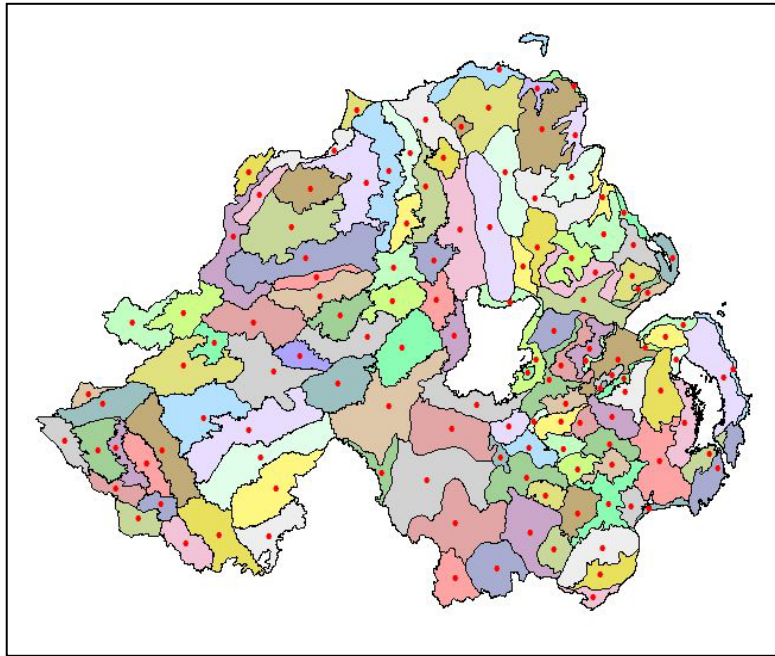




Landscape Character Areas in Northern Ireland



In recognizing the importance of sustaining local identity, Environment and Heritage Service (EHS) in association with the Planning Service, commissioned a survey from environmental consultants Environmental Resources Management (ERM), which resulted in the identification of 130 distinct character areas within Northern Ireland. Each landscape character area was described and analysis for key characteristics, landscape condition and sensitivity to change.

West Lough Shores and Lough Neagh Peatlands.

The SPAN Study Area is described within the survey and this report is an edited version of the survey highlighting the 2 main landscape characters affecting the research territory

[A full version of the of the survey can be found www.ehsni.gov.uk]

West Lough Neagh Shores



Landscape

Key Characteristics :

- Relatively flat, expansive landscape on the lower reaches of large rivers and fringes of Lough Neagh.
- Shallow drumlins form 'islands' surrounded by flat, open pastures; they have a diverse landscape pattern, with farmsteads and mature trees.
- Large fields on floodplain, often surrounded by straight drainage ditches.
- Some poorly-drained areas within the farmland and large wet woodlands on more extensive low-lying land.
- Extensive ribbon development along straight roads, which often end at farms towards the fringes of Lough Neagh.
- Mature hedgerow oak trees are prominent features in a well-connected network of hedgerows.

Landscape Description

The landscape of the West Lough Neagh Shores is found to the east of Cookstown, on the extensive floodplain of the Ballinderry River and its tributaries. The land is relatively low-lying, with a transition from shallow drumlins on the edges of the floodplains, to extensive flat farmland on the fringes of Lough Neagh. Stretches of the rivers are enclosed by embankments and are often hidden from view by extensive woodlands on wet, low-lying land. Such woodlands are dominated by willow, alder and birch and they are generally close to the river channel.

The landscape has a relatively homogeneous landscape pattern, with extensive flat pastures surrounded by drainage ditches and a well-connected network of straight hedgerows. There are numerous hedgerow trees and the mature hedgerow oaks are a special, distinctive feature of the area. Farms and individual houses are concentrated on shallow drumlins, which often form prominent 'islands' with a relatively diverse, well treed landscape pattern. Traditionally, larger properties and settlement clusters were sited on higher land, with cottages dispersed in a linear pattern along the embanked floodplain roads. In recent years, this pattern has become increasingly overwhelmed by ribbon development, which includes some prestigious, large properties on the flat lands close to Lough Neagh.

Landscape Condition and Sensitivity to Change

Most farmland is in relatively good condition, and that on the drumlins is particularly well managed. However, much low-lying land is extensively managed, with a transition to poorly-drained areas of rushes and scrub. Derelict buildings and partially used farms are common, despite the high proportion of recent development. Views across a flat landscape are wide and open and the only way to screen or integrate new development is by planting with native trees which can blend with the existing wet woodlands.

Existing hedgerow trees help to screen some existing ribbon development. The fringes of Lough Neagh are particularly sensitive to change. This area is important for its scenic, ecological and heritage value; for instance, the landscape setting of the Ardboe Cross and the long, expansive views along the shoreline are sensitive to mineral extraction, housing, and tourist developments.

Principles for Landscape Management

- The characteristic hedgerow oak trees are now in decline and a programme of replanting and tree surgery to existing specimens should be introduced.
- Engineering works relating to local watercourses should be carefully designed to minimise disruption to the alignment of river banks and channels and the associated riparian vegetation.
- Management and extension of existing deciduous woodlands will ensure their long-term survival as landscape features and create visual screening for new developments.
- Wet meadows on the shores of the Lough should be managed in accordance with the Draft Management Plan for the Lough Neagh/Lough Beg SPA and the ASSI Schedules to maximise nature conservation value.
- There is scope to promote and manage wider public access to the lough shore, reducing the risks of ad hoc damage to highly sensitive areas.

