The Drainage of Thorne Waste in the Nineteenth Century

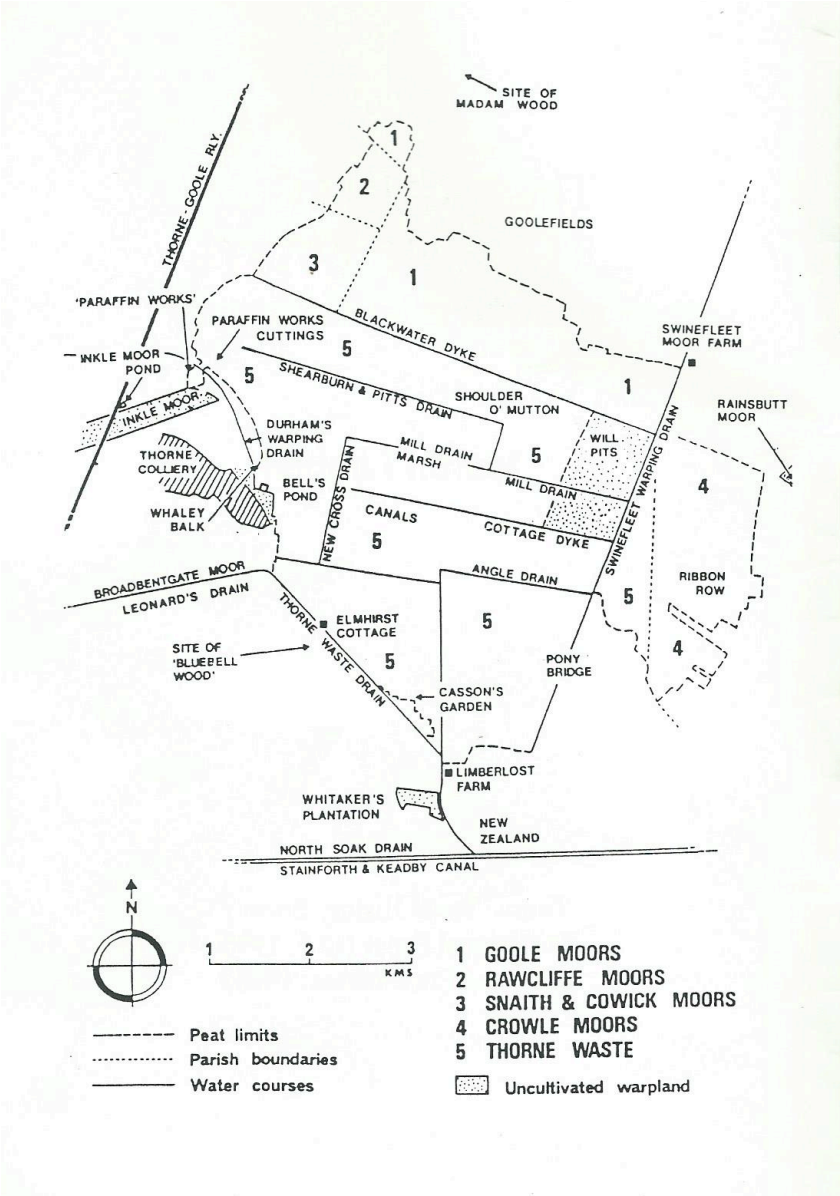
By Martin Limbert

Thorne Local History Society

Occasional Paper No 5

1990

The Drainage of Thorne Waste in the Nineteenth Century



Thorne Moors, a degraded raised mire 15km NE of Doncaster, lies to the NE of Thorne and SSW of Goole, in a flat, low-lying region, a part of the extensive Humberhead Levels. Although situated mostly in Yorkshire, its easternmost part extends into Lincolnshire. The moorland is divided by parish boundaries, with each parish-share individually named: Snaith and Cowick Moor, Rawcliffe Moor, Goole Moor, Crowle Moor and largest of all - Thorne Waste. The name Thorne Moors is applied to the aggregated whole, simply as a term of convenience. This circumscribed peat is surrounded by reclaimed 'moors', often defined by parish or lesser boundaries, which were once part of the same wetland complex. Their transformation from mire, fen and carr to agricultural land is now virtually complete.

At its maximum extent, the peat probably stretched over 4,000ha (Beresford 1986), but at least eight centuries of peat winning and reclamation have inexorably reduced the area of

A view of Thorne Moors Prior to the drainage. Probably painted in 1609.

From Thorne Historical Society Collection (2014)

peat and destroyed its dome-shaped profile. On the one inch scale Hull sheet of the Ordnance Survey published in 1824 (surveyed 1819-22), the moorland still covered c.3, 400ha, and in the same decade, Casson (1829) described the peat as extending to a depth of 6m. The peat of the site is a Flandrian period deposit, having been initiated c.3,000 years ago (Godwin 1975, Gaunt 1987). Rocks of the Sherwood Sandstone Group underlie the western part of the moorland, with Mercia Mudstones to the east, largely covered by lacustrine sediments and riverine alluvium.

Scheuchzeria palustris L. ("Rannoch-rush"): Symbol of the Untouched Mire.

Where this plant is found growing we can assume that a waste or mire has been untouched.

