

**THE STATUS OF
RED GROUSE IN NORTHERN IRELAND
2004**



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**Authors – David Allen, Clive Mellon & Kevin Mawhinney
Contract Managers – John Milburne & Declan Looney**

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I BACKGROUND

The willow grouse (*Lagopus lagopus*) is a circumpolar monogamous species of heather dominated habitats such as Arctic tundra, heaths and moors. The red grouse (*Lagopus lagopus scoticus*) is considered by many authorities to be a sub-species of the willow grouse. It has also been treated as a separate species endemic to the British Isles, where it occurs on heather moorland, blanket bog and raised bogs. The primary food source of red grouse is heather (*Calluna vulgaris*). In the UK it is normally associated with suitable habitat, usually above 150 metres, although in the northern parts of its range this can come down to almost sea-level.

In parts of the UK (especially Scotland and northern England), red grouse are managed to produce an excess for commercial shooting. In Ireland commercial shooting is now rare and the grouse has been recognised as a red list species of conservation concern due to a decline of over 60% in the last 30 years. British birds have been regularly introduced into Northern Ireland to augment the few commercial shoots and apparently to try and increase vigour in the native stock.

The sub-species *hibernicus* which is found in Ireland and the Hebrides (Witherby 1941, Bannerman 1963) has been recognised by some taxonomists, but its treatment has been very inconsistent. The putative sub-species *hibernicus* has never been as abundant as its British cousin and appears better adapted to Irish conditions. For example, they are a paler orange/yellow colour, which may enable them to be better camouflaged on the sedge and grass rich bogs of Ireland. The current status of *hibernicus* in the Hebrides is uncertain and it appears to have been adversely affected by introduced *scoticus* (Bannerman 1963).

Red Grouse, irrespective of race, are notoriously hard to census due to their secretive nature and often remote environs. In Northern Ireland no accurate data was available on either numbers or distribution. In addition, there was no information on the current status of *hibernicus* in Northern Ireland or any recent work on its taxonomic position. Since so little was known about the red grouse, and it was included on the list of Priority Species for the NI Biodiversity Strategy, Environment and Heritage Service contracted Allen and Mellon Environmental Ltd to undertake a range of tasks relating to the red grouse. This work began in November 2003 and was completed by the end of July 2004.

0 ABSTRACT

A total of 881 km² of suitable habitat throughout Northern Ireland was surveyed for red grouse. Between 202 and 221 territories (indicating pairs) were identified indicating that the red grouse population in Northern Ireland is perilously low. The highest densities recorded were 3 territories per km² on managed habitat but more usually around one territory per km². Many of the populations are isolated and are unlikely to be augmented by recruits from other populations due to the sedentary nature of the species. A number of likely pressures on the remaining red grouse were identified, namely; habitat destruction, degradation and fragmentation, development pressure, over and under-grazing, heather beetle damage, predation, large scale peat extraction, afforestation, climate and disease.

Research into the status of "hibernicus" as being at least a valid sub-species suggests that further work is required into its taxonomy. The available evidence suggests that it is equally as valid as many other recognised sub-species within the Palaearctic and Nearctic regions. A full phylo-genetic study is recommended.

1 OBJECTIVES

1.1 There were three main objectives for the red grouse study:

- **To complete a full field survey of Red Grouse in Northern Ireland and report on the findings in the context of historical information.**
- **To review the taxonomic status of the “Irish” Red Grouse**
- **To prepare a draft Biodiversity Action Plan incorporating suggested genetic research.**

1.2 **This report details the findings from the first two objectives. Relevant information from this work has been incorporated into a separate Biodiversity Action Plan for the red grouse.**

2 THE IRISH RED GROUSE – A BRIEF HISTORY AND TAXONOMY

2.1 TAXONOMY

2.1.1 The “Irish” Red grouse, *Lagopus lagopus hibernicus*, has a somewhat confused, and amongst taxonomists, contentious position in the various checklists and books on the birds of Britain and Ireland. Differences in birds found in Ireland were first noted from the British form (*L. scoticus*) by Ussher and Warren (1900) who stated:

“It has been remarked that Irish Grouse are lighter in colour, especially on the under-parts, than those of Great Britain. Some striking variations have occurred; thus a very light-coloured bird, of which the quills were much paler than usual, was received by A. G. More from Mayo and identified with the form called L. persicus by Gray.”

2.1.2 Although originally regarded as a distinct species (Kleinschmidt 1919), in recent years the status of the Irish Red Grouse, even as a distinct race of willow or red grouse has been questioned. However, this was not always the case. For example, Bannerman (1963), one of the twentieth century’s foremost ornithologists, recognises *hibernicus* as a separate race with the comment:

“Resident in every county in Ireland but often very scarce; rapidly decreasing in numbers. Birds in the Outer Hebrides are allied with this race, where they are resident.”

A footnote states:

“Owing to introductions from Scotland the birds in the Outer Hebrides are today a slightly mixed population and the same must unfortunately apply to the Irish population, through importations from Britain from time to time.”

He goes on to write:

*“It seems truly astonishing with our tremendous interest in game birds in Great Britain and Ireland that we had to wait for a German scientist - in 1919 - the late Pastor Kleinschmidt - to acquaint us with the fact that Irish red grouse could be distinguished fairly easily by the paler colour when series are compared with series, more especially in the hen bird. Mr Witherby examined many examples from Ireland when he was preparing The Handbook descriptions and relied on his own opinion before accepting Kleinschmidt's name *hibernicus*.”*

- 2.1.3 The various taxonomic positions and relationships of the relevant *Lagopus* species and/or sub-species are listed below in an attempt to show the constant state of flux and changing opinion over the last 100 years.

SYNONYMS

Irish Red Grouse =

Tetrao hibernicus = *Lagopus scoticus hibernicus* = *Lagopus lagopus hibernicus*

British Red Grouse = Red Grouse =

Tetrao scoticus = *Lagopus scoticus scoticus* = *Lagopus lagopus scoticus*

Willow Grouse = Willow Ptarmigan =

Tetrao lagopus = *Lagopus lagopus* and includes *Lagopus lagopus variegatus*,
Lagopus lagopus scoticus and *Lagopus lagopus hibernicus*

- 2.1.4 Kleinschmidt (1919) first described *Tetrao hibernicus* as a full species. Later authoritative texts refer to *Lagopus scoticus hibernicus* as a race of red grouse (eg Witherby (1941) and Bannerman (1963)) with a range encompassing Ireland and the Outer Hebrides. However, the decision not to give species status to *scoticus* and merging it as a sub-species of *lagopus*, resulting in *Lagopus lagopus scoticus*, in turn led to the apparent dismissal of *hibernicus* as anything other than part of a range of variation within *scoticus* (BOU 1952). Irish authors including Ruttledge (1966) continued to refer to *Lagopus lagopus hibernicus*. A clear divergence of opinion (not unusual amongst taxonomists) was clearly emerging regarding the taxonomic position of *L.l.hibernicus*.
- 2.1.5 Vaurie (1965) has become renowned for his liberal approach to species definition and is considered now to be very forward thinking in his taxonomic approach in the light of modern DNA analysis and the so-called phylo-genetic approach to speciation. This approach and rationale is well explained by Knox (1994a & 1994b). In his monumental work Vaurie is somewhat dismissive of *hibernicus* stating that
- “.....through introductions from GB, the population of the Outer Hebrides and Ireland has become now much mixed”.
- 2.1.6 He relates this comment to the Checklist of the Birds of Great Britain and Ireland (BOU 1952). He also failed to recognise British red grouse as a full species and was clearly in line with the BOU (1952) taxonomy of the time. He

seems to be not entirely logical in dismissing *hibernicus* yet maintaining ten Palaearctic races, with the comment that:

"...the geographical variation manifests itself chiefly in differences in the colour or pattern of the brown summer plumage and is predominantly clinal in both Eurasia and America."

This seems to ignore significant differences in plumage noted on *hibernicus* birds and discussed in section 2.2 below. Hohn (1969) originally supported Vaurie's view, as he saw red grouse (*scoticus*) as only being "halfway to speciation". Interestingly later on, Hohn (1980) actually recognised *hibernicus* as "racially distinct"! Neither author provides any reasoning behind their decisions.

- 2.1.7 Hutchinson (1989), in the most recent definitive work on Irish Birds comments that:

"The Irish red grouse was formerly considered to be an endemic sub-species L.l.hibernicus but recent authorities consider that the Irish and British birds are all of the same race L.l.scoticus and that the Red Grouse itself is the same species as the Willow Grouse of northern Eurasia and America (Cramp and Simmons, 1979)."

- 2.1.8 Hutchinson though, goes on to state that:

"Nevertheless the Irish red grouse is generally paler than Scottish birds and introductions of British stock do not appear to have affected the paler plumage"

- 2.1.9 By making this statement Hutchinson is echoing the writings of previous authors of texts on Irish birds (eg Ruttledge 1966 & 1980). It would appear that Irish ornithologists, who may arguably be more familiar with potential Irish races, have always held a belief that *L.l.hibernicus* merits further study.

- 2.1.10 During the 1990s many debates surfaced around new approaches to taxonomy and hence speciation. One of the most contentious "splits" concerned the so-called Scottish crossbill (*Loxia scotica*) and a letter in British Birds (Parker 1992) touched on perceived discrepancies with the treatment of the British red grouse (*Lagopus (lagopus) scoticus*). Parker argued this was just as good a species as Scottish Crossbill and that it should not be lumped with the willow grouse (*Lagopus lagopus*) of Eurasia. The response from Knox & Parkin (1993) is interesting, as is the counter attack from Bourne (1993) who supports Parker. They cite (as have other authors) the isolated Norwegian populations of willow grouse (*L.l.variegatus*) as having independently acquired partly or heavily pigmented winter plumage of the otherwise year-round white feathers. They state that:

*"...this suggests that populations of *Lagopus lagopus* readily show local differences and supports the argument that the red grouse is best treated as a race of that species".*

- 2.1.11 Although not directly linked to the *hibernicus* debate, the parallels with the treatment of Scottish crossbill (now treated as Britain's only endemic species of bird) and *L.l.variegatus* are obvious. It is known that red pigments (carotenoids) in birds' plumage are (or can be) directly related to diet and the chemicals therein (Knox 1994a) and that the *hibernicus* grouse's yellower plumage may result from a diet which is depleted in certain carotenoids. But it is also known that genetic factors can also affect take-up of these chemicals, complicating the issue considerably (Brush 1990). If a lack of specific available carotenoids was the driver, then genetic differences between *hibernicus* and *scoticus* would probably be minor. In reality the differences appear to be more than just yellower plumage. For example, ecological differences have been cited from studies in the Hebrides (Witherby 1941), and although he suggests that such differences don't occur in Ireland this may warrant further investigation. In addition, other plumage features listed in the texts do show apparent variation from *scoticus* which will be fully dealt with later.
- 2.1.12 Ruttledge (1966 & 1980) and Hutchinson (1989) both mention that the Irish birds appear undiluted by introductions of British stock and that characteristic *hibernicus* birds can still be found. They do not cite any source of information on the effects of inter-breeding between the two apparent sub-species, if indeed they do inter-breed. They fail to make it clear whether the two sub-species continued to be found together or in discreet sites. Most of the recent studies on grouse in Ireland have only paid *hibernicus* passing comment making an assessment of its status more difficult.
- 2.1.13 The species/sub-species debate revolves mainly around the plumage of *hibernicus* as this is the main usable feature in field ornithology (see 2.2 below). Whether the apparent variation from *scoticus* is diet related or genetic has not been critically assessed by any study to date.
- 2.1.14 Taxonomically the current position of *L.l.hibernicus* is not clear, though work underway is leaning towards the resurrection of red grouse (*Lagopus scoticus*) as a species separate from willow grouse (*Lagopus lagopus*) (Madge & McGowan 2001). If this case is proven, using accepted modern techniques, there must surely be a case for at least the sub-specific ranking of *hibernicus*. The answer will surely only emerge from a full phylo-genetic study of the whole *Lagopus lagopus* complex (Madge & McGowan 2002 list some 17 sub-species of *L.lagopus* and putatively *L.scoticus* as a species; del Hoyo, J. et al, 1994, 19 sub species but neither recognise *hibernicus*).
- 2.1.15 A number of recent Irish publications (eg Shorten & Styles, 2000) continue to refer to *L.l.hibernicus*. The authoritative World Pheasant Association's internet based list of Game-birds of the World refers to the red grouse as a full species (*Lagopus scoticus*) and Madge & McGowan (2002) similarly suggest species status for Red Grouse. These authors also refer to *hibernicus* in passing and the -

“...female being paler, but this is possibly a result of a more prolonged moult”.

- 2.1.16 The above statement is misleading and confusing as the texts which describe *hibernicus* in detail do not place so much weight on just the female characters (Witherby 1941; Bannerman 1963). If moult sequences or length are different then this in itself provides evidence of differentiation, which in turn could also explain the yellower plumage (Bannerman 1963). The situation clearly remains very confused and intriguing.
- 2.1.17 The 1979 EU Birds Directive contributes to this debate by listing both “*Lagopus lagopus scoticus et hibernicus*” in Annexes II/1 & III/1. of the Directive, at least ensuring that all angles are covered.

2.2 Plumage Features and Variation

2.2.1 Bannerman (1963) includes 'Notes on Moults and Plumage' written by Adam Watson referring to *L.l.hibernicus*:

"Grouse vary greatly in plumage from one individual to another. Some are very reddish, others dun-brown, others blackish, and others yellowish. Most have some white feathers or white-tipped feathers in various places such as the head, flanks and wings. It is in fact unusual to see two neighbouring cocks or hens on a moor that look exactly alike in the field, let alone in the hand. The whitest birds have completely white bellies, legs and lower breasts, heavily white-spotted upper breasts, wings and tail, and also large white patches on the head, neck and back. Such birds are most characteristic of the Highlands, but well-marked examples occur in most parts of the bird's range, including the west of Ireland. In the red form the general colour is rufous-chestnut, without any white spots on the breast. This form is said mostly to be found in the western counties of Scotland, England and Wales, also in the Hebrides and in the low ground of Ireland.

One of the main reasons for the paler colour of grouse from Ireland and the Outer Hebrides is that their moult is slightly different. The different moults are less distinct than in mainland Britain, with cocks and hens growing feathers in every month of the year. Feather growth is particularly more common during wintertime in Ireland, thus producing much yellower birds than in Britain. Many birds from Wales and western Scotland have a similar moult and colour, and there can be little doubt that different grouse moults become less distinct, and the birds consequently yellower, towards milder climates."

2.2.2 The most detailed description of *hibernicus* is to be found in Witherby (1941) when it was still treated as a sub-species of what he called the British red grouse *Lagopus scoticus scoticus*. Witherby also states that *hibernicus* is not separable in the field but optical equipment has improved considerably since the time of writing and this statement should now be reconsidered. There are frequent references to areas of overlap in plumage characters and such a caveat should be appended to all the identification features. In summary the main plumage features of adult males in winter (August – March) are listed as:

- Upper-parts and wings often paler (more or less yellowish) with terminal bars often paler and black bars more pronounced than in the British race.
- Under-parts paler than British race (usually more or less yellowish-chestnut) and finely and closely barred and very little vermiculated with black, usually no black on abdomen, feathers of which are finely barred as rest, no white tips or very narrow ones to feathers of belly and under-tail coverts.
- Axillaries often wholly brown and usually with less white than in British race.
- Often all tail feathers vermiculated with rufous on outer webs.
- Secondary feathers: vermiculations on outer webs rather paler and more prominent.

- Cramp & Simmons (1979) and personal observation of specimens indicate that *scoticus* birds often show random white feathering throughout the plumage, especially the wing coverts and around the head – this does not seem the case in *hibernicus* type birds.
- Personal observation of wild birds and specimens by Godfrey McRoberts, Anthony McGeehan and Dave Allen indicate that the feathering on the tarsi is more greyish in *hibernicus* compared to white in *scoticus*. This feature has not previously been noted in literature.

Adult females of *L.l.hibernicus* are said simply to be paler and more yellowish and more uniformly and finely barred (Witherby 1941, and subsequent authors such as Madge & McGowan 2002).

- 2.2.3 Witherby states that summer plumage of males and females is like those of the British race. However, this requires further investigation, since this assumes for example that axillaries change colour between seasons.
- 2.2.4 The moult sequence in *scoticus* and *hibernicus* differs from *lagopus* in that they only have two, rather than three moults per year. Moults are protracted affairs, which undoubtedly leads to some of the plumage features appearing to be variable between individuals and Witherby (1941 as quoted by Bannerman 1963) suggests this could lead to the yellower plumage. Though the mechanism by which this can produce yellower plumage is questionable unless the fresher feather tips can be shown to produce the effect.
- 2.2.5 There are references in many texts to the individuality of birds within a population – orange/yellow males appear to turn up throughout the British range but always in very low numbers. Similarly Ussher and Warren (1900) noted oddly plumaged birds in Ireland. The occasional orange/yellow British birds could be exhibiting such a plumage because of poor diet or protracted moult or some genetic aberration. Dark coloured Irish birds could be introduced *scoticus* rather than a variant of *hibernicus*. Detailed observation or examination is essential to check other plumage features to try and find out the range of genuine variation in both sub-species.
- 2.2.6 Scottish birds have been introduced into Ireland for over a century and possibly much longer (D Kinney pers comm, G McRoberts pers comm. Sharrock 1976, Hutchinson 1989) and one would have expected that if diet was a factor in the yellower plumage of *hibernicus* (see 2.1.11) then the introduced birds would have shown plumage changes resulting in birds resembling *hibernicus*, at least in terms of yellowness. To put it simply the majority of grouse in Ireland would be of yellower plumage and only recently introduced *scoticus* would remain red. Ruttledge (1966) and Hutchinson (1989) both state that despite introductions of British birds this has not been the case and the existence of both forms was confirmed by field observations. .
- 2.2.7 Many *scoticus* birds are very dark red and can appear almost blackish – any white feathers on the body and axillaries contrast sharply. The wings appear dark. Though many male birds are certainly not clearly separable in the field it

is possible to make putative identifications based on the more typical forms. This information, with photographs, was disseminated to all the fieldworkers.

- 2.2.8 The rationale behind the different plumages of *scoticus* and *hibernicus* have been well described by Hutchinson (1989) and O'Hare (1968). The classic plumages of both are respectively adapted to heather (*Calluna vulgaris*) dominated moors in Britain and the blanket bogs of Ireland which are co-dominated by grasses, rushes and sedges with which *hibernicus* can camouflage perfectly.
- 2.2.9 Further investigation is required into the apparent differences in tarsi feathering (grey in *hibernicus*; white in *scoticus*, a previously unrecorded possible feature), plumage variation throughout the moult cycle and the moult cycle itself.



Fig1: Two male *scoticus* grouse (UM)



Fig 2: Putative *hibernicus* grouse (UM)

2.3 Status, Range and Population of the Red Grouse in Northern Ireland

- 2.3.1 Ussher and Warren (1900) provide the best guidance as to the status of the Red Grouse in Ireland in the late nineteenth century:

“Resident on the many mountain ranges and also on the red bogs of the central plain, breeding in every county.