Principles for Accommodating New Development

- New development would be prominent in the relatively open landscapes, although there may be scope to integrate housing using extensive native planting, imitating the wet woodlands found on the edge of the floodplain.
- Traditional buildings located close to the Lough are long, low and white-washed and they increase in size inland; new development which follows this pattern could be integrated within the local landscape pattern but there is a danger of overcrowding.
- The open character of the landscape of the Lough fringe should be retained in order to maintain views across the water from local roads.

Geodiversity

Outline Geomorphology and Landscape Setting

The use of a cultural overlay in defining Landscape Character Areas (LCAs) means that they frequently subdivide natural physiographic units. It is common therefore for significant geomorphological features to run across more than one LCA. It is also possible in turn, to group physiographic units into a smaller number of natural regions. These regions invariably reflect underlying geological, topographic and, often, visual continuities between their component physiographic units, and have generally formed the basis for defining landscape areas such as AONBs. It is essential therefore, that in considering the 'Geodiversity' of an individual LCA, regard should be given to adjacent LCAs and to the larger regions within which they sit. In the original Land Utilisation Survey of Northern Ireland, Symons (1962) identified twelve such natural regions.

This LCA lies within the region described as the Central Lowlands. This region owes its large-scale morphology to the early Tertiary subsidence of the Lough Neagh basin into the magma chamber from which the basalts that underlie much of the landscape originated. This has produced a largely centripetal drainage system from the rim of the basin into Lough Neagh that ultimately drains northwards via the Lower Bann. To the south of the Lough Neagh basin, the lowlands extend southwestwards along a Caledonian structural trend into the Monaghan-Clones depression. In the east of the region the lowlands extend northeastwards along the fault-guided Lagan Valley. There are no strong topographical barriers in the region and boundaries between LCAs tend to be subtle. The low gradients of the rivers, especially on the clay lowlands immediately around Lough Neagh, create inherent drainage problems and frequently it is only the slopes of the many drumlins that provide permanently dry sites. The Lough Neagh Basin was a major ice accumulation centre during the Late Midlandian and much of the lowland areas to the north and south of the Lough are dominated by extensive drumlin swarms.

The landscape of the West Lough Neagh Shores is found to the east of Cookstown, on the extensive floodplain of the Ballinderry River and its tributaries. The land is relatively low-lying, with a transition from shallow drumlins on the edges of the floodplains, to extensive flat farmland on the fringes of Lough Neagh. Stretches of the rivers are enclosed by embankments and are often hidden from view by extensive woodlands on wet, low-lying land. This LCA is therefore characterised by relatively flat, expansive landscape on the lower reaches of large rivers and fringes of Lough Neagh in which shallow drumlins form 'islands' surrounded by flat, open pastures.

Pre-Quaternary (Solid) Geology

The stratigraphy of this area is made up of the mapped formations in the table, the youngest of which usually overlie the oldest.

Stratigraphic Table (youngest rocks at the top of the table)

Tertiary Lough Neagh Group – about 20 million years old
Tertiary intrusive units – between 50 and 60 million years old
Tertiary Interbasaltic units – between 50 and 60 million years old
Tertiary Lower Basalt Formation – between 50 and 60 million years old
Cretaceous Hibernian Greensand & Ulster White Limestone – about 100 million years old
Triassic Mercia Mudstone Group – between 220 and 210 million years old

This LCA extends across the basalt escarpment to the west of Lough Neagh. Here, Cretaceous greensands and limestones or Tertiary basalts rest unconformably on a range of older Mesozoic rock units. The LCA comprises 45% Lough Neagh Group; 45% Lower Basalt Formation, the remainder being the older, underlying units.

The geology appears more complex than it is: being dominated by basalts. The limestones are quarried extensively for lime and aggregate, including the succession of this LCA, the limeworks at Carmean.

Tertiary-aged basalts comprise a crudely-bedded succession of lava flows, columnar jointed lava flows, ash-falls and red-weathered horizons (or boles). The basalts were erupted 55 million years ago as the North Atlantic opened. They are extensively quarried for construction materials, especially roadstone. The palaeoweathered succession of Interbasaltic beds crop out as a small strip on the eastern margin of LCA48.

Quaternary (Drift) Geology

Northern Ireland has experienced repeated glaciations during the Pleistocene period that produced vast amounts of debris to form the glacial deposits that cover >90% of the landscape. Their present morphology was shaped principally during the last glacial cycle (the Midlandian), with subsequent modification throughout the post-glacial Holocene period. The Late Midlandian, the last main phases of ice sheet flow, occurred between 23 and 13ka B.P. from dispersion centres in the Lough Neagh Basin, the Omagh Basin and Lower Lough Erne/Donegal. The clearest imprint of these ice flows are flow transverse rogen moraines and flow parallel drumlin swarms which developed across thick covers of till, mostly below 150m O.D. during a period that referred to as the Drumlin Readvance. At the very end of the Midlandian, Scottish ice moved southwards and overrode parts of the north coast. Evidence for deglaciation of the landscape is found in features formed between the glacial maximum to the onset of the present warm stage from 17 and 13ka B.P. – a period of gradual climatic improvement. Most commonly these are of glaciofluvial and glaciolacustrine origin and include: eskers, outwash mounds and spreads, proglacial lacustrine deposits, kame terraces, kettle holes and meltwater channels (McCarron et al. 2002). During the Holocene, marine, fluvial, aeolian and mass movement processes, combined with human activities and climate and sea-level fluctuations, have modified the appearance of the landscape. The landforms and associated deposits derived from all of these processes are essentially fossil. Once damaged or destroyed they cannot be replaced since the processes or process combinations that created them no longer exist. They therefore represent a finite scientific and economic resource and are a notable determinant of landscape character.