The first useful description of the vegetation of Thorne waste is probably that of Casson (1829):

'In different parts of its widely extended surface may be seen, small clumps of stunted birch trees, which draw a scanty nourishment from the peat,

Scheuchzeria palustris L. (‘Rannoch-rush’)

Image from the internet.

whilst here and there a single three, shews by a more luxuriant foliage, that its roots have reached the soil below. Near these trees and in several other parts of the morass, are large ponds or pits of dark coloured water, perfectly free from weeds and aquatic plants, which are places of resort for the wild fowl that frequent the moor.'

These 'ponds or pits' of more or less open water were scattered over the mire surface, approximately forming a ring, as illustrated by Limbert (1987). The earliest reference to them is contained within George Stovin's manuscript history of the drainage of Hatfield Chase and adjacent parts, written in the mid – 18th century. The relevant section, describing the area of Will Pits, is transcribed by Collier (1905-07):

'Blackwater: now called wild Pitts. – There is many of them upon these moors of an oval* form for the most part. About 14 yards Deep,

and always full to the Top, in dry or wet season and never overflow, the water Black. Some of ym -100 yards about.'

* Collier erroneously transcribes as novel form.

There are no other known allusions until the following century, commencing with the Wm Casson, antae. Subsequently Hatfield (1866) gave further details:

'The pits of Thorne Moors, generally surrounded by small threes, and resort for wild fowl, were deemed by the superstitious to be bottomless. They are certainly most treacherous, for the Sphagnum has so encompassed the margin that, unless the stranger is very wary, he may find himself submerged. The floating mass of moss and other fibrous vegetation have accumulated to a considerable thickness, extending partly across the water, and in several instances, entirely over it . . . The water conveyed from one of the pits on Thorne Moors by means of an

outlet, constructed in 1862, has filled up and become solid peat . . . Even at the bottom of these pools vegetation knows no rest, and it is believed, from recent observation, that a lining of great thickness of fine tough moss, beautifully green, and of a texture and softness like a rough but soft blanket or woollen fabric, is in process of formation.

In this second edition, Casson (1869), in describing the pools, observed:

‘ . . in several parts of the morass, are large ponds or pits they are called, of dark coloured water, clear and perfectly free from weeds and aquatic plants; many of the are extremely curious in shape – one perhaps will be like two miniature seas divided by narrow strait, others will have edges intended with large bays and inlets; . . .

The margins of the ponds at some seasons are beautifully fringed with variously coloured moss, in green, in pinks, and up to dark maroon or brown; here the lovely Andromeda with its

pale pink wax – like flower flourishes, and in the pink ericas are in strong contrast to the dark waters of the pond(.) The carex and scheuchzeria add to the interest of this solitary resort of the wild duck and widgeon.

These pools were often known locally as ‘wells’, and in the 19th century at least 10 of them had recorded names (Limbert 1987). One of these wells, situated on Thorne Waste close to the SW moor edge and within comparatively easy reach of the Causeway Bank, was known as Scheuchzeria Well. It is so named on the relevant six inches scale O.S. map of 1853, this part of the map being recently reproduced by Taylor (1987). The name as incidentally alluded to by Casson antea, records the presence of the plant Scheuchzeria palustris. This was once a great prize in English botany, having been first discovered at Leckby Carr, near Boroughbridge, in 1787. It was regarded as extinct in its few English stations by the end of the 19th century*(Sledge 1949).

*It should, however, be noted that Bennett (1921) stated that Scheuchzeria was "nearly extinct in England", and Buckland (1979) commented that it survived on Thorne Moors until the 1940's, citing Wm Bunting of Thorne as his source.

It's need for high and constant water level precluded it's growth in a site subject to drying out during any part of the year (Sledge 1949, Tallis and Briks 1965). The plant is therefore one of the first to be affected by the drainage, and now survives only in Scotland, on Rannoch Moor in Perthshire. It, perhaps more than any other peat – forming species, has suffered from the drainage and alteration of mires in the British Isles (Bellamy 1986).

At Thorne, the pattern of occurrence of sub – fossil remains suggests that Scheuchzeria was a regular and persistent constituent of the undisturbed mire flora (Tallis and Briks 1965, Godwin 1975, Smart et al. 1986) Living material

was first discovered by Robert Harrison in 1831 (Limbert 1987).

Initially, the species was found to be quite widespread on the Thorne peat, growing ‘in great plenty’ (Appleby 1832), inhabiting ‘the borders of deep pits of clear water of which several are still to be seen on the waste’ (Hatfield 1866). However, the record history of Scheuchzeria at Thorne proved to be regrettably short: 40 years on, it had probably been all but eliminated from its pool – side refuges. Most of these may have been on Thorne Waste, as the 1853/54 six inches scale maps show that the greatest number of pools existed within the boundaries of Thorne parish. A single flowerless example, collected by Dr. F. A. Lees in 1870 (Lees 1888), is the last definitely known.

