

Solway Country

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*Land, Life and Livelihood
in the Western Border Region
of England and Scotland*

By

Allen J. Scott

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*In memory of my parents
William Rule Scott and Nella Maria Pieri
A native son and an adopted daughter of the Solway Country*

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PREFACE

This modest volume slowly gestated within me for many years but until my recent retirement from a busy academic career whose preoccupations took me in altogether different directions I could never find the time to bring it into life. I present it now as a book that I wrote entirely for my own pleasure and edification, but that may also appeal to readers with a personal or intellectual interest in the extraordinarily rich physical and human attributes of the lands around the inner Solway Firth, or what I refer to in these pages as the “Solway Country.” At the same time, the book is much more than simply a catalogue of factual information about this part of the world, for it also seeks to show in interpretative terms how the interacting phenomena of land, life and livelihood have evolved in the Solway Country over the centuries, and how this complex process of unfolding has produced a peculiar kind of composite region with a highly distinctive meaning and identity.

As I argue in the chapters that follow, the Solway Country represents a geographic entity with a significant degree of internal regional coherence, even as it is at the same time split by the Anglo-Scottish border into two contrasting but complementary sub-units. Because of this division, there is a persistent tendency for those who write on various aspects of the region to deal with its English and Scottish components as essentially separate and incommensurable entities. By the same token, the published work on the region is for the most part deeply riven into two more or less non-communicating literatures that pay little heed to the common features that extend across both shores of the Solway Firth. My objective in this book is to present the evolution and structure of the region as a meaningful whole, and coincidentally to offer a description of its history and geography that goes far beyond this debilitating rupture. Now that the people of Scotland have clearly expressed their desire to remain part of the United Kingdom it seems more than ever opportune to present a picture of the region in its simultaneously bipartite and yet unified totality.

The Solway Country has always represented a little-known corner of Britain, and apart from Brian Blake’s excellent but now outdated book, *The Solway Firth*, published in 1955, there is little in the way of synthetic overviews of this captivating region. Certainly, the Solway Country has never received as much attention as the two popular tourist destinations to

which it lies adjacent, namely, the Lake District to the south and the Scottish Border Counties to the northeast. That said, there is a fascinating and long-standing body of enquiry on different aspects of the region's development and internal order. Over the last few decades, moreover, a growing number of university researchers and a veritable army of amateur antiquarians, archaeologists, environmentalists, etymologists, geographers, genealogists, historians, and others have added enormously to our knowledge of the region's physical and human dimensions. Much of the writing of these workers has been published in two serial publications, both originating in the nineteenth century and still regularly published today, namely, the *Transactions of the Cumberland and Westmorland Antiquarian and Archaeological Society* and the *Transactions of the Dumfriesshire and Galloway Natural History and Antiquarian Society*. These publications remain by far the most authoritative and detailed sources of information about the Solway Country, and as any quick perusal of the following pages will reveal, the contents of the present book depend to an enormous degree on the copious testimony that they offer. More generally, I owe a very significant debt of gratitude to all those many individuals, past and present, whose enquiries have laid the essential foundations of my own work and whose insights have helped to guide me time and time again into fruitful lines of investigation. The references contained within the book are an indication of the abundance and diversity of these antecedents. I also want to thank the unfailingly helpful staff of Carlisle Public Library, the Cumbria Archive Centre, the Ewart Library of Dumfries, and the Dumfries and Galloway Archives. Lastly, I am especially obliged to Matt Zebrowski, resident cartographer in the Department of Geography at the University of California – Los Angeles for the excellent maps and diagrams that accompany the text.

The book will appeal, I hope, to those who already have some direct experience of the pleasures and satisfactions offered by acquaintance with the Solway Country. It will also have some more than passing interest for the even wider public that is increasingly attuned to the enjoyment of local history and geography as well as to the rewards of informed examination and discovery of the treasures of the British landscape, both rural and urban. In addition, the book is addressed to all those diverse professional scholars for whom local studies are of interest and significance not only for their own sake but also as vehicles of reflection on the much wider canvas of human life in general. In any case, I am delighted to share this very personal exploration with the public at large in the hope that some will discover as they peruse it an echo of the same fascination with the Solway Country that has motivated me to write it.