Though thus widespread on the heath-covered lands of Ireland, and fairly common from a naturalist's point of view, Grouse do not abound on Irish moors as they do under stricter preservation in Scotland. The letting of grouse-moors is by no means general in Ireland, as proprietors more usually reserve them for private use or neglect to preserve them effectively; accordingly the enemies of game-birds, such as Grey Crows and Magpies, are common. The burning of gorse and heather on mountains, too, is a very frequent practice, even in the spring, and where this does not destroy the eggs or young it deprives the birds of shelter. On well-preserved estates, however, Grouse have increased, as for instance in parts of Connemara; but in Achill they are kept down by numerous foxes and winged enemies.

Grouse are not confined to the higher lands, but are found on the great flat bogs of Queen's and King's Counties, Westmeath, Eastern Galway, and other similar tracts; the larger patches of brown on the maps in this volume indicate in a general way the haunts of this bird.

Mr. G. H. Kinahan informs me that he has seen large flocks of Grouse, consisting of several packs, on the Munster and Connaught mountains, but not in Ulster.

In exceptional frost and snow, Grouse have been seen picking on the manure-heaps at the cottage-doors in the mountains, or have been found on low coastlands like the Warren at Donaghadee and on the Copeland Islands; and though not given to migrating round the coasts, stragglers have visited Black Rock, Mayo, and Inishtrahull (Migration Reports)”.

- 2.3.2 It is clear from this source that the red grouse occurred in all Irish counties and hence all six in Northern Ireland. It is also worth noting that “packs” of birds were not recorded in Ulster. The links drawn with managed moorland are clear as is the concern about predation.
- 2.3.3 Deane (1954) refers directly to *hibernicus* and introduced *scoticus* (from Scotland and Yorkshire) stating the latter to be commonest in Co. Antrim but decreasing in all areas. Ruttledge (1966) echoes these statements, stressing the recent serious declines but highlights Ulster as an exception “... *where conservation is much more efficacious*”. This statement should be tempered by the knowledge that the birds benefiting would undoubtedly have been the introduced *scoticus* birds as introduction was part of the estate management (D Kinney pers comm.). This point is further highlighted by the same author (1975) where “widespread re-stocking” is referred to, as is the overall population decline.
- 2.3.4 From the historical evidence it is not always possible to distinguish the two types of bird and their former range, though it seems probable that all birds

were *hibernicus* types prior to introductions. . It has not been possible within the scope of this project to trace the history and regularity of introductions as there is no central database, though further research into old estate records may give some evidence. Godfrey McRoberts (pers comm.) suggests these introductions may have taken place every 10-15 years. A “well managed” estate at Carnalbanagh, Co Antrim shot 11,088 birds between 1923 and 1945 with 731 birds shot in 1931 being the highest annual total. Although impressive, this is still not in the same league as some Scottish shoots, where this number can be easily achieved in a day on some drives.

- 2.3.5 The two Breeding Bird Atlases (Sharrock 1976 & Gibbons 1993) show a 66.4% range decline in Ireland between the two survey periods. The population estimate for the whole of Ireland being between 1,000 and 5,000 pairs. The number of occupied 10 km² was also much reduced with large swathes of west Derry and Antrim apparently losing its birds. However, the Atlas methodology is not a good method for accurately assessing such a dispersed, low density species and this must be borne in mind when interpreting the results.
- 2.3.6 Nevertheless there is no doubt that decline has continued in Northern Ireland and recent estimates of the population have been 300 pairs (RSPB pers comm. 1995) and 200 pairs (S. Newton [BWI] pers comm.2000). These figures were based on anecdotal information from individuals and personal knowledge, rather than surveys, but are very consistent with the findings of the current study.
- 2.3.7 No previous survey has attempted to distinguish between native (*hibernicus*) and non-native (*scoticus*) birds. The regular introductions of the latter may have had a fundamental impact on the local populations through in-breeding (though disputed by authors such as Hutchinson 1989, 2.1.9 above) or direct competition. The introduced birds now probably outnumber native grouse in Northern Ireland, and appear to have replaced them in the north and east. Yet with the exception of a few managed areas in the east, both types occur at similarly low densities.
- 2.3.8 Tony Murray (pers comm.) believes that all birds in the Nephin Beg range, Co Mayo are likely to be *hibernicus* types. There is no history of introduction within this range of mountains and other parts of western Ireland may also support “pure” *hibernicus* populations.
- 2.3.9 It is likely that *hibernicus* populations are most likely to be found in areas at least 42 km (Hudson 1988) from any historical introductions as movements greater than this distance are unheard of for the species within the British Isles (Hickling 1983). Red grouse also appear unwilling to travel over unsuitable terrain away from their principle food supplies and habitat.

2.4 Limiting Factors & Possible Reasons for Decline

- 2.4.1 Specialised and sedentary species such as grouse are always vulnerable to habitat change and degradation as they are unable to adapt to new conditions or alternative food supplies.
- 2.4.2 Similarly individual birds are poor travellers and tend to move only within a limited area delineated by preferred habitat. When habitat is destroyed populations become isolated in pockets. This can affect gene flow and can lead to genetic-related problems within a species. It also makes these isolated populations much more vulnerable to the impacts of disease, predation or further habitat loss (Franklin 1980 & BirdLife International 2000).
- 2.4.3 This is further influenced by the inability of the Irish grouse populations to re-populate through high productivity. Watson and O'Hare (1973, 1979a & 1979b) showed that in Mayo the grouse populations were non-cyclic (unlike Scottish populations). They do not have boom and bust years but maintain a population in a steady state, albeit at low densities. Population densities of three or more pairs per km² were found to be exceptional. With intensive management of the habitat, densities of up to fifteen pairs per km² are possible (Watson & O'Hare 1979b). This compares with up to 100 pairs per km² in Scotland in a good year (Game Conservancy Trust), on similar habitat (see summary in Hutchinson 1989).
- 2.4.4 A range of factors have contributed to the crash in population of Irish red grouse.
- 2.4.5 **Habitat destruction and degradation:** The loss and fragmentation of peatland habitats has been well documented, with only some 12% remaining (Cruikshank & Tomlinson 1990 and Tomlinson 1997). The upland habitats of red grouse have been reduced by afforestation, drainage, peat-extraction, over-grazing, and in some cases under-grazing and dereliction. Agricultural intensification has been particularly problematic in recent decades. For instance sheep numbers in Northern Ireland have risen from 870,000 in 1955 to nearly 2.5 million in 1995. Many of these sheep are in upland areas, leading to a reduction in heather cover in many areas. The increase in sheep could also lead to an increase in spread of disease (see 2.4.8).
- 2.4.6 Heather beetle damage is common throughout the peatlands of Northern Ireland and is especially severe on the wetter habitats such as blanket bog, wet heath, raised bog etc. A severe outbreak in the Sperrins was reported in 2004 (McCormack 2004). The ecology of this species is well understood and it fares better on degraded wet heath/blanket bog. Ireland therefore offers near perfect conditions for this pest to thrive (<http://www.heathertrust.co.uk/newsprbeet.htm>). Loss of heather has serious implications for density of grouse populations and in some cases their survival within the damaged area. At the time of writing a particularly severe outbreak of heather beetle is affecting many of the heather dominated habitats in Northern Ireland.

Inappropriate development in areas of suitable habitat may also have an adverse impact on red grouse.

- 2.4.7 Genetic: An inherent loss of vigour was thought to be a problem with *hibernicus* and this was one reason for the introduction of *scoticus* (Sharrock 1976). This notion is discounted by Watson & O'Hare (1973), and the current poor performance of *scoticus* birds in NI compared to performance in Scotland illustrates this. Conversely, the introduction of Scottish and English birds may have been damaging to the genetic stock in the release areas, and there may have been a competitive rather than sympatric relationship between native and introduced birds, although this is conjecture. The continued survival of *scoticus* type birds in Antrim does though suggest they can survive at sustainable levels in an Irish ecosystem, possibly at the expense of *hibernicus*.
- 2.4.8 Disease: Two diseases can seriously affect grouse populations, namely a caecal nematode (*Trichostrongylus tenuis*) and Louping Ill. The former is not thought to seriously affect low-density populations. Louping Ill can be a serious problem and cause high mortality (Byrne 2000 and Redpath & Thirgood 1997). This disease is linked to sheep numbers as the sheep tick is the vector for disease transfer. The authors could find no current information on the status of these (or other) diseases in Northern Ireland.
- 2.4.9 Predation: The effects of predators on low density populations of grouse can be damaging (Redpath & Thirgood 1997) and the likely problem species are both avian and mammalian. Corvids are likely to be an important predator of eggs and chicks. Foxes and mustelids are probable predators of eggs, chicks and sitting females. (RSPB/EHS, ongoing study of curlews in the Antrim Hills). Birds of prey, and especially hen harrier, are known to take grouse (usually chicks) (Redpath & Thirgood 1997) but the actual interpretation of the effect on grouse populations is subject to debate (Baines 2003, Amar et al 2004, Thirgood et al 2000 & RSPB 2004). In the main Langholm study area the numbers of grouse (both present and historic) and numbers of hen harrier do not equate to any area in Northern Ireland. The total hen harrier population in Northern Ireland is around 40 pairs (survey results will be available 2004)) and the highest densities occur in County Antrim where the highest numbers of grouse are also to be found. However, there is no evidence that the hen harrier is an important predator of grouse in the Antrim Hills. A recent study of the diet of harriers in County Antrim indicates that small birds such as starling and skylark are the most significant food items, along with young lagomorphs (D Scott *in litt.*). Corvids are a likely predator of eggs and chicks. Foxes and mustelids are probable predators of eggs, chicks and sitting females.
- 2.4.10 Climate: The wet Irish climate may have an effect on productivity – ground nesting species are all vulnerable to excessive wetness. Similarly wet conditions will benefit severity of and damage caused by heather beetle. It is possible that *hibernicus* is better adapted than *scoticus* to these conditions and may be a factor in the non-cyclic nature of *hibernicus* populations.
- 2.4.11 Lack of Positive Habitat Management: The decline in well-managed grouse moors since the period between the wars is undoubtedly a factor in the decline

of red grouse as cited by many authors. There are currently only around seven areas being managed for grouse in Northern Ireland, mostly in County Antrim. At some of these sites management is carried out through the available agri-environment schemes. The two managed sites (through burning, provision of medicated grit and limited predator control) in Co Tyrone (Lough Fea and Murley Mountain) are probably the only estates/trusts managing for native *hibernicus*-type birds (G McRoberts *pers comm.*). Positive management could also be achieved by careful application of appropriate prescriptions under the Agri-Environment Schemes (ESA/CMS) which are listed in Appendix 7.

- 2.4.12 The Irish red grouse has apparently always been at lower densities in Ireland than Scotland, even on sites with similar heather cover, soil type, wetness etc (Watson & O'Hare 1973). The introduction of *scoticus* birds has not dramatically increased densities even on managed sites. This suggests that the prevailing conditions in Ireland dictate that populations are naturally going to be no more than three pairs per km² and more frequently about one per km² (Watson & O'Hare 1979 and Murray 2003). It is also probable that this low density population is sustainable under natural conditions but becomes highly threatened when tied to all the factors listed above.

3 SURVEY PREPARATION and METHODOLOGY

3.1 Preparation

- 3.1.1 No systematic survey of red grouse had ever been undertaken in Northern Ireland. The initial task was to identify all the 1 km² in Northern Ireland capable of holding Red Grouse which would require to be surveyed. To achieve this, GIS information from a variety of sources had to be carefully examined and cross-referenced with aerial photographs, site visits and personal knowledge. The GIS information covered both habitat and botanical information. These datasets were interrogated to produce appropriate maps of heather dominated habitats and bogs. The maps used to allocate survey squares will be stored by EHS.
- 3.1.2 Once the digital maps were cross-referenced with the available aerial photographs, areas deemed suitable for survey were divided up into 1 km² on the appropriate ordnance survey maps of various scales. This resulted in some alterations to the squares selected for survey as habitat data varied between the data-sets. This was in part due to the general nature of some of the habitat data-sets and the age of some of the aerial photographs.
- 3.1.3 The next stage in preparation involved collating all available records of Red Grouse sightings, which were provided by CeDAR and NIBA. Other records were obtained from a variety of sources, including private individuals. This helped to identify both key areas, but also some areas of apparently suitable habitat which could be discarded such as Rathlin Island and Fair Head. Any areas with Red Grouse records, including historical records, were retained for survey depending on the continued existence of suitable habitat.
- 3.1.4 All the evidence collected on habitat type was marked using a colour code onto the 1 km² in question (original documents are in EHS archives). This resulted in the production of a map of squares identified for survey. Following selective ground-truthing some additional squares were identified for survey as well as other squares being dismissed.
- 3.1.5 The squares were allocated to survey workers (Appendix 3) on the basis of proximity, available time and local knowledge. All surveyors were instructed to use the 1km² grid provided on O/S maps as a template and if squares were unsuitable from a habitat perspective (for example no heather) then they were to be ignored. Similarly squares with apparently good habitat not identified on the maps were to be covered. Details of the methodology and recording cards were sent to each fieldworker (see Appendices 1 and 2).
- 3.1.6 On an initial analysis, nearly 2,000 1km² were considered to have sufficient heather cover for grouse. However, just over 1,000 1km² was found in very isolated pockets (more than 40 km from nearest population) or with no recent history of red grouse presence or no recorded history of grouse presence or ground-truthing revealed that the habitat was so degraded and fragmented that they were considered unsuitable for grouse.

3.1.7 At the completion of the survey a total of 881 1km² had been surveyed encompassing all the 1km² considered likely to be or potentially holding red grouse. It is certainly possible that this survey may have overlooked some small pockets of red grouse but these populations would have to be in an area with no history of red grouse sightings and in an area with apparently little suitable habitat! Similarly some grouse may have been missed by observers in surveyed areas, where they are occurring at very low densities (see 3.2 below).

3.2 Methodology

3.2.1 Undertaking a survey or census of Red Grouse is known to be difficult (Bibby et al 1992, Murray 2002 & Gilbert et al 1998). Methodologies rely on varying techniques involving the use of pointer dogs, extrapolations based on finding dropping piles, and extrapolations from shooting bag records. Surveys on some managed Scottish sites are difficult because of the high densities of birds (50+ per km²) whereas in Ireland the very low densities of birds are equally problematic.

3.2.2 Techniques involving extrapolations with such a low density, widely scattered population were considered to be unsuitable for this study. This was reinforced by the knowledge that large areas of apparently suitable habitat were known not to hold any grouse, such as Rathlin Island in County Antrim.

3.2.3 Bag records are very sparse and insufficient to assist with anything other than an historical overview of populations in discrete areas.

3.2.4 Flushing birds with trained dogs will give a number of birds per site but will not distinguish territorial males. In addition there is a lack of available trained dogs in Northern Ireland (J. Milburne *pers comm.*).

3.2.5 Murray (2002) used a highly labour intensive technique of transects designed to locate dropping piles and birds. Some dropping piles contained “clocker” droppings indicating a paired female (these distinctive greenish large, solid droppings) or the green more liquid caecal droppings which indicate long term presence (both types are well described in Brown et al 1987). Transects were undertaken on a regular basis (100m spacing) in a small number of 1 km². Results from these squares were extrapolated for the whole Nephin range, linked to percentage heather cover. This method was deemed inappropriate for two reasons:

- it is highly labour intensive, allowing only a small number of squares to be covered during the survey and
- it relies upon extrapolation to gain a population estimate for a much wider area. While this might be feasible for a relatively discrete and homogenous area such as the Nephin Beg range, it was not considered appropriate for an area as large and diverse as Northern Ireland.

- 3.2.6 Based on these considerations, it was decided that the most effective means of establishing an estimate of the grouse population was to record breeding pairs.
- 3.2.7 As red grouse are almost entirely monogamous (Cramp and Simmons 1979) it was decided that the male should be the key count unit. The recording of males was to be augmented with other data, including records of pairs, females, unsexed birds, dropping piles (with or without “clocker” or caecal droppings, scattered droppings and feathers (which were all collected). This ensured that detection of grouse within a square was maximised. The method selected is a variation on the “Look-See” methodology described by Bibby et al (1992). With any survey there have to be a number of assumptions which need to be taken into account when viewing the results.

Assumptions

- All suitable habitat within each square is adequately covered by the survey worker
- There is no variability in grouse responses related to time of day or the date of survey
- There is no variability in recording effort between survey workers
- All survey workers have equal detection skills
- Presence of dropping piles equates to a pair of birds
- All grouse will respond equally to taped calls
- Responses from *hibernicus* and *scoticus* are the same
- Weather conditions (within the parameters for survey, see Appendix 2) do not affect results

- 3.2.8 Every square selected for survey was known to contain a variable percentage of suitable habitat. Survey workers were instructed to walk transects through the square ensuring that they walked all suitable habitat with the aim of getting within at least 500m of all points. Full instructions are set out in Appendix 2.
- 3.2.9 To maximise contacts with males, all fieldworkers were provided with a tape of grouse song and calls. This was to be used regularly during the transect walks. Birds at low densities are known to be more silent (Witherby 1941 & Watson & O’Hare 1979c) and tape luring was the best way of checking for presence. To test the tape lure a 1km² in Co Antrim was surveyed thoroughly and revisited at different times of day, month and in differing weather conditions. Three males were found in the square and this was constant on the majority of revisits.
- 3.2.10 The timing of the contract allowed fieldwork to start in late December and run through to April. Grouse are territorial from autumn to spring (Bibby 1992) although this can be curtailed by very cold, snowy conditions (Cramp & Simmons 1979). This is however less of a problem in the milder western climate of Northern Ireland.
- 3.2.11 It was the aim of Allen and Mellon Environmental to use only experienced fieldworkers to maximise contacts with grouse and reduce observer bias, as

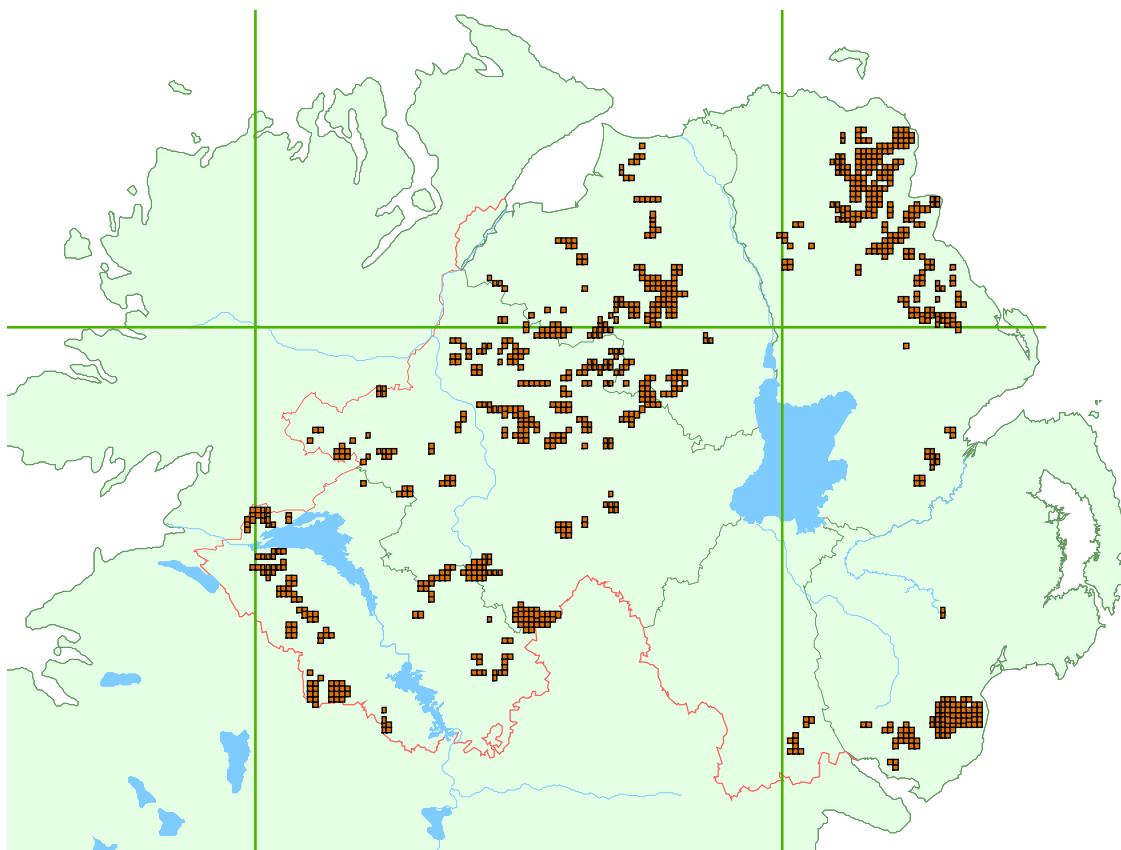
well as provide some information on *hibernicus* and *scoticus* type birds. Photographs of classic types were circulated with the recording cards.

