

Blackstairs Habitat Mapping and Biodiversity Audit 2015

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Mary Tubridy and Associates

A report for the Blackstairs Farming Group

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December 2015

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Cover photo of Mount Leinster by Patrick Monahan

‘You have to be born into hill farming and have a genuine interest in it’

Comment on project questionnaire by a Blackstairs hill farmer, Summer 2015

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Glossary

Annexed Habitats and Species. -Habitats and species listed in the Birds and Directives arranged in lists or annexes in relation to their importance and management requirements

AA -Appropriate Assessment. The assessment carried out to discover the significance of a development to a site or species listed in the EU Birds and Habitats Directive.

Biodiversity –This term describes all types of biological diversity, including varieties of a species, all species, the habitats with which they are associated and the environmental conditions or ecosystems which sustain them.

DAHG -Department of Arts, Heritage and Gaeltacht.

DAFM -Department of Agriculture, Food and the Marine.

EU Birds Directive -Earliest biodiversity directive from the EU (Directive 2009/147/EC (Birds Directive) on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended). Associated annexes list principally migratory species and birds of prey.

EU Habitats Directive -Directive 92/43/EEC which lists (mainly) habitats of importance, certain bats and invertebrates and specifies their requirements for protection.

NPWS -National Parks and Wildlife Service, the section of the Department of Art, Heritage and the Gaeltacht with principal responsibility for development of government policy and action on biodiversity.

Natura 2000 -Network of sites designated under the Birds and Habitats Directive containing important habitats and species.

Priority Habitat - A subset of the habitats listed in Annex I of the EU Habitats Directive which is priority for biodiversity conservation e.g. Actively growing Blanket Bog.

SAC -Special Area of Conservation designed under the Habitats Directive which has good examples of one or more habitats or /and species listed in the Habitats Directive.

SPA -Special Protection Area designated under the Birds Directive as it has significant populations of species listed in the Birds Directive.

Acknowledgements

Thanks are due to the members of the Blackstairs Farming Group. The landowners particularly Martin Shannon who provided valuable information, support and guidance throughout the study and Helena Fitzgerald, Project Manager. We greatly appreciate the help received from local naturalists including Ciaran Byrne, Brian Power and Lorcan Sottt, National Parks and Wildlife Service, who willingly shared their knowledge and experience. Paul Green, Botanical Society of Britain and Ireland provided insights into the flora of County Wexford. Séamus Ó Murchú provided a digital map of town lands. Carlow and Wexford County Council supported the project by providing access to digital data which they have under license from the Ordnance Survey while John Carley, Wexford County Council assisted the study by collating relevant data from both local authorities.

Summary

This report provides an account of biodiversity in the Blackstairs to support an application by the Blackstairs Farming Group to obtain government support for a locally led agri-environmental scheme.

Biodiversity was assessed primarily through field-based habitat mapping in 2015 to locate and evaluate areas of biodiversity value. Mapping took place in the unenclosed mountain within Blackstairs Mountain SAC and in a sample of adjacent land to the 200m contour agreed with the Blackstairs Farming Group. Fieldwork was carried out by three ecologists (Brendan O' Hanrahan, Betsy Hickey and Mary Tubridy) between July and September 2015. The area examined covered c. 70sqkms. It included town lands surveyed in 2002 for a pilot project on habitat mapping (Hickey, 2002). Information was also obtained through consultations and examination of recent reports including a baseline biodiversity audit commissioned by the BFG (Smith, 2015).

While Dry Heath a listed habitat under the Habitats Directive is the principal habitat associated with the Blackstairs SAC fieldwork showed that blanket bog and wet heath commonly occur as part of vegetation mosaics. Blanket bog was considered to be actively regenerating. A condition assessment methodology based on that used in a national survey of upland habitats (Perrin et al, 2014) showed that all habitats are in good condition. Listed habitats dry and wet heath were identified outside the SAC and good examples of semi-natural grasslands and woodlands. The protected fern *Asplenium obovatum* is present on a granite wall adjacent to the uplands.

The study confirms that this area qualifies as being of high value due to the presence and quality of its peat land habitats. It suggests that the proposed agri-scheme should focus on measures which ensure that grazing, burning and scrub removal practices protect and enhance local biodiversity. Habitat mapping and observations on habitat condition should be used to target agri- environmental measures and inform guidelines for farming.

Chapter One: Introduction

1.1 Background

The unenclosed land in the Blackstairs has been designated as an area of international importance for biodiversity due to the presence of two habitats dry heath and wet heath which are listed in the EU Habitats Directive.

The National Parks and Wildlife Service assessment of the national status of these habitats (NPWS, 2013) concluded that future prospects for both dry and wet heath nationally were bad. Issues highlighted by the national habitat condition reports were inappropriate grazing regimes and burning. A more assessment of heath and scrub habitats listed under-management or abandonment resulting from under grazing, succession to scrub or heath, bracken encroachment as threats (DAHG, 2014).

While a Conservation Management Plan for the Blackstairs SAC has been drafted (NPWS 2006?) adequate resources have not yet been directed to implement its recommendations. Within the local farming community there is an awareness that upland farming which is principally responsible for biodiversity is in decline. Following the announcement of a proposal to fund Locally Led Agri-Environment Schemes under the Rural Development Programme, a local group has been set up, the Blackstairs Farming Group with representatives of farming and community development interests to initiate the process of making an application to include the Blackstairs in this scheme. The group initially commissioned a desk based baseline study of biodiversity which used historic records in digital databases and collated historic mapping (Smith, 2015). Fact finding visits were made to the Burren and Reeks in early 2015 to examine similar locally led initiatives concerned with farming and recreation/farming. Informed by discussions with potential funders and awareness of similar initiatives within Ireland this study was commissioned to support their application to provide an up to date assessment of biodiversity and particularly its relationship to local farming practices.

1.2 Study brief

The principal objective of the study is to support the farming community make a successful application for an agri-environmental scheme. The brief included:

- 1 Assessing the nature of biodiversity in the area(s), ecosystems/habitats & species in consultation with the local community.
- 2 Assessing of the potential for a local agri-environment or other incentive based management schemes in consultation with the local community.
- 3 Specifying spatial and management targets with regard to habitats, species and management.
- 4 Developing indicators that can be used as a basis for payment of the delivery of the objectives of the programme.
- 5 Consideration of the relationship between local cultural heritage (archaeology, field boundaries) and a local agri-environment scheme.

1.3 Approach

The approach to the study was based on the brief, the experience of the consultants, awareness of statutory requirements and best practice approaches used to map and assess habitats and biodiversity in similar environments.

Consultants are experienced terrestrial ecologists and include Dr. Betsy Hickey who was involved in a habitat mapping exercise in the following town lands associated with the Blackstairs in 2002: Ballynalour, Dranagh, Ballycrinnigan, Aghnaglear, Ballybeg Big, Ballybeg Little, Gowlin and Ballyknockcrumpin;

Brendan O' Hanrahan who was one of the authors of the guidelines for upland habitat mapping (Perrin et al 2014) and Dr. Mary Tubridy had recently produced a report on vegetation management and farming in the Wicklow uplands (Tubridy, 2013).

Statutory requirements regarding biodiversity and water are particularly relevant to this study as the Blackstairs Mt is an SAC, designated under the EU Habitats

Directive which gives protection to annexed habitats and species listed in the Directive. The annexed or listed habitats wet and dry heath are known to occur in the Blackstairs Mountain. See Appendix 1 for Blackstairs Mts SAC Site Synopsis. The major rivers which have their headwaters in the Blackstairs are also designated as being important for biodiversity (Fig 1.1). The Water Framework Directive requires that all Member States implement the necessary measures to prevent deterioration of the status of all waters - surface, ground, estuarine and coastal - and protect, enhance and restore all waters with the aim of achieving good status by 2015.

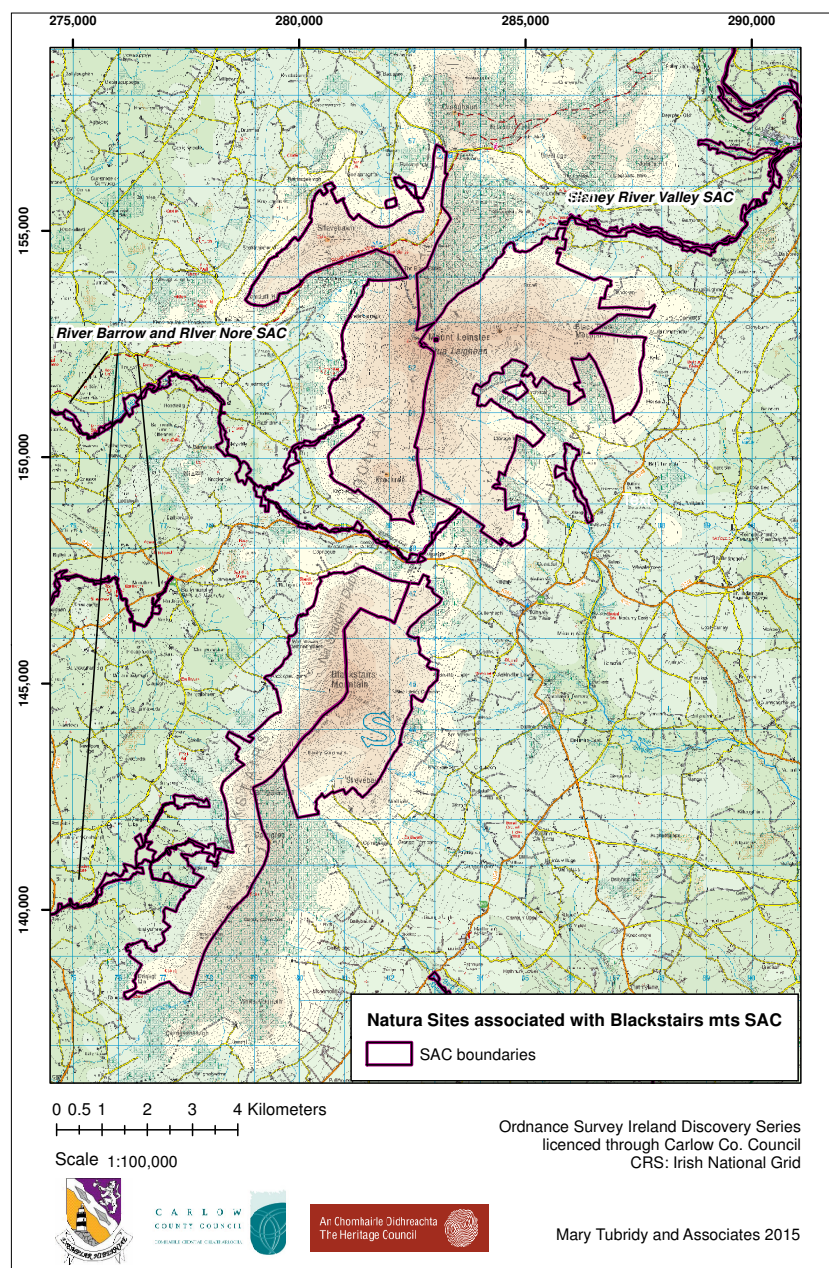


Fig. 1.1 Sites of Biodiversity Importance adjacent to the Blackstairs SAC

There is a particular requirement to protect watercourses of good quality, in designated areas such as SAC's and those supporting rare species. Associated with the implementation of the Water Framework Directive management plans have been prepared for the Mountain and Ballymurphy rivers which have populations of the rare and endangered Freshwater Pearl Mussel (DELG, 2012). The Freshwater Pearl mussel population is at Unfavourable Conservation Status in the Mountain/ Aughnabriskey catchment (ranked as the 20th out of the 27 pearl mussel catchments in the country). The Mountain River population is in very poor status, is in rapid decline, and in danger of imminent extinction. Management plans emphasise the link between land management and protection of its habitat. According to Evelyn Moorkens (pers.comm. 2015) agri-environmental measures should focus on retaining wetlands in the catchments, reducing silt and fertilizer inputs particularly in the catchments of the Mountain and Ballymurphy rivers rather than the Aughavaud, where no mussels were found alive in the last survey.