Drainage Events on Thorne Waste

Although widely subject to invasive peat winning and reclamation, gradually encroaching inwards from the edges, Thorne Moors was seemingly crossed by only one major waterway at the beginning of the 19th century. This was Blackwater Dyke, dividing the peat resources belonging to the medieval centres of Thorne and Snaith respectively. This, the oldest man made feature surviving on the moorland, once demarcated the NE edge of Hatfield Chase, and still marks one side of Thorne parish. As a chase boundary, the dyke must predate dischasing of the area in the 17th century. The virgin peat of Thorne Waste was not otherwise affected by direct endeavour until the beginning of the 19th century. The earlier boating Dyke and Top Boating Dyke, along which peat turves for the fuel trade were transported from the SW edge of Thorne Waste, flowed from the River Don to the peat. Thus, as with other drains around the moor, they had little direct influence beyond the moorlands margins in their vicinity. This aquatic

link was impaired twice around the turn of the 19th century. First, it was cut in two in the 1790's when the Stainforth and Keadby Canal and its attendant soak drains were excavated. For some years there were no replacement waterways, with peat carriage requiring at least some haulage by land. Then, in 1806, the sluice by which the boating dykes communicated with the River Don at Thorne Waterside was taken up, ending the viability of both dykes. Being disused, they shrank and became stagnant (Casson 1869). Although the Canal took on some peat carriage, it and soak drains were probably of only very localised significance as drains. There is no evidence suggest otherwise.

The earliest notable drainage project in the 19th century on Thorne Waste was the cutting in 1815 of Thorne Waste Drain (Casson 1869), also initially known as New drain. It was dug along the SW edge of the moorland, from Pighill Moor to the North Soak Drain of the Canal. An embankment was constructed on its Thorne side

to protect the adjacent drained lands from flooding. Initially, the drain was also intended for peat conveyance, thus its water level had to be deliberately kept high for the boats. However, with the decline of the peat trade, boating ceased c.1830, allowing water levels to be lowered. This led to more efficient water removal from that part of the moorland and adjoining areas, via the drain to the North Soak Drain. Casson (1869), remarking on the creation of the Thorne Waste Drain, particularised its significance:

'The cutting of this drain was the first step in the improvement of the Thorne Moors (i.e. of Thorne Waste), as it severed, by an embankment on the west side, the higher of waste (i.e. moorland) water from the enclosed (i.e. Parliamentary enclosure) portion of the cultivated and lower land lying to the west of the morass.'

He added that the next step taken in this process of drainage improvement, 'many years after',

was to require the Company of Proprietors of the Stainforth and Keadby Canal Navigation to improve the North Soak Drain and its outlet into the River Trent at Keadby. Casson remarked that 'great good the drainage of the cultivated lands was thereby effected', although he also lamented that the peat beyond continued 'in almost hopeless abeyance'.

The land extending from Thorne itself towards the moorland was divided into a multitude of thin strips – known locally as 'cables' – each identically aligned and bounded by dykes. These were the results of plots of land at the edge of Thorne being gradually extended over many decades (Limbert 1987), thrusting eastwards in ever lengthening ribbons as the peat was removed and the ground beneath cultivated. Thus the edge of the moorland was continually, but fitfully, receding from the town. The digging of Thorne Waste Drain in 1815 created, in effect, a barrier to further cable reclamation, with the peat to the west rendered relatively

inaccessible. Thus, the strip reclamation never meaningfully extended further than its 1815 limit. This curtailment was reinforced by a growing view that perhaps the entire area of peat remaining in the parish could be subjected to advancing reclamation technology. It was envisaged that this particularly achieved through warping (q.v.), to create new land relatively quickly, on a far greater scale, and much less laboriously, than along the cables. The later were becoming outdated and uneconomic: perhaps the initial willingness to undertake the creation of Thorne Waste Drain was a symptom of this changing attitude.

The Hatfield, Thorne and Fishlake Enclosure Act of 1811 noted that Thorne Waste, which had 'Time immemorially been considered, used and enjoyed as the Estate, Right, and Property of the Person or Persons whose Estate abuts or adjoins the same', was not to be enclosed, and the turbary was to be preserved, as before. The signing of the Enclosure Award in 1825

confirmed and reinforced ownership titles to the land abutting the peat, and extrapolation of the strips across Thorne Waste as far as the parish boundary. The one inch scale O.S. map of 1824 displays no strip boundary dykes on Thorne Waste. Yet the six inches O.S. map of 1853 shows that by then they were relatively frequent. The possibility of warping had rendered these strip holdings much more valuable, with speculative buyers establishing their respective claims (Tomlinson 1882). These marker dykes were of importance as the first across that part of the open moor, with additional impact for having some collective drainage significance.

Interestingly, on the 1853 map, several of these dykes are depicted as being laterally linked by short lengths of dyke to existing pools, presumably in an attempt to drain the latter. In addition, several relatively large pools at Will Pits are shown as being connected by a drainage dyke, originating at one pool and linking two others in line, then extended to the county

boundary to the east. The purpose of the dyke is questioned as it may alternatively have simply been linked to a duck decoy immediately adjacent, but over the county boundary, in Lincolnshire (Crowle New Decoy, vide Limbert et al. 1986). Its purpose may thus have been merely to help provide a current of water in the decoy pool, necessary for its effective operation.

A crucial element in the peripheral reclamation of Thorne Moors was warping, as detailed in recent years by Metcalfe (1960), Robinson (1969) and Gaunt (1987). There were two types. Flood warping involved the deposition of water – borne silt and clay (i.e. warp) via specially dug warping drains connected to suitable stretches of warp – laden tidal river. The water was carried on the rising tide into embanked compartments of moor or other poor lands. Having deposited its load, it was allowed to ebb away at low tide. In this way, a laminated deposit was built up gradually, converting unfarmed land into a valuable agricultural area. The land to be

improved had to be below the level of the highest tides, and for a worthwhile deposit, much lower. Some of the lowest reaches of peat moorland were accessible for treatment in this way, commencing in 1814, using massive warping drains. Two of these affected Thorne Waste. Although warping drains were intended to facilitate the reclamation of adjoining marshy areas and the lowest peat, they were of sufficiently wide importance when acting as drains to influence areas which ultimately escaped reclamation. The second method of warping was dry or cart warping, whereby the warp was conveyed from a suitable source by cart or narrow gauge railway laid for the purpose. Around Thorne Moors, the latter method was only limited impact, despite ambitious intentions.

