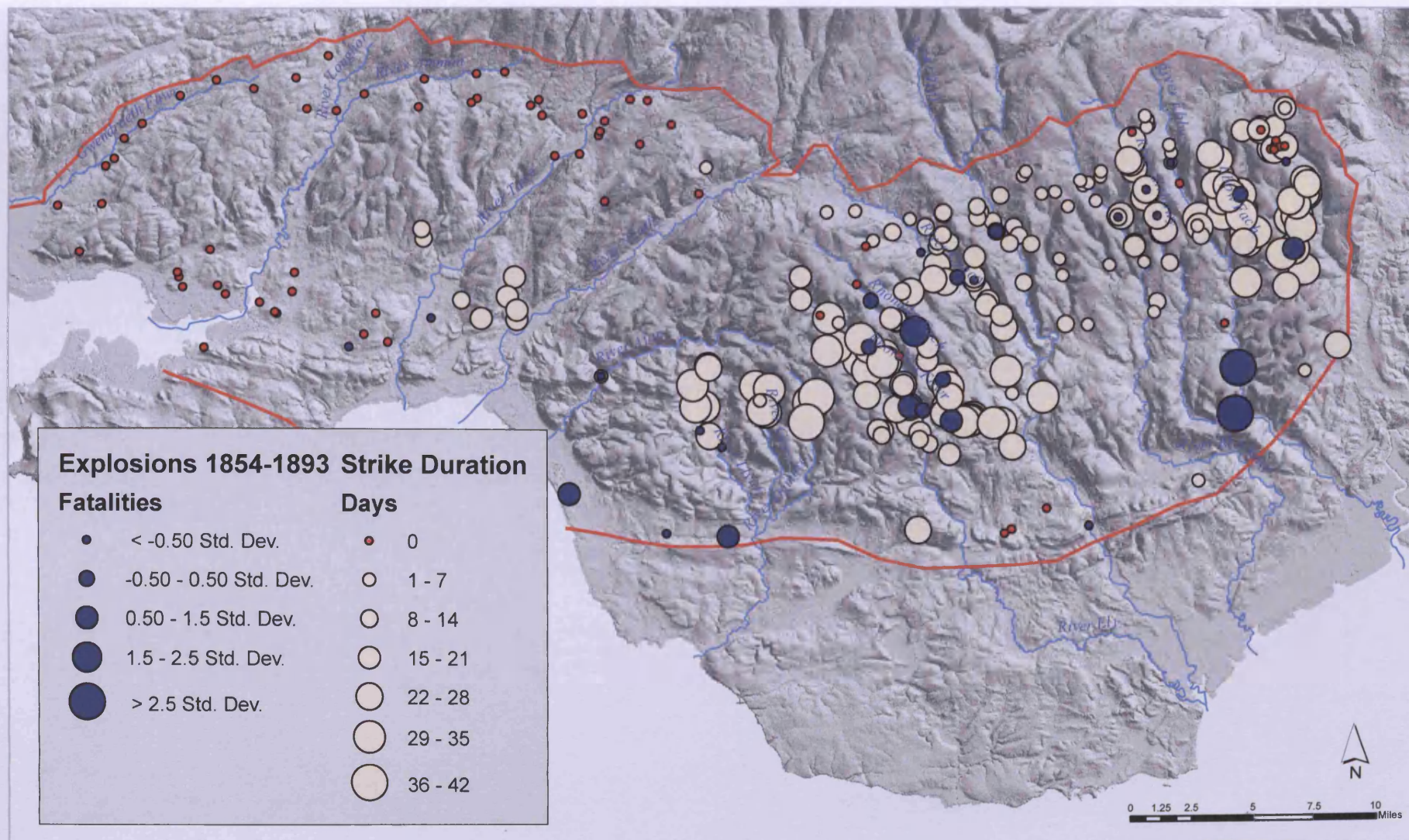


Fig. 13.2: Fatalities and Strike Duration