For the convenience of the reader, endnotes are placed at the end of each chapter. A gazetteer of places mentioned in the text together with Ordnance Survey grid references is presented at the back of the book.

CHAPTER ONE

IN SEARCH OF THE SOLWAY COUNTRY

Region, Place, Landscape

There is a unique but elusive type of satisfaction that derives from the contemplation of the intimate history and geography of particular localities. This sentiment is often notably intense when the encounter is direct via immediate observation, but also even when it takes the indirect form of scrutinizing maps, photographs, archival materials, and the musings of retired academics. On certain occasions, an encounter of this sort results in a moment of crystallization in the mind of the observer when the diverse details of local history and geography seem to take on definite articulation and focus. I mean by this an informed recognition of a coherent local identity, embodied in the landscape, and expressed in a distinctive regional character. Relph has referred to a similar process that occurs when the amalgam of physical features, historical residues, and visible marks of human life that make up the landscape crystallize into “a sense of place.”¹ Over a century ago, the French geographer, Paul Vidal de la Blache, proposed the complementary idea that selected regions are endowed with personality reflecting the impress of human affairs on the land, and he expressed this notion of personality in the metaphorical guise of “a medallion struck in the image of a people.”²

I offer these remarks at the outset because they are so apposite to the tract of land that I refer to in these pages as the *Solway Country*. This undeservedly disregarded area lying around the shores of the Solway Firth possesses a personality that vigorously affirms itself by virtue of its unusual degree of physical symmetry and the exceptional human drama of conflict and conquest, adversity and accomplishment, that has unfolded across its surface from time immemorial. However, like any other multifaceted regional entity, the Solway Country inevitably resists hard and fast definition. In particular, while it unquestionably represents a distinctive object of attention and intellectual appreciation, its outer borders are never anything but an indeterminate zone of transition. Figure 1.1 depicts the Solway Firth and its surrounding lowlands in the context of

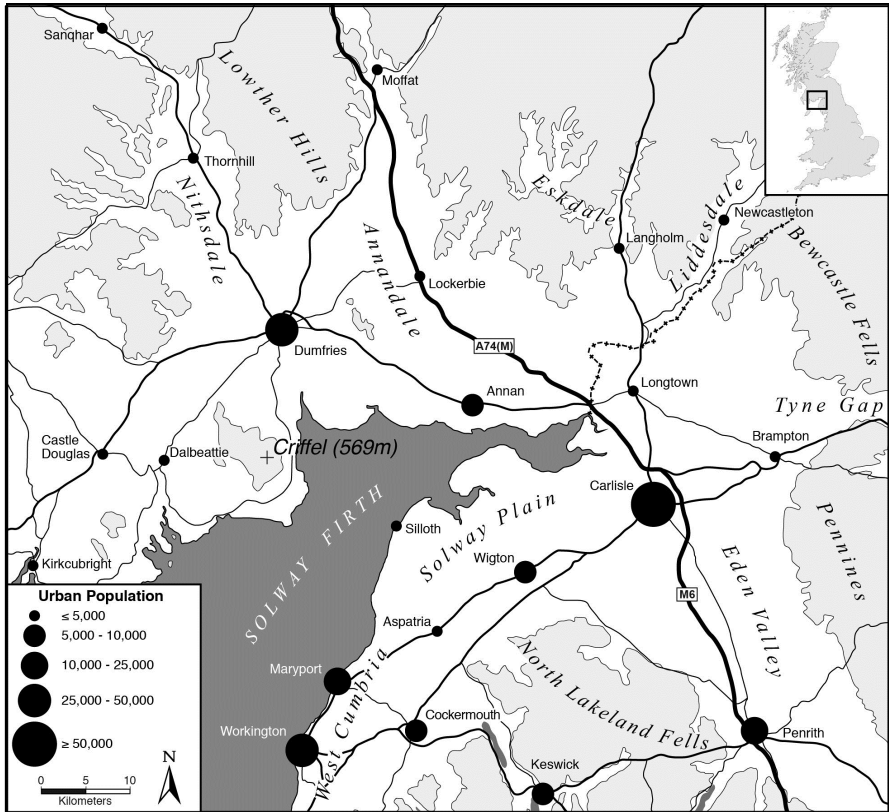


Figure 1.1. General situation map showing the Solway Country and its immediately surrounding area. Urban population figures are for 2011. Land over 200 metres above sea level is shaded.