Obligations resulting from these EU Directives have been translated into a wide range of objectives and statutory controls implemented nationally and locally. Some of the obligations of relevance to farmers include the requirement for an ecological assessment (Appropriate Assessment) to inform works which could affect designated sites and restrictions on burning and scrub clearance. The requirement to implement EU biodiversity directive also determines research agendas and underpins monitoring systems. Quality assessment protocols have been developed by the authorities to assess the condition of many of the habitats listed in the Habitats Directive.

In association with a statutory based approach to ensuring land is managed to benefit biodiversity agencies have also supported a partnership based approach. NPWS was an active promoter of the Burren agri-environmental scheme and was involved in a scheme to support biodiversity friendly farming (the NPWS Farm Scheme). Agri-environmental schemes operated by the Dept. of Agriculture contained measures to benefit all types of biodiversity not just listed habitats and species. Catchment management planning is currently being re-organised to operate at a local level and aims to mobilise local communities and particularly farmers to become more actively involved in protecting water quality (EPA, 2015). Initiatives by

NGO's support the partnership approach. The proposal for Locally Led Agri-environmental Schemes will provide resources for existing agri –environmental schemes (Burren and Hen Harrier) support a scheme targeting priority Freshwater Pearl Mussel catchments (but not in Blackwater catchments) and areas with semi-natural habitats including upland peatlands.

This brief review suggests that the study should have the following characteristics:

- Include an examination of areas within and outside the Blackstairs Mts SAC to maximize local potential for a successful application.
- Habitat mapping would focus on habitats of high nature value which are managed by farmers, thus fields with intensive grassland would not be mapped, nor rivers and streams.
- Involve the entire community of farmers and land managers in Carlow and Wexford by providing for effective consultations on local biodiversity and farming throughout the study.
- Recognise the potential for management associated with the system of commonage farming which is a particular feature of upland habitats.
- While published best practice methodologies NSUH (Perrin, 2014), O'Neill (2013), Smith et al (2011) and classification systems (Fossitt (2000) and EU (2007) will be followed it can be assumed that amendments will be required to ensure that field based studies inform the requirements and specifications for an agri-environmental scheme.
- As condition assessments have only been developed for listed habitats traditional criteria such as naturalness, presence of rare and typical native species, size, management impacts and trends will be used to assess the quality of other semi-natural types.

Chapter 2 Methodology

2.1 Introduction

Information on biodiversity was collected through desk research, fieldwork and consultations.

Desk research and consultations focused on assembling relevant digital data sets and sourcing information on local upland biodiversity from local consultations, published and unpublished sources.

Digital data sets included:

OSI digital mapping and aerial photography under license from Carlow and Wexford County Councils.

EPA rivers and streams digital data layer assembled by Smith, (2015).

Designated site boundaries (NHA's and SAC's) and commonage boundaries from the NPWS. As the SAC boundary was not always compatible with OS the latter's features were used (based on consultation with GIS section of NPWS).

Townland boundaries from Séamus Ó Murchú.

A particularly good source of information on local biodiversity was Power (2014) whose part M. Sc. thesis reporting on a biodiversity survey of an abandoned upland area north of the SAC at Deerpark, Kildavin provided information on upland birds and invertebrate biodiversity.

Other sources accessed included NPWS Rare and Protected Species Records for plants and an NPWS commissioned report on bryophytes (Hodgetts, 2008) and the flora and fauna section in a recently produced Appropriate Assessment in association with the planning application for expansion of RTE's transmission mast

at Mt Leinster (file reference numbers in Carlow County Council 5/2013, 8/2014 and 14/290).

Consultations took place either in person, by phone or email with individuals who had local knowledge. They included Lorcan Scott, District Conservation Officer for the National Parks and Wildlife Service (re birds), Brian Power, manager of the Wild Carlow Facebook page, Ciaran Byrne (general uplands biodiversity), Dr Evelyn Moorkens concerning the status of FWPM, Lisa Dowling and Paul Green, Botanical Society of Britain and Ireland recorders for Carlow and Wexford respectively (plants and habitats), Tom Bates of the Ballycrystal Gun Club (re Red Grouse status and management) and Mick Monahan, lowland farmer and hill walker (general upland biodiversity). Many upland farmers provided useful comments particularly in relation to Red Grouse. Consultations took place at meetings organised by the BFG and during fieldwork.

The following websites were also examined:

<http://maps.biodiversityireland.ie/#/Map> for local topography, geology, subsoils and areas of biodiversity importance including Freshwater Pearl Mussel Sensitive Areas.

<http://gis.epa.ie/Envision> for water catchments, sub catchments and information on water quality at specific monitoring points.

www.osi.ie for historical mapping (1st ed and 2nd edition 6" mapping) and aerial photography (1995, 2000 and 2005).

2.2 Fieldwork

Fieldwork took place in the upland habitats in the SAC (note the woodland area near the River Urrin to the east of the SAC was not examined). Outside the SAC and with the permission of landowners fieldwork took place roughly to the 200m contour line in the following townlands:

Carlow

Aghnaglear, Ballybeg Big, Ballycrinnigan, Ballyglisheen, Coolasnaghta, Dranagh, Gowlin, Kilbrannish South, Knockroe, Knockymulgurry, Raheenleigh, Rathanna and Walshestown

Wexford

Askinvillar Upper, Ballygibbon, Ballycrystal, Ballindoney, Ballynabearna, Corrageen, Templeludigan, Ballygalvert, Boladurragh, Cloroge Beg, Cloroge More, Cullentragh, Kiltealy, Knocktober, Newtown, Kyle, Camteige, Mandoran, Monamolín, Rossard, Slievegar, Springmount

Their location is shown in Fig. 2.1

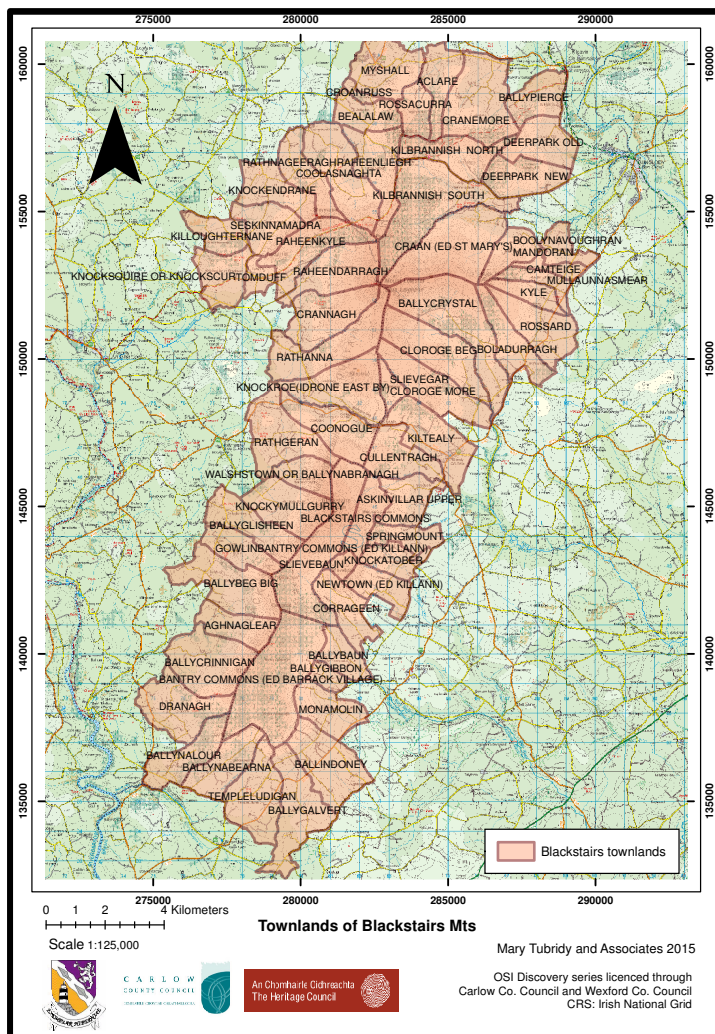


Fig. 2.1 Townlands associated with the Blackstairs

Prior to the commencement of fieldwork working guidance notes were developed by the team. These were based on existing guidelines for habitat mapping in uplands and grasslands, desk research on local biodiversity and reconnaissance visits. They contained accounts of the principal habitats and specified the types of habitats to be mapped. They defined the minimum mapping unit as 50m X50m. An information note was prepared for landowners. Appendix 2.

Fieldwork in the SAC followed the principal features of the NSUH (2014) methodology the objective of which is to identify annexed habitats and assess their condition. Prior to fieldwork in the SAC pre-defined polygon maps were produced for the SAC area based on the interpretation of orthorectified Ordnance Survey aerial photographs. Individual polygons reflected areas of consistent vegetation mosaic or / and topography.

Outside the SAC, fieldwork followed Fossitt (2000), and the Heritage Council's habitat mapping guidelines. Priority areas for fieldwork were identified by the examination of current and historic aerial photographs. As the principal aim of the project was to characterize farmland of high nature value preliminary desk research focused on identifying fields or parts of fields with semi-natural vegetation which would be examined directly.

Fieldwork in the SAC was carried out principally by Brendan O' Hanrahan and Betsy Hickey working either alone or together. Mary Tubridy and Betsy Hickey were responsible for habitat mapping outside the SAC. Habitats or vegetation units were identified using the Fossitt (2000) habitat classification. Specific upland classification systems for upland habitats were only used to evaluate rare types or / those which have specific management requirements.

Following the convention in the NSUH, units which were mapped in the uplands comprised several habitats of which one was considered the dominant type. Appendix 3 lists associated information collected for each polygon. This convention is based on the predominance of mainly habitat mosaics in upland areas due to the strong influence of factors such as topography, edaphic conditions and drainage. While mapping habitats care was also taken to record the presence of features of

upland biodiversity such as hepatic maps and rare plants, particularly those with arctic-alpine affinities.

Outside the SAC units containing single habitats were mapped following the conventions in Fossitt (op cit) and the Irish Semi-natural Grassland Survey (O'Neill, 2013). As the objective of the study was to identify farmland of biodiversity importance, fields which only had improved agricultural grassland (habitat GA1) were not mapped. However fields transitional between improved grassland and semi-natural habitats such as scrub and semi natural grassland or fields which had any other semi-natural habitats with improved grassland were mapped. The convention used in the uplands to map units based on a dominant habitat was followed when mapping areas which had a mix of improved grassland, unimproved grassland or scrub outside the SAC. This formula was required as mapping units were large and many of the fields targeted for fieldwork contained a mosaic of habitats.

Thus no units solely defined by GA1 were mapped in this study. All areas identified as GA1 also had significant areas with semi-natural habitats.

The following information was also recorded on each mapped unit outside the SAC:

Townland

Surveyor name

Survey type (either by fieldwork, binoculars, aerial photography or 2002 survey)

Principal habitat (Fossitt code)

Associated habitats X % area

Characteristic plant species

Features of note (plants, fauna, geodiversity)

Ranking (on a scale from 1 (poor)-5 (excellent))

Notes on current management and potential for biodiversity focused management

A photographic record was also compiled in both areas.

The approach taken by the Irish semi-natural grassland survey (ISGS) was used to describe intermediate grasslands. Thus GS (i) 3 was used to identify a grassland

intermediate between semi-natural acid grassland and the improved type GA1, similarly GS (i) 4 for an intermediate wet grassland.

Landowner consultation was a feature of fieldwork. On reaching the area to be examined outside the SAC (the extent of which had been agreed beforehand with the BFG) landowners who were involved in the BFG were located. They oriented the surveyors towards local target areas and identified convenient access routes.

Land was surveyed by walking along public roads or through fields. Where possible contact was also established directly with the landowner whose land was being surveyed. Information about the project was provided to landowners. During fieldwork habitat codes were either added to digital or hard copy aerial photos. If the habitat being mapped was not bounded by a field boundary, its limits were identified using a combination of aerial photography and field inspection.

While mapping in the field surveyors used both digital mappers and hard copy aerial photography at a scale 1:10,000 to which contour information and the SAC boundaries (Blackstairs Mt and river SAC's) were added. As there was good broadband coverage smart phones and tablets allowed for access to other sources of information.

In order to carry out formal condition assessments, the habitats Dry Heath, Wet Heath and Blanket Bog within the SAC were assessed for their condition and function at a series of monitoring stops (c. 30 for the Blackstairs) shown on Fig.2.2. See Appendix 4 for characteristics recorded at these stops and key indicator species used for blanket bog.