The drift geology map for this LCA shows that most of it is dominated by till deposits resulting from the drumlin readvance. Away from the lake shore, the landscape of the western half of the LCA is shown in Edwards (1980) to be dominated by large numbers of E-W orientated drumlins that form part of the Western Lough Neagh Drumlin Field. Within Northern Ireland drumlins take a variety of forms; some are rounded in plan, although the majority are elongated in the direction of ice flow. Some have sharp crests, whereas others are more whaleback in profile. Although most drumlins are composed of glacial till or tills, a small number are 'drumlinoid features' are rock-cored and some are composed of sand and gravel. Where drumlins are rock cored there may have been significant frost shattering prior to their shaping by ice flow. It is possible therefore to see tails of shattered debris within till leading away from the feature in the direction of flow (Davies and Stephens 1978). It is generally accepted that the drumlins of Northern Ireland were formed by deposition beneath fast flowing ice. In the majority of cases this has resulted in a thick layer of

Upper (younger) Till overlying a core of Lower (older) Till. This pattern has been observed across Northern Ireland, apart from a limited area in the north of County Down. The precise temporal relationship between the two tills has not been definitively resolved, but Davies and Stephens (1978) refer to an organic layer between the tills in County Fermanagh that has been dated at $30\,500 \pm 1170/1030$ years B.P. and shelly material between the tills on the Ards Peninsula dated at $24\,050 \pm 650$ years B.P.. However, these deposits only indicate that the Lower Till is older than the dates obtained.

The drift map indicates the presence of small, isolated areas of glaciofluvial sands and gravels associated with the deglaciation of the region and the wasting of the Lough Neagh ice sheet. The map also highlights the alluvial deposits associated with the present-day drainage system and the lacustrine clays and silts of the current Lough shore. The narrow band of lacustrine alluvium around the Lough shore has most probably been exposed by arterial drainage works, such as those completed in 1942, designed to lower Lough Neagh and to improve drainage conditions within the surrounding Basin.

Key Elements

ASSI

030 LOUGH NEAGH

Largest lake in the British Isles, supporting beds of submerged aquatic vegetation with marginal swampy woodland and wet grassland.

Biodiversity

In the following account of this LCA it should be noted that for consistency, the biodiversity section follows the standard order for all LCAs even though some of the communities discussed later may have more importance for biodiversity than those discussed earlier

Key Characteristics

- woodlands cover approximately 3% of the LCA, the majority of which is broadleaved or mixed
- much of the broadleaved woodland in the LCA is developed on cut-over bog; wet woodland is also extensive
- grassland covers c.74% of the LCA, only slightly in excess of the percentage for Northern Ireland as a whole (c.71%); more than four-fifths of the grassland is in improved pastures
- wet grasslands in wide flat low-lying areas and along shore of Lough Neagh – of especial importance to breeding waders, but also as part of the intricate mix of habitats in the farmland to give habitats for Priority Species of birds
- no remaining intact lowland bogs
- Lough Neagh of national and international importance for the diversity of wetland birds and of national importance for pollan (one of two UK sites)

Woodlands

Woodlands cover approximately 3% of the LCA, the majority of which is broadleaved or mixed. State Forest comprises two parts of Cookstown Forest located near Coagh. The smaller, known as The Birch Wood, is mixed woodland of sycamore, oak, beech, alder, spruces, Douglas fir and Japanese larch. The larger site is predominantly coniferous with mostly Sitka spruce and Lodgepole pine and a fringe of birch and alder on the south side; the wood occupies former cut-over bog.

Much of the broadleaved woodland in the LCA is developed on cut-over bog; the Gort Moss/Annaghmore Moss, a largely cut-over bog has been colonised by trees and Killycolpy Wood is developed on a partially cut-over bog and typically consists primarily of alder and birch; the herb layer has considerable quantities of regal fern. The site has an unusual bramble flora with three extremely rare species having been recorded - they are associated with cut-over bogs and further cutting and drainage has led to their decline. To the east of Killycolpy Wood, woodland is

extensive, again partly on cut-over bog; the presence of conifers at both sites indicates evidence of some planting. However, the eastern site adjoins the wet grasslands of the lough shore and here wet woodland and scrub is colonising.

Issue: low woodland cover of variable biodiversity value

Actions:

- further study of the history and ecology of broadleaved woodlands particularly any ancient and long-established, as a key to future management
- encourage planting of native broadleaved woodlands, through appropriate grant schemes, rather than the small conifer plantations which are of poor biodiversity and landscape value.
- allow succession of scrub and woodland on cut-over bogs and shoreline to develop

Grassland and Arable

Grassland covers c.74% of the LCA, only slightly in excess of the percentage for Northern Ireland as a whole (c.71%). However, more than four-fifths of the grassland is in improved pastures. Arable (including grass re-seeding) accounts for about 16% of the land cover, well above the percentage for Northern Ireland (c. 6%).