The two warping drains relevant to Thorne Waste were Swinefleet Warping Drain and Durham's Warping Drain. The former was opened in 1821, being dug from the river Ouse

along a ribbon enclosure on the eastern side of Goole parish. By 1826, the drain had been cut 4.5km southwards from the River Ouse to what became Swinfleet Moor Farm. By 1845, it had been extended over 7.5 km eastwards, to Fockerby Common. Around the turn of the century, the original southerly course of the drain was lengthened a further 4.5km (Gaunt 1987): this was the section that directly affected Thorne Waste. Durham's Warping Drain, cut from the River Don eastwards as far as the road running north from Thorne was opened in 1856 (Anon. 1856, Hatfield 1866). Casson (1869), commenting on the drain's success, recorded that much former wetland had been raised in height by at least 1m and had been turned into farmland of the highest quality. However, the warping was hindered by the opening of the Thorne-Goole railway in 1869, and by problems with silting in the River Don (Anon. 1870, Tomlinson 1882, Robinson 1969). Despite this, Durham's Warping Drain was eventually extended further east, after which it was taken

southwards to warp ground in the area later occupied by Thorne Colliery, this latter being ploughed for the first time in 1896 (Gaunt 1987).

Inextricably bound up with realised warping were further efforts to drain, hence to lower and thus eventually to facilitate the intended flood warping of the more central part of the peat dome. Even those parts which ultimately escaped warping did not evade preliminary preparations for reclamation in this way. The entire surface of Thorne Waste was progressively modified by drains dug in the 1860's. This action originated in the 1840's, although the proposed reclamation of Thorne Waste was initially obstructed by the 'Participant' right to cut peat from 405 ha (i.e. 100 acres) on the eastern side of Thorne Waste. The original 'Participants' had been involved with the regional drainage scheme of Sir Cornelius Vermuyden. Virtually all were Dutch or Flemish, and their adventure capital was secured against land allocations on Hatfield

Chase. They had also been provided with turbary rights, in specified areas, including the Thorne Waste allotment antea. The later occupiers of the Participant land still held the turbary rights, which had, in event, been rarely exercised. As the strip boundary dykes from the Thorne edge were extended over this little-used turbary towards the parish boundary, a dispute arose. This centred on ownership of the peat in question and the land beneath (Casson 1869, Tomlinson 1882). By 1858, some warping of the southern portion of the 405 ha allocation had been undertaken on behalf of the turbary holders, who asserted the right to do this. The strip holders contended that they themselves were entitled to the land beneath, claiming a right to continue their strips across the Participant turbary. A meeting was arranged towards the end of that year to settle the ownership rights, and to consider the desirability of allotting and draining the whole of Thorne Waste (Anon. 1858). Further activity (Casson 1869, Tomlinson 1882) led to a meeting in 1861

in which the strip holders offered £1500 to extinguish the remaining Participant rights to the moor, and this was accepted (Hatfield 1866). As a result, the Thorne Moor Drainage and Improvement Act, 1861, was obtained, which, inter alia, approved the reactivation of an earlier Thorne Moor Improvement Co. In anticipation of a perceived, but eventually abortive, opportunity to dry warp Thorne Waste, a Thorne Moor Drainage and Improvement Act, 1848, and an associated Thorne Moor Improvement Co., were already in existence.

The following was noted by Hatfield (1866):

'An act was obtained in 1861 for the re-allotment of the peat moors within the parish of Thorne, and for their warping by a railway (i.e. by dry warping), for they are much above the level of spring tides within the rivers. It is proposed to deposit warp upon the low lands, and from thence to convey it on the adjacent peat moors . . . Sanguine hopes are entertained that the covering of the moors will, after a short time, when all the preparation for the warp by

drainage is completed, be successfully carried out.'

However, the Act was substantially unsuccessful, except as a means of peatland drainage, and demarcating ownership by further shallow boundary dykes. Casson (1869) summarised the progress of the decade:

' . . the Company have proceeded to re-arrange the position of each Owner's portion of the Waste, and to set out drains and roads, and to have each Owner's boundary ditch cut. The cutting of the ditches and drains, with the evaporation of the very dry summer of 1868, has caused the body of the waste to lower and compress amazingly; and it is hoped that, in the course of a few years, progress will be made, either by means of portable rail or flooding, to cover the whole surface with warp. Already a considerable breadth of the land on the edge of the waste that a year ago was totally unproductive has been brought into cultivation