- 3.2.12 The recording cards were designed to collect incidental information including other species, heather beetle damage, other threats to grouse and approximate heather cover. This additional information has been retained on the record cards for any future use. Grid references were recorded for all grouse related sightings.
- 3.2.13 The recording of percentage heather cover was always intended as a guide only, unlike Murray (2003) who used this information to extrapolate numbers. When using a large number of fieldworkers, the percentage cover within a square is considered to be highly subjective without doing detailed quadrat recording.

4 RESULTS

4.1 Results

4.1.1 Coverage: 881 1km² were surveyed (Map 1) for Red Grouse in the current study, whilst over 2,000 1km² were assessed as to their suitability for survey.



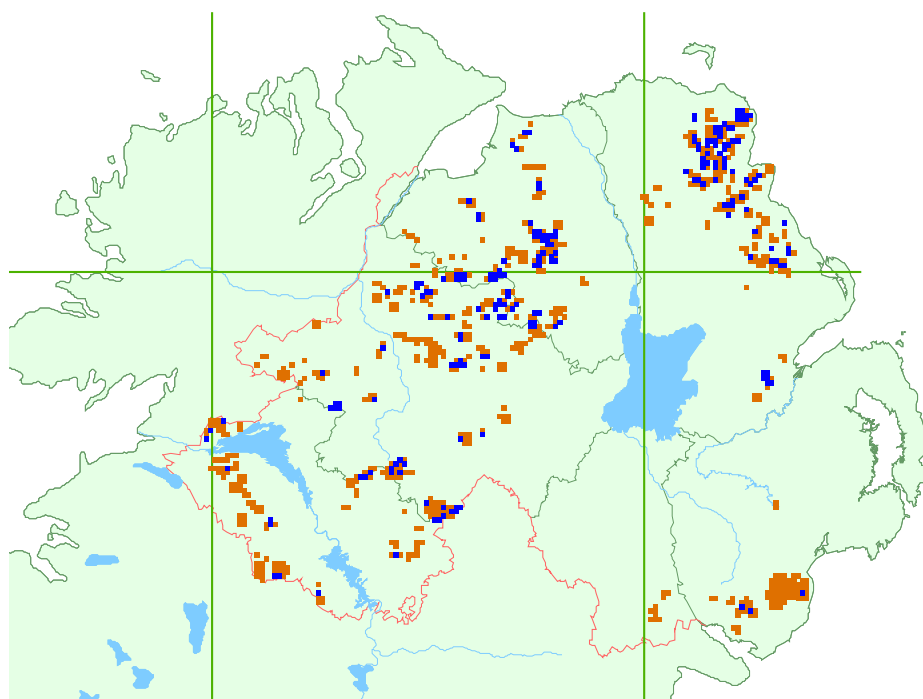
Map 1: 1km² covered by the survey

4.1.2 All contacts (any combination of bird, droppings, feathers etc) were plotted against coverage to show total distribution in suitable habitat (Map 2).

4.1.3 In total, positive contacts were recorded from 204 1km² out of 881 1km² surveyed. This equates to 23% presence in what was assessed as being suitable habitat in areas with a history of grouse occurrence (see Map 3). The variability between counties was stark (see Table 1).

County	No. of Squares Surveyed	Number of Squares with Positive contacts	Percentage of Squares with Grouse
Fermanagh	137	18	13%
Tyrone	250	47	19%
Down	83	3	4%
Antrim	243	77	32%
Derry	158	60	38%
Armagh	10	0	0%
TOTAL	881	205	23%

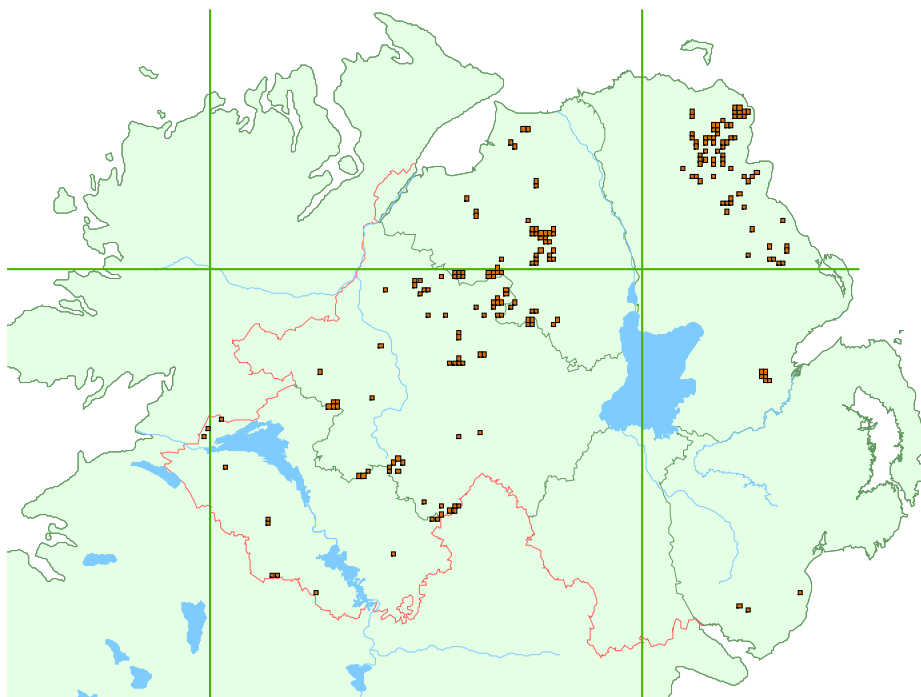
Table 1: Breakdown by County of Survey Squares and Grouse presence.



Map 2: Recorded distribution against coverage.

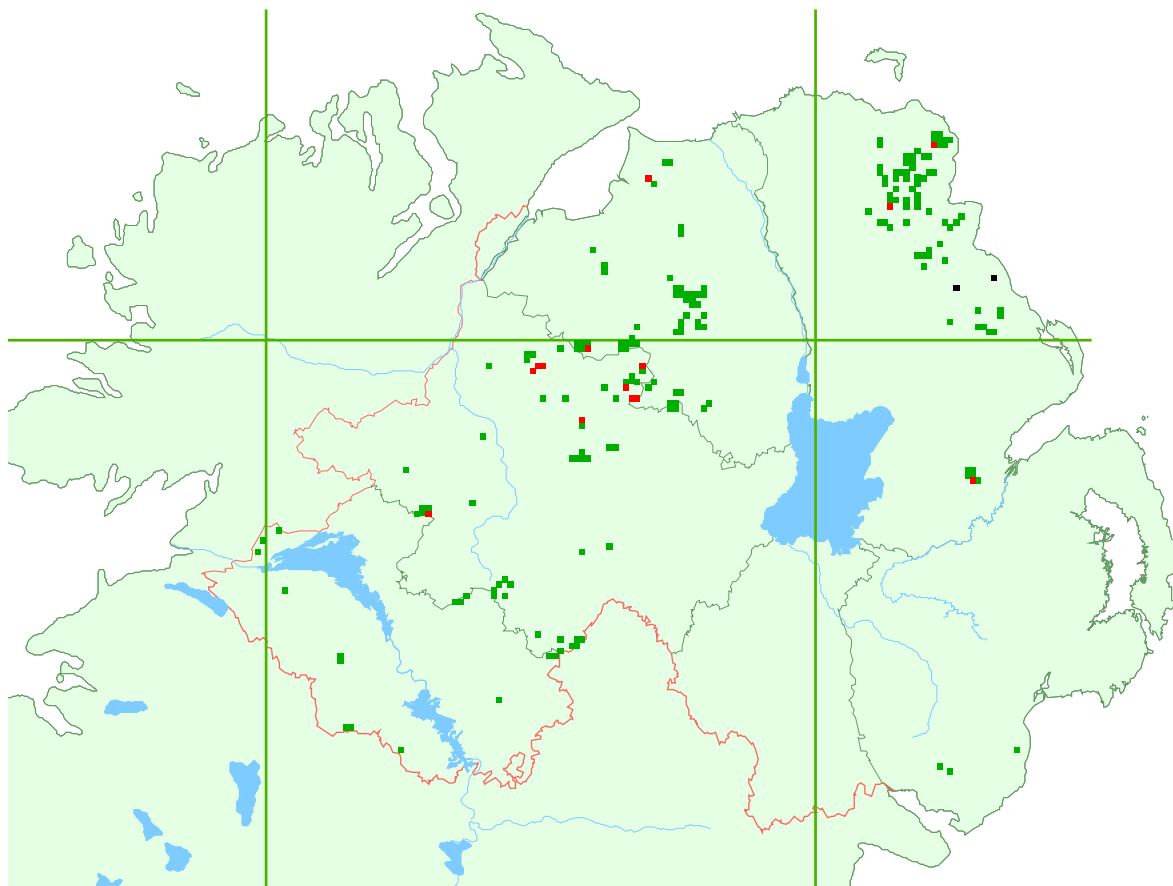
Positive = Blue

Negative = orange



Map 3: All 1km² where grouse or signs of grouse were recorded

4.1.4 Density: To assist with the interpretation of the data a map of density was constructed whereby squares were given values for mapping purposes, depending on the findings in that square. A value of 0 was given to a square with droppings or feathers only a single female or non-territorial male; a value of 1 where a single territorial male was recorded or a pair; 2 for two pairs etc. No square held more than three males (see Map 4).



Map 4: Density Map per sq km

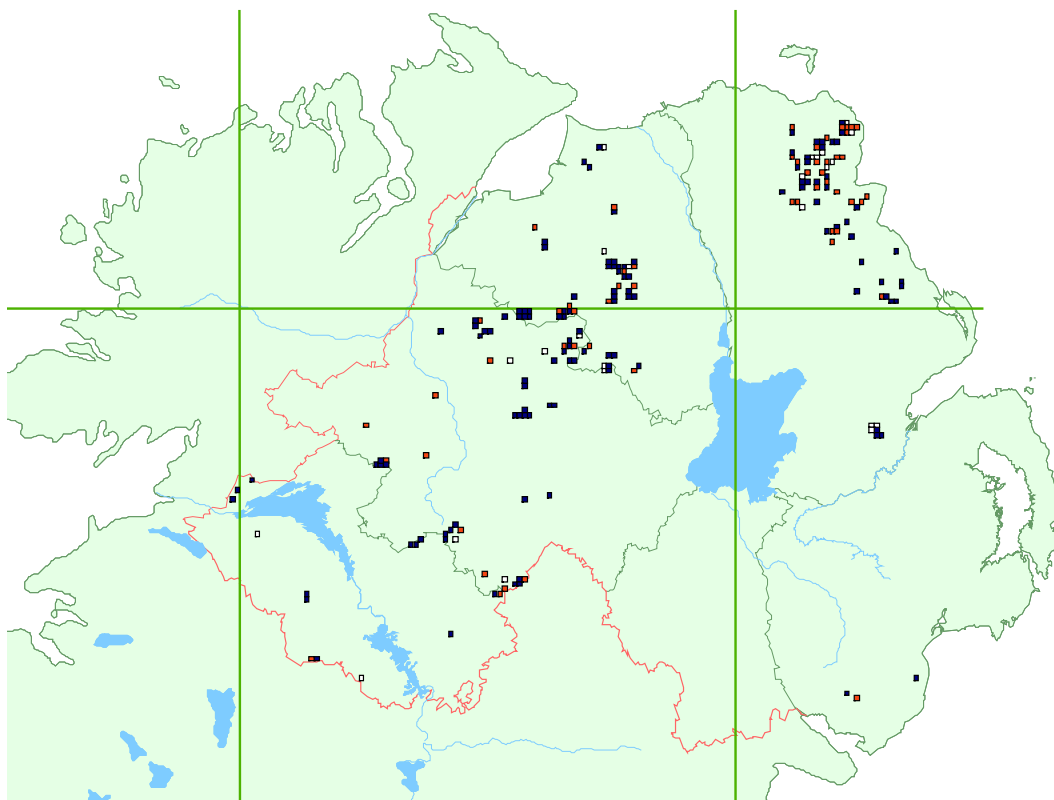
GREEN = Single bird or signs present

RED = 2 males, pairs etc

BLACK = 3 males, pairs etc

- 4.1.5 The lowest altitude at which any grouse was recorded was 140 metres above sea-level based on hand held GPS readings. This was at Croagh, Pettigo Plateau, Co Fermanagh and almost certainly involved *hibernicus* type birds.
- 4.1.6 Using a totally subjective assessment, the percentage of “suitable habitat” was recorded on the cards to give an idea of heather cover. The lowest percentage cover recorded where grouse were found was 25% from the same locality as in 4.1.5. The majority of other records come from squares with at least 25% cover which is similar to that recorded by Murray (2003).
- 4.1.7 To try and estimate the number of pairs the data was sifted using the presence of dropping piles (Murray 2003) and males and/or pairs. Each of these registrations were assumed to equate to a pair of grouse. A map plotting this data (Map 5) allows a quick calculation to be made with the density added from Map 4. Where only scattered droppings were found but the square was not adjacent to one with grouse present it is assumed that territorial birds may

have been missed and they are recorded as a territory. During fieldwork, in some areas, male grouse were observed to fly in excess of 1 km when disturbed. This underlines the size of territory that low density populations use to ensure adequate feeding.



Map 5: Apparent Territories

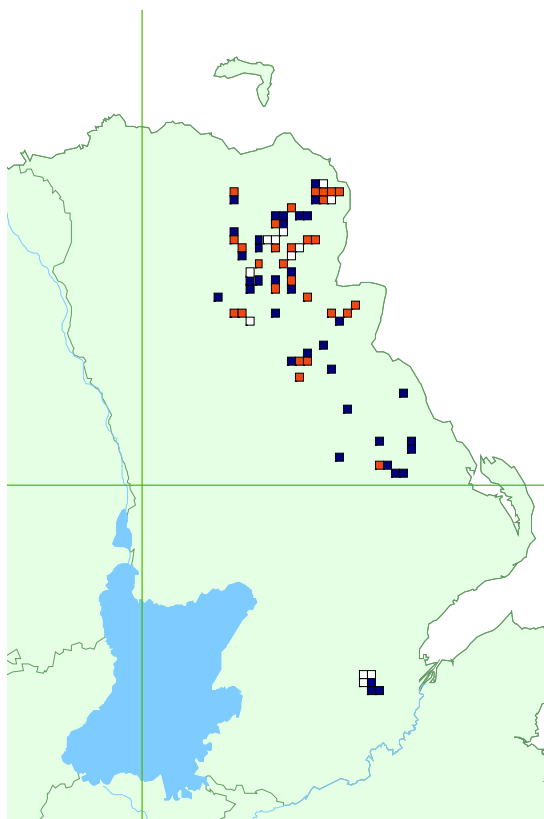
Black = males present

Red = dropping piles

White = scattered droppings/lone birds (non-territorial)

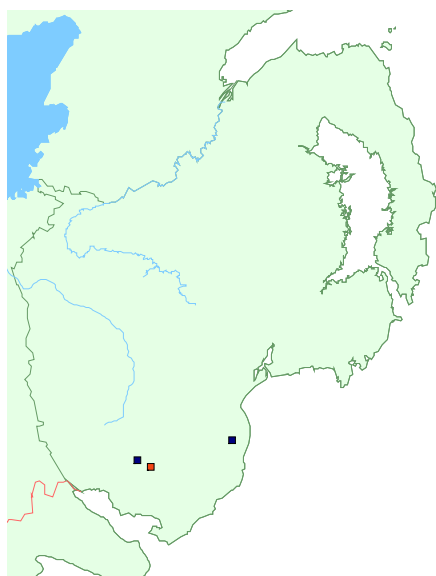
4.1.8 This was also plotted on a county by county basis, though as can already be seen, no grouse or signs were recorded in Co Armagh, where the bird appears likely to be extinct.

4.1.9 **County Antrim:** A minimum of **72 pairs** but possibly as many as **84 pairs**. All birds “racially identified” were thought to be *scoticus*. D.Kinney (pers comm.) believes this to be a true picture and has not seen what he referred to as “an orange boy” since 1959. The highest densities of 3 males per km² were at Black Hill and Carnalbanagh, where active grouse management is undertaken. The overall percentage of squares with grouse was 32% of those surveyed.