Improved pastures generally have low biodiversity as a result of relatively intensive management. Some of the pastures are sown grasslands dominated by ryegrass and few other species - low biodiversity is in-built. Other grasslands have been converted to improved pastures through management. High levels of grazing or repeated cutting for silage, high inputs of fertilizers and slurry, and selective herbicides serve to reduce diversity of both flora and fauna.

Biodiversity in areas of improved pastures and arable is often concentrated in hedgerows. Indeed, they may be the most significant wildlife habitat over much of lowland Northern Ireland, especially where there are few semi-natural habitats. Hedgerows are a refuge for many woodland and farmland plants and animals. In this LCA predominantly hawthorn hedgerows are generally well-managed, dense and treed – and notably with oaks in some locations. However, hedgerows are replaced as field boundaries by ditches on the wide flat lands between the isolated drumlins.

The wide flat low-lying land, especially between Coagh and Blackers Rock and along the Balinderry, also has damp pastures and rush-dominated fields amongst the improved pastures. In addition to increasing the species diversity, these wet grasslands increase the habitats available so that the farmland as a whole has a wide range of Priority Species of birds – bullfinch, song-thrush, curlew, linnet, reed bunting, tree sparrow, yellowhammer, spotted flycatcher and skylark are widespread.

Wet meadows are most extensive near the shore of Lough Neagh. Here successive lowering of the lough since the 1840s has created a mosaic of fen, reedbeds, wet woodland and wet meadows that are seasonally flooded. This mosaic is extremely important for breeding waders with relatively high numbers of lapwing, redshank and snipe and some curlew. Irish hare also finds a refuge in these less-managed grasslands.

Issue: poor biodiversity of farmland

Actions:

- maintain and improve field boundaries especially hedgerows – where traditional in the landscape. This may be achieved through adoption of correct cutting cycles; hedge laying and replanting where necessary; leaving saplings uncut to develop into hedgerow trees (possible need to replace over-mature oaks in hedges); avoidance of spraying with fertilizers, slurry, herbicides; provision of wildlife strips and conservation headlands around fields; and limitation of field amalgamation.
- encourage (through participation in Environmental Schemes) adoption of less intensive management of pastures to allow reversion to more species-rich grassland and protect damp grassland, particularly against arterial and field drainage
- leave stubble over winter, rather than autumn ploughing, to increase food resources for farmland birds; spring sown cereals are beneficial to breeding farmland birds.

Heaths and Bogs

There are no heaths in the LCA and no intact lowland raised bog survives; bog has either been drained and reclaimed for agriculture or after being cut-over has been afforested or has become colonised by trees to form birch dominated woodland or wet woodland around the edge.

Wetlands and Lakes

Fens and reedbeds form part of a mosaic along the shore of Lough Neagh together with wet woodland and wet grasslands. Both fens and reedbeds have declined in the UK as a result of drainage and reclamation, and the impact of nutrient enrichment from farmland and from expansion of rural settlement. Their occurrence in this LCA is important therefore as examples of a formerly more widespread ecosystem as well as providing habitats for wetland birds (see above).

Lough Neagh ASSI (Eutrophic standing waters) is part of a proposed SPA (along with Lough Beg ASSI and Portmore Lough ASSI) and of a Ramsar listed site. The site designations – of national and international status - are merited because it regularly supports internationally important numbers of wintering Bewick's swan and whooper swan and nationally important numbers of breeding common tern. The site regularly supports over 20,000 waterfowl in winter. Lough Neagh is also notable for supporting an assemblage of breeding birds that occur in nationally important numbers: great-crested grebe, gadwall, pochard, tufted duck, snipe, redshank, common gull, lesser black-backed gull and black-headed gull. Other important breeding wetland species include shelduck, teal, shoveler, lapwing and curlew.

The lough also hosts a declining population of pollan, one of the few locations in Ireland and one of the two known locations in the UK (the other is Lower Lough Erne). The decline of this fish perhaps associated with inflow of nutrients to the lough or over-fishing.

The Balinderry River has river water-crowfoot and the otter has been recorded in the river, as well as in several others.

Issue: Fens in Northern Ireland are a large proportion of the UK resource and together with patches of reedbeds, wet grasslands and wet woodlands provide an important mosaic of habitats along the lough shore

Actions:

- protect fens against loss by drainage and infill, which includes use as official refuse tips as well as sites in which to deposit building rubble and fly-tipping.
- leakage of fertilizers and slurry from surrounding agricultural land should be prevented as this increases the nutrient levels and affects species composition.

Issue: Lough Neagh of national and international importance for wetland birds nationally important for other Priority Species; rivers of importance to Priority Species

Actions:

- improve water quality of the lough, thus attempt to lower the trophic level of the lough
- promote and encourage existing good farming practices so that streams and the lough are not polluted by run-off from agricultural land or seepage from silage pits
- continued monitoring of streams below industrial plants to protect both streams and the lough
- monitor streams in relation to expansion of rural and urban housing and associated septic tanks/sewage treatment plants to preserve habitats in both streams and the lough
- monitor the effects of recreational activities on habitats and species, in particular on bird populations