**Fig. 13.3: Explosion Fatalities 1854-1893
and Strike Duration**

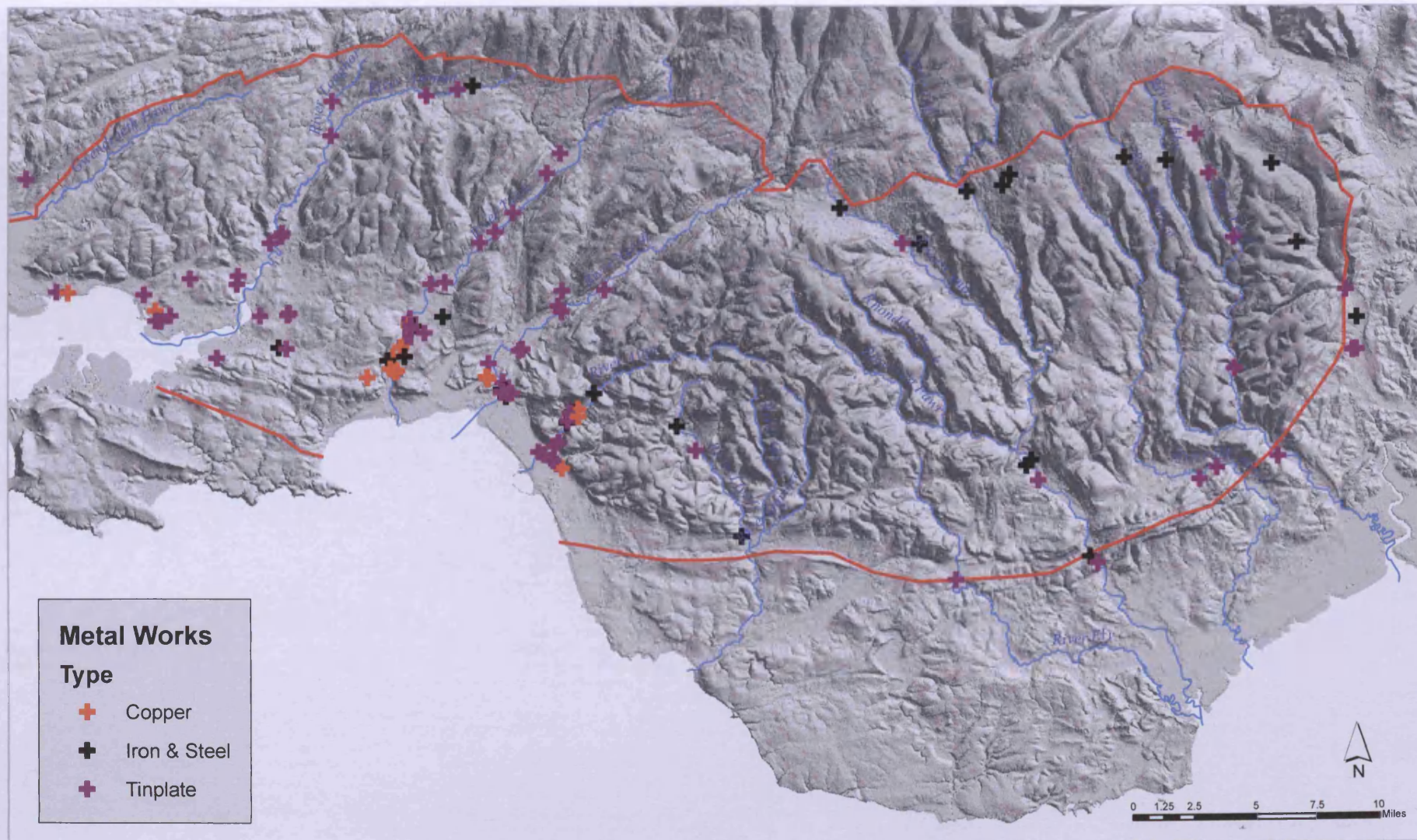