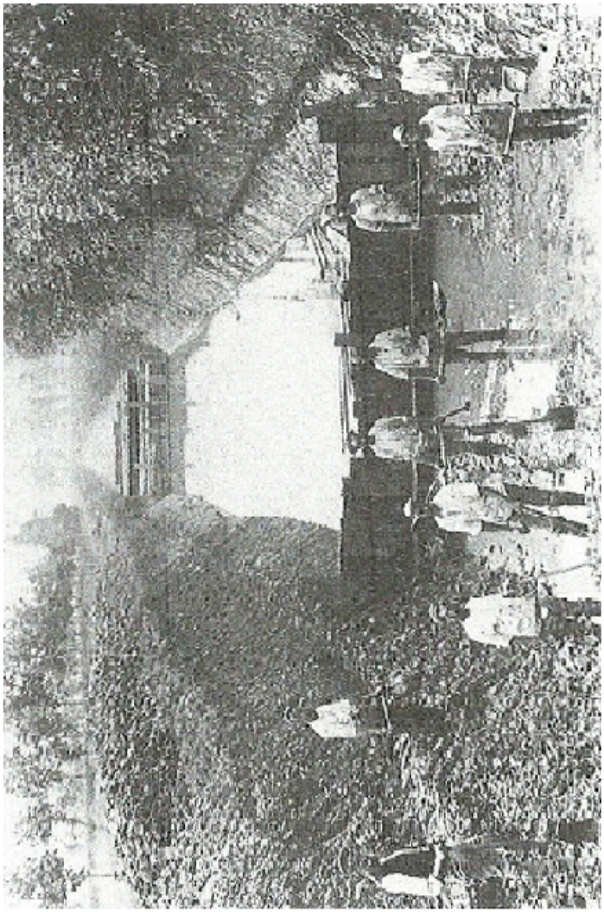
(from Durham's Warping Drain?), and grain and root crops obtained that are very satisfactory.'

The drains set out on Thorne Waste in the 1860's were of lasting significance in draining the surface, with the intention, eventually unfulfilled, of facilitating warping over the entire surface. They comprised Shearburn and Pitts Drain, Mill Drain, Cottage Dyke and Angle Drain.

One other drain requires a brief reference. The exact date of Thousand Acre Drain is uncertain; although obviously dug as a boundary marker along the western edge of the Participant turbary, it is not definitely established that it was dug in the 1860's. Significantly, it is not shown on the relevant six inches scale O.S map of 1853, which strongly suggests that it was indeed created as a part of the events of the following decade.

The drainage system which was essentially in

place at the end of the 1860's remained virtually unaugmented for over a century. The only major



Photograph of drainage workers supplied from

Thorne Historical Society collection. (2014)

new waterway system was associated with changes in the peat industry which had their local origins in the 1880's. The ancient peat fuel industry had been in terminal decline for much of the century. By the 1860's, the trade was very lethargic (Casson 1869), and had probably provided no serious obstacles to reclamation for several decades. Interest in the Thorne peat was revived and redirected in the 1880's, with the national growth of the peat litter industry (Limbert 1986). At this time, when the reclamation of new land had already ceased to be profitable (Prince 1981), much of the region's warpland had been put on the market. This was in response to both poor, wet seasons in the 1870's, and, more fundamentally, falling agricultural profits in the gathering agrarian depression (Robinson 1969). Further large scale warping of the peat was thus most unlikely. Instead, peat came to be viewed once again as a valuable resource, not as a hindrance to improvement.

In the 1880's/90's, several litter companies became established on Thorne Moors. Each of them, not all of which were contemporaneous, leased a part of the moorland, from where they removed their peat for processing, usually via a muscle-powered tramway network. The ability to lay workable tramways demonstrates the degree to which moorland drainage was by then advancing. One of the companies, the Dutch-based Griendtsveen Moss Litter Company, became established at Thorne in 1894 (Limbert in prep.). This, and the other surviving companies, amalgamated their interests in 1896 to form the British Moss Litter Company. In their brief period of direct involvement, Griendsveen established – as in the Netherlands – a series of parallel canals on their part of Thorne Waste. These subsequently remained in use with the British Moss Litter Company until 1922, when they became disused (Limbert 1986). The canal system, for the conveyance of cut peat to the company's mill, was quite separate from the older watercourses on the

moorland, and the main canal traversed the existing Durham's Warping Drain via a purpose-built aqueduct. The canals were never fully operational, with only the southernmost certainly exploited and used, and at least some of the others never proceeded with, beyond being marked out on the surface (Limbert in prep.). The projected total length of the canals was over 22km (Nunn 1905), but the percentage actually boated on was appreciably less, perhaps no more than 50% (Limbert in prep.). An associated drainage network was excavated into the same region of peat ground, but quite separate from the canals, being linked instead to the pre-existing drains. The drainage had to attempt the difficult balance of drying the immediate area sufficiently to achieve effective peat winning and localised wheelbarrow transportation, yet keeping the water levels in the canals sufficiently high to allow the passage of barges. There was, nevertheless, a severe water shortage in the canals at times, and silting was a problem. A wind-pump was erected to move some water

into the southern canals from a neighbouring drain. In a further effort to retain water, clay was deposited in the canals in places, but probably neither efficiently nor effectively (Smart et al. 1986).

In addition to the localised effects of the Dutch canals, the litter industry also required wide-scale drainage of the areas of active peat workings (the 'flats'). These minor drains and cuttings were linked with the established moorland drains. The scale of the industry by the turn of the century was obviously large, the extent of the peat workings affecting a large percentage possibly as high as 40% - of the moor surface at any given time. This heightened level of activity on the moorland demanded and allowed drainage improvements, and dictated that all relevant water courses should be periodically maintained. The method of peat cutting, and the requirement to blend different types of peat at the mills, did not necessitate that the peat resource of any given workings had to

be continuously dug until the soil beneath was reached. The employed method was to take cuts into a flat at intervals, removing the peat in measured and relatively shallow layers. Thus the entire moorland surface was differentially, but progressively, lowered. This process of vertical phasing not only facilitated moorland transportation, but also eased nascent drainage problems. The decline of the litter industry in the years following the First World War required less intense exploitation, and this situation remained until the 1960's when Fisons took over the ailing British Moss Company. They projected the moorland into the growing horticultural peat market, concentrating on what had previously only been a minor use of the peat.