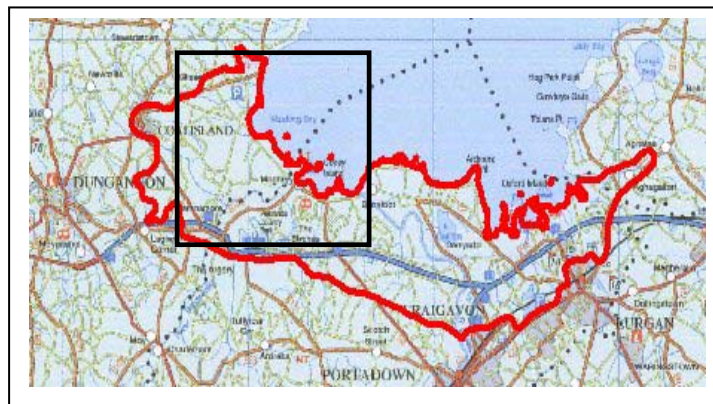


Lough Neagh Peatlands

Landscape

Key Characteristics

- A low lying marshy landscape with small, protruding drumlins.
- The old canal, river channels and drainage patterns have a strong visual influence.
- Extensive, varied patchwork of pasture, plantations, regenerating bog areas and small settlements.
- Many scattered smallholdings, villages and new residential areas on higher ground linked by embanked roads.
- High quality water edge landscape and wildlife habitats.



Landscape Description

The Lough Neagh Peatlands landscape is found on the southern shores of Lough Neagh. Much of the area has been previously worked for peat and has been extensively modified through extraction; there are distinct sharp changes of level marking areas where peat extraction has taken place. There are areas of regenerating birch and willow scrub and farmland, wherever drainage permits. The landscape is strongly influenced by the traditional road pattern, which mirrors that of the peat workings - a pronounced backbone down the Lough Guillian peninsular with laterals running off at right angles.

The M1 is the exception and cuts a swathe through the area which is contrary to the general pattern. To the south west (towards Dungannon) the pattern is of meandering roads, reflecting the more pronounced drumlin forms in this area. Pastures are mostly of medium size and are edged with hedgerows and hedgerow trees. Common species are oak, beech and ash, with silver birch, alder, sycamore and ash on wetter land. Scots pines are scattered through the area. Larger pastures are found on the farmland adjacent to the River Bann. Extensive blocks of gorse are common and many hedgerows are gappy, overgrown or have disappeared.

There are small orchards and areas of horticulture (mostly strawberries) on the old peat beds. The scattered traditional farmsteads and small lough edge and drumlin villages have been supplemented by groups of new residential dwellings. The local vernacular is of two storey or one storey buildings with plaster finished and white-washed exteriors; new buildings are often of bright brick and tile construction and recent development often overwhelms the traditional settlement pattern.

Landscape Condition and Sensitivity to Change

Hedgerows are often neglected and some fields suffer from invasion by gorse and bramble, with areas of regenerating scrub. However this is a varied landscape with superb indented shoreline landscapes and a valuable sense of isolation and tranquillity. The wetland and shoreline landscapes on the edge of Lough Neagh are extremely sensitive and highly valued for their scenic quality and wildlife interest. They fall within the 'Lough Neagh Shores Area of Scenic Quality'. Extensive areas are designated as an ASSI and the area is part of the extensive Lough Neagh/Lough Beg Special Protection Area, which recognises its international significance as a habitat for breeding birds. Open, flat areas are particularly sensitive to the visual impact of vertical elements. New development can be sustained in small groupings when contained within existing planted areas.

Principles for Landscape Management

- The natural biodiversity of the water environment and water edge landscapes is sensitive to changes in drainage patterns and runoff. Policies to protect biodiversity and which limit development close to shore edges should be considered.
- Lough Neagh has high scenic quality and there is scope for more view points and footpaths to take advantage of this landscape asset.

Principles for Accommodating New Development

- The continued development of single houses on drumlins is likely to be detrimental to landscape character and the existing settlement pattern should be conserved.
- The architectural style and intensity of development is important in this area of dispersed rural character. Simple architectural forms, using materials with subtle colours which will age with time are most appropriate; developments should be small.
- The visual impact of new development and its associated infrastructure should be considered in relation to long views from higher land to the south.

Geodiversity

Outline Geomorphology and Landscape Setting

The use of a cultural overlay in defining Landscape Character Areas (LCAs) means that they frequently subdivide natural physiographic units. It is common therefore for significant geomorphological features to run across more than one LCA. It is also possible in turn, to group physiographic units into a smaller number of natural regions. These regions invariably reflect underlying geological, topographic and, often, visual continuities between their component physiographic units, and have generally formed the basis for defining landscape areas such as AONBs. It is essential therefore, that in considering the 'Geodiversity' of an individual LCA, regard should be given to adjacent LCAs and to the larger regions within which they sit. In the original Land Utilisation Survey of Northern Ireland, Symons (1962) identified twelve such natural regions.

This LCA lies within the region described as the Central Lowlands. This region owes its large-scale morphology to the early Tertiary subsidence of the Lough Neagh basin into the magma chamber from which the basalts that underlie much of the landscape originated. This has produced a largely centripetal drainage system from the rim of the basin into Lough Neagh that ultimately drains northwards via the Lower Bann. To the south of the Lough Neagh basin, the lowlands extend southwestwards along a Caledonian structural trend into the Monaghan-Clones depression. In the east of the region the lowlands extend northeastwards along the fault-guided Lagan Valley. There are no strong topographical barriers in the region and boundaries between LCAs tend to be subtle. The low gradients of the rivers, especially on the clay lowlands immediately around Lough Neagh, create inherent drainage problems and frequently it is only the slopes of the many drumlins that provide permanently dry sites. The Lough Neagh Basin was a major ice accumulation centre during the Late Midlandian and much of the lowland areas to the north and south of the Lough are dominated by extensive drumlin swarms.