their wider geographical situation. The lowlands thus identified form a shallow basin constituting the essential terrain of the Solway Country. The edges of this basin rise towards the Lake District Massif in the south, towards the Pennines and the Bewcastle Fells in the east, and towards the Southern Uplands of Scotland in the north. As we follow the Solway coast to the south, the region fades imperceptibly into West Cumbria, and as we move westwards along the northern shore of the Firth we come eventually to the old county of Wigtownshire in Galloway. However, I shall take it that West Cumbria and Wigtownshire lie for the most part outside the terms of reference of this book. The former area is an old and now

exhausted focus of coal mining and steel production and represents a highly idiosyncratic spatial formation in its own right; the latter has its own peculiar cultural and political history that distinguishes it in many different ways from the region under consideration here. The core area of the Solway Country proper, then, can be identified more or less with the lowlands that surround the inner or upper Solway Firth (comprising an area that is approximately 90 kilometres from east to west and 60 kilometres from north to south). But again, and in the spirit of these remarks about the necessary fuzziness of the region's boundaries, the discussion in the present book will range over narrower or wider expanses of terrain relative to this benchmark identification, depending on the specific topic in view.

In spite of the many features that constitute the unifying identity of the Solway Country's landscape, the region is fragmented into a diversity of administrative units that in different ways may be thought to compromise its alleged identity. The southern portion of the region is contained within the former county of Cumberland, which itself was absorbed into the newly constituted county of Cumbria after the local government reforms of the early 1970s. The northern half of the region coincides with part of the old counties of Dumfriesshire and Kirkcudbrightshire (or the Stewartry as the latter is sometimes referred to³), though these administrative units (along with Wigtownshire) were also abolished in the early 1970s and assimilated into the new Dumfries and Galloway Council Area. In addition, a small sliver of land in the northeast corner of the Solway Country, corresponding with Liddesdale, or the valley of the Liddel, lies in the former county of Roxburghshire, which has now been absorbed into the Scottish Borders Council Area. An even greater source of divergence is the fact that the Solway Country is riven into separate English and Scottish entities by the border that extends through the region southwards and westwards downstream along the Kershope Burn, Liddel Water, the Rivers Esk and Sark and then through the main channel of the Solway estuary. Even so, and without in any sense repudiating the dual English-Scottish qualities of the region, its frontier character can be seen as contributing to a joint identity covering both of its national segments just as much as it represents a symptom of cleavage.

To begin with, the English and Scottish portions of the region share in a strikingly unified physical setting comprising the glaciated lowlands encircling the inner Solway Firth with its distinctive peat bogs and coastal marshlands. There is also a strong though remote historical connection between both halves based on their joint incorporation into the early kingdoms of Strathclyde and Reghed and on their unification under the rule of David I of Scotland. Then again, over most of the medieval period,