The Effects of Drainage.

Until the middle of the 19th Century, the surface of the mire was still active and developing, notwithstanding peat removal and drainage work. Although encroached on at the rim, the surviving naturally domed surface, albeit checked, continued to grow upwards. Hatfield (1866), in referring to the Thorne botanist Robert Harrison, stated that in 1831 the latter had remarked:

'When he went to live at Thorne, he could stand on his own threshold and see Crowle Church across the Moors, but such had been the rapid rise of the surface in a comparatively short period, that the sacred edifice had become obscured from view.'

In addition, and despite the mire's liquid core (Rogers and Bellamy 1972), seasonal and annual fluctuations in height were maintained. These reflected variations in precipitation and thus saturation, a phenomenon which, as on Hatfield

Chase and in the Marshland district, had been long observed (Camden 1586, Gibson 1695, Hunter 1828, Hatfield 1866, West 1886, Shilleto 1893). It had even featured in Michael Drayton's Poly-Olbion, an extended description of England and Wales deeply embedded in poetic metaphor, which was published 1612-22 (Hebel 1961). It is perhaps significant that one of Drayton's chief sources was Camden's Britannia.

The first reference to human influence on the peat of Thorne Moors, at least beyond that of ambient activity, predates even the embryonic documentation of the 18th century. A reference to the alternation in height of the mire surface contained in Gibson's edition of Camden's Brittannia (Gibson 1695), refers to the effects of the Vermuyden drainage, over 60 years earlier:

'Dr. (Nathaniel) Johnston affirms he has spoke with several old men, who told him, that the Turf-moor betwixt Thorn and Gowle was so

much higher before the (Vermuyden) draining (especially in wintertime) than they are now; that before, they could see little of the (? Thorne) Church-steeple, whereas now they can see the church-yard wall.'

Eighteenth century documentation concentrated on the fringing peatland reclamation (e.g. Young 1771, Jackson 1882, Collier 1905-07). Not until drainage began to make visible changes in the 1860's do traced comments on the moorland surface become useful. By the 1860's/70's, following the extensive cutting of dykes into the peat, the surface had become markedly consolidated and compressed. Casson's (1869) statement that the peat had been observed to 'lower and compress amazingly' was reinforced, more prosaically, in the succeeding decade by Parsons (1877):

'The mere act of cutting a drain through the Peat causes it to collapse, for although the Peat is almost as impervious as Clay, yet the water,

which it holds like a sponge, gradually drains away, and the Peat then shrinks.'

A writer in the Goole Weekly Times (Anon. 1884), commenting that 'the whole of the surface of this bog is too high to be flood warped', added that 'the ingenuity of the engineer has had to be directed towards consolidating and lowering the waste (ie moor) so that it can be covered by spring tides from the Ouse'. He further stated that in some parts between 1867 and 1882, 'the moors have gone down from five to seven feet (1.5-2.1m)', and that' several hundreds of acres' were then low enough to receive the ordinary spring tides for flood warping. Woodruffle-Peacock (1920-21) noted that even in the 1860's, in an 'abnormally wet season', the winter rise and summer fall were separated by as much as 2.5m'. He put the lessening alternation in 1875 as c. 1.8m.

Also under threat were the wells, which were being dried and vegetationally altered, or even

eliminated altogether (Limbert 1987). Casson (1869) described the moorland in that decade as being in a 'transition state', due to the cutting of dykes and the draining of the wells, causing the moor to become drier and compacted. He further commented that many notable plants were imperilled, on both the acid peat and its margins, with peripheral fenland species in particular 'fast giving way to oats and turnips, and mangolds'.

In the early 1870's, the mire surface was still domed, with much of the surviving peat at least 2m above the limit for flood warping, although obviously not beyond the reach of determined dry warping. The maximum peat depth at this time was 6.26m (Smart et al. 1986). By the beginning of the present century, the entire peat surface had been brought below a feasible flood warping height (Smart et al. 1986), by both consolidation and peat removal. However, by this time, economic circumstances were much less favourable to extensive warping schemes.

The gathering of a last specimen of Scheuchzeria in 1870 suggests that untouched surfaces had by then already been almost totally eliminated, although Davis and Lees (1878) did note that there were 'parts not yet reached by drainage alterations'. If Scheuchzeria could maintain even a tenuous presence for a few years beyond 1870, and F. A. Lees' 1878 comment actually referred to a situation pertaining a year or so earlier, the 'watershed' between the survival of even a vestige of unaltered mire surface and a totally modified habitat, may have been around 1874.