The Lough Neagh Peatlands is a low-lying marshy landscape with small, protruding drumlins, found on the southern shores of Lough Neagh. Much of the area has been previously worked for peat and has been extensively modified through extraction; there are distinct sharp changes of level marking areas where peat extraction has taken place. There are areas of regenerating birch and willow scrub and farmland, wherever drainage permits.

Pre-Quaternary (Solid) Geology

The stratigraphy of this area is made up of the mapped formations in the table, the youngest of which usually overlie the oldest.

Stratigraphic Table (youngest rocks at the top of the table)

Tertiary – Lough Neagh Group, about 20 million years old
Tertiary – Lower Basalt Formation basalts – about 55 million years old
Cretaceous – Ulster White Limestone – about 100 million years old
Triassic – Mercia Mudstone and Sherwood Sandstone groups – spanning 240 to 210 million years old
Carboniferous – Millstone Grit and Coal Measures – about 300 million years old

75% of LCA64 is underlain by Tertiary Lough Neagh Group. The eastern area comprises Tertiary basalts, the western area is underlain by Triassic and Cretaceous.

Carboniferous

The Coal Measures are exposed in the far eastern extension of LCA64 (Coalisland Brick Pit - ESCR Site 247).

Quaternary (Drift) Geology

Northern Ireland has experienced repeated glaciations during the Pleistocene period that produced vast amounts of debris to form the glacial deposits that cover >90% of the landscape. Their present morphology was shaped principally during the last glacial cycle (the Midlandian), with subsequent modification throughout the post-glacial Holocene period. The Late Midlandian, the last main phases of ice sheet flow, occurred between 23 and 13ka B.P. from dispersion centres in the Lough Neagh Basin, the Omagh Basin and Lower Lough Erne/Donaghy. The clearest imprint of these ice flows are flow transverse rogen moraines and flow parallel drumlin swarms which developed across thick covers of till, mostly below 150m O.D. during a period that referred to as the Drumlin Readvance. At the very end of the

Midlandian, Scottish ice moved southwards and overrode parts of the north coast. Evidence for deglaciation of the landscape is found in features formed between the glacial maximum to the onset of the present warm stage from 17 and 13ka B.P. – a period of gradual climatic improvement. Most commonly these are of glaciofluvial and glaciolacustrine origin and include: eskers, outwash mounds and spreads, proglacial lacustrine deposits, kame terraces, kettle holes and meltwater channels (McCarron et al. 2002). During the Holocene, marine, fluvial, aeolian and mass movement processes, combined with human activities and climate and sea-level fluctuations, have modified the appearance of the landscape. The landforms and associated deposits derived from all of these processes are essentially fossil. Once damaged or destroyed they cannot be replaced since the processes or process combinations that created them no longer exist. They therefore represent a finite scientific and economic resource and are a notable determinant of landscape character.

The drift geology map for this LCA shows it to be predominantly underlain by Late Midlandian till associated with the large ice mass that was centred on the Lough Neagh Basin. Superimposed on the till are post-glacial spreads of alluvium associated with the floodplains of the Blackwater and Bann. Around the Lough shore there is a narrow band of lacustrine alluvium that has most probably been exposed by the lowering of Lough Neagh in historical times to improve drainage conditions within the Basin. Of possibly greater geomorphological significance is an area of glaciofluvial deposits in the west of the LCA between Washing Bay and Coalisland. This appears to be an extension of the sands and gravels of the Moneymore Complex that occurs mainly in LCAs 42,45 and 49 to the west and north. The Moneymore complex consists of discontinuous sand and gravel mounds and spreads in a north/south oriented belt in the Lough Neagh lowlands to the east of the Sperrin highlands between Moneymore, Coalisland and Dungannon. The landforms are dissected and consist predominately of ice-marginal and extra-marginal glaciolacustrine sequences superimposed upon the western Lough Neagh drumlin field. The stratified deposits formed in association with localised and variable palaeolake levels during the final deglacial stages of the region. Sediment supply was largely from a small, lowland residual ice-mass within the Lough Neagh basin and meltwater draining the eastern margin of the Sperrin highlands. As indicated in the geomorphological description above, much of the LCA is now blanketed by peat. The narrow band of lacustrine alluvium around the Lough shore has most probably been exposed by arterial drainage works, such as those completed in 1942, designed to lower Lough Neagh and to improve drainage conditions within the surrounding Basin.

Key Elements

ASSI

030 lough neagh

Largest lake in the British Isles, supporting beds of submerged aquatic vegetation with marginal swampy woodland and wet grassland.

Sites/units identified in the Earth Science Conservation Review

247 Coalisland Brick Pit

Best exposure of Coal Measures strata of Westphalian age. Unfossiliferous mudstones with thin beds of sandstones. Fossiliferous bands with brachiopods and goniatites.