when the border represented a strong line of political cleavage, the English and Scottish halves of the region were caught up in a peculiar but extraordinarily intense form of parasitic interdependence as represented by so-called *reiving* activities focused on mutual plunder and rapine. This in turn gave rise to a complex web of local social and political arrangements—both formal and informal—purporting to impose some semblance of cross-border control over the resulting anarchy. The same anarchical conditions gave birth to a shared culture of heroism and lament embodied in the ballads of the Anglo-Scottish borderlands. Since the Union of the Crowns in 1603 and the Union of the Parliaments in 1707, the border, has effectively lost any meaning as a barrier to social and economic interaction between the two halves of the Solway Country, despite the administrative devolution that occurred in 1998. The Scottish referendum of September 18th 2014 in favour of remaining inside the United Kingdom has reconfirmed this openness even though further transfers of administrative responsibility from Whitehall to Holyrood are almost certain to ensue. Perhaps even more significantly almost two-thirds of the voters in the Dumfries and Galloway Council Area opted for union. Thus, while unquestionable differences between the two main segments of the region can be detected, the Solway Country retains an overall regional coherence rooted in physical geography, in a common set of historical and cultural references, in many current similarities of social and economic life, and even in the ancient rivalries that once kept its northern and southern portions locked together in a kind of febrile symbiosis. There is therefore much to be said for considering this little-known but alluring part of the British Isles as a geographical unit in its own right, and much to be gained from reflection on the formation of its unique landscape comprising a fusion of visible features rooted in both geological and historical time and repeatedly refashioned over extended periods of turbulent political division and reconsolidation.

The Land and the Sea

The Solway Country can be epitomized in physical terms as an extended concavity in the landscape, or perhaps more accurately, as a funnel-shaped area opening up steadily to the west and southwest. Roughly one-fifth of this area is occupied by the estuary of the Solway Firth, with the rest comprising for the most part a gently shelving land surface rising from sea level to approximately 200 metres at its highest extremities.

The estuary itself is a lonely expanse of sea, fringed for much of its extent by salt marshes supporting an abundant bird life. In winter, when its deserted character is most in evidence, the estuary takes on a haunted aspect, especially at night when it echoes with the strident cries of the migrant geese that roost on the coastal marshes. Swarms of Atlantic salmon migrate annually through the estuary and then move upstream through its tributary rivers to breeding grounds in their upper reaches. The natural drama of the Solway Firth is compounded by the ever-shifting cloudscapes that roll across it, and, on clear days, by the panoramic views that it offers of the higher land in the distance, most notably the Lake District Fells on the English side and the granite mass of Criffel, which, as Sir Walter Scott writes in *Redgauntlet*, “lords it over the Scottish side of the estuary.” As the tidal waters of the estuary ebb and flow, rapid changes of scene occur, hour by hour, with the seabed now exposed in extensive open stretches of mud and sand, now covered by a flood that on occasions reaches as far as the landward edges of the surrounding salt marshes. When the water rises a tidal bore can often be observed travelling rapidly eastwards through the narrowing channel of the estuary. Not surprisingly, the swift-flowing tides of the Solway are notorious in local folklore and literature for the dangers posed by their unpredictable behaviour. All the same, the estuary is fordable at a number of places, and its fords, though never entirely safe, were often used as lines of passage in former times. Neilson, the foremost historian of the Solway, indicates that the most commonly travelled fording places were the Sulewath (at the mouth of the Esk), Sandywath (from Dornock to Drumburgh) and Bowness Wath (linking Annan and Bowness).⁴

The lands that surround the Firth, to the south, east and north, have been moulded by the intensive ice action that occurred in the Quaternary era, resulting in a gently undulating topographic surface over most of the region’s extent. This type of topography is especially characteristic of the innermost land area of the region commonly referred to as the “Solway Plain,” that is, the terrain lying immediately adjacent to the southern coast of the Solway Firth together with its extension over the Anglo-Scottish border to Annan and vicinity (see figure 1.1). Among the other features in the region deriving from its experience of glaciation is a mantle of soils comprising varying admixtures of clay, sand, and gravel, and numerous poorly drained hollows and depressions frequently occupied by peat bogs, or mosses as they are known locally. Systematic drainage over the centuries, has reduced the surface area of virtually all of these mosses, though significant residues remain as a stubborn element of the landscape. Both the mosses and the salt marshes of the region represent finely

balanced ecological systems, and significant efforts are now being expended in securing their future as wildlife preservation zones.