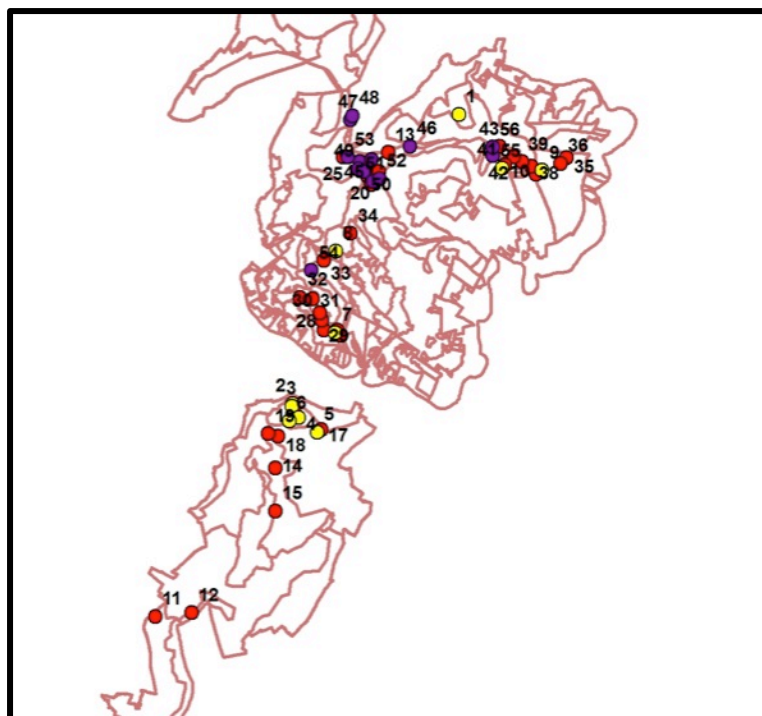


Fig. 2.2 Location of monitoring stops for condition assessment in the SAC

Characteristics of blanket bog in good condition were a) continuous surface of peat-forming species (at least one of the *Eriophorum* spp. or *Sphagnum* co-dominant, accompanied by *Calluna* and / or *Trichophorum germanicum*); there should be more than four indicator species present (Appendix 3), there should be no active erosion and no signs of damage to bryophyte layer by burning.

Almost all these monitoring stops were recorded along ridgelines which allowed for easier visual inspection of features being assessed. The methodology followed the approach developed by the NSUH where both negative and positive features were considered and ranked either as a yes or no. Monitoring stops with no failed criteria automatically passed at the top level. With up to 25% failures the condition was rated as amber. Above that level it was given a fail shown as red.

During fieldwork, a large amount of information was gathered. This included species lists, digital photographs, annotated vector maps and target notes on individual units. This information was entered into an Excel spreadsheet within one or two days of fieldwork. Susan Iremonger digitized mapping, developed a GIS

based information system to link notes and photos to specific mapped location and produced GIS based maps.

As the methodology used within and outside the SAC was substantially different two shape files were produced. The shapefile for the SAC is accompanied by notes on the polygons and the access database containing the results of the condition assessment. The second shape file contains the results of habitat mapping for the land outside the SAC, accompanied by an excel spreadsheet populated by notes on each mapped unit. Two metadata reports were also produced.

In the following chapter an account is provided of local biodiversity obtained through fieldwork and local records.

Chapter 3 Biodiversity

3.1 Introduction

Table 1 lists the habitats which were identified and their extent inside and outside the SAC. Figs 3.1-4 contain habitat maps showing the location of habitats. Listed or annexed habitats are in bold.

Table 1 Blackstairs Habitats 2015 (annexed types are in bold).

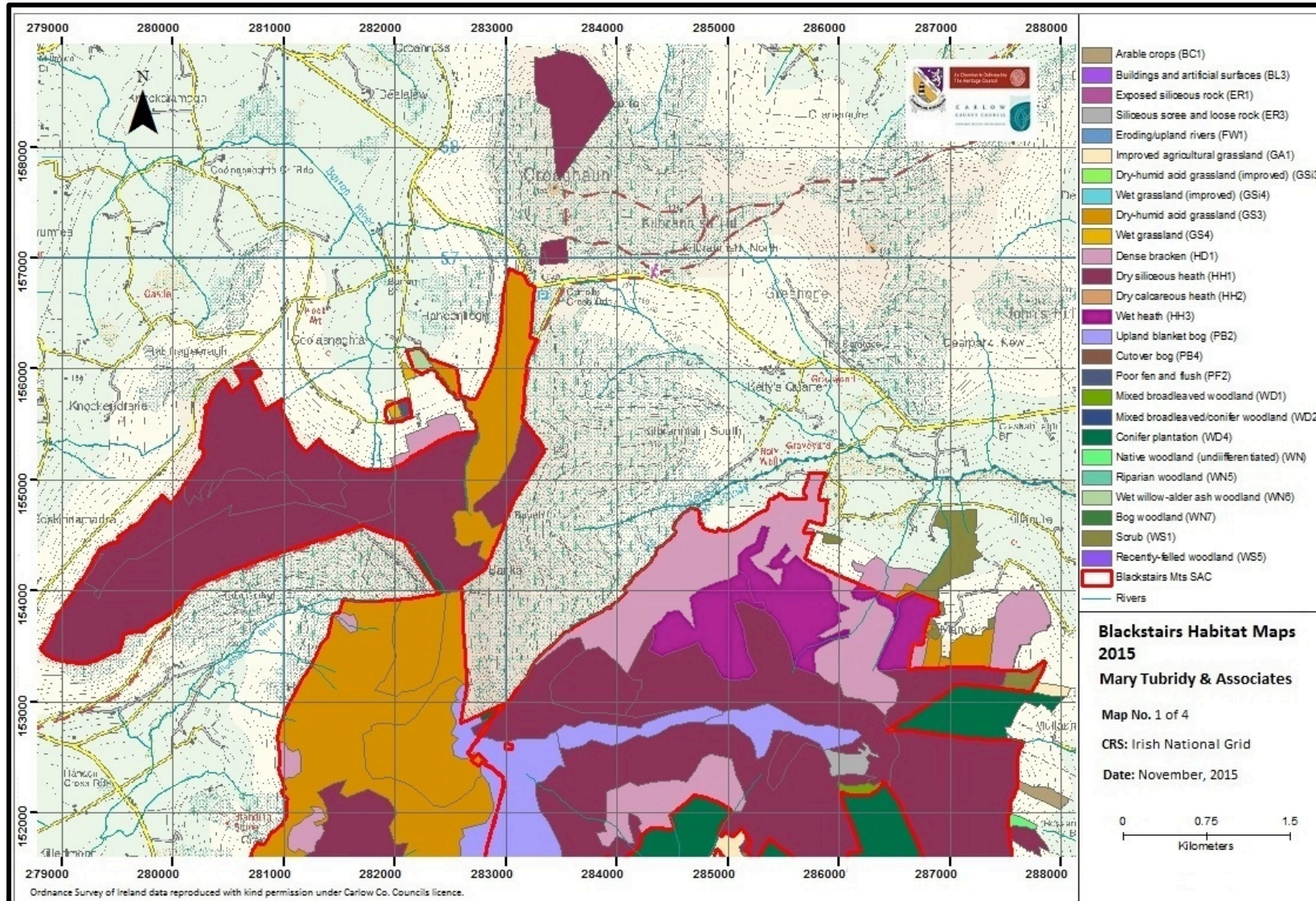
Habitat Fossitt code	Common name	Total Area (ha)	Area in SAC (ha)	Area outside SAC (ha)
BC1	Arable land	7.23	0.00	7.23
BL3	Buildings and roads	0.92	0.00	0.92
ER1	Rocks (acid)	2.39	2.39	0.00
ER3	Loose rock (acid)	35.63	35.42	0.21
GA1	Improved agricultural grassland	136.45	7.42	136.70
GS(i)3	Semi-improved acid grassland	9.72	0.09	9.63
GS(i)4	Semi-improved wet grassland	7.91	0.02	7.88
GS3	Acid grassland	711.67	667.63	55.04
GS4	Wet grassland	67.38	1.32	66.06

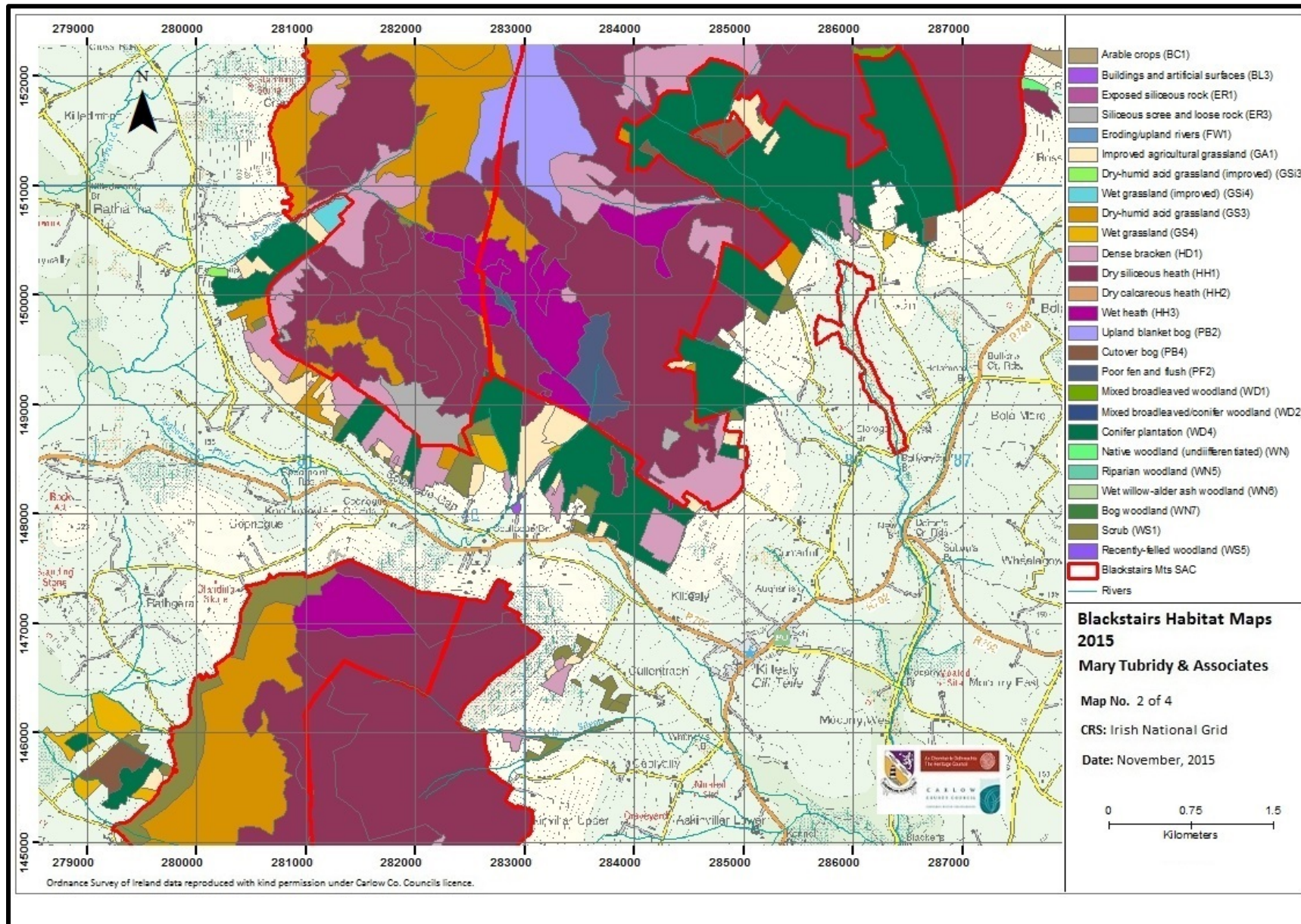
Habitat Fossitt code	Common name	Total Area (ha)	Area in SAC (ha)	Area outside SAC (ha)
HD1	Bracken	1034.35	830.74	203.61
HH1	Acid Dry Heath	2858.63	2745.28	113.34
HH2	Calcareous dry heath	0.28	0.00	0.28
HH3	Wet Heath	357.53	355.66	1.88
PB2	Upland Blanket Bog	173.63	172.73	0.90
PB4	Cutover Bog	111.48	46.31	65.17
PF2	Acid Fen and Flush	36.98	32.53	4.45
WD1	Broadleaved woodland (various species)	3.47	3.13	0.35
WD2	Woodland with mix of broadleaves and conifers	3.51	0.00	3.51
WD4	Conifer woodland	809.28	8.82	800.46
WN	Semi natural woodland (type not defined)	2.08	0.00	2.08
WN5	Semi natural woodland beside river	2.62	0.00	2.62