Biodiversity

In the following account of this LCA it should be noted that for consistency, the biodiversity section follows the standard order for all LCAs even though some of the communities discussed later may have more importance for biodiversity than those discussed earlier

Key Characteristics

- woodlands account for about 2.5% of the land cover of the LCA, about half of the percentage for Northern Ireland as a whole.
- most woodland is semi-natural and developed on cut-over lowland bog and includes much wet woodland
- grassland cover approaches the percentage for Northern Ireland as a whole (c.71%); almost all of this is improved pasture, generally of low biodiversity
- important areas of wet grassland, particularly along the shore of L. Neagh and mouths of major rivers
- Lough Neagh of national and international importance for the diversity of wetland birds and of national importance for pollan (one of two UK sites)

Woodlands

Woodlands account for about 2.5% of the land cover of the LCA, about half of the percentage for Northern Ireland as a whole. Most of this is semi-natural and developed on cut-over lowland bog. However, Annagarriff Wood (Annagarriff NNR) in Peatlands Park has an older origin because it appears to have survived as a hunting preserve for over 200 years; it is at least 'long-established' and may be 'ancient'. Such woodlands have had sufficient time for species to colonise and therefore tend to have higher species diversity than more recent woodlands. Although felled on occasion, Annagarriff Wood appears never to have been farmed and most native tree species are present. Oak and birch predominate but rarities such as yew, aspen and alder-buckthorn may be seen, the latter in areas of wet woodland. These are usually dominated by downy birch and grey willow below which the woodland floor is mainly of acid communities composed of a thick bryophyte carpet of Polytrichum spp., Scleropodium purum and a variety of bog-mosses (Sphagnum), through which grow a scattering of grasses, sedges and herbs. There is an abundance of mammals and birds include sparrowhawk and long-eared owl; this is the only known Irish site for the wood ant (Formica aquilonia). Some of the low hills at Peatlands Park have planted pines with rhododendron beneath, part of the planting of the Church Hill estate.

The majority of the woodland, developed on cut-over bog, is of birch with some willow species in wetter parts. Where it occurs, the herb layer is varied, partly depending on the density of the canopy and the wetness, and often consists of purple moor grass, brambles, gorse, raspberry and mosses.

Issue: low woodland cover, but includes extensive wet woodland and example of possibly ancient woodland (Annagarriff)

Actions:

- protect wet woodlands and woodlands on cut-over bog from loss arising from reclamation, drainage, land-fill and rubbish dumping
- Annagarriff is protected as a NNR, but further work on its ecology and history should be promoted

Grassland and Arable

Grassland cover approaches the percentage for Northern Ireland as a whole (c.71%); almost all of this is improved pasture. Arable land (includes grass re-seeding) also compares with the c.6% for Northern Ireland as a whole. It is largely restricted to the eastern half of the LCA, generally avoiding the peat, and much of it is grass re-seeding. There is also some horticulture on drained peat.

Improved pastures generally have low biodiversity as a result of relatively intensive management. Some of the pastures are sown grasslands dominated by ryegrass and few other species - low biodiversity is in-built. Other grasslands have been converted to improved pastures through management. High levels of grazing or repeated cutting for silage, high inputs of fertilizers and slurry, and selective herbicides serve to reduce diversity of both flora and fauna.

Biodiversity in areas of improved pastures and arable is often concentrated in hedgerows. Indeed, they may be the most significant wildlife habitat over much of lowland Northern Ireland, especially where there are few semi-natural habitats. Hedgerows are a refuge for many woodland and farmland plants and animals. In this LCA predominantly hawthorn hedgerows are commonly treed – ash, beech and oak on the drier land and birch and alder in the peat areas.

Hedges tend to be well managed on some of the intensive dairy farms, but elsewhere are gappy and remaining shrubs very overgrown. In those areas of flat land near to Lough Neagh where there are large pasture fields, hedges may be less common and boundaries are of ditches and fence-and-wire.

Rough grassland is found in three situations - in the surroundings of Craigavon where they form part of the undeveloped land or of the open design of the town; on cut-over bogs that have not been colonised by trees, and in fields that have been 'reclaimed' from peat in the past. On the cut-over bogs, the variation in depth of peat left leads to variation in the cover so that the acid grasslands may have small 'islands' with common heather and sedges or in some drier sites, gorse. Grassland reclaimed in the past may be dominated by rushes and generally poor in plant species. On the southern shore of Lough Neagh many of the reclaimed grasslands are rush-dominated, but wet grasslands in this district are an important part of the habitats for wetland birds that are associated with the lough.

The inter-mix of farmland with areas of cut-over bog, damp grasslands and woodland gives rise to a mosaic of habitats for birds and many of the Priority Species are found in the LCA – including bullfinch, linnet, skylark, song thrush, reed bunting, tree sparrow, curlew and spotted flycatcher. Most of these are recorded also in the undeveloped grassland and scrub woodlands around Craigavon.

Issue: poor biodiversity of farmland

Actions:

- maintain and improve field boundaries especially hedgerows. This may be achieved through adoption of correct cutting cycles; hedge laying and replanting where necessary; leaving saplings uncut to develop into hedgerow trees; avoidance of spraying with fertilizers, slurry, herbicides; provision of wildlife strips and conservation headlands around fields; and limitation of field amalgamation.
- encourage (through participation in Environmental Schemes) adoption of less intensive management of pastures to allow reversion to more species-rich grassland and protect unsown areas of grassland, particularly in this LCA of wet grassland – thus,
- maintain and enhance floodplain grassland by restricting field or arterial drainage

- leave stubble over winter, rather than autumn ploughing, to increase food resources for farmland birds; spring sown cereals are beneficial to breeding farmland birds.