Many rivers and streams flow across the surface of the Solway Country and into the estuary, and some of these, as they traverse the higher land towards the edges of the region have cut deep, picturesque valleys into the underlying rock. Among the more notable of these are Nithsdale, Annandale, Liddesdale, Eskdale, and the Eden Valley. These names designate not only topographic features, but also resonate with echoes of human history and geography, almost (but not quite) as powerfully as the *noms de pays* that another French geographer, Lucien Gallois, has so eloquently discussed.⁵ Indeed, the physiography of the Solway Country not only represents a major landscape phenomenon in its own right but is also critical to any understanding of the region's human record for the events that have unfolded in the region over the ages have been profoundly affected by the manner in which the detailed lie of the land has left its imprint on local patterns of life, from the cut and thrust of border warfare to the diverse types of settlement and forms of social existence that have come and gone through the centuries. The human occupation of the region through the ages has in turn profoundly shaped and re-shaped the visual character of the land.

Life and Livelihood

Over the course of historical time, the lands of the Solway have been the scene of many different waves of human colonization as well as extraordinary turmoil, both military and civil. Celts, Romans, Anglians, Vikings, Normans, Scots and English have variously established a presence in the region and vied for supremacy over the whole or selected parts of it; and each wave, through its practices of settlement and exploitation of the land, has made its own individual contributions to the character and landscape of the region.

Perhaps the single most defining event in the historical development of the region was its emergence as a frontier zone of the Roman *imperium* and the consolidation of its role as a borderland after AD 122 when Hadrian's Wall was built from the mouth of the River Tyne on the east coast of Britain, over the moorlands where the Pennines and the Cheviots meet, through what is now the northern suburbs of Carlisle, to Bowness-on-Solway in the west. From that moment down to the Union of the Crowns in 1603 the Solway Country was virtually destined to function as a war zone with intermittent intervals of peace when it fell under the sway of some wider overlordship. Even after the Union of the Parliaments in

1707, a final brief recrudescence of violence occurred in 1745 when the peace was shattered by the passage of Bonnie Prince Charlie through the region in pursuit of his fruitless claim to the throne of Great Britain. Moreover, the turmoil that raged over the region as a result of its strategic military position between England and Scotland was greatly intensified in the Middle Ages by endemic reiving focused primarily on cattle-stealing activities in which armed gangs from one side of the border periodically wreaked havoc on farmsteads and villages on the other side. For much of its history, this small wedge of land must have been marked by the kind of chronic insecurity, aggression, and terror that we read about today in newspaper reports on parts of the Middle East or the Congo Basin. The border itself is, of course, a reminder that this region was once internationally contested territory, and this is further recorded in numerous battle sites and the scars of the sieges that were a more or less standard feature of the military campaigns that criss-crossed over the region. This history of violence is visible on the landscape in the numerous medieval castles, pele towers, and fortified farm houses scattered over both sides of the border.

After 1745, the Solway Country entered into a period of unbroken tranquillity that saw it gradually emerge from its indurated backwardness relative to more prosperous parts of England and Scotland. The region has always been on the margins of British economic and social life, and it has consistently ranked towards the lower end of the scale in regard to material wealth, but it nevertheless moved rapidly ahead once the agrarian and industrial revolutions started to gather steam. Agriculture, of course, has always been the dominant means of obtaining a livelihood in rural parts of the Solway Country. The traditionally impoverished peasant agriculture of the region was based for the most part on the runrig system involving communal infield and outfield methods of cultivation. This system then gave way as rationalizing pressures increased in the seventeenth and eighteenth centuries, leading in turn to more intensive techniques of operation and the reorganization of land holding and land tenure arrangements. Since the nineteenth century, agricultural activities in the region have focused primarily on dairying with some mixed farming. However, the agricultural population has declined intermittently since the 1850s and nowadays the countryside is increasingly subject to residential colonization by commuters whose work is concentrated above all in the towns.