Although the growing drainage scheme was not sufficient to eliminate all the species of mire plants on Thorne Moors, their precise communities and associations were liable to modification. The irregular, and sometimes impermanent, nature of perimetric reclamation allowed pockets of marginal fen and carr survivors also to maintain a continued, although not necessarily geographically permanent,

presence. The rate of reclamation was very uncertain, and the results were not immediately clear cut: referring to the 1820's, Clarkson (1889) stated that the 'rich cultivated land' close to Thorne passed 'gradually into interminable tracts of peat and bog'. Some of the enduring native species were also able to benefit from the establishment of plantations on newly won, though imperfectly drained, strips of land, which could be at least seasonally wet. These plantations, as a long term crop or as game converts, were relatively undisturbed, allowing some former fen and carr elements to recolonize and spread more readily, as opportunities arose. These plantations of Larix, Pinus sylvestris L. and a range of other species (the latter probably for game) were allowed to persist until they were no longer required or had become a realisable asset.

The new drainage network on the moorland was seemingly inefficient at times, its results were, to a superficial degree, reversible, and ultimately

its effects were not as positive as earlier expected. It relied heavily on dry weather, favourable terrain, and on the right human aspirations and circumstances to promote and carry out the innovations required. Woodruffe Peacock (1920-21) wrote that in 1874, when he first knew Thorne Moors well, the site was still a quaking bog in places. When impacted, the surface could be seen 'trembling in waves', the undulations being lost 'in the distance', or suggestively, 'at the edge of the nearest ditch'. This description is, nevertheless, misleading. Sledge (1941) was able to depict the Spectacles Well area as late as the 1940's thus:

'One could hardly conceive of the locality being any wetter a century ago than it is today, and the conditions in this respect are not unlike those prevailing at the Rannoch Moor station for Scheuchzeria.'

Even in the 1970's, limited sections of the moor could be made to 'tremble in waves', though the

areas in question had clearly been cut for peat, probably on more than one occasion. Davis and Lees' (1878) remark that the moorland was 'intersected by numerous dykes of almost stagnant water' suggests at least a seasonally inefficient drainage system.

The development of the moss litter industry from the 1880's was the most vital factor in both maintaining the moorland drainage and by definition, significantly destroying and removing the peat. Woodruffe-Peacock (1920-21) observed that he did not experience 'liquidity in the upper layers of this hag' after 1891, although this comment obviously precluded the continuation of very wet areas in neglected dykes, derelict peat cuttings, turbary pits, surviving wells and odd corners. Some individual species of mire plants remained in these, and sometimes in more disturbed areas, the latter arising from the need to work the peat sequentially and in discrete units. Thus the surface was never entirely cut over; indeed, at least 60% of it was probably vegetated at any

one time, though the exact parts varied temporarily. Some vegetational regeneration was possible between successive cuts of peat, an occurrence underpinned by the locally deteriorating state of the drainage until further exploitation required improvements to be made. Nevertheless, the scale of the new peat industry was sufficient to promulgate noticeable changes.

Parsons (1877), writing of the peat of Thorne Moors in that year, observed:

It is said that points in the landscape are now visible across the moor which formerly were hidden, owing to the shrinkage of the drained (peat) land.

At the close of the century, Bunker (1898) remarked that formerly only a part of the spire of Goole church was visible across the moors from Medge Hall, but that by the late 1890's, the entire spire and a part of the tower beneath were easily seen, a phenomenon he ascribed to

drainage and associated consolidation. It therefore seems paradoxical that Bunker, in his 1898 paper, and in an earlier manuscript version of it (Limbert 1989), should remark:

‘The growth of peat … is still going on, though in consequence of a system of drainage well carried out, the moor is getting more solid, and is gradually sinking’.

It seems certain that the ‘growth of peat’ referred to was simply that of Sphagnum moss exhibiting localised colonisation in suitable niches as they became available. This happened, for example, with S. fimbriatum Wils. In the Dutch peat canals following their abandonment in 1922, and by Sphagnum species in duck decoys when they became redundant (Payne-Gallway 1886, Bunker 1905, Smart et al. 1986). Anon. (1899) similarly remarked on the lowering of the entire moorland:

‘The trenches from which the peat has been cut have so effectually drained the land there has

been a subsidence on the Goole and Crowle Moors of nearly twelve feet (c. 3.7m); a subsidence so definite that whereas before the moors were worked on their present extensive scale, a person standing at Crowle and looking in a bee-line across the moors could only see the top of Goole church spire, a view of the whole of the steeple can now be obtained'.

The latest contemporary reference to these changes was that from Stephenson (1912), who noted that Thorne Moors had been, 'till recently', regarded as a 'dangerous swamp'. He added that 'Deep ditches have been cut through it and the water drained off, and it is now comparatively sound'.

Acknowledgements.

For the provision of information and references, I am grateful to Dr. W. A. Sledge and Messrs. G. Davidson, C. A. Howes, P. Tuffrey and D. I. Woodcock.

References.

Anon. (1856) treat for the Workmen at Thorne Hall. Doncaster, Nottingham and Lincoln Gazette, 16 May.

Anon. (1858) Thorne Turf Moors. Doncaster, Nottingham and Lincoln Gazette, 26 November.

Anon. (1870) M. Durham Esq. v The North Eastern Railwat Company – Important case. Doncaster, Nottingham and Lincoln Gazette, 24 June.

Anon. (1884) Warping Operations in Marshland and Howdenshire. Goole Weekly Times, 8 August.

Anon. (1899) Reclaiming the Peat Moors. Goole Times, 3 March.

Appleby, S (1832) Rare Plants in the Neighbourhood of Doncaster. Mag. Nat. Hist. 5: 556-58.

Bellamy, D (1986) Bellamy's Ireland: the wild boglands. London.

Bennett, A (1921) Scheuchzeria palustris L. in Thorne Moors. Naturalist 46: 128.

Beresford, M W (1986) Inclesmoor, West Riding of Yorkshire, in R A Skelton and P D A Harvey (eds) Local Maps and Plans from Medieval England. Oxford.

Buckland, P C (1979) Thorne Moors:

A Palaeoecological Study of a Bronze Age Site.

University of Birmingham Dept. of Geography Occ. Publ. No. 8.

Bunker, T (1898) The Natural History of Goole Moor and the Immediate Vicinity. Trans Hull Sci. Fld Nat. Cl. 1: 1-9.

Camden, W (1586) Britannia sive florentissimorum regnorum Angliae, Scotiae, Hiberniae, et Insularum adjacentium ex intima antiquitate chorographica descriptio & c. London.

(Casson, W) (1829) The History and Antiquities of Thorne. Thorne.

(Casson, W) (1869) The History and Antiquities of Thorne. Second edn. Thorne.

Clarkson, H (1889) Memories of Merry Wakefield. Second edn. Wakefield.

Collier, C V (1905-07) Stovin's Manuscript. Trans East Riding Antiq. Soc. 12: 23-60; 13: 197-245.

Davis, J W and Lees, F A (1878) West Yorkshire: An Account of its Geology, Physical Geography, Climatology and Botany. London.

Gaunt, G D (1987) The Geology and Landscape Development of the Area around Thorne Moors, in M Limbert (ed) Thorne Moors Papers, Doncaster.

Gibson, E (1695) Camden's Britannia, Newly Translated into English: With Large Additions and Improvements. London.

Godwin, H (1975) The History of the British Flora. Second edn. Cambridge.

Hatfield, CW (1866) Historical Notice of Doncaster. Vol. 1. Doncaster.

Hebel, J W (ed) (1961) Poly – Olbion by Michael Drayton, Being the Fourth Volume of his Works. Corrected edn. Oxford.

Hunter, J (1828) South Yorkshire. The History and Topography of the Deanery of Doncaster. Vol. 1. London.

Jackson, C (1882) The Stovin Manuscript. Yorks. Archaeol Topog . J . 7: 194-238.

Lees, F A (1888) The Flora of West Yorkshire. Bot . Ser . Trans YNU Vol 2.

Limbert, M (1986) The Exploitation of Peat at Thorne. Old West Riding 6: 9-16.

Limbert, M (1987) Some Notes on the Landscape History of Thorne Moors, in M. Limbert (ed) Thorne Moors Papers. Doncaster.

Limbert, M (1987a) Materials for a history of botanical investigation on Thorne Moors. Naturalist 112: 117-24.

Limbert, M (1989) First recorders of the Goole Scientific Society, with particular reference to Thomas Bunker. Naturalist 114: 93-97.

Limbert, M, Mitchell, R D and Rhodes, R J (1986) Thorne Moors: Birds and Man. Doncaster.

Metcalfe, B (1960) Geographic aspects of the reclamation and development of Hatfield Chase. MA thesis, University of Leeds.

Nunn, Lt-Col (1905) The Scientific and Commercial Value of Peat Moss. Vet.J. 11 (new ser.): 6-17.

Parsons, H F (1877) The Alluvial Strata of the Lower Ouse Valley. Proc.Geol. & Polytechnic Soc. West Riding Yorks. 4 (new ser) : 203-38.

Payne-Gallwey, R (1886) The Book of Duck Decoys. Their Construction, Management, and History. London.

Prince, H (1981) Victorian Rural Landscapes, in G. E. Mingay (ed) The Victorian Countryside. Vol 1. London.

Robinson, G G (1969) Some aspects of the historical geography of the Humber Warplands, circa 1600-1940. MA thesis, University of Hull.

Rogers, S A and Bellamy, D J (1972) Peat Exploitation and Conservation. A Case History. Proc. 4th Internat.Peat Congress I – IV, Helsinki 1972: 219-33.

Shilleto, W (1893) The Earlier History of Gowle and Marshland. Goole Weekly Times, 1-15 September.

Sledge, W A (1941) Thorne Waste Plants. Naturalist 66: 266-68.

Sledge, W A (1949) The Distribution and Ecology of Scheuchzeria palustris L. Watsonia 1: 24–35.

Smart, P J, Wheeler, B D and Willis, A J (1986) Plants and peat cuttings: historical ecology of a much exploited peatland – Thorne Waste, Yorkshire, UK. New Phytol. 104: 731-48.

Stephenson, J (1912) Warping. J. Roy. Agric. Soc. England 73: 104-13.

Tallis, J H and Birks, H J B (1965) The Past and Present Distribution of Scheuchzeria palustris L. in Europe. J. Ecol. 53: 287-98.

Taylor, M (1987) Thorne Mere and The Old River Don. York.

Tomlinson, J (1882) The Level of Hatfield Chase and Parts Adjacent. Doncaster.

West, G (1886) Methodism in Marshland. London.

Woodruffe-Peacock, E A (1920-21) The Ecology of Thorne Waste. Naturalist 45: 301-04, 353-56, 381-84; 46: 21-25.

Young, A (1771) A Six Months' Tour Through the

North of England. Vol 1. Second edn. London.

The Committee of the Thorne and District Local History Association wish to thank Martin Limbert for making the results of his researches available for this publication. 20.3.90.

Published by Thorne Local History Society

Supported by Thorne Moorends Regeneration Project 2014