Fig. 14.1: Metal Works

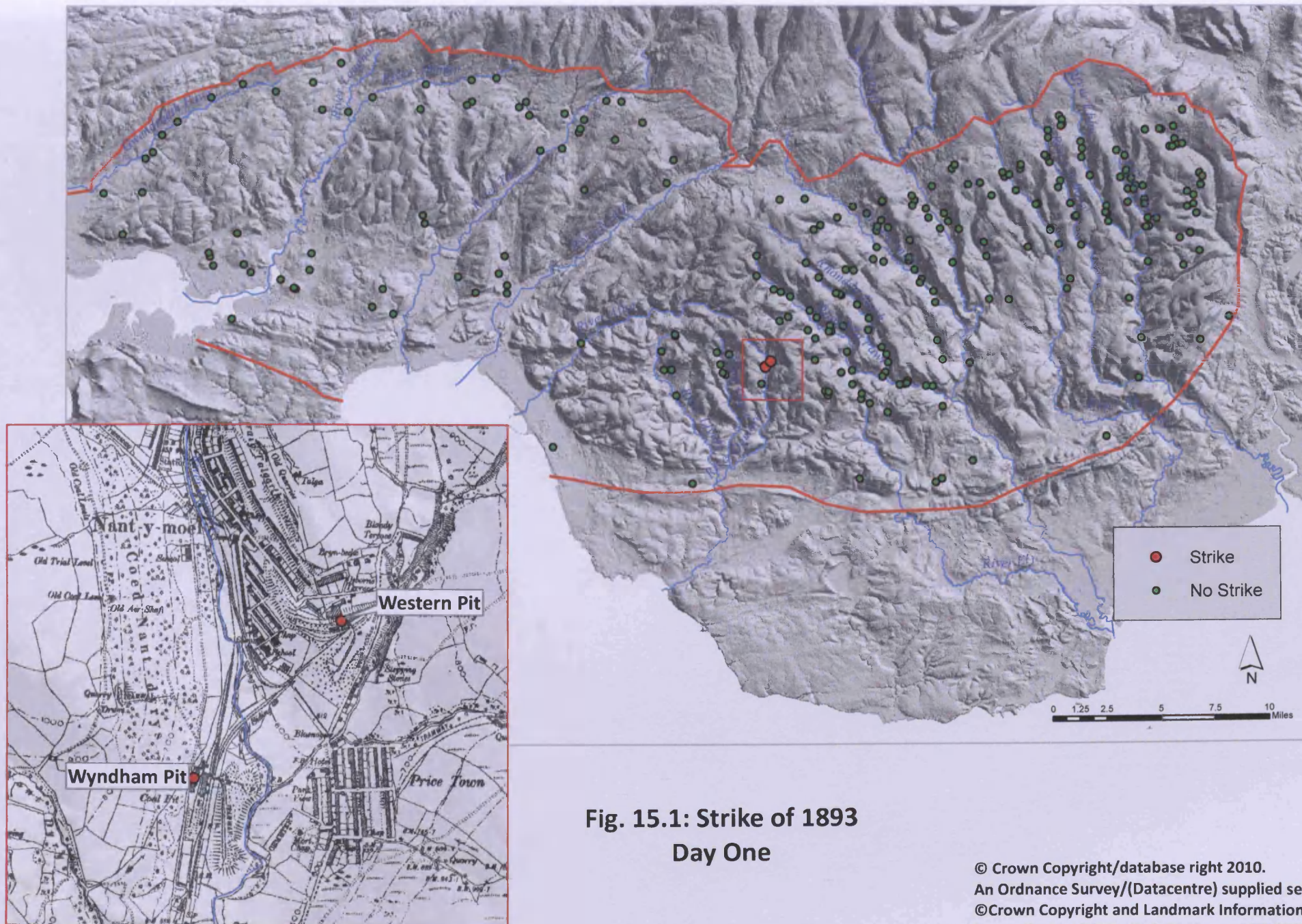
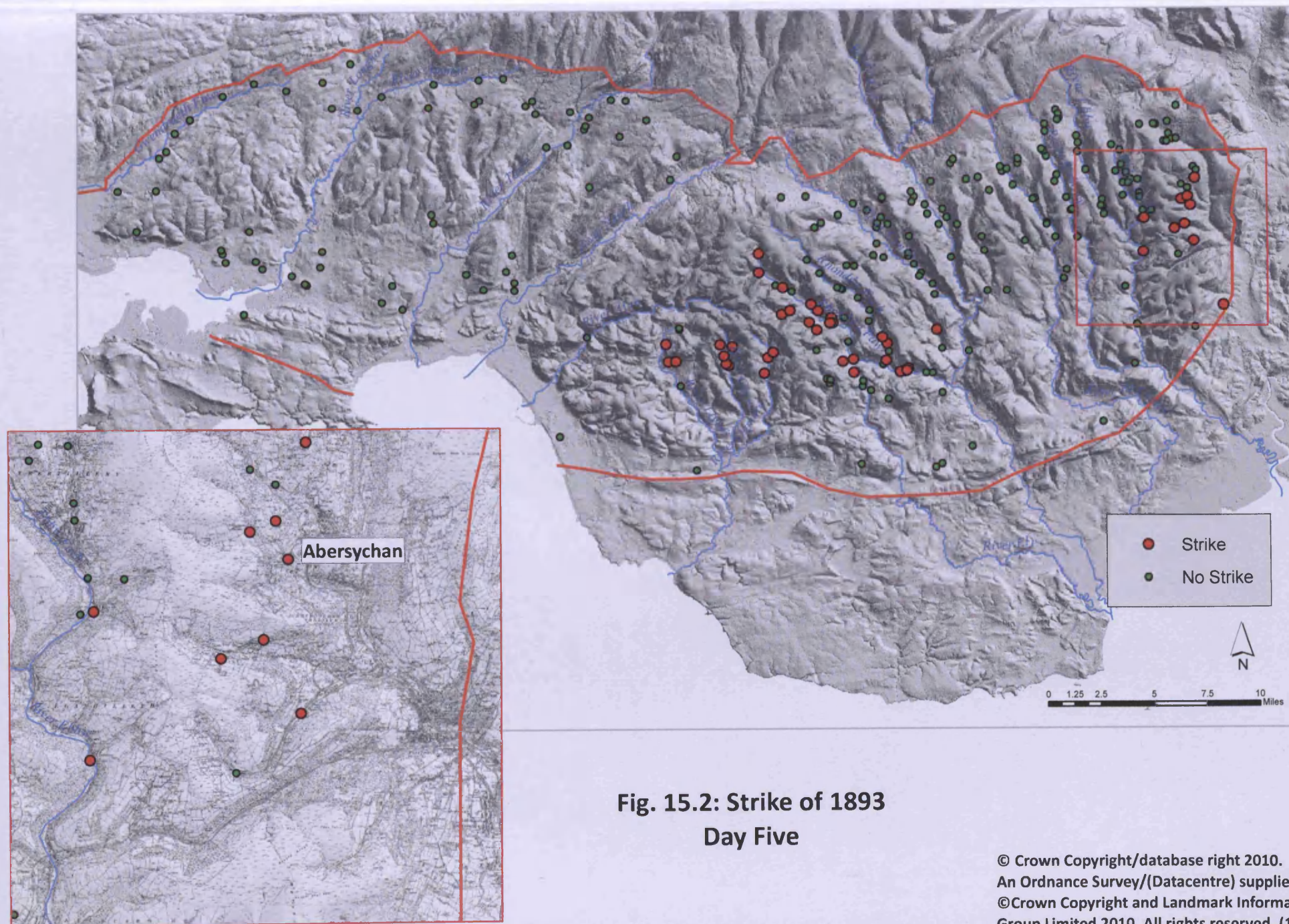