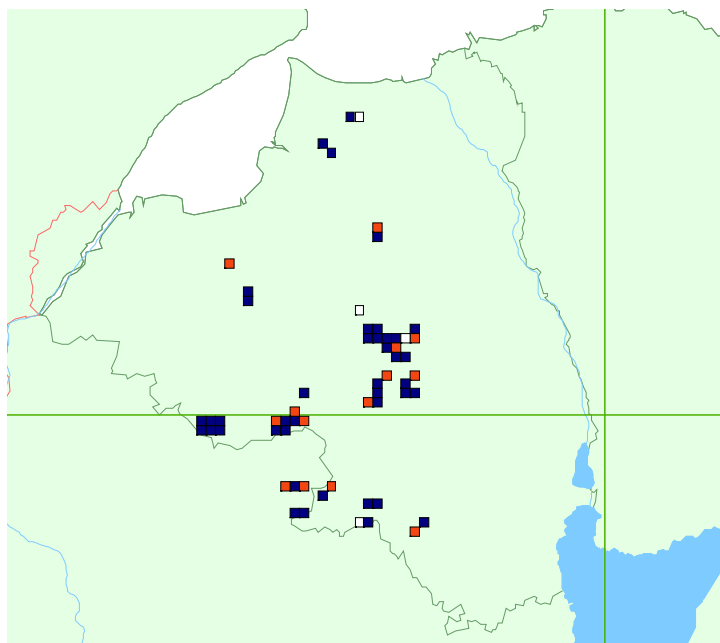
Map 6: Co Antrim – apparent territories. (legend as Map 5)

4.1.10 **County Down:** Within the county grouse are now restricted to a few parts of the Mourne. Despite extensive searching using one of the most experienced survey workers, evidence of grouse and/or sightings were restricted to three 1km². The County Down population should be considered as **3 pairs**. This would seem to be hardly sustainable though wandering, non-territorial, unattached birds may be present to help augment the meagre population. All birds “racially identified” were thought to be *scoticus*. Only 4% of squares surveyed held grouse.



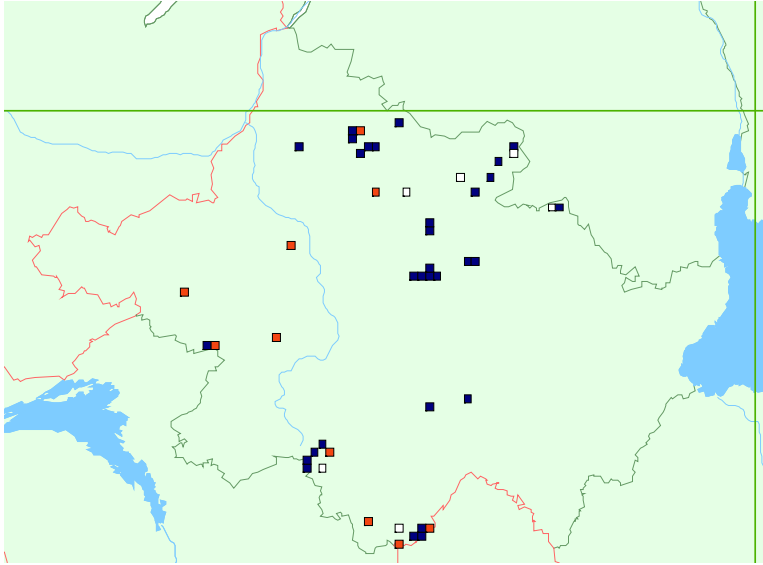
Map 7: Co Down – apparent territories (Legend as Map 5)

4.1.11 **County Londonderry:** The Sperrins, and especially the border area with Tyrone and Glenshane (another managed area) provided the best numbers of grouse outside County Antrim and perhaps surprisingly had the highest percentage of occupied squares with 38%. From the data the minimum population is **60 pairs** but could be as high as **63 pairs**. All birds “racially identified” were thought to be *scoticus*. The Tyrone border areas though could still hold some *hibernicus* birds. It is theoretically possible that birds from the nearest Antrim population (ie *scoticus*) could have colonised north County Londonderry but could have also have been introduced.



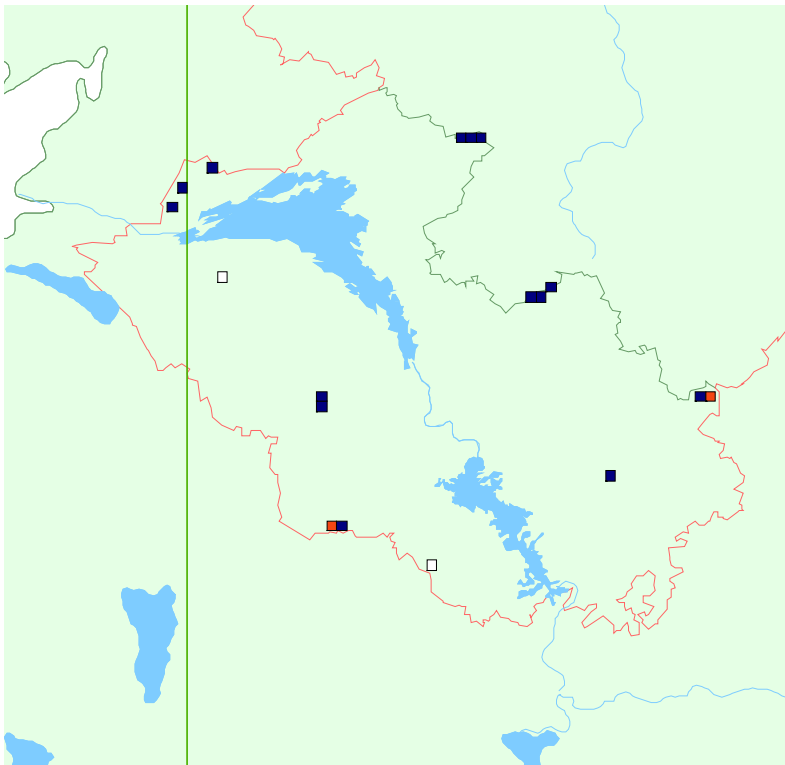
Map 8: Co Londonderry – apparent territories (Legend as Map 5)

4.1.12 **County Tyrone:** Grouse are widely scattered in the county but within the Sperrins do reach densities (although rarely) of 2 males per km². The Aughtentain Estate (Murley Mountain) does operate a non-ESA grouse management scheme although it is not clear if they have ever previously imported British birds but this is thought to be the case (G McRoberts pers comm.). On the extensive bog-land around Lough Fea there is further grouse management (burning, medicated grit provision and limited predator control) by the Lough Fea Trust, who do not shoot on the site. A minimum population of **50 pairs** and a maximum of **52 pairs** can be calculated from the data with a poor 19% of squares surveyed holding grouse. Most interesting was the occurrence of *hibernicus* type birds in the Plumbridge and Slieve Beagh areas plus suspected birds at Murrins and Lough Fea. These suspicions were corroborated by G McRoberts (pers. comm.) who believed birds in these sites plus Murley Mountain and Black Bog to be also of this form. His view, that the boundary zone between the two sub-species to be in the vicinity of Glenshane-Lough Fea, is consistent with the findings of this survey.



Map 9: Co Tyrone – apparent territories (Legend as Map 5)

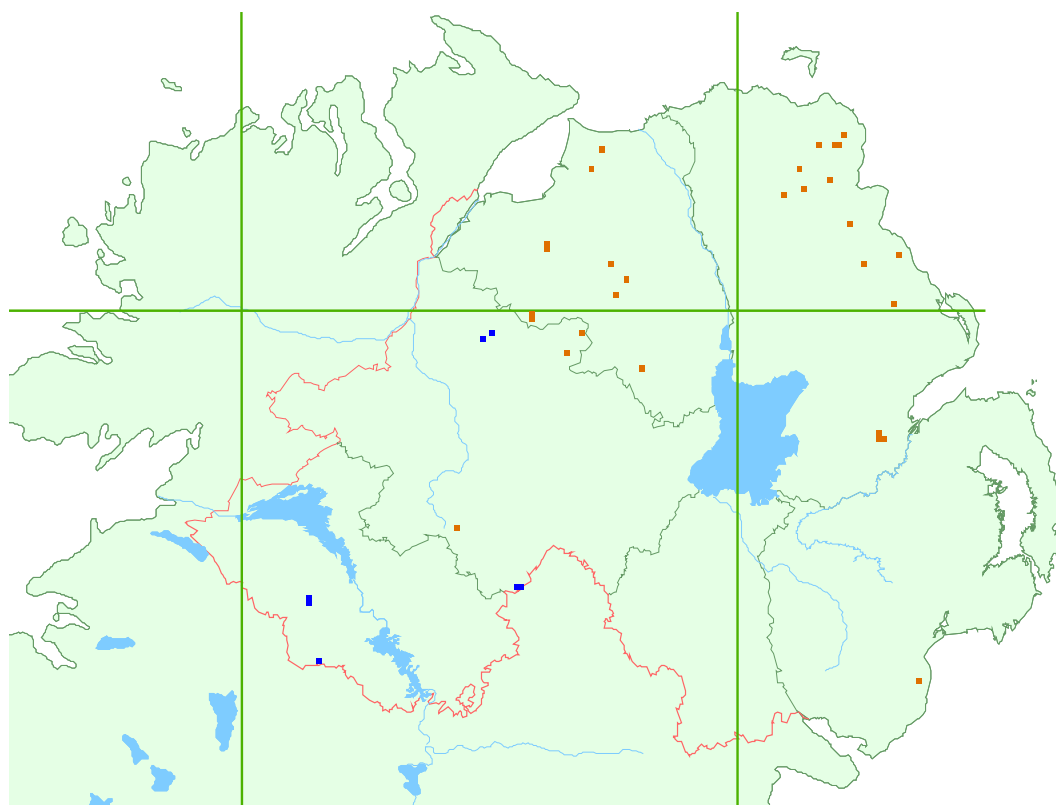
4.1.13 **County Fermanagh:** With no apparent history of introductions Fermanagh, like parts of Tyrone offers the best hope of finding pure *hibernicus* – birds of this type being seen at Cuilcagh and Pettigo. Densities of grouse in the county are consistently lower than elsewhere in Northern Ireland . A density of one male per 2 km² of suitable habitat is considered realistic (B Robson pers comm.). A minimum of **17 pairs** and a maximum **19** territories were identified, some of which were very isolated and surrounded by forestry. Though small, this population may well be all *hibernicus* type birds. Only 13% of squares surveyed held grouse.



Map 10: Co Fermanagh - apparent territories (Legend as Map 5)

4.2 Interpretation

- 4.2.1 The total Northern Ireland population of Red Grouse (both *hibernicus* and *scoticus*) is estimated on the basis of the data collected as being a minimum of **202 pairs** but possibly as high as **221 pairs**. The lower figure should be quoted.
- 4.2.2 Evidence, both collected and anecdotal, suggests that *hibernicus* is now restricted to the south west of Northern Ireland, most certainly in Fermanagh and parts of Tyrone and potentially south Derry (Map 11). Within Tyrone, *scoticus*, was recorded in the north of the county (Sperrins) but also at Lendrum's Bridge in the south of the county, which almost certainly suggest nearby introductions were carried out at Murley Mountain (G McRoberts pers comm.). Without more research it is not possible to put an accurate figure on the number of pairs of *hibernicus* in Northern Ireland, but from the information gathered in this survey there may be fewer than 50 pairs left.



Map 11: Apparent distribution of sub-species – **fieldwork based only**

hibernicus type **BLUE**
scoticus type **ORANGE**

- 4.2.3 The following densities have been calculated in areas where grouse occur. In the few areas managed specifically for grouse and areas containing the optimum habitat, grouse reach densities of around **three pairs per km²**. These represent the highest densities recorded in the study. Two pairs per km² were

recorded in some areas (County Antrim and Sperrins) but over most of its current range **one pair per km²** is the norm. In parts of Fermanagh and Tyrone the densities are probably even lower. These densities are very similar to those found by Murray (2002 & 2003).

- 4.2.4 *Hibernicus* appears to occur at only the lowest densities (ie one pair per km² or less) and in the wetter less *Calluna* dominant habitat, in the west. This may be their preferred habitat.
- 4.2.5 There appears to be a correlation between the higher densities of grouse and managed areas (eg Glenarm area and Glenshane, Carnalbanagh where a range of management includes burning, flailing, predator control and use of medicated grit) but these appear to involve *scoticus* type birds.
- 4.2.6 The grouse seem to be able to maintain a small tick-over population even in poor habitat and isolated areas. The survival of a tiny population in the Mourne is testament to its ability to survive. Nevertheless there appear to be no grouse left at Slieve Gallion in Co Armagh where pre-war shoots used to take place (G McRoberts pers comm.).
- 4.2.7 In terms of range the latest Atlas (Gibbons et al 1993) showed a retraction of 66.4%. The methodology was not geared to specifically detect grouse and the figure of 48 10 km² in which grouse were recorded would have been an underestimate. The 2004 survey was specifically designed to detect grouse and only detected birds in 46 10 km². This underlines the continued plight of this species in Northern Ireland.

5 CONCLUSIONS

- 5.1 The taxonomic position of *hibernicus* is one of debate. Unfortunately many authors have been quick to dismiss it as being within the range of variation within *scoticus*. There is evidence from the literature, field observations and examination of specimens that it has been unfairly dismissed, whereas equally subtle, isolated, sub-species are freely recognised across the Palaearctic and Nearctic regions.
- 5.2 There is evidence that the race *L.l.hibernicus* is worthy of at least sub-specific status and that would fit with the clinal nature of variation across the range of *L.lagopus*. Many authorities (World Pheasant Association, Madge & McGowan 2001, etc) are suggesting that the red grouse is again given specific status as *L.scoticus* which would make *hibernicus* potentially *L.scoticus hibernicus*. Further phylo-gentic research is needed to ascertain its true status; even specific status remains a valid consideration.
- 5.3 It seems likely from the evidence that the native Irish populations of red grouse (*hibernicus*) are adapted to surviving at densities of one pair per km² or lower. Densities of up to three per km² were recorded but may refer to *scoticus* birds. Specific management can increase population densities artificially but management has to be continuous and intensive for these to be maintained. It is possible that *scoticus* may be more responsive to intense habitat management than native *hibernicus*.
- 5.4 The red grouse (of either form) must be considered extinct (or at best approaching extinction) in Co Armagh. An overall range contraction in Northern Ireland can be seen from the last Atlas of breeding birds (Gibbons et al 1993).
- 5.5 The putative sub-species *hibernicus* appears to persist at least in the western counties of Northern Ireland. Positive sightings of birds fitting the descriptions were definitely recorded from Slieve Beagh and Plumbridge, Co Tyrone and Belmore and Cuilcagh, Co Fermanagh. Other evidence (pers comm.) suggests that Lough Fea, Murrins, Murley Mountain, Black Bog and Pettigo all support this putative sub-species. It is likely that all isolated, bog dwelling, grouse distant from previous introductions, in south-west Tyrone and Fermanagh are of this form.
- 5.6 Red grouse (of either race) in NI are found at densities of up to 3 pairs per km² but often lower than one pair per km² in areas of suitable habitat. High densities in the early twentieth century (G.McRoberts & D C Kinney pers comm.) were on managed sites with severe predator control and probably all involved introductions of *scoticus* birds.
- 5.7 The Northern Ireland population of red grouse has been estimated by the survey as being a minimum of **202 pairs but possibly as high as 221 pairs**. The authors believe the figure of **202 pairs should be quoted**. Co Antrim holds most grouse but apparently no *hibernicus* type birds (D.C. Kinney pers comm. and personal observation).

- 5.8 Grouse seem to be able to survive for long periods at very low densities but this ability to survive is probably being compromised by other factors such as disease, habitat destruction and disturbance.

6 RECOMMENDATIONS

Actions derived from these recommendations are to be found in the Draft Red Grouse Biodiversity Species Action Plan.

- 6.1 A full phylo-genetic study of the putative sub-species/species *Lagopus lagopus hibernicus* should be undertaken using DNA extracted from feathers collected in NI and elsewhere and compared to DNA sequences of birds of known provenance. The results from this will dictate the need to implement some of the following recommendations.
- 6.2 Parallel research should be commissioned into the potential dietary effects on plumage; this should concentrate on the relationship between available carotenoids in the grouse diet (mainly *Calluna vulgaris*) and redness/yellowness of plumage.
- 6.3 In conjunction with the above, a captive breeding programme using birds of known provenance should be considered to allow close observation of individual birds and any plumage changes which take place over time due to “hybridisation” and or diet. Plumage of any “cross-bred” birds and all relationships between parents and progeny should be carefully recorded.
- 6.4 Further investigate plumage variation between *hibernicus* and *scoticus* through examination of specimens of known provenance.
- 6.5 Instigate investigations into both Louping Ill and nematode diseases in red grouse in NI.
- 6.6 Investigate the effects of all development and their associated effects, close to peatlands supporting red grouse populations.
- 6.7 Conduct further research into previous introductions of *scoticus* throughout Northern Ireland and possible impacts.
- 6.8 Undertake a detailed study of identified *hibernicus* populations to ascertain any ecological and behavioural differences from *scoticus*.

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8 CONTACTS

Paul Corbett	EHS
Richard Weyl	EHS
Bobbie Hamill	EHS
Gregor Watson	EHS
Ian Enlander	EHS
John O'Boyle	EHS
David Mitchell	formerly EHS
Dan Kinney	Private
Fred Quinn	DARD (FS)
Godfrey McRoberts	DARD (CMD)
Basil Lenaghan	DARD (FS)
Dick Schaible	DARD (FS)
Ian McKee	DARD (FS)
Dermot Hughes	UWT
Tony Murray	Duchas RoI
Dave Suddaby	BWI
Stephen Newton	BWI
Dr Graham Hirons	RSPB
Brad Robson	RSPB
Ian Dawson	RSPB
Anthony McGeehan	RSPB
Robbie McDonald	Quercus
George Gordon	NIBA
Roger Pollen	BASC

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10 APPENDICES**Appendix 1****Red Grouse Survey - Record Card**

Surveyor's Name			
Site Name		Priority _____	County _____
Square Grid Ref		Altitude _____m	Taped calls used ? Yes/No
Survey Date ____/____/____		Time: Early am / Late am / Early pm / Late pm	
Weather	Dry/ Rain/ Snow/ Showers	Wind Speed F ____	Visibility _____m
	Temperature ____C	Snow Cover ____%	
Habitat	Blanket Bog	Dry Heath	Cut-over Bog
	Raised Bog	Mosaic	Other _____
% area heather cover _____%		Vegetation height _____cm	
Grazing? Yes / No		Recently burnt? Yes / No	
Ground conditions 1 / 2 / 3 / Frozen / Snow		Heather Beetle Damage? Yes / No	
Habitat threats	Over grazing	Reclamation	Agri Improvement
	Windfarm	Development	Other _____

Bird Sightings

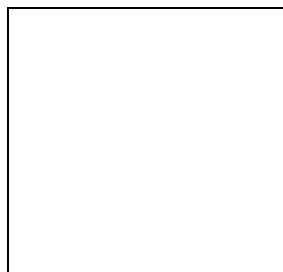
Territorial Male Red Grouse (calls/display/fight etc)

RG male	Race	Grid ref.
	Hib / Scot / indet.	
	Hib / Scot / indet	
	Hib / Scot / indet	
	Hib / Scot / indet	
	Hib / Scot / indet	
	Hib / Scot / indet	
	Hib / Scot / indet	
	Hib / Scot / indet	
	Hib / Scot / indet	

Other Red Grouse Presence / Evidence

Non territorial males Qty _____
Females or indet. Sex Qty _____
Red Grouse droppings? Yes / No
RG droppings found in Piles / or Scattered?
Red Grouse tracks? Yes / No
Feathers collected? Yes / No
Birds calling? Yes / No

Other species of note. List:



Square sketch map

Notes :

Appendix 2

Red Grouse Survey of Northern Ireland – Methodology

All areas of potential red grouse habitat in NI will be assessed and assigned with either high or low survey priority, based on the suitability of the habitat (from vegetation survey data) and on historical bird records. The aim will be to visit all the high priority areas during the period of the survey. Low priority areas will be visited only if time and resources permit. The fieldwork will run from December until mid April, the period of maximum territorial activity of the species. Suitable habitat areas will be divided into 1km squares which will be surveyed using a system of transects and vantage points. Survey work is best carried out in early morning or late afternoon. Constant rain, strong wind (> force 4) and days of poor visibility should be avoided. The aim is to record all territorial red grouse males (whose calls can carry up 1km in good conditions). To achieve this, the transect route should take the surveyor close to, or through, all areas of suitable habitat in each square (minimum 500m). Transects should be walked at an even pace and observations recorded on the record card. In some cases, if the terrain allows, you may be able to select a suitable vantage point to sit and listen from. This option will not be possible on some sites and it will be down to the surveyor's judgement to select a vantage point with good all round visibility and listening potential. A tape of grouse calls should be used, being played occasionally in areas of low bird density to encourage a response. If, on arrival at a square, you feel that the habitat is unsuitable for red grouse, record this and move to the next scheduled square. Similarly, if during your survey work, you find an area of suitable red grouse habitat, which is not scheduled to be surveyed, either carry out a survey, or report your findings so that a survey can be organised. Aim to cover an average of 8 squares per day. Ensure that a responsible person knows where you are surveying and your expected time of return.