Heaths and Bogs

Northern Ireland has a large proportion of the UK's lowland raised bogs and they are therefore of national importance; they are also of European importance as examples of the maritime or oceanic types of lowland raised bogs. However, although lowland raised bog is widespread across the LCA, almost all has been cut-over in the past and much has been colonised by birch woodland (see above). The major intact bog is Mullenakill NNR; this has most of the typical bog species including hare's tail cotton sedge, common cotton sedge, bog mosses (Sphagnum) and sundews. At Peatlands Park ASSI where areas of cut-over peat are protected against further extraction, regeneration is taking place with common heather, cross-leaved heath, a mixture of sedges including hare's-tail cotton sedge and common cotton sedge, and bog-mosses. The peatland flora includes bog-rosemary at one of its few Northern Ireland sites and the marsh fritillary butterfly is also found. Cut-over peatland can provide a diversity of habitats, not only those that are relatively dry (see above) but also water-logged sites or small pools that provide a habitat for dragonflies. There can be also patches of lowland heathland; this may be found where the peat left after cutting is shallow (wet heathland has less than 50cm of peat). However, because it is inter-mixed with other cut-over areas it is difficult to delimit.

Recent and present peat extraction is common on both sides of the Blackwater River, except at Peatlands Park, and includes both milling/vacuum and sod cutting, mainly for horticultural peat.

Issue: raised bogs are of national and international importance

Actions:

- maintain the integrity of existing lowland raised bogs by for example, preventing infilling, fly-tipping, fires, new drainage and new peat cutting

consider further restoration of raised bog habitats through appropriate water level management, tree removal (individual colonisers) and phasing out peat cutting

Wetland and Lakes

The fens of north Armagh have long been recognised as of national and international significance, not only for their plant life, but as part of a complex of open water (especially Lough Neagh), reedbeds, wet meadows and carr woodland that provides a diversity of habitats for mammals, insects and birds. Although not as extensive as formerly, because of drainage for agriculture, the fens and other wetland habitats remain of importance. For example, Oxford Island NNR includes a diversity of habitats including wet meadows, reedbeds, woodlands and shoreline scrub, all of which are typical of the Lough Neagh shore. Sheltered bays provide a refuge for large numbers of wintering wildfowl, and whooper and Bewick's swans can usually be found grazing on wet grassland fields, that in summer provide habitats for butterflies, including some rare species.

Fens and reedbeds are not confined to the L. Neagh shore, they also occur around Lough Gullion, Derryadd Lake and as isolated patches along the major rivers, as at Derryvore in the Bann valley.

The LCA contains several large and small lakes, but although many are classed as mesotrophic lakes, most are considered to be of low biological interest because of nutrient enrichment from the surrounding land. Derrylard Quarry is mesotrophic, but relatively base and nutrient poor (a *Nymphaea/Fontinalis/Littorella* type). Derryadd Lake has eutrophic standing waters; the outstanding example of this type is, however, Lough Neagh. Lough Neagh ASSI is part of a proposed SPA (along with Lough Beg ASSI and Portmore Lough ASSI) and of a Ramsar listed site. The site designations – of national and international status - are merited because it regularly supports internationally important numbers of wintering Bewick's swan and whooper swan and nationally important numbers of breeding common tern. The site regularly supports over 20,000 waterfowl in winter. Lough Neagh is also notable for supporting an assemblage of breeding birds that occur in nationally important numbers: great-crested grebe, gadwall, pochard, tufted duck, snipe, redshank, common gull, lesser black-backed gull and black-headed gull. Other important breeding wetland species include shelduck, teal, shoveler, lapwing and curlew.

The lough also hosts a declining population of pollan, one of the few locations in Ireland and one of the two known locations in the UK (the other is Lower Lough Erne). The decline of this fish perhaps associated with inflow of nutrients to the lough or over-fishing.

This part of Lough Neagh has a number of the islands that have been designated, with others (about 80 in total), as the Lough Neagh Islands NNR. These provide secure nesting sites, free from predators, for many species of wetland birds. They also have habitats that in themselves are of interest to biodiversity; Coney Island (National Trust) has fringing reed swamp and alder carr and broadleaved woodland. Species of note include large bitter-cress which occurs within the woodland, and the crane fly (*Erioptera squalida*) – its only known location in Ireland.

The Upper Bann, the Callan River and River Blackwater have river water-crowfoot; the Blackwater River also is a salmon river (also trout and dollaghan). The otter is widespread.

Issue: Fens in Northern Ireland are a large proportion of the UK resource

Actions:

- protect fens against loss by drainage and infill, which includes use as official refuse tips as well as sites in which to deposit building rubble and fly-tipping.
- leakage of fertilizers and slurry from surrounding agricultural land should be prevented as this increases the nutrient levels and affects species composition.

Issue: Lough Neagh of national and international importance for wetland birds; nationally important for other Priority Species; rivers of importance to Priority Species

Actions:

- improve water quality of the lough, thus attempt to lower the trophic level of the lough
- promote and encourage existing good farming practices so that streams and the lough are not polluted by run-off from agricultural land or seepage from silage pits
- continued monitoring of streams below industrial plants to protect both streams and the lough
- monitor streams in relation to expansion of rural and urban housing and associated septic tanks/sewage treatment plants to preserve habitats in both streams and the lough
- monitor the effects of recreational activities on habitats and species, in particular on bird populations of L Neagh and surrounds apply above measure appropriately to other smaller loughs