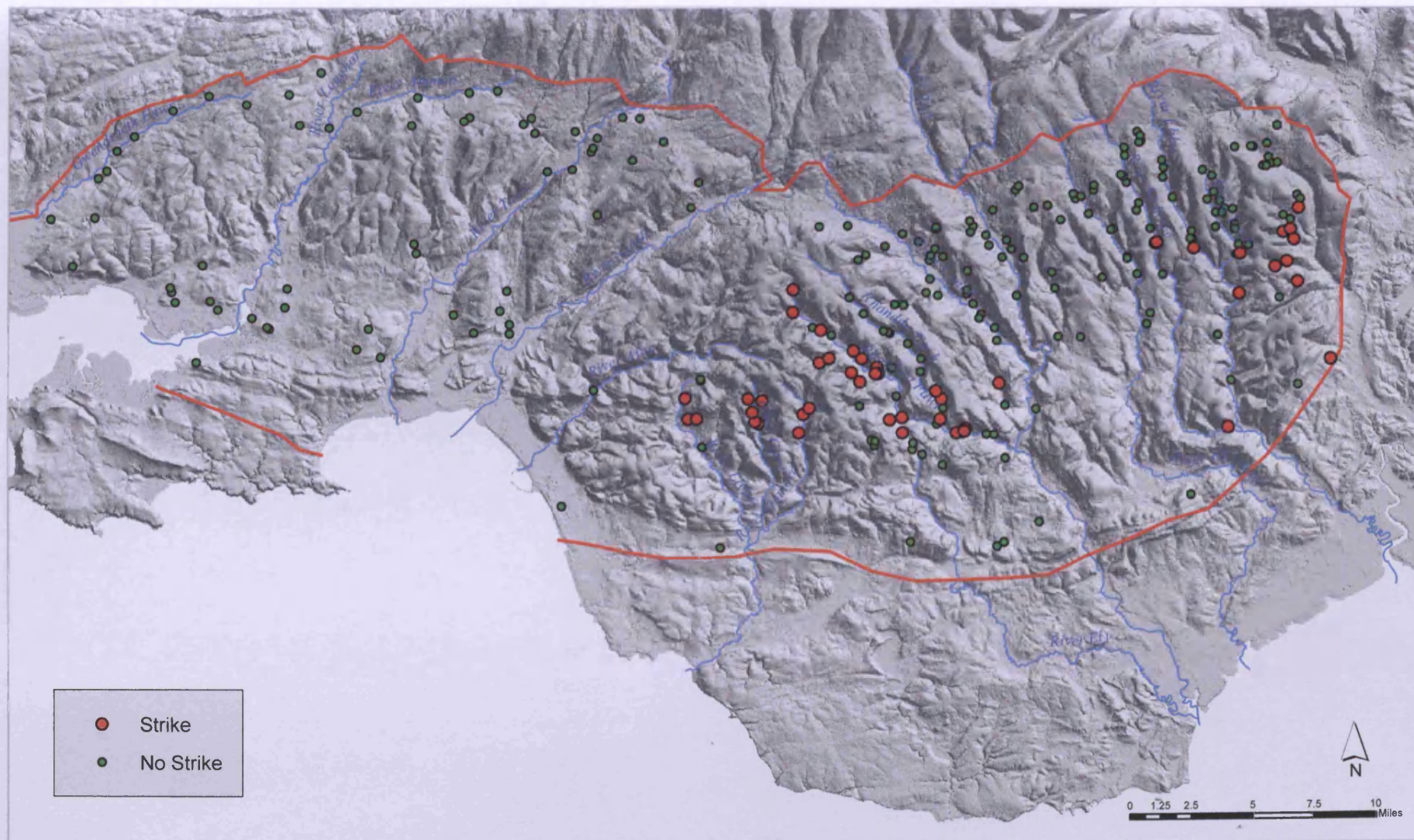
Fig. 15.1: Strike of 1893
Day One

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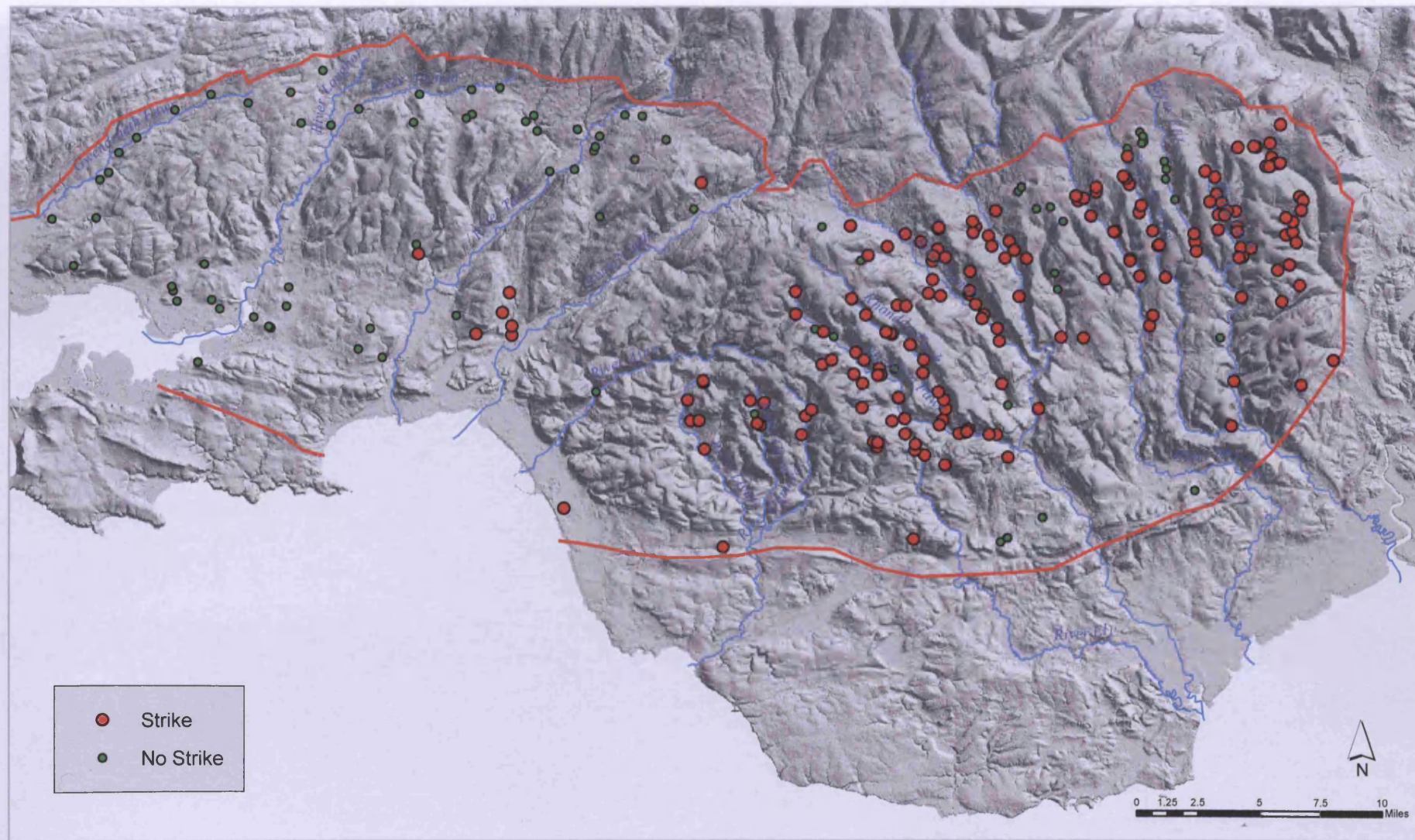