Record Card. A 4 figure grid reference with the letter prefix eg H 6580 is given for each site which is located at the SW corner of the square. Give date as dd/mm/yy. Record the time of day of the survey using the boxes. The approximate altitude of the site should be noted from map contours or GPS. Assess the weather conditions and enter on the card by circling items or filling in boxes as appropriate. The major habitat type in the square and some details on its condition should be noted. Note the percentage area of good heather in the square. Record the approx. height of the heather (this equates to age). If Heather Beetle damage is seen, this should be recorded. Ground conditions underfoot should be assessed and recorded as either: 1 Dry; 2 Damp or 3 Waterlogged. Frozen ground and / or snow % cover are also recorded. These observations should be approximate and reflect the average conditions for the square.

Male red grouse showing territorial behaviour (calling / displaying / interacting) should be recorded on the card with their locations. The race should be noted, if possible, or otherwise recorded as indeterminate. The quantity of female or non-territorial male red grouse seen in the square should be recorded. Take note of where flushed birds land to help ensure the same birds are not counted more than once. The presence or absence of droppings and an indication of whether these were found scattered or in piles should be noted. Any red grouse tracks seen (mainly on snow) in the square should be recorded. Any red grouse feathers found should be collected and bagged with a note of the grid reference of their location.

Any other species of interest (raven / raptors / waders / ring ouzel/ hare) that are seen during the survey should be recorded on the card. Record any evidence of foxes (sightings or presence of droppings). Complete a quick sketch map of the square showing areas of heather and any significant features.

The Beaufort scale of wind speed			
Force	Speed mph	Name of wind	Observable features
0	0	Calm air	Smoke rises vertically
1	1 – 3.5	Light air	Smoke drifts downwind
2	4.5 - 7	Light breeze	Wind felt on face, leaves rustle
3	8 – 11.5	Gentle breeze	Leaves and twigs in constant motion. Wind extends light flag
4	12.5 – 18.5	Moderate breeze	Raises dust and loose paper. Small branches are moved
5	19.5 - 24	Fresh breeze	Small trees in leaf begin to sway. Crested wavelets on inland waters
6	25 - 31	Strong breeze	Large branches in motion. Whistling heard in telegraph wires.
7	32 - 38	Moderate gale	Whole trees in motion. Inconvenience felt in walking against wind
8	39 - 46	Fresh gale	Twigs break off trees. Progress generally impeded
9	47 - 54	Strong gale	Slight structural damage occurs (chimney pots and slates removed)
10	55 - 63	Whole gale	Seldom experienced inland. Trees uprooted. Considerable structural damage.

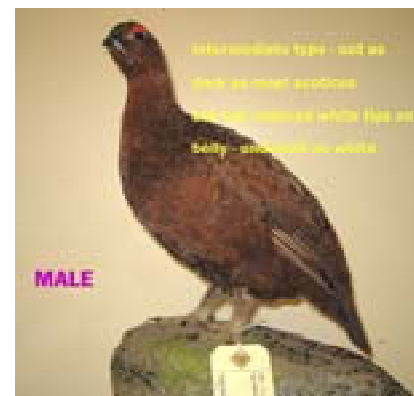
Appendix 3

Red Grouse Survey Staff

<i>NAME</i>	<i>POSITION</i>	<i>HOME ADDRESS & TELE</i>
Anja Rosler	Fieldworker	Randal Shough Monea Enniskillen BT93 7BQ Tel: 028 6634 1456
AnneMarie McDevitt	Fieldworker	10 Belvedere Park Stranmillis Belfast 07736 477524 028 90524365 (DARD) 028 9066 9218 Home
Anthony McGeehan	Fieldworker	75 Lyndhurst Avenue Bangor BT19 1AY 028 9147 9009 07773 917071
Bob Brown	Fieldworker	4 Green Row, Castleward, Strangford, Co Down BT30 7LR 028 4488 1636 07736 792516
Brad Robson	Fieldworker	Randal Shough Monea Enniskillen BT93 7BQ Tel: 028 6634 1456 Mobile: 07711 019808
Clive Mellon	Director	101 Priory Park Belfast BT10 0AG Tel: 028 9061 3765 07753 570094
Dave Allen	Director	21a Windsor Avenue Belfast BT9 6EE Tel: 028 9066 3153 Mobile: 077743 282497
Fionnbarr Cross	Fieldworker	Bannagh Beg Kesh Co Fermanagh BT93 8BY Tel: 028 6863 1319 Mobile: 0770 296 8835
Giles Knight	Fieldworker	Glebe Cottage, Aghavea Glebe, Brookeborough, Co Fermanagh, BT94 4JP 028 8953 1837 Home

		07803 187376 Mob 02890 690836 (RSPB)
Hugh Thurgate	Fieldworker	16 Inishmore Killyleagh Downpatrick BT30 9TP 4482 1098
Ian Herbert	Fieldworker	18 Clonaog Valley Lisnaskea Co Fermanagh BT92 0LJ 6772 1730 07811 396761
Kevin Mawhinney	Survey Coordinator	19 Swifts Quay Carrickfergus BT38 8BQ Home 028 9336 2775 Mobile 07740 721 796
Kendrew Colhoun	Fieldworker	30 Dundrinne Gardens Castlewellan Co Down BT31 9UY 4377 0616 Home 9052 1081 Work 07969 460858 Mob.
Matthew Tickner	Fieldworker	39 Castle View Park Portrush BT56 8AS Tel: 028 7082 4830 (tel/fax) Mobile: 07802 897984
Peter Taylor	Fieldworker	57 Corbin Avenue Enniskillen Co. Fermanagh BT74 6EB 028 6632 8814
Ruth Wilson	Fieldworker	20 Hatton Drive Belfast BT6 9BD Home: 028 9020 5670 Mobile: 07866 554136 02890 690839 Work

Appendix 4: Photographs circulated to survey workers.



Appendix 5All Surveyed 1km²

Site Name	County	Grid ref.	10km Square
Agangarrive Hill	Antrim	D1531	D13
Agangarrive Hill	Antrim	D1530	D13
Agangarrive Hill	Antrim	D1532	D13
Agangarrive Hill	Antrim	D1533	D13
Agangarrive Hill	Antrim	D1433	D13
Agangarrive Hill	Antrim	D1432	D13
Agangarrive Hill	Antrim	D1431	D13
Agangarrive Hill	Antrim	D1430	D13
Agangarrive Hill	Antrim	D1429	D12
Agangarrive Hill	Antrim	D1428	D12
Agnews Hill	Antrim	D3201	D30
Agnews Hill	Antrim	D3200	D30
Agnews Hill	Antrim	D3202	D30
Altahullion	L'Derry	C6112	C61
Altahullion	L'Derry	C6113	C61
Altahullion	L'Derry	C6212	C61
Altahullion	L'Derry	C6213	C61
Ballintempo	Fermanagh	H0641	H04
Ballintempo	Fermanagh	H0642	H04
Ballintempo	Fermanagh	H0945	H04
Ballintempo	Fermanagh	H0643	H04
Ballintempo	Fermanagh	H0946	H04
Ballintempo	Fermanagh	H0741	H04
Ballintempo	Fermanagh	H1144	H14
Ballintempo	Fermanagh	H1044	H14
Ballintempo	Fermanagh	H1145	H14
Ballintempo	Fermanagh	H0742	H04
Ballintempo	Fermanagh	H0743	H04
Ballintempo	Fermanagh	H1045	H14
Ballintempo	Fermanagh	H0846	H04
Ballycollin	Antrim	J2570	J27
Ballycollin	Antrim	J2671	J27
Ballycollin	Antrim	J2670	J27
Ballycollin	Antrim	J2571	J27
Ballynahone Bog	L'Derry	H8598	H89
Ballynahone Bog	L'Derry	H8597	H89
Ballynahone Bog	L'Derry	H8697	H89
Ballypatrick	Antrim	D1934	D13
Ballypatrick	Antrim	D2033	D23
Ballypatrick	Antrim	D1933	D13
Ballypatrick	Antrim	D1535	D13

Ballypatrick	Antrim	D1833	D13
Ballypatrick	Antrim	D1834	D13
Ballypatrick	Antrim	D1435	D13
Ballypatrick	Antrim	D1437	D13
Ballypatrick	Antrim	D1436	D13
Ballypatrick	Antrim	D2134	D23
Ballypatrick	Antrim	D2034	D23
Ballypatrick	Antrim	D1635	D13
Ballypatrick	Antrim	D1526	D12
Ballypatrick	Antrim	D1537	D13
Banagher	L'Derry	C6905	C60
Banagher	L'Derry	C6805	C60
Banagher	L'Derry	C6804	C60
Banagher	L'Derry	C6803	C60
Banagher	L'Derry	C6904	C60
Banagher	L'Derry	C6801	C60
Banagher	L'Derry	C6702	C60
Barnes	Tyrone	H5589	H58
Barnes	Tyrone	H5489	H58
Barnes	Tyrone	H5289	H58
Barnes	Tyrone	H5389	H58
Barnes	Tyrone	H5089	H58
Barnes	Tyrone	H5189	H58
Belmore	Fermanagh	H1441	H14
Belmore	Fermanagh	H1342	H14
Belmore	Fermanagh	H1341	H14
Belmore	Fermanagh	H1240	H14
Belmore	Fermanagh	H1241	H14
Benaughlin	Fermanagh	H1730	H13
Benaughlin	Fermanagh	H1731	H13
Benbradagh	L'Derry	C7211	C71
Benbradagh	L'Derry	C7311	C71
Benbradagh	L'Derry	C7310	C71
Benbradagh	L'Derry	C7309	C70
Bessy Bell	Tyrone	H3982	H38
Bessy Bell	Tyrone	H3983	H38
Bessy Bell	Tyrone	H3881	H38
Bessy Bell	Tyrone	H3880	H38
Big Collin	Antrim	J2396	J29
Big Dog	Fermanagh	H0550	H05
Big Dog	Fermanagh	H0752	H05
Big Dog	Fermanagh	H0751	H05
Big Dog	Fermanagh	H0649	H04
Big Dog	Fermanagh	H0749	H04
Big Dog	Fermanagh	H0848	H04
Big Dog	Fermanagh	H0748	H04
Big Dog	Fermanagh	H0650	H05

Big Dog	Fermanagh	H0652	H05
Big Dog	Fermanagh	H0449	H04
Big Dog	Fermanagh	H0651	H05
Big Dog	Fermanagh	H0549	H04
Big Dog	Fermanagh	H0450	H05
Binevenagh	L'Derry	C7232	C73
Binevenagh	L'Derry	C7332	C73
Binevenagh	L'Derry	C7231	C73
Binevenagh	L'Derry	C7131	C73
Binevenagh	L'Derry	C7128	C72
Binevenagh	L'Derry	C7334	C73
Binevenagh	L'Derry	C7028	C72
Binevenagh	L'Derry	C6929	C62
Binevenagh	L'Derry	C6930	C63
Black Bog	Tyrone	H6381	H68
Black Bog	Tyrone	H6380	H68
Black Bog	Tyrone	H6281	H68
Black Bog	Tyrone	H6182	H68
Black Bog	Tyrone	H6280	H68
Black Bog	Tyrone	H6282	H68
Black Hill	Antrim	D3211	D31
Black Mountain	Antrim	J2873	J27
Black Mountain	Antrim	J2975	J27
Black Mountain	Antrim	J2874	J27
Black Mountain	Antrim	J2974	J27
Bolaght	Tyrone	H2476	H27
Bolaght	Tyrone	H2475	H27
Bolaght	Tyrone	H2576	H27
Bolaght	Tyrone	H2676	H27
Bolaght	Tyrone	H2575	H27
Bolaght	Tyrone	H2074	H27
Bolaght	Tyrone	H2376	H27
Bolaght	Tyrone	H2175	H27
Brougher Mountain	Fermanagh	H3553	H35
Brougher Mountain	Fermanagh	H3452	H35
Brougher Mountain	Fermanagh	H3653	H35
Brougher Mountain	Fermanagh	H3552	H35
Brougher Mountain	Fermanagh	H3351	H35
Brougher Mountain	Fermanagh	H3652	H35
Brougher Mountain	Tyrone	H3754	H35
Brougher Mountain	Tyrone	H3654	H35
Brougher Mountain	Tyrone	H3352	H35
Brown Hill	L'Derry	C7204	C70
Brown Hill	L'Derry	C7004	C70
Brown Hill	L'Derry	C7104	C70
Brown Hill	L'Derry	C7103	C70
Brown Hill	L'Derry	C7102	C70

Brown Hill	L'Derry	C7202	C70
Brown Hill	L'Derry	C7203	C70
Brunt Hill	Antrim	D3100	D30
Brunt Hill	Antrim	D3101	D30
Brunt Hill	Antrim	D3001	D30
Camclough Mountain	Armagh	J0425	J02
Camclough Mountain	Armagh	J0525	J02
Camclough Mountain	Armagh	J0424	J02
Cappagh	Tyrone	H6666	H66
Cappagh	Tyrone	H6263	H66
Cappagh	Tyrone	H6262	H66
Cappagh	Tyrone	H6765	H66
Cappagh	Tyrone	H6866	H66
Cappagh	Tyrone	H6766	H66
Cappagh	Tyrone	H6768	H66
Cappagh	Tyrone	H6865	H66
Carnalbanagh	Antrim	D2509	D20
Carnalbanagh	Antrim	D2608	D20
Carnalbanagh	Antrim	D2508	D20
Carnalbanagh	Antrim	D2610	D21
Carnalbanagh	Antrim	D2609	D20
Carnanelly	Tyrone	H6693	H69
Carnanelly	Tyrone	H6591	H69
Carnanelly	Tyrone	H6793	H69
Carnanelly	L'Derry	H7093	H79
Carnanelly	L'Derry	H7193	H79
Carnanelly	L'Derry	H6792	H69
Carnanelly	L'Derry	H6891	H69
Carnanelly	L'Derry	H6692	H69
Carnanelly	L'Derry	H6992	H69
Carnanelly	L'Derry	H7092	H79
Carnanelly	L'Derry	H6592	H69
Carnanelly	L'Derry	H6991	H69
Carncoagh Hill	Antrim	D1411	D11
Carncoagh Hill	Antrim	D1410	D11
Cave Hill	Antrim	J3180	J38
Cave Hill	Antrim	J3279	J37
Cave Hill	Antrim	J3280	J38
Church Hill	Tyrone	H1878	H17
Craig	Antrim	D2028	D22
Craig	Antrim	D2027	D22
Craigcluggan	Antrim	D2907	D20
Craigcluggan	Antrim	D2908	D20
Craigcluggan	Antrim	D3007	D30
Crilly's Hill	Tyrone	H2179	H27
Croaghan	Antrim	D1131	D13
Croaghan	Antrim	D1328	D12

Croaghan	Antrim	D1228	D12
Croaghan	Antrim	D1029	D12
Croaghan	Antrim	D1030	D13
Croaghan	Antrim	D0931	D03
Croaghan	Antrim	D1031	D13
Croaghan	Antrim	D1132	D13
Croaghan	Antrim	D1130	D13
Croaghan	Antrim	D1230	D13
Croaghan	Antrim	D1129	D12
Croaghan	Antrim	D1229	D12
Croaghan	Antrim	D1032	D13
Crockdooish	L'Derry	C5202	C50
Crocknamoghil	Tyrone	H5984	H58
Crocknamoghil	Tyrone	H5784	H58
Crocknamoghil	Tyrone	H5985	H58
Crocknamoghil	Tyrone	H5885	H58
Crocknamoghil	Tyrone	H5884	H58
Crocknamoghil	Tyrone	H5785	H58
Crocknamoghil	Tyrone	H5685	H58
Crocknamoyle	Antrim	D1731	D13
Crocknamoyle	Antrim	D1631	D13
Crocknamoyle	Antrim	D1629	D12
Crocknamoyle	Antrim	D1630	D13
Crocknamoyle	Antrim	D1730	D13
Crocknamoyle	Antrim	D1831	D13
Cuilcagh	Fermanagh	H1431	H13
Cuilcagh	Fermanagh	H1532	H13
Cuilcagh	Fermanagh	H1530	H13
Cuilcagh	Fermanagh	H1629	H12
Cuilcagh	Fermanagh	H1432	H13
Cuilcagh	Fermanagh	H1531	H13
Cuilcagh	Fermanagh	H1430	H13
Cuilcagh	Fermanagh	H1429	H12
Cuilcagh	Fermanagh	H1129	H12
Cuilcagh	Fermanagh	H1128	H12
Cuilcagh	Fermanagh	H1233	H13
Cuilcagh	Fermanagh	H1030	H13
Cuilcagh	Fermanagh	H1529	H12
Cuilcagh	Fermanagh	H1630	H13
Cuilcagh	Fermanagh	H1132	H13
Cuilcagh	Fermanagh	H1029	H12
Cuilcagh	Fermanagh	H1031	H13
Cuilcagh	Fermanagh	H1032	H13
Cuilcagh	Fermanagh	H1034	H13
Cuilcagh	Fermanagh	H1131	H13
Cuilcagh	Fermanagh	H1632	H13
Cuilcagh	Fermanagh	H1631	H13

