



Farmland Bird Hotspot Mapping Phase 2 Project Report

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A full list of the datasets provided by a range of organizations is contained in Table 2 of the report.

Phase 1 of the Farmland Bird Hotspot Mapping Project was supported primarily by the Heritage Council under the Community Heritage Grant Scheme 2021 and also received complementary funding from the Department of Agriculture, Food and the Marine (DAFM). Phase 2 was funded by DAFM.

It is hoped that the results of this project will provide valuable assistance to all organizations working to protect and enhance the presence of farmland birds and biodiversity in Ireland.

This project uses the definition of the landmask of Ireland as published by Ordnance Survey Ireland, and basemaps published openly by both ESRI and the OpenStreetMap community. This project has been developed using R and related software, published open-source by the R community.

Executive Summary

The Farmland Bird Hotspot Mapping Project aims to produce indicative maps of areas of importance for farmland birds of conservation concern in Ireland, by collating and mapping records from a wide range of data sources.

It has been implemented in two Phases. Phase 1 was the initiation and set up phase, which produced a broad map of farmland bird hotspots in Ireland at the 10km level. In Phase 2, an enhanced set of maps was produced, indicating locations of particular importance for both individual species and groups of species. 28 species of birds of conservation concern with a particular dependence on farmland habitat were considered.

Scientifically validated records of almost 2.5 million observations of birds were gathered from 27 datasets. Over 130,000 of these records are of the 28 species of interest.

All datasets were restructured into a consistent format and coordinate reference system. This standardized format includes the level of breeding evidence if available and the season of the observation (Winter, Breeding or Other). The assigned season comprehends out-of-season breeding where species-specific breeding evidence justifies it.

A comprehensive scoring scheme was applied to each of these records. Scoring parameters included species, season, level of breeding evidence, and recentness of record. For records with point locations, scores are allocated to regions surrounding the record, based on species-specific and season-specific home ranges, with the precise score also depending on distance to the point location.

To produce the maps, the country was divided into grids of both 10km and 1km square resolution. A final score was calculated for each species in each grid cell. These scores provided the basis for species-specific maps. For maps of groups of species, normalised species scores were consolidated using a weighting of relative species importance. These weights were derived from species trends documented in Birds of Conservation Concern in Ireland 2020-2026 (Gilbert *et al.* 2021).

The hotspots were considered to be the top scoring cells for each species or group of species. They comprise a percentile of all grid cells, selected to include the recent records of the relevant species or group of species. In most cases, the 15% of cells with the highest score - the 85th percentile – was selected. The resulting maps identify the most important locations in Ireland for both individual species and groups of species, based on the available data that was included in this project.

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Introduction

The publication of the Birds of Conservation Concern in Ireland 2020-2026 highlighted continued declines in a range of farmland birds in Ireland, with ground nesting birds faring particularly badly. Aware of the significant number of datasets relating to farmland birds that have been compiled in recent years, BirdWatch Ireland recognized that developing farmland bird hotspot maps through the collation of these datasets could provide valuable spatial information to help target conservation measures for farmland birds at a national, regional and local level. This report presents a set of hotspot maps for both individual species and groups of species which were generated by the collation of these available datasets.

As a first step, those species dependent on farmed habitats for part or all of their life cycle and which are of conservation concern were identified, resulting in a list of twenty-eight species including ground-nesting waders such as the Redshank, Golden Plover, Lapwing and Curlew, wider countryside passerines such as the Yellowhammer, Tree Sparrow and Twite, and birds of prey including the Barn Owl, Kestrel, and Hen Harrier.

Relevant datasets were identified and permission to include them in the project was sought from the data holders. A total of 27 datasets were provided by the following organisations: BirdWatch Ireland, The Heritage Council, The National Parks and Wildlife Service (NPWS), the Department of Agriculture, Food and the Marine (DAFM), the National Biodiversity Data Centre and Bord na Móna. Only datasets which had been professionally validated were included; an extra layer of validation was performed by BirdWatch Ireland on those records contributed by members of the public.

Datasets were then prepared for analysis. All records for each species of interest were scored using a carefully designed scoring algorithm. Scoring parameters included the species, any evidence of breeding recorded, the season, the typical home-range of the species in each season, the distance to the record, and the age of the record. The 28 species scores were then weighted by species, with species of highest conservation concern in Ireland, as indicated by Gilbert *et al.* (2021), having the highest weighting.

From these scores sets of hotspots were identified, and a range of static and interactive maps produced.

The project was implemented using R, (<https://www.r-project.org/>), with custom R scripts developed to ensure scientific repeatability.

This report documents the various phases of this project: species selection, data gathering, data preparation, data validation, record scoring, national hotspot determination, and map generation. The suite of maps developed are provided and further details of specific aspects are included in the appendices. The potential for further development and refinement for future phases is also set out.

Methods

Species Selection

Ireland supports just under 200 regularly occurring bird species. The following criteria were used to identify those to be included in the farmland bird hotspot mapping project.

- The species must be on the Red List or Amber List as per the Birds of Conservation Concern in Ireland 2020-2026 report (135 species retained)
- The species must be largely dependent on farmed habitats for all or part of its life-cycle. Species omitted by this criteria included
 - Water/shore birds not reliant on farmland (46 species removed)
 - Seabirds (28 species removed)
 - Garden birds (2 species removed)
 - Woodland birds (4 species removed)
 - Irregularly occurring migrant species (17 species removed)
 - Upland/bog species (4 species removed)
 - Aerial insect feeders (4 species removed)
- The species must not be commonly occurring throughout Ireland in other habitats also (3 species removed)

This process resulted in 28 species being selected for this project. They are listed in Table 1.

Table 1: Species of farmland bird included in this analysis

BoCCI Status	Species	Scientific Name
Red	Barn Owl	<i>Tyto alba</i>
	Bewick's Swan	<i>Cygnus columbianus</i>
	Corncrake	<i>Crex crex</i>
	Curlew	<i>Numenius arquata</i>
	Dunlin	<i>Calidris alpina</i>
	Golden Plover	<i>Pluvialis apricaria</i>
	Grey Partridge	<i>Perdix perdix</i>
	Kestrel	<i>Falco tinnunculus</i>
	Lapwing	<i>Vanellus vanellus</i>
	Meadow Pipit	<i>Anthus pratensis</i>
	Quail	<i>Coturnix coturnix</i>
	Red Grouse	<i>Lagopus lagopus</i>
	Redshank	<i>Tringa totanus</i>
	Snipe	<i>Gallinago gallinago</i>
	Stock Dove	<i>Columba oenas</i>
	Twite	<i>Linaria flavirostris</i>
	Whinchat	<i>Saxicola rubetra</i>
	Yellowhammer	<i>Emberiza citrinella</i>
Amber	Barnacle Goose	<i>Branta leucopsis</i>
	Brent Goose	<i>Branta bernicla</i>
	Chough	<i>Pyrrhocorax pyrrhocorax</i>
	Greenland White-fronted Goose	<i>Anser albifrons</i>
	Greylag Goose	<i>Anser anser</i>
	Hen Harrier	<i>Circus cyaneus</i>
	Skylark	<i>Alauda arvensis</i>
	Spotted Crake	<i>Porzana porzana</i>
	Tree Sparrow	<i>Passer montanus</i>
	Whooper Swan	<i>Cygnus cygnus</i>

Data Gathering

Datasets that might contain records of the 28 species of interest were identified for inclusion in the project. Permission was requested for those datasets not already in the ownership of BirdWatch Ireland or available publicly. Priority was given to recent datasets with national coverage. Records older than 2007 were generally excluded. This allowed for the retention of the data from the Bird Atlas 2007-2011 (Balmer *et al.* 2013), which provides comprehensive distribution data for all species. For robustness, only scientifically validated datasets were considered for inclusion.

Table 2 lists the datasets which were successfully integrated into the project. Although some datasets listed did not target any of the 28 species specifically, they did record details of farmland species encountered during fieldwork; these supplementary records have been integrated into this project.

Table 2: Datasets gathered for analysis

Dataset	Records
BirdWatch Ireland	
Barn Owl Survey and Monitoring	411
Bird Atlas 2007-2011	114,635
Bird Track	772,738
Cooperation Across Borders for Biodiversity (CABB)	3,226
Supplementary records	29
Whinchat - Shannon Callows 2014 (Kenny et al.)	23
Whinchat - Shannon Callows 2017-2019	155
Yellowhammer Galway 2020	14
Bord na Móna	
Curlew Survey	45
Department of Agriculture, Food and the Marine	
Bride EIP	57
Curlew EIP	30
Lapwing Lifeline Survey 2019-2021	366
National Biodiversity Data Centre	
Bird Atlas 2007-2011	458,187
Birds Of Ireland	67,229
Kingfisher Survey 2010	6,883
National Parks and Wildlife Service	
Corncrake Survey	3,499
Countryside Bird Survey (CBS)	43,710
Irish Wetland Bird Survey (I-WeBS)	86,017
National Chough Survey	2,765
National Curlew Database	294
National Curlew Survey 2015-2017	138
National Hen Harrier Survey 2015	157
National Red Grouse Survey 2006-2008	491
Red Grouse Survey of Owenduff/Nephrin Complex 2012	61
Shannon Breeding Wader Survey	31
West Coast Survey of Breeding Waders 2019	871
Heritage Council	
Late Breeding Bird Survey - Yellowhammer Records	554

Note that depending on the dataset, a single record may refer to more than one bird or nest observed.

This project also investigated integrating the data published by eBird, but the relevant records could not

be professionally validated in the timeframe required by the resources available to this project. If future resourcing and priorities permit, these records might be validated and integrated into a future iteration of this project.

Data Preparation

Almost every dataset provided to this project had a unique format and structure. To support the required analysis, all datasets had to be transformed into a consistent format, structure and coordinate reference system.

The required data preparation addressed all of the following challenges:

- Datasets were provided in a variety of formats including CSV, tab-delimited, Microsoft Excel (.xls), Microsoft Excel (.xlsx), and ESRI Shapefile formats. Some datasets were provided via multiple files in a mix of multiple formats.
- Different datasets used different species-codes, different scientific names, or different forms of the same English name to refer to each species.
- Some datasets provided location information as a point coordinate, some as a polygon (e.g. outline of a bog).
- Datasets used a variety of coordinate reference systems. Some datasets used multiple coordinate reference systems within the same dataset:
 - Longitude and Latitude (decimal)
 - Longitude and Latitude (degrees)
 - Irish Grid References (at 10km, 2km, 1km, 100m, or 10m resolutions)
 - Irish Grid Coordinates
 - Irish Transverse Mercator Coordinates
- Some datasets included data from outside the land border of Ireland, included marine records, Northern Ireland records and records from further afield.
- Some datasets provided year and season, some provided year and month, and others provided the full date of the observation.
- Some datasets provided details of evidence of breeding in free-text descriptions, others used structured breeding evidence codes (with different breeding codes used by different datasets).
- Some datasets included relatively old records. All records predating 2007 were ignored except for the National Chough Survey 2003.

All datasets were standardized and merged into a master project dataset. The core attributes of these records included:

- Provider of the record
- Dataset of the record
- Species name (in English)
- Year of record
- Season of record
- Level of evidence of breeding (if available)
- Location of record (in Irish Transverse Mercator, either point or polygon or Irish Grid square as appropriate)

The Bird Atlas 2007-2011 (Balmer *et al.* 2013) was used as the reference on evidence of breeding. If evidence of breeding could be mapped to a recognized code such as “Singing Male” or “Recently Fledged Chicks” (for example) then that mapping was performed, and the record assigned the associated level of breeding evidence: Confirmed Breeding, Probable Breeding, Possible Breeding, or Non-breeding. If no evidence of breeding was available, the record was deemed to indicate Presence.

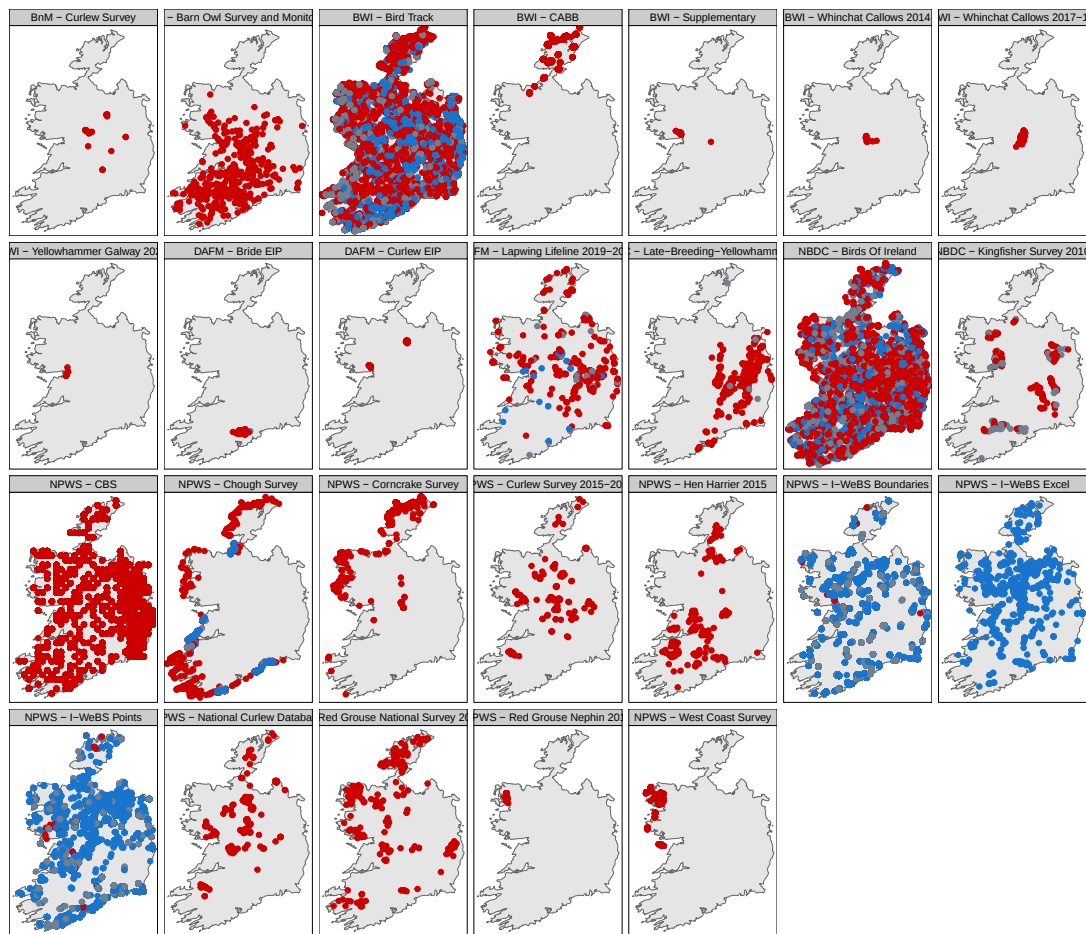
The Bird Atlas was also used as the authority on assigning a season to each record. Thus, all records November through February inclusive were assigned to the Winter season. All records April through August inclusive were assigned to the Breeding season. All remaining records were assigned to a season of “Other”, unless there was sufficient evidence to indicate out-of-season breeding, in which case they were assigned to the Breeding Season. Appendix 4 of the Bird Atlas specifies the breeding evidence codes that can be used in each month to indicate early or late breeding records. The code and month combinations that indicate out-of-season breeding are different for each species. This project uses all combinations specified in the Bird Atlas Appendix 4 to determine if “Other” season records are better allocated to the “Breeding” season.

The resulting set of consolidated records was saved in csv, geojson and shapefile file formats.

The following tables and maps summarize the records extracted from all of the datasets during this data preparation phase. A more detailed summary of the records extracted from each dataset is provided in Appendix 1.

Table 3: Summary of prepared records by dataset

Species	BaM - Curlew Survey	BW1 - Barn Owl Survey and Monitoring	BW1 - Bird Atlas 2007-2011	BW1 - Bird Track	BW1 - CABB	BW1 - Supplementary	BW1 - Whinchat Callows 2014	BW1 - Whinchat Callows 2017-19	BW1 - Yellowhammer Galway 2020	DAFM - Bride EIP	DAFM - Curlew EIP	DAFM - Lapwing Lifeline 2019-2021	HC - Late-Breeding-Yellowhammer	NBDC - Bird Atlas 2007-2011	NBDC - Birds Of Ireland	NBDC - Kingfisher Survey 2010	NPWS - CBS	NPWS - Chough Survey	NPWS - Corncrake Survey	NPWS - Curlew Survey 2015-2017	NPWS - Hen Harrier 2015	NPWS - I-WeBS Boundaries	NPWS - I-WeBS Excel	NPWS - I-WeBS Points	NPWS - National Curlew Database	NPWS - Red Grouse National Survey 2006-2008	NPWS - Red Grouse Nephin 2012	NPWS - Shannon Breeding Wader Survey	NPWS - West Coast Survey
Curlew	26		963	4800	2	1					30	3		667	1824	28	254		138			4964		2201	293			2	
Dunlin			358	1960	51									243	227	1	10					1881		544					8
Lapwing	4		927	3364	2502	14				1	331			875	583	19	131					4449		2092			6	114	
Whinchat			46	191			23	155						37	30	1	24												
Redshank			573	3469	391	9						1		445	479	3	46					3441		1240			10	7	
Corncrake			70	91										61	42				3471										
Grey Partridge			22	66										21	16		1												
Golden Plover			703	1613	4									486	268	14	107					1608		654				5	
Snipe	11		1356	2613	141	5				5	1			1291	741	130	848					1707		893			13	23	
Barn Owl		411	512	220						3				482	597		2					1							
Twite			68	117										60	19		27												
Bewick's Swan			11	91										10	7							67	3	24					
Red Grouse			297	198	5									276	293		71								222	19		13	
Stock Dove			480	738						9				457	137		456												
Kestrel	4		1645	3287	4					4				1564	1276	22	475					261		109					
Chough			373	1022										352	371		75	2122				1		4					
Quail			26	61										18	2		1												
Yellowhammer			579	1639					14	30		553		562	1810	28	1724												
Meadow Pipit			1708	6376	70									1649	904	16	4069									29		308	
Hen Harrier			617	1107						1				544	207		41			157	147		44						
Skyllark			1212	2851	53					4				1202	718	57	2380						1			13		393	
Tree Sparrow			325	421										313	168	4	277												
Greenland White-fronted Goose			121	294										98	67		1					589		120					
Barnacle Goose			92	245										71	28		1					243		34					
Brent Goose			163	545										169	421							1080		414					
Greylag Goose			222	958										222	115	2	14					1550		696					
Whooper Swan			589	1869										562	494	11	7					3299	706	2747					
Spotted Crane			1	8										1															



Point Records

- Breeding
- Other
- Winter

Figure 1: Maps by dataset of prepared point records

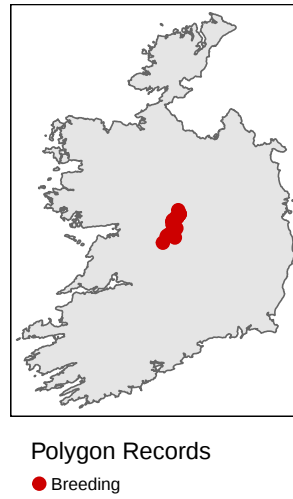


Figure 2: Map of prepared polygon records (NPWS Shannon Breeding Wader Survey)

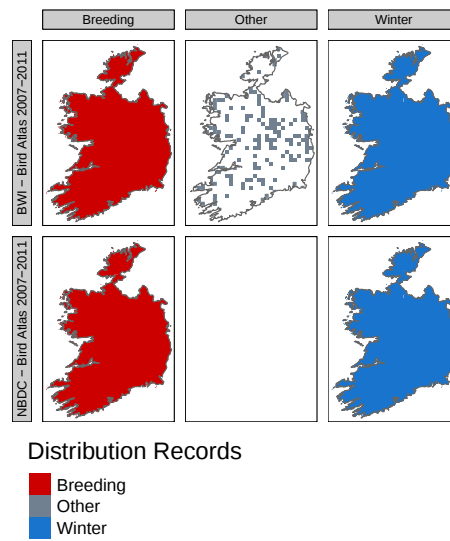


Figure 3: Maps by dataset of prepared distribution records

Data Validation

All datasets gathered by this project have been through a scientific validation process. This includes datasets that incorporate observations submitted by the general public, such as the Birds of Ireland dataset compiled by the National Biodiversity Data Centre, and the Bird Track dataset curated by BirdWatch Ireland in association with the British Trust for Ornithology.

To further ensure the robustness of the data prepared for analysis, an additional validation step was taken during this project with a comprehensive validation report prepared for each dataset that included submissions from the general public. The validation report includes a set of maps for every species in the dataset. These maps illustrate the location of:

- all records by season
- all records by level of breeding evidence
- all records by year

An extract from the validation report for the Bird Track dataset is reproduced in Appendix 4.

As mentioned previously, the eBird dataset was also considered for integration with this project but the validation report indicated some records (e.g. records of Chough) worthy of further investigation. As a comprehensive validation of the eBird dataset could not be performed in the timeframe of this project, the dataset was not included in this iteration of the project.

Record Scoring

The scoring methodology for a given hotspot map can be summarized as follows:

- A grid of squares was created covering the entire country, e.g. 1km squares aligned to the Irish Grid.
- Records were filtered to the subset of records of interest. E.g. to a particular set of species, for a particular season or since a certain year.
- For each species included in the map:
 - Scores were calculated for every individual record for every square near the record (within twice the average home range of the species).
 - The final species-specific score for a square was the maximum score assigned to the square from all the nearby records.
- In the case of a multi-species map:
 - each species-specific set of square scores was normalised to values between 0 and 1
 - each normalised score was multiplied by a species-specific relative weight
 - the final multi-species score for a square was the sum of the weighted normalised species-specific scores
- The final hotspot map outlined all regions of squares whose final score was above a certain score threshold. In most cases an 85 percentile hotspot map was produced, highlighting the 15% of squares in the country with the highest final score.

Filtering Records

The score for each square is calculated from scientifically validated records of observations. The records contributing to a given map can be filtered to include:

- records of particular species
- records of a particular season
- records with a minimum level of breeding evidence e.g. at least Breeding Probable
- records gathered since a certain date
- records gathered within a certain geographical region

Species-Specific Scoring

The area surrounding the point location of a given record is likely to support the habitat on which the species depends and to reflect this, each record contributes to the score for both the square in which it is located, and surrounding squares.

The score of an individual square on a species-specific map is the maximum score for the species derived from all nearby records of that species. This ensures that the zone of influence is recognized. In many cases the score ultimately assigned to a particular 1km square is based on a recent breeding record from outside that square.

All available records were analysed to see how they would score the squares surrounding the record. The score assigned to each of the surrounding squares depends on the species, the level of breeding evidence recorded, the season, the distance between the record and the square, and how recent the record was.

These parameters are customised for each species but generally the following apply:

- The higher the level of breeding evidence the higher the score
- For many species Winter and Other season records are scored lower
- The older the record the lower the score
- The further the distance between the square and the record, the lower the score

Base Score The base score for a record depends on the season and the level of breeding evidence. Example base scores are illustrated below.

Table 4: Base scores for Kestrel

Season	Breeding Evidence	Base Score
Breeding	Breeding Confirmed	15
	Breeding Probable	14
	Breeding Possible	13
	Not Breeding	10
	Present	10
Winter	Present	9
Other	Present	9

Distance to Record multiplier An average home-range was assigned to each species in each season. Where no published data was available, relevant experts within BirdWatch Ireland were consulted.

The base score was reduced depending on the distance between the square and the record, using a normal distribution about that average home range. Any squares beyond twice the average home-range were ignored and scored 0 for that record.

In the following example, the average home range for Kestrel in winter is estimated at 4km radius. Squares a short distance away from the record have a multiplier close to 1.0. Squares 4km from the record are multiplied by 0.5. Squares beyond 4km have a very small multiplier and squares beyond 8km (twice the average home range) are ignored and scored 0.