**Fig. 15.2: Strike of 1893
Day Five**

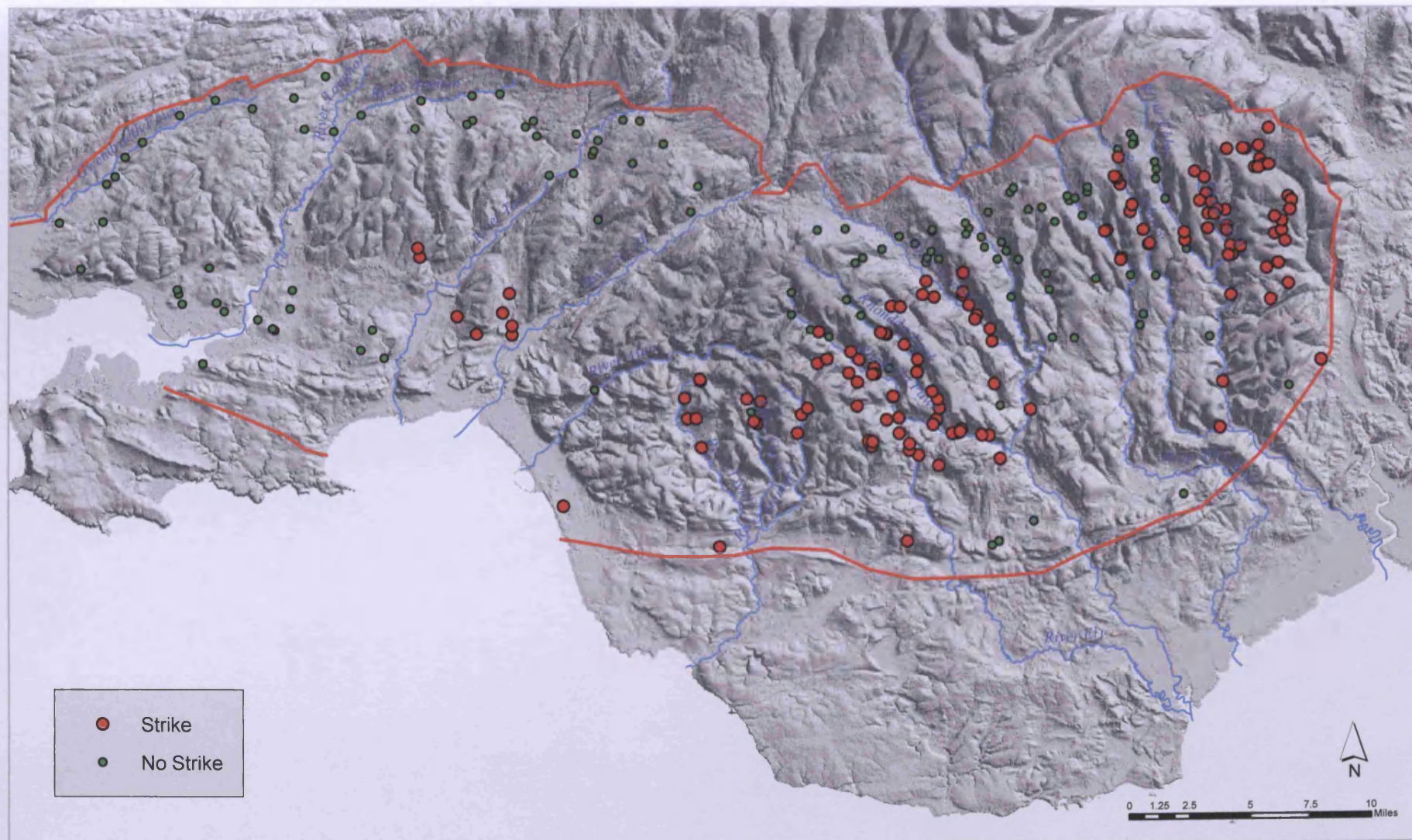
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**Fig. 15.3: Strike of 1893
End of Week One**