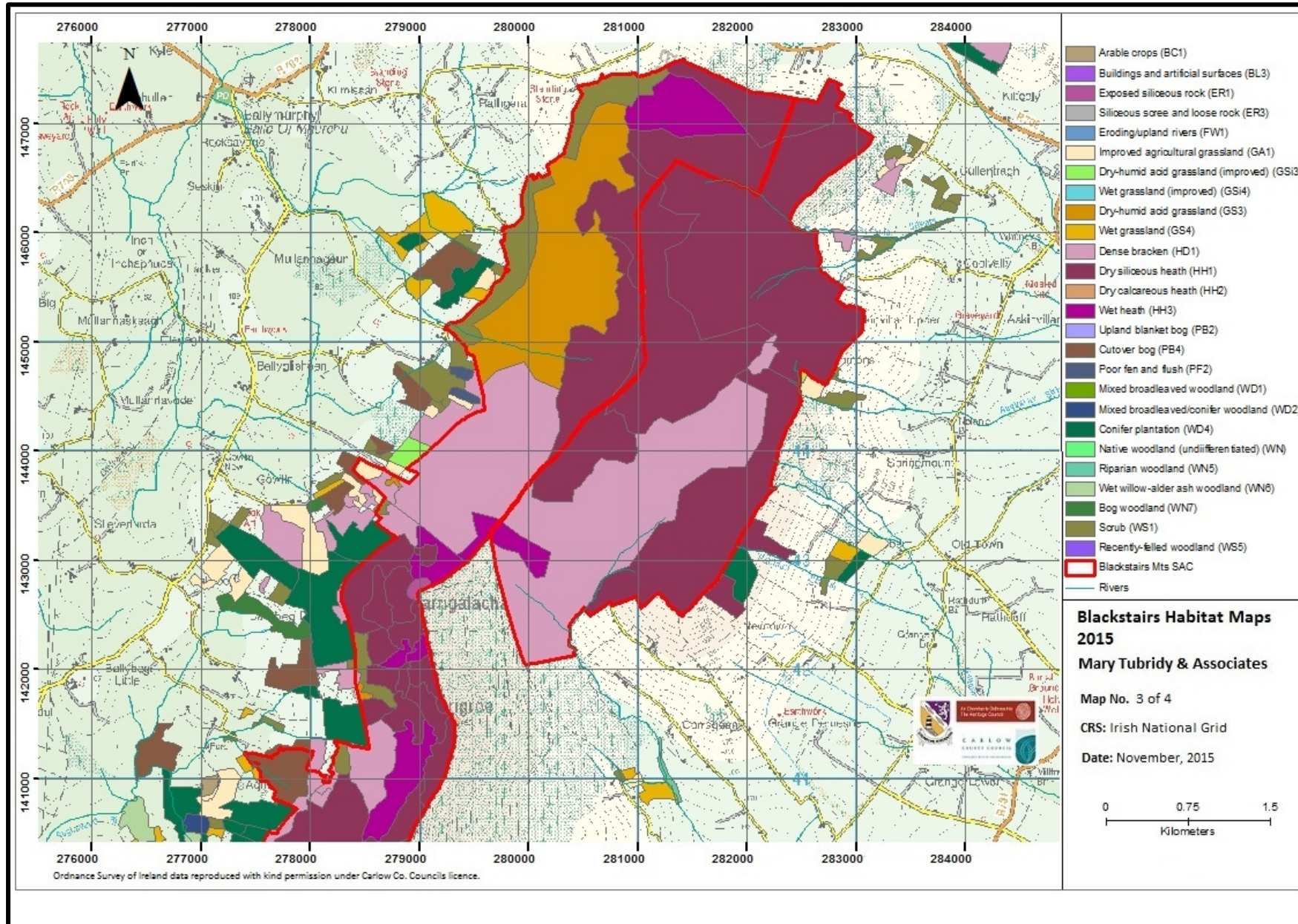
Habitat Fossitt code	Common name	Total Area (ha)	Area in SAC (ha)	Area outside SAC (ha)
WN6	Semi -natural woodland with willow, ash and alder	21.73	3.33	18.40
WN7	Bog woodland	13.27	0.00	13.27
WS1	Scrub (mainly furze)	250.70	104.14	146.57
WS5	Shrubbery with non native species	3.30	0.00	3.30
TOTAL (ha)		6662.14	5019.96	639.44

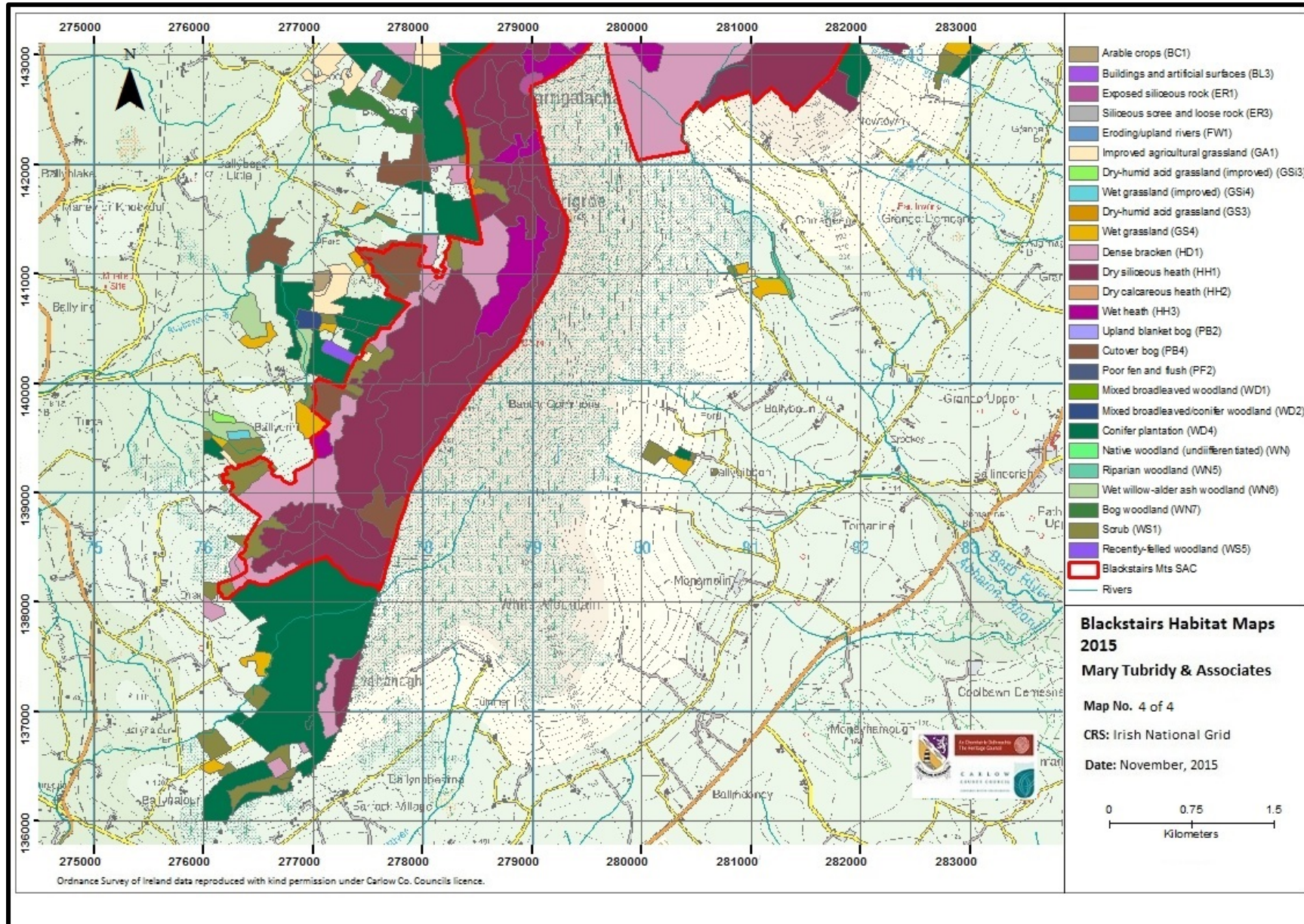
Annexed types are described first i.e. those listed in the Habitats Directive, starting with the only priority type. This is followed by accounts of non-listed types.

Habitat maps are shown in the following pages covering the study area from north to south.









3.2 Habitats listed in the Habitats Directive

3.2.1 Blanket bog

This habitat is only priority type in the Blackstairs. It is found within the Blackstairs SAC where its depth is between 0.5-3.0m (generally c 50cm) also in mosaics with wet heath. (see Fig 3.5). It is shallower in areas where peat is reforming e.g. areas of former turf cutting. Larger deep deposits were cut for turf until 1940's- 1950's and possibly even later principally at locations indicated by the main access routes into the mountains i.e. north of Mt. Leinster area, Ballycrystal, Ballycrinnigan, and Aghnaglear etc. It can now be found on broad plateau, on saddle areas and in small terraces and basins located between steep slopes. Blanket bog is present at all altitudes from the edge of cultivated farmland right up to the summits of Mt. Leinster (790 m) and Blackstair Mt. (730 m). For example in Ballybeg it was present in a saddle at altitude ~ 400m with peat depth 30 – 45 cm plus adjacent to a small water body. Drainage potential or wetness are diagnostic characters. Its presence can be expected where the topography is flat or / and drainage is impeded.



Fig. 3.5 Blanket bog at Craan

Blanket bog is distinguished by the presence of peat-forming species – which in the Blackstairs are mainly Hare’s Tail Cotton Grass (*Eriophorum vaginatum*) and/or, Common Bog Cotton (*Eriophorum angustifolium*) accompanied by Sphagnum species, of which *S. capillifolium* is by far the commonest, followed by *S. papillosum* on the wettest ground and, slightly less commonly, *S. fallax* and *S. subnitens*. Deergrass (*Trichophorum germanicum*) can also be a significant component of blanket bog – particularly where it is associated with transitions from wet heath. This habitat will also have Ling Heather (*Calluna vulgaris*) not growing very vigorously (usually subordinate to the bog cotton species, though locally co-dominant). Other species which occur in Blackstairs blanket bog are: Tormentil (*Potentilla erecta*), fraochan (*Vaccinium myrtillus*), the mosses *Polytrichum commune* and pleurocarps (‘feather-mosses’ such as *Pleurozium schreberi* and *Hypnum jutlandicum*), Purple Moor-grass (*Molinia caerulea*) and, more locally, *Luzula sylvatica*. The nationally rare montane dwarf-shrub *Vaccinium vitis-idaea* occurs in several places, including on Mt. Leinster.

The extent of bog moss (*Sphagnum*) depends on wetness, as well as on management history, i.e., severe burning may lead to the local disappearance of this moss type and, not infrequently, to its replacement by *Polytrichum commune* – a species which is much more tolerant of disturbance. *Erica tetralix* is often absent from the more montane blanket bog types – especially that dominated by *Calluna* and *Eriophorum*. However, it is usually present in lower saddle bogs with other species found on at these locations such as Marsh Orchid *Dactylorhiza maculata*? and Devil’s Bit Scabious (*Succisa pratensis*).

In several places, e.g., Cloroge, there are areas of transitional habitat between poor fen and blanket bog – especially where there is acid flushing (i.e. movement of water) across expanses of rain-fed (ombrotrophic) peat. These areas are generally characterised by the frequently dominant and very tussocky *E. vaginatum*, mixed with *S. palustre*, *S. fallax*, *Deschampsia flexuosa*, less *J. effusus*, much *Anthoxanthum*, *E. angustifolium* prominent, locally abundant *Juncus acutiflorus* & variable *Molinia*, even *Calluna* and *Polytrichum commune*.