Small-scale industrialization began to make its appearance in the Solway Country in the second half of the eighteenth century and almost all of the larger settlements of the region attracted different sorts of factory or

workshop facilities, with linen, woollen, and cotton textiles leading the way. Throughout the nineteenth century, industrial development proceeded apace in Carlisle and to a lesser extent in Dumfries, the two largest towns of the region. However, economic growth in the Solway Country never progressed to the extent that it did in the great manufacturing districts in the rest of Britain so that its landscape was shielded from many of the more ravaging effects of industrialization observable elsewhere. This point is significant because even a quite small change in initial conditions at the turn of the eighteenth century might well have induced a much more insistent development of manufacturing industry in the region. As it is, those manufacturing sectors that thrived in the Solway Country over the nineteenth century and the early decades of the twentieth found themselves under steadily increasing competitive stress as the twentieth century wore on. By the late 1960s, in particular, the region's traditional industries were on their last legs and today the old urban industrial base has largely disappeared, to be replaced by a more resolute focus on administration, trade and services. These activities now mainly drive urban growth in the region, not only in Carlisle and Dumfries, but in several smaller centres, too.

Diversity and Harmony

In the light of these observations, the Solway Country today can be described as a many-layered palimpsest reflecting more than two millennia of changing social, economic and political currents whose lingering traces remain engraved on the landscape. The region's visible face is thus decipherable as a rich record of patterns of settlement and ways of life in what was for centuries a deeply divided frontier zone. Many observable differences between the northern and southern segments of the region continue to exist, and even the casual observer will perceive a sudden change of accent on crossing the border. At the same time, it is possible to see something of an intensifying general identity emerging out of the vestiges of the region's interpenetrating historical conflicts and its ways of life in the context of its unique physical texture. This identity has affirmed itself with growing insistence since the seventeenth century, and in the modern era has tended to become yet more assertive. Concomitantly, and as suggested in all of the above, a fruitful way of approaching an understanding of the Solway Country can be cast in terms of a descriptive and analytical programme based on the notions of region, landscape and place. A further way of stating this same idea is to invoke the notion of "topophilia," a term coined by Yi Fu Tuan to signify engaged scrutiny of

the affective elements of ways of life in given geographic milieux.⁶ My objective in this book is to provide just such a scrutiny of this small and unjustifiably neglected transborder region.

Notes

¹ E Relph, *Place and Placelessness* (London: Pion, 1976).

² P Vidal de la Blache, *Tableau de la Géographie de la France* (Paris: Hachette, 1903).

³ The term “Stewarty” reflects the former status of Kirkcudbrightshire as a dependency of the lord of Galloway who appointed a steward to administer justice and to collect revenues in this part of his fiefdom.

⁴ G Neilson, *Annals of the Solway until A.D. 1307* (Glasgow: J. MacLehose and Sons, 1899).

⁵ L Gallois, *Régions Naturelles et Noms de Pays: Etude sur la Région Parisienne* (Paris: Armand Collin, 1908). *Noms de pays* can be taken roughly to mean traditional names of small tracts of countryside, usually with a distinctive agrarian and cultural identity.

⁶ Y F Tuan, *Topophilia: A Study of Environmental Perception, Attitudes, and Values* (New York: Columbia University Press, 1974).

CHAPTER TWO

THE LIE OF THE LAND

The identity of the Solway Country is in many significant ways a reflection of its physical anatomy. This, in turn, is to a large degree an effect of the underlying geology of the region, for geological forces determine both the broad sweep of its landscape and many of its small-scale physiographic details. A brief commentary on some of the detailed issues implied by these remarks is hence a necessary prelude to any further account of the Solway Country. That said, I shall attempt to keep the more recondite technical particulars of this exercise to a minimum.

Bedrock Structures

The geology of the Solway Country comprises rocks of many different types and ages (see figure 2.1). The higher land that flanks the region on three sides is composed of ancient and resistant pre-Carboniferous and Carboniferous rocks. To the south of the region, bands of mixed Carboniferous strata form a rolling countryside that then gives way to the northern Lakeland Fells made up chiefly of primordial rocks from the Silurian era. To the east, the Pennines and the Bewcastle Fells consist of Carboniferous rocks producing elevated moorlands, which are separated from the Solway Country with special drama by the escarpment formed by the Pennine Fault. To the north, the Southern Uplands are made up almost entirely of old pre-Carboniferous rocks (again, mainly Silurian), which, as they swing down into Dumfriesshire and Kirkcudbrightshire, penetrate deeply into the Solway Country.