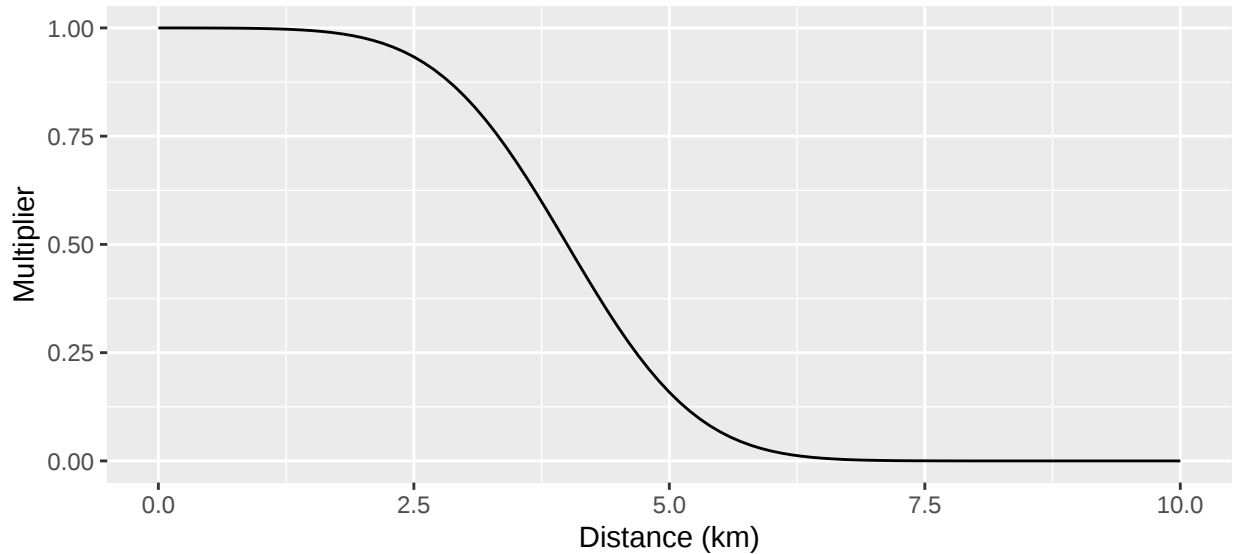


Figure 4: Distance Multiplier for Kestrel in Winter - 4km average home range

Age of Record multiplier Regarding the age of the record, appropriate reductions of the score can also be configured by species. However, for the purposes of this project all records within the last three years are considered “full-scoring”, records more than 10 years old are reduced to 20% of the original score, and records between 3 and 10 years old are reduced proportionally.

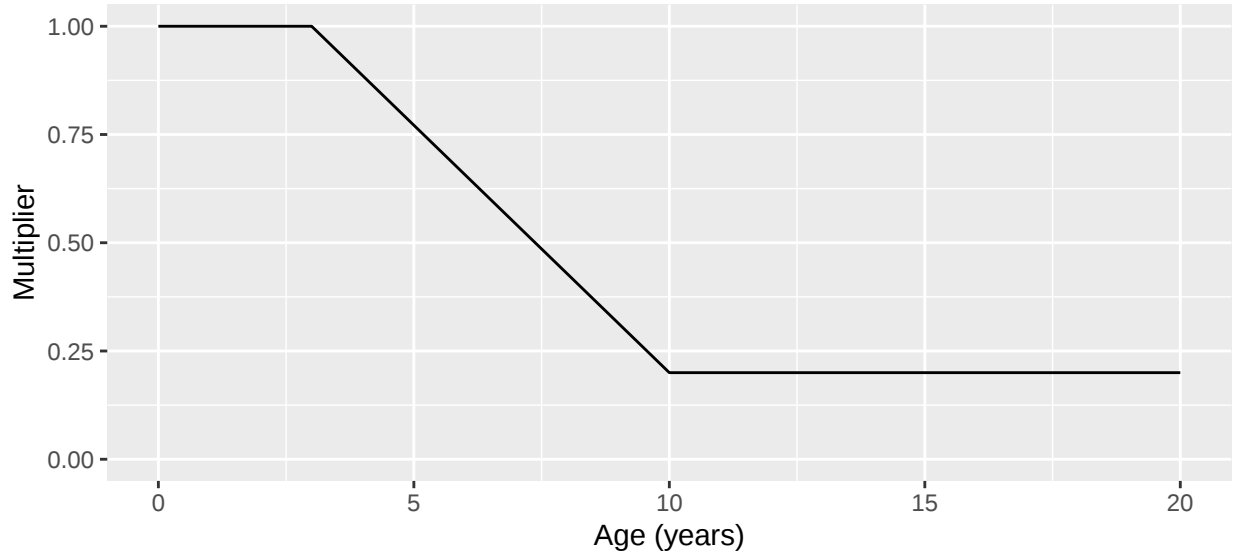


Figure 5: Age of Record Multiplier for Kestrel

Total score for a species in square The final species-specific score for a square is the maximum value of (base score * distance multiplier * age of record multiplier) for all the nearby records of that species.

The final scoring parameters for all species are listed in Appendix 2.

Multi-Species Scoring

A multi-species map is essentially a merging of the relevant species-specific maps. The species-specific scores are first normalised to between 0 and 1, and then multiplied by a species-specific weighting. The resulting map thus can take into account the relative importance of species, if some species are deemed to be more important than others.

Relative Weighting The relative weighting between species is derived from parameters used to discern the Red and Amber lists of Birds of Conservation Concern in Ireland (Gilbert *et al.* 2021) and include:

- Species of European Concern status in 2017
- Historically declining species
- Breeding declines in population in the last 20 years (BDP1)
- Breeding declines in population in the last 40 years (BDP2)
- Wintering declines in population in the last 20 years (WDP1)
- Wintering declines in population in the last 40 years (WDP2)
- Breeding declines in range in the last 20 years (BDR1)
- Breeding declines in range in the last 40 years (BDR2)

Each field was scored a 0, 5 or 10 depending on whether the BOCCI 2021 parameter meets the Green, Amber or Red threshold for that species. The score was then multiplied by a parameter weighting as indicated in the following table.

Table 5: BOCCI Parameter Weightings

BOCCI 2021 Parameter	Weighting
SPEC (2017)	6
HD (based on BoCCI3)	4
BDP1	7
BDP2	5
WDP1	5
WDP2	4
BDR1	7
BDR2	5

The sum of these weighted scores was then added to a subjective Farm Management Measures score, derived by experts in BirdWatch Ireland, to broadly reflect the importance of management in influencing the occurrence or outcomes for the species. This process produced the final species relative weighting.

The various BOCCI and Farmland Management Measure scores and the relative weightings that they give rise to are presented in Appendix 3.

Observations

There are several notable characteristics of this scoring approach. The final square scores, and thus hotspots, are not influenced by

- the quantity or density of records in a square
- multiple surveys recording the same nest
- the same nest being recorded on multiple days in the same season

This is because only the highest scoring record for each species in each square contributes to the final score.

Fundamental to this scoring approach is that a location recently supporting even one nest of a species is relevant for that species and recognized. The maps reflect occurrence, rather than density of occurrence. The scoring approach implemented assigns an equal importance to a location with just one nest of a species as to a location supporting multiple nests.

Hotspot Determination

Having determined an aggregate score for each scoring cell in the national grid (of either 10km square or 1km square resolution), the national hotspots were then ascertained.

Hotspot maps indicate areas where the final score exceeds a certain threshold.

The score threshold for a hotspot map can be arbitrary, or it can be derived e.g. based on a percentile. An 85 percentile map highlights the 15% of squares in the country that have the highest scores.

For each hotspot map the percentile was tuned to ensure all important recent records were included within the hotspot boundaries.

Those cells with a score above the final score threshold were dissolved into hotspot polygons. Geojson and shapefile formatted files containing appropriate attributes were generated.

Attributes

The following attributes are supplied for each hotspot:

- ID of the hotspot
- Area of the hotspot in kilometres squared
- For each species in the map:
 - Presence in the hotspot (True, False or Undisclosed)
 - The maximum score of the species in the hotspot
 - The dataset from which the maximum score of the species in the hotspot was derived
 - The most recent year the species has been recorded in the hotspot
 - The dataset from which the most recent record of the species in the hotspot was derived

For some versions of the maps the species attributes are “Undisclosed” or blank if the area of the hotspot is smaller than the minimum mapping area defined for that species as per the Bird Atlas 2007-2011. This is to preserve the confidentiality of the precise location of particularly scarce or vulnerable species.

Results

A set of maps was produced to illustrate both the scores and the national hotspots for groups of species and for some individual species at both 10km square and 1km square resolution.

All maps have been produced in both static and interactive (html) formats.

The maps indicate the date on which they were generated. This will allow for clarity should the maps be regenerated in the future.

The most significant maps produced by this project are presented in the following pages.

Multi-Species Maps

A selection of multi-species maps have been prepared. Each map is based on records of a number of species as identified in the following table.

Table 6: Species of farmland birds included in each multi-species map

Species	Farmland Bird	Breeding Farmland Wader	Lowland Farmland Bird	Upland Farmland Bird	Geese and Swans
Curlew	x	x			
Dunlin	x	x			
Lapwing	x	x			
Redshank	x	x			
Golden Plover	x	x			
Snipe	x	x			
Twite	x		x		
Red Grouse	x			x	
Meadow Pipit	x				
Hen Harrier	x			x	
Skylark	x				
Greenland White-fronted Goose	x				x
Whinchat	x		x		
Corncrake	x				
Grey Partridge	x				
Barn Owl	x				
Bewick's Swan	x				x
Stock Dove	x		x		
Kestrel	x		x		
Chough	x			x	
Quail	x				
Yellowhammer	x		x		
Tree Sparrow	x		x		
Barnacle Goose	x				x
Greylag Goose	x				x
Brent Goose	x				x
Whooper Swan	x				x
Spotted Crake	x				

Farmland Bird

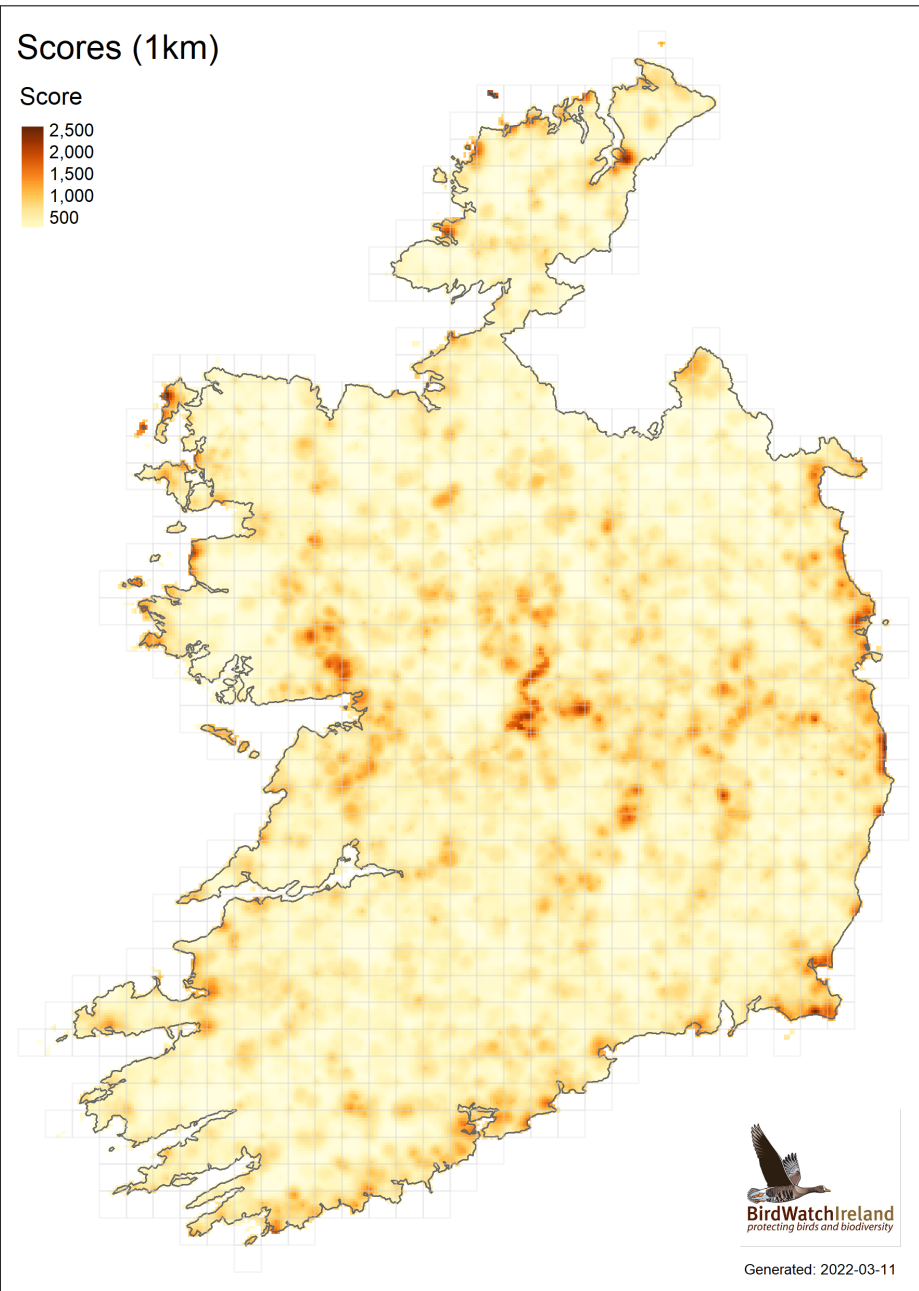


Figure 6: Farmland Bird Scores

Farmland Bird

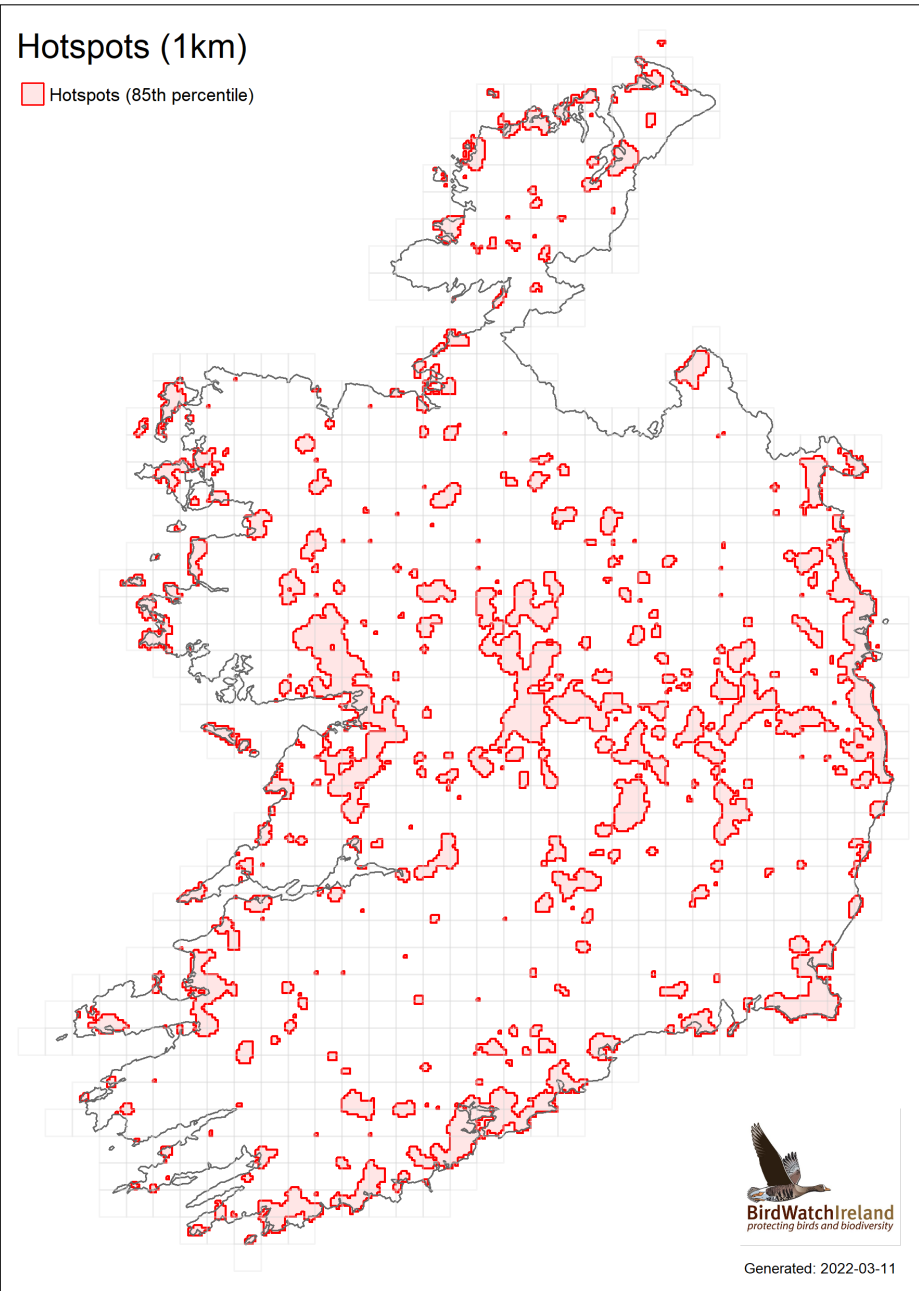


Figure 7: Farmland Bird Hotspots (85th percentile)

Breeding Farmland Wader

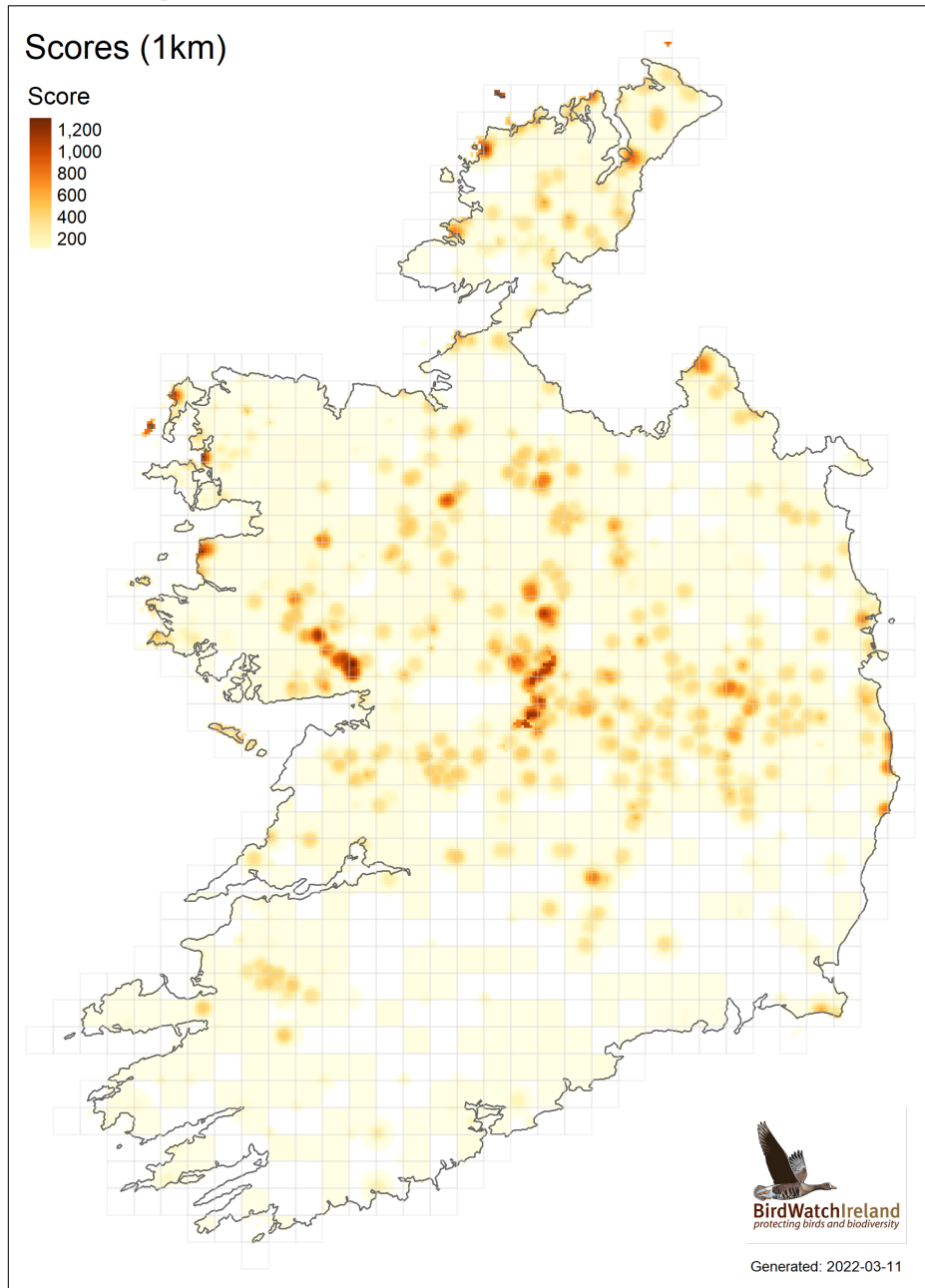


Figure 8: Breeding Farmland Wader Scores

Breeding Farmland Wader

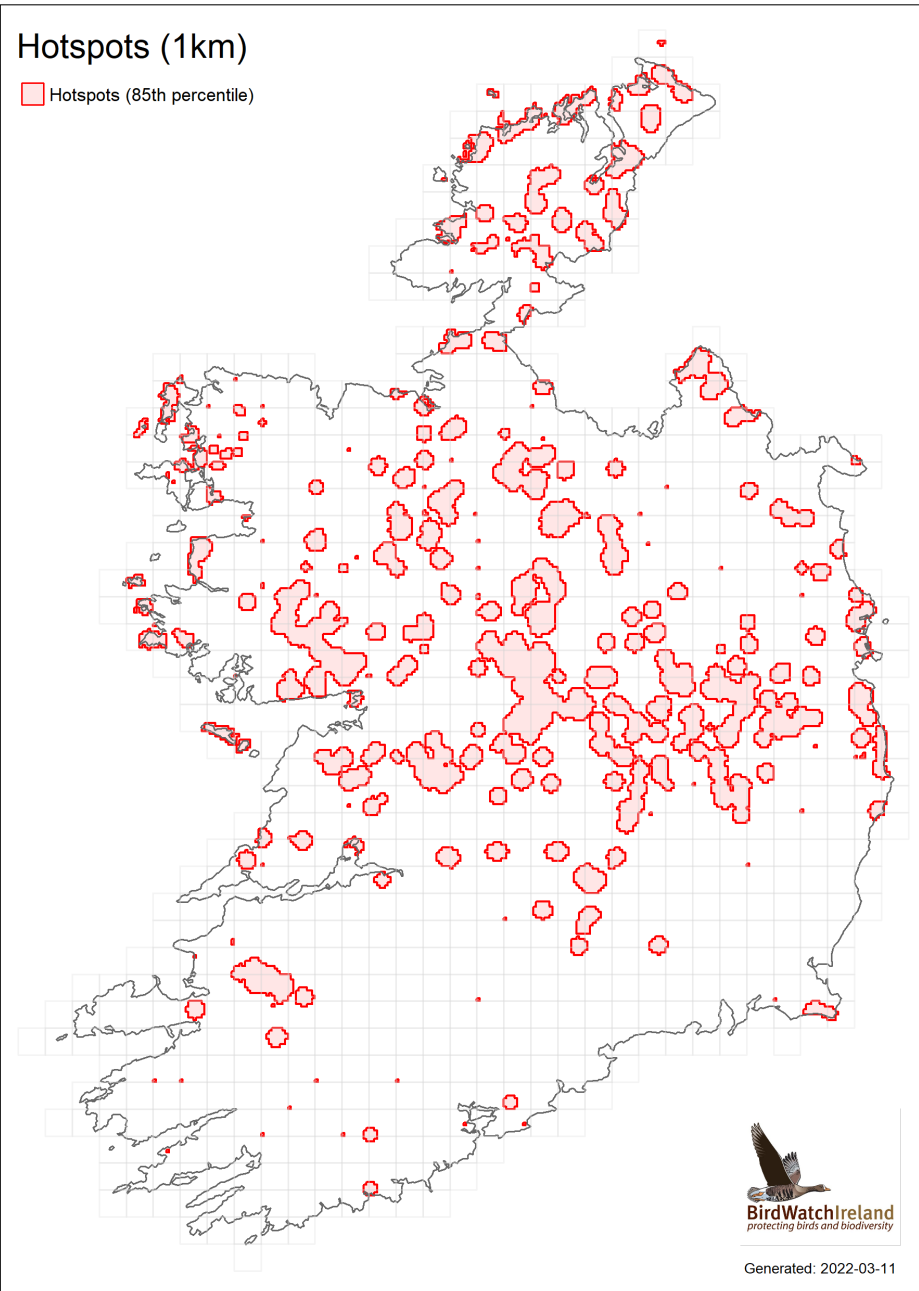


Figure 9: Breeding Farmland Wader Hotspots (85th percentile)