While the Blackstairs lacks lakes, a small water body, identified as an example of the annexed habitat Dystrophic Pool (Fossitt category FL1) is present on the ridge of the

Blackstairs Mountain. The pool has a peaty bottom c. 30mX 5m in extent and up to 1m deep. Various Sphagnum species are present in the water *S. cuspidatum?* *S. subnitens* and it is important for invertebrates. Damselflies, micro moths and two bee species were noted during fieldwork.



Fig. 3. 5 Water body on summit of Blackstairs Mountain

3.2.2 Wet heath HH3

Wet heath was only identified as the dominant habitat in units mapped in the SAC. It is present outside the SAC in mosaics with acid fen. It is only found when there is some hindrance to free drainage, but usually not enough to result in the formation of blanket bog. Peat depth is rarely more than 20-30cm, but can be found (particularly where there has been a relaxation in pressure from burning or / and grazing) as shallow as 5 cm.

Unlike dry heath it is not defined by a certain amount of cover by dwarf shrubs. Best quality wet heath has Deergrass with *Calluna*, Bog Cotton, Cross leaved heath, and peat forming Sphagnum such as *Sphagnum capillifolium* or *S. subnitens*, (some *S. palustre*), Bog Asphodel (*Narthecium ossifragum*), Tormentil (*Potentilla erecta*), Green-ribbed Sedge (*Carex binervis*), Carnation sedge (*C. panicea*), also Bell heather (*Erica cinerea*), Fraochan of Bilberry (*Vaccinium myrtillus*), Heath Rush, and some Purple Moor-grass. Hare's Tail Cottongrass is usually absent or only sporadic. Vegetation should not have too much *Juncus squarrosus* as this is an indicator of flushing and thus supports another type of habitat.

Species poor wet heath, e.g., where substrate is drier or where disturbance is (or has been) greater Deergrass is often overwhelmingly dominant, accompanied by lesser amounts of Heath Rush, variable *Calluna*, Tormentil and scattered patches of Bog Cotton.



Fig. 3. 6 Wet heath on south side of Sturra

There are several areas (e.g. Cloroge, Knockroe, Gowlin, Knockymullgurry, Rathgeran) where the wet heath is markedly flushed, even locally with some signs of calcium enrichment. Such flushed wet heath is often recognisable by having less dwarf-shrub cover than normal and a dramatically increased cover of sedges (*Carex* spp.) such as Carnation Sedge (*Carex panicea*) Star Sedge (*C. echinata*), Green-ribbed Sedge even *Carex viridula oedocarpa*. Bog Asphodel is also usually prominent, with sometimes *Sphagnum denticulatum* appearing alongside *S. capillifolium* or *S. subnitens*. *Deer grass* is generally still quite prominent in these flushed areas, though less dominant than in some other places. Mat grass (*Nardus stricta*) tends to be conspicuous on higher-altitude examples. Saplings of two native trees Willow (*Salix*)sp and Rowan (*Sorbus aucuparia*) can occur.

Outside the SAC wet heath is present on the Carlow side in areas which are too rocky or steep for blanket bog but which are waterlogged due to flowing water from upslope. The vegetation of these areas is characterized by the presence of bog mosses *Sphagnum* sp. such as *Sphagnum palustre*, *fallax* with Bog Asphodel, Cross-leaved Heath, Round leaved sundew, Carnation Sedge, Star Sedge, Purple Moor Grass, Bog Cotton and abundant Devil's Bit Scabious. Where rock is close to the

surface more *Calluna* and Autumn Gorse (*Ulex gallii*) are found and if grazing pressure has been low and areas have been unburnt Gorse plants can reach 2m, even in very wet areas. In Gowlin and Walshestown, the wet heath is associated with flushed areas of poor fen and flush (PF2) characterised by the herbs Broad Leaved Pondweed (*Potamogeton polygonifolius*), Bog St John's Wort (*Hypericum elodes*), Lesser Spearwort (*Ranunculus flammula*), Bog Pimpernel (*Anagallis tenella*) and peat forming *Sphagnum* spp. and *Polytrichum commune*.

3.2.3 Dry Heath (Fossitt, HH1)

This is the principal habitat found within the SAC where it has been subject to a long history of grazing and burning. It is also found outside. *Calluna* is typically the principal shrub species but Bell Heather, Autumn Gorse (*Ulex gallii*) and Bilberry (*Vaccinium myrtillus*) are common. To be characterized as Dry Heath dwarf shrub cover should be over 25%.

Drainage rather than peat depth characterises this habitat. It can be found on mineral and peat soil on sloping sites or in areas with outcropping or loose rock. It is also found when blanket bog is severely eroded, e.g. near the summit of Mt. Leinster, where dry heath has formed on the drier, oxidising edges of peat hags. There are also rare areas of deeper peat which have been so thoroughly desiccated that there is almost no water retention any more – and these are now colonised by dry heath, e.g., some parts of the saddle northwest of Knockroe.

A *Calluna*-Bell Heather type, particularly characteristic of sunnier, west or south-facing steeper slopes is the most widespread dry heath type in the Blackstairs. There are also extensive areas of *Calluna*-Bilberry heath where eastern or northern aspects result in higher humidities and fewer opportunities for desiccation.



Fig. 3. 7 Dry heath at lower altitudes is often present in a mosaic with bracken and grassland

Rarer but important dry heath types include *Calluna-S. capillifolium* bryophyte heath on the steeper north-facing slopes of Craan and one or two other areas; and *Calluna-Autumn Gorse* heath at the base of some slopes. There are small patches of more montane heath, distinguished by greater amounts of *Racomitrium lanuginosum* and Crowberry (*Empetrum nigrum*) in the vicinity of Mt Leinster. Species associated with dry heath are Green-ribbed sedge (*Carex binervis*), Wavy Hair-grass (*Deschampsia flexuosa*), Crowberry, Great Woodrush (*Luzula sylvatica*), Heath Bedstraw (*Galium saxatile*), Hard Fern (*Blechnum spicant*), Mat-grass and the mosses *Polytrichum commune* and *Hylocomium splendens*. An associated habitat with the dry heath on steeper and/or bouldery slopes was Giant Wood Rush tall herb vegetation – often merging and fading backwards and forwards with *Calluna-Bilberry* heath. This habitat was particularly extensive on all but the south side of Mt. Leinster and was more extensive on the ridge linking Mt. Leinster with Craan.

Some of the dry heath had been frequently and intensively burnt, often (though not always) with the result that *Calluna* became the sole dwarf-shrub present and, perhaps, more crucially, leading to extensive exposure of bare peat or soil. Where burnt often and intensively, Bracken (*Pteridium aquilinum*) became more common. *Calluna* regeneration was usually very good, with some local exceptions (especially where burning had also affected neighbouring stands of bracken). However the loss

of peat and soil is detrimental to water quality, to carbon retention and to the habitat quality of freshwater ecosystems. Where this habitat was unburnt heather grew very tall and a healthy *Pleurozium schreberi* & *H. jutlandicum* understorey developed below the plant.

The *Calluna-Bell Heather* heath which was the type most frequently burnt is relatively tolerant of such management as long as burning events are spaced out – e.g., once every 8-12 years – and most dry heath areas examined seemed to have a good complement of species apart from *Calluna*, with the heath around Mt. Leinster often being particularly species-rich. In this location most of the damage by burning was done to either blanket bog or the rare *Calluna-S. capillifolium* bryophyte heath).

3.2.4 High altitude grassland

A small amount of this priority habitat (Siliceous alpine and boreal grasslands [6150](#)) not classified directly in Fossitt (op.cit) is found in several locations at the eastern end of the summit area on Mt. Leinster and on a much smaller area on Sturra/Blackstairs Mt (Fig. 3.8). It is one of only three properly Arctic-alpine Annex I habitats that occur in Ireland and is characterized by the presence of several uncommon vascular plants, mosses and liverworts. On the Blackstairs these include the rare sedge *Carex bigelowii*. This habitat occurs as clonal mats with Wavy Hair Grass and Brown Bent grass (*Agrostis vinealis*).



Fig. 3. 8 *Carex bigelowii* heath at Mt Leinster

3.2.5 Bog woodland (Fossitt WN7)

This type of woodland is a rare annexed type. It was only found outside the SAC in Gowlin and Ballybeg and has developed on transitional bog. Peat depth reaches 2m in Ballybeg. Survey work in 2002 (Hickey, 2002) recorded the presence of Birch, various Willows and Rowan, and noted that trees may have been coppiced as several are multi-stemmed. Other woody plants included Bramble (*Rubus fruticosus* agg) Ivy (*Hedera helix*), Honeysuckle (*Lonicera periclymenum*), Bilberry and seedlings of oak (*Quercus* sp). In the herbaceous layer were Foxglove (*Digitalis purpurea*) Common Rush, Soft Shield Fern (*Polystichum setiferum*), and Bracken. There were signs of woodland regeneration. There was no change in this habitat since 2002.

3.3 Condition assessments of annexed habitats in the SAC

Condition assessments which took place at thirty locations in the three annexed habitats (results in an Access Data Base) showed that habitats were in good condition. No sample area failed and few had negative characteristics. While sites failed on some characteristics, these features were of minor importance.

3.4 Semi-natural habitats not listed in the Habitats Directive

3.4.1 Cutover Bog (Fossitt PB4)

Areas with this habitat are present inside and outside the SAC. Within the SAC the habitat is present in mosaics with blanket bog and wet heath. Outside the SAC cutover bog is in defined areas surrounded by fields managed more intensively i.e. at Knockymullgurry. The flora is also different as cutover bog outside the SAC has resulted from the exploitation of a transitional type of peat land, that is transitional between blanket and raised bog. Fig. 3.9



Fig. 3. 9 Regenerating cutover bog at Knockymulgurry

Floral diversity can be high as the vegetation has species associated with bog, fen, heath and scrub habitats. Bog species include Bog Bean (*Menyanthes trifoliata*), Round leaved Sundew, abundant Cranberry (*Vaccinium oxycoccus*), Pale Butterwort (*Pinguicula lusitanica*) abundant Bog Asphodel, Bog St Johns Wort (*Hypericum elodes*), Cross-leaved Heath, *Calluna*, *Sphagnum capillifolium*, *S. fallax*, *S. palustre*, Purple Moor Grass, Bog Cotton, Deergrass, Lesser Spearwort (*Ranunculus flammula*), *Carex nigra*, Bog Pimpernel, (*Anagallis tenella*), Many stalked spike Rush (*Eleocharis multicaulis*), Bell Heather, Crowberry Bog Violet (*Viola palustris*), Hare's Tail Cotton Grass, Lousewort (*Pedicularis sylvatica*), Royal Fern (*Osmunda regalis*). Cranberry, Bog Bean and Bog St John's Wort were rarely found in peatlands on the mountain. Wet heath types are Deer Grass, Devil's Bit Scabious, Carnation Sedge, Jointed rush, Milkwort, (*Polygala vulgaris*) Heath Rush, Bog Asphodel, Star Sedge. *Succisa* is particularly abundant in this habitat. Less wet areas have species typical of dry heath and acid grassland such as Autumn Gorse, Tormentil, Star Sedge, Bent Grass, Green-ribbed Sedge, Bilberry, Heath Wood Rush, (*Luzula multiflora*), Common Gorse (*Ulex europaeus*) Hard Fern (*Blechnum spicant*) Bitter Vetch (*Lathyrus linifolius*) Bird's-foot Trefoil (*Lotus uliginosus*), Sweet vernal grass (*Anthoxanthum odoratum*), Heath Bedstraw (*Galium saxatile*), Wavy Hair Grass (*Deschampsia flexuosa*), Common Sorrel (*Rumex*

acetosa), Red Fescue and Sheep's Fescue grass (*Festuca rubra* and *ovina*), Bog stitchwort, *Stellaria alsine*. Fen/wet grassland species such as *Carex demissa*, Flea sedge (*Carex pulicaris*) Marsh Orchid, (*Dactylorhiza maculata*), Yorkshire fog (*Holcus lanatus*), Common Rush (*Juncus effusus*) Mat Grass and Milkwort were found. Scrub habitat was dominated by Common Gorse.