Cuilcagh	Fermanagh	H1130	H13
Cushleake	Antrim	D2235	D23
Cushleake	Antrim	D2336	D23
Cushleake	Antrim	D2436	D23
Cushleake	Antrim	D2337	D23
Cushleake	Antrim	D2237	D23
Cushleake	Antrim	D2236	D23
Cushleake	Antrim	D2136	D23
Cushleake	Antrim	D2435	D23
Cushleake	Antrim	D2137	D23
Cushleake	Antrim	D2135	D23
Cushleake	Antrim	D2335	D23
Cushleake	Antrim	D2234	D23
Cushleake	Antrim	D2334	D23
Davagh	Tyrone	H7586	H78
Davagh	Tyrone	H7685	H78
Davagh	Tyrone	H7585	H78
Davagh	Tyrone	H7485	H78
Davagh	Tyrone	H7486	H78
Davagh	Tyrone	H7386	H78
Davagh	Tyrone	H7181	H78
Davagh	Tyrone	H7083	H78
Davagh	Tyrone	H7183	H78
Davagh	Tyrone	H7283	H78
Davagh	Tyrone	H7384	H78
Davagh	Tyrone	H7182	H78
Davagh	Tyrone	H7082	H78
Davagh	Tyrone	H6982	H68
Divis	Antrim	J2875	J27
Divis	Antrim	J2775	J27
Divis	Antrim	J2876	J27
Divis	Antrim	J2776	J27
Donald's Hill	L'Derry	C7521	C72
Donald's Hill	L'Derry	C7520	C72
Donald's Hill	L'Derry	C7519	C71
Donald's Hill	L'Derry	C7518	C71
Donald's Hill	L'Derry	C7618	C71
Donald's Hill	L'Derry	C7417	C71
Donald's Hill	L'Derry	C7517	C71
Douglas Top	Antrim	D2403	D20
Douglas Top	Antrim	D2402	D20
Dunloy Bog	Antrim	D0319	D01
Dunloy Bog	Antrim	D0219	D01
Evishanoran	Tyrone	H6677	H67
Evishanoran	Tyrone	H6678	H67
Evishanoran	Tyrone	H6778	H67
Evishanoran	Tyrone	H6777	H67

Fairywater Bog	Tyrone	H3376	H37
Fairywater Bog	Tyrone	H3377	H37
Frosses Bog	Antrim	D0515	D01
Garron	Antrim	D1915	D11
Garron	Antrim	D2117	D21
Garron	Antrim	D2217	D21
Garron	Antrim	D2218	D21
Garron	Antrim	D2318	D21
Garron	Antrim	D2317	D21
Garron	Antrim	D2216	D21
Garron	Antrim	D2015	D21
Garron	Antrim	D2016	D21
Garron	Antrim	D2017	D21
Garron	Antrim	D2116	D21
Garron E	Antrim	D2320	D22
Garron E	Antrim	D2622	D22
Garron E	Antrim	D2523	D22
Garron E	Antrim	D2521	D22
Garron E	Antrim	D2420	D22
Garron E	Antrim	D2321	D22
Garron E	Antrim	D2421	D22
Garron E	Antrim	D2522	D22
Garron E	Antrim	D2422	D22
Garron E	Antrim	D2722	D22
Garron Point	Antrim	D2823	D22
Garron Point	Antrim	D2924	D22
Garron Point	Antrim	D2824	D22
Garron Point	Antrim	D2923	D22
Garron W	Antrim	D1916	D11
Garron W	Antrim	D1614	D11
Garron W	Antrim	D1714	D11
Garron W	Antrim	D1814	D11
Garron W	Antrim	D1815	D11
Garron W	Antrim	D1914	D11
Garron W	Antrim	D2014	D21
Garron W	Antrim	D1913	D11
Garron W	Antrim	D1715	D11
Glenariff	Antrim	D2021	D22
Glenariff	Antrim	D1918	D11
Glenariff	Antrim	D1919	D11
Glenhead	Antrim	D2601	D20
Glenhead	Antrim	D2602	D20
Glenhead	Antrim	D2502	D20
Glenlark	Tyrone	H6492	H69
Glenlark	Tyrone	H6392	H69
Glenlark	Tyrone	H5888	H58
Glenlark	Tyrone	H5887	H58

Glenlark	Tyrone	H5987	H58
Glenlark	Tyrone	H6292	H69
Glenlark	Tyrone	H6291	H69
Glenlark	Tyrone	H6389	H68
Glenlark	Tyrone	H5991	H59
Glenlark	Tyrone	H5990	H59
Glenlark	Tyrone	H5890	H59
Glenlark	Tyrone	H6289	H68
Glenlark	Tyrone	H6493	H69
Glenlark	Tyrone	H6393	H69
Glenlark	Tyrone	H6191	H69
Glenshane	L'Derry	C7704	C70
Glenshane	L'Derry	C7608	C70
Glenshane	L'Derry	C7503	C70
Glenshane	L'Derry	C7602	C70
Glenshane	L'Derry	C7808	C70
Glenshane	L'Derry	C7508	C70
Glenshane	L'Derry	C7708	C70
Glenshane	L'Derry	C8010	C81
Glenshane	L'Derry	C7706	C70
Glenshane	L'Derry	C8006	C80
Glenshane	L'Derry	C8106	C80
Glenshane	L'Derry	C7509	C70
Glenshane	L'Derry	C7408	C70
Glenshane	L'Derry	C7407	C70
Glenshane	L'Derry	C7607	C70
Glenshane	L'Derry	C7604	C70
Glenshane	L'Derry	C7908	C70
Glenshane	L'Derry	C7603	C70
Glenshane	L'Derry	C8011	C81
Glenshane	L'Derry	C7911	C71
Glenshane	L'Derry	C7507	C70
Glenshane	L'Derry	C7707	C70
Glenshane	L'Derry	C7807	C70
Glenshane	L'Derry	C7605	C70
Glenshane	L'Derry	C7705	C70
Glenshane	L'Derry	C7910	C71
Glenshane	L'Derry	C7909	C70
Glenshane	L'Derry	C7804	C70
Glenshane	L'Derry	C7907	C70
Glenshane	L'Derry	C7409	C70
Glenshane	L'Derry	C7609	C70
Glenshane	L'Derry	C7903	C70
Glenshane	L'Derry	C7904	C70
Glenshane	L'Derry	C7905	C70
Glenshane	L'Derry	C7906	C70
Glenshane	L'Derry	C7504	C70

Glenshane	L'Derry	C7806	C70
Glenshane	L'Derry	C7902	C70
Glenshane	L'Derry	C7805	C70
Glenshane	L'Derry	C7803	C70
Glenshane	L'Derry	C7802	C70
Glenwhirry	Antrim	D2900	D20
Glenwhirry	Antrim	D2701	D20
Glenwhirry	Antrim	D2702	D20
Glenwhirry	Antrim	D2703	D20
Glenwhirry	Antrim	D2803	D20
Glenwhirry	Antrim	D2802	D20
Glenwhirry	Antrim	D2902	D20
Glenwhirry	Antrim	D2901	D20
Grousehall Hill	Tyrone	H1677	H17
Grousehall Hill	Tyrone	H1776	H17
Grousehall Hill	Tyrone	H1575	H17
Grousehall Hill	Tyrone	H1576	H17
Grousehall Hill	Tyrone	H1675	H17
Grousehall Hill	Tyrone	H1676	H17
Grousehall Hill	Tyrone	H1775	H17
Gruig	Antrim	D2030	D23
Gruig	Antrim	D1930	D13
Gruig	Antrim	D1929	D12
Gruig	Antrim	D1928	D12
Gruig	Antrim	D1829	D12
Gruig	Antrim	D1828	D12
Gruig	Antrim	D2029	D22
Gruig	Antrim	D2231	D23
Gruig	Antrim	D2130	D23
Gruig	Antrim	D2131	D23
Keady Mountain	L'Derry	C7624	C72
Keady Mountain	L'Derry	C7224	C72
Keady Mountain	L'Derry	C7524	C72
Keady Mountain	L'Derry	C7324	C72
Keady Mountain	L'Derry	C7424	C72
Knocklayd	Antrim	D1136	D13
Knocklayd	Antrim	D1135	D13
Lendrum's Bridge	Tyrone	H4455	H45
Lendrum's Bridge	Tyrone	H4553	H45
Lendrum's Bridge	Tyrone	H4456	H45
Lendrum's Bridge	Tyrone	H4352	H45
Lendrum's Bridge	Tyrone	H4453	H45
Lendrum's Bridge	Tyrone	H4353	H45
Lendrum's Bridge	Tyrone	H4255	H45
Lendrum's Bridge	Tyrone	H4153	H45
Lendrum's Bridge	Tyrone	H4152	H45
Lendrum's Bridge	Tyrone	H4054	H45

Lendrum's Bridge	Tyrone	H4053	H45
Lendrum's Bridge	Tyrone	H4354	H45
Lendrum's Bridge	Tyrone	H4154	H45
Lendrum's Bridge	Tyrone	H3953	H35
Lendrum's Bridge	Tyrone	H4052	H45
Lendrum's Bridge	Tyrone	H4155	H45
Lendrum's Bridge	Tyrone	H4254	H45
Lendrum's Bridge	Tyrone	H4253	H45
Lendrum's Bridge	Tyrone	H4252	H45
Lendrum's Bridge	Tyrone	H4653	H45
Lendrum's Bridge	Tyrone	H4356	H45
Lendrum's Bridge	Tyrone	H4355	H45
Lisnaskea Forest	Fermanagh	H4840	H44
Lisnaskea Forest	Fermanagh	H4735	H43
Lisnaskea Forest	Fermanagh	H4734	H43
Lisnaskea Forest	Fermanagh	H4736	H43
Lisnaskea Forest	Fermanagh	H4737	H43
Lisnaskea Forest	Fermanagh	H4634	H43
Lisnaskea Forest	Fermanagh	H4740	H44
Lisnaskea Forest	Fermanagh	H4237	H43
Lisnaskea Forest	Fermanagh	H4444	H44
Lisnaskea Forest	Fermanagh	H4137	H43
Lisnaskea Forest	Fermanagh	H4837	H43
Lisnaskea Forest	Fermanagh	H4534	H43
Lisnaskea Forest	Fermanagh	H4533	H43
Lisnaskea Forest	Fermanagh	H4334	H43
Lisnaskea Forest	Fermanagh	H4234	H43
Lisnaskea Forest	Fermanagh	H4236	H43
Lisnaskea Forest	Fermanagh	H4134	H43
Little Trosk	Antrim	D2619	D21
Little Trosk	Antrim	D2519	D21
Long Mountain	Antrim	D0112	D01
Long Mountain	Antrim	D0016	D01
Long Mountain	Antrim	D0017	D01
Long Mountain	Antrim	D0012	D01
Long Mountain	Antrim	D0111	D01
Long Mountain	Antrim	D0115	D01
Long Mountain	Antrim	C9917	C91
Long Mountain	Antrim	D0011	D01
Lough Navar	Fermanagh	H0156	H05
Lough Navar	Fermanagh	H0056	H05
Lough Navar	Fermanagh	H0557	H05
Lough Navar	Fermanagh	H0054	H05
Lough Navar	Fermanagh	H0357	H05
Lough Navar	Fermanagh	H0154	H05
Lough Navar	Fermanagh	H0356	H05
Lough Navar	Fermanagh	H0256	H05

Lough Navar	Fermanagh	G9954	G95
Lough Navar	Fermanagh	H0454	H05
Lough Navar	Fermanagh	H0555	H05
Lough Navar	Fermanagh	H0554	H05
Lough Navar	Fermanagh	H0252	H05
Lough Navar	Fermanagh	H0457	H05
Lough Navar	Fermanagh	H0353	H05
Lough Navar	Fermanagh	H0254	H05
Lough Navar	Fermanagh	H0354	H05
Lough Navar	Fermanagh	H0153	H05
Lough Navar	Fermanagh	H0253	H05
Loughan Hill	Tyrone	C4601	C40
Loughan Hill	Tyrone	C4701	C40
Loughermore	L'Derry	C5716	C51
Loughermore	L'Derry	C5816	C51
Loughermore	L'Derry	C6016	C61
Loughermore	L'Derry	C5916	C51
Loughermore	L'Derry	C6015	C61
Loughermore	L'Derry	C5915	C51
Main Mountain	Tyrone	C5100	C50
Moneygal Bog	Tyrone	H2387	H28
Moneygal Bog	Tyrone	H2487	H28
Moneygal Bog	Tyrone	H2488	H28
Moneygal Bog	Tyrone	H2388	H28
Mournes	Down	J2121	J22
Mournes	Down	J2120	J22
Mournes	Down	J2024	J22
Mournes	Down	J2023	J22
Mournes	Down	J1923	J12
Mournes	Down	J2824	J22
Mournes	Down	J3427	J32
Mournes	Down	J3426	J32
Mournes	Down	J3425	J32
Mournes	Down	J3424	J32
Mournes	Down	J3527	J32
Mournes	Down	J3524	J32
Mournes	Down	J2922	J22
Mournes	Down	J2923	J22
Mournes	Down	J3428	J32
Mournes	Down	J2925	J22
Mournes	Down	J3326	J32
Mournes	Down	J2825	J22
Mournes	Down	J2926	J22
Mournes	Down	J3026	J32
Mournes	Down	J3526	J32
Mournes	Down	J3525	J32
Mournes	Down	J3625	J32

Mournes	Down	J3626	J32
Mournes	Down	J3627	J32
Mournes	Down	J3725	J32
Mournes	Down	J2924	J22
Mournes	Down	J2322	J22
Mournes	Down	J3127	J32
Mournes	Down	J3128	J32
Mournes	Down	J3129	J32
Mournes	Down	J3029	J32
Mournes	Down	J2521	J22
Mournes	Down	J2520	J22
Mournes	Down	J2420	J22
Mournes	Down	J2223	J22
Mournes	Down	J2222	J22
Mournes	Down	J3324	J32
Mournes	Down	J2321	J22
Mournes	Down	J3325	J32
Mournes	Down	J3223	J32
Mournes	Down	J3224	J32
Mournes	Down	J3124	J32
Mournes	Down	J3123	J32
Mournes	Down	J3122	J32
Mournes	Down	J3328	J32
Mournes	Down	J3023	J32
Mournes	Down	J3327	J32
Mournes	Down	J3027	J32
Mournes	Down	J2221	J22
Mournes	Down	J2421	J22
Mournes	Down	J3227	J32
Mournes	Down	J3228	J32
Mournes	Down	J3229	J32
Mournes	Down	J2927	J22
Mournes	Down	J2928	J22
Mournes	Down	J2324	J22
Mournes	Down	J3126	J32
Mournes	Down	J3125	J32
Mournes	Down	J3727	J32
Mournes	Down	J2423	J22
Mournes	Down	J3022	J32
Mournes	Down	J2323	J22
Mournes	Down	J2422	J22
Mournes	Down	J3025	J32
Mournes	Down	J3028	J32
Mournes	Down	J3429	J32
Mournes	Down	J3726	J32
Mournes	Down	J3024	J32
Mournes	Down	J3724	J32

Mournes	Down	J3624	J32
Mournes	Down	J3225	J32
Mournes	Down	J3728	J32
Mournes	Down	J3628	J32
Mournes	Down	J3226	J32
Mournes	Down	J3529	J32
Mullaghboy Hill	Antrim	D2613	D21
Mullaghcarn	Tyrone	H5079	H57
Mullaghcarn	Tyrone	H5178	H57
Mullaghcarn	Tyrone	H5078	H57
Mullaghcarn	Tyrone	H4979	H47
Mullaghcarn	Tyrone	H4285	H48
Mullaghcarn	Tyrone	H4779	H47
Mullaghcarn	Tyrone	H5180	H58
Mullaghcarn	Tyrone	H4684	H48
Mullaghcarn	Tyrone	H5083	H58
Mullaghcarn	Tyrone	H5082	H58
Mullaghcarn	Tyrone	H5381	H58
Mullaghcarn	Tyrone	H4584	H48
Mullaghcarn	Tyrone	H4780	H48
Mullaghcarn	Tyrone	H5080	H58
Mullaghcarn	Tyrone	H5281	H58
Mullaghcarn	Tyrone	H5183	H58
Mullaghcarn	Tyrone	H5282	H58
Mullaghcarn	Tyrone	H5182	H58
Mullaghcarn	Tyrone	H5084	H58
Mullaghcarn	Tyrone	H4884	H48
Mullaghcarn	Tyrone	H5081	H58
Mullaghcarn	Tyrone	H4784	H48
Mullaghcarn	Tyrone	H5179	H57
Mullaghcarn	Tyrone	H4385	H48
Mullaghcarn	Tyrone	H5181	H58
Mullaghcarn	Tyrone	H4783	H48
Mullaghcarn	Tyrone	H4983	H48
Mullaghcarn	Tyrone	H4485	H48
Mullaghcarn	Tyrone	H5380	H58
Mullaghcarn	Tyrone	H4484	H48
Mullaghcarn	Tyrone	H4984	H48
Mullaghmeash	L'Derry	C6207	C60
Mullaghmore	L'Derry	C7502	C70
Mullaghmore	L'Derry	C7501	C70
Mullaghmore	L'Derry	C7500	C70
Mullaghmore	L'Derry	C7600	C70
Mullaghmore	L'Derry	C7401	C70
Mullaghmore	L'Derry	C7402	C70
Mullaghsallagh	Tyrone	H6795	H69
Mullaghsallagh	Tyrone	H6894	H69

Mullaghsallagh	Tyrone	H6895	H69
Mullaghsallagh	Tyrone	H6995	H69
Mullaghturk	L'Derry	H6689	H68
Mullaghturk	L'Derry	H6789	H68
Mullaghturk	L'Derry	H7089	H78
Mullyfa	Tyrone	H1280	H18
Mullyfa	Tyrone	H1180	H18
Munie Moss	Antrim	D2812	D21
Munie Moss	Antrim	D2712	D21
Munie Moss	Antrim	D2811	D21
Munie Moss	Antrim	D2711	D21
Murrins	Tyrone	H5779	H57
Murrins	Tyrone	H5577	H57
Murrins	Tyrone	H5578	H57
Murrins	Tyrone	H5677	H57
Murrins	Tyrone	H5678	H57
Murrins	Tyrone	H5878	H57
Murrins	Tyrone	H5778	H57
Murrins	Tyrone	H5879	H57
Murrins	Tyrone	H6277	H67
Murrins	Tyrone	H5980	H58
Murrins	Tyrone	H5679	H57
Niells Top	Antrim	D2413	D21
Niells Top	Antrim	D2313	D21
Niells Top	Antrim	D2414	D21
Niells Top	Antrim	D2314	D21
North Sperrins	Tyrone	H5499	H59
North Sperrins	Tyrone	H5598	H59
North Sperrins	Tyrone	H5498	H59
North Sperrins	Tyrone	H5398	H59
North Sperrins	L'Derry	H5698	H59
North Sperrins	L'Derry	H5599	H59
North Sperrins	L'Derry	H5898	H59
North Sperrins	L'Derry	H5999	H59
North Sperrins	L'Derry	H5699	H59
North Sperrins	L'Derry	H5799	H59
North Sperrins	L'Derry	C5700	C50
North Sperrins	L'Derry	H5899	H59
North Sperrins	L'Derry	C5600	C50
North Sperrins	L'Derry	H5798	H59
NW Sperrins	Tyrone	H4095	H49
NW Sperrins	Tyrone	H4094	H49
NW Sperrins	Tyrone	H3797	H39
NW Sperrins	Tyrone	H3897	H39
NW Sperrins	Tyrone	H3996	H39
NW Sperrins	Tyrone	H4396	H49
NW Sperrins	Tyrone	H4496	H49