**Fig. 15.5: Strike of 1893
End of Week Three**



**Fig. 15.6: Strike of 1893
End of Week Four**

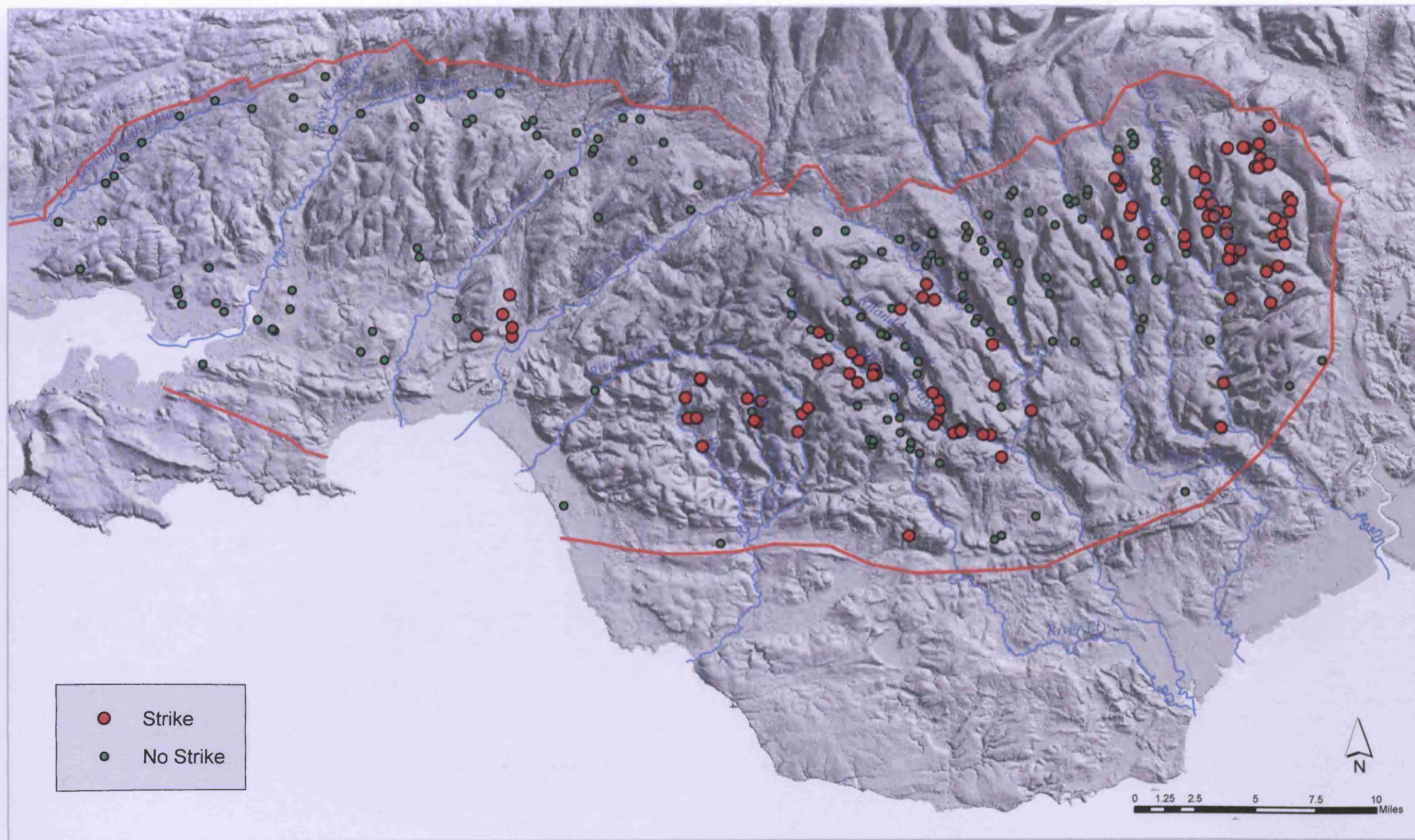
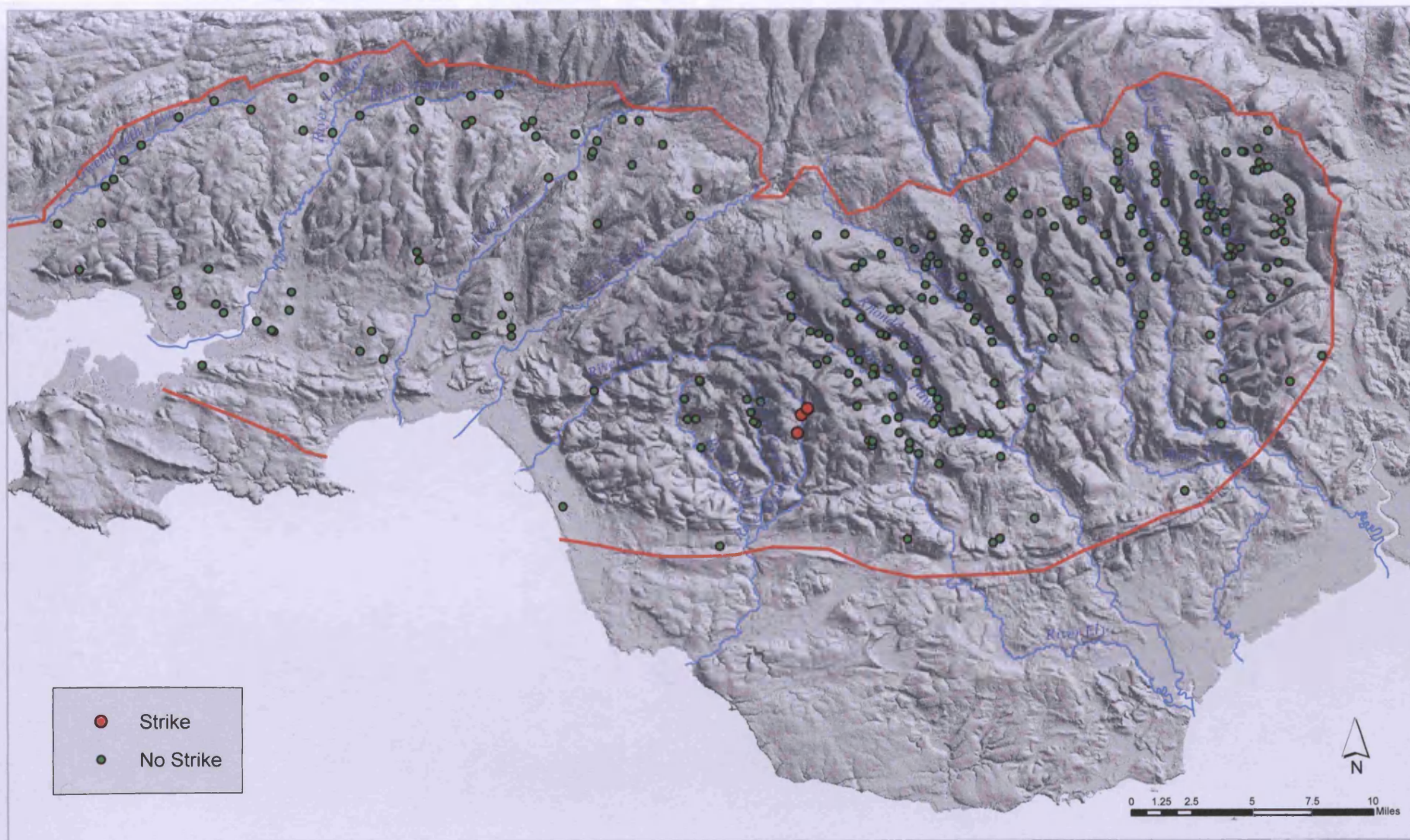