3.4.2 Eroding Blanket Bog (Fossitt PB5)

Eroding blanket bog is found on the summits of both Mt Leinster & Blackstairs Mt (Sturra). This is a common feature of high mountains due to a combination of land management (i.e. burning and trampling from livestock), and natural factors wind and rain exacerbated by altitude i.e. the high degree of exposure to rain and wind. Its location is indicated by the characteristic gullying which is particularly prominent on Mt. Leinster and (to a lesser extent) on Sturra/Blackstairs Mt.

3.4.3 Fens and flushes (Fossitt PF1 and PF2)

Fen and flush habitats are peat forming systems. They are found predominantly in the SAC within or adjacent to wet heath or blanket bog, but can also be found on waterlogged drainage axes through unimproved acid grassland inside and outside the SAC. Poor fen (PF1) is characterised by the dominance of Jointed Rush. Deer Grass, Yorkshire Fog, Common Rush, *Sphagnum palustre* are often present with Tormentil, Heath Rush, *Sphagnum capillifolium* and Bog Cotton.

More species-poor areas are dominated by Common Rush- *Polytrichum commune* or *Sphagnum palustre* tend to dominate the understorey; Velvet Bent Grass *Agrostis canina* is often present and, sometimes, Common Marsh Bedstraw (*Galium palustre*).

There are also some examples (especially west of Knockroe and along the well-irrigated west-facing slopes of Sturra/Blackstairs Mt.) of more base-rich flushes (PF2). These tend to have 'brown mosses' such as *Palustriella*, *Campylium stellatum* and/or *Scorpidium* spp., more base-tolerant *Sphagnum* spp. like *Sphagnum inundatum*, abundant Sedges, especially the more lime-loving kinds like *Carex viridula oedocarpa*, but also Carnation Sedge and Star Sedge.

3.4.4 Acid Grassland (Fossitt GS3)

Acid grassland is the principal semi-natural type of dry agricultural grassland found in the SAC and adjacent to it. It has developed as a result of the conversion of dry heath to grassland through grazing and burning. It is not a peat-forming habitat. The degree of “naturalness” depends on its history of management by farmers.

Characteristic species are the herbs Tormentil, Bird’s Foot Trefoil, Common Sorrel, Common Mouse Ear, with the grasses Yorkshire Fog, Sweet Vernal Grass, Common Bent (*Agrostis capillaris*), Mat Grass, False Oat Grass (*Arrhenatherum elatius*) and Sheep’s Fescue. More neutral or lime loving species can often be found i.e. Crested dog’s tail (*Cynosurus cristatus*) Silverweed, Self heal (*Prunella vulgaris*), Eye bright (*Euphrasia rostkoviana X anglica*) perhaps due to past liming of these fields or flushing from igneous intrusions or influence of hay making.

3.4.5 Bracken (Fossitt HD1)

Areas dominated by Ferns or Bracken are found inside and outside the SAC but never near the summits as Bracken is sensitive to altitude and is not found above 350m. It was noted that grassland is generally present with bracken. While species diversity was less than in fields with acid grassland grasslands it included shade-loving species such as Violet sp., Bluebell (*Hyacinthoides non-scripta*), Wood Sorrel (*Oxalis acetosella*) and Primrose (*Primula vulgaris*).

3.4.6 Wet grassland (Fossitt GS4)

This locally rare habitat is found in wet fields in some of the townlands on the Carlow side where it has survived due to poor local drainage networks. Soils are usually peaty podzols or gleys. Vegetation is characterised by a high cover of Common Rush (50% cover) and a range of species tolerant of wet conditions such as Creeping Bent (*Agrostis stolonifera*), Common Bent, Yorkshire Fog, occasional Creeping Soft Grass (*Holcus mollis*), Sweet Vernal Grass and Crested Dog’s Tail grass. A small amount of Rye Grass (*Lolium perenne*) will usually be present. Common herbaceous species were Bitter Vetch, Jointed Rush (*Juncus acutiflorus* and *articulatus*), Broad-leaved Dock (*Rumex obtusifolius*), Marsh thistle (*Cirsium palustre*),

Carnation Sedge (*Carex panicea*), Lesser Spearwort, (*Ranunculus flammula*), Marsh Orchid (*Dactylorhiza maculata?*) Star Sedge, (*Carex echinata*), Bird's Foot Trefoil (*Lotus uliginosus*), Red Clover (*Trifolium pratense*), Tormentil (*Potentilla erecta*), Grey Willow (*Salix cinerea*) and Common Buttercup (*Ranunculus acris*). Seedlings of tree species of Birch (*Betula pubescens*) were occasionally seen.

3.4.7 Productive intensively managed grassland (Fossitt GA1)

While this locally common habitat was not mapped, as it was not a semi natural type, notes were taken of the species found which included Rye Grass (*Lolium perenne*), Crested dog's Tail, Common Bent and Cock's Foot (*Dactylis glomerata*). It was the dominant vegetation in fields adjacent to the mountain on the Wexford side.

3.4.8 Wet willow alder ash woodland (Fossitt WN6)

With the exception of conifer plantations woodland cover was rare in the study area. This type is present at several locations at Ballycrinnigan on a shallow peaty soil. Main tree species are Grey Willow, Goat Willow, and Eared Willow (*Salix aurita*) with Rowan (*Sorbus aucuparia*) and Holly (*Ilex aquifolium*) in drier parts. There was the occasional Ash (*Fraxinus excelsior*) and Birch. Herbaceous species included Marsh Violet, Marsh Willow herb (*Epilobium palustre*), Common Rush, Hemp Agrimony, (*Eupatorium cannabinum*), Scaly Male fern, (*Dryopteris affinis*), Broad Buckler Fern (*Dryopteris dilatata*) Hard Farn, Lesser Spearwort, Marsh Thistle, Creeping Bent, Star Sedge, Creeping Forget me Not (*Mysotis secunda*), and Yorkshire Fog. Mosses and liverworts included *Climacium dendroides*, *Polytrichum commune*, *Plagiomnium undulatum* and *Rhizomnium punctatum*.

3.4.9 Semi-natural scrub (Fossitt WS1)

This habitat is dominated by Furze or Gorse with occasional Autumn Gorse. It is found inside and outside the SAC where it has developed in dry and wet environments. Grazing usually occurs in this habitat.

Scrub dominated solely by Autumn Gorse was not put into this habitat type but was identified as part of a mosaic with dry heath or acid grassland.

Scrub vegetation is characterized by a species diversity which reflect its origins and current drainage status. Grazing may or may not occur. Species include Bracken, Yorkshire Fog, Common Rush, Spear Thistle, (*Cirsium vulgare*) Foxglove, *Calluna*, Autumn Gorse and Bramble (in dry areas). Indicators of wetter habitats include Bog Cotton, Devil's Bit Scabious, *Sphagnum capillifolium*, Marsh Orchid, Bog Asphodel, Carnation Sedge, Heath Rush, Hard Fern, Purple Moor Grass, Sorrel, Marsh Thistle, Bird's Foot Trefoil, *Sphagnum palustre*, Marsh Violet, Tormentil, Lesser Spearwort, Crested Dog's Tail, Greater Tussock Sedge (*Carex paniculata*), Cross Leaved Heath, Purple Moor Grass and Bog St John's Wort.

3.4.10 Upland river (Fossitt FW1)

This habitat was not mapped as the locations are shown by EPA rivers and streams digital layer. It was noted that due to their history and flow patterns the bases of larger upland watercourses typically have clear coarse sandy bottoms with intermittent small rocks and steep banks. Little vegetation is found in the water but as the banks are entirely natural they may be covered in Bracken or more often scrub with either Furze, Elder (*Sambucus nigra*), Willow, Hawthorn (*Crataegus monogyna*), Holly, Brambles, and herbs such as Ivy, Wood Sorrel, Scaly Male Fern, Broad Buckler Fern, Herb Robert, (*Geranium robertianum*) and Honeysuckle. Occasionally a narrow bank of riparian woodland (**WN5**) may have developed in flatter areas with Birch, Willow sp, and herbs typical of wet acid woodlands such as Honeysuckle, Ivy, Bracken, Bramble, Wood sorrel, Hard Fern, Broad Buckler Fern, Bluebell and Great Wood Rush.

3.4.11 Hedgerows/field boundaries (Fossitt WL1 and WL2)

These habitats were not mapped. Their locations can be seen on aerial photographs or OSI digital data sets. It was noted that vegetated field boundaries above 200m can support a dense vegetation with trees, shrubs and herbs. Trees can include Holly, Rowan, and the occasional Prunus sp., Sycamore and Beech. Willow, Birch and Hazel are more common in hedgerows at lower altitudes. Two Gorse species can be found together with Bramble, Bilberry, *Calluna* and Bell Heather. Bird sown *Cotoneaster* is occasional. Herbs are usually indicative of sheltered situations and dry

acid soils and include species not found in other habitats, such as Wood Sage, (*Teucrium scorodonia*), Sheep's Bit (*Jasione montana*), Tutsan, (*Hypericum androsaemum*), *Saxifraga spathularis* and Hart's Tongue Fern, (*Phyllitis scolopendrium*).

3.4.12 Stone Walls (Fossitt BL1)

Bare granite walls have a limited but very specific flora which includes *Asplenium obovatum* (Fig. 3.10) a rare and protected species. The distribution map for this species indicates its rarity in Ireland. Its presence in the Blackstairs area has been known since the early 20th century.



Fig. 3. 10 *Asplenium obovatum* in a wall at Ballyglisheen

3.5 Invasive plant species

Several sites for two terrestrial invasive alien species Japanese Knotweed (*Reynoutria japonica*) and Himalayan Balsam (*Impatiens balsamifera*) were located. All were outside the SAC. Himalayan Balsam is present on the Carlow side along the southern verge of the road between the bridge over the Burren River at Coolasnaghta and Murphy's crossroads. This plant is also spreading along the Hollowcawshe River at Walshestown. While a small stand of Japanese knotweed was found at an abandoned house in Carlow (Grid ref. 7851 4326) and at Bolledurragha beside a recently installed traffic sign, a much more extensive

population is present along Newtown Lane in Co Wexford which has recently been subject to road widening.

3.6 Birds

Power (2015) recorded a total of twenty eight confirmed breeding birds, three were probable breeders and a further eleven were possibly breeding in Deerpark.

Red Grouse

Red Grouse was not recorded by Power (2015) at Deerpark. Observations during fieldwork in the SAC suggest that the mountains support c. twelve pairs and that at least two territorial males are present around Cloroge c. 200 m E of Mt. Leinster, NW of Craan, and an other on SW side of Mt. Leinster. This estimate is significantly less than that observed c. 20 years ago by hill walker Mick Monahan (pers.comm. 2015) who noted a pair every kilometre during a ridge walk which traversed the complete range.



Fig. 3. 11 Red Grouse

Tom Bates of Ballindaggan Gun Club (pers.comm 2015) released ten pairs of grouse (of Shropshire, UK origin) in the vicinity of Cloroge and Ballycrystal with the support of a local farmer in 2005. Previous to the release Tom spent several weeks in

Scotland working with a gamekeeper. Members of the gun club became involved in feeding, predator control and controlled burning (in co-operation with Coillte) over the following years. A formal moratorium on grouse shooting was put in place by County Wexford Game Council among gun clubs (Tom Bates, pers. comm. 2015). Some members are still interested in improving the Red Grouse population. Counts are occasionally made and in 2015 members of Carlow and Wexford Gun Clubs attended a heather management demonstration in Boleybrack, Co. Leitrim.

Raptors

While all local birdwatchers including Power (2015) have reported sightings of Hen Harrier there are as yet no reports of nesting birds. It is not clear if their absence is due to the lack of surveying, the intrinsic unsuitability of the habitats i.e. the high cover of conifer plantations or factors related to habitat management. While nesting Hen Harrier have not been found, Kestrel and Peregrine Falcon are reported to be nesting (Ciaran Byrne, pers. comm. 2015). Power (op. cit) reported presence of Buzzard (numbers increasing according to Tom Bates) and Sparrowhawk in Deerpark study. Merlin are considered occasional breeders (Lorcan Scott, pers. comm. 2015) but this species was not mentioned by local birdwatchers. During habitat mapping in 2015 a Ring Ouzel was seen on the rocky southwest side of Knockroe. This species was also noted by Byrne (op. cit.).