NW Sperrins	Tyrone	H4295	H49
NW Sperrins	Tyrone	H4395	H49
NW Sperrins	Tyrone	H3894	H39
NW Sperrins	Tyrone	H3793	H39
NW Sperrins	Tyrone	H3893	H39
NW Sperrins	Tyrone	H4192	H49
NW Sperrins	Tyrone	H4292	H49
NW Sperrins	Tyrone	H4291	H49
NW Sperrins	Tyrone	H4191	H49
NW Sperrins	Tyrone	H3794	H39
Oghtbristacree	Antrim	D1633	D13
Oghtbristacree	Antrim	D1832	D13
Oghtbristacree	Antrim	D1632	D13
Oghtbristacree	Antrim	D1733	D13
Oghtbristacree	Antrim	D1732	D13
Orra More	Antrim	D1327	D12
Orra More	Antrim	D1325	D12
Orra More	Antrim	D1528	D12
Orra More	Antrim	D1427	D12
Orra More	Antrim	D1426	D12
Orra More	Antrim	D1326	D12
Orra More	Antrim	D1527	D12
Orra More	Antrim	D1424	D12
Orra More	Antrim	D1425	D12
Orra More	Antrim	D1324	D12
Pettigo Plateau	Fermanagh	G9862	G96
Pettigo Plateau	Fermanagh	G9861	G96
Pettigo Plateau	Fermanagh	H0064	H06
Pettigo Plateau	Fermanagh	G9964	G96
Pettigo Plateau	Fermanagh	G9963	G96
Pettigo Plateau	Fermanagh	H0265	H06
Pettigo Plateau	Fermanagh	H0163	H06
Pettigo Plateau	Fermanagh	H0264	H06
Pettigo Plateau	Fermanagh	G9863	G96
Pettigo Plateau	Fermanagh	H0164	H06
Pettigo Plateau	Fermanagh	H0262	H06
Pettigo Plateau	Fermanagh	H0362	H06
Pettigo Plateau	Fermanagh	H0263	H06
Pettigo Plateau	Fermanagh	H0065	H06
Pettigo Plateau	Fermanagh	G9965	G96
Pettigo Plateau	Fermanagh	H0664	H06
Pettigo Plateau	Fermanagh	H0663	H06
Pettigo Plateau	Fermanagh	H0165	H06
Pigeon Top	Tyrone	H3570	H37
Pigeon Top	Tyrone	H3671	H37
Pigeon Top	Tyrone	H3770	H37
Pigeon Top	Tyrone	H3670	H37

Pigeon Top	Tyrone	H3771	H37
Plumbridge	Tyrone	H5095	H59
Plumbridge	Tyrone	H5195	H59
Plumbridge	Tyrone	H4996	H49
Plumbridge	Tyrone	H4797	H49
Plumbridge	Tyrone	H4796	H49
Plumbridge	Tyrone	H4693	H49
Plumbridge	Tyrone	H4894	H49
Plumbridge	Tyrone	H4897	H49
Plumbridge	Tyrone	H4995	H49
Plumbridge	Tyrone	H4993	H49
Plumbridge	Tyrone	H5092	H59
Plumbridge	Tyrone	H4994	H49
Plumbridge	Tyrone	H4695	H49
Plumbridge	Tyrone	H4893	H49
Plumbridge	Tyrone	H5094	H59
Retreat	Antrim	D2022	D22
Retreat	Antrim	D2023	D22
Robin Youngs Hill	Antrim	D3306	D30
Rotten Mountain	Fermanagh	H2070	H27
Sallagh	Antrim	D3304	D30
Sallagh	Antrim	D3404	D30
Sallagh	Antrim	D3305	D30
Scawt Hill	Antrim	D3209	D30
Scawt Hill	Antrim	D3208	D30
Shanes Hill	Antrim	J3399	J39
Shanes Hill	Antrim	D3300	D30
Shillanavogy	Antrim	D2503	D20
Skeagh	Antrim	D2905	D20
Skerry Hill	Antrim	D1421	D12
Skerry Hill	Antrim	D1321	D12
Skerry Hill	Antrim	D1220	D12
Skerry Hill	Antrim	D1319	D11
Skerry Hill	Antrim	D1320	D12
Skerry Hill	Antrim	D1420	D12
Slemish	Antrim	D2305	D20
Slemish	Antrim	D2304	D20
Slemish	Antrim	D2205	D20
Slieve Beagh	Fermanagh	H5242	H54
Slieve Beagh	Fermanagh	H5142	H54
Slieve Beagh	Fermanagh	H5243	H54
Slieve Beagh	Tyrone	H5244	H54
Slieve Beagh	Tyrone	H5145	H54
Slieve Beagh	Tyrone	H5745	H54
Slieve Beagh	Tyrone	H5543	H54
Slieve Beagh	Tyrone	H5443	H54
Slieve Beagh	Tyrone	H5345	H54

Slieve Beagh	Tyrone	H5444	H54
Slieve Beagh	Tyrone	H5245	H54
Slieve Beagh	Tyrone	H5346	H54
Slieve Beagh	Tyrone	H4944	H44
Slieve Beagh	Tyrone	H4945	H44
Slieve Beagh	Tyrone	H5043	H54
Slieve Beagh	Tyrone	H5044	H54
Slieve Beagh	Tyrone	H5045	H54
Slieve Beagh	Tyrone	H5046	H54
Slieve Beagh	Tyrone	H5047	H54
Slieve Beagh	Tyrone	H5143	H54
Slieve Beagh	Tyrone	H5144	H54
Slieve Beagh	Tyrone	H5544	H54
Slieve Beagh	Tyrone	H5545	H54
Slieve Beagh	Tyrone	H5445	H54
Slieve Beagh	Tyrone	H5343	H54
Slieve Beagh	Tyrone	H5246	H54
Slieve Beagh	Tyrone	H4946	H44
Slieve Beagh	Tyrone	H5645	H54
Slieve Beagh	Tyrone	H5344	H54
Slieve Beagh	Tyrone	H5146	H54
Slieve Beagh	Tyrone	H5644	H54
Slieve Croob	Down	J3045	J34
Slieve Croob	Down	J3046	J34
Slieve Gallion	L'Derry	H8191	H89
Slieve Gallion	L'Derry	H8090	H89
Slieve Gallion	L'Derry	H7991	H79
Slieve Gallion	L'Derry	H7890	H79
Slieve Gallion	L'Derry	H7989	H78
Slieve Gallion	L'Derry	H8091	H89
Slieve Gallion	L'Derry	H7887	H78
Slieve Gallion	L'Derry	H8088	H88
Slieve Gallion	L'Derry	H8189	H88
Slieve Gallion	L'Derry	H7990	H79
Slieve Gallion	L'Derry	H7988	H78
Slieve Gallion	L'Derry	H7987	H78
Slieve Gallion	L'Derry	H7787	H78
Slieve Gullion	Armagh	J0219	J01
Slieve Gullion	Armagh	J0119	J01
Slieve Gullion	Armagh	J0222	J02
Slieve Gullion	Armagh	J0319	J01
Slieve Gullion	Armagh	J0220	J02
Slieve Gullion	Armagh	J0221	J02
Slieve Gullion	Armagh	J0121	J02
Slieve Kirk	L'Derry	C4707	C40
Slieve Kirk	L'Derry	C4608	C40
Slieve Kirk	L'Derry	C4409	C40

Slieve Kirk	L'Derry	C4508	C40
Slieve Rushen	Fermanagh	H2425	H22
Slieve Rushen	Fermanagh	H2427	H22
Slieve Rushen	Fermanagh	H2524	H22
Slieve Rushen	Fermanagh	H2424	H22
Slieve Rushen	Fermanagh	H2423	H22
Slieve Rushen	Fermanagh	H2523	H22
Slieveboy	L'Derry	C5503	C50
Slievecarnane	Down	J1624	J12
Slievecarnane	Down	J1524	J12
Slievemartin	Down	J2117	J21
Slievemartin	Down	J2116	J21
Slievemartin	Down	J2017	J21
Slievemore	Tyrone	H5962	H56
Slievemore	Tyrone	H5961	H56
Slievemore	Tyrone	H5861	H56
Slievemore	Tyrone	H5761	H56
Slievemore	Tyrone	H5862	H56
Slievemore	Tyrone	H5762	H56
Slievemore	Tyrone	H5960	H56
Slievemore	Tyrone	H5860	H56
Slievenahanagan	Antrim	D1222	D12
Slievenahanagan	Antrim	D0923	D02
Slievenahanagan	Antrim	D1221	D12
Slievenahanagan	Antrim	D1120	D12
Slievenahanagan	Antrim	D1020	D12
Slievenahanagan	Antrim	D1121	D12
Slievenahanagan	Antrim	D1022	D12
Slievenahanagan	Antrim	D1023	D12
Slievenahanagan	Antrim	D1122	D12
Slievenanee	Antrim	D1721	D12
Slievenanee	Antrim	D1722	D12
Slievenanee	Antrim	D1622	D12
Slievenanee	Antrim	D1521	D12
Slievenanee	Antrim	D1621	D12
Sperrin	L'Derry	H6799	H69
Sperrin	L'Derry	H6499	H69
Sperrin	L'Derry	H6398	H69
Sperrin	L'Derry	C6500	C60
Sperrin	L'Derry	H6498	H69
Sperrin	L'Derry	H6598	H69
Sperrin	L'Derry	C6501	C60
Sperrin	L'Derry	C6600	C60
Sperrin	L'Derry	H6699	H69
Sperrin	L'Derry	H6599	H69
Star Bog	Antrim	D3102	D30
Star Bog	Antrim	D3002	D30

Straid Hill	L'Derry	C5803	C50
Sturrin	Tyrone	H1078	H17
Tappaghan	Fermanagh	H2968	H26
Tappaghan	Fermanagh	H2868	H26
Tappaghan	Fermanagh	H2768	H26
Tappaghan	Tyrone	H2969	H26
Tappaghan	Tyrone	H2869	H26
Teal Lough	Tyrone	H7487	H78
Teal Lough	Tyrone	H7387	H78
Teal Lough	Tyrone	H7587	H78
Teal Lough	L'Derry	H7489	H78
Teal Lough	L'Derry	H7389	H78
Teal Lough	L'Derry	H7490	H79
Teal Lough	L'Derry	H7388	H78
Teal Lough	L'Derry	H7488	H78
Teal Lough	L'Derry	H7590	H79
Tempo	Fermanagh	H3250	H35
Tempo	Fermanagh	H3348	H34
Tempo	Fermanagh	H3349	H34
Tempo	Fermanagh	H3251	H35
Tempo	Fermanagh	H3151	H35
Tempo	Fermanagh	H3150	H35
Tievebulliagh	Antrim	D1825	D12
Tievebulliagh	Antrim	D1725	D12
Tievebulliagh	Antrim	D1727	D12
Tievebulliagh	Antrim	D1726	D12
Tievebulliagh	Antrim	D1826	D12
Tievebulliagh	Antrim	D1626	D12
Tievebulliagh	Antrim	D1625	D12
Tievebulliagh	Antrim	D1926	D12
Tiftarney	Antrim	D2505	D20
Tiftarney	Antrim	D2506	D20
Topped Mountain	Fermanagh	H3045	H34
Topped Mountain	Fermanagh	H3145	H34
Tornoge	Tyrone	H5199	H59
Trostan	Antrim	D1823	D12
Trostan	Antrim	D1824	D12
Trostan	Antrim	D1724	D12
Trostan	Antrim	D1723	D12
Trostan	Antrim	D1624	D12
Trostan	Antrim	D1623	D12

Appendix 6All Red Grouse Records in Summary Form

Site	Grid ref	Quantity	Date	Comment
Agangarrive Hill	D1429	1	26-Mar-04	Unknown race.
Agangarrive Hill	D1430	0	26-Mar-04	RG feathers. RG droppings (piles) (scattered).
Agangarrive Hill	D1530	0	26-Mar-04	RG feathers.
Agnews Hill	D3201	1	29-Dec-03	Unknown race. 1 RG (unknown sex).
Altahullion	C6112	1	13-Feb-04	Race Scoticus. RG droppings (piles).
Altahullion	C6113	1	13-Feb-04	Race Scoticus. RG droppings (scattered).
Ballypatrick	D1834	0	08-Mar-04	RG droppings (piles).
Ballypatrick	D1933	1	08-Mar-04	Race Scoticus. 1 RG female.
Ballypatrick	D2033	1	08-Mar-04	Race Scoticus. RG droppings (piles). 1 RG female.
Banagher	C6702	1	08-Apr-04	Unknown race.
Barnes	H5089	0	24-Mar-04	RG droppings (piles). RG feathers.
Barnes	H5489	0	24-Mar-04	RG droppings (scattered).
Belmore	H1341	1	12-Apr-04	Race Hibernicus.
Belmore	H1342	1	12-Apr-04	Race Hibernicus. 1 RG female. RG droppings (scattered).
Benbradagh	C7311	0	28-Mar-04	RG droppings (scattered). RG feathers.
Bessy Bell	H3982	0	23-Mar-04	RG droppings (piles).

Binevenagh	C6929	2	14-Feb-04	Unknown race.
Binevenagh	C7028	1	14-Feb-04	Race Scoticus
Binevenagh	C7232	1	05-Mar-04	Race Scoticus. RG droppings (piles) (scattered).
Binevenagh	C7332	0	05-Mar-04	RG droppings (scattered).
Black Bog	H6280	1	12-Feb-04	Unknown race.
Black Bog	H6380	1	12-Feb-04	Unknown race.
Black Hill	D3211	3	15-Jan-04	Race Scoticus.
Black Mountain	J2874	2	15-Feb-04	Race Scoticus. RG droppings (piles).
Black Mountain	J2974	1	15-Feb-04	Race Scoticus. RG droppings (scattered).
Bolaght	H2576	0	10-Apr-04	RG droppings (piles).
Brougher Mountain	H3452	0	29-Mar-04	1 RG (unknown sex).
Brougher Mountain	H3552	1	29-Mar-04	Unknown race. 1 RG (unknown sex). RG feathers.
Brougher Mountain	H3653	1	29-Mar-04	2 (unknown race/sex). RG feathers. RG droppings (piles).
Brunt Hill	D3101	1	29-Dec-03	Race Scoticus. RG droppings (piles). 1 RG female.
Cappagh	H6262	1	29-Mar-04	1 (unknown sex) (unknown race). RG droppings (piles).
Carnalbanagh	D2509	3	27-Jan-04	2 RG male Race Scoticus. 1 RG male unknown race.
Carnanelly	H6591	2	18-Feb-04	Race Scoticus. RG droppings (piles). 1 RG female.

Carnanelly	H6592	0	18-Feb-04	RG droppings (piles).
Carnanelly	H6692	1	18-Feb-04	1 RG female. Unknown race.
Carnanelly	H6693	1	18-Feb-04	Unknown race. RG droppings (piles).
Carnanelly	H6792	0	18-Feb-04	RG droppings (piles).
Carnanelly	H6991	1	18-Feb-04	Unknown race
Carnanelly	H7092	0	18-Feb-04	RG droppings (piles).
Croaghan	D1130	0	05-Mar-04	RG droppings (piles).
Croaghan	D1131	1	05-Mar-04	Unknown race
Croaghan	D1228	1	05-Mar-04	Race Scoticus. 1 RG female. RG droppings (piles).
Croaghan	D1229	0	05-Mar-04	RG droppings (piles).
Crocknamoghil	H5784	1	10-Mar-04	Unknown race.
Crocknamoghil	H5785	2	10-Mar-04	Unknown race. 1 RG female.
Crocknamoyle	D1629	0	27-Apr-04	RG droppings (piles) (scattered).
Crocknamoyle	D1630	0	27-Apr-04	RG droppings (scattered).
Crocknamoyle	D1731	0	27-Apr-04	RG droppings (scattered).
Cuilcagh	H1429	0	26-Mar-04	RG droppings (piles).
Cuilcagh	H1529	1	26-Mar-04	Race Hibernicus.
Cushleake	D2135	2	25-Mar-04	Race Scoticus. 1 female. Droppings (piles) (scattered).

Cushleake	D2136	0	14-Apr-04	RG droppings (piles).
Cushleake	D2137	1	16-Apr-04	Unknown race. RG droppings (scattered).
Cushleake	D2235	0	25-Apr-04	RG droppings (piles) (scattered). RG feathers.
Cushleake	D2236	0	14-Apr-04	RG droppings (piles) (scattered).
Cushleake	D2237	0	16-Apr-04	RG droppings (scattered).
Cushleake	D2335	0	25-Apr-04	RG droppings (scattered).
Cushleake	D2336	0	14-Apr-04	RG droppings (piles). RG feathers.
Cushleake	D2436	0	14-Apr-04	RG droppings (piles) (scattered).
Divis	J2775	0	15-Feb-04	RG droppings (scattered).
Divis	J2776	0	12-Feb-04	RG droppings (scattered).
Divis	J2875	1	15-Feb-04	Race Scoticus.
Divis	J2876	0	12-Feb-04	RG droppings (scattered).
Donald's Hill	C7519	0	10-Apr-04	1 RG (unknown sex/race) RG droppings (piles).
Donald's Hill	C7520	0	10-Apr-04	RG droppings (piles).
Douglas Top	D2403	1	24-Dec-03	1 RG female. Unknown race.
Garron	D1915	0	16-Jan-04	RG droppings (piles).
Garron	D2015	0	16-Jan-04	RG droppings (piles).
Garron	D2016	0	16-Jan-04	1 RG (unknown sex).

Garron	D2217	1	16-Jan-04	Race Scoticus. 1 RG female.
Garron E	D2321	0	22-Jan-04	RG droppings (piles).
Garron E	D2420	1	22-Jan-04	Unknown race. 1 RG female.
Garron E	D2521	0	22-Jan-04	RG droppings (piles).
Garron E	D2622	0	22-Jan-04	RG droppings (piles).
Garron W	D1815	1	09-Feb-04	Unknown race. RG droppings (piles).
Garron W	D1913	0	09-Feb-04	RG droppings (piles).
Glenlark	H6191	0	24-Mar-04	RG droppings (scattered).
Glenlark	H6389	1	24-Mar-04	Unknown race.
Glenshane	C7408	1	19-Feb-04	Unknown race.
Glenshane	C7409	1	25-Apr-04	Race Scoticus.
Glenshane	C7503	1	22-Feb-04	Race Scoticus. RG droppings (piles).
Glenshane	C7508	1	19-Feb-04	Unknown race.
Glenshane	C7509	1	19-Mar-04	Unknown race.
Glenshane	C7604	0	22-Feb-04	RG droppings (piles).
Glenshane	C7607	1	19-Feb-04	Unknown race.
Glenshane	C7608	1	19-Feb-04	Unknown race.
Glenshane	C7706	0	06-May-04	Unknown race.