Fig. 15.7: Strike of 1893
End of Week Five



**Fig. 15.8: Strike of 1893
Week Six**



Fig. 16: Railway Network 1893

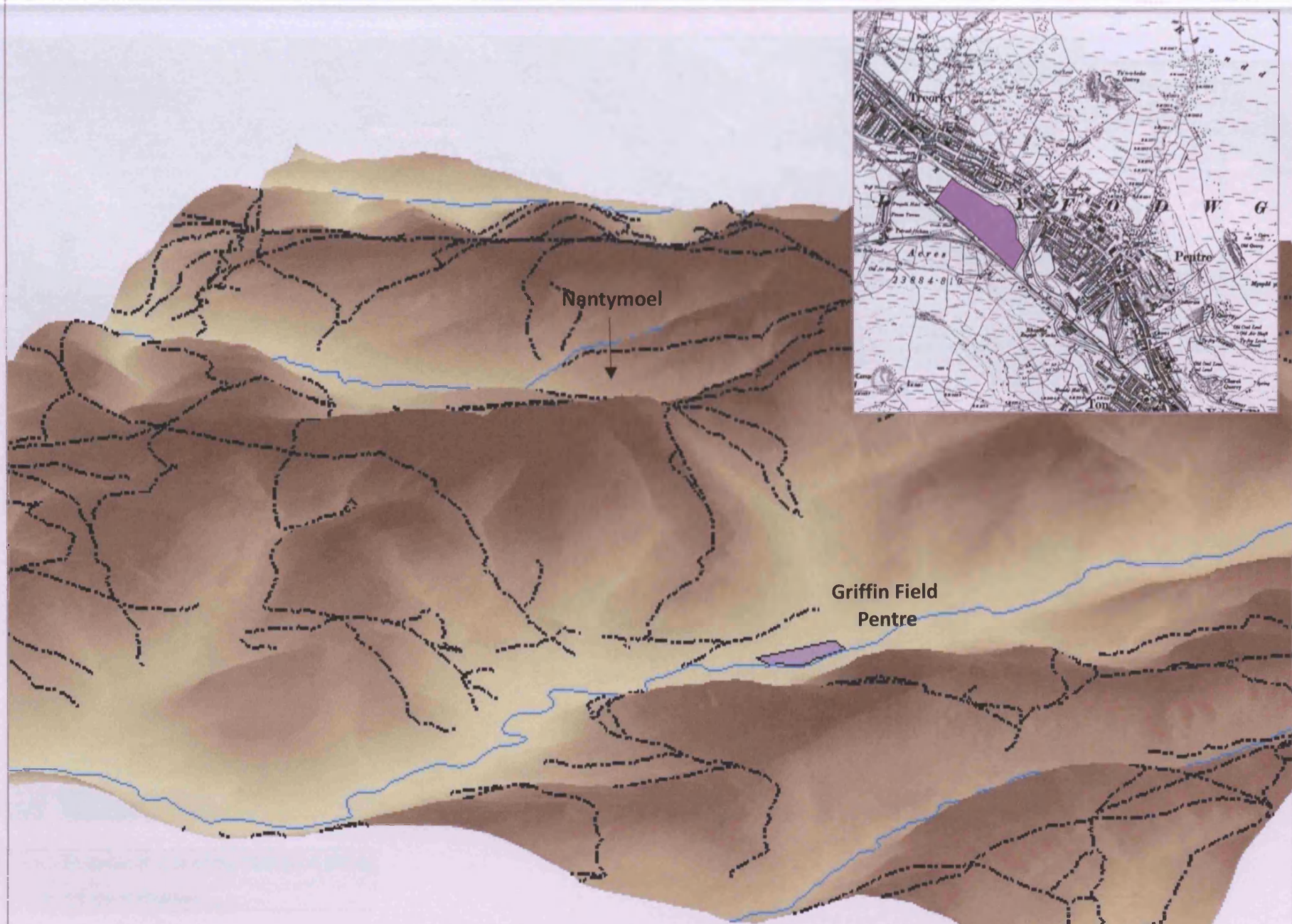


Fig. 17: Griffin Field, Pentre

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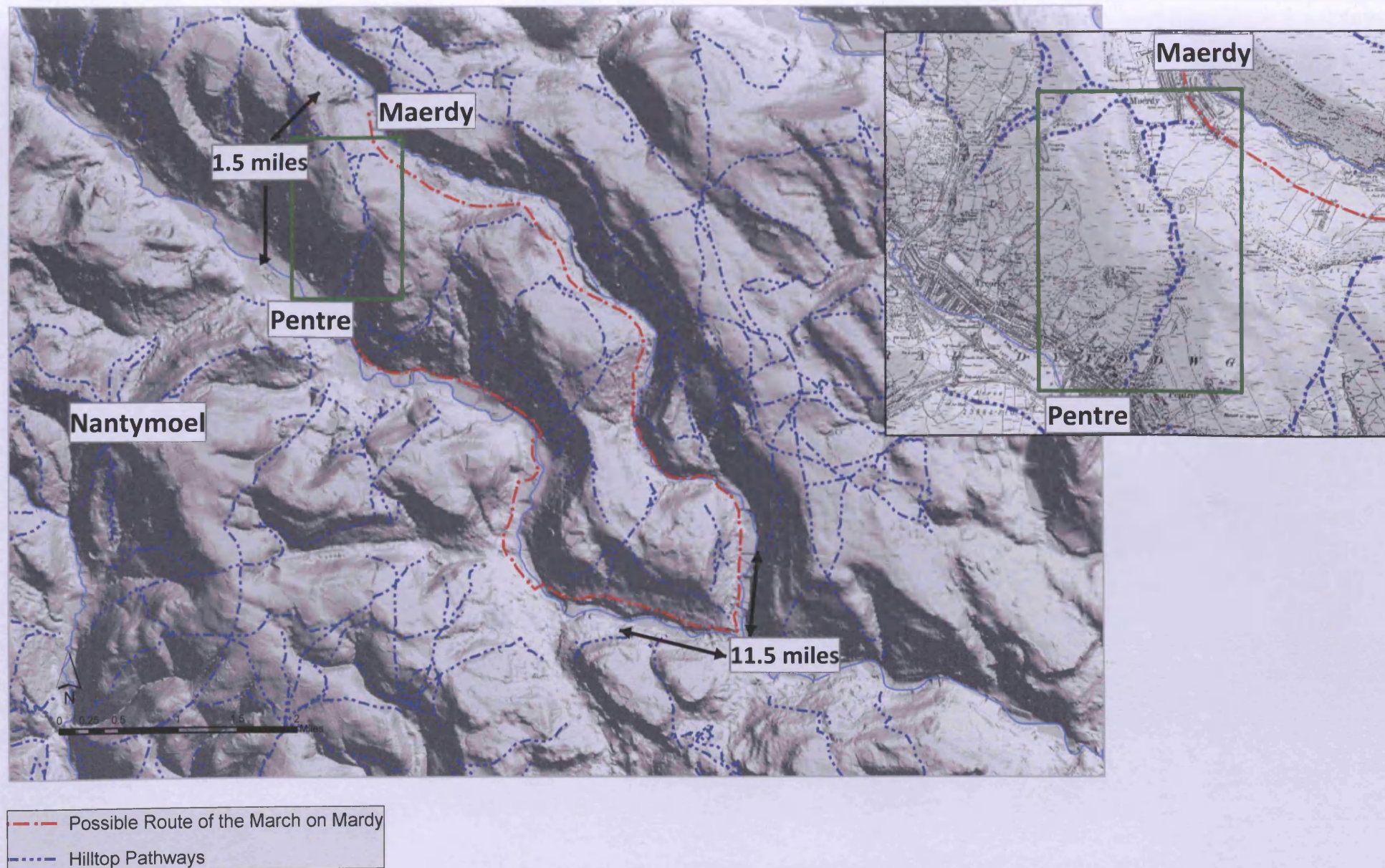