Other birds of particular conservation interest in the Blackstairs are Meadow Pipit and Yellowhammer. The former breeds in the open mountain (mainly along the ridge), where they are an important prey species for raptors such as Hen Harrier, Kestrel, Peregrine Falcon and Buzzard. Yellowhammer is more commonly associated with the lower slopes particularly areas near tillage and dense hedgerows. Golden Plover are using the area as a stop off point during migration and occasionally can be seen in improved fields (as per Lorcan Scott). Ravens (two pairs) were last seen in 2008.

According to Ciaran Byrne (pers. comm. 2015) Grasshopper Warbler is breeding in heath/scrub/bog on the open mountain. Pheasants are also common on the margins of the mountains (numbers increasing or shooting pressure less?) and snipe in wet grassland (Tom Bates, pers. comm. 2015). Other breeding birds of interest in the

mountains are Skylark, Wheatear, Woodcock (mainly in conifers) and Whinchat (Ciaran Byrne, pers. comm. 2015). According to Lorcan Scott, NPWS and Ciaran Byrne the populations of Skylark and Whinchat are in decline.

Migratory species of particular interest are Snow Bunting as there is reported to be a wintering flock in the mountains.

3.7 Mammals

Information from local sources suggests that there are increasing numbers of deer (Sika and hybrids (Sika X Red Deer) but only in the vicinity of Mt Leinster) and that wild feral Goats (possibly 50-60) are regularly present in the southern part of the range and in the Clody valley (Fig. 2.12). Members of the Old Irish Goat Society who inspected pictures of a herd considered that that while most displayed signs of the Old Irish Goat type the obvious presence of a female of British Alpine type goat threatens the population (Sean Carolan, pers.comm 2015).



Fig. 2.12 Herd of feral goats (pic from Mick Monahan)

According to Mick Monahan badgers have been present near the top of Mt. Leinster. Byrne (op. cit.) reported the presence of Pine Marten (mainly in plantations), Irish Hare, Rabbit, Irish Stoat, Red Fox, abundant Red Squirrel and Pygmy Shrew in Deerpark.

Bat surveys by Byrne (op. cit.) recorded Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*Pipistrellus pygmaeus*) and Leisler's Bat (*Nyctalus leisleri*) while a Natterer's Bat (*Myotis nattereri*) was photographed on site.

3.8 Amphibians and reptiles

Byrne (op. cit.) recorded the Common lizard and Frog in Deerpark. Common lizard was reported from the Blackstairs in 2015 (Helena Fitzgerald, pers. comm.). Frogs were seen frequently during fieldwork in summer 2015.



Fig. 3. 13 Lizard basking on rock (Helena Fitzgerald)

3.9 Invertebrates

The Deerpark survey provided records from several invertebrate groups such as butterflies (19 species), moths (35), ladybirds (5), beetle sp. (8), solitary bees (4), bumble bees (6), hover flies (11) and damselflies and dragonflies (6). According to Byrne (pers. comm. 2015) small heath and dark green fritillary are common on the mountains. While some efforts were made to search for Marsh Fritillary webs in September none were observed. There is a single record for this butterfly outside the study area in the townland of Seskinmadra (www.nbdc.ie)

Particular species of note from the Deerpark survey are Green Tiger beetle (*Cicindela campestris*), *Carabus nemoralis*, *Carabus granulatus* and *Nembria brevicollis* and Small Argent and Sable moths (*Epirrhoe tristata*)

Chapter 4 Conclusions

4.1 Introduction

This section of the report provides an assessment of the important features of biodiversity and the implications for a Blackstairs agri-environmental scheme.

4.2 Biodiversity assessment

4.2.1 Annexed habitats within the SAC

The results of the condition assessment were confirmed by observations during fieldwork. Blackstairs annexed habitats are in good condition. Throughout the Blackstairs there are ubiquitous signs of blanket bog which after a long history of turf cutting is recovering and beginning to increase in area again, even if many of the recovering areas show signs of historical damage e.g. poor species diversity or *Sphagnum* cover due to drainage or burning. Areas of wet heath while also subject to burning retain their peat generating characteristics.

While erosion is occurring around the summit of Mt Leinster it was considered that most if not all the blanket bog erosion in the Blackstairs is likely to be due to a combination of land management (i.e. burning, cutting and trampling from livestock) and environmental factors (wind and rain). Recreation is causing erosion but impacts are very localised. Neither were there signs of overgrazing.

Dry heath which is the dominant habitat is a stable vegetation type. Most dry heath areas examined had a good complement of species, with the heath around Mt. Leinster often being particularly species-rich. A rare type of dry heath type present in the Blackstairs is the *Calluna-S. capillifolium* bryophyte heath which is found on the steeper north-facing slopes of Craan. Unlike some other comparable hill areas in eastern or south eastern Ireland, bryophyte layers were mostly intact.

While some of the dry heath has been frequently and intensively burnt leading to the dominance of *Calluna* this effect may be temporary as *Calluna* regeneration was usually very good. The type of dry heath most commonly found in the Blackstairs, a *Calluna-Erica cinerea* heath, is relatively tolerant of burning management as long as burning events are spaced out – e.g., once every 8-12 years.

However intensive and too frequent burning increases the risk of peat and soil loss, with negative impacts on carbon retention and the habitat quality of freshwater ecosystems.

Fieldwork identified the presence of two more annexed habitats in the SAC: montane grassland and a small acid pool. While covering small areas both features increase the diversity of the upland environment and the former is characteristic of higher altitudes.

4.2.2 Annexed habitats outside the SAC

Of particular interest was the identification of the annexed habitats dry heath and bog woodland outside the SAC. While the condition of dry heath was not subject to a formal assessment observations suggest that this was of similar quality to that found in the SAC. Further examination of bog woodland is desirable to assess its condition in relation to national surveys of semi-natural woodlands.

While cutover bog is not an annexed type it is of regional importance as it supports high species diversity and is associated with a rare type of eastern raised bog transitional to blanket bog. Species such as *Vaccinium oxycoccus* and Bog bean (*Menyanthes trifoliata*) are characteristic with Marsh St John's Wort (*Hypericum elodes*) also common. Almost all areas with cutover bog were actively regenerating.

4.2.2 Other habitats of medium value

While the annexed habitats within the SAC are of highest value, the following types; semi-natural grasslands (all GS types), wetlands (fens and wet grassland), rock outcrops and scree, semi-natural woodlands with broadleaved trees, scrub with Furze and field boundaries are also of biodiversity importance. The value of areas

dominated by Bracken depends on the relative cover of associated grassland/heathland.

4.2.3 Habitats of relatively lower value

Of lowest value for biodiversity are the improved agricultural grassland and intensively tilled fields (with the exception of species such as yellowhammer which feed in arable fields and also use upland).

4.2.4 Species of international importance

The area holds a breeding population of international importance, Red Grouse, which has a long history in the Blackstairs. Anecdotal evidence suggests the population has declined but there are no details of its current status. Other birds listed as being of importance for biodiversity are also found in the Blackstairs.

4.2.5 Species of national importance

The fern *Asplenium obovatum*, present in a wall in the Blackstairs, is of national importance as it is listed among plant species requiring special protection under the Wildlife Amendment Act 2000.

Many other native species are given protection under the Wildlife Act such as native mammals, bats, all breeding birds, frogs and lizards. While the report has not recorded fauna species in the Blackstairs it can be presumed that nationally protected important fauna species are present as many were recorded in Deerpark and the areas share similar habitats.

4.2.6 Species of regional importance

While not listed for protection under the Wildlife Act the following species which were recorded during the survey are of regional biodiversity interest: *Carex bigelowii*, *Lycopodium clavatum* (arctic alpine species) and *Vaccinium vitis-idea* as accounts of local biodiversity highlight their presence. Devil's Bit Scabious (*Succisa pratensis*) is

of regional importance as it is the food plant for the Marsh Fritillary butterfly, a species protected under the EU Habitats Directive.

4.3 Management implications

The biodiversity assessment has clarified the nature of important upland habitats. While these were identified in previous reports the study updates the account of Blackstairs biodiversity using current protocols for describing and evaluating upland habitats.

Some examples of annexed habitats are outside the SAC. The annexed habitats are all rare. Wet heath and blanket bog are particularly vulnerable to damage as plants are slow growing and recovery after damaging impacts is particularly slow.

Bird species of biodiversity importance associated with the Blackstairs include Red Grouse, Peregrine Falcon, Kestrel, Buzzard, Sparrowhawk. Merlin, Whinchat, Meadow Pipit, Ring Ouzel, Yellowhammer, Golden Plover, Skylark, and Jack Snipe. Four bat species are present. Marsh Fritillary is likely to be found throughout the Blackstairs due to the widespread occurrence of its food plant, Devil's Bit Scabious.

Condition assessments show that annexed habitats are in good condition in the SAC and while the Red Grouse population has declined breeding birds are still present.

Fieldwork has revealed concern with the impact of burning practices in certain areas which suggest guidelines for this operation which could be incorporated in a local agri-environmental scheme. These would include a recommendation that no burning or very infrequent burning should occur in Wet Heath and Blanket Bog areas as this encourages unpalatable species such as *Molinia* or else it reinforces the tendency of deergrass (*Trichophorum germanicum*) to become overwhelmingly dominant in the habitat and shade out lower-growing species such as *Calluna*. If this tussocky habitat develops it is avoided by sheep. In dry heath burning should probably only occur on a 10-15 year cycle. Burning of *Calluna-Erica cinerea* or *Calluna-Ulex gallii* heath could be on a shorter cycle than *Calluna-Vaccinium myrtillus* heath and *Calluna-S. capillifolium* heath should never be burnt.

Survey work did not examine all aspects of Blackstairs biodiversity. It is likely that other important sites for biodiversity and species occur in the locality. Therefore a local agri-environmental scheme must incorporate a site survey.

4.4 Implications for the Blackstairs local agri-environmental scheme

4.4.1 Pre-launch

A working guide to Blackstairs biodiversity should be prepared for promoters, advisors and participants, explaining the principal features of biodiversity and the rationale for the measures associated with the scheme. An appendix should contain details of habitat assessment procedures.

A GIS system should be set up containing habitat mapping which has been produced for this project. This contains links to descriptions and photos of units and condition assessments of annexed types. Other baseline data sets of relevance to management (commonages etc.) should be added and arrangements made to allow convenient local access to this data. GIS should be used to record and manage management measures.

If resources become available further survey work could be carried to characterize biodiversity in the townlands not included in this survey, the River Urrin woodland (part of Blackstairs SAC), habitats such as rivers, streams, stone walls, hedgerows and ditches. The condition of annexed habitats outside the SAC could be assessed and the current status of FWPM could be determined to clarify the sensitivity of different sub-catchments in the mountains. Survey work should include a baseline Red Grouse survey. This could be carried out with local gun clubs, as members are familiar with the species and methodology.

4.4.2 Target areas

The rationale for including any habitat is to allow for management to benefit biodiversity and farming.

As resources will be limited priority should be given to land with annexed habitats inside and outside the SAC, particularly those within the catchments of streams associated with the Mountain and Ballymurphy rivers which support FWPM.

4.4.3 Target actions

All plans should be informed by survey work to identify relevant habitats, agree and discuss actions and carry out baseline condition assessments. This type of survey or farm visit should involve ecologist/agricultural advisor and farmer and should occur in early to mid summer. It may be necessary to do some fieldwork in September for Marsh Fritillary.

Management plans should only be finalized after adequate consultation with farmers or groups of farmers to agree management actions. Their focus will be both management actions common to all farmers as well as site specific measures. Common management actions are grazing and burning. Specific management actions will involve other types of actions in specific areas or targeted at particular species. In the development of grazing plans there should be some discussion of historic and present stocking rates, seasonality and location of grazing, stock type etc. Burning management will consider location and frequency of burning.

4.3.4 Indicators

All management plans will contain assessments of the biodiversity value of individual management units which will be regularly reviewed to monitor their impact. For annexed habitats indicators will be based on characteristics used in the condition assessments for report. For other habitats quality indicators will be based on approaches used in national assessments of grasslands and woodlands.

An overall Blackstairs quality indicator should be elaborated within the community. This could incorporate objectives relating to the condition of semi-natural habitats, the populations of key bird species, especially those listed in the EU Birds and Habitats Directive, the achievement of good ecological status in all the streams and rivers draining the mountains, appropriate levels of grazing and evidence for good burning management.