Lowland Farmland Bird

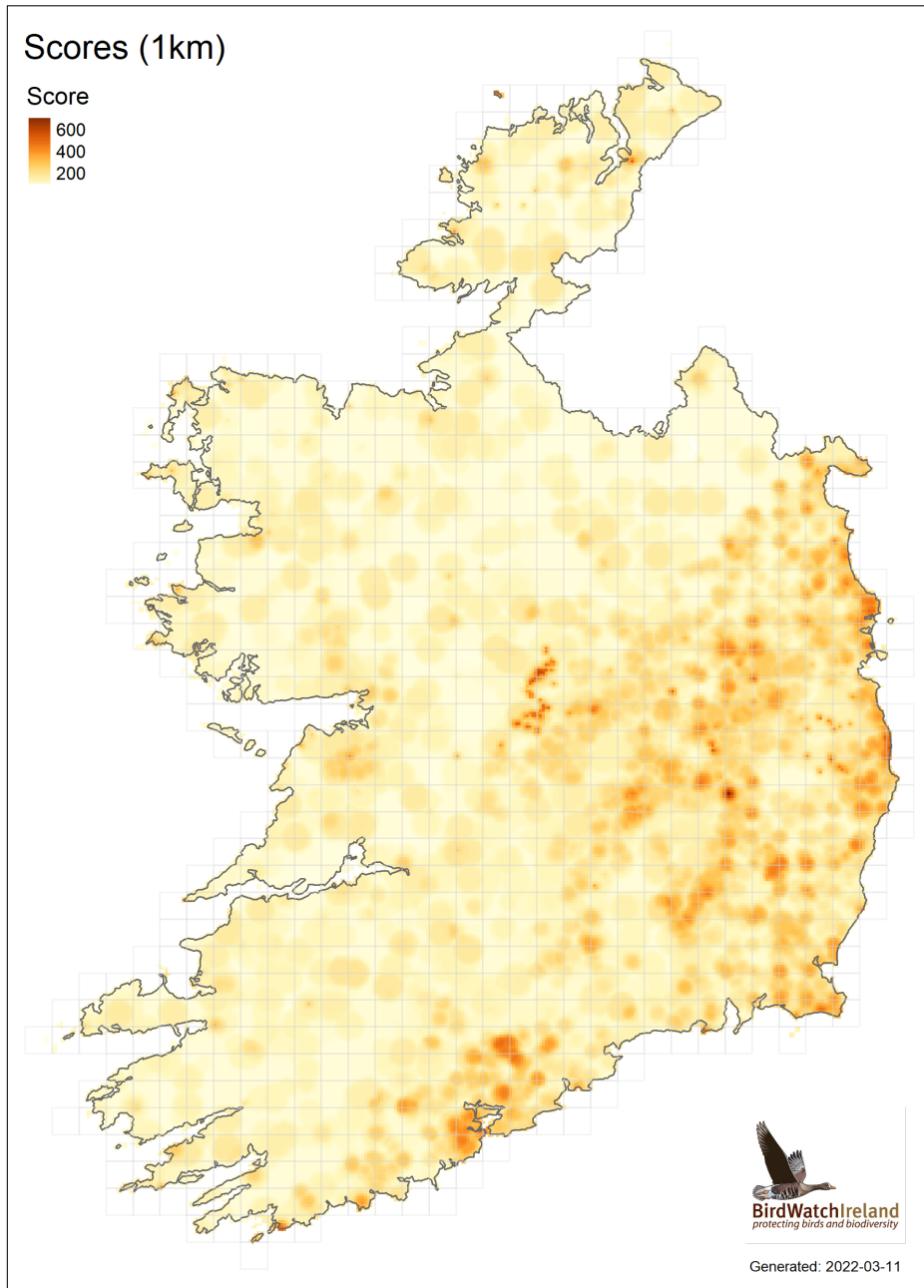


Figure 10: Lowland Farmland Bird Scores

Lowland Farmland Bird

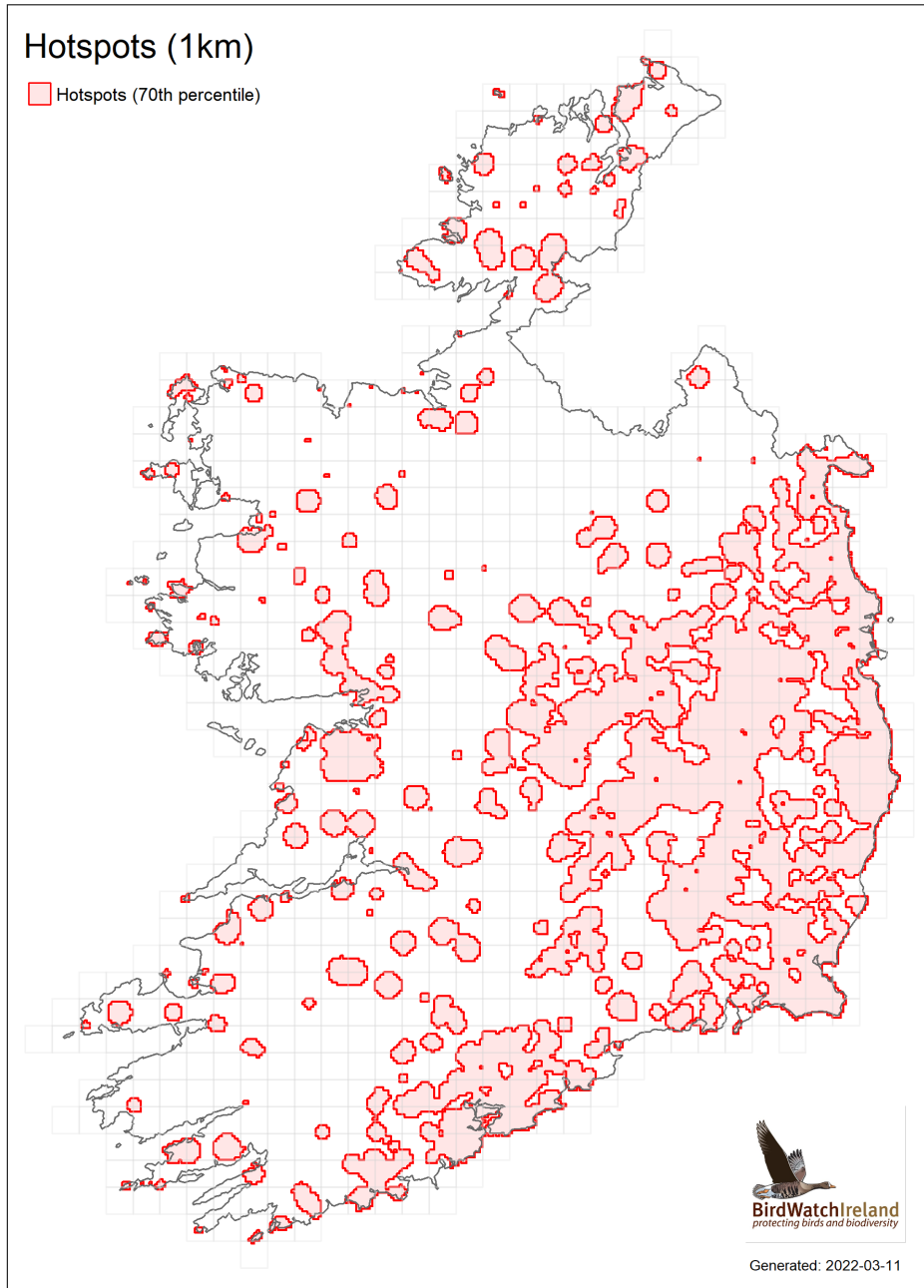


Figure 11: Lowland Farmland Bird Hotspots (70th percentile)

Upland Farmland Bird

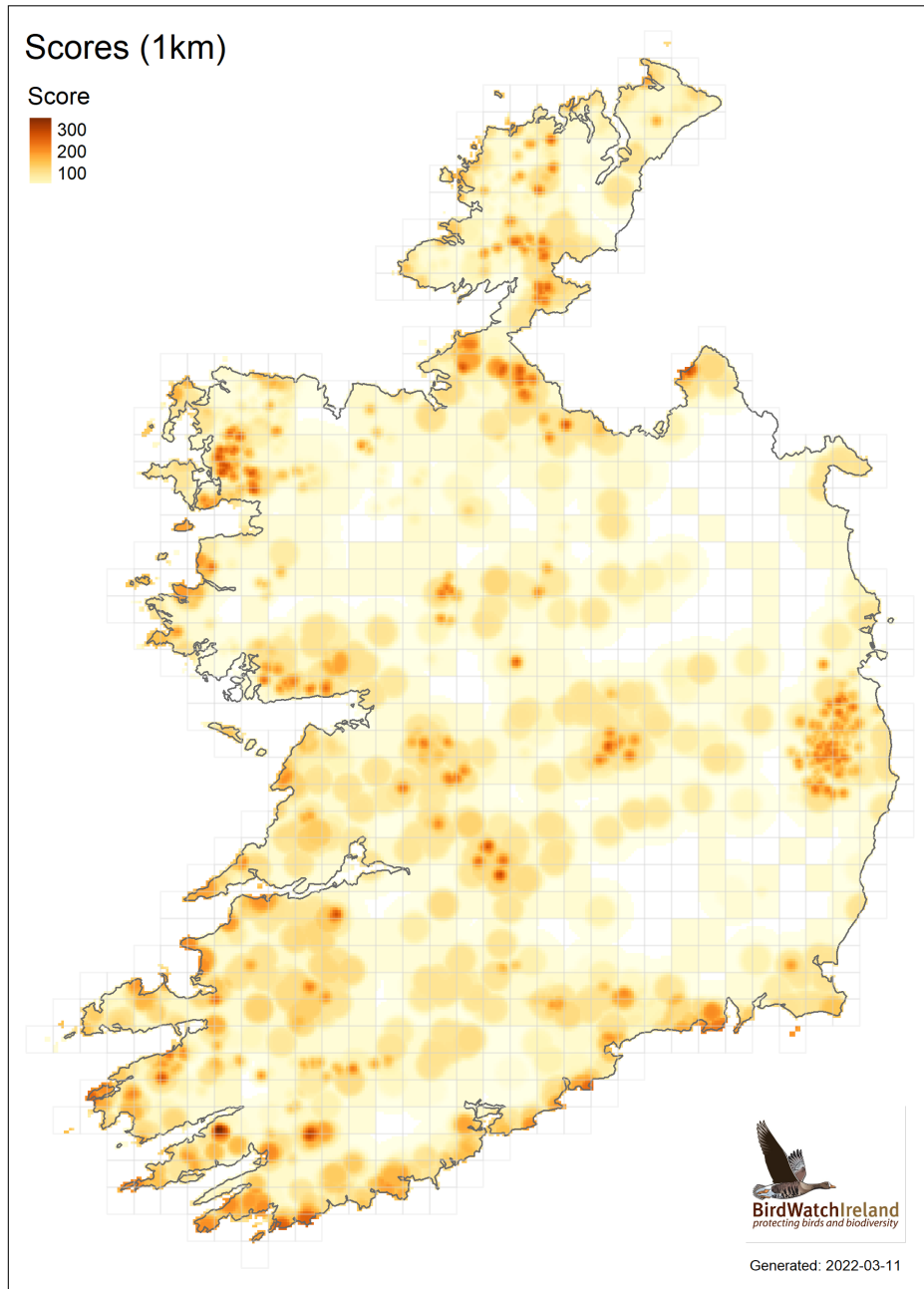


Figure 12: Upland Farmland Bird Scores

Upland Farmland Bird

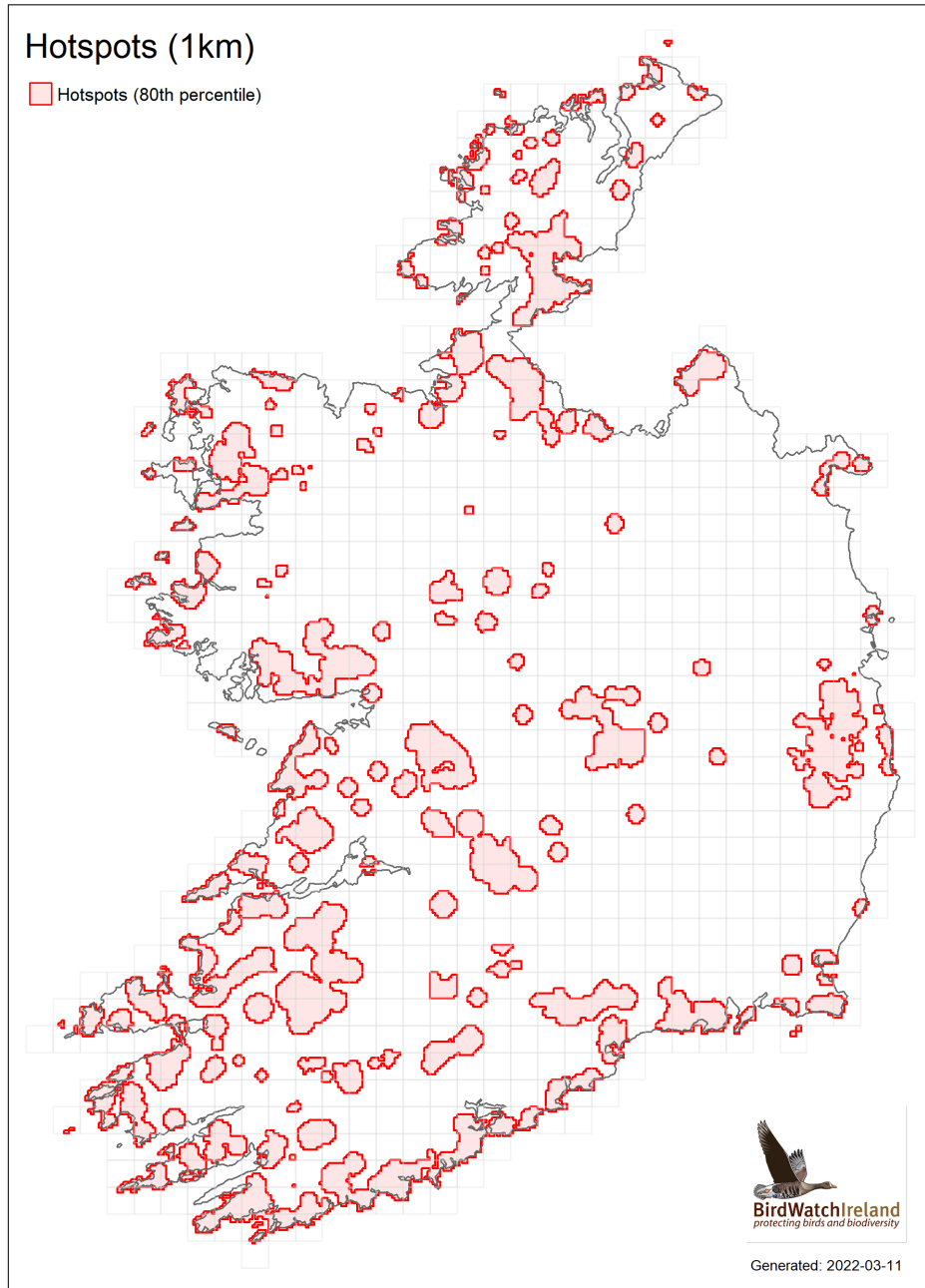


Figure 13: Upland Farmland Bird Hotspots (80th percentile)

Geese and Swans

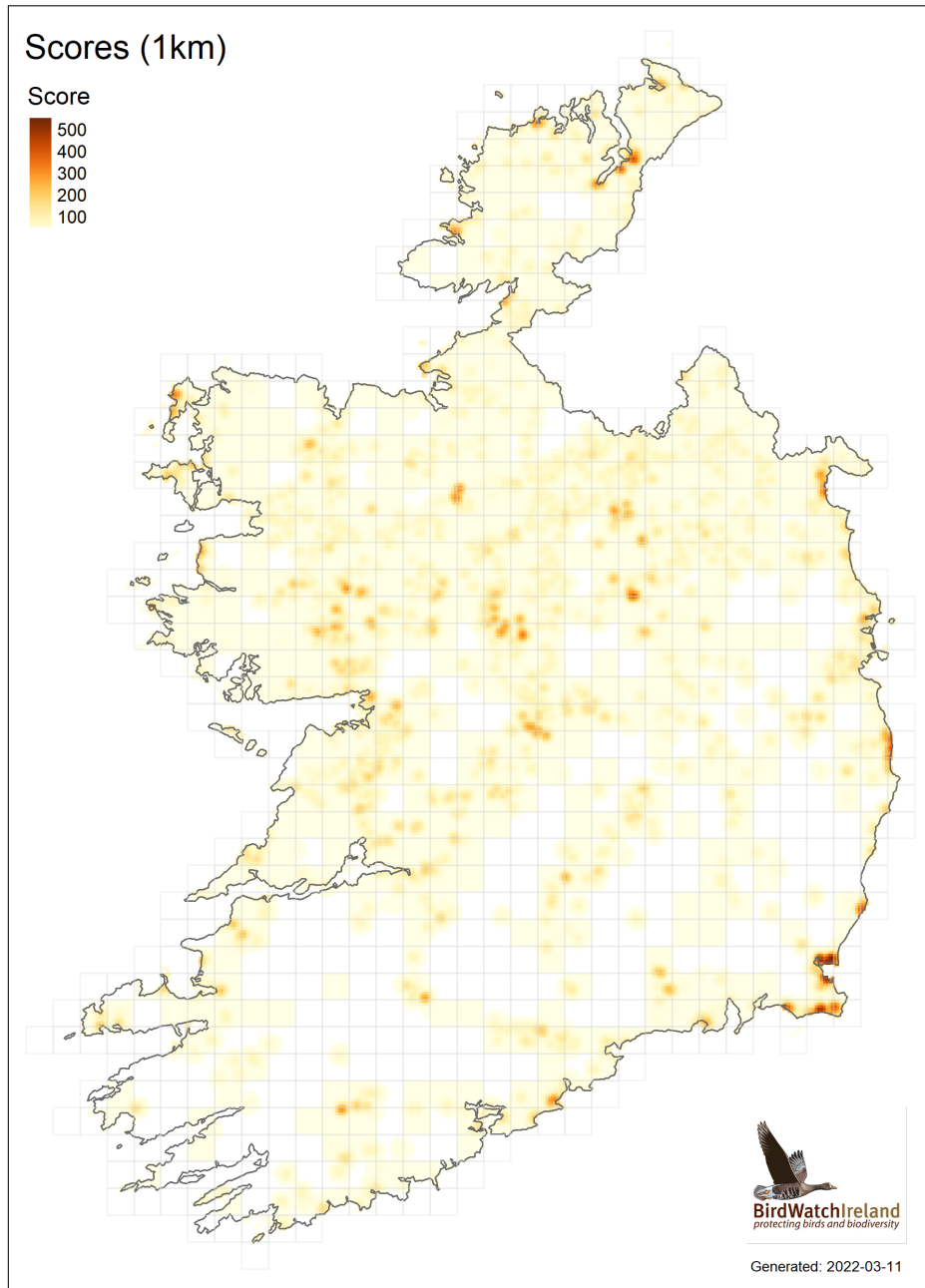


Figure 14: Geese and Swans Scores

Geese and Swans

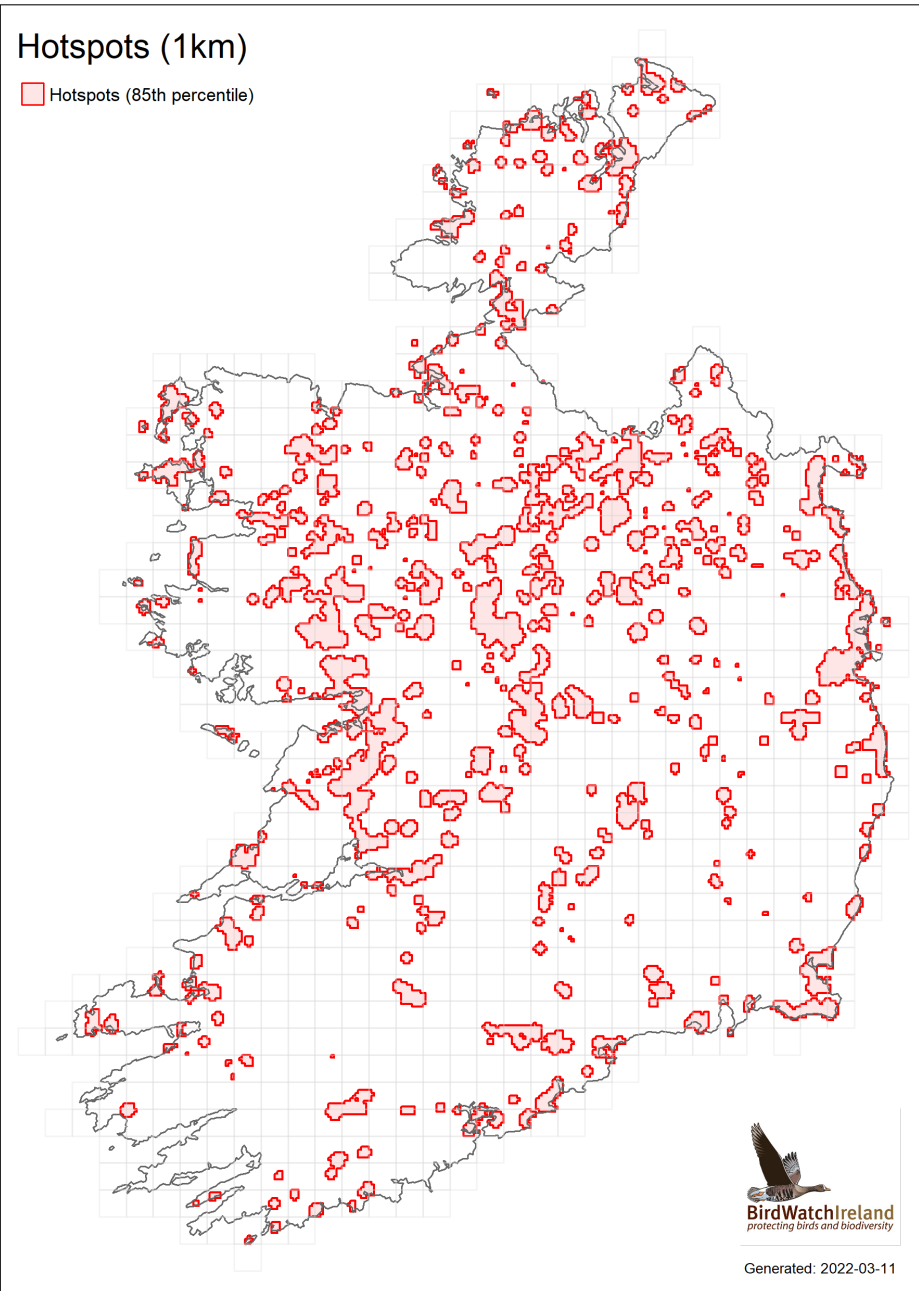


Figure 15: Geese and Swans Hotspots (85th percentile)

Single-Species Maps

Single-species maps have been prepared for the following species:

- Curlew
- Dunlin
- Lapwing
- Whinchat
- Redshank
- Grey Partridge
- Golden Plover
- Snipe
- Twite
- Stock Dove
- Kestrel
- Chough
- Yellowhammer
- Hen Harrier
- Greenland White-fronted Goose