Fig. 18: March on Maerdy

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Fig. 19.1: Viewshed of the Ebbw Valley

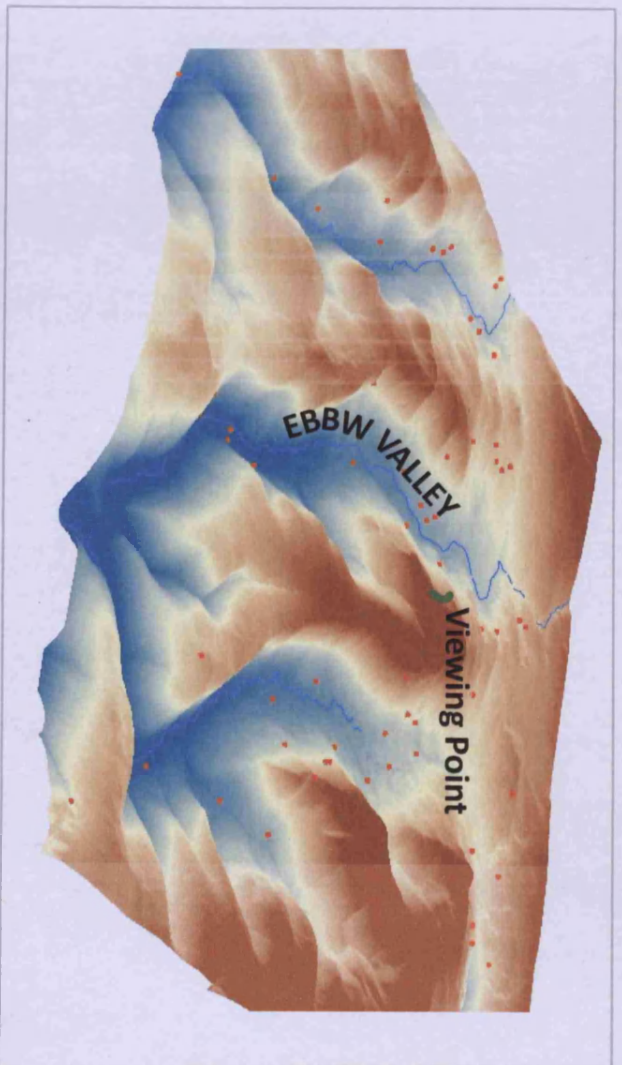
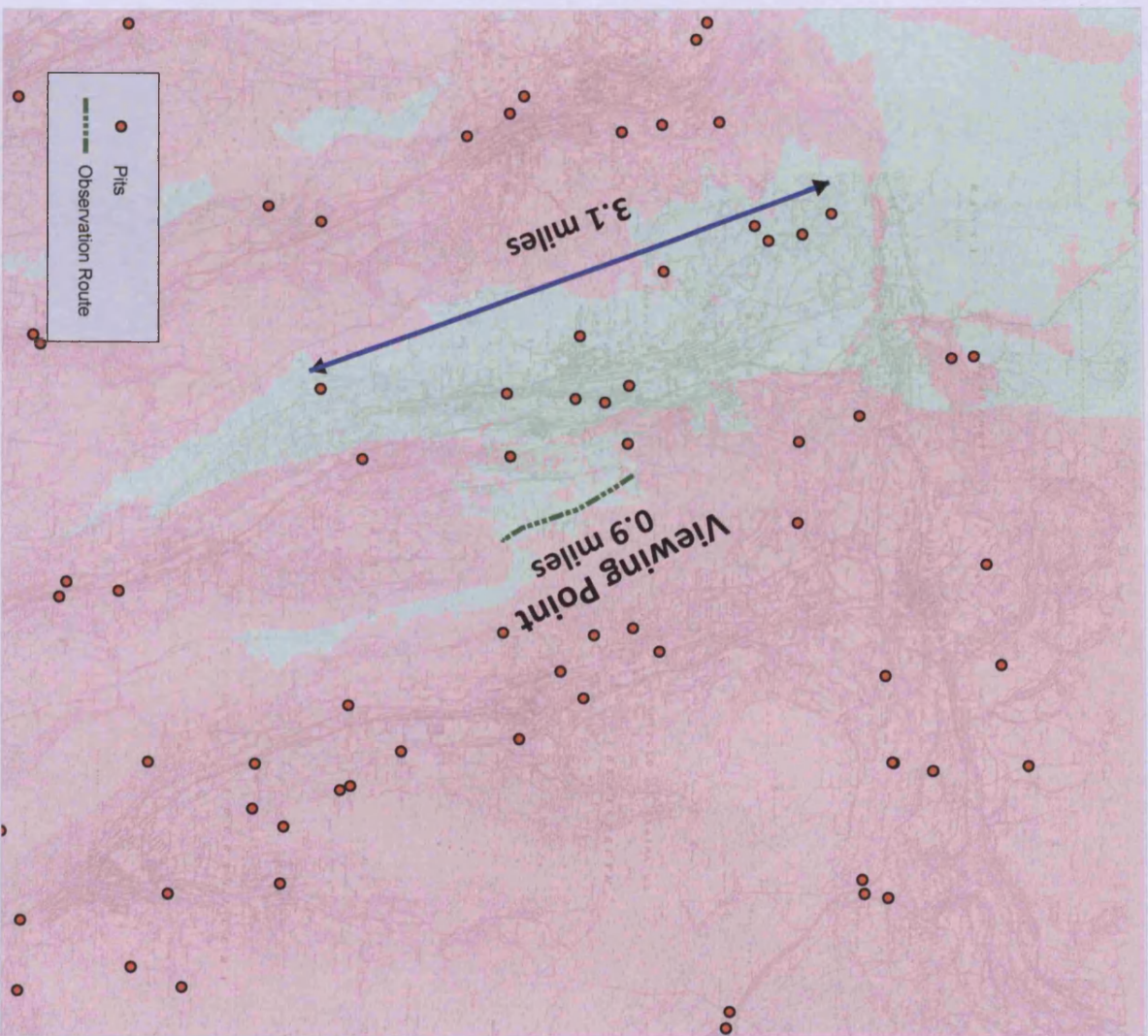


Fig. 19.2: Ebbw Valley Terrain