



An Inventory of Biodiversity in the Wicklow/Dublin Uplands



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Acknowledgements

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We would also like to acknowledge the support of the National Parks and Wildlife Service (NPWS) who provided extensive habitat and boundary data and to the National Biodiversity Data Centre (NBDC) for the provision of species data for use in this project.

1.0 Background

The Wicklow Uplands are extensively farmed areas which are also valuable for biodiversity and ecosystem services. The Wicklow Uplands are of European importance for their habitats and birds. This is recognised by the designation of much of the Wicklow Mountains as a Special Area of Conservation (SAC) and Special Protection Area (SPA). The heaths (dry, wet and montane) and blanket bog which cover about two-thirds of these SACs are all Annex I habitats.

Although a large portion of the mountains has been designated as SAC/SPA, adequate resources have not yet been directed at maintaining or improving the condition of these habitats or enhancing their biodiversity. There has been no field conservation assessment of the habitats in the Wicklow Uplands SAC but the NPWS national assessment of conservation status concluded that dry heaths were of inadequate status and wet heath and blanket bog were unfavourable (bad) for structures and functions. Throughout Ireland and particularly in Wicklow, traditional hill sheep farming, which is very important for the management of upland habitats, is in decline. Wicklow Uplands Council seeks to redress this decline.

In response to the challenges facing the uplands, cross community discussions have been taking place in Wicklow over the last four years to develop a new consensus based approach to upland management which will seek both to restore or enhance biodiversity and support a recovery in upland farming. In 2011, a series of well attended public meetings facilitated by the Wicklow Uplands Council (WUC) and the Irish Uplands Forum (IUF) led to the establishment of a working group with representation from local and national stakeholders. In 2013, Wicklow Uplands Council commissioned a study 'To Identify Best Management of Upland Habitats in County Wicklow' which was undertaken by Mary Tubridy and Associates. The report outlines key recommendations which are critically poised in light of the review of the Common Agricultural Policy and the new Rural Development Programme (RDP). One of these recommendations was the need for support for upland hill farmers to best manage upland habitats through a locally led agri-environmental scheme. Following a lengthy consultation process on the RDP, provision was included for a locally led agri-environmental scheme which was subsequently allocated a budget of €70 million by the Department of Agriculture. The Department have already agreed that the Burren Farming for Conservation Scheme, the freshwater pearl mussel and hen harrier will receive support under the scheme and have advised that they will issue a competitive call for applications from other areas in autumn 2015. With this in mind, Wicklow Uplands Council is currently making preparations for an application for the Wicklow/Dublin Uplands and seeks to establish a biodiversity baseline for the area using the best available information.

Objectives

The objectives of the study are;

- To produce an indicative habitat map of the study area using existing data sources.
- To compile a desk based inventory of records of threatened and protected species in the Wicklow/Dublin Uplands using existing data sources.
- To identify where there are gaps in available data which may require future survey.
- To provide a summary analysis of the species and habitat data results.

2. Study Area & Methods

2.1 GIS analysis

All spatial analysis for this project was undertaken using ArcGIS Desktop 10.3.1 (ESRI 2015).

2.2 Study area

The study area for this project was defined as all land over 200m in County Wicklow and neighbouring counties where the topography crossed county borders so that contiguous area would not stop at an administrative geographical boundary. In addition to this any relevant land (natural and semi-natural) overlapping with the 200m or directly adjacent to the 200m boundary were also included in the study area. Two datasets were used to determine the study area of this project, 1. Ordnance Survey Ireland (OSi) contour data and 2. Corine land cover classification data.

OSi contour data

This dataset was supplied under licence by Wicklow County Council. It provided elevation data in the form of contour polylines.

CORINE land cover classification data

CORINE (co-ordinated information on the environment) land cover data was devised as a means of compiling geo-spatial environmental information in a standardised and comparable manner across Europe (Lydon and Smith 2014). The data are derived by using remote sensing techniques to classify all land cover in Europe. In Ireland the Environmental Protection Agency (EPA) has been co-ordinating the project since 2000. The latest CORINE dataset (CORINE 2012) holds the most comprehensive and up to date dataset on land cover in Ireland. While the resolution and detail at the habitat level is limited it is a useful tool to indicate land parcels which have the potential to be managed to maintain and enhance upland biodiversity through vegetation management (e.g. 'land principally occupied by agriculture with areas of natural vegetation') and those that do not have the potential to be managed to maintain or enhance upland biodiversity through vegetation management (e.g. 'coniferous forest').

To create the study area both OSi and CORINE datasets were used. Firstly, a 200m elevation boundary was created in ArcMap by selecting all contours of 200m and above. The boundary of those areas selected was digitised creating a new 200m boundary layer. These were then displayed over the CORINE dataset. Using the 'select' functionality in ArcMap all semi-natural datasets (see Table 1) adjacent to the 200m boundary were selected. The new 200m boundary was then edited to include the additional adjacent semi-natural areas to create the study area dataset.

Land Cover Type	Code
Land principally occupied by agriculture with areas of natural vegetation	243
Broad-leaved forest	311
Mixed forest	313
Natural grassland	321
Moors and heathland	322
Transitional woodland scrub	324
Peat bogs	412

Table 1: List of natural/semi-natural land cover types adjacent to 200m elevation boundary used to create the study area boundary.

A total of 23 discrete sites were identified as 200m or over and/or with adjacent natural or semi-natural land cover types (Figure 1, Table 2). There is a large variation in site area with the largest, site 1 at 1066km² and site 23, the smallest at 0.08km². The study area crosses the Wicklow county

boundary to the north, west and south (Figure 1, Table 2). These contiguous areas of upland areas were included for the purposes of this study. A full list of CORINE land cover types within sites can be found in Appendix I.

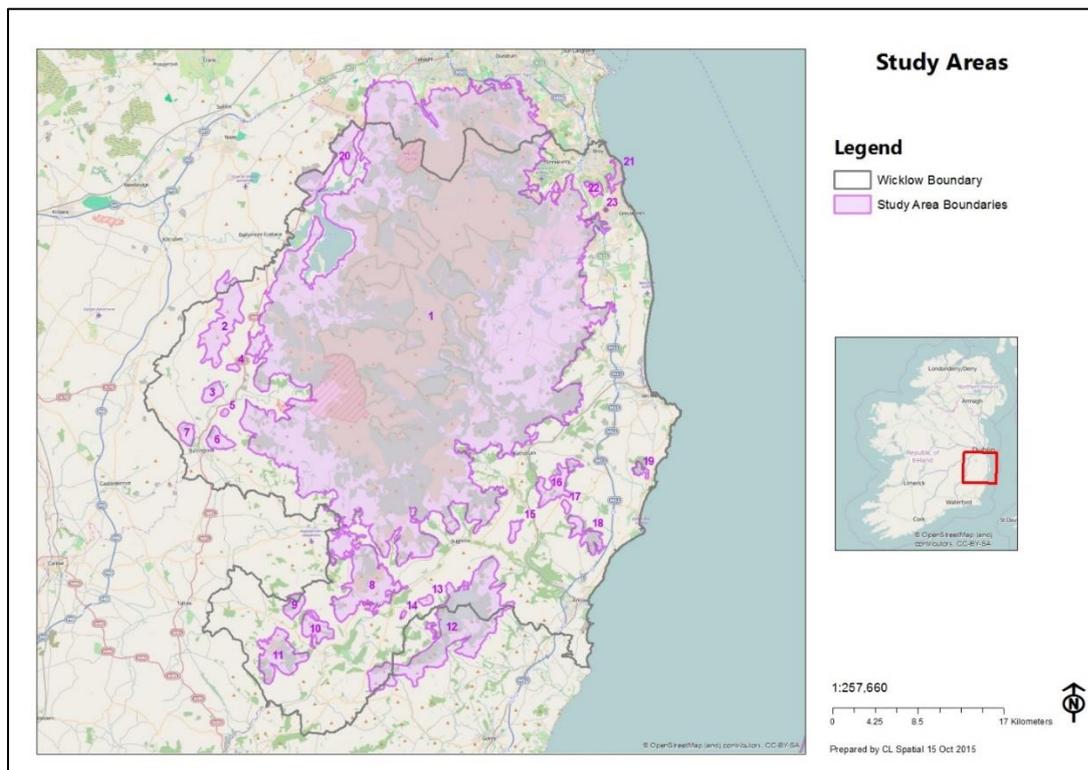


Figure 1: Map showing 23 sites within the study area.

Site number	Site Name
1	Wicklow and South Dublin Mountains
2	Friar Hill, Dunlavin
3	Ballyhook Hill, Stratford
4	Whitestown Upper
5	Saundersgrove Hill, Ballinacarrow
6	Baltinglass Hill
7	Tinoran Hill
8	Tinahely North
9	Seskin Hill
10	Shillelagh North
11	Stookeen
12	Wicklow/Wexford Uplands
13	Ballagh
14	Killaveny
15	Ballymoneen
16	Kilmacoo
17	Ballydonnell
18	Barranisky
19	Collon Hill
20	North West Uplands
21	Bray Head
22	Little Sargarloaf
23	Kindlestown Wood

Table 2: List of 23 sites with allocated site names

As mentioned above, site 1 is the largest of the sites within the study area. It is also the most significant in terms of its conservation interest. The Wicklow Mountains National Park, Wicklow Mountains SAC and Wicklow Mountains SPA (protected under national legislation and the EU Habitats and Birds Directives, Natural 2000) all fall within site 1 (Figure 2-4).

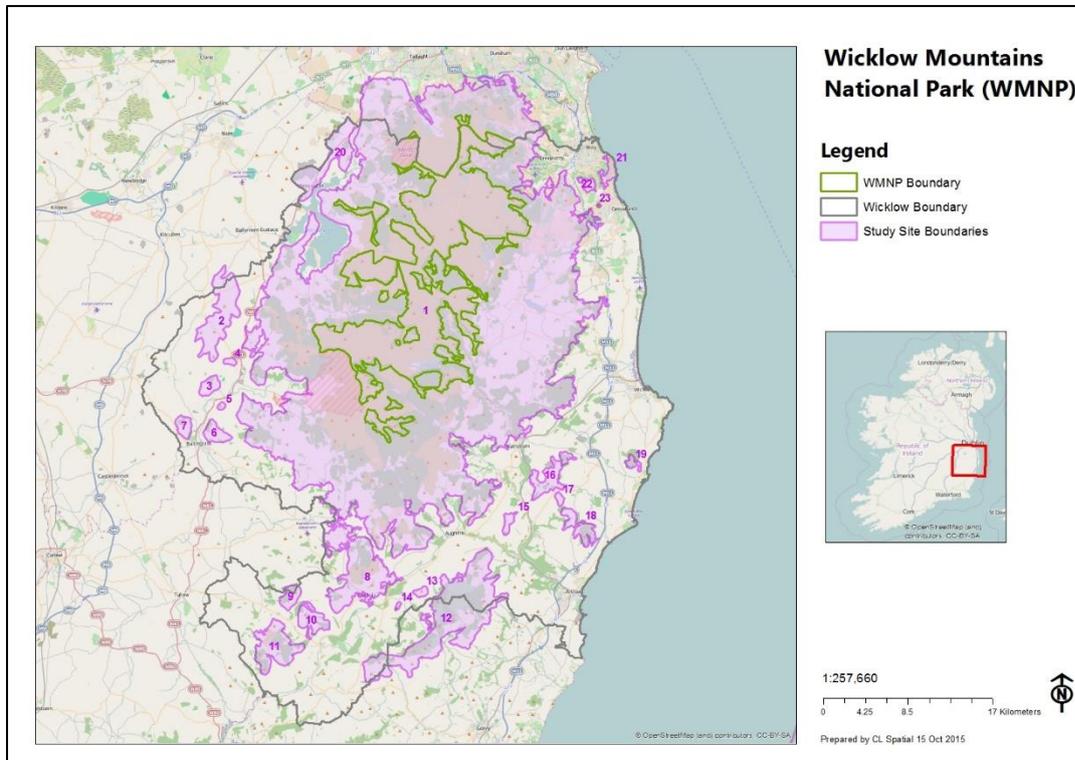


Figure 2: Map showing Wicklow Mountains National Park within site 1 of the study area.
The WMNP boundary is indicative and not legal as in areas the boundary overlaps with Coillte land.

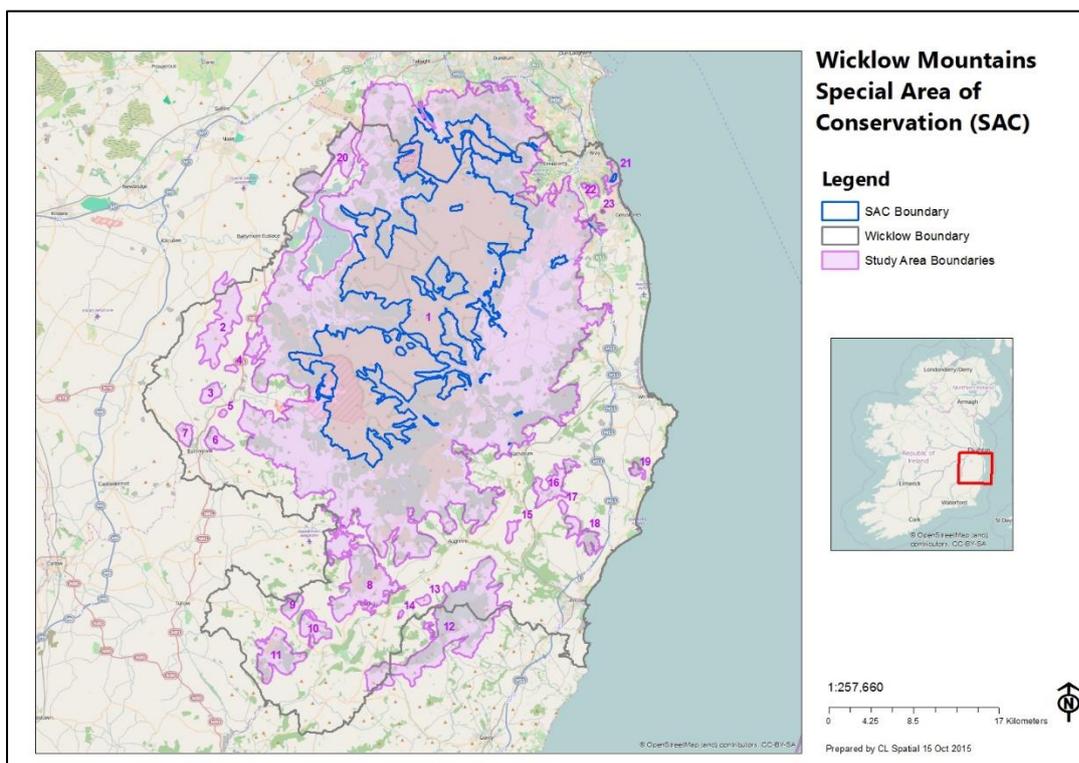


Figure 3: Map showing Wicklow Mountains SAC within site 1 of the study area.

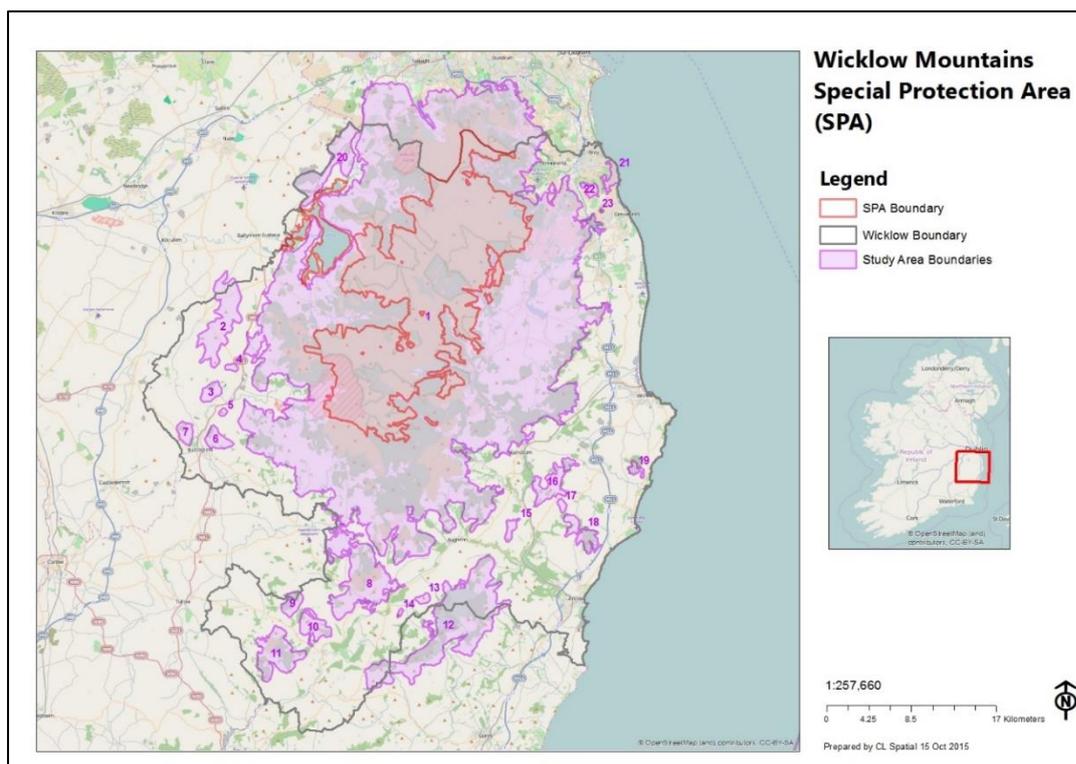


Figure 4: Map showing Wicklow Mountains SPA within site 1 of the study area.

2.3 Habitat datasets

Habitat data for this project was mainly sourced from National Parks and Wildlife Service and Wicklow County Council. Another much smaller dataset from the HNV farming research project was made available for this study but given the wide scope of this study and the access restrictions of the NNV data it was decided that these data would only be useful at later stages of the project. All the HNV data occur within the boundary of site 1 where there is already existing habitat data.

A total of 62 habitat datasets were collated. Of those a total of 26 occur within or overlap with the study area, however 6 are incomplete and others are only displayed at the 10km level or have access restricted (see Appendix II).

The majority of the habitat datasets provided by NPWS were classified using the Natura 2000 habitat classification and were created for reporting on the condition of Annex I habitats in Ireland (see Appendix II for a full list of habitat datasets available for this study). The survey areas of these datasets are very comprehensive and it was therefore agreed by the steering group to focus on the Natura 2000 Annex I habitats within Wicklow all of which are upland habitats and are listed in the SAC citation. Of particular interest was the area of priority Natura 2000 habitats outwith the SAC, SPA and National Park boundary.

While Fossitt level 2 was initially the preferred habitat classification for reporting in this study, the available Fossitt datasets were much smaller in area and overlapped with what was available for the Natura 2000 datasets. A decision was made by the vegetation management steering group to use the Natura 2000 habitat classification for reporting.

All habitat data presented in this report are indicative only, no ground-truthing of data was undertaken as part of this study.

2.4 Species datasets

The National Biodiversity Data Centre (NBDC, <http://maps.biodiversityireland.ie/#/Home>) was the source of all the species datasets for this study. There are over 700 species datasets available for County Wicklow. Given the volume of data available it was agreed by the steering group to focus on the priority species as outlined in the SAC and SPA citations. Using these priority species lists, data on those species was then downloaded from the NBDC website.

All species data presented in this report are indicative only, no ground-truthing of data was undertaken as part of this study.

3. Results

3.1 CORINE land cover data

The CORINE dataset was a useful indicator map of potential areas for upland vegetation management to maintain and enhance biodiversity. The most abundant land cover type across the study area was the 'peat bog' (412) type at 35,952 ha (Table 3). Of the 35,952 ha 'peat bog' (412) 34,790 ha are held within site 1. The next abundant land cover types across the study area are 'pastures' (231) at 26,409 ha and 'coniferous woodland' (312) at 22,780 ha. Other significant semi-natural land cover types across the study area include 'land principally occupied by agriculture with areas of semi-natural vegetation' (243) at 12,512 ha, 'natural grassland' (321) at 1,021 ha, 'moors and heathland' (322) at 6,977 ha and 'transitional woodland scrub' (324) at 12,471 ha.

Land Cover Class	Land Cover Code	Area (ha)
Discontinuous urban fabric	112	329.54
Road and rail networks and associated land	122	0.18
Mineral extraction sites	131	107.25
Dump	132	217.86
Sport and leisure facilities	142	269.30
Non-irrigated arable land	211	500.91
Pastures	231	26,409.75
Complex cultivation systems	242	212.28
Land principally occupied by agriculture with areas of semi-natural vegetation	243	12,513.85
Broad-leaved woodland	311	1,250.37
Coniferous woodland	312	22,780.28
Mixed woodland	313	1,661.47
Natural grassland	321	1,021.99
Moors and heathland	322	6,977.37
Transitional woodland scrub	324	12,471.27
Sparsely vegetated areas	333	72.54
Peat bogs	412	35,952.45
Water bodies	512	527.98

Table 3: List of land cover types and their areas in hectares within the study area boundary.

3.2 Habitat datasets

The habitat data presented here (Table 4) refer to the 11 Annex I protected habitats notified under the Habitats Directive for the Wicklow Mountains SAC. One of the datasets, Blanket Bog (7130) is incomplete for County Wicklow and cannot be used for this project and the dataset for Natural dystrophic lakes and ponds (3160) is only available at a 10km resolution and therefore areas cannot be calculated for this project. Data for the Calcareous Scree habitat are also incomplete. NPWS undertook a national assessment of the status of the habitats that Ireland is required to protect under the EU Habitats Directive (NPWS 2008). These results are presented and discussed below.