Curlew

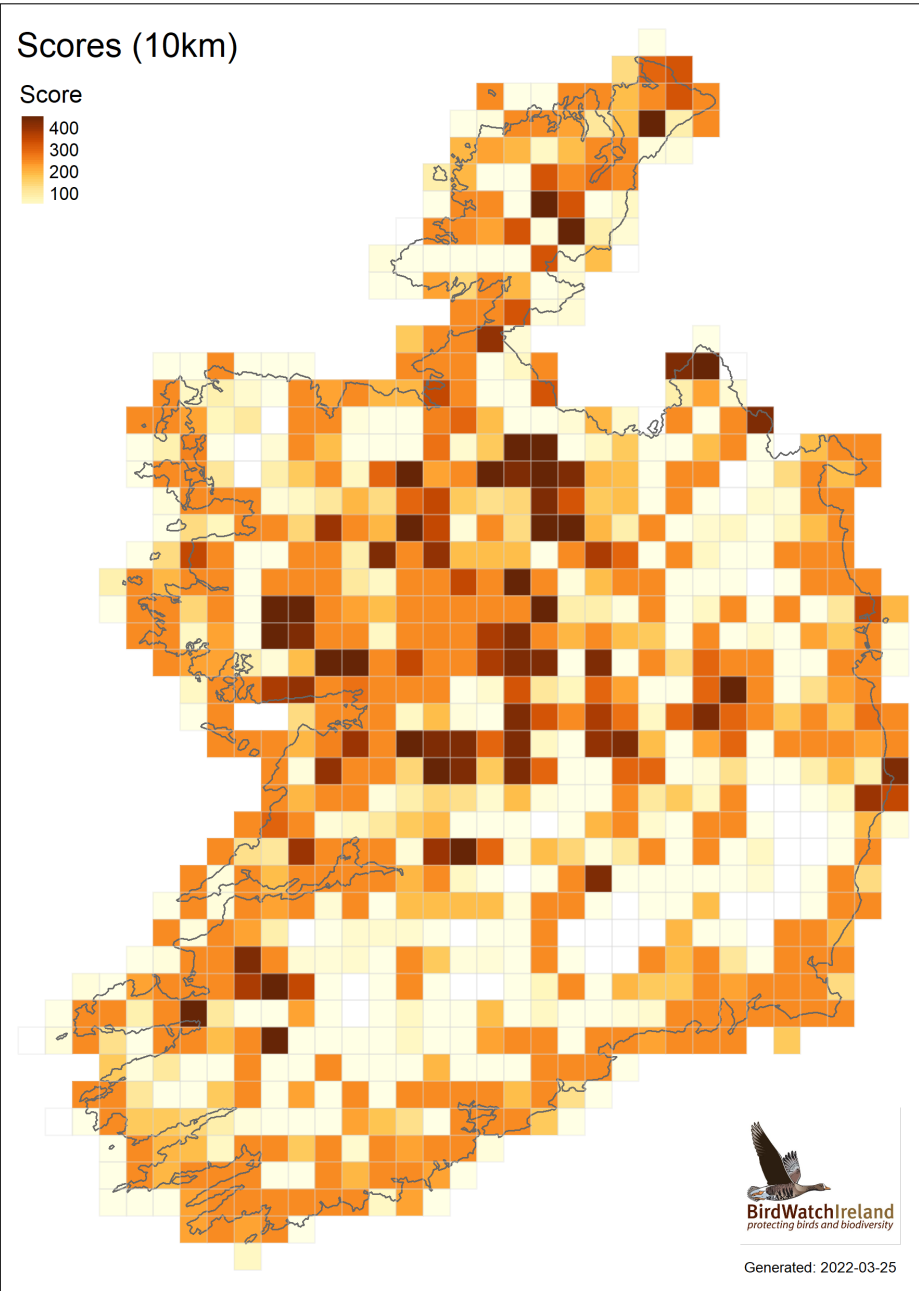


Figure 16: Curlew Scores

Curlew

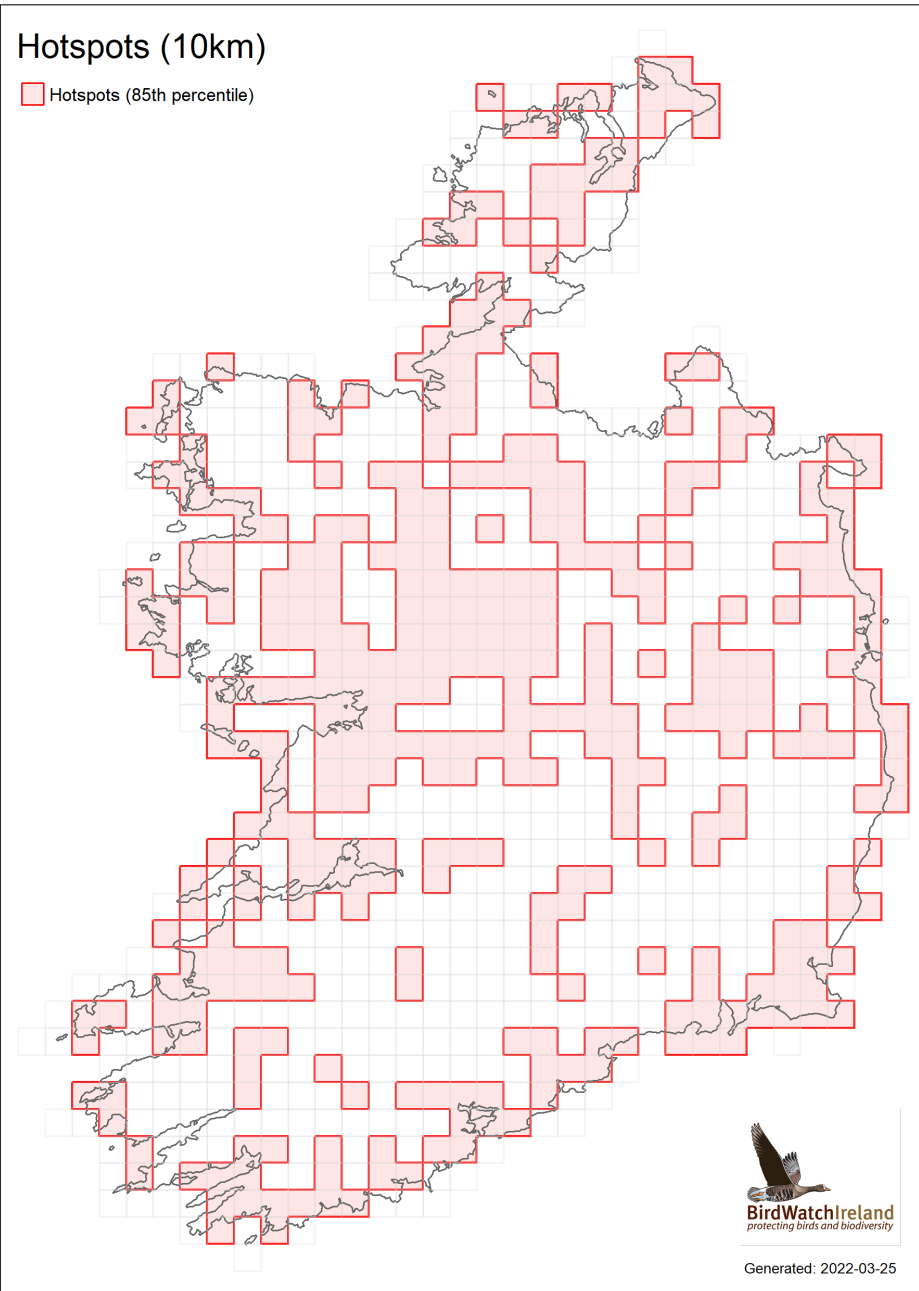


Figure 17: Curlew Hotspots (85th percentile)

Dunlin

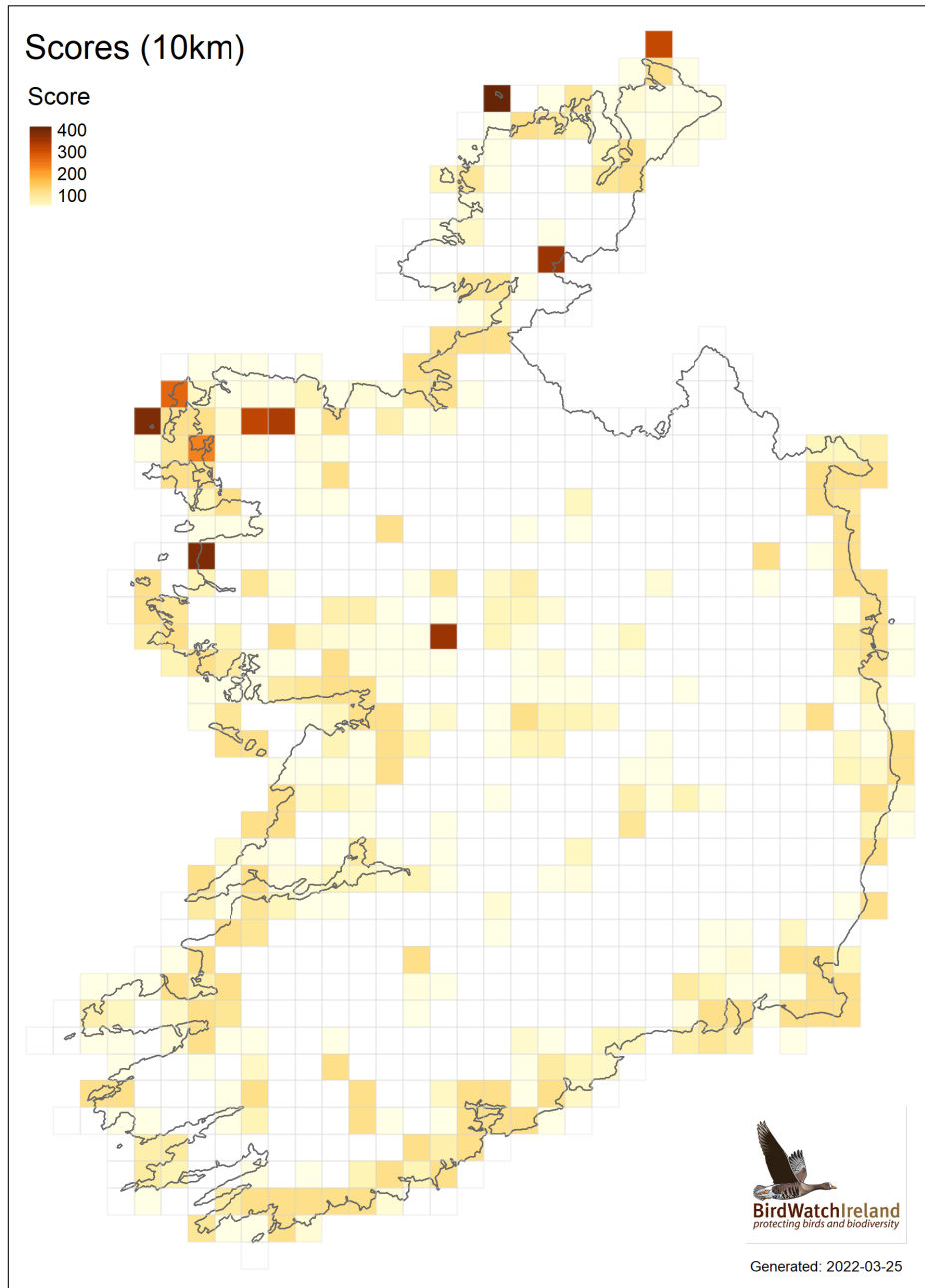


Figure 18: Dunlin Scores

Dunlin

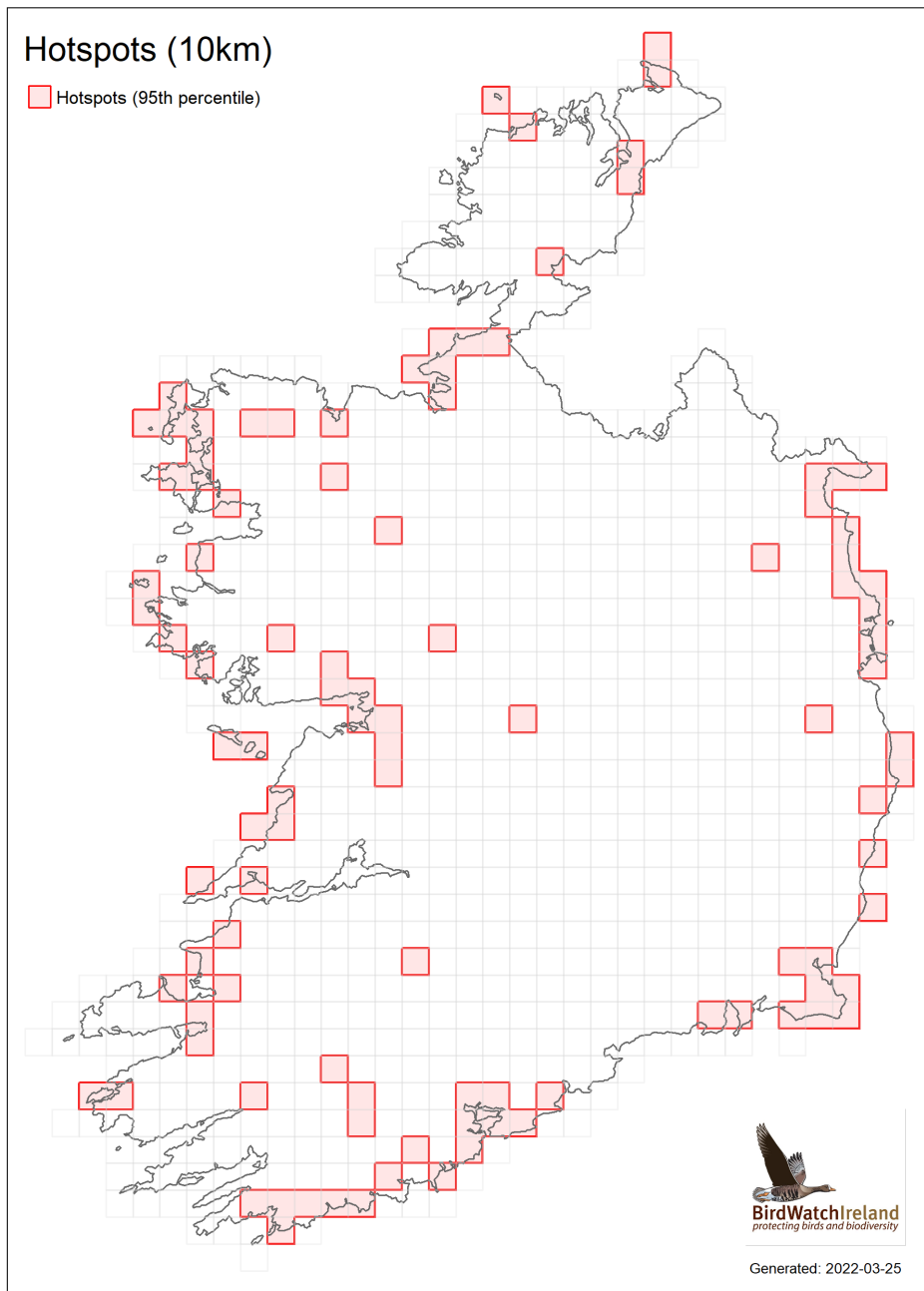


Figure 19: Dunlin Hotspots (95th percentile)

Lapwing

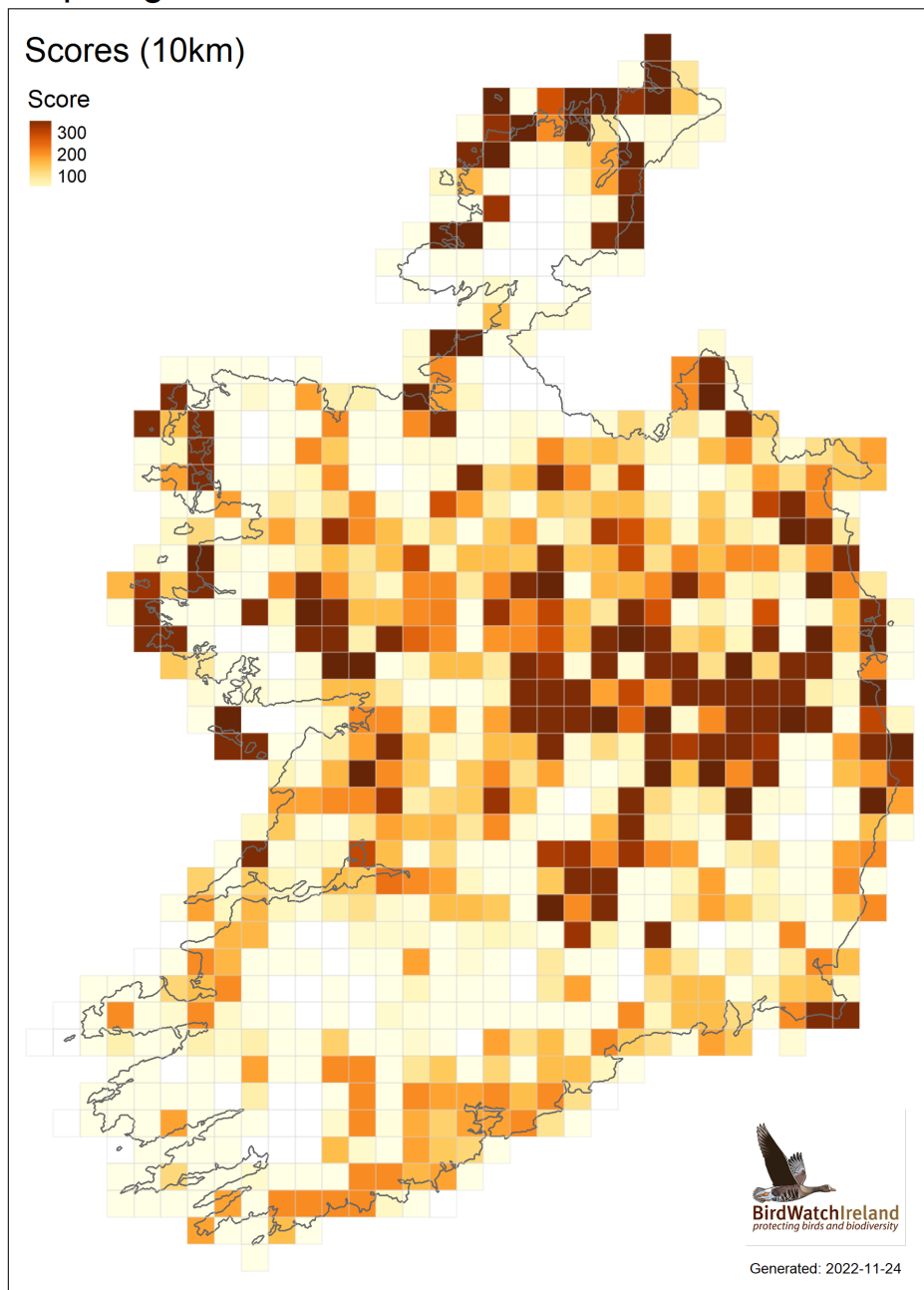


Figure 20: Lapwing Scores

Lapwing

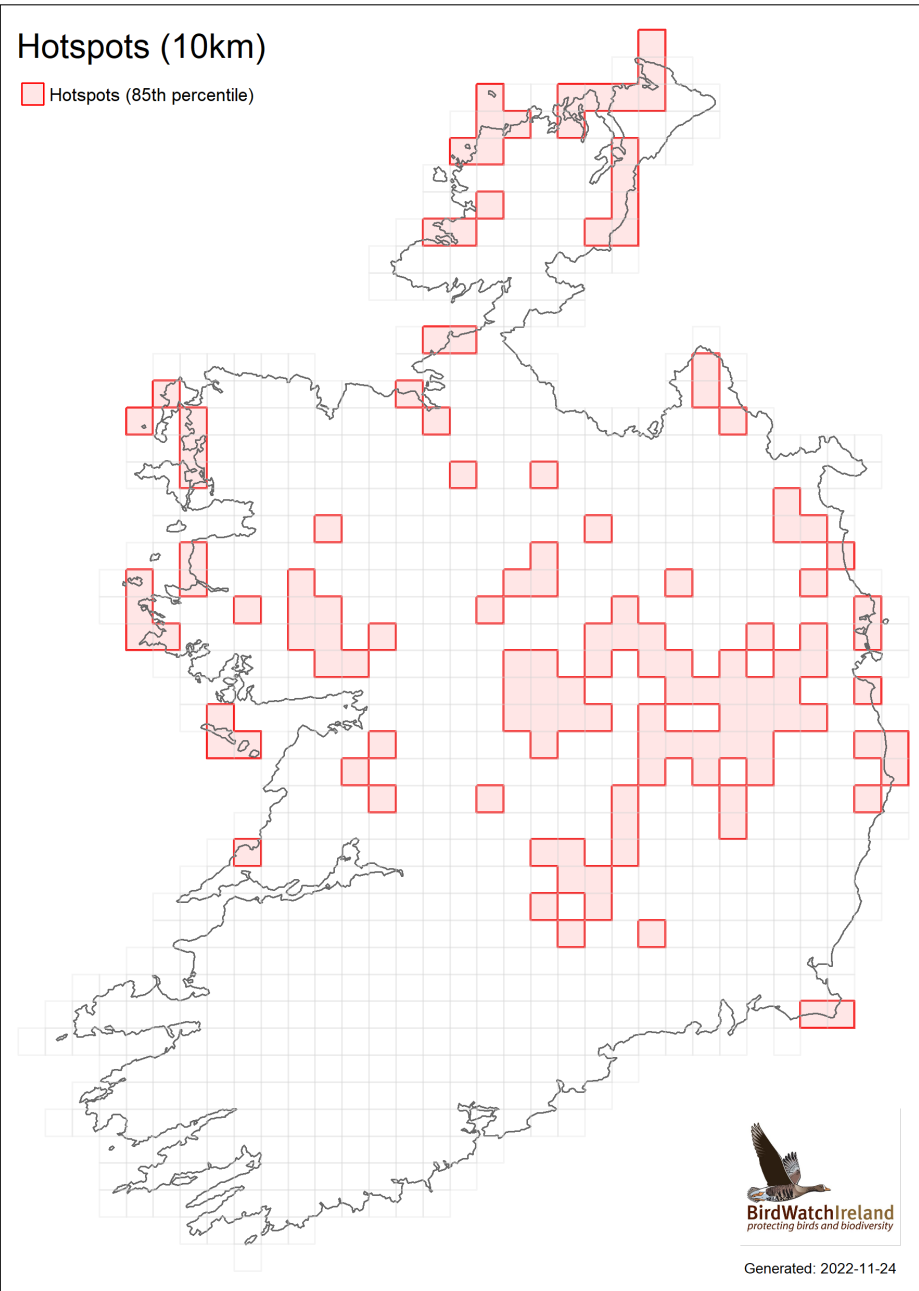


Figure 21: Lapwing Hotspots (85th percentile)