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Appendix 1 Site Synopsis Blackstairs Mountains

SAC No. 770

Version date: 23.09.2013 (from NPWS website)

The Blackstairs Mountains are located along the border of the Counties Wexford and Carlow, forming a mountain chain that runs in a north-east/south-west direction for approximately 22 km, and includes six peaks over 520 m. The range has a core of granite, and on the Carlow side, erosion has cut deeply into the dome exposing successive layers of granite, giving a steeply stepped slope. On the east side some overlying Ordovician slates and sandstones are evident.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[4010] Wet Heath

[4030] Dry Heath

The site is important for extensive areas of dry heath. The higher, steeper slopes are covered with a dense, tall carpet dominated by Heather (*Calluna vulgaris*) and Bilberry (*Vaccinium myrtillus*), with small amounts of Crowberry (*Empetrum nigrum*), Bell Heather (*Erica cinerea*) and Cross-leaved Heath (*E. tetralix*). Occasionally Common Bent (*Agrostis capillaris*) and Mat-grass (*Nardus stricta*) are also found. Abundant moss cover is present, particularly in those areas which have escaped burning – species include *Racomitrium lanuginosum*, *Hypnum cupressiforme*, *Polytrichum commune*, *Hylocomnium splendens* and *Rhytidiadelphus squarrosus*. Stiff Sedge (*Carex bigelowii*) occurs on the stony ground on the west side of the range.

Lower down the slopes the heath is dominated by Gorse (*Ulex europaeus*), with some of the species listed above, along with Heath Bedstraw (*Galium saxatile*) and Tormentil (*Potentilla erecta*). Bracken (*Pteridium aquilinum*) is also abundant on the lower slopes, particularly on the western flanks.

Upland grassland is found on those slopes which have been heavily grazed. Grassland species include Mat-grass and Common Bent. Heath Bedstraw and the mosses *H. splendens* and *R. squarrosus* are also found.

Wet heath occurs in mosaic with dry heath towards the base of some of the steeper slopes and is also found outside the western edge of the commonage. Typical species include Purple Moor-grass (*Molinia caerulea*), bog mosses such as *Sphagnum capillifolium* and *S. palustre*, and sometimes Bog Asphodel (*Narthecium ossifragum*). There are relatively extensive tracts of a peat/heath mosaic on the gentle slopes at the east of the southern section of the site and within the commonage. Cottongrasses (*Eriophorum* spp.) are dominant here, with small amounts of Purple Moor-grass and over 90% cover of bog mosses. Some very wet patches with Soft Rush (*Juncus effusus*) occur.

A series of lowland bogs north of Mount Leinster and around Black Rock Mountain have recently been identified which have considerable local importance. These occur around Ballycrystal, south-west of Black Rock Mountain, where the highest feeders of the Urrin River rise, and around Crann on the north of the Black Rock ridge, where feeders of the Clody River rise just south of the Wexford/Carlow border. In these bogs considerable populations of Cranberry (*Vaccinium oxycoccos*) occur. The Crann bogs also have abundant Bog-myrtle (*Myrica gale*), uncommon in the county. Other species of interest that occur in the Urrin and Clody bogs include Marsh St. John's-wort (*Hypericum elodes*), Pale Butterwort (*Pinguicula lusitanica*) and Lesser Skullcap (*Scutellaria minor*). The Crann bogs include quite extensive stands of Purple Moor-grass, and Water Horsetail (*Equisetum fluviatile*) is widespread. The bogs are reduced to fragments bordering improved grassland or forestry.

Mount Leinster is the highest mountain of the range (795 m). On the east side of the summit a few plants with arctic or alpine affinities occur such as the scarce Starry Saxifrage (*Saxifraga stellaris*) and the Stag's-horn Clubmoss (*Lycopodium clavatum*).

The headwaters of the Urrin River are included within the site. Habitats along it include patches of deciduous woodland dominated by Downy Birch (*Betula pubescens*). Further south the woodland becomes more dense and consists of Alder (*Alnus glutinosa*), willows (*Salix* spp.), Hazel (*Corylus avellana*) and Holly (*Ilex aquifolium*). The woodland in the south of the area is comprised of Sessile Oak (*Quercus petraea*). There are also patches of peaty marsh, with species similar to those listed for the lowland bog.

The scarce species Ivy-leaved Bellflower (*Wahlenbergia hederacea*) and Mountain Fern (*Thelypteris limbosperma*) occur along the Urrin River, while Cowberry (*Vaccinium vitis-idaea*), also a scarce species, is found in heath in a number areas of the site. Small Cudweed (*Logfia minima*), a Red Data Book species that is protected under the Flora (Protection) Order, 1999), has been recorded in heathy grassland on the site. The rare, Red Data Book species Bird's-foot (*Ornithopus perpusillus*) is found in dry, sandy places at Knockroe in Co. Carlow.

Small numbers of Red Grouse use the site – their numbers have declined here in recent years.

Land use within the site is centred on grazing. Overall, sheep numbers are low, though there are some pockets where high numbers are found. In these areas there are patches of bare ground, an abundance of Mat-grass and in some places upland grassland replaces the heath. Burning of the Heather is carried out on what appears to be a rotational basis. Heather is regenerating in the burnt areas. From a distance the age structure is evident in the different hues of brown to be seen. Cattle are out-wintered on the slopes just inside the boundary of the commonage. Severe poaching is associated with this, especially where supplementary feeding is carried out. Coniferous forestry is present over much of the slopes of the mountain (outside of the site), extending to a height of 640 m north of Mount Leinster.

The Blackstairs Mountains SAC is the only example of moorland above 300 m in Counties Wexford and Carlow. It includes good examples of dry heath, a habitat listed on Annex I of the E.U. Habitats Directive. The plant and animal communities are typical of upland habitats, and the growth of Heather is particularly profuse, rivalling some of the larger areas of Heather cover in Co. Wicklow. The presence of rare and scarce species adds significantly to the conservation value of the site.

Appendix 2 Habitat Mapping Information Notice

BLACKSTAIRS FARMING GROUP: Habitat Survey Project



To support an application from the BLACKSTAIRS FARMING GROUP for a locally led agri-environmental scheme fieldwork is being carried out this summer to identify and assess habitats and biodiversity around Mt Leinster and The Blackstairs.

The objective of agri-environmental schemes is to ensure that farming and environmental quality are mutually supportive. In contrast to Glas and Glas+ a locally led scheme considers the state of local biodiversity, the type of farming and the potential of farming to address issues which affect the relationship between them.

Fieldwork by ecologists employed by BLACKSTAIRS FARMING GROUP will provide a comprehensive account of local biodiversity. Combined with results from a farming questionnaire adequate information will be available to the BLACKSTAIRS FARMING GROUP to make an application to government and the EU under the current Rural Development Programme to implement a locally led agri-environmental scheme in the Blackstairs.

The ecologists involved in this fieldwork based survey, Dr Mary Tubridy (Leader), Brendan O'Hanrahan and Dr Betsy Hickey have extensive experience of identifying habitats in uplands and farmland. Habitats such as heathland, various types of grassland, woodlands and scrub are principally identified from the plants associated with them.

Survey areas have been agreed with the BLACKSTAIRS FARMING GROUP. While fieldwork will principally focus on the unenclosed parts of the mountain it may also cover fields. If survey work is being carried out around fields permission will be sought from the landowner. The ecologists will be easily identifiable with their clipboards and cameras. They will be spending their time examining vegetation close up and from a distance, writing notes or recording details on maps and notebooks. In addition to producing a map of habitats, the ecology team plans to hold a series of walks with farmers in locations across Mount Leinster & The Blackstairs.

If you would like to know more about the habitat survey contact Mary Tubridy 087-2506311, Helena Fitzgerald, BFG Coordinator, Borris (087 7820229) or Martin Shannon, BFG Chairperson, Kiltaly (085 7497314)

Appendix 3 Interpretation of column headings in excel spread sheet associated with habitat mapping in the SAC

CaEciHH	CaDfiHH	CaVmyHH	VmyRlorMH	UgaEciHH	CaScapHH
Calluna- Erica cinerea Heath	Calluna- Deschampsia flexuosa Heath	Calluna- Vaccinium myrtillus Heath	Vaccinium myrtillus- Rhytidiadelph us loreus Montane Heath	Ulex gallii- Erica cinerea Heath	Calluna- Sphagnum capillifoliu m Heath
TcEangB Gca	CaRacoMH	TcCxpawH	TcEangBGBG	EangJsqBG	ErioSpapB G
Trichoph orum- Eriophor um angustifo lium Blanket bog/Wet heath (Calluna- rich)	Calluna- Racomitrium lanuginosum Montane Heath	Trichophoru m-Carex panicea Wet heath	Trichophorum -Eriophorum angustifolium Blanket bog	Eriophoru m angustifoliu m-Juncus squarrosus Blanket bog	Eriophoru m- Sphagnum papillosum Blanket bog
CaErioB G	EangSfaHW	CxbigRaco M		LsylvTH	AgFovGD
Calluna- Eriophor um Blanket bog	Eriophorum angustifoliu m- Sphagnum fallax bog pool/hollow	Carex bigelowii- Racomitriu m lanuginosu m Montane Vegetation		Luzula sylvatica Tall Herb Vegetation	Agrostis- Festuca ovina Grassland

AgFoGD sprh	JeffHlanGD	GA1	PaquBK	CxvoPvuFL U	JcuCcuFL U
Agrostis- Festuca ovina Grasslan d (species- rich)	Juncus effusus- Holcus lanatus Gld	Fossitt	Pteridium aquilinum Bracken community	Carex viridula oedocarpa- Pinguicula vulgaris Flush	Juncus- Calliergon ella cuspidata Flush
UeuScb	WN	WD1	WD4	SScreeRK	LsRK
Ulex europaea s Scrub	Semi-natural woodland (general)	Broadleaved planted woodland (Fossitt)	Conifer plantation (Fossitt)	Siliceous Scree	Loose Rock
HH4	PB2	GS3	GS4	HD1	PF1
Montane heath (Fossitt)	Upland Blanket bog (Fossitt)	Acid grassland (Fossitt)	Wet grassland (Fossitt)	Bracken (Fossitt)	Rich fen and flush (Fossitt)
BL3	BC1	HH1	HH3	PF2	WS1
Buildings and artificial surfaces (Fossitt)	Arable land (Fossitt)	Dry heath (Fossitt)	Wet heath (Fossitt)	Poor fen and flush (Fossitt)	Semi natural scrub (Fossitt)
ER3					
Siliceous scree and loose rock (Fossitt)					

Appendix 4 Condition Assessment Criteria/Blanket Bog Indicator Species

1 Condition assessment criteria (area assessed)

≥ 2 spp. moss, liverwort, non-crustose lichen (1m²)

All hths: ≥ 2 indic spp from Grp 1 (4m²)

Sp-rh hth: 25-75% veg fr indic spp.(4m²)

Oth hth: ≥ 60% veg cvr fr indic, except f Raco or Clad-rh hths in expo locns in W – 33% (4m²)

≥ 25% cvr fr indic d-shs (4m²)

< 1% veg aliens (all visible)

< 10% veg fr Bracken (all visible)

< 20 % veg cvr fr trees/scrub (10% not sca'd) (all visible)

< 1% veg cover of weedy spp (Cirarv, Cvul, lg Rumex, Sjac, Rrep, Udi) (all visible)

105 <10 % veg cvr of Jeff (all visible)

No burning signs in ssv areas all visible & between sample locations

Senescent Ca < 50% cvr at ≥ half all stops (Visible)

< 33% palbl d-shs (Ca, Ecin & Vmy) coll'y w brwg signs: Qualifier - must be min of 10 plants of sp. prst to be assessed (4m²)

< 10% grd cvr of b grd? (4m² for diffuse disturbance)

< 10% grd cvr of b grd? (visible)

area of bpt (w or w'out evdc of trpg) < 10%? (4m²; average for site)

2 Blanket bog indicator species (Group 1)

Calluna vulgaris

Eriophorum vaginatum

Eriophorum angustifolium

Trichophorum germanicum

Vaccinium myrtillus

Vaccinium vitis-idaea

any *Sphagnum* spp.

pleurocarpous mosses (a max of 1 can be counted)

Narthecium ossifragum

Erica tetralix