Natura 2000 Habitat (Annex I)	Natura 2000 Code	Area (ha)	NPWS Condition Assessment	Figure no.
Alpine and Boreal Heath	4060	36,410.12	Poor	5
Atlantic Wet Heath	4010	34,367.10	Bad	6
European Dry Heath	4030	15,038.16	Bad	8
Species Rich <i>Nardus</i> Grasslands	6230	34.17	Poor	9
Mesotrophic Standing Waters	3130	533.11	Bad	10
Old Oak Woodlands	91A0	158.87	Poor	11
Siliceous Scree	8110	456.89	Poor	12
Calcareous Scree	8210	Present	Poor	13
Siliceous Rocky Scree	8220	689.46	Poor	14
Blanket Bog	7130	15,952.17	Bad	7
Natural Dystrophic Lakes and Ponds	3160	Present	Bad	15

Table 4: List of Annex I habitats and their areas in hectares within the study area boundary.

Alpine and boreal heath 4060 is the most abundant Annex I habitat across the study area (Figure 5). This habitat comprises 36,410 ha of the study area with 34,986 ha occurring in site 1 and 31,666 ha within the SAC boundary. Sites 8 and 12 hold 1045 ha and 286 ha of alpine and boreal heath respectively. This habitat is under threat nationally from afforestation, burning, sheep grazing and leisure activities such as hill walking and quad bikes (NPWS 2008). This habitat is in 'poor' conservation status for those reasons (NPWS 2008).

Atlantic wet heath 4010 is the second most abundant Annex I habitat across the study area (Figure 6). Of the 34,367 ha of Atlantic wet heath available across the study area site 1 holds 34,227 ha, with 31,469 ha of the habitat in site 1 protected by the SAC. Other significant areas of Atlantic wet heath occur at the north east and south east of site one. Both of these areas are not designated. Reclamation, afforestation and burning have resulted in significant losses in this habitat, especially in the west (NPWS 2008). The overall conservation status of this habitat is 'bad' (NPWS 2008).

Blanket Bog 7130 is the third most abundant Annex I habitat across the study area (Figure 7). Again it is concentrated in the SAC area of the Wicklow uplands with satellite areas to the east of the SAC boundary within site 1. Blanket bogs depend on maintenance of surface water flow patterns at a landscape level (NPWS 2008) and as such are sensitive to and are affected by land management practices in the surrounding area. Current pressure includes over stocking, peat extraction, burning and development (NPWS 2008). The blanket bog habitat nationally is in 'bad' condition due to these pressures and threats (NPWS 2008).

It is clear from Figures 5, 6 and 7 that there is significant overlap between these three upland habitats as they have similar characteristics and the habitats often occur in mosaics making it difficult to map discrete areas of each habitat. However, all three habitats are under threat and in 'poor' or 'bad' condition.

The distribution of **European dry heath 4030** is a lot more fragmented throughout the study area (Figure 8). It covers an area of 15,038 ha with 14,209 ha occurring in site 1. Sites 8 and 12 both hold significant areas of the habitat comprising 275 and 343 ha respectively. Smaller areas of this habitat can be found in sites 21 (Bray Head), 9 and 11. This habitat was also found to be in 'poor' condition nationally (NPWS2008).

The area of **species rich *Nardus* grasslands 6230** is the smallest area of habitat present in the study area covering just 34.17 ha (Figure 9). This upland habitat is under great threat from both over-

grazing and abandonment and large areas have been lost nationally (NPWS 2008). Species rich *Nardus* grassland was found to be in 'bad' condition (NPWS 2008).

The distribution of **mesotrophic standing waters 3130** is concentrated within site 1 only (Figure 10). These are mainly upland lakes that have low levels of nutrients and minerals. The main threat to this habitat is eutrophication through diffuse pollution from agricultural land. The overall conservation status of this habitat is 'bad'. (NPWS 2008).

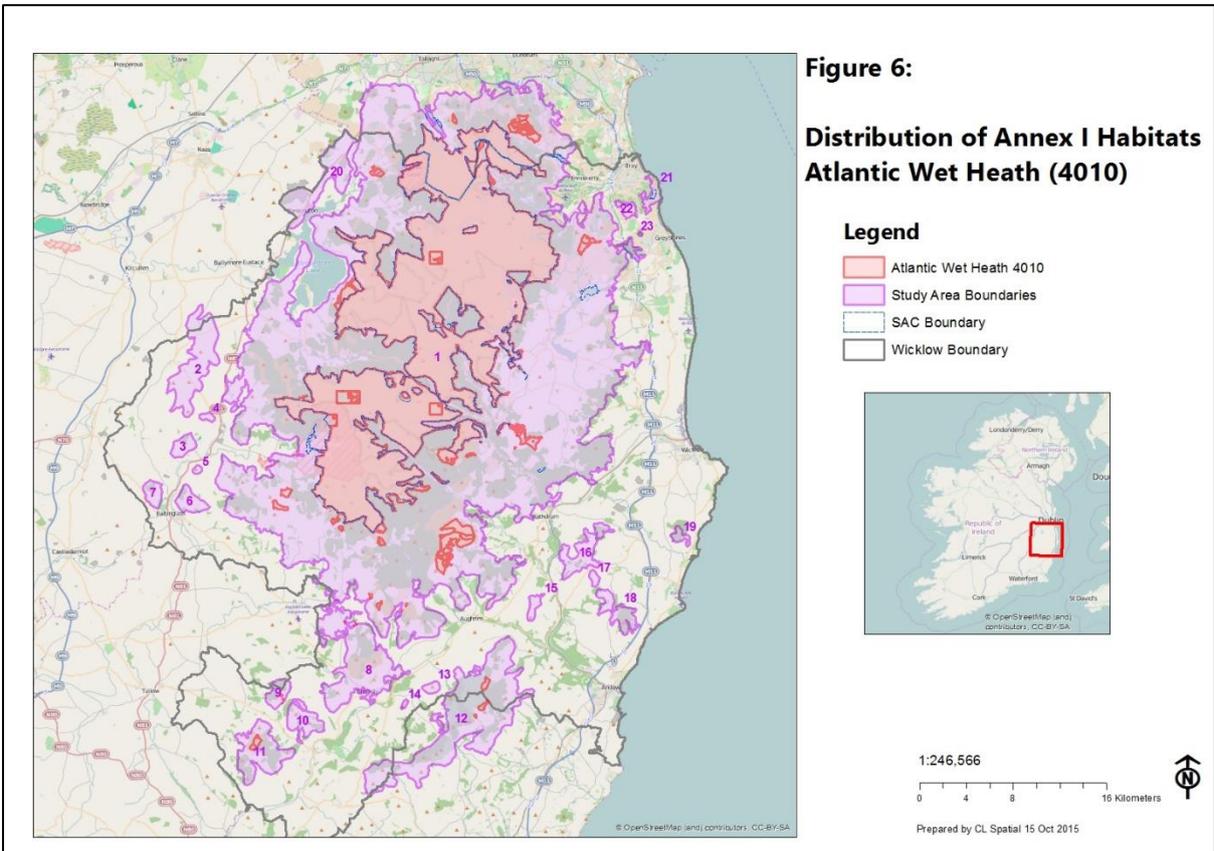
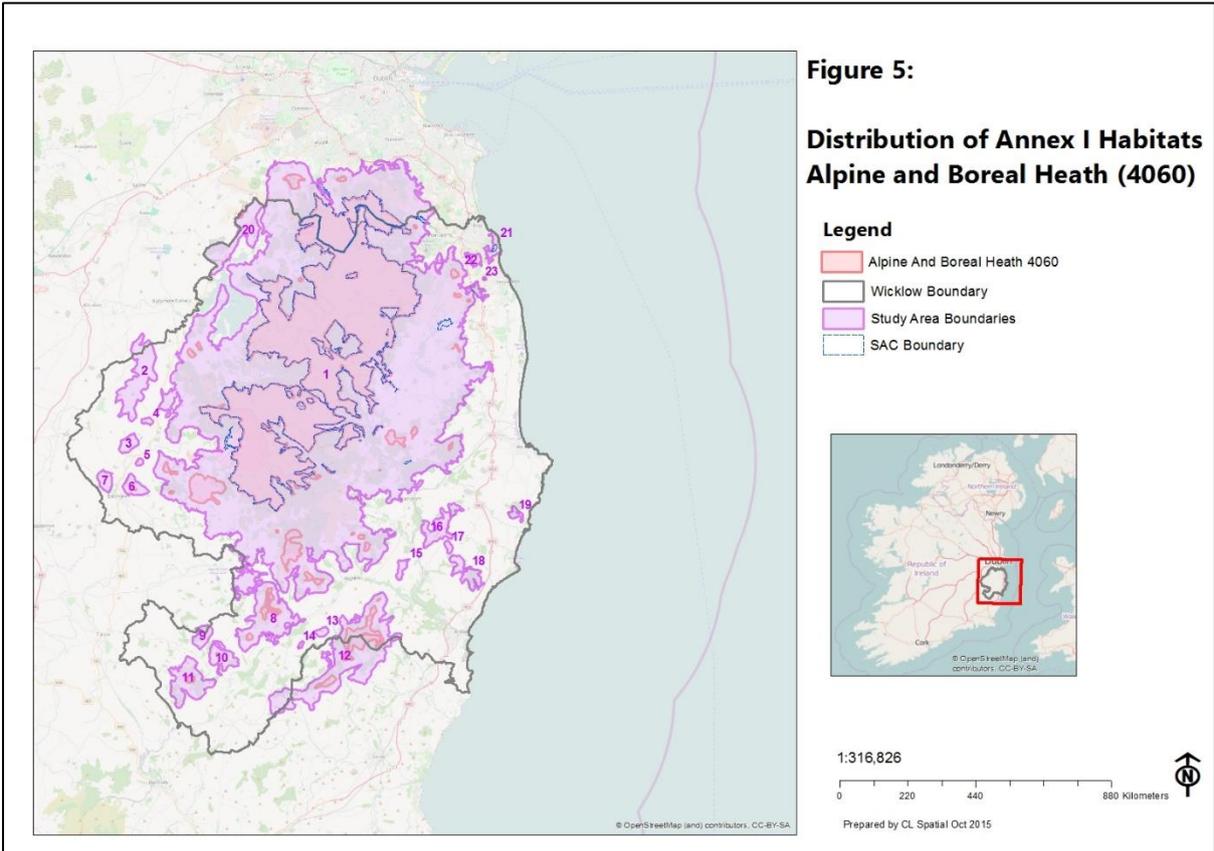
The distribution of **old oak woodlands 91A0** habitat is fragmented within site 1 (Figure 11). This habitat holds many of the bird species designated under Annex II of the habitats directive. This habitat has declined through woodland clearance. The conservation status of this habitat is 'bad'.

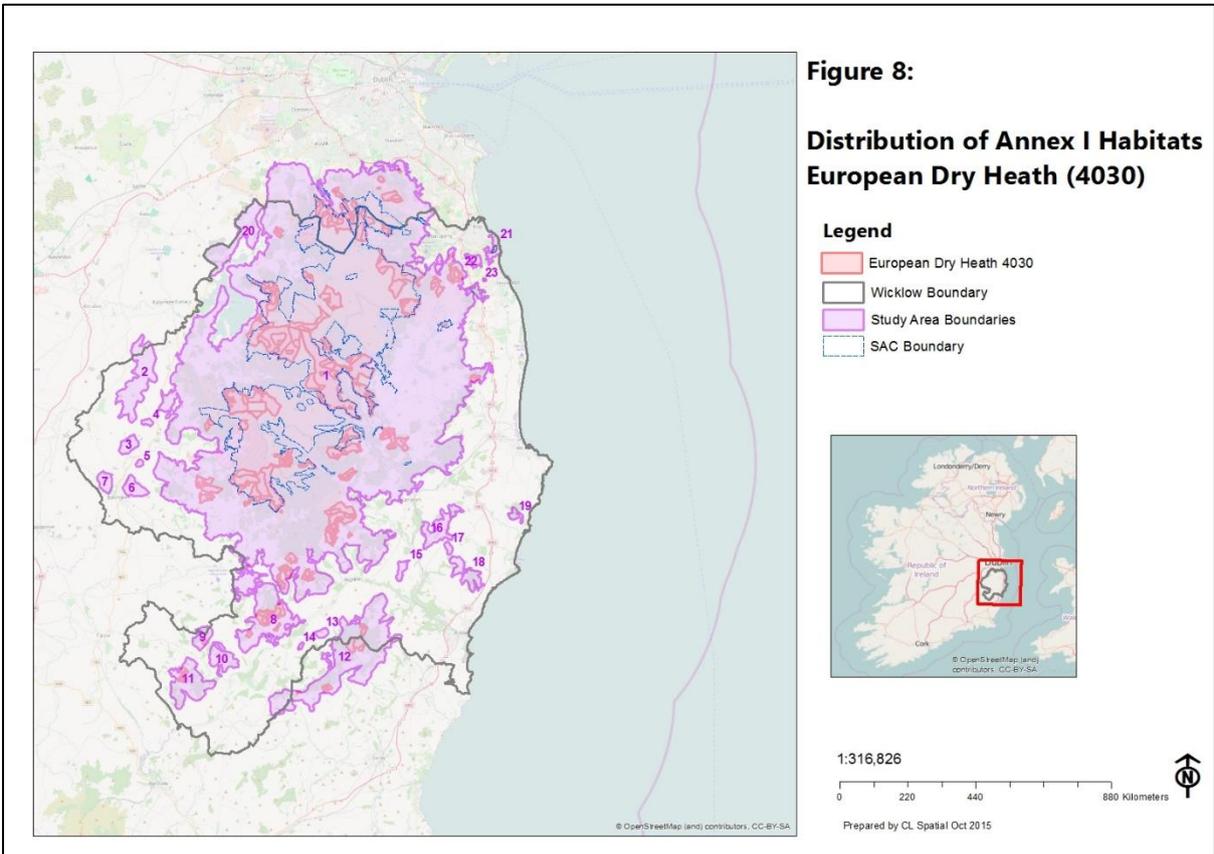
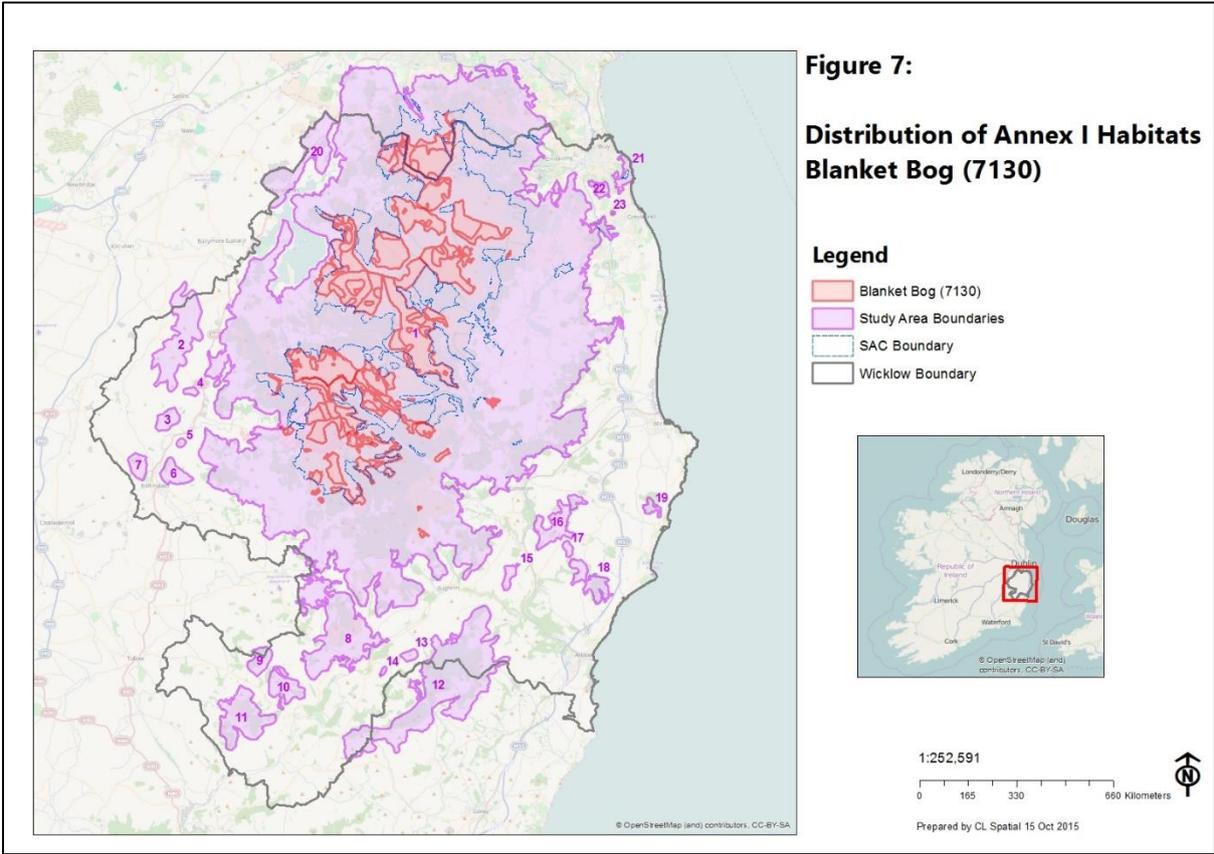
Siliceous scree 8110 habitats consist of rock fragments covering exposed upland summits or accumulating on slopes below cliffs (Figure 12). This habitat is under threat from rock-climbing, hill walking and potentially grazing although this is not formally assessed. The conservation status of this habitat is 'poor'.

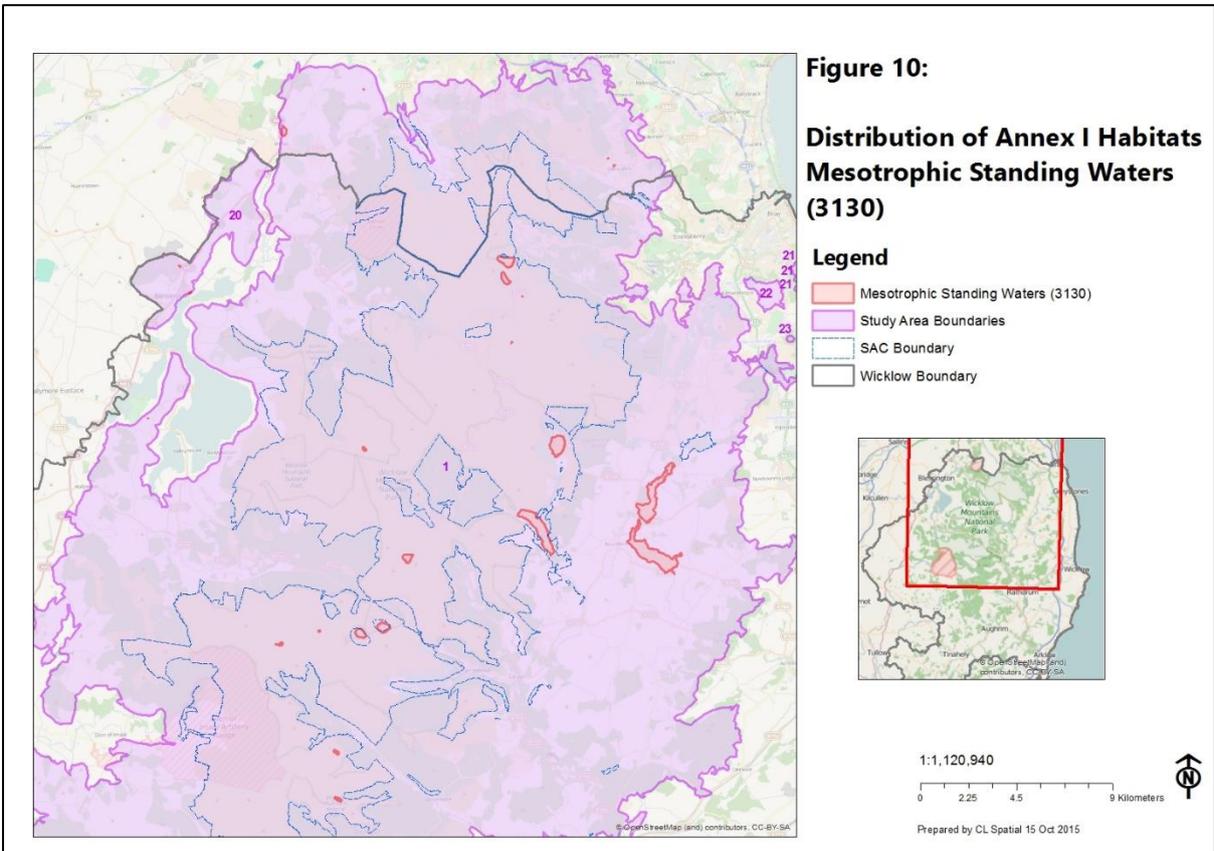
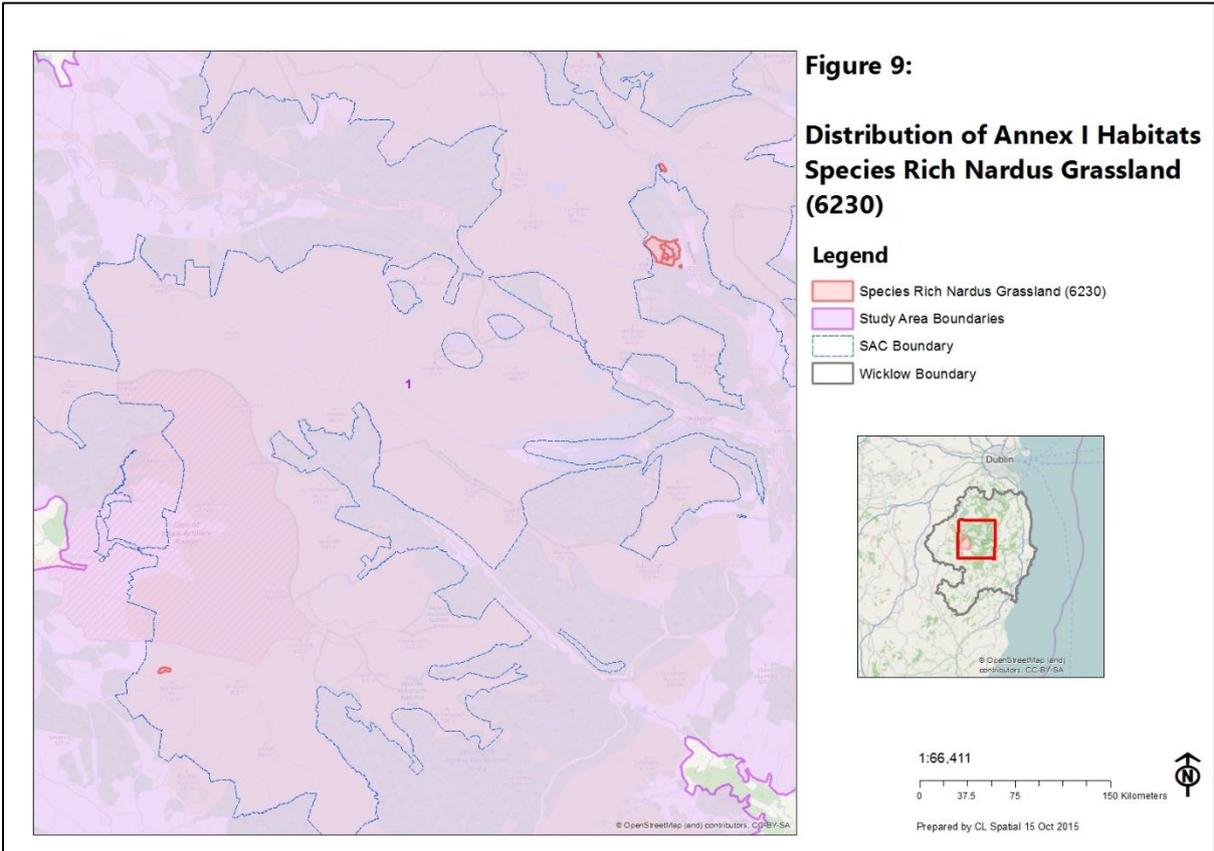
Although the **calcareous scree 8210** habitat is documented in the Wicklow Mountains SAC the exact location is not known as the data are incomplete (Figure 13). This conservation status of this habitat (which mostly occurs in Sligo and Leitrim) has been assessed as 'poor' due to threats from rock climbing and hill walking.