Whinchat

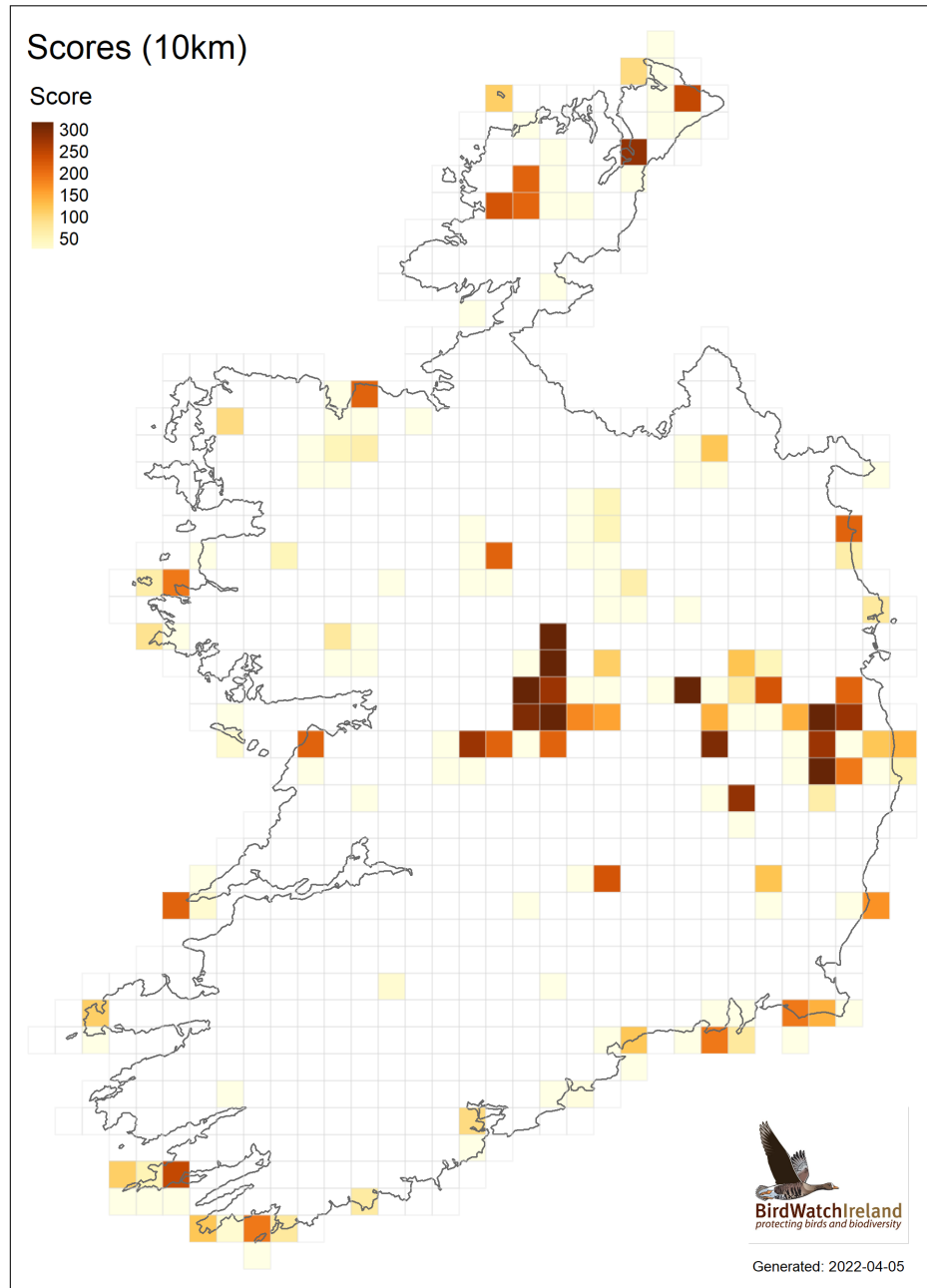


Figure 22: Whinchat Scores

Whinchat

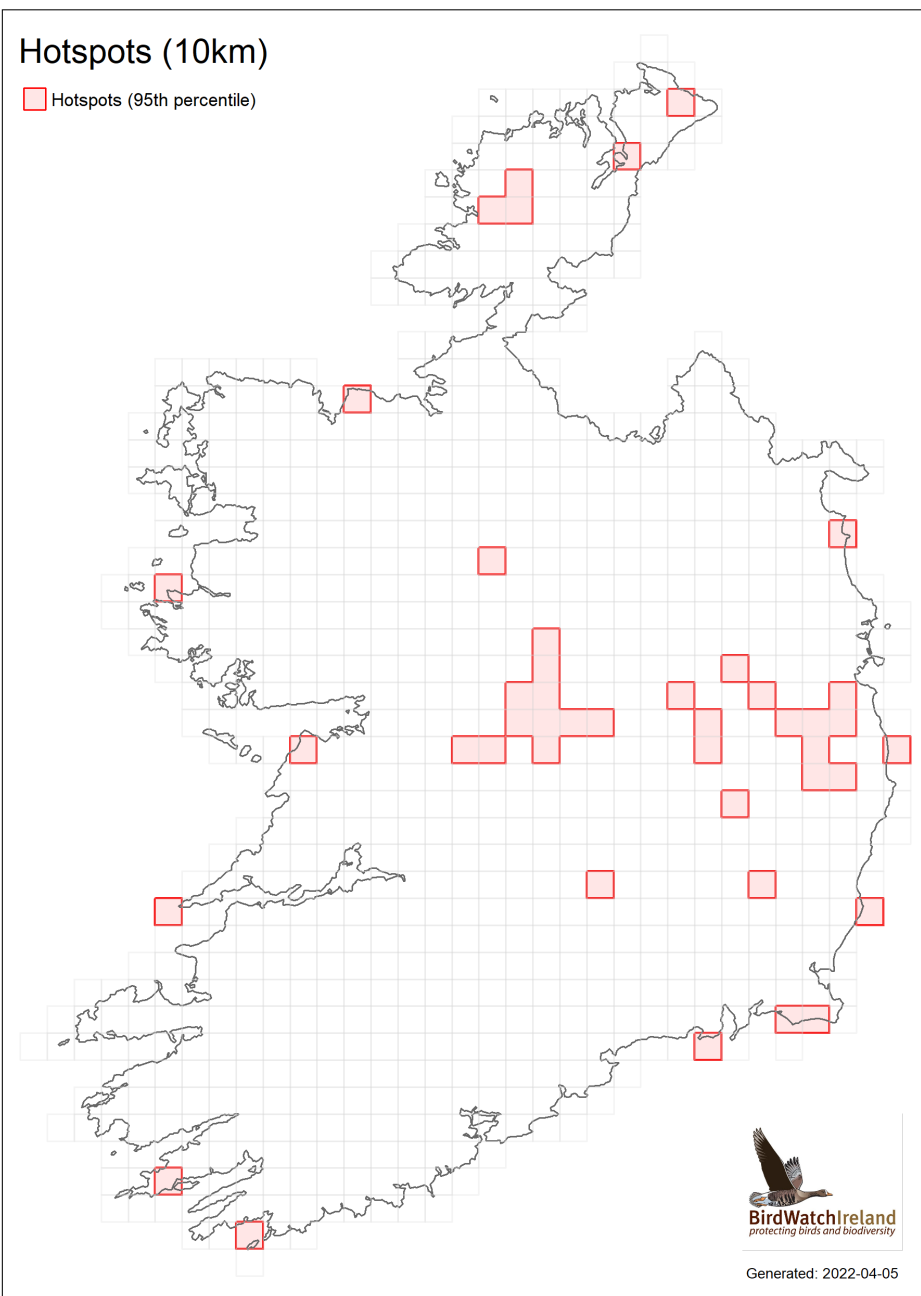


Figure 23: Whinchat Hotspots (95th percentile)

Redshank

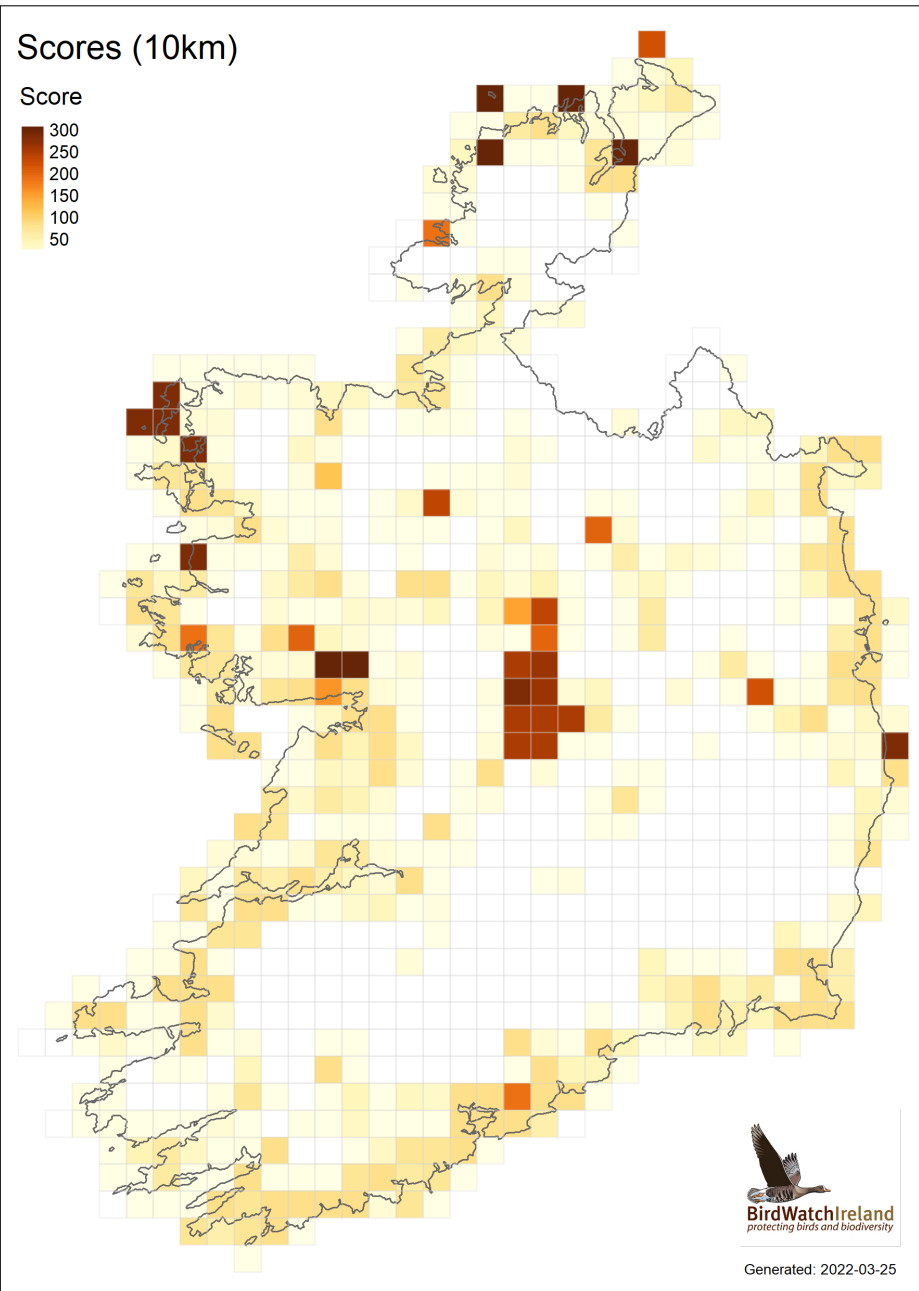


Figure 24: Redshank Scores

Redshank

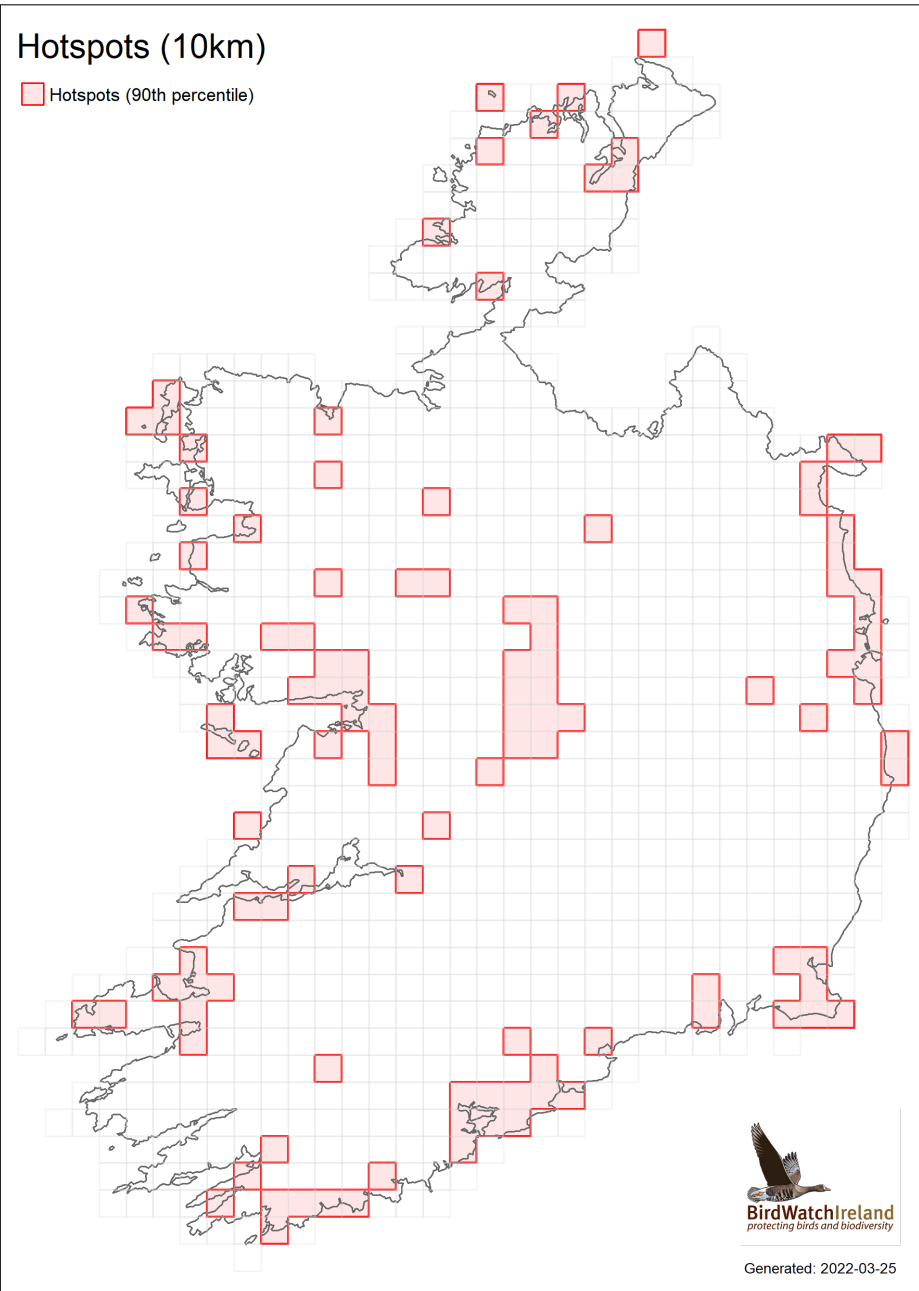


Figure 25: Redshank Hotspots (90th percentile)

Grey Partridge

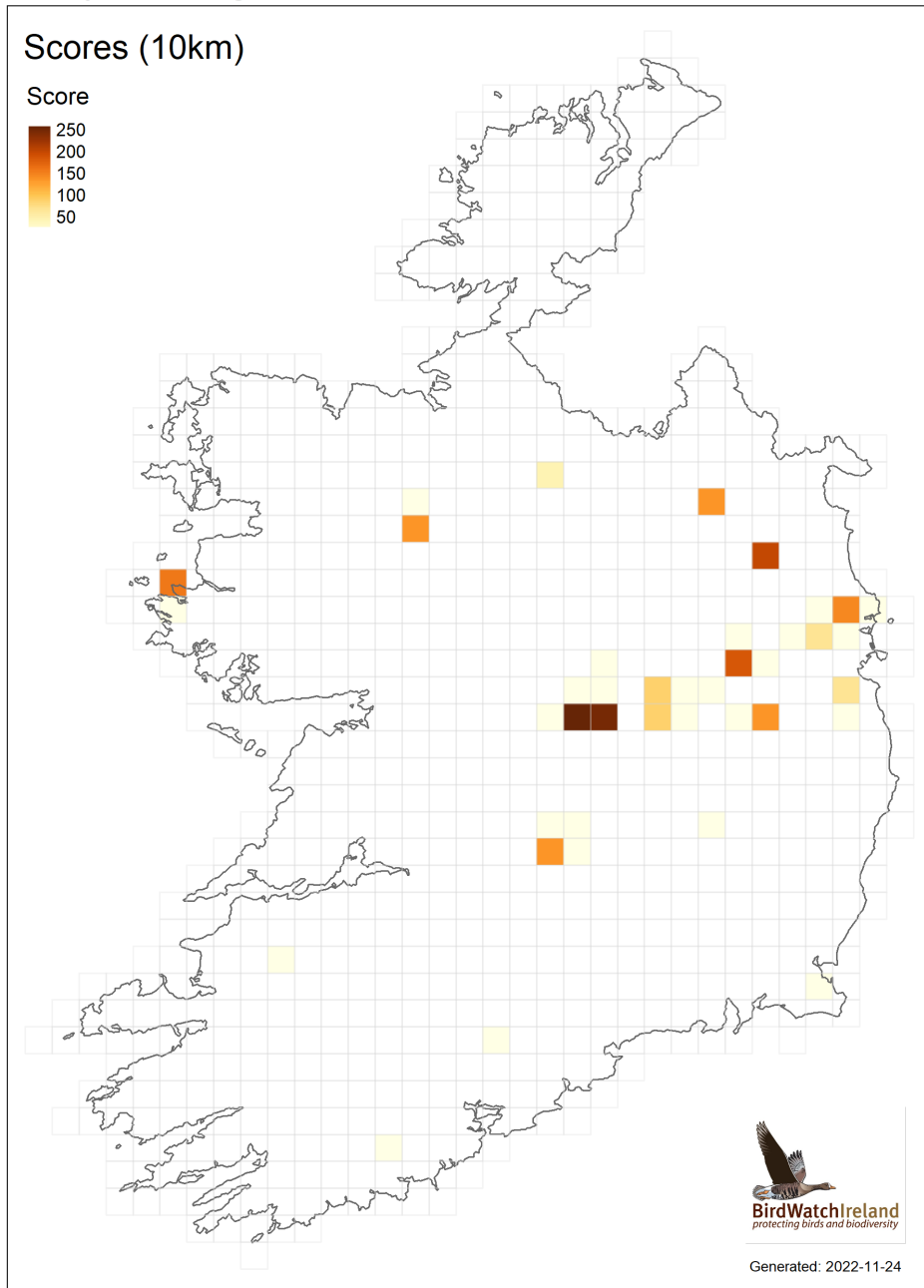


Figure 26: Grey Partridge Scores

Grey Partridge

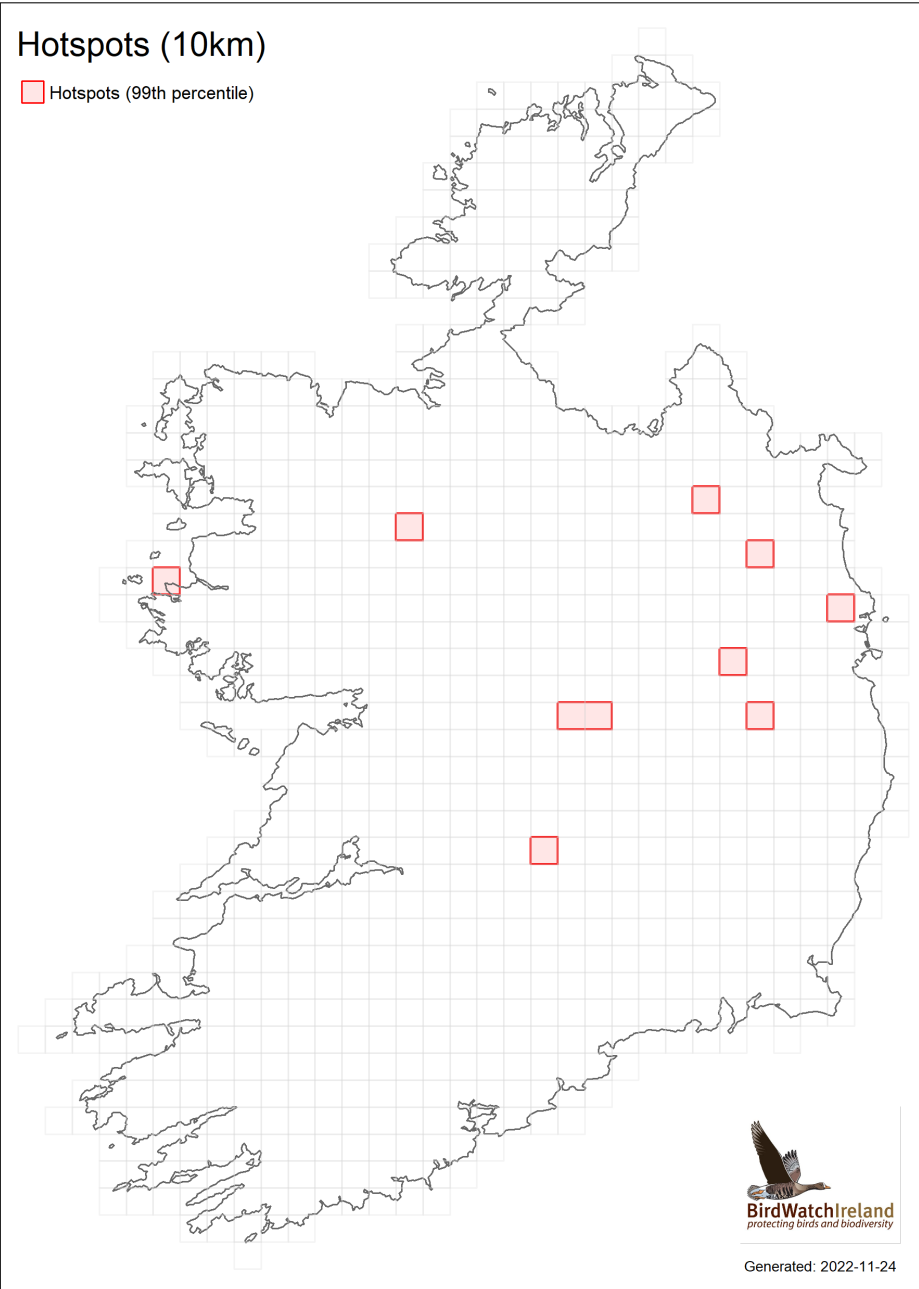


Figure 27: Grey Partridge Hotspots (99th percentile)

Golden Plover

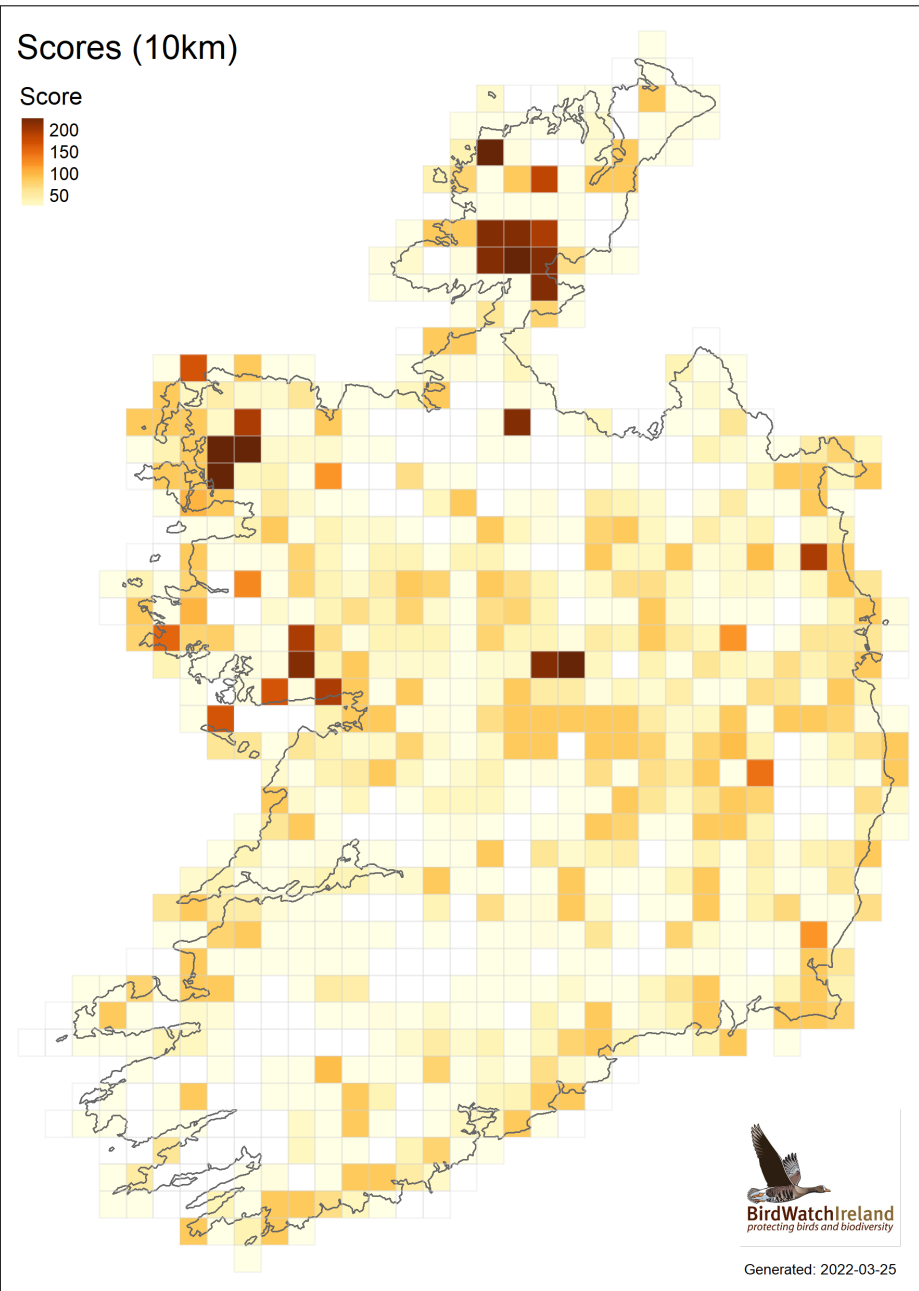


Figure 28: Golden Plover Scores

Golden Plover

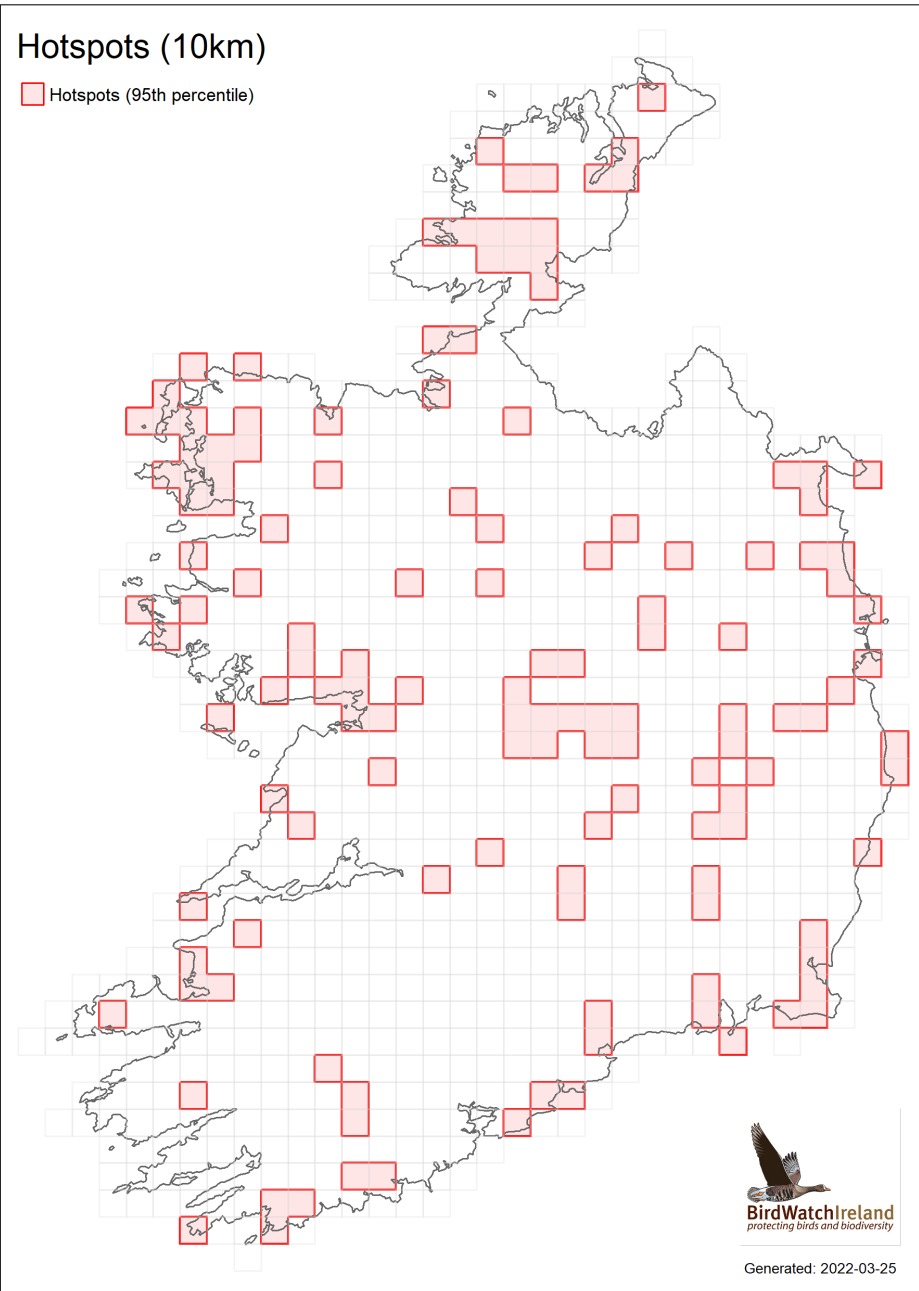


Figure 29: Golden Plover Hotspots (95th percentile)

Snipe

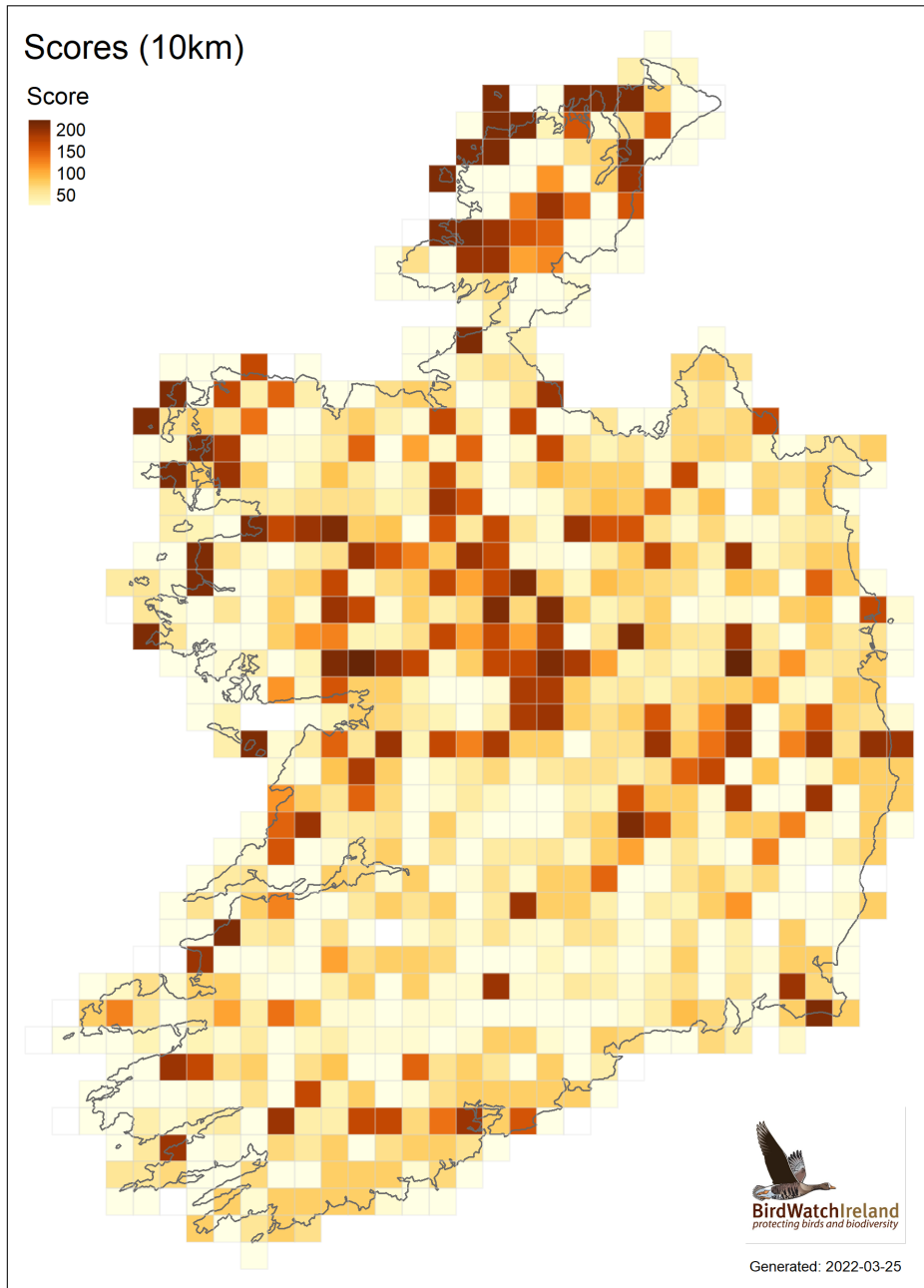


Figure 30: Snipe Scores

Snipe

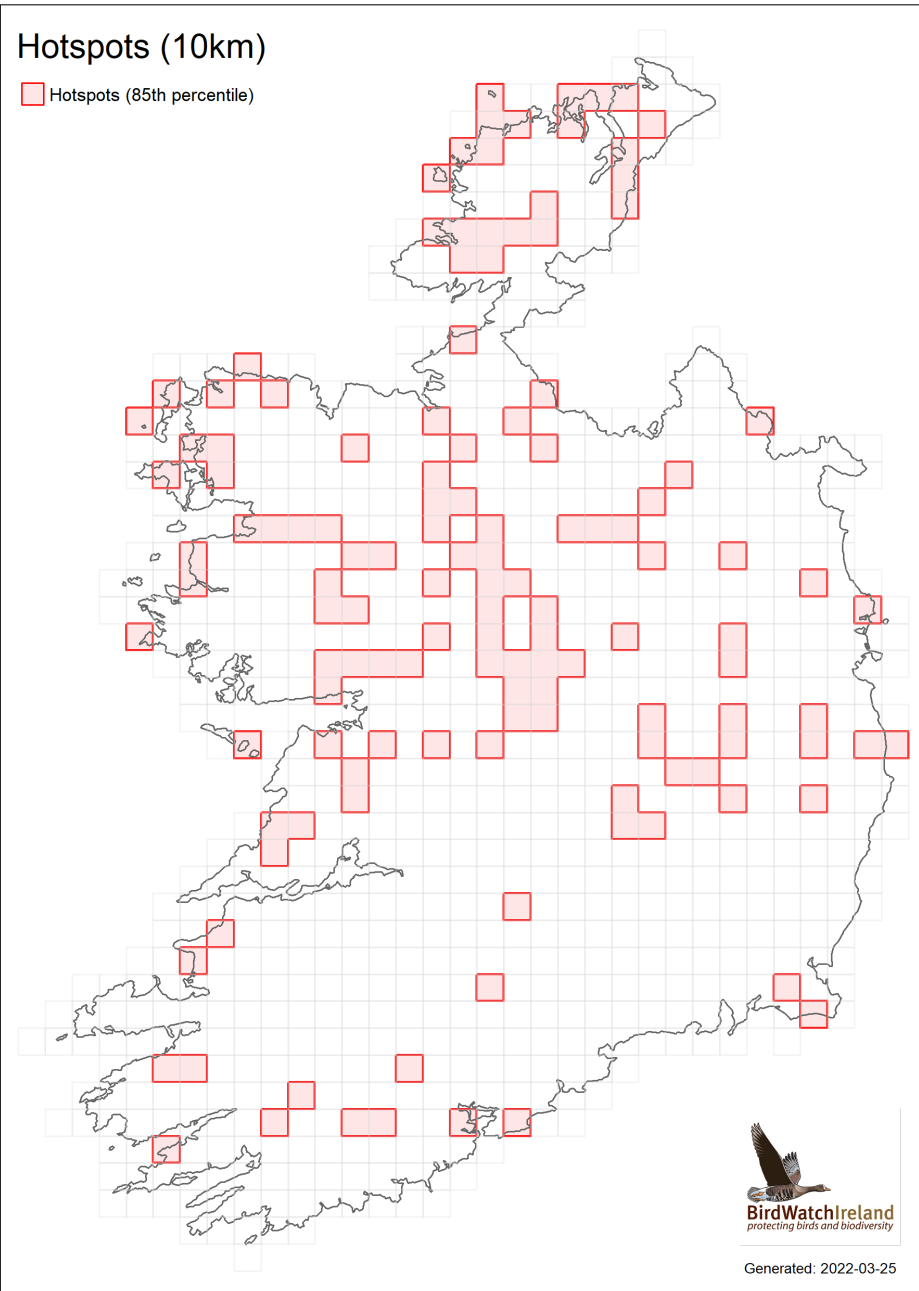


Figure 31: Snipe Hotspots (85th percentile)

Twite

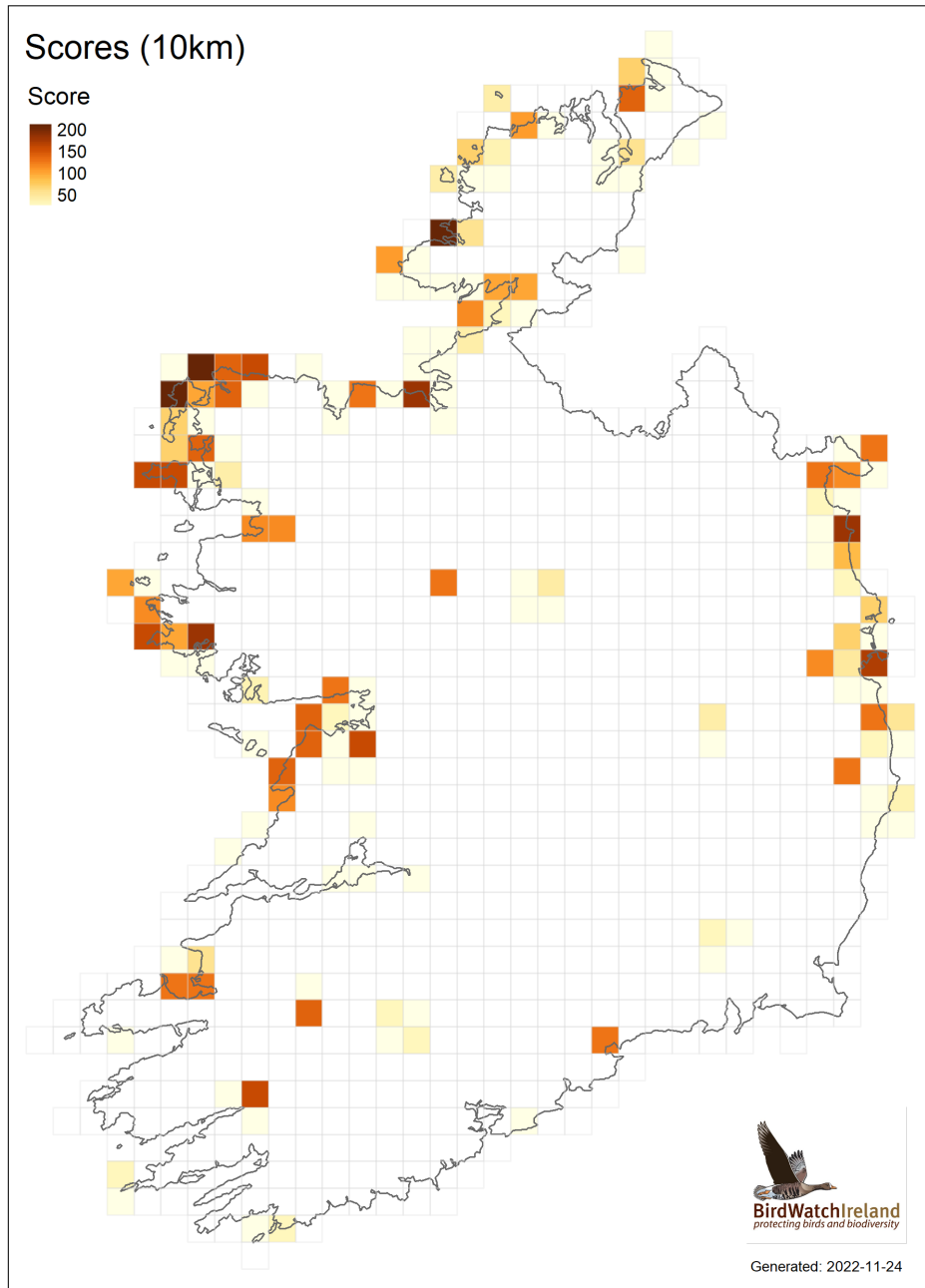


Figure 32: Twite Scores

Twite

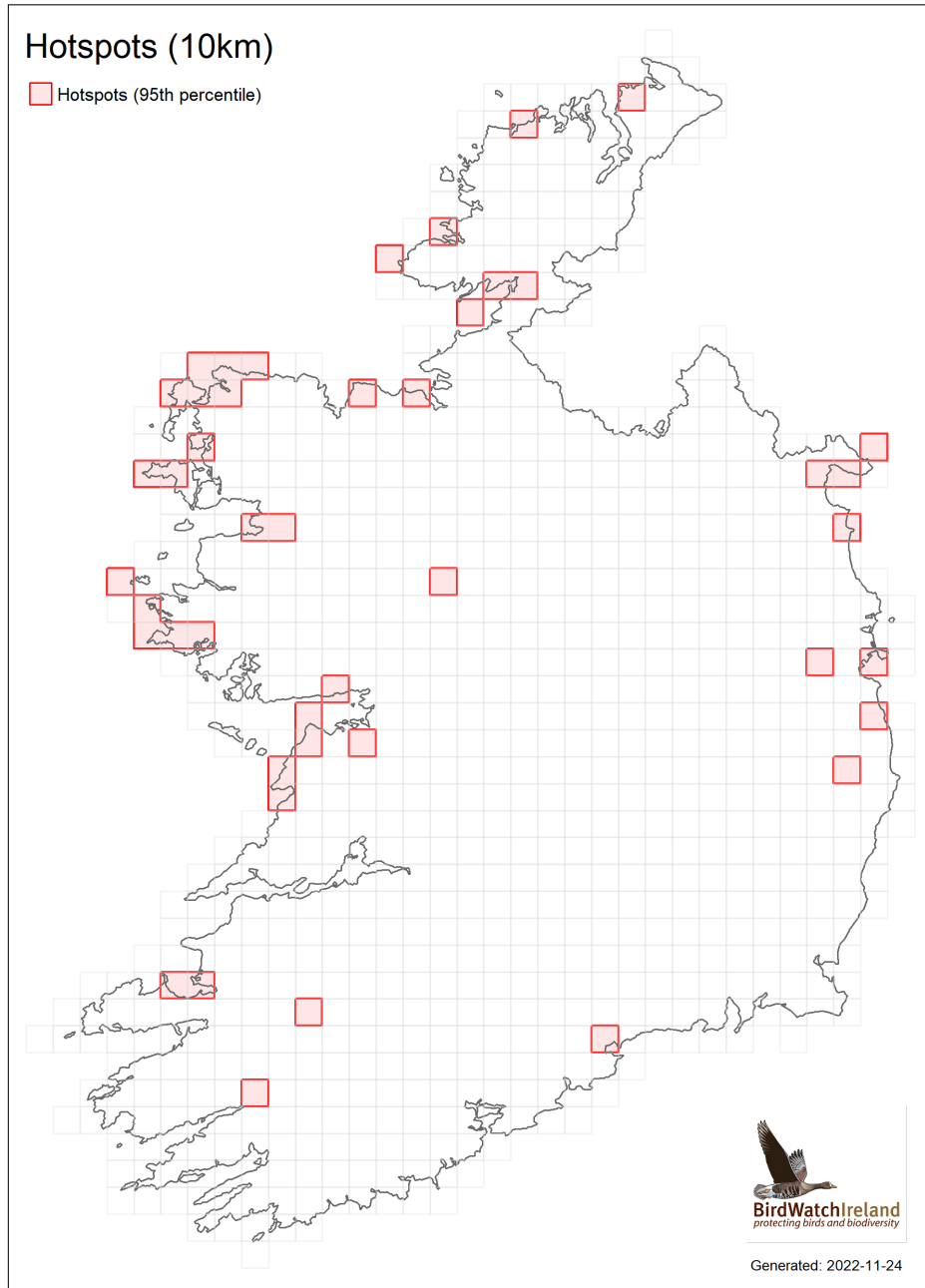


Figure 33: Twite Hotspots (95th percentile)

Stock Dove

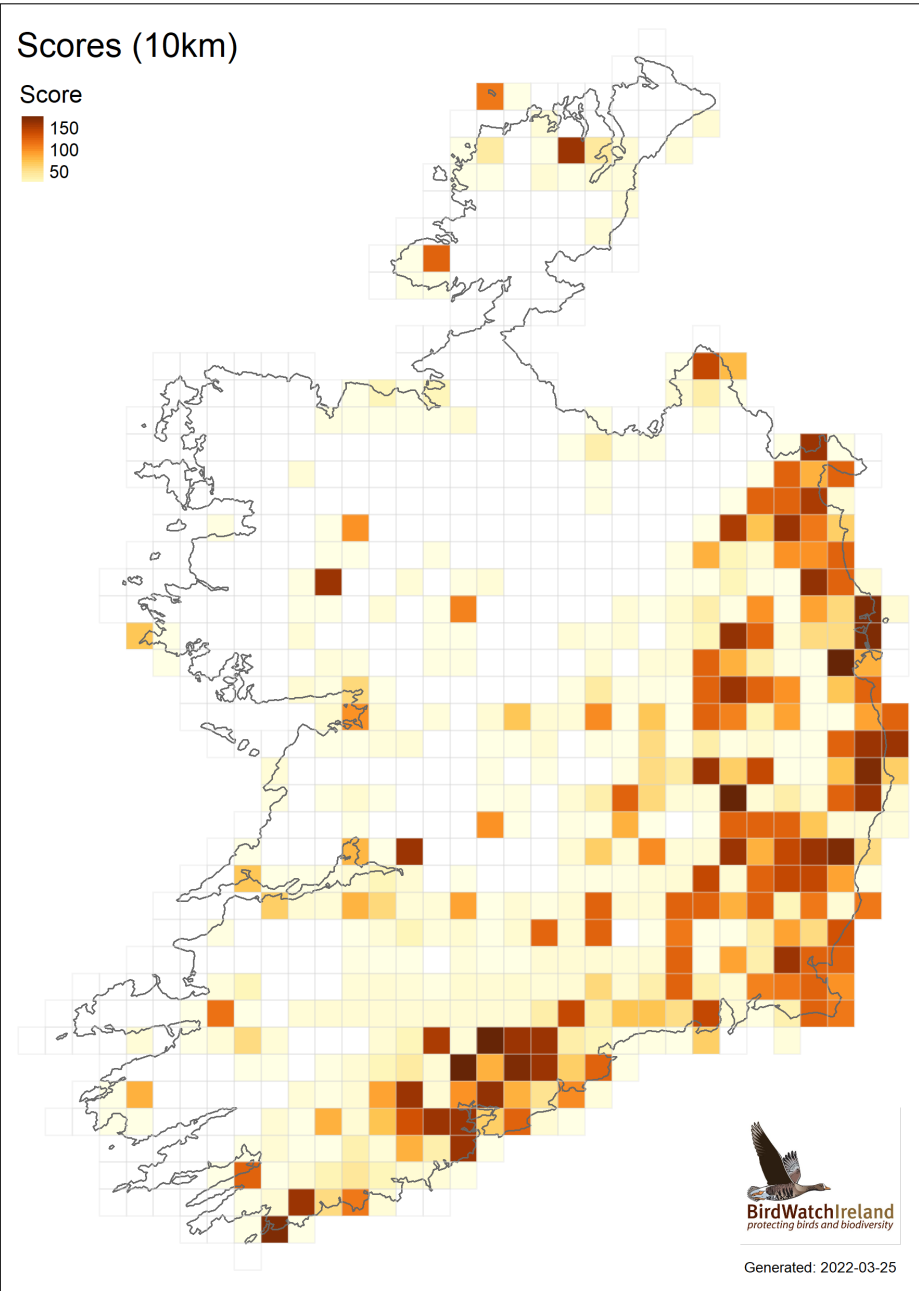


Figure 34: Stock Dove Scores

Stock Dove

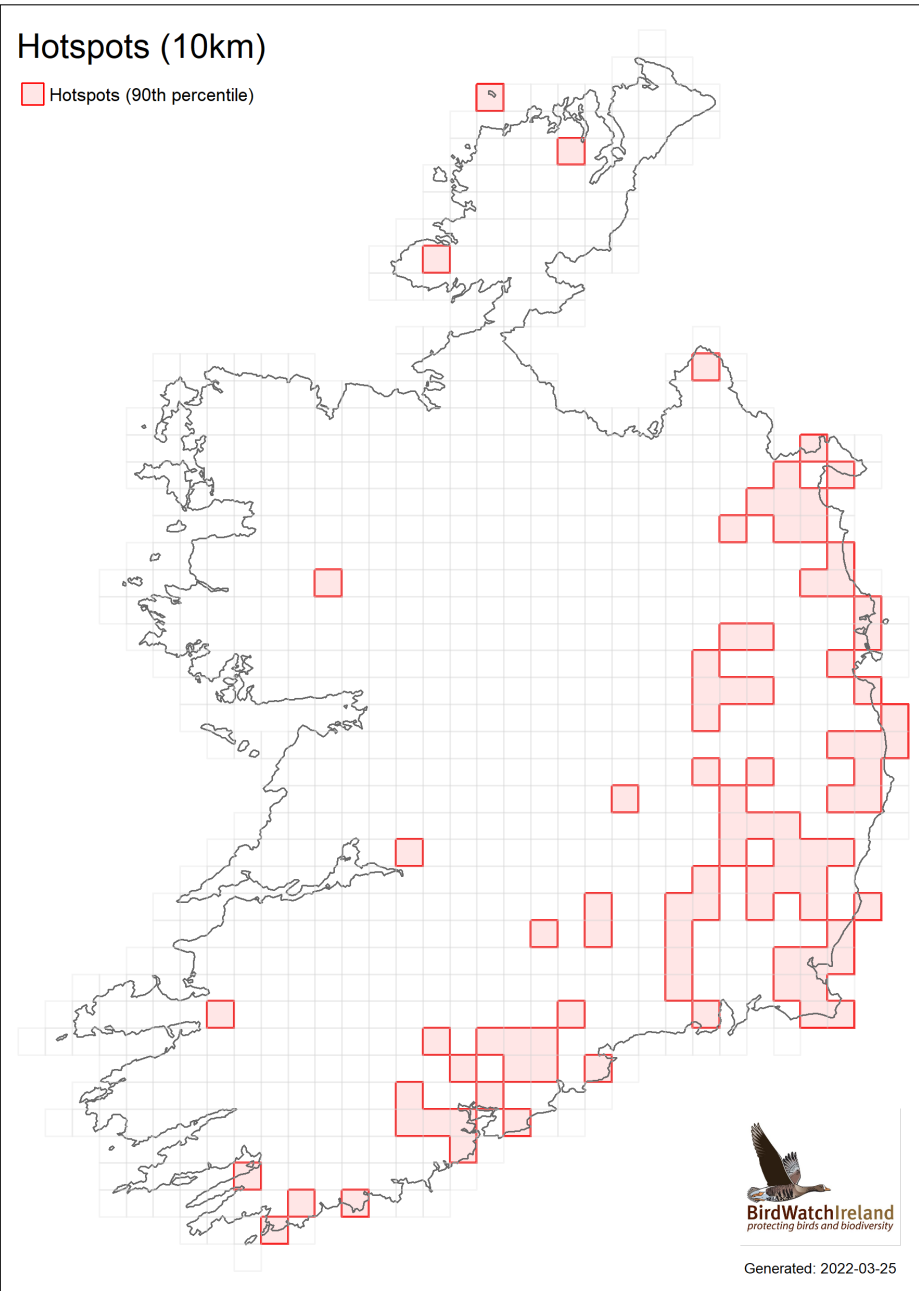


Figure 35: Stock Dove Hotspots (90th percentile)

Kestrel



Figure 36: Kestrel Scores

Kestrel

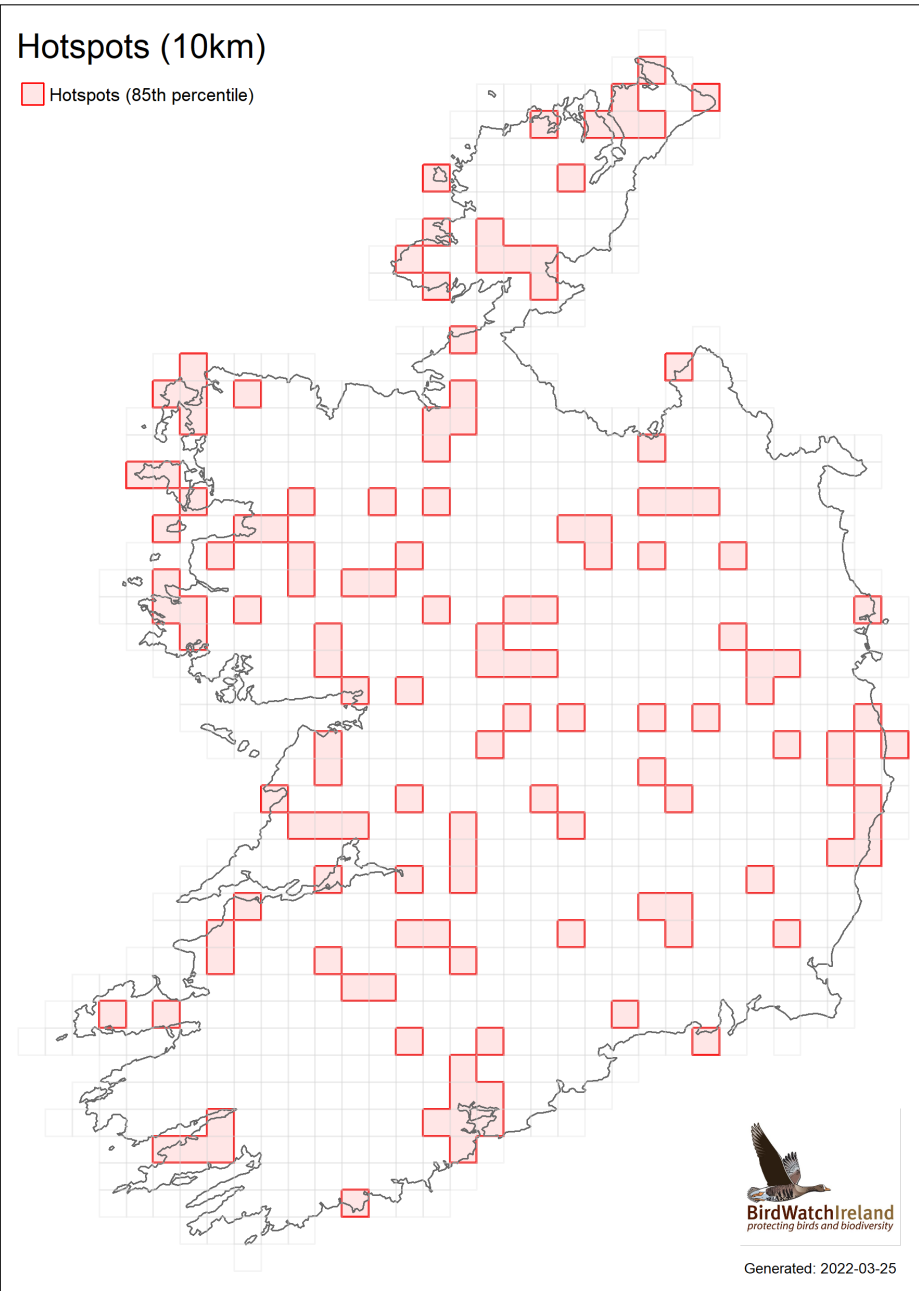


Figure 37: Kestrel Hotspots (85th percentile)

Chough

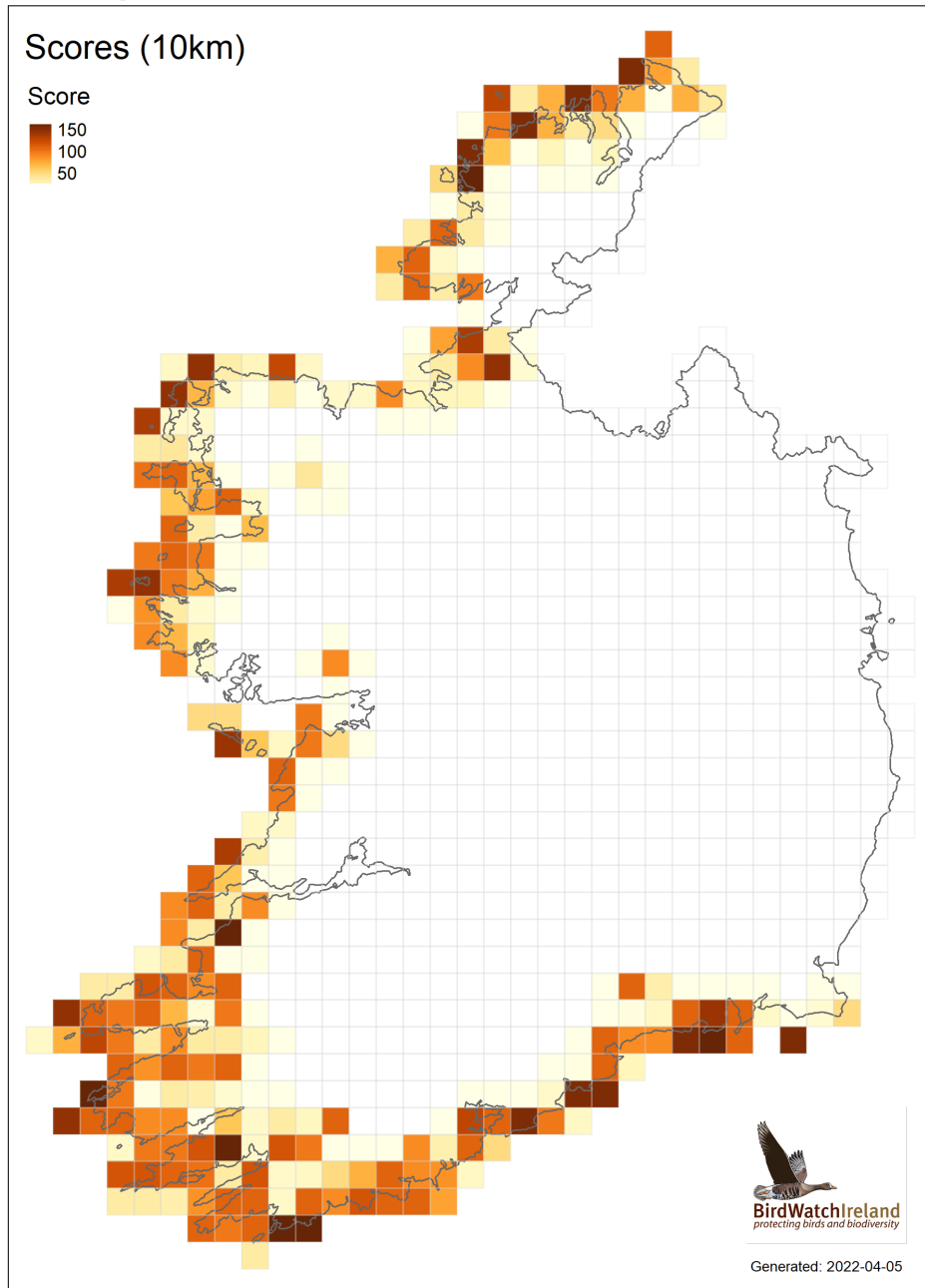


Figure 38: Chough Scores

Chough

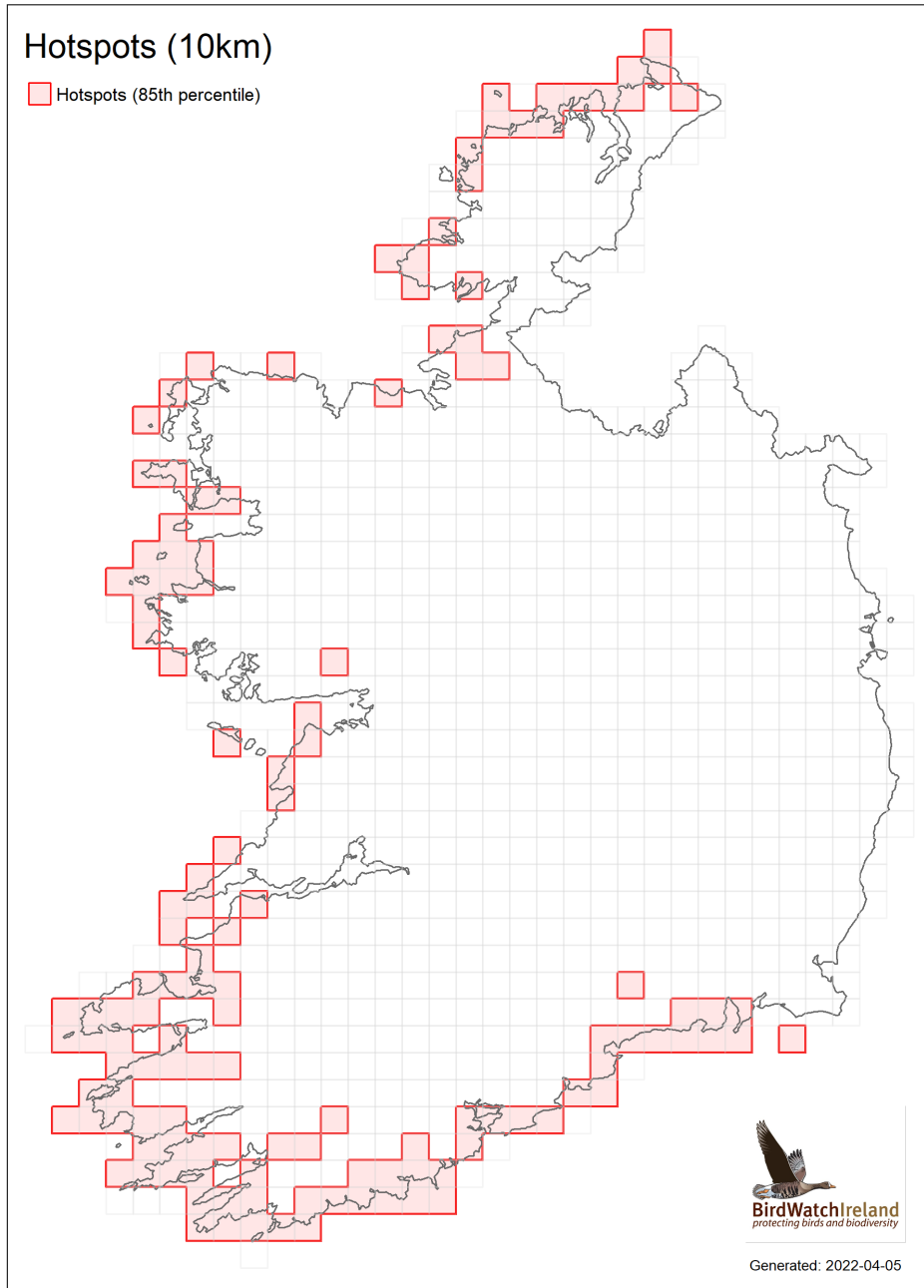


Figure 39: Chough Hotspots (85th percentile)

Yellowhammer

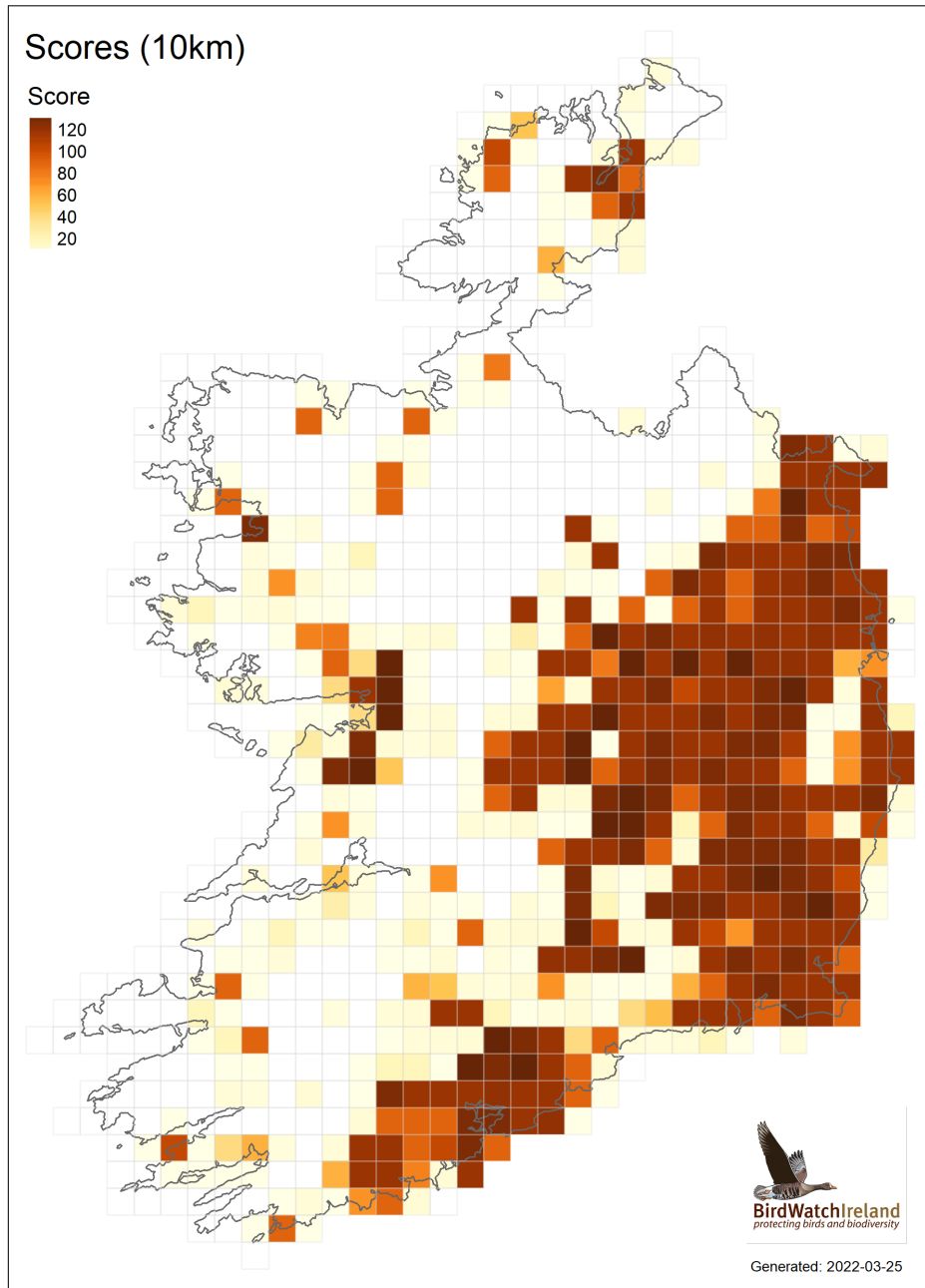


Figure 40: Yellowhammer Scores

Yellowhammer

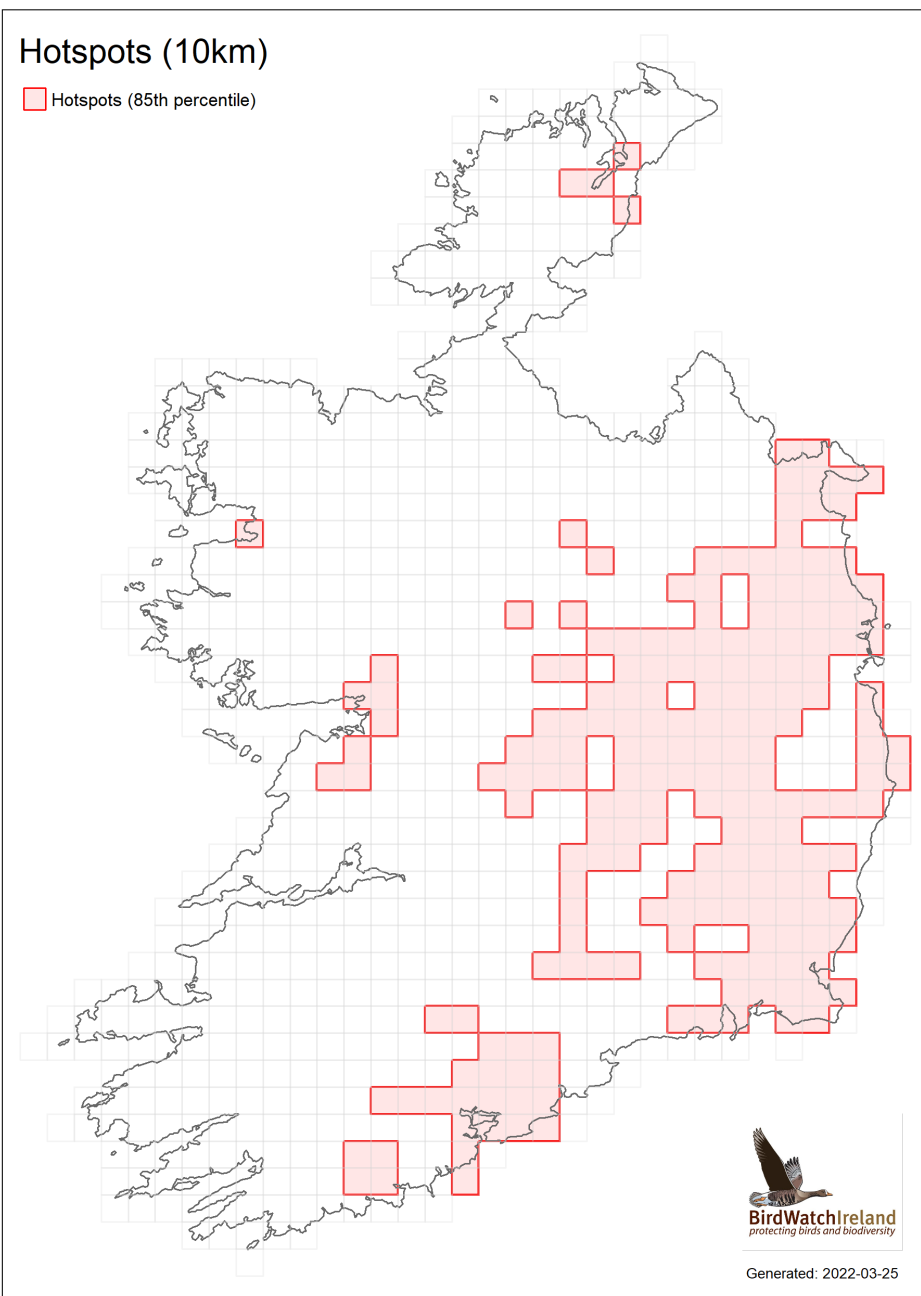


Figure 41: Yellowhammer Hotspots (85th percentile)

Hen Harrier

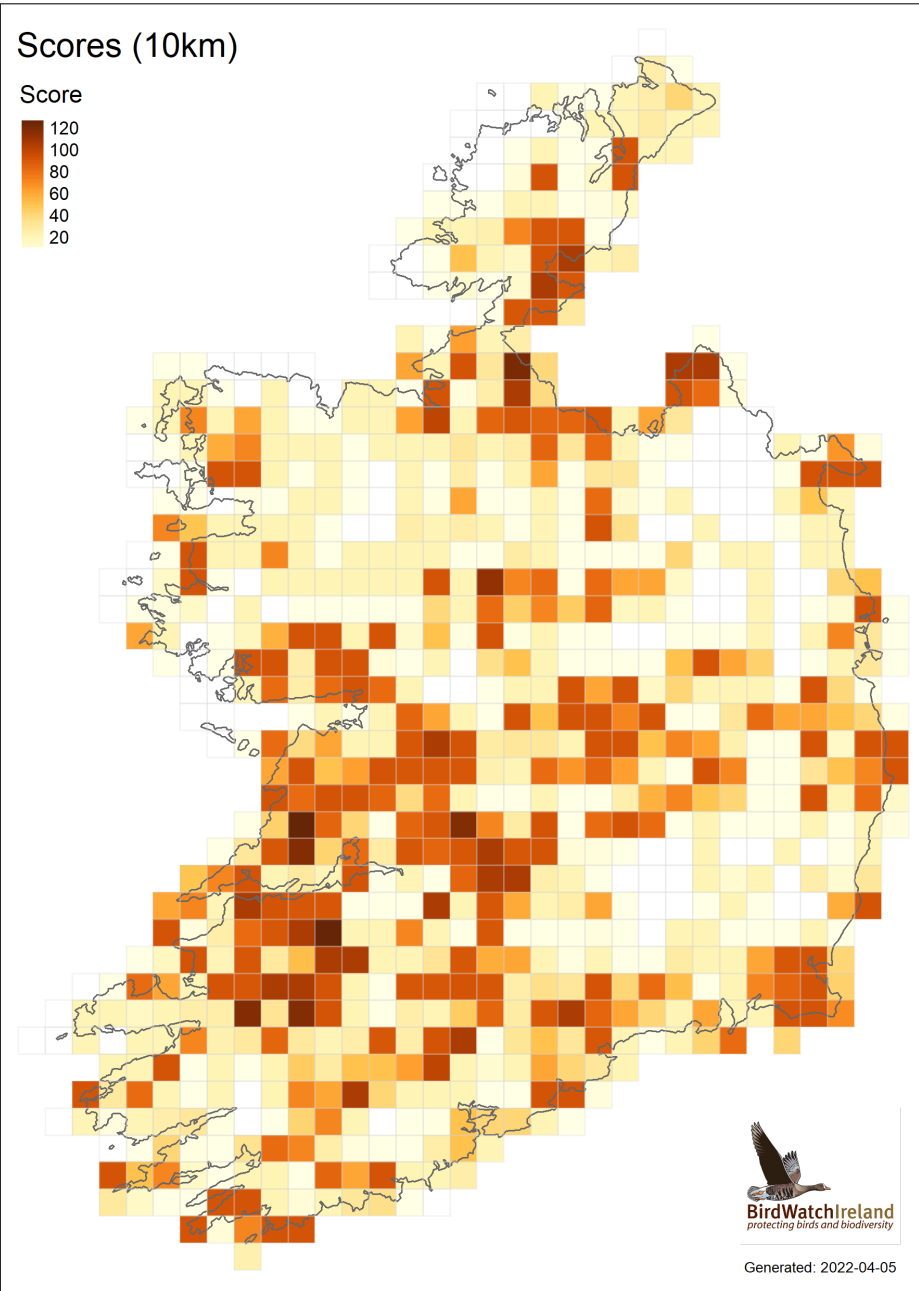


Figure 42: Hen Harrier Scores

Hen Harrier

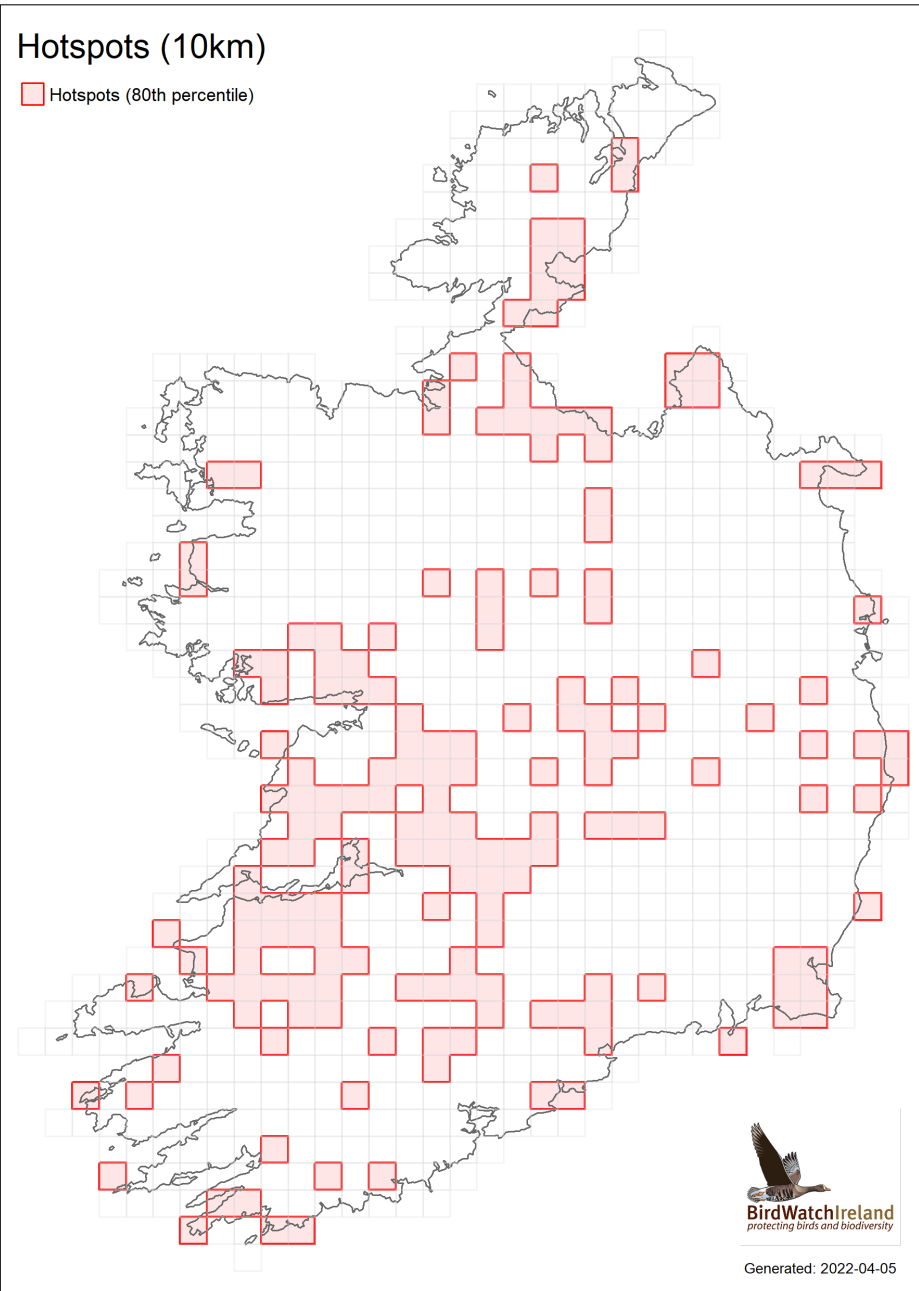


Figure 43: Hen Harrier Hotspots (80th percentile)

Greenland White-fronted Goose

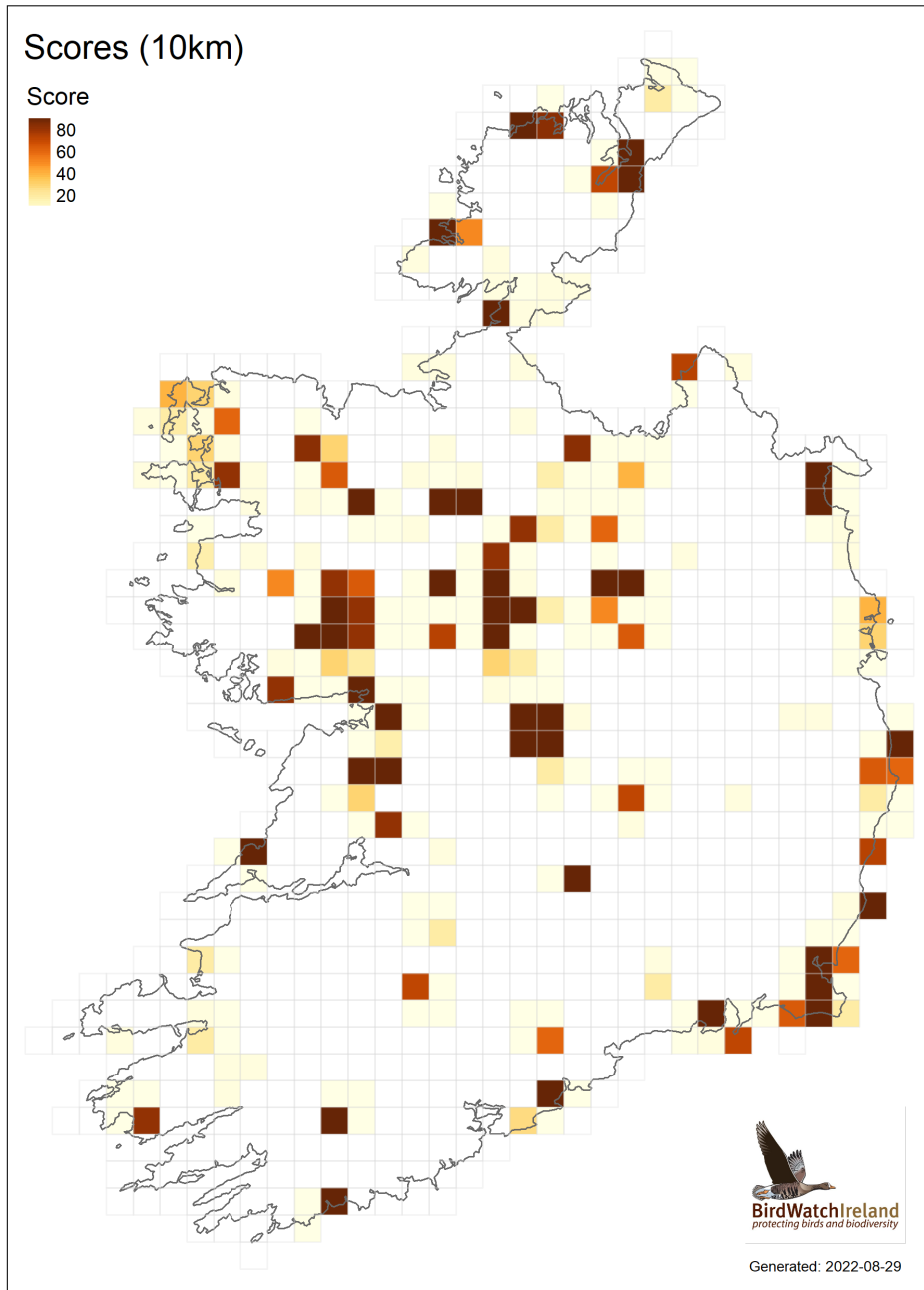


Figure 44: Greenland White-fronted Goose Scores

Greenland White-fronted Goose

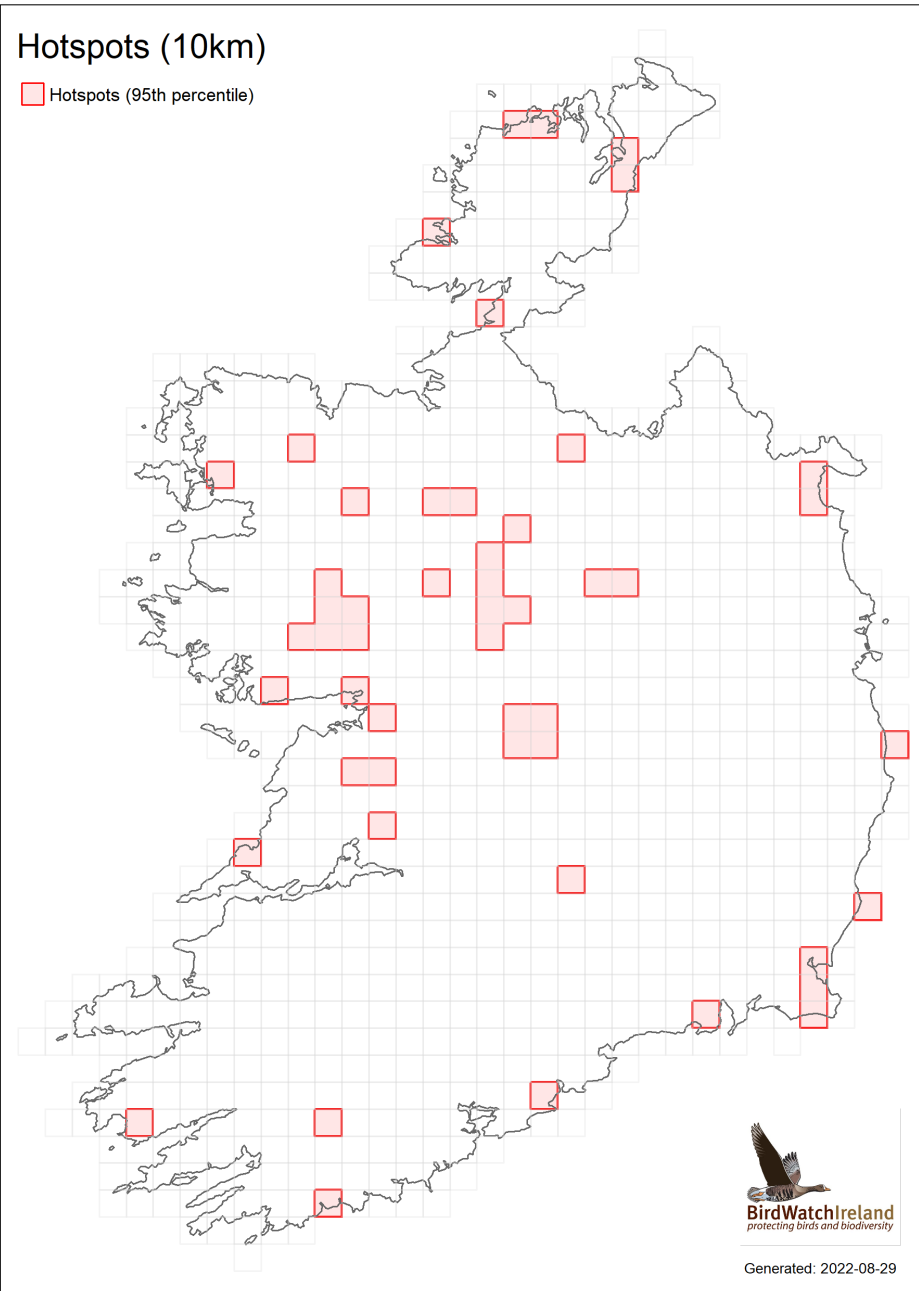


Figure 45: Greenland White-fronted Goose Hotspots (95th percentile)

Conclusion

The Farmland Bird Hotspot Mapping project has successfully produced a suite of maps highlighting locations of particular importance for 28 species of farmland birds of conservation concern in Ireland.

The maps are based on a comprehensive analysis of over 130,000 scientifically validated records extracted from almost 2.5 million records spread across 27 datasets acquired by the project from five national organisations.

A detailed scoring algorithm was developed that comprehends factors including level of breeding evidence, age of the record, typical home-range of the species per season, distance to the record and the relative importance of the species compared to the other species considered.

Maps were developed to highlight hotspots for various combinations of farmland bird species, and for individual species.

BirdWatch Ireland sees significant potential for this work to feed into national, regional and local initiatives that may support farmland birds in Ireland.

This project could and indeed should be developed further. Foreseeable enhancements include:

- fine-tuning of the scoring parameters to reflect evolving project needs and maturing scientific understanding of our biodiversity (e.g. species home-ranges),
- refinements to the scoring algorithm,
- updates to the existing datasets,
- integrating entirely new datasets that may become available.

References

- Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013). Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland. BTO Books, Thetford.
- Gilbert, G., Stansbury, A. & Lewis, L. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. Irish Birds 43: 1-22.

Appendix

Appendix 1: Dataset Preparation

This appendix summarizes all datasets used to generate the hotspot maps. The numbers refer to numbers of records in the dataset rather than quantities of birds. These are the number of records in each dataset after dataset cleaning, filtering to the species and time-span of interest, and removal of records referring to locations outside of Ireland.

BnM - Curlew Survey

- Cleaned and filtered records within Ireland: 45

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Curlew	4	22					
Kestrel			4				
Lapwing			4				
Snipe			11				

BWI - Barn Owl Survey and Monitoring

- Cleaned and filtered records within Ireland: 411

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Barn Owl	411						

BWI - Bird Atlas 2007-2011

- Cleaned and filtered records within Ireland: 14,059

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Barn Owl	118	25	109	6	10	12	232
Barnacle Goose				6	12		74
Bewick's Swan							11
Brent Goose				24	25		114
Chough	114	43	13	7	7	6	183
Corncrake	9	34	18	3	3	3	
Curlew	22	42	57	193	89	11	549
Dunlin	7	8	4	82	33		224
Golden Plover	15	12	2	122	72	2	478
Greenland White-fronted Goose				13	10		98
Grey Partridge	8		3	1			10
Greylag Goose	28	16	19	12	10		137
Hen Harrier	71	28	44	33	27	12	402
Kestrel	313	168	289	7	8	61	799
Lapwing	104	104	41	19	19	7	633
Meadow Pipit	616	143	73		5	52	819
Quail	1	7	10	5	2	1	
Red Grouse	28	52	58		3	17	139
Redshank	33	35	23	74	47	7	354
Skylark	265	294	180		2	3	468
Snipe	40	270	196	17	22	24	787
Spotted Crake			1				
Stock Dove	66	103	84	6	9	5	207
Tree Sparrow	77	32	34	1	8	1	172
Twite	11	3	4	3	3	2	42
Whinchat	14	10	10	7	2		3
Whooper Swan	1	1	3	77	34	3	470
Yellowhammer	142	92	76	1	3	10	255

BWI - Bird Track

- Cleaned and filtered records within Ireland: 40,214

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Barn Owl	23	16	26		46	33	76
Barnacle Goose					30	64	151
Bewick's Swan						9	82
Brent Goose					91	121	333
Chough	22	44	15		376	351	214
Corncrake	4	10	29		40	8	
Curlew	124	16	21	2	1383	1364	1890
Dunlin	3	2	4		651	615	685
Golden Plover	3	19	11		272	578	730
Greenland White-fronted Goose					34	83	177
Grey Partridge	4	2	1		39	6	14
Greylag Goose	15	5	1		215	219	503
Hen Harrier	34	32	68	1	232	289	451
Kestrel	81	73	176		1022	927	1008
Lapwing	97	92	28		767	805	1575
Meadow Pipit	216	256	226		2327	1724	1627
Quail	1	1	4		52	3	
Red Grouse	6	19	19		52	39	63
Redshank	21	23	6		850	1022	1547
Skylark	61	103	357		1121	652	557
Snipe	21	132	99		555	752	1054
Spotted Crane					6	1	1
Stock Dove	9	40	54		288	142	205
Tree Sparrow	25	14	8		117	72	185
Twite	3	3	5		24	20	62
Whinchat	13	14	9		75	77	3
Whooper Swan	2	1			170	547	1149
Yellowhammer	21	101	152		673	262	430

BWI - CABB

- Cleaned and filtered records within Ireland: 3,223

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Curlew			2				
Dunlin	32	18	1				
Golden Plover		1	3				
Kestrel			4				
Lapwing	2120	382					
Meadow Pipit		69	1				
Red Grouse		1	4				
Redshank	224	167					
Skylark		45	8				
Snipe		134	7				

BWI - Supplementary

- Cleaned and filtered records within Ireland: 29

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Curlew		1					
Lapwing	14						
Redshank	9						
Snipe	3	2					

BWI - Whinchat Callows 2014

- Cleaned and filtered records within Ireland: 23

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Whinchat	18		5				

BWI - Whinchat Callows 2017-19

- Cleaned and filtered records within Ireland: 155

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Whinchat	43	54	28		30		

BWI - Yellowhammer Galway 2020

- Cleaned and filtered records within Ireland: 14

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Yellowhammer	14						

DAFM - Bride EIP

- Cleaned and filtered records within Ireland: 57

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Barn Owl	2					1	
Hen Harrier					1		
Kestrel		1	1		2		
Lapwing					1		
Skylark	4						
Snipe					5		
Stock Dove	2	3	4				
Yellowhammer	5	11	14				

DAFM - Curlew EIP

- Cleaned and filtered records within Ireland: 30

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Curlew	20	10					

DAFM - Lapwing Lifeline 2019-2021

- Cleaned and filtered records within Ireland: 336

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Curlew		1	1		1		
Lapwing	29	164	33	8	46	27	24
Redshank		1					
Snipe		1					

HC - Late-Breeding-Yellowhammer

- Cleaned and filtered records within Ireland: 553

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Yellowhammer	62	36	441		9	5	

NBDC - Bird Atlas 2007-2011

- Cleaned and filtered records within Ireland: 12,738

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Barn Owl	118	25	109				230
Barnacle Goose							71
Bewick's Swan							10
Brent Goose							169
Chough	114	43	13				182
Corncrake	9	34	18				
Curlew	22	42	57				546
Dunlin	7	8	4				224
Golden Plover	15	12	2				457
Greenland White-fronted Goose							98
Grey Partridge	8		3				10
Greylag Goose	31	23	20				148
Hen Harrier	71	28	43				402
Kestrel	313	168	288				795
Lapwing	104	104	41				626
Meadow Pipit	615	143	73				818
Quail	1	7	10				
Red Grouse	28	52	58				138
Redshank	33	35	23				354
Skylark	265	293	180				464
Snipe	40	269	196				786
Spotted Crake			1				
Stock Dove	66	103	84				204
Tree Sparrow	77	32	33				171
Twite	11	3	4				42
Whinchat	14	10	10				3
Whooper Swan	32	24	22				484
Yellowhammer	142	91	76				253

NBDC - Birds Of Ireland

- Cleaned and filtered records within Ireland: 11,844

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Barn Owl	39	14	3	43	133	135	230
Barnacle Goose					1	4	23
Bewick's Swan							7
Brent Goose	1	1		1	49	111	258
Chough	9	23	2	48	150	87	52
Corncrake		1	17		24		
Curlew	6	10	2	77	532	408	789
Dunlin	1			2	82	44	98
Golden Plover		1	1	5	38	86	137
Greenland White-fronted Goose				1	1	14	51
Grey Partridge		1		1	8	1	5
Greylag Goose	7	4		3	30	19	52
Hen Harrier	2	6		15	46	60	78
Kestrel	42	7	4	88	464	310	361
Lapwing	8	17	1	6	120	102	329
Meadow Pipit	18	26	35	15	366	224	220
Quail			1		1		
Red Grouse	9	22	10	4	109	59	80
Redshank		3		4	80	109	283
Skylark	11	19	135	11	295	110	137
Snipe	1	17	12	12	188	181	330
Stock Dove	1	2	2	4	58	26	44
Tree Sparrow	7	1	2	1	58	21	78
Twite		2			7	4	6
Whinchat	2	2	2		18	6	
Whooper Swan	6	4		5	45	117	317
Yellowhammer	21	80	555	10	598	221	325

NBDC - Kingfisher Survey 2010

- Cleaned and filtered records within Ireland: 336

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Curlew					9	19	
Dunlin					1		
Golden Plover					4	10	
Greylag Goose					2		
Kestrel					16	6	
Lapwing					14	5	
Meadow Pipit					14	2	
Redshank						3	
Skylark					54	3	
Snipe					65	65	
Tree Sparrow					3	1	
Whinchat						1	
Whooper Swan					7	4	
Yellowhammer					24	4	

NPWS - CBS

- Cleaned and filtered records within Ireland: 11,042

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Barn Owl					2		
Barnacle Goose				1			
Chough			21	38	16		
Curlew			57	110	87		
Dunlin			3	1	6		
Golden Plover			28	66	13		
Greenland White-fronted Goose				1			
Grey Partridge			1				
Greylag Goose			1	12	1		
Hen Harrier			2	21	18		
Kestrel			26	195	252		2
Lapwing			53	46	32		
Meadow Pipit			2787	597	681	2	2
Quail					1		
Red Grouse			19	4	48		
Redshank			22	7	17		
Skylark			1451	353	573	1	2
Snipe			296	108	444		
Stock Dove			165	153	137		1
Tree Sparrow			194	1	82		
Twite			13	6	8		
Whinchat			13		11		
Whooper Swan			2	3	2		
Yellowhammer			1280	88	354	1	1

NPWS - Chough Survey

- Cleaned and filtered records within Ireland: 2,122

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Chough	166	20	151		828	468	489

NPWS - Corncrake Survey

- Cleaned and filtered records within Ireland: 3,471

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Corncrake		3471					

NPWS - Curlew Survey 2015-2017

- Cleaned and filtered records within Ireland: 138

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Curlew		138					

NPWS - Hen Harrier 2015

- Cleaned and filtered records within Ireland: 157

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Hen Harrier	93	49			15		

NPWS - I-WeBS Boundaries

- Cleaned and filtered records within Ireland: 25,288

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Barn Owl							1
Barnacle Goose					2	49	192
Bewick's Swan						8	59
Brent Goose					5	226	849
Chough						1	
Curlew					42	1575	3347
Dunlin					10	571	1300
Golden Plover					9	463	1136
Greenland White-fronted Goose					7	142	440
Greylag Goose					125	441	984
Hen Harrier						52	95
Kestrel					2	109	150
Lapwing					28	1061	3360
Redshank					20	1132	2289
Snipe					10	513	1184
Whooper Swan					14	643	2642

NPWS - I-WeBS Excel

- Cleaned and filtered records within Ireland: 709

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Bewick's Swan							3
Whooper Swan						1	705

NPWS - I-WeBS Points

- Cleaned and filtered records within Ireland: 11,817

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Barnacle Goose					1	7	26
Bewick's Swan						5	19
Brent Goose					1	101	312
Chough						1	3
Curlew					7	605	1589
Dunlin					3	147	394
Golden Plover						158	496
Greenland White-fronted Goose					1	23	96
Greylag Goose					125	183	388
Hen Harrier						15	29
Kestrel					1	41	67
Lapwing					17	416	1659
Redshank					9	350	881
Skylark						1	
Snipe					11	251	631
Whooper Swan					5	378	2364

NPWS - National Curlew Database

- Cleaned and filtered records within Ireland: 293

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Curlew	92	182	19				

NPWS - Red Grouse National Survey 2006-2008

- Cleaned and filtered records within Ireland: 222

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Red Grouse		222					

NPWS - Red Grouse Nephin 2012

- Cleaned and filtered records within Ireland: 61

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Meadow Pipit		29					
Red Grouse		19					
Skylark		13					

NPWS - Shannon Breeding Wader Survey

- Cleaned and filtered records within Ireland: 31

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Curlew		2					
Lapwing		6					
Redshank		10					
Snipe		13					

NPWS - West Coast Survey

- Cleaned and filtered records within Ireland: 871

Species	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Other Present	Winter Present
Dunlin		8					
Golden Plover		5					
Lapwing		114					
Meadow Pipit		308					
Red Grouse		13					
Redshank		7					
Skylark		393					
Snipe		23					

Appendix 2: Species Scoring Parameters

Table 7: Scoring parameters for each species

Species	Base Score							Avg. Home Range (km