Glenshane	C7707	0	19-Feb-04	RG droppings (piles).
Glenshane	C7708	1	19-Feb-04	Unknown race.
Glenshane	C7802	1	12-Apr-04	Unknown race. 1 RG female. RG droppings (piles).
Glenshane	C7803	1	12-Apr-04	Unknown race. RG droppings (piles).
Glenshane	C7806	1	12-Apr-04	Unknown race. RG droppings (piles).
Glenshane	C7808	0	19-Feb-04	RG droppings (scattered).
Glenshane	C7902	1	12-Apr-04	Unknown race.
Glenshane	C7904	0	12-Apr-04	RG droppings (piles).
Glenshane	C7908	0	22-Apr-04	RG droppings (piles).
Glenshane	C7909	0	22-Apr-04	1 male (unknown race). RG droppings (scattered).
Glenwhirry	D2902	0	13-Feb-04	RG droppings (piles).
Gruig	D1828	0	11-Feb-04	RG droppings (scattered).
Gruig	D1829	0	11-Feb-04	RG droppings (piles).
Gruig	D1929	0	11-Feb-04	RG droppings (scattered).
Gruig	D2030	0	11-Feb-04	RG droppings (piles).
Gruig	D2130	0	11-Feb-04	RG droppings (piles).
Knocklayd	D1135	1	08-Mar-04	1 male. Unknown race.
Knocklayd	D1136	0	08-Mar-04	RG droppings (piles) (scattered). RG feathers.

Lendrum's Bridge	H4153	0	17-Mar-04	1 RG (unknown sex). RG droppings (piles).
Lendrum's Bridge	H4154	1	10-Apr-04	Unknown race. 1 RG female. RG droppings (scattered).
Lendrum's Bridge	H4255	1	17-Mar-04	Unknown race. 1 RG female.
Lendrum's Bridge	H4353	0	10-Apr-04	RG droppings (scattered).
Lendrum's Bridge	H4356	1	17-Mar-04	Race Scoticus. RG droppings (piles).
Lendrum's Bridge	H4455	0	17-Mar-04	RG droppings (piles).
Lisnaskea Forest	H4234	1	01-Mar-04	Unknown race. 1 RG female.
Lough Navar	H0354	0	13-Mar-04	RG droppings (scattered).
Loughermore	C5916	0	13-Feb-04	RG droppings (piles). RG feathers.
Mournes	J2222	0	08-Feb-04	1 RG (unknown sex)
Mournes	J2421	0	05-Apr-04	RG droppings (piles).
Mournes	J3625	1	28-Dec-03	Race Scoticus
Mullaghmore	C7401	0	20-Feb-04	RG droppings (piles).
Mullaghmore	C7501	1	20-Feb-04	1 male. Unknown race
Mullaghmore	C7502	1	20-Feb-04	1 RG female. Unknown race.
Mullaghsallagh	H6894	0	30-Mar-04	RG droppings (scattered). RG feathers.
Mullaghsallagh	H6895	2	30-Mar-04	Race Scoticus. RG feathers. 1 RG female.
Mullaghturk	H6689	2	24-Mar-04	Unknown sex. RG droppings (piles).

Mullaghturk	H6789	4	24-Mar-04	Unknown race. 2 RG females.
Murrins	H5578	1	31-Mar-04	Unknown race. RG droppings (scattered).
Murrins	H5678	1	31-Mar-04	Unknown race. RG droppings (piles).
Murrins	H5778	1	31-Mar-04	Unknown race. 1 male . RG droppings (piles).
Murrins	H5779	1	31-Mar-04	Unknown race. RG droppings (piles).
Murrins	H5878	1	31-Mar-04	Unknown race. RG droppings (scattered).
Niells Top	D2314	1	27-Jan-04	1 male. Unknown race.
North Sperrins	H5398	0	26-Jun-05	1RG (unknown sex).
North Sperrins	H5698	1	26-Jun-05	Unknown race. 2 RG (unknown sex).
North Sperrins	H5699	1	26-Jun-05	1 male Unknown race.
North Sperrins	H5798	1	07-Apr-04	1 male Unknown race. RG feathers.
North Sperrins	H5799	1	07-Apr-04	1 male Unknown race.
North Sperrins	H5898	2	07-Apr-04	1 RG male Race Scoticus. 1 RG male unknown race.
North Sperrins	H5899	1	07-Apr-04	Race Scoticus.
NW Sperrins	H4095	1	20-Apr-04	1 male Unknown race.
Oghtbristacree	D1632	0	23-Apr-04	RG droppings (piles).
Oghtbristacree	D1633	1	23-Apr-04	Race Scoticus. RG droppings (scattered).
Oghtbristacree	D1732	1	23-Apr-04	1 male Unknown race.

Oghtbristacree	D1733	1	23-Apr-04	1 male Unknown race. RG droppings (piles).
Orra More	D1324	2	29-Mar-04	1 male Scoticus. 1 male unknown, 1 female. RG droppings (piles) (scattered).
Orra More	D1325	0	29-Mar-04	RG feathers. RG droppings (piles).
Orra More	D1326	0	29-Mar-04	RG droppings (scattered).
Orra More	D1425	1	29-Mar-04	RG feathers. 1 RG female. RG droppings (scattered).
Orra More	D1427	0	29-Mar-04	RG droppings (piles) (scattered).
Petti go Plateau	G9861	1	08-Mar-04	1 male Unknown race.
Petti go Plateau	G9963	1	17-Mar-04	Unknown race. 1 RG female.
Petti go Plateau	H0265	0	19-Feb-04	1 RG (unknown sex). RG droppings (piles) (scattered).
Pigeon Top	H3770	0	23-Mar-04	RG droppings (piles).
Plumbridge	H4796	1	26-Jun-05	Unknown race. RG feathers. RG droppings (piles).
Plumbridge	H4797	1	26-Jun-05	1 male Unknown race.
Plumbridge	H4894	2	29-Feb-04	1 Hibernicus. Droppings (scattered). 1 RG (unknown sex).
Plumbridge	H4897	0	26-Jun-05	RG droppings (piles).
Plumbridge	H4995	2	29-Feb-04	1 male Unknown race.
Plumbridge	H5095	2	29-Feb-04	1 RG male Race Hibernicus. 1 RG male unknown race.

Retreat	D2023	0	26-Jan-04	RG droppings (piles).
Sallagh	D3304	1	30-Dec-03	1 male Unknown race.
Sallagh	D3305	1	30-Dec-03	1 male Unknown race.
Skeagh	D2905	1	04-Feb-04	1 male Unknown race.
Skerry Hill	D1320	0	17-Feb-04	RG droppings (scattered).
Slieve Beagh	H4946	0	24-Jan-04	RG droppings (piles) (scattered).
Slieve Beagh	H5142	0	09-Mar-04	1 RG (unknown sex) (unknown race).
Slieve Beagh	H5242	0	09-Mar-04	RG droppings (piles).
Slieve Beagh	H5343	0	29-Feb-04	RG droppings (piles).
Slieve Beagh	H5345	0	13-Mar-04	RG feathers.
Slieve Beagh	H5544	1	13-Mar-04	Race Hibernicus. 1 RG female. RG droppings (piles).
Slieve Beagh	H5644	1	13-Mar-04	Race Hibernicus. 1 RG female.
Slieve Beagh	H5645	0	13-Mar-04	1 RG male (non territorial).
Slieve Beagh	H5745	0	13-Mar-04	RG droppings (piles).
Slieve Gallion	H7987	0	21-Feb-04	RG droppings (piles).
Slieve Gallion	H8088	1	21-Feb-04	Race Scoticus. 1 RG female.
Slieve Rushen	H2425	0	20-Feb-04	RG droppings(scattered).
Slievemore	H5761	1	28-Apr-04	1 male Unknown race.

Slievenahanagan	D0923	1	19-Feb-04	Race Scoticus.
Slievenahanagan	D1121	0	19-Feb-04	RG droppings (piles).
Slievenahanagan	D1221	0	19-Feb-04	RG droppings (piles).
Slievenanee	D1621	1	17-Feb-04	1 male Unknown race. RG droppings (piles).
Sperrin	C6600	0	04-Mar-04	RG droppings (piles).
Sperrin	H6498	1	04-Mar-04	Unknown race. RG feathers.
Sperrin	H6499	0	04-Mar-04	RG droppings (piles).
Sperrin	H6598	0	04-Mar-04	1 RG (unknown sex). RG droppings (piles).
Sperrin	H6599	1	04-Mar-04	Unknown race. RG droppings (scattered).
Sperrin	H6699	0	04-Mar-04	1 RG (unknown sex).
Sperrin	H6799	0	04-Mar-04	RG droppings (piles) (scattered)
Star Bog	D3002	1	29-Dec-03	Unknown race.
Tappaghan	H2768	0	10-Apr-04	1 RG (unknown sex).
Tappaghan	H2868	1	10-Apr-04	1 male Unknown race.
Tappaghan	H2869	1	10-Apr-04	1 male Unknown race. RG droppings (piles).
Tappaghan	H2968	2	10-Apr-04	1 RG female. Droppings (piles) (scattered). RG feathers.
Tappaghan	H2969	0	10-Apr-04	RG droppings (piles). RG feathers.

Teal Lough	H7387	0	08-Mar-04	RG droppings (scattered). RG feathers.
Teal Lough	H7388	0	08-Mar-04	RG droppings (scattered).
Teal Lough	H7487	1	08-Mar-04	Unknown race. 1 RG female. RG droppings (scattered).
Teal Lough	H7488	1	08-Mar-04	Unknown race. 1 RG female. RG droppings (scattered).
Teal Lough	H7490	1	08-Mar-04	Unknown race. RG droppings (scattered).
Teal Lough	H7590	1	08-Mar-04	Unknown race. RG droppings (scattered).
Tievebulliagh	D1625	0	01-Apr-04	RG feathers. RG droppings (piles).
Tievebulliagh	D1727	0	15-Feb-04	RG droppings (piles).
Tievebulliagh	D1825	0	15-Feb-04	RG droppings (piles).
Tievebulliagh	D1826	1	15-Feb-04	Race Scoticus. RG droppings (piles). RG feathers.
Trostan	D1624	0	17-Feb-04	RG droppings (piles).
Trostan	D1824	1	17-Feb-04	Unknown race.

Appendix 7 DARD ESA/CMS Moorland and Lowland Raised Bog management prescriptions and explanatory notes

Moorland

What is moorland ?

In Northern Ireland there are five main habitats associated with moorland – dry and wet heath, degraded heather, blanket bog and rough moorland grazing.

Heather moorland is land with more than 25% heather cover.

Only areas of moorland over 1.0 hectare in size are eligible.

Why is moorland important ?

Moorland is an internationally important habitat. It supports a number of specialised plants, animals and birds such as the golden plover and hen harrier. During the last 50 years the area of heather moorland has declined due to overgrazing, drainage, reclamation, peat extraction and afforestation. If managed properly, moorland can provide valuable grazing as well as being an important wildlife habitat.

Livestock disposal option

If you wish to reduce stock numbers on your farm to meet the management requirements you may volunteer to enter the livestock disposal option. Under this option you must sell and remove livestock from the farm business to meet the required grazing levels and the remaining stocking level must not be increased for the duration of your agreement. Details of eligible livestock and the numbers to be removed will be provided on your site-specific management plan. You will be asked to provide proof that the livestock have been sold and removed from the farm business.

What about areas where heather is present, but there is less than 25% cover ?

These areas may still be eligible to enter the degraded heather management option. The aim is to increase the cover of heather through controlled grazing.

What happens if my moorland is common or shared grazing ? Can I still enter it into the scheme ?

Acceptance of an area of common grazing is dependent upon all shareholders agreeing to join the scheme.

Will I be required to carry out burning or flailing of heather ?

The need for heather regeneration will be assessed during the application procedure. Where burning or flailing is considered necessary, a programme of planned work will be agreed detailing the extent and timing of work to be carried out.

This work may be paid for under the specific conservation measures option.

How will I be required to manage my moorland ?

Each type of moorland needs to be managed in a particular way, but the key issue in all is the level of grazing.

Controlling the number and type of livestock on moorland is essential to ensure the area is not damaged. The main grazing requirements are summarised below. Further information and advice can be obtained from the points of contact provided at the back of this explanatory booklet. Blocks of moorland vegetation less than five hectares in size will be subject to a site-specific management plan.

Grazing requirements for dry heath

- Graze between 1 March and 31 October at a maximum stocking density of 0.3 LU per hectare (equivalent to one cow per three hectares or two sheep per hectare);

and

- Exclude all livestock from 1 November until 28/29 February.

Grazing requirements for wet heath

- Graze with sheep only between 1 March and 31 October at a maximum stocking density of 0.25 LU per hectare (equivalent to five sheep per three hectares);

and

- Exclude all livestock from 1 November until 28/29 February;

or

- With prior consent graze with cattle only between 1 June and 31 August at a maximum stocking density of 0.2 LU per hectare (equivalent to one cow per five hectares);

and

- Exclude all livestock from 1 September until 31 May.

Grazing requirements for blanket bog

- Graze with sheep only between 1 March and 31 October at a maximum stocking density of 0.075 LU per hectare (equivalent to one sheep per two hectares);

and

- Exclude all livestock from 1 November until 28/29 February.

Cattle are not permitted on blanket bog because of trampling damage.

Grazing requirements for degraded heath

- The grazing prescriptions for either wet or dry heath will apply depending upon the heather classification.

Grazing requirements for rough moorland grazing

- These areas should be grazed at a maximum stocking density of 0.75 LU per hectare (equivalent to three cows per four hectares or five sheep per hectare).

There are no restrictions on the grazing period.

Mosaics

Where a mosaic of moorland habitats occur together, an average stocking density will apply. This will be based on the ratio of the area in each habitat type. Where applicable, the associated stocking rates will be discussed and agreed at the outset of your agreement.

Drainage works

Maintenance of existing drains is permissible but must be in accordance with written advice from DARD.

On certain sites it may be desirable to raise the water level. Where applicable, this will be discussed and agreed at the outset of your agreement. This work may be paid through the enhancement plan but expenditure will be limited to the annual ceiling on capital works.

New drainage or the improvement of existing drainage is not permitted.

On your moorland

- The use of all terrain vehicles requires prior written consent because of the damage they cause to this habitat;
- Cultivation, reclamation, ploughing, reseeding, rolling or chain harrowing are not allowed;
- Fertilisers, farmyard manure, slurry, sewage sludge or lime must not be applied;
- Pesticides may only be used to control noxious

weeds such as spear thistle, creeping thistle, ragwort, and broad-leaved dock. Application must be by weed-wiper or spot-sprayer using an approved herbicide. This can only be carried out with prior written consent from DARD;

- Siting of supplementary feeding sites, temporary silage clamps and storage areas for big baled silage are not acceptable.

Lowland raised bogs

Intact raised bogs are areas of wet heather, rough grassland and recolonising birch trees

What are lowland raised bogs ?

Lowland raised bogs occur in low-lying areas where a dome of peat has been raised above the surrounding land. Formed on old lakebeds and waterlogged depressions, the depth of peat can exceed 13 metres.

Raised bogs have been affected by peat-cutting and are often a mosaic of wet heather, fen meadow, swamp and scrub woodland containing birch, willow and alder.

Only areas of lowland raised bog greater than 1.0 hectare in size are eligible.

Why are lowland raised bogs important ?

Lowland raised bogs are an internationally important habitat which support a range of very special plants and animals. In Northern Ireland, almost 90% have been damaged or destroyed by peat-cutting and drainage. Today, all our remaining raised bogs contain a range of habitats. These include uncut bog, wet heath and scrub woodland. Controlled grazing, scrub clearance and the maintenance of water levels are essential to maintain areas of open bog.

What happens if my lowland raised bog is common or shared grazing ? Can I still enter it into the scheme ?

Acceptance of an area of common grazing is dependent upon all shareholders agreeing to join the scheme.

How will I be required to manage my lowland raised bog ?

While each type of lowland raised bog needs to be managed in a particular way, the main management requirements are summarised below. Further information and advice can be obtained from the points of contact provided at the back of this explanatory booklet.

Grazing requirements for intact or uncut lowland raised bog

- Grazing of intact or uncut bog or scrub woodland is not permitted at any time.

Grazing requirements on cut-over lowland raised bog - *wet heath*

- Graze with sheep only between 1 June and 31 October at a maximum stocking density of 0.25 LU per hectare (equivalent to five sheep per three hectares);

and

- Exclude all livestock from 1 November until 31 May.

Grazing requirements on cut-over lowland raised bog - *rough grassland*

- Graze with sheep only between 1 June and 31 October at a maximum stocking density of 1.0 LU per hectare (equivalent to six sheep per hectare);

and

- Exclude all livestock from 1 November until 31 May.

Grazing requirements on cut-over lowland raised bog - *swamp or fen*

- Graze with sheep only between 1 June and 31 October at a maximum stocking density of 0.3 LU per hectare (equivalent to two sheep per hectare);

and

- Exclude all livestock from 1 November until 31 May.

Cattle may only graze cut-over lowland raised bog with prior written consent from DARD.

Mosaics

Most cut-over lowland raised bogs will consist of a mixture of habitats. Where a mosaic of lowland raised bog habitats occur together, an average stocking density will apply. This will be based on the ratio of the area in each habitat type. Where applicable, the associated stocking density will be discussed and agreed at the outset of your agreement.

Water levels in the drains

On certain sites it may be desirable to raise the water levels in sheughs and drains. Where applicable this will be discussed and agreed at the outset of your agreement. This work may be paid through the enhancement plan but expenditure will be limited to the annual ceiling on capital

works.

Routine positive management

Your annual payment includes the cost of undertaking routine positive management. This will be discussed and agreed at the outset of your agreement. Examples of positive management include the control of rhododendron, gorse and advancing scrub woodland. If additional work is necessary, this may be paid under the specific conservation measures option.

On your lowland raised bog

- Burning is not permitted;
- The use of all terrain vehicles is not acceptable because of the damage they cause to this habitat;
- Cultivation, ploughing, reseedling, drainage, reclamation, rolling or chain harrowing are not allowed;
- Fertilisers, farmyard manure, slurry, sewage sludge or lime must not be applied;
- Pesticides may only be applied for the control of bracken, rhododendron and scrub. This can only be carried out with prior written consent from DARD;
- Siting of supplementary feeding sites, temporary silage clamps and storage areas for big baled silage are not permitted.