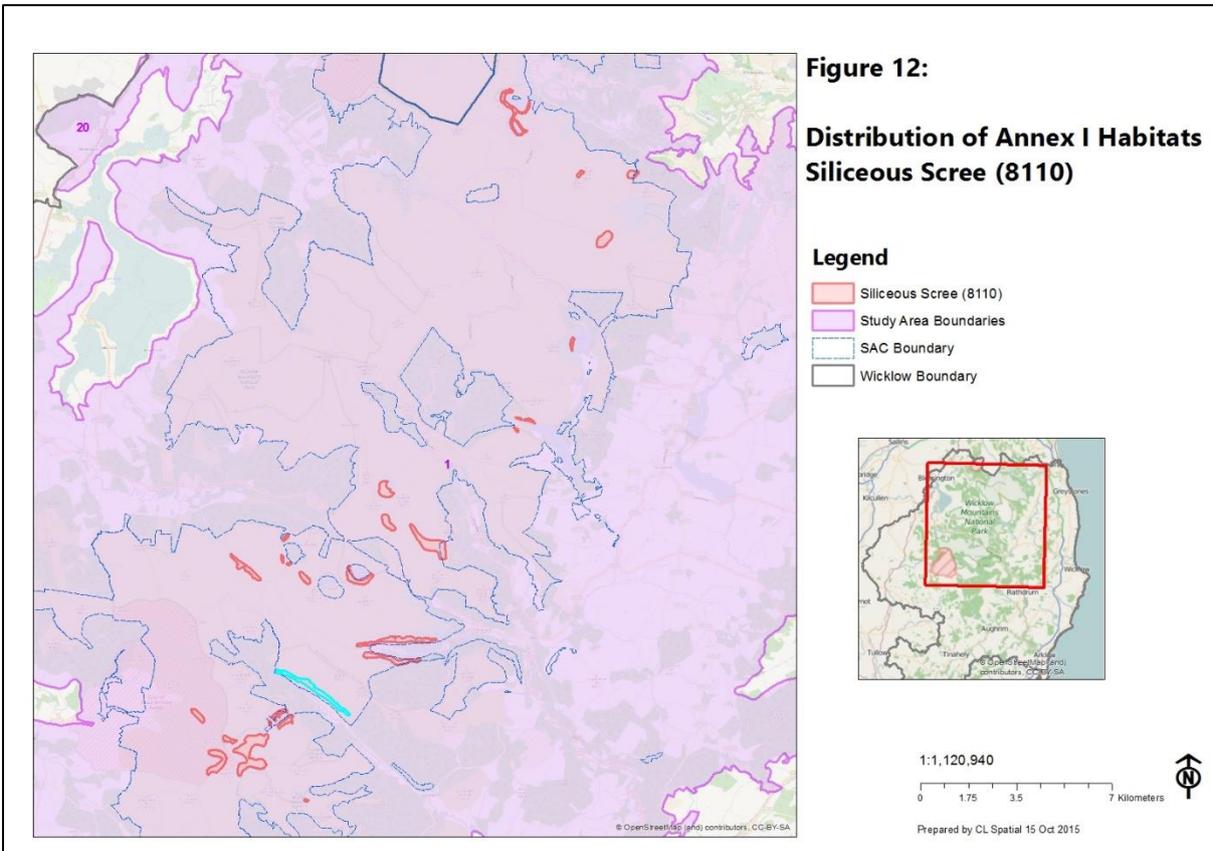
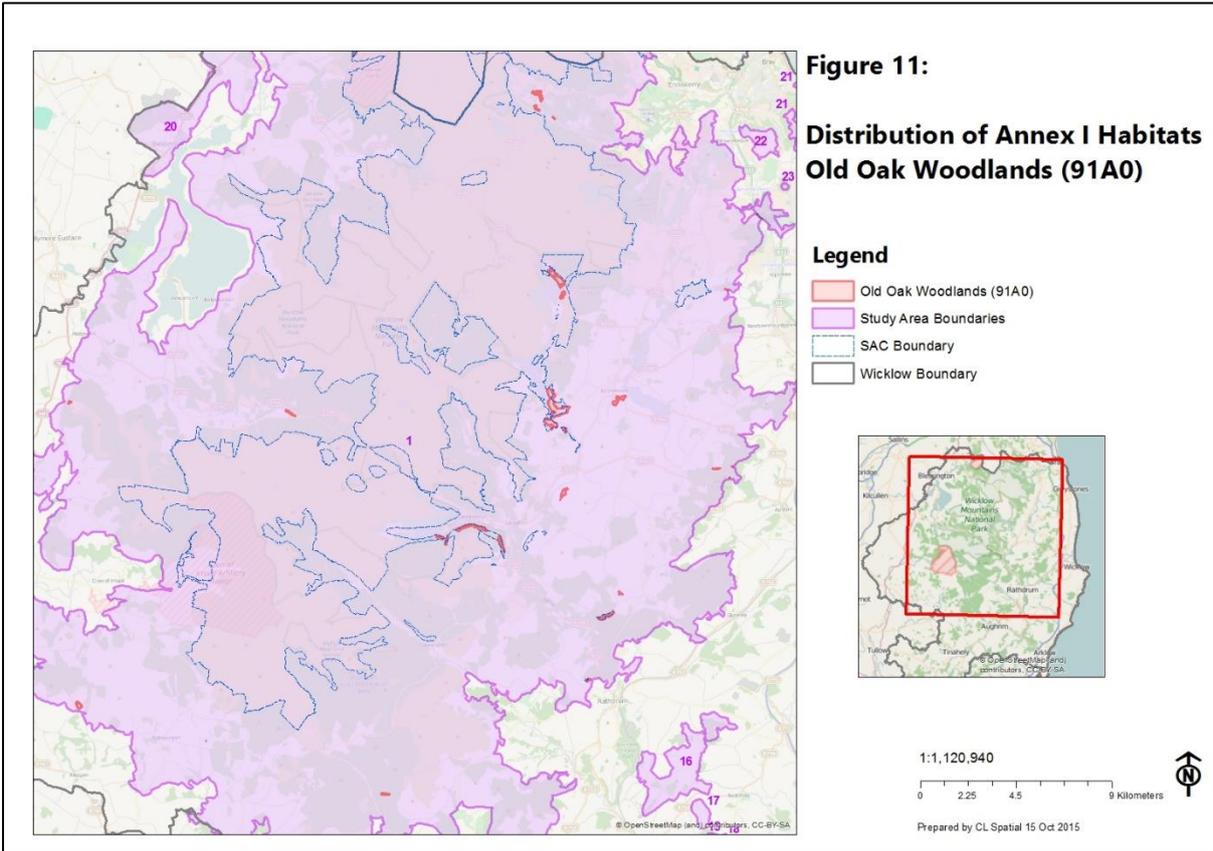
The **siliceous rocky slopes 8220** habitat consists of plant communities that colonise the cracks and fissures of upland rock faces. This habitat is located at altitudes over 350m. The habitat is quite localised in the Wicklow uplands again concentrated at site 1 (Figure 14). The habitat is under threat from hill walking and climbing and as such as been assessed as 'poor' conservation status. (NPWS 2008).

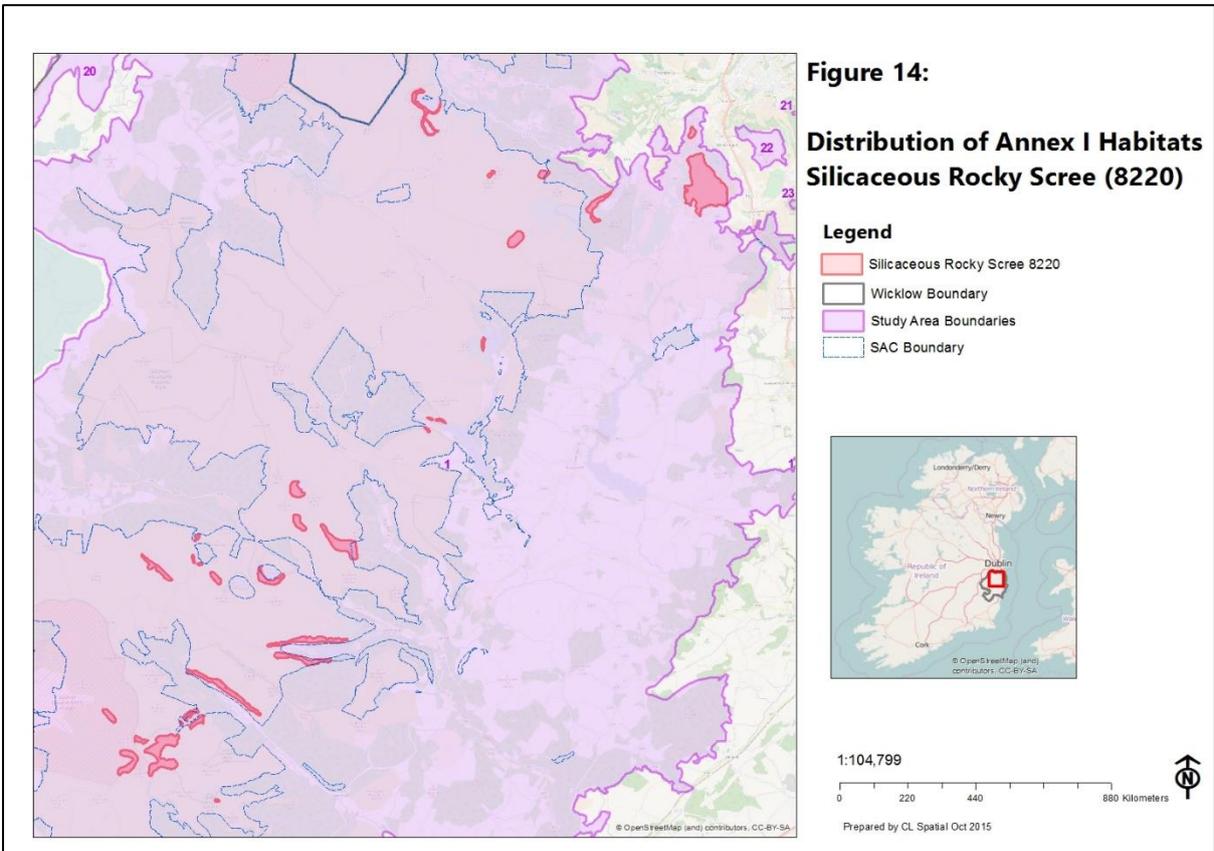
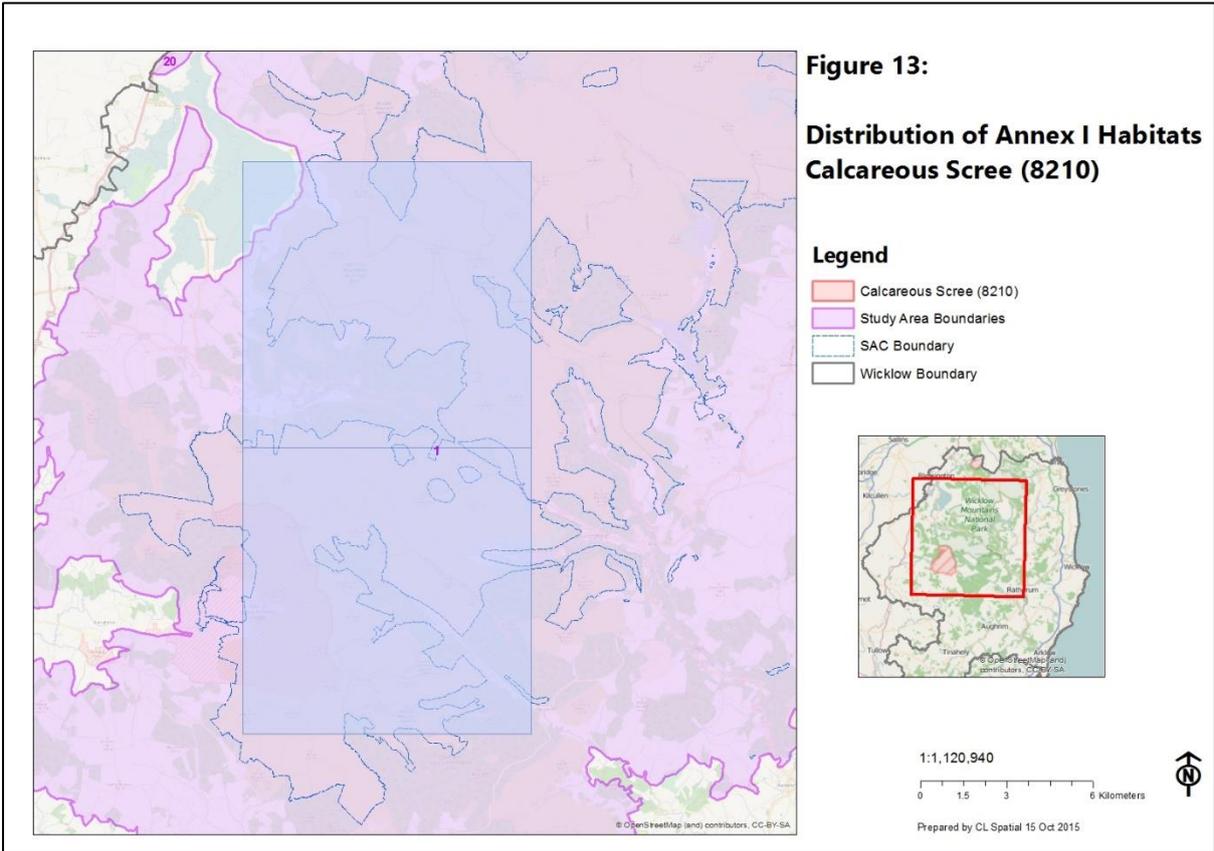
Dystrophic lakes 3160 are natural lakes and ponds with brown tinted water due to the presence of peat and humic acids. They generally occur in bogs. The distribution data for Wicklow are incomplete at present (Figure 15). The principal threats to this habitat are peat cutting, overgrazing and afforestation of peatland habitats. The overall status of this habitat is considered to be 'bad'. (NPWS 2008).

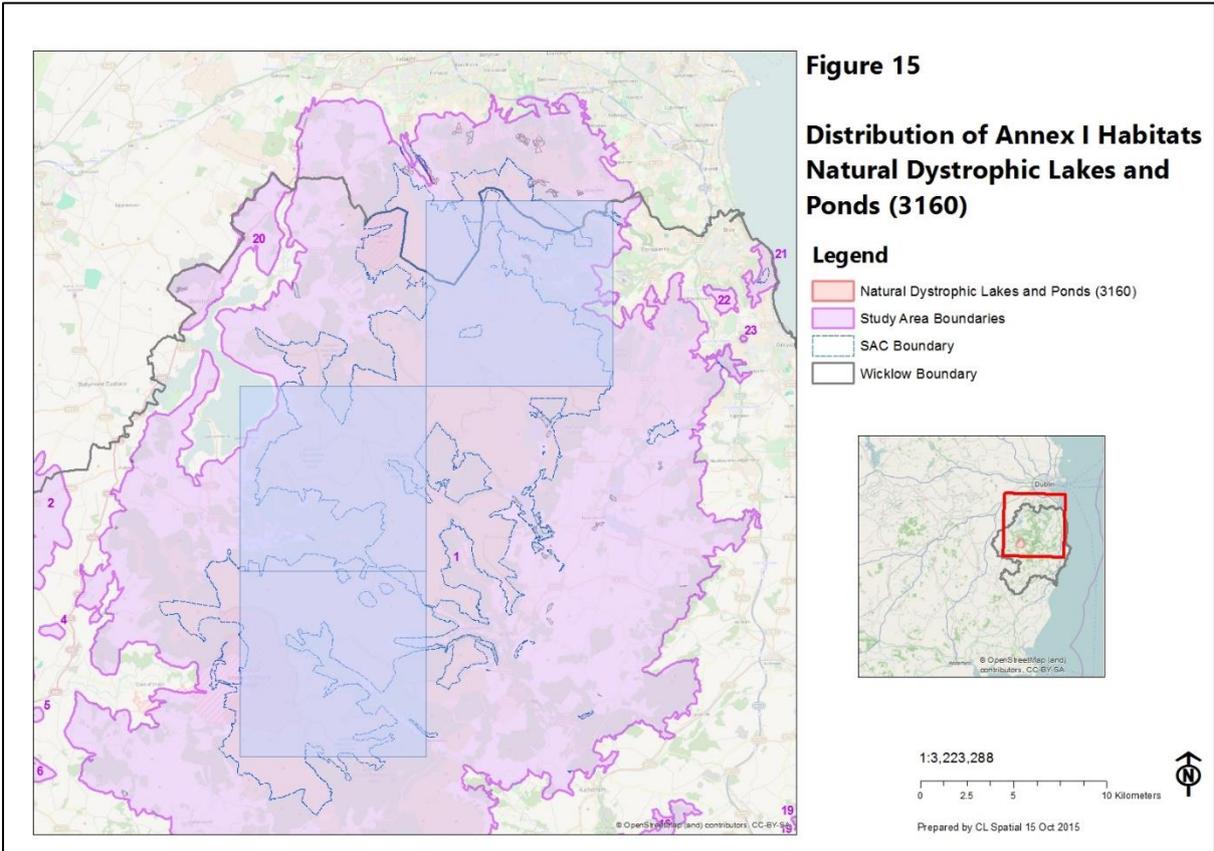












3.3 Species datasets

The species data presented here (Table 5) refer to the 11 species referred to and listed in Annex I & II of the Birds Directive and under Annex II, IV and V of the Habitats Directive and a further 24 species of conservation importance in Ireland. All of the species datasets were downloaded from the National Biodiversity Data Centre (NBDC) (www.biodiversity.ie) which acts as a central repository for all species data in Ireland. There were gaps in the data for some species (see Table 4 for further details). See Figures 16 – 46 for distribution maps within the study area. All data are presented at the 10km grid square resolution. Some datasets are available at a finer resolution but for the purposes of this project it was decided to present the data as presence/absence in all 10km squares for consistency.

Species name	Conservation status*	Habitat association	Data source	Figure no.
BIRDS				
<i>Falco columbaris</i> Merlin	BI, HII	Open moorland, bog	Bird Atlas 2007-2011	16
<i>Falco peregrinus</i> Peregrine falcon	BI, HII	Mountain cliffs	Bird Atlas 2007-2011	17
<i>Ficedula hypoleuca</i> Pied flycatcher	HII	Oak woodland	Bird Atlas 2007-2011	18
<i>Mergus merganser</i> Goosander	HII,	Aquatic	Bird Atlas 2007-2011	19
<i>Phoenicurus phoenicurus</i> Redstart	HII, BII	Broadleaf woodland	Bird Atlas 2007-2011	20
<i>Phylloscopus sibilatrix</i> Wood warbler	HII, BII	Irish population breed in oak woodland in Wicklow	Bird Atlas 2007-2011	21
<i>Saxicola rubetra</i> Whinchat	HII, BII R	Meadows and bracken covered slopes in uplands	Bird Atlas 2007-2011	22
<i>Sylvia atricapilla</i> Blackcap	HII	Deciduous woodlands, hedgerows and gardens	Bird Atlas 2007-2011	23
<i>Sylvia borin</i> Garden warbler	HII, BII	Dense deciduous woodland	Bird Atlas 2007-2011	24
<i>Turdus torquatus</i> Ring ouzel	HII, BII, R	Scree slopes in mountainous terrain with limited vegetation.	Bird Atlas 2007-2011	25
<i>Lagopus lagopus</i> Red grouse	I, R	Heather moorland	Bird Atlas 2007-2011	26
<i>Circus cyaneus</i> Hen harrier	BI	Heather moorland	Bird Atlas 2007-2011	27
<i>Milvus milvus</i> Red kite		Broadleaf woodland, farmland, pasture, heathland	Bird Atlas 2007-2011	28
PLANTS				
<i>Alchemilla alpine</i> Alpine lady's mantle	R	Mountain tops	No species distribution data	
<i>Saussurea alpine</i> Alpine saw-wort	R	Bogs, marsh, birch woodland	No species distribution data	
<i>Cryptogramma crispa</i> Parsley fern	R	Rocky outcrops	No species distribution data	
<i>Nitella gracilis</i> Slender stonewort	R	Acidic lakes and pools	No species distribution data	
<i>Oreopteris limbosperma</i> Mountain fern	O	Open woodland, peaty	National Vegetation Database	29
<i>Hammarbya paludosa</i> Bog orchid	R	Mountains and bogs	Atlas of vascular plants 2012-2020	30
MAMMALS				
<i>Lutra lutra</i> Otter	HII	Aquatic	Atlas of Mammals in Ireland 2010-1015	31
<i>Erinaceus europaeus</i>	R, I	Bordering deciduous	Atlas of Mammals in	32

Hedgehog		woodland, scrub, grassland	Ireland 2010-2015	
<i>Lepus timidus hibernicus</i> Irish hare	R, E, I, HV	Moorland, coastal grasslands	Atlas of Mammals in Ireland 2010-2015	33
<i>Martes martes</i> Pine marten	R, HV	Coniferous and mixed woodland	Atlas of Mammals in Ireland 2010-2015	34
<i>Meles meles</i> Badger	R, I	Deciduous and mixed woodland	Atlas of Mammals in Ireland 2010-2015	35
<i>Myotis daubentoni</i> Daubenton's bat	R, I, HIV	Woodland and open water	National Bat Database of Ireland	36
<i>Myotis mystacinus</i> Whiskered bat	R, I, HIV	Woodland and open water	National Bat Database of Ireland	37
<i>Myotis nattereri</i> Natterer's bat	R, I, HIV	Woodland, hedgerow and pasture	National Bat Database of Ireland	38
<i>Nyctalus leisleri</i> Leisler's bat	R, I, HIV	Woodland species	National Bat Database of Ireland	39
<i>Pipistrellus pipistrellus</i> Pipistrelle's bat	R, I, HIV	Open water, semi-natural grassland, houses	National Bat Database of Ireland	40
<i>Plecotus auritus</i> Brown long eared bat	R, I, HIV	Open deciduous and coniferous woodland	National Bat Database of Ireland	41
<i>Sciurus vulgaris</i> Red squirrel	I	Coniferous and mixed woodland	Atlas of Mammals in Ireland 2010-2015	42
INVERTEBRATES				
<i>Quercusia quercus</i> Purple hairstreak	HII	Woodland	Irish Butterfly Monitoring Scheme, Butterflies of Ireland	43
<i>Euphydryas aurinia</i> Marsh fritillary	R	Devil's bit scabious food plant	All Ireland Marsh Fritillary Database	44
AMPHIBIANS				
<i>Rana temporaria</i> Common frog	HII, HIV	Aquatic and marsh habitats	National Frog Database	45
<i>Triturus vulgaris</i> Smooth newt	HII	Aquatic and marsh habitats	National Newt Survey	46
FISH				
<i>Salvelinus alpinus</i> Arctic char	HII	Lough Dan	No species distribution data	

*Conservation status: HI = Annex I habitats directives, HII = Annex II habitats directive, HIV/V = Annex IV/V habitats directive, BI = Annex I birds directive, BII = Annex II birds directive, R = Red data list, E = Endemics, I = International conventions, O = other.

Table 5: List of protected and threatened species within the study area (Balmer *et al.* 2013, Colhoun *et al.* 2013, .

Species data sources accessed via NBDC

Bird Atlas 2007-2011

This dataset contains bird records from the Bird Atlas 2007-2011: The breeding and wintering birds of Britain and Ireland (Balmer *et al.* 2013). Bird records from every 10km square were collected which were used to describe the distribution range. The bird data illustrated in this report are presence/absence data for both winter and summer.

National Vegetation Database

The National Vegetation Database (NVD) was established by NBDC in 2007 in conjunction with NPWS. It is a central repository for Irish vegetation surveys. This dataset includes vascular plant data extracted from the NVD as species records.

Atlas of Vascular Plants

This dataset is collated by the NBDC from different sources. Data are captured through an online records submission form by the general public. Data are validated and verified by NBDC species experts.

Atlas of Mammals in Ireland

This dataset is collated by NBDC from different data sources. Data are captured through online record submissions from the public. Data are validated by national experts.

National Bat Database of Ireland

This dataset contains records of bat observations received and maintained by Bat Conservation Ireland (BCI). The data originate from various surveys undertaken by BCI and their members.

Irish Butterfly Monitoring Scheme

This dataset was established in 2007 by NBDC. It is a volunteer survey and data are captured using an online submission form.

All Ireland Marsh Fritillary database

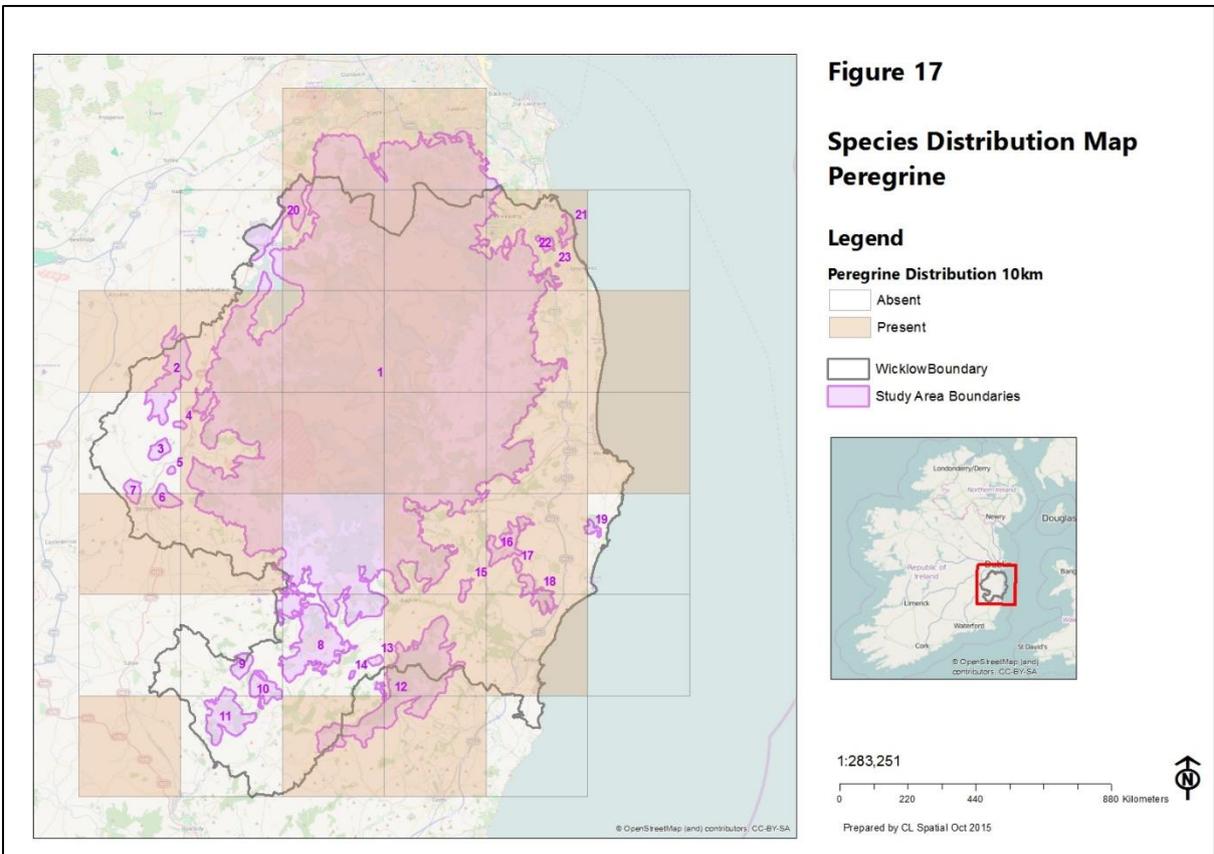
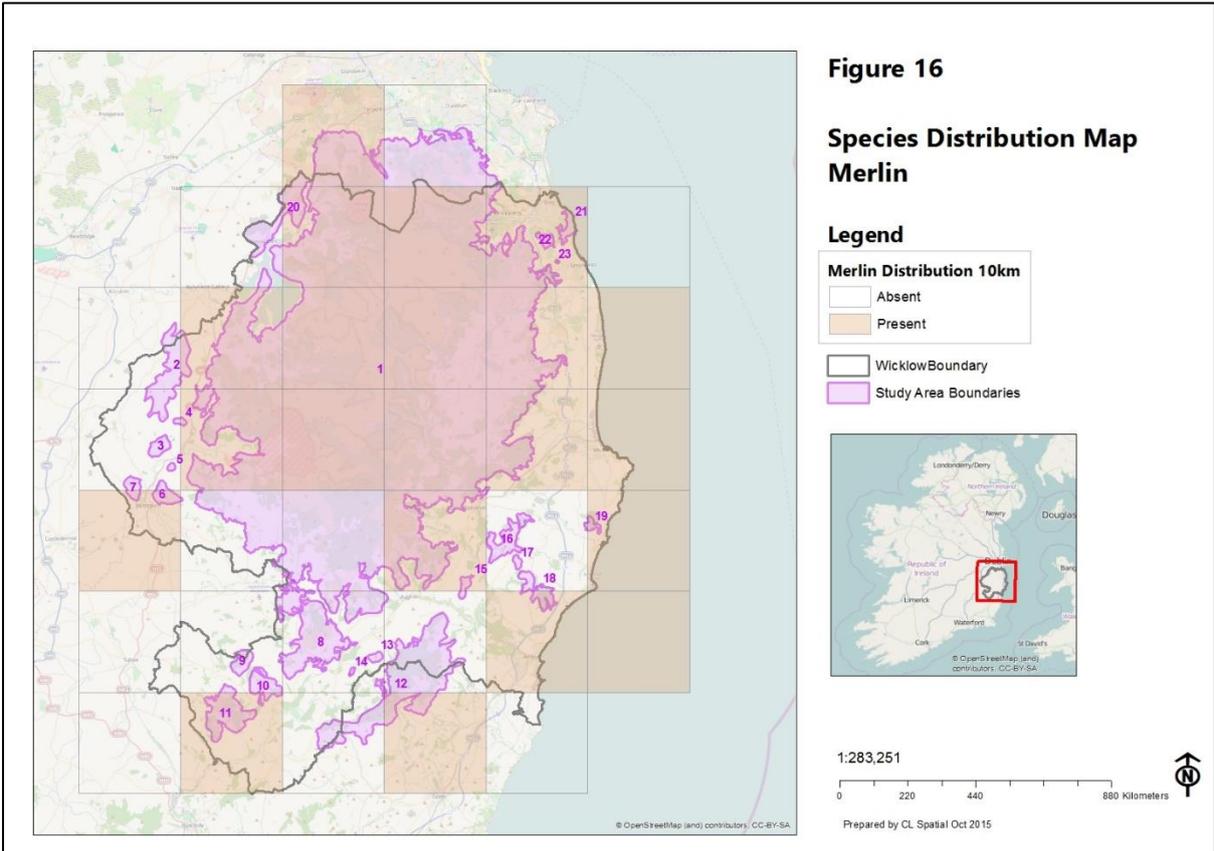
This dataset contains records from the marsh fritillary monitoring scheme collated by the NBDC

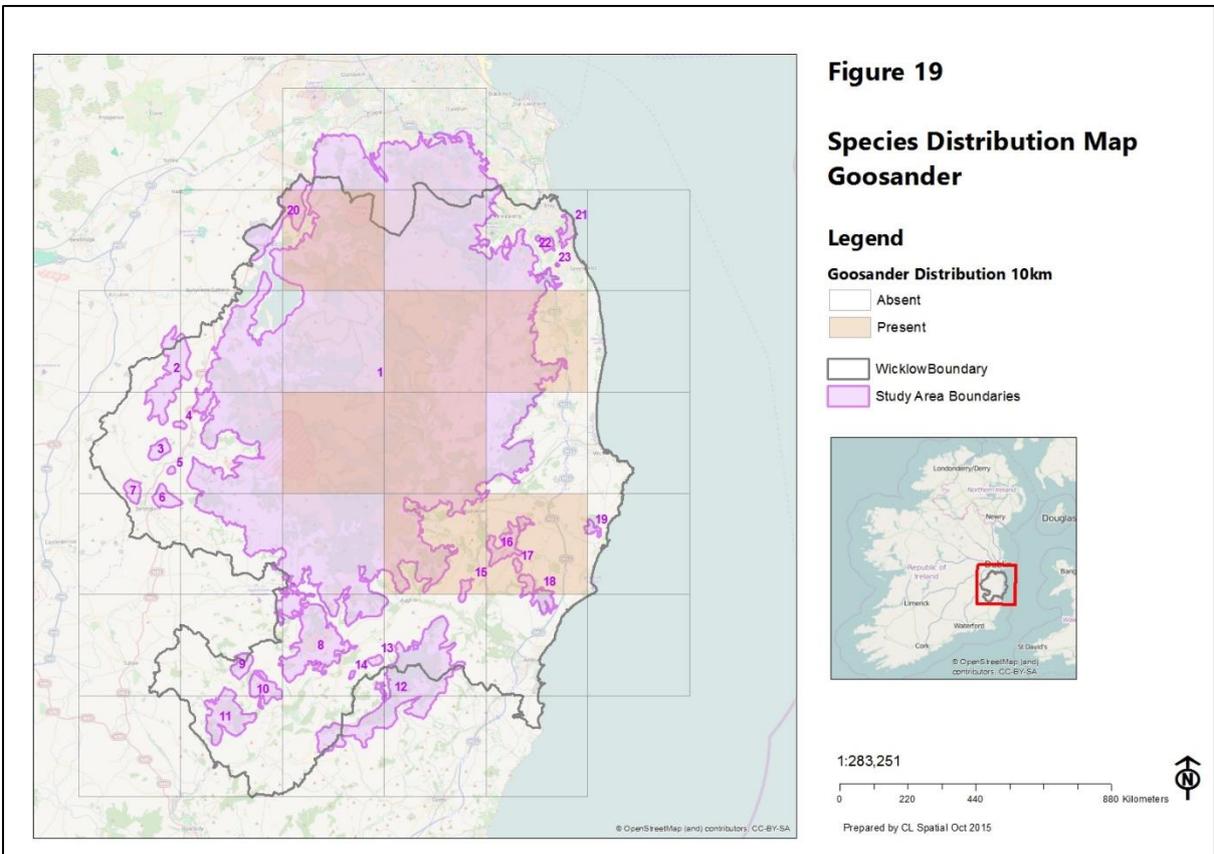
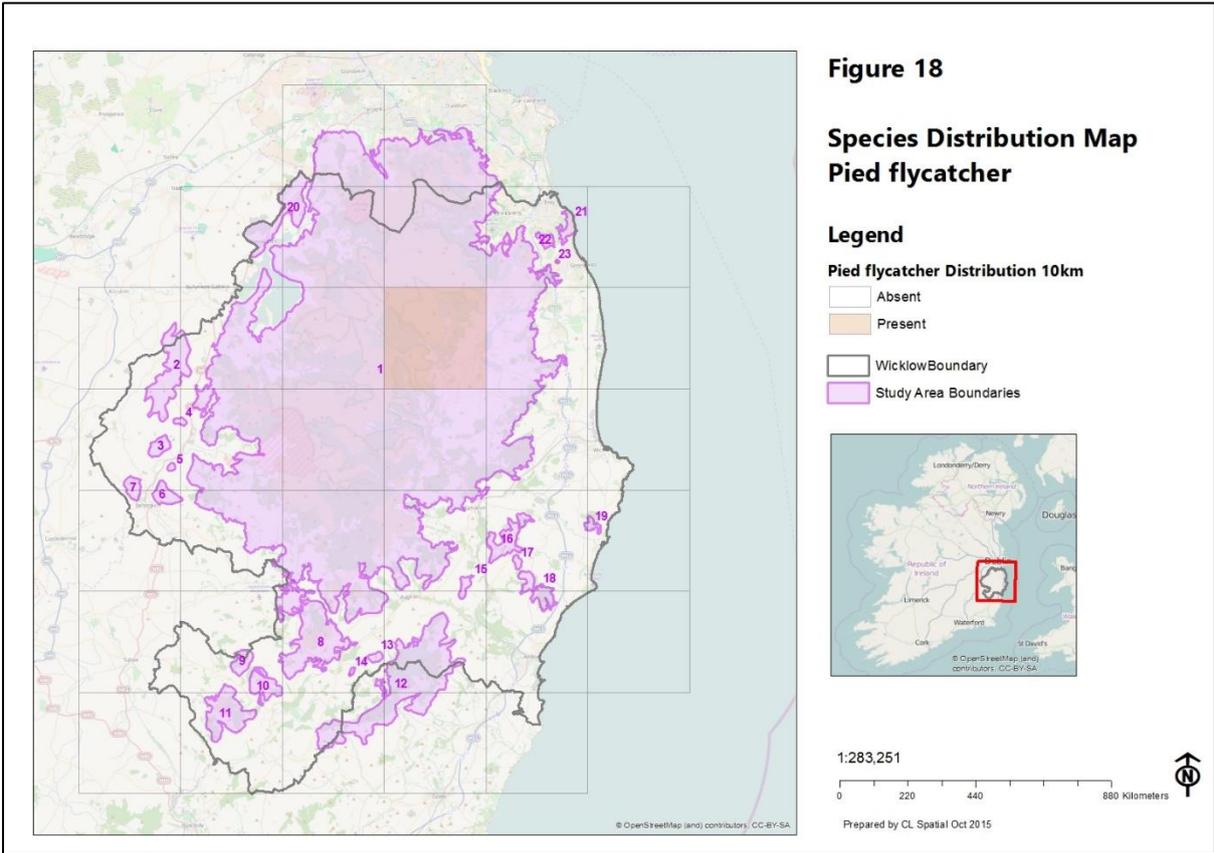
National Frog Survey of Ireland

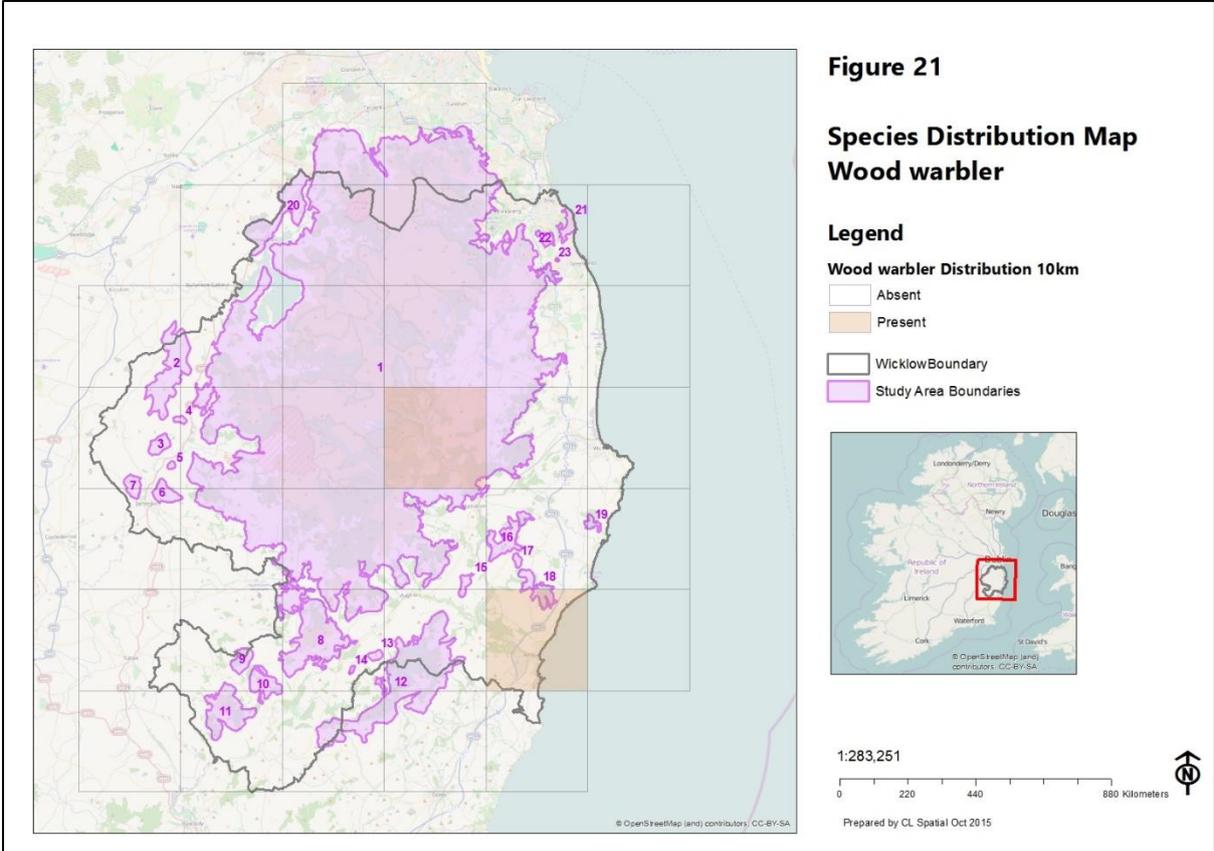
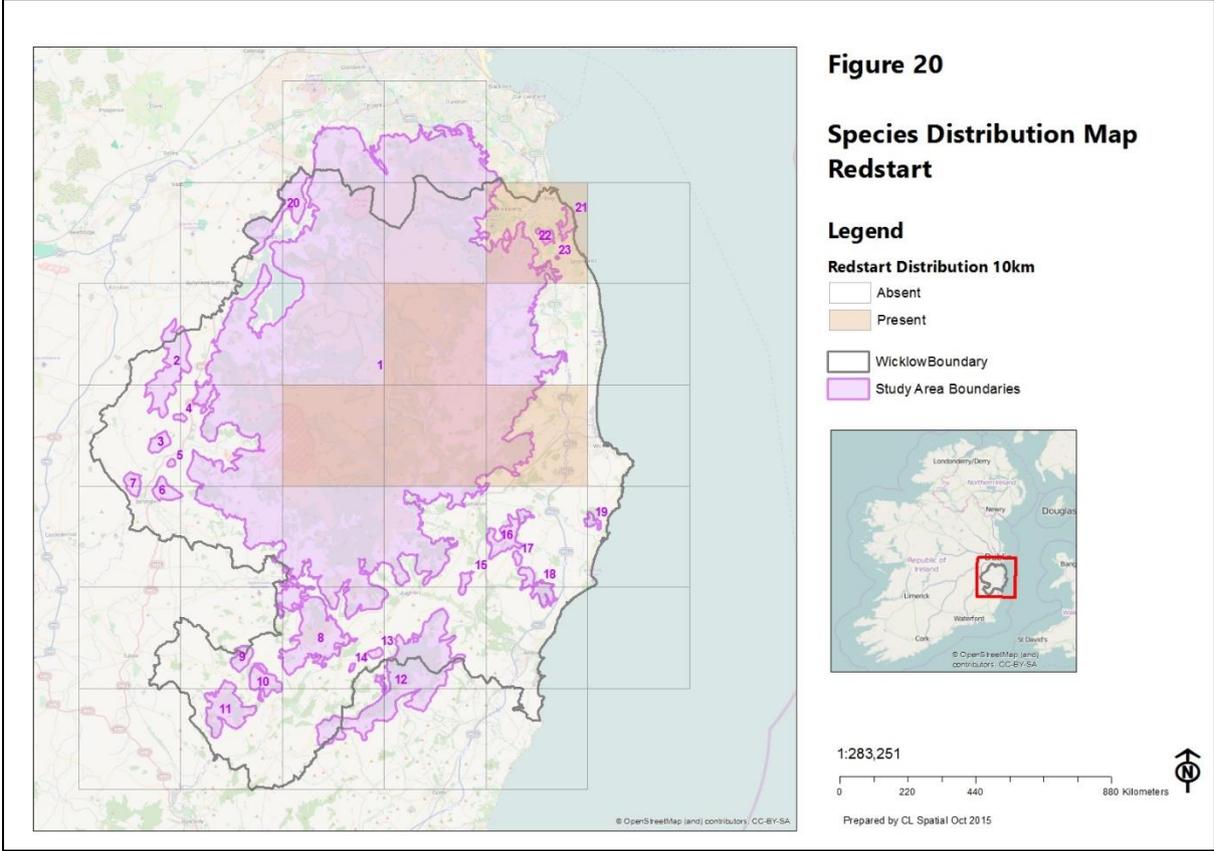
This dataset holds presence/absence species data for frogs collected during the National Frog Survey 2010/2011.

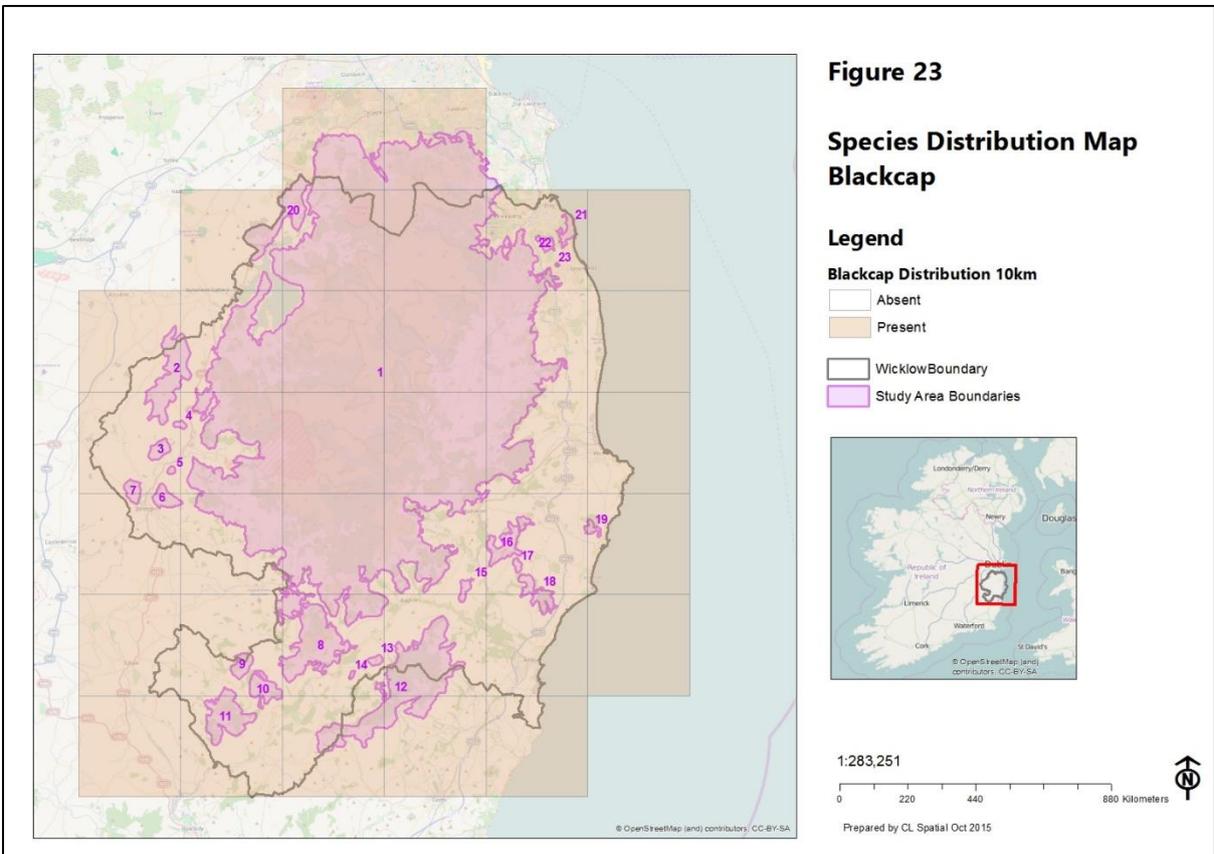
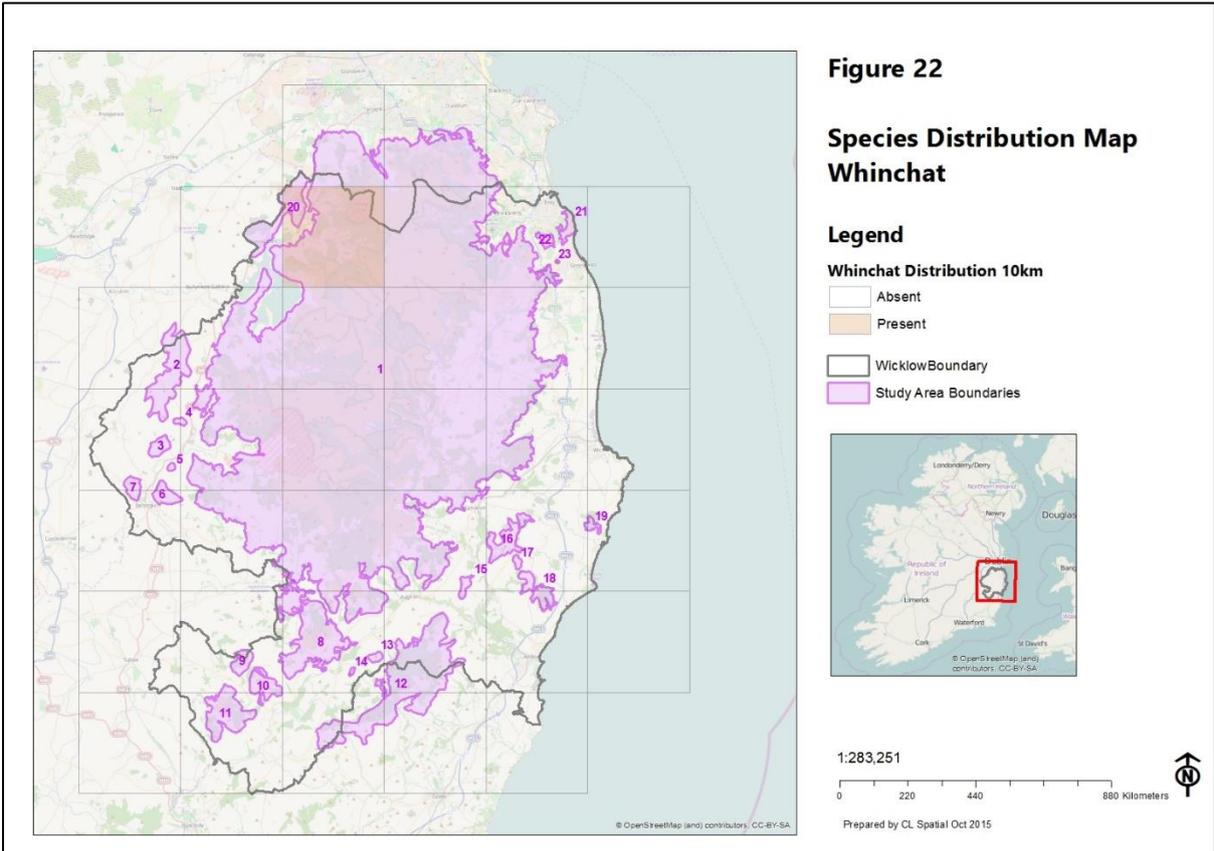
National Newt Survey

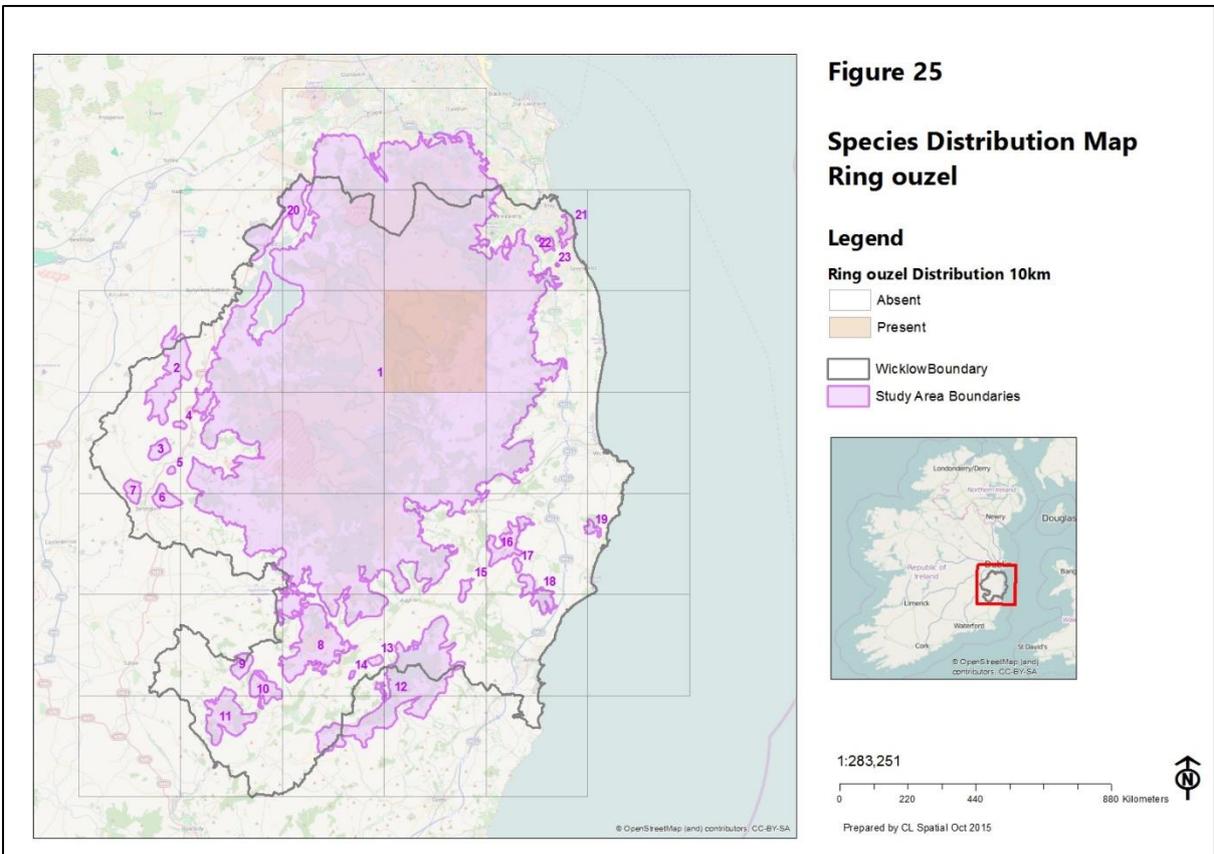
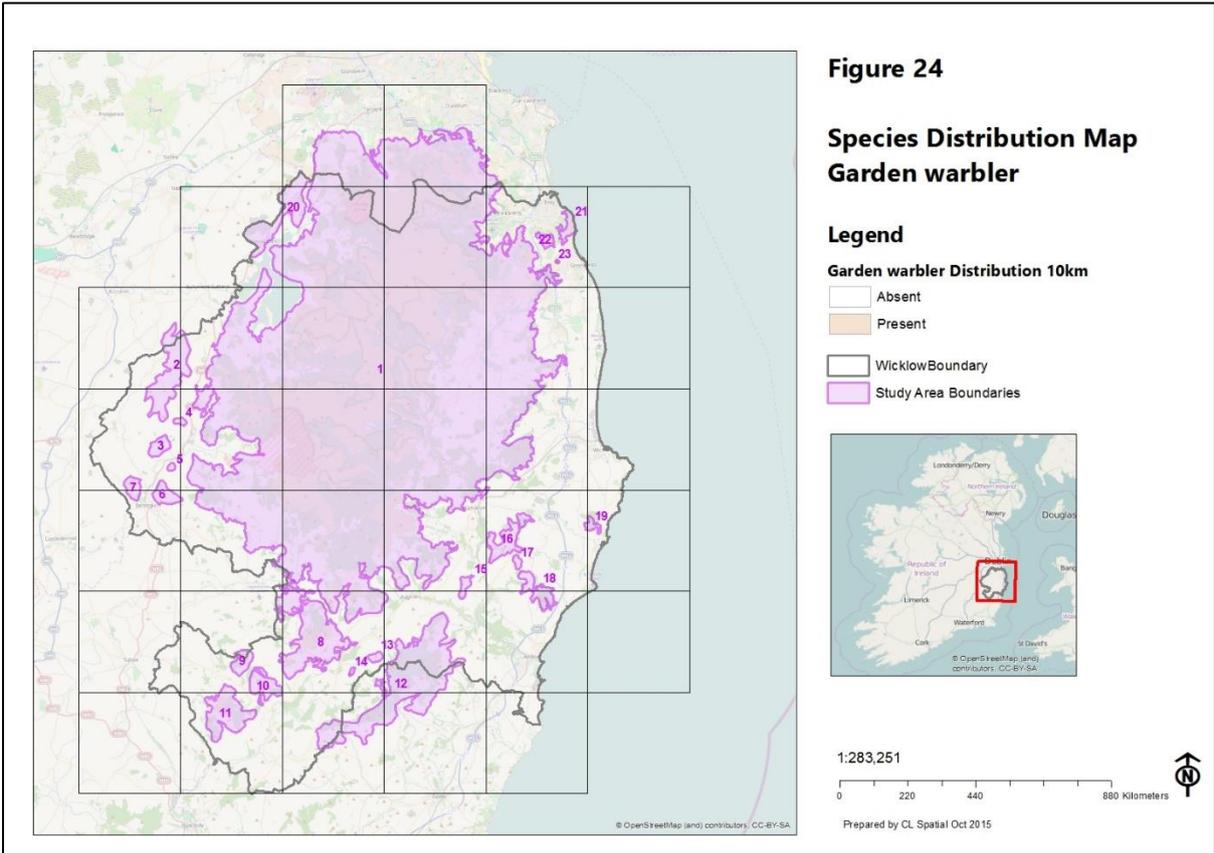
This survey is co-ordinated by the Irish Wildlife Trust. Data are collected through the submission of sightings by the public and IWT trained surveyors. Presence/absence only data are collected.

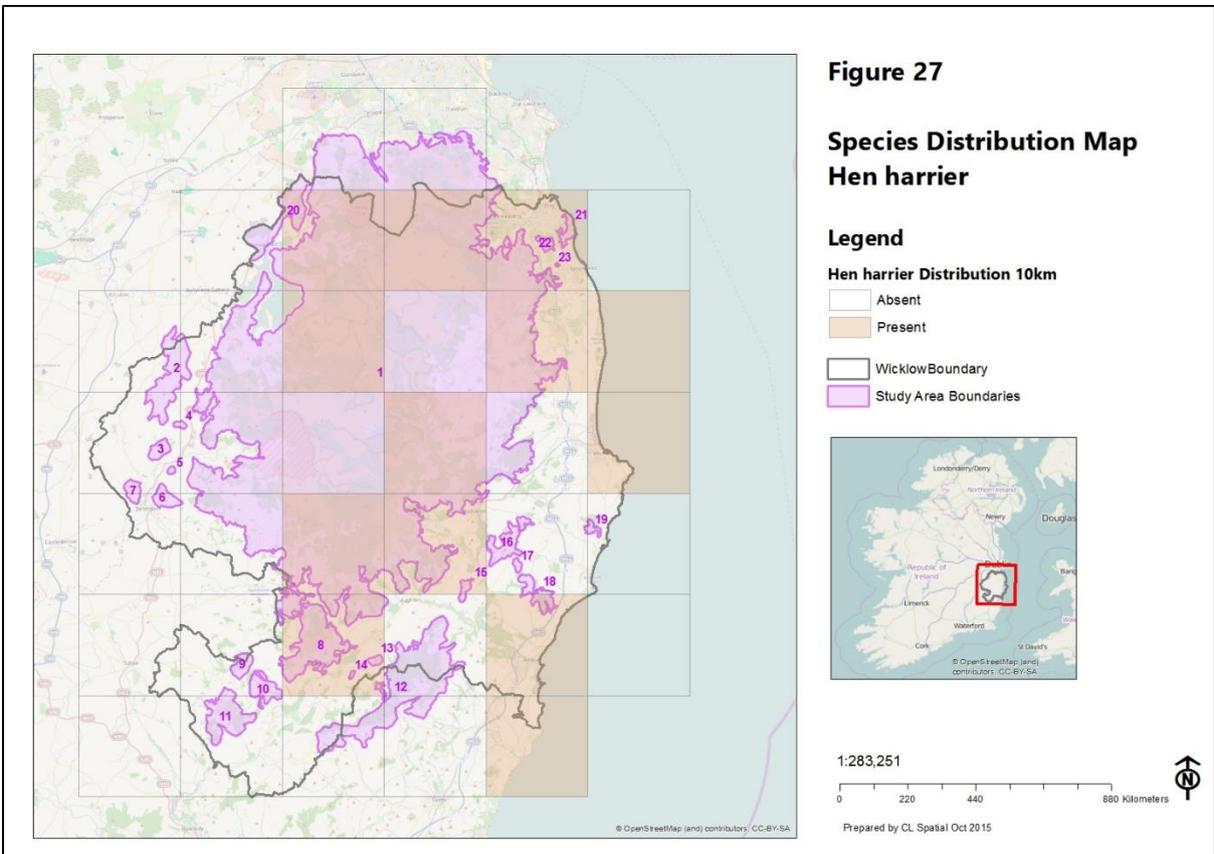
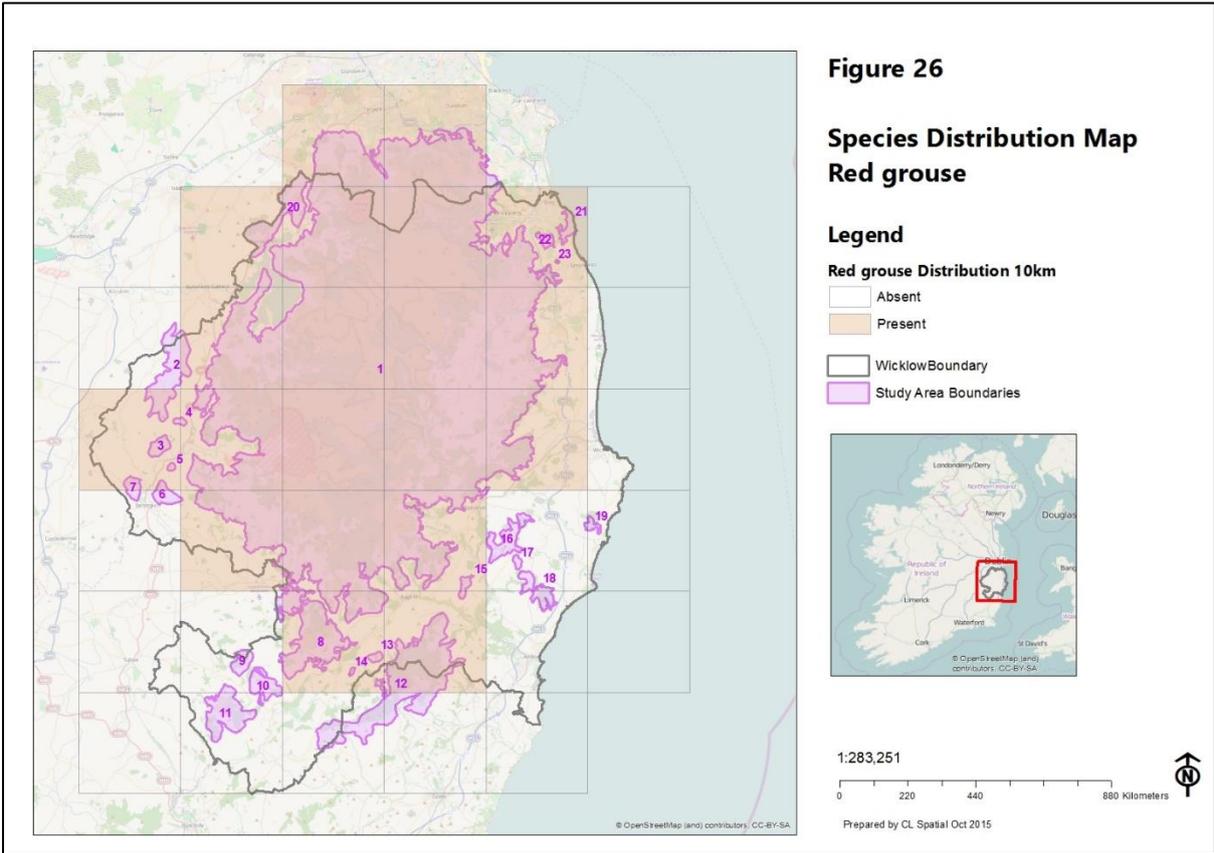


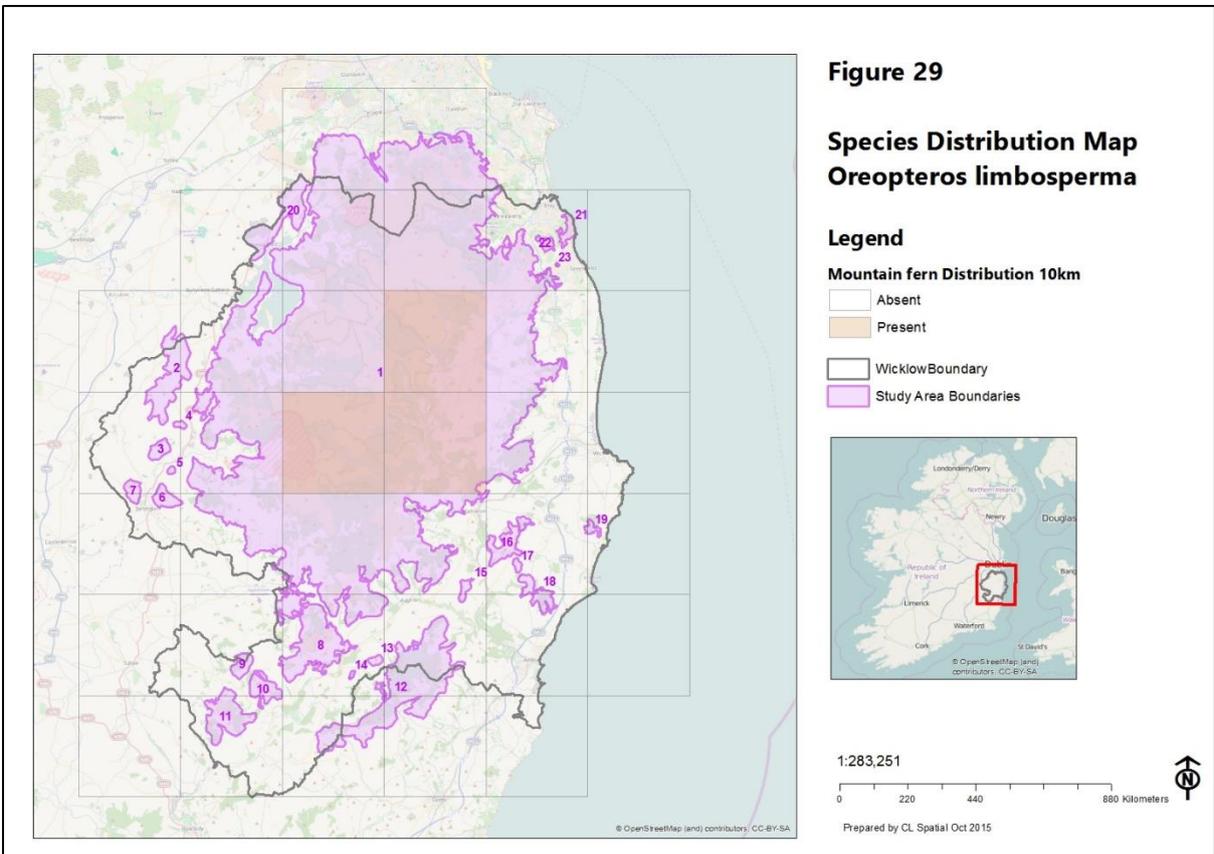
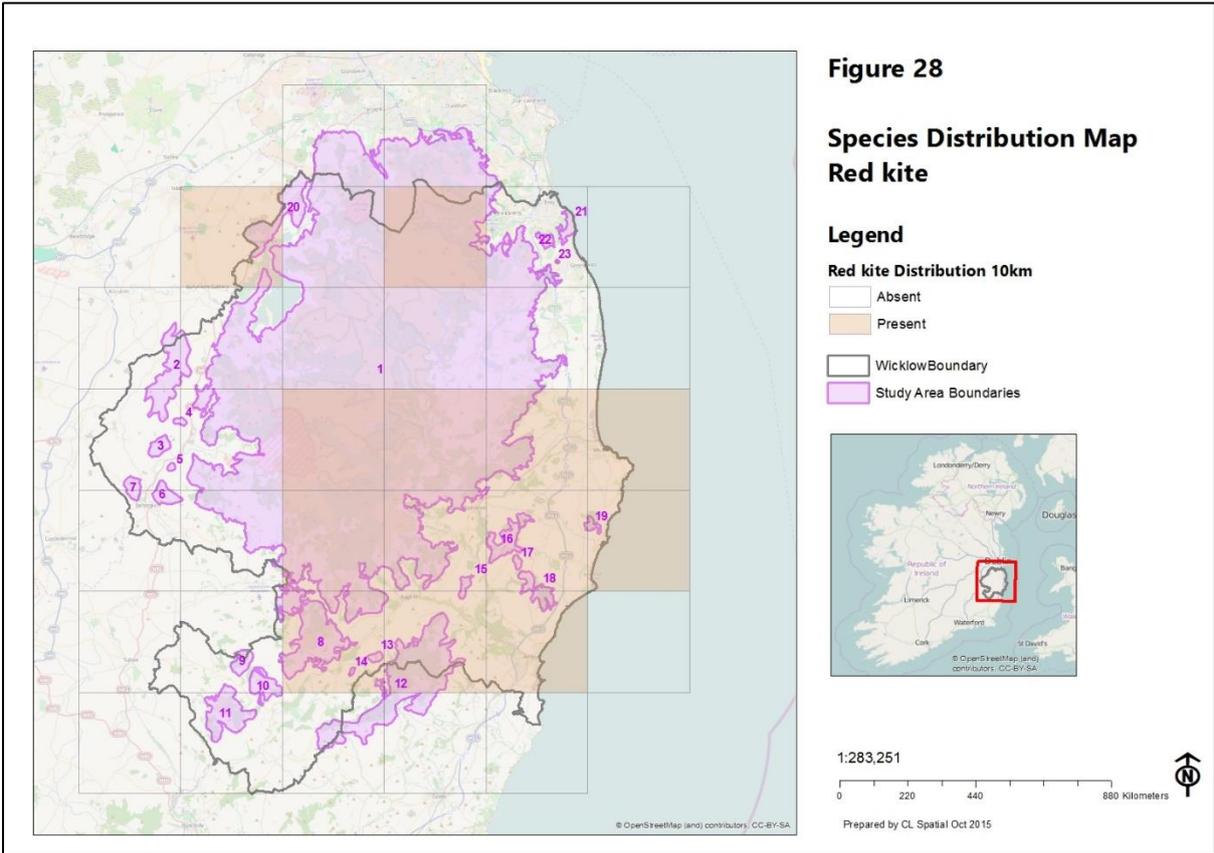


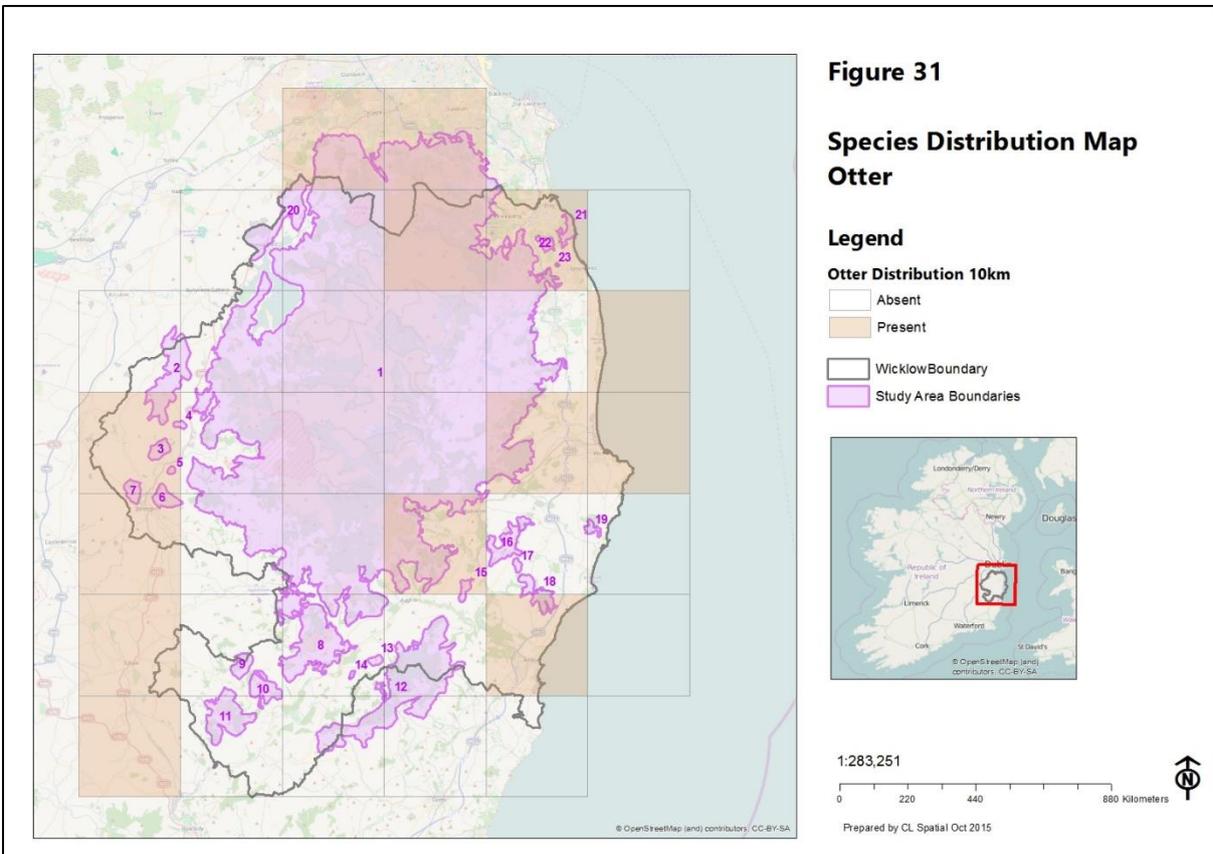
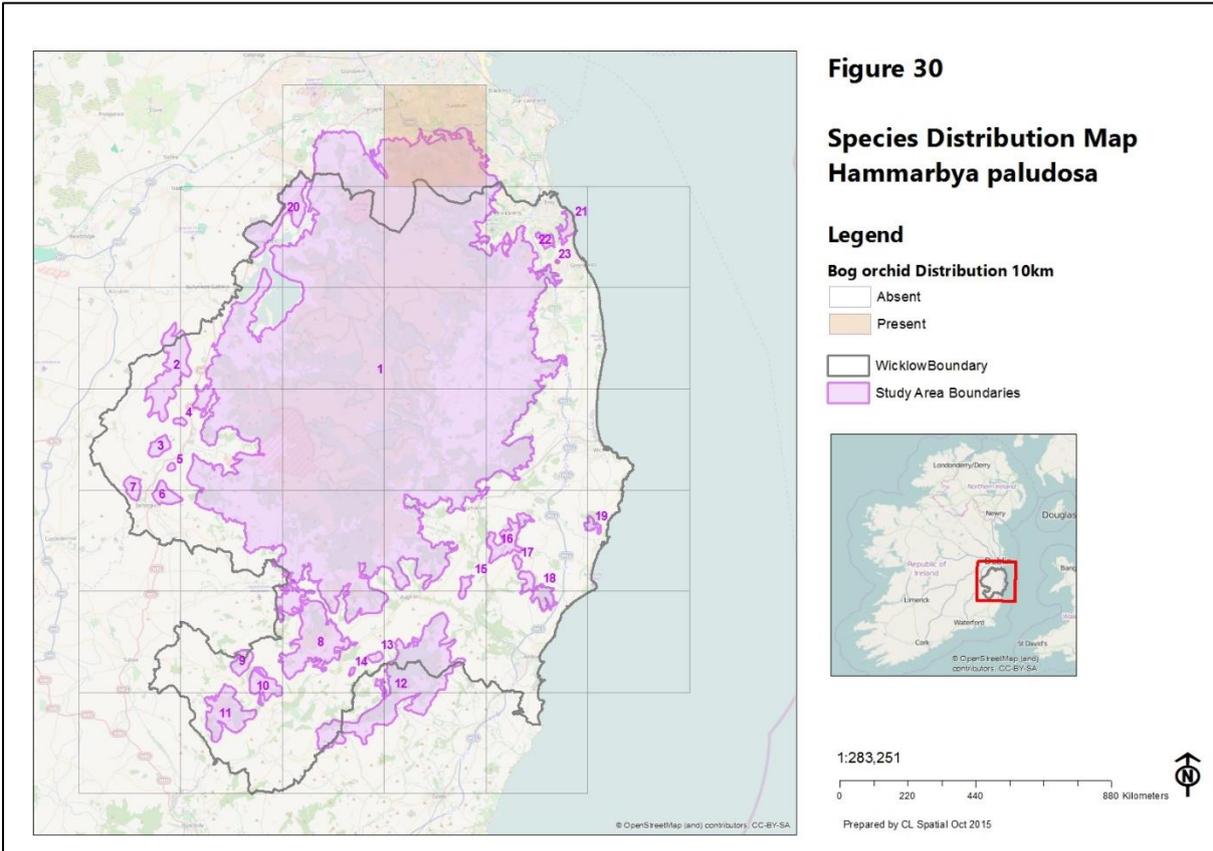


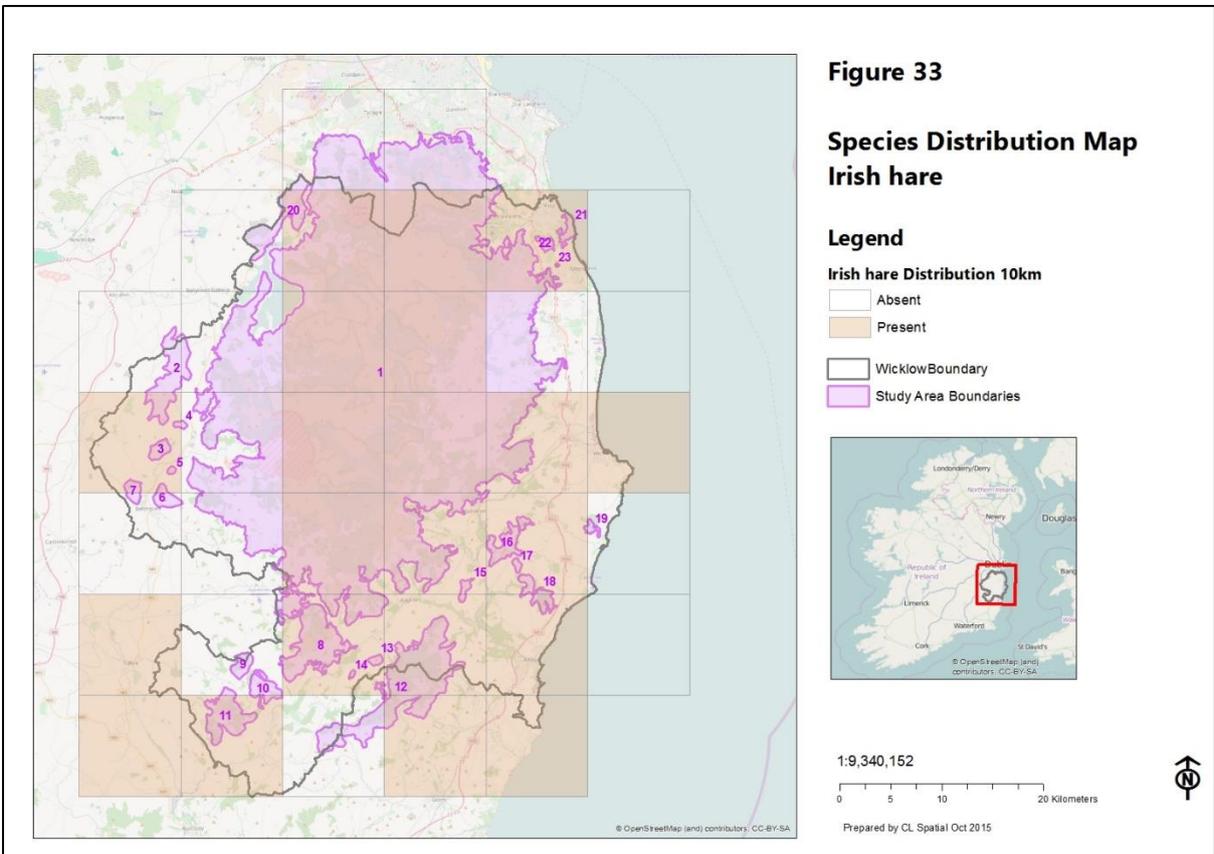
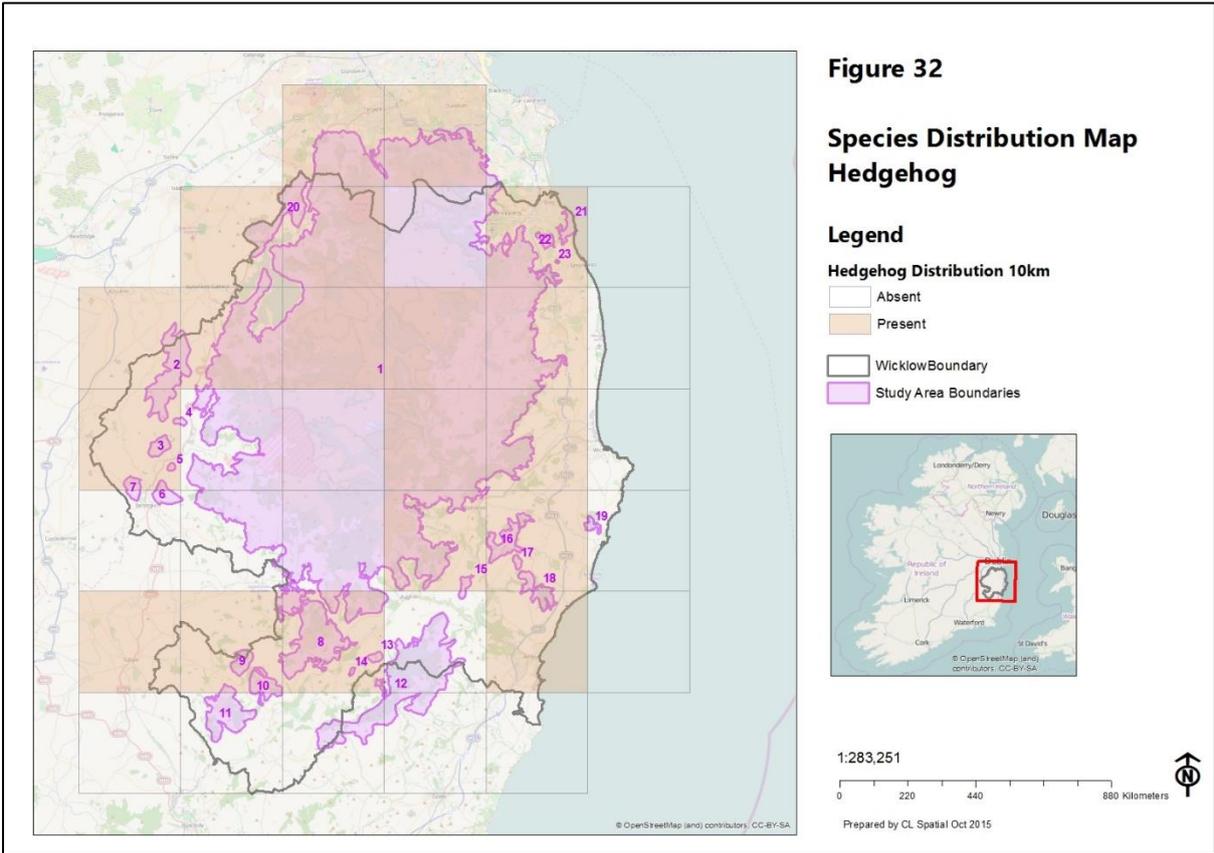


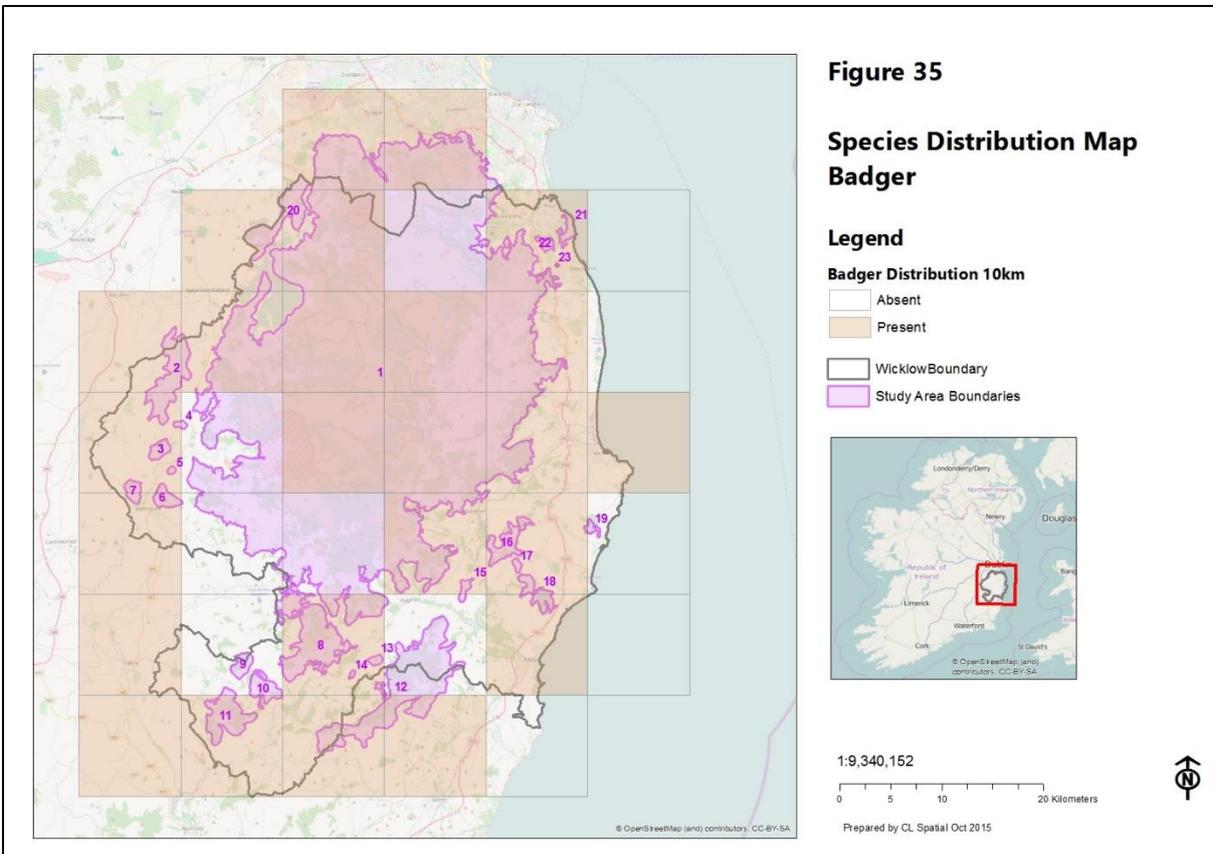
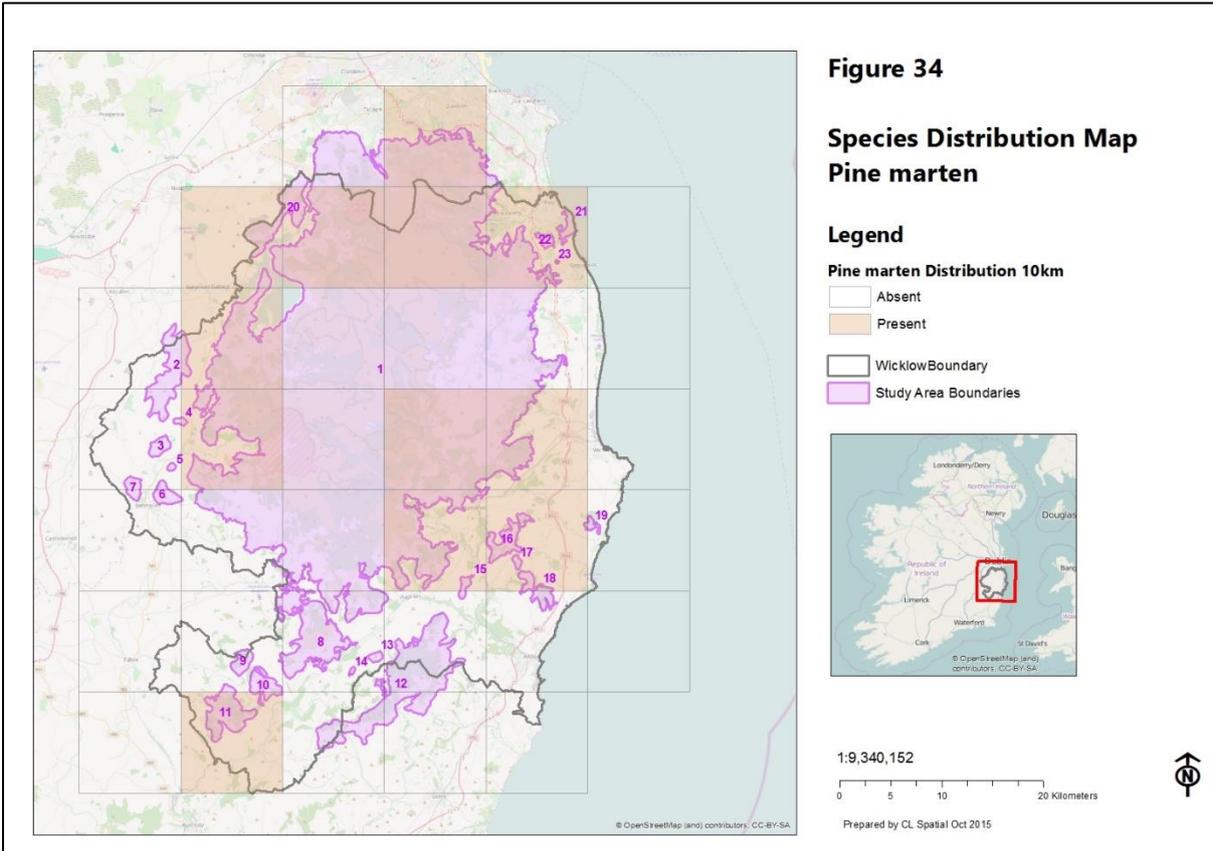


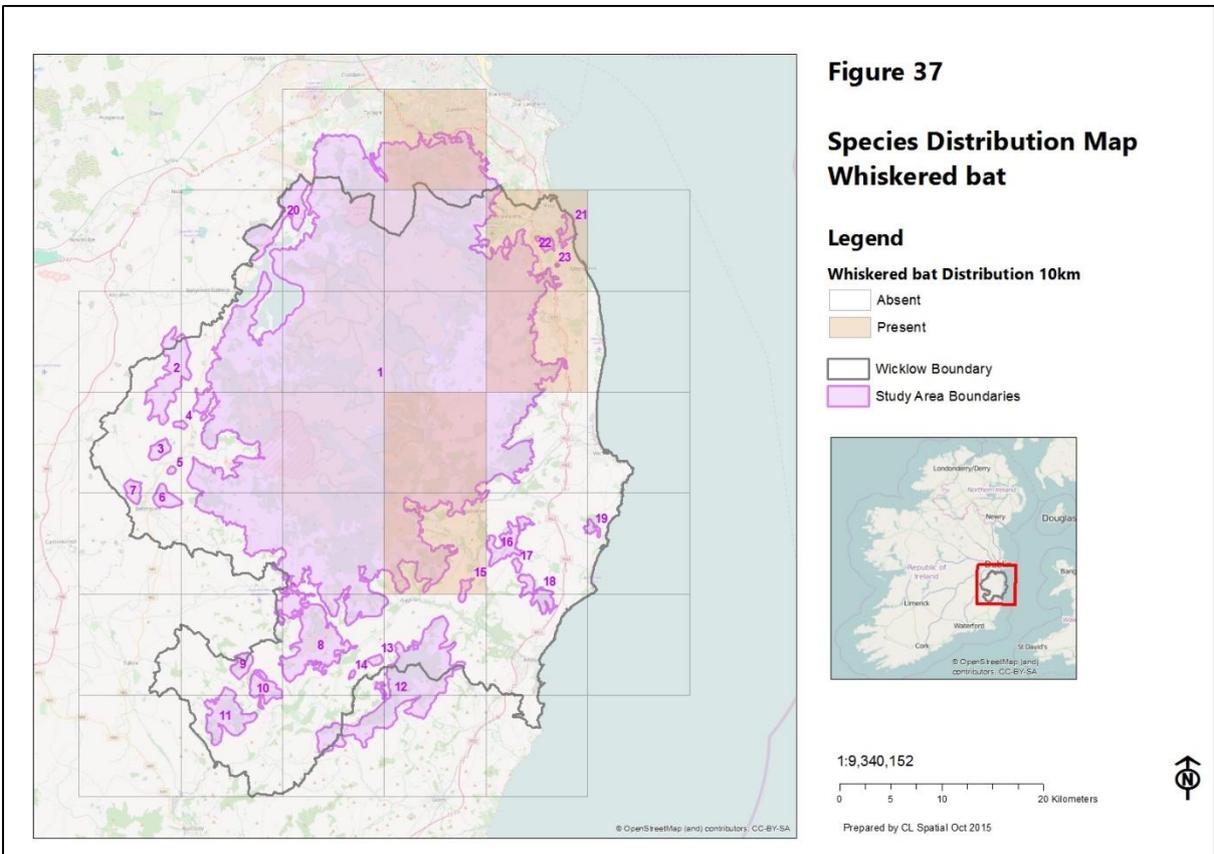
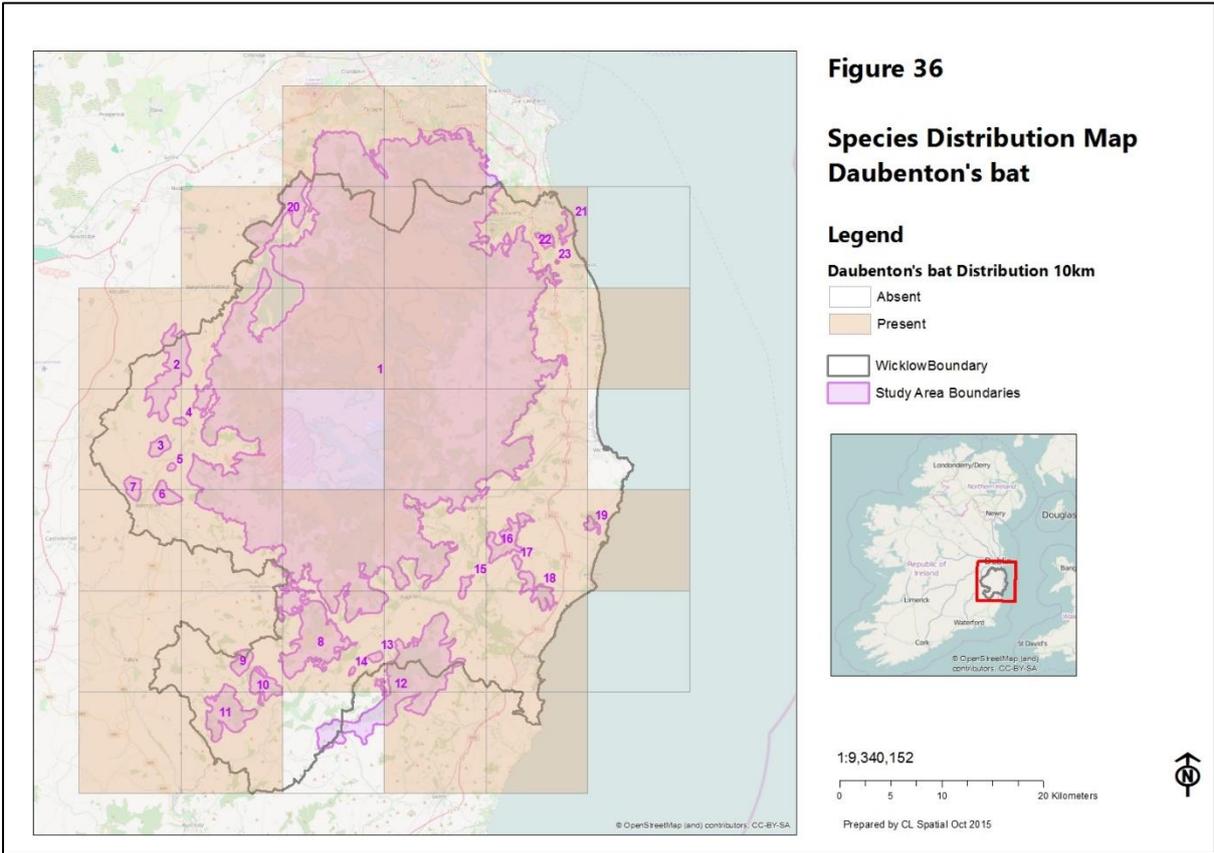


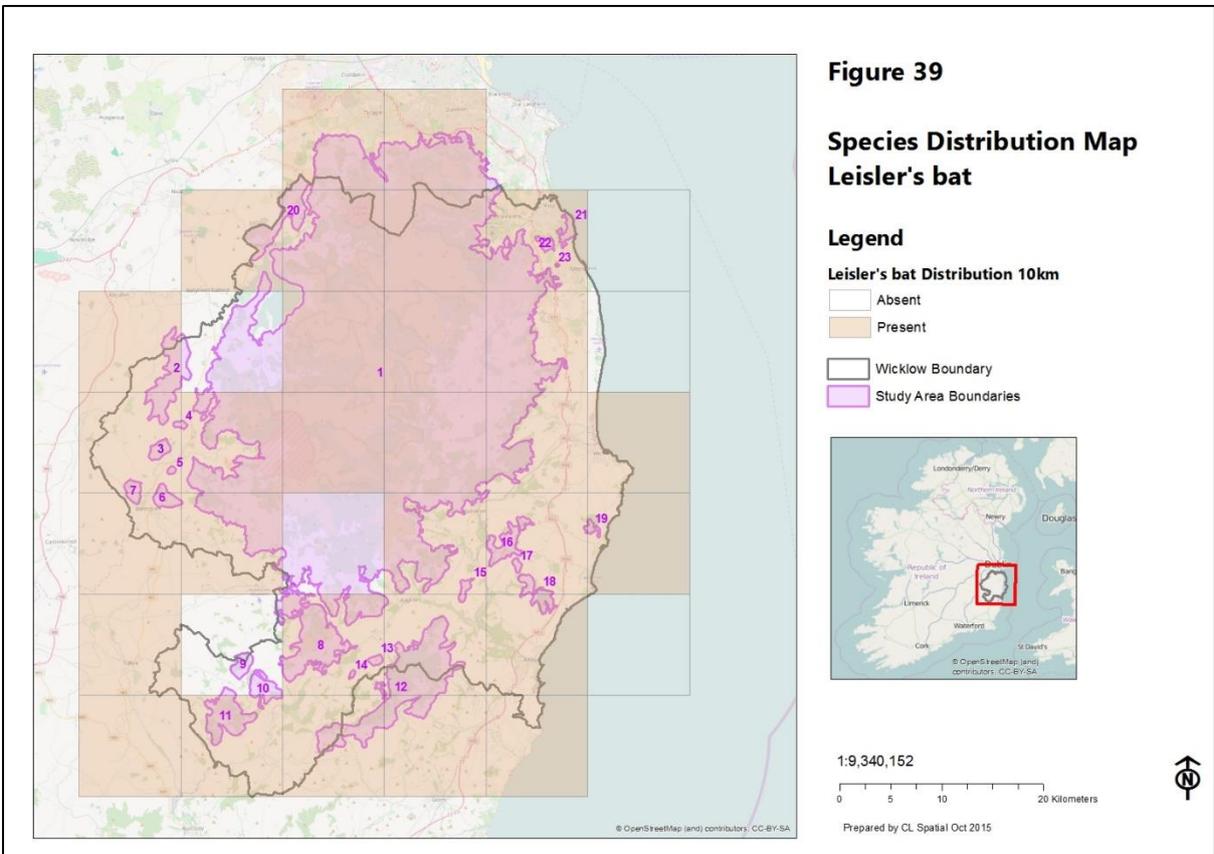
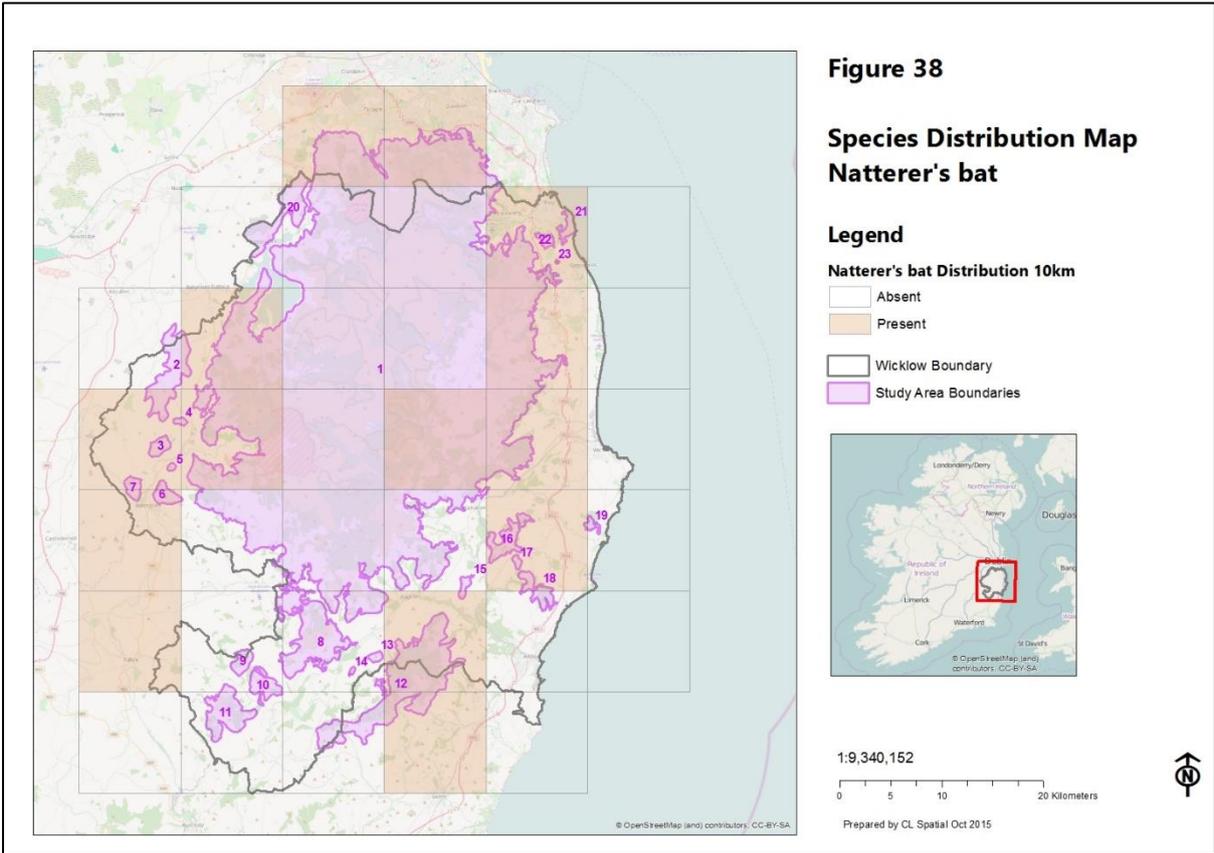


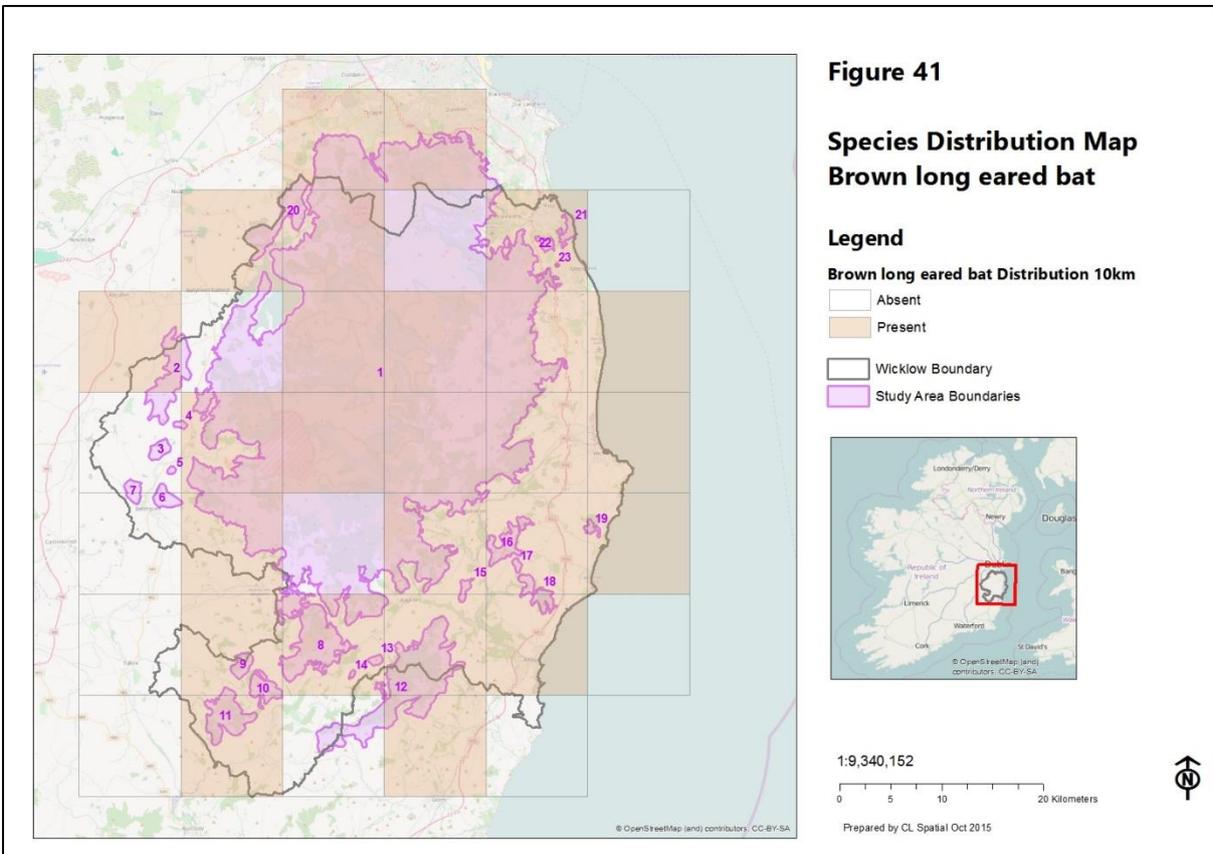
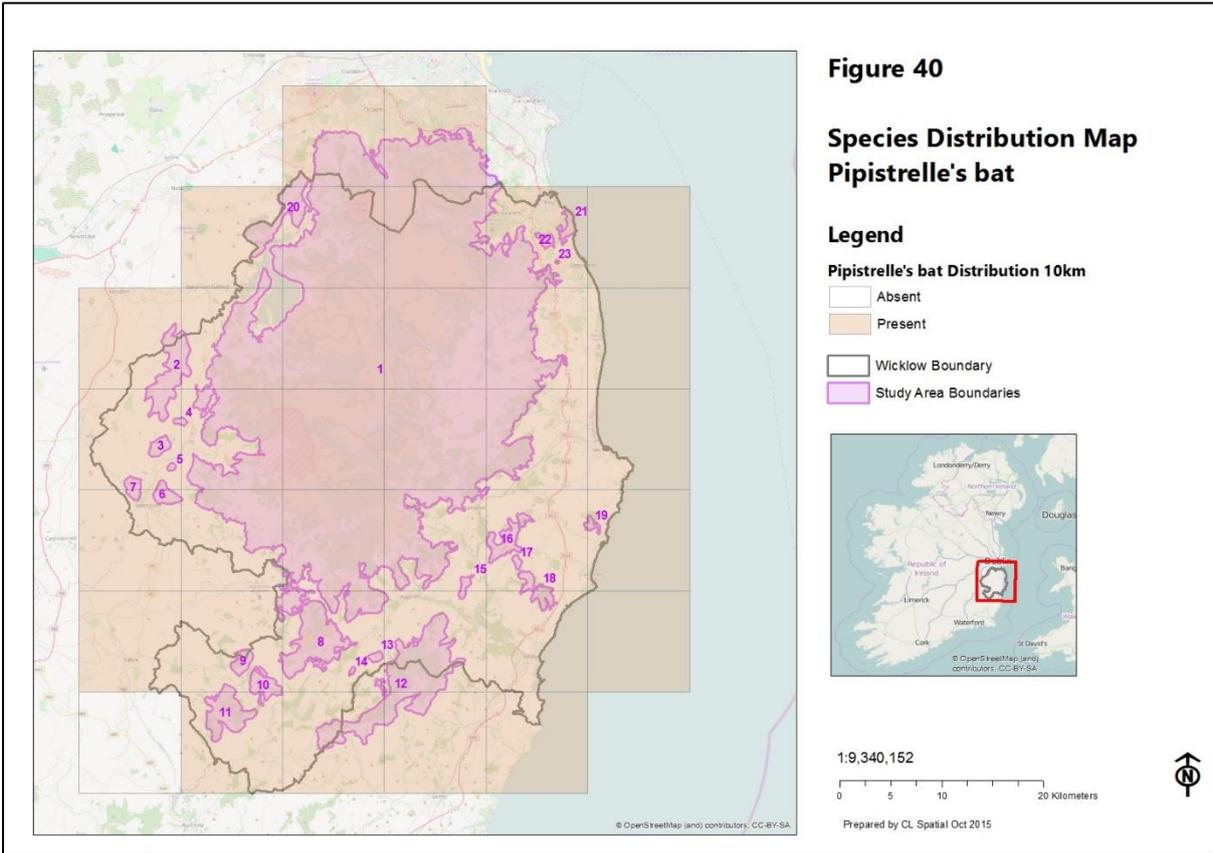


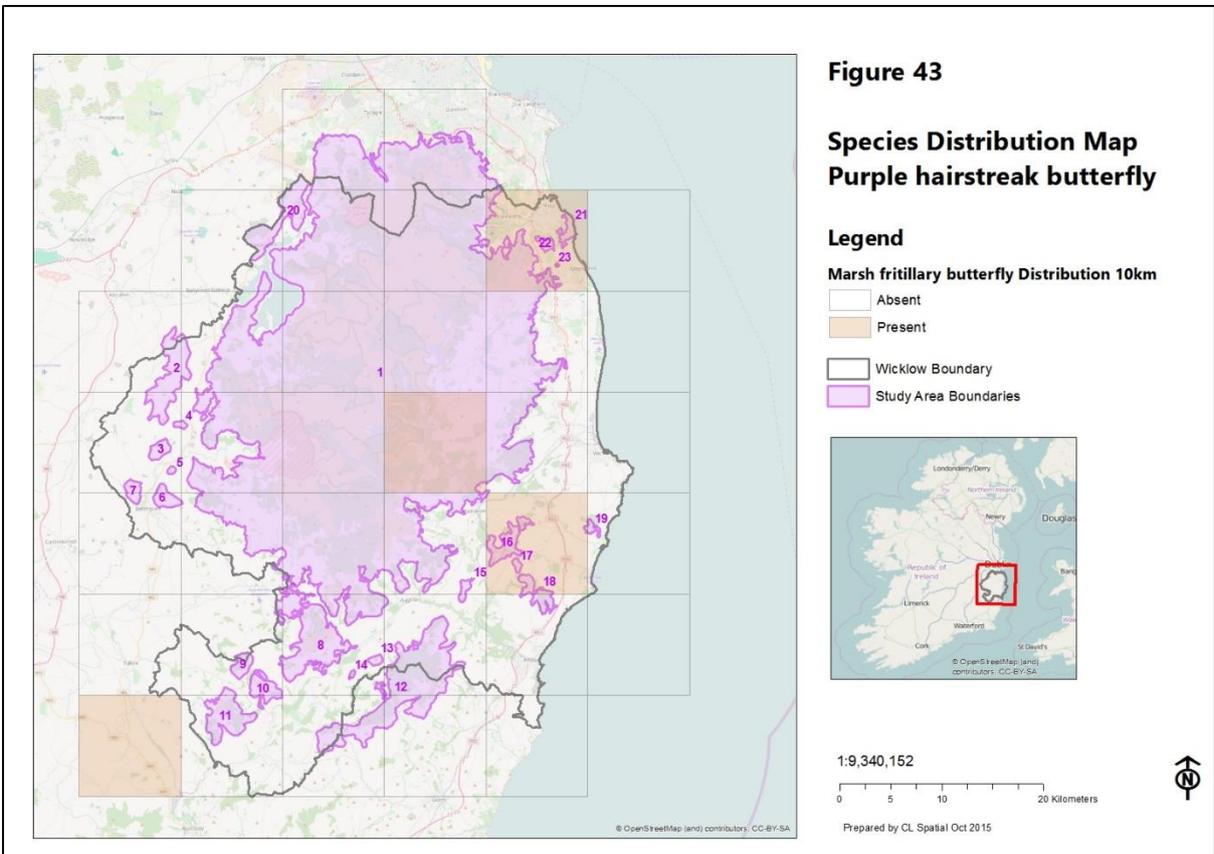
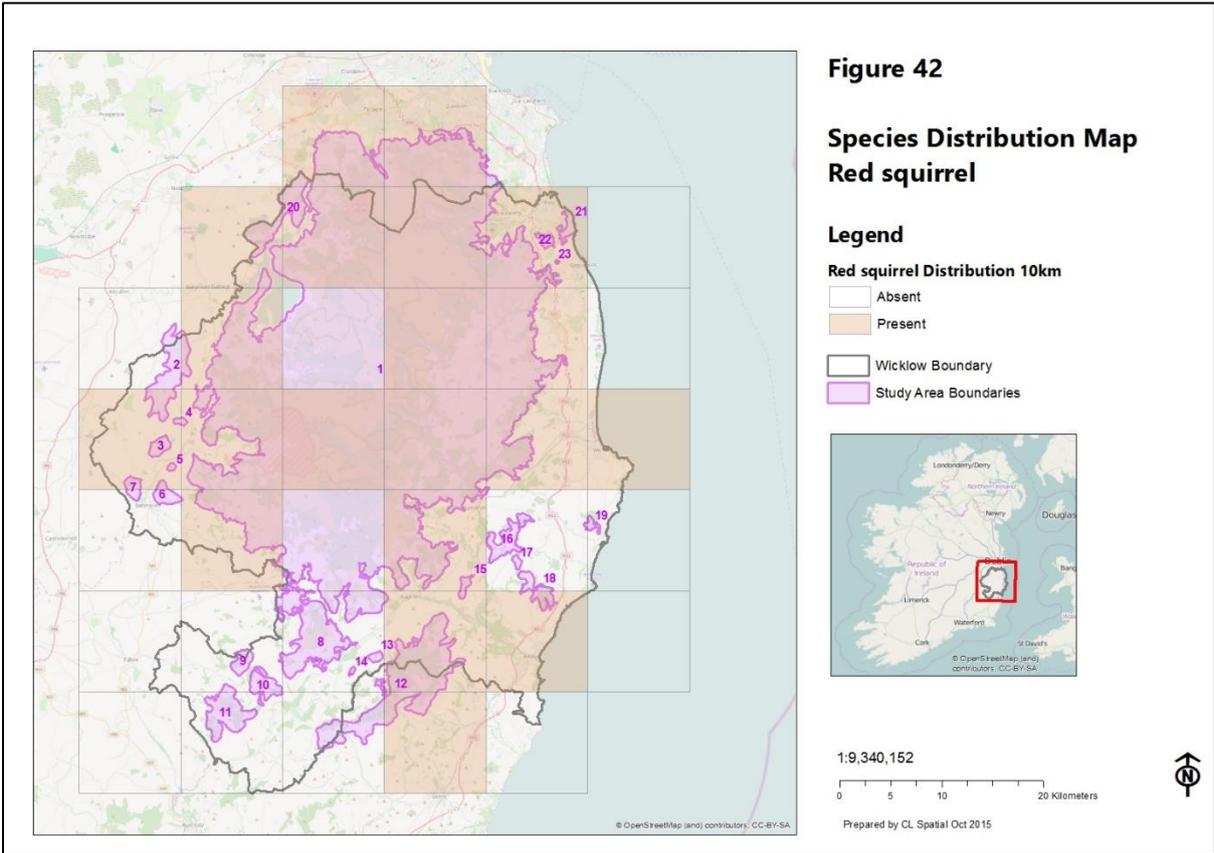












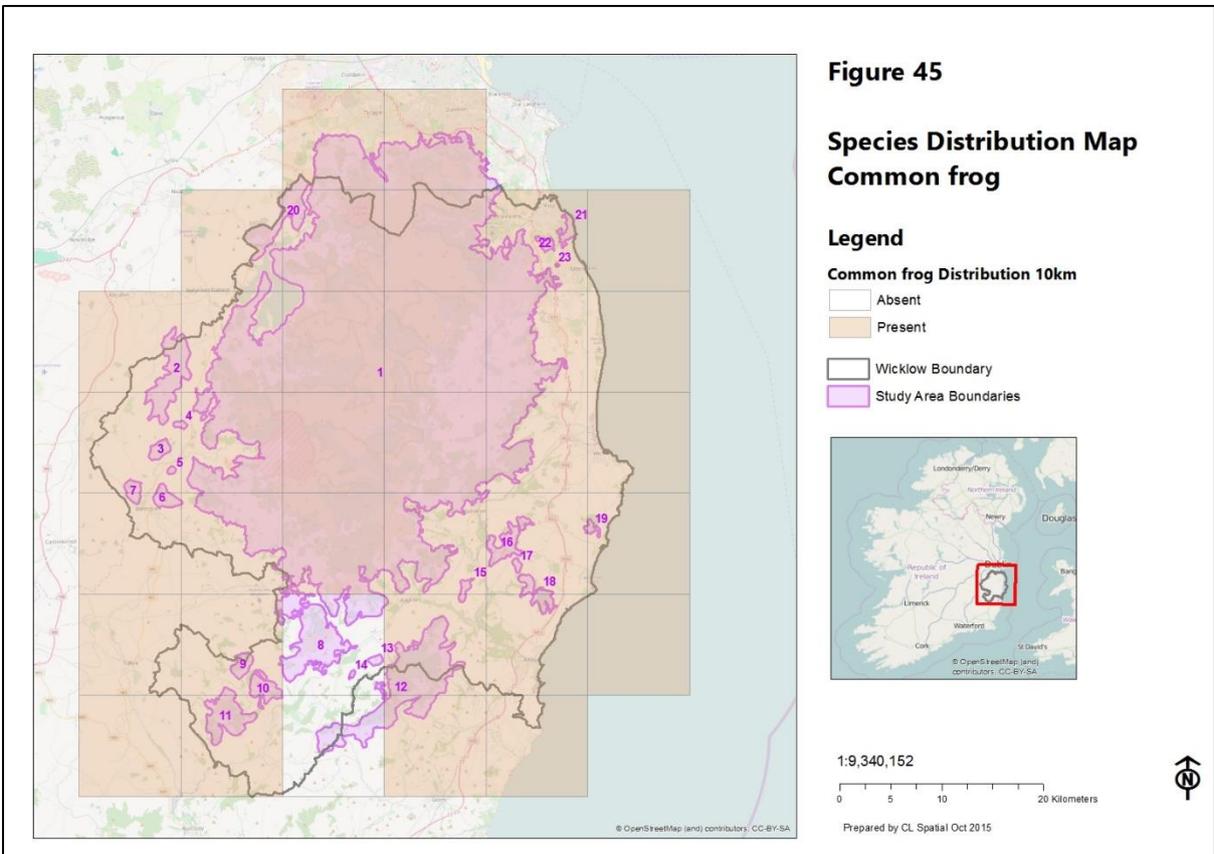
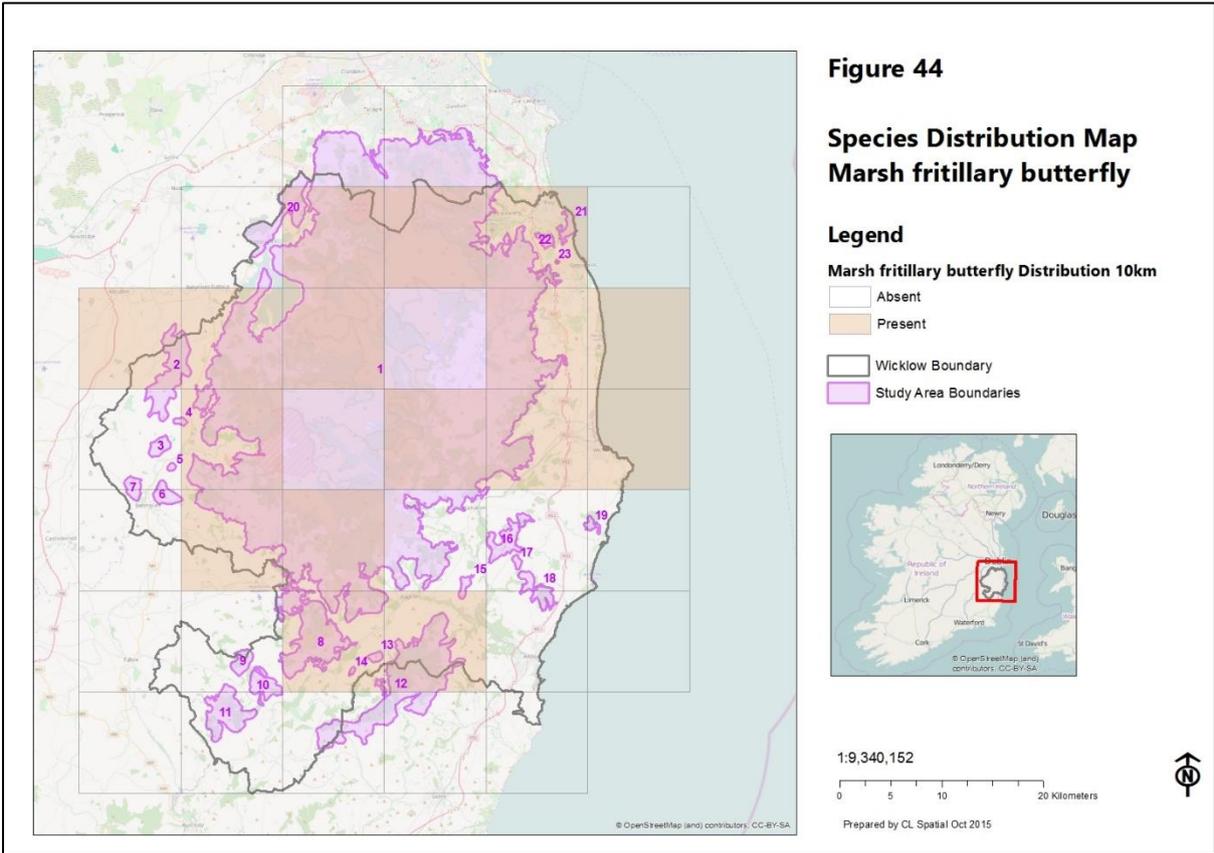


Figure 46

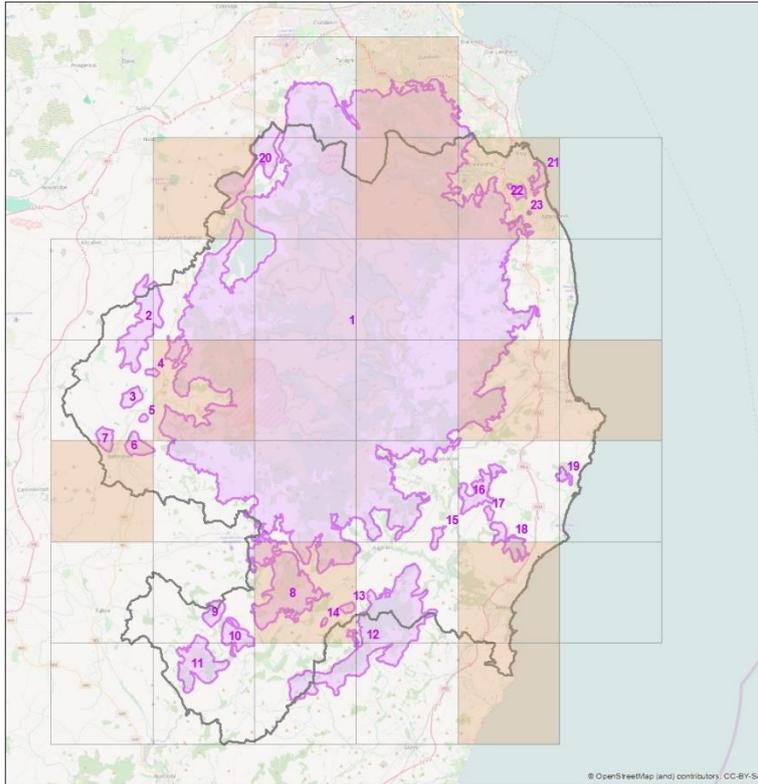
**Species Distribution Map
Smooth newt**

Legend

Smooth newt Distribution 10km

-  Absent
-  Present

-  Wicklow Boundary
-  Study Area Boundaries



1:9,340,152

0 5 10 20 Kilometers



Prepared by CL Spatial Oct 2015

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