The core lowland areas of the region are underlain by strata comprising sandstones and mudstones of Permian and Triassic age for the most part. The Permian rocks are found in discrete patches of varying size. One major occurrence of these rocks forms an elongated strip stretching from north to south along the western flanks of the Eden Valley and giving rise to the minor peaks of Barrock Fell, Blaze Fell, Lazonby Fell, and Beacon Hill. Other occurrences of Permian rocks coincide with a series of basin-shaped declivities centred on Dumfries, Thornhill, and Lochmaben, with

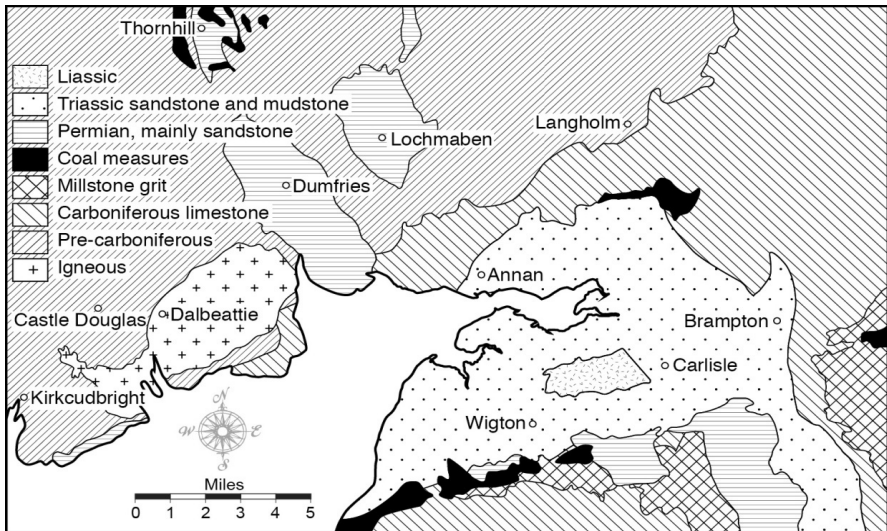


Figure 2.1. Simplified geological map of the Solway Country and its environs.

the Dumfries basin forming one of Scotland's largest artesian aquifers. The Triassic sandstones and mudstones coincide with the low-lying heart of the region. These rocks extend over the central Solway Plain (including its extension into Scotland) and the wider Carlisle Basin, and they also protrude southwards along the eastern edges of the Eden Valley. A small outlier of very recent Liassic shale and limestone lies on top of the Triassic strata just to the west of Carlisle, forming a small plateau rising in its northern, western, and southern extremities from the surrounding plain to some 70 to 80 metres above sea level and then descending gradually to the east. The plateau represents the last vestiges of what must once have been a series of much more widely distributed Liassic strata, now almost entirely eroded away.

The pre-Carboniferous bedrock that occupies much of the Scottish portion of the Solway Country is characterized by a number of idiosyncratic landscape features contrasting sharply with those associated with the younger rocks that predominate in the region's core area. In particular, it gives rise to a generally accidented land surface that is traversed in an approximately north-south direction by deep and picturesque river valleys separated by tongues of higher land protruding southwards from the Southern Uplands of Scotland. The strata forming this bedrock are orientated in a northeast-southwest direction with the

result that the rivers flowing across the surface are almost entirely nonconformable, meaning that their courses are not guided by underlying rock structure, but have been etched into the landscape after cutting through overlying layers of glacial deposits.¹ In the far west of this Scottish portion of the region, the pre-Carboniferous rocks reach down to the coastline of the Dee estuary where they emerge in a line of cliffs with many craggy indentations. In the southeast of Kirkcudbrightshire, a major igneous intrusion comprising a large granitic mass penetrates through the pre-Carboniferous bedrock. Here, the terrain is extremely irregular with many minor summits rising to one or two hundred metres, and dominated by the mass of Criffel, which attains to an elevation of 569 metres above sea level. A series of headlands with deep embayments rise out of the sea at points where this granitic mass intersects with the Solway coastline.

The bedrock of the Solway Country offers rather meagre resources in the way of economically exploitable minerals. Both the Permian and Triassic sandstones have often been quarried in the past for building materials—especially for monumental buildings—and their rich, red hues add an occasional glow to the architectural landscape of the region. Extensive granite quarrying was carried on in Kirkcudbrightshire in the nineteenth century, but has now virtually disappeared. Small deposits of coal are found in the area around Aspatria in the south and Canonbie in the north, and additional small deposits occur in the vicinity of the Tyne Gap and in the Thornhill basin to the north of Dumfries. At various times over the last couple of centuries, these coal deposits have been worked commercially, but they are all too small in size, too thin, and too fractured to have supported anything but relatively minor exploitation, and little is now left of the former mine workings except for irregular disturbances of the landscape.

Glaciation and its Legacy

The bedrock geology of the Solway Country has left many visible traces on the landscape, but the repeated glaciations to which the area was subject in the Quaternary era have also been an important factor in the modelling of its surface forms. This was an era marked by alternating advances and retreats of great ice sheets, with the last major glaciation in the region occurring as recently as 12,000 years ago. During this last glaciation what is now the Solway Firth coincided with a line of encounter between ice flows originating in the Lake District Massif and the Southern Uplands of Scotland. Ice originating in the former area moved in a northerly and westerly direction towards the Irish Sea, while ice

originating in the latter moved in a southerly and easterly direction towards the Tyne Gap (figure 2.2).

On higher ground, notably in southeast Kirkcudbrightshire, glaciation left an abundant record of *striae* or ice scratches on the exposed bedrock, indicating the direction of glacier movement. On most of the lower ground, the great ice sheets deposited a thick cover of glacial till or drift composed of clay, sand, gravel, and boulders, and in some parts of the region these deposits have given rise to severely disrupted drainage systems, as in the case of the western Solway Plain. As the ice sheets moved over the land surface they also moulded the till into a great diversity of landforms, particularly drumlins, which are widespread throughout the region. Drumlins are elongated hillocks created under the moving ice and shaped like half-buried eggs with the sharper end pointing in the direction of the ice flow. They vary in size, but a typical case in the Solway Country might be something of the order of 1.5 kilometres long, 450 metres wide and up to 50 metres high. Swarms of drumlins are to be found across wide tracts of the region where they account for the low rolling topography of much of the countryside. A map of drumlin occurrences is presented in figure 2.3, which clearly reveals the anti-clockwise pattern formed by the main drumlin swarms in the area south of the Solway estuary in accordance with the directions of ice-flow in this part

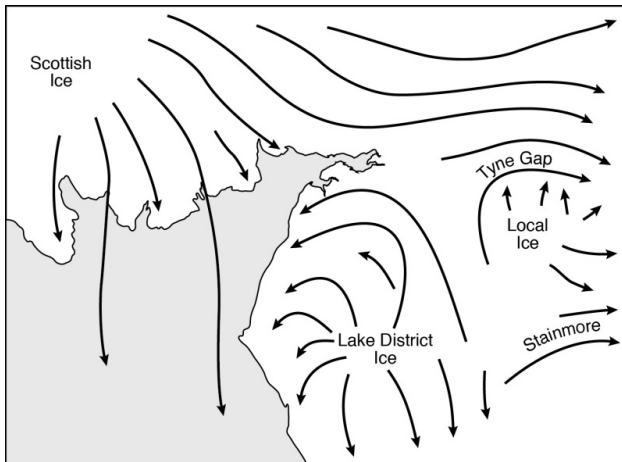


Figure 2.2. Generalized pattern of ice flow around the Solway Firth during the last glaciation. Adapted from A. A McMillan, J. W Merritt, C. A Auton and N. R Gollidge, *The Quaternary Geology of the Solway*, Keyworth, Nottingham: British Geological Survey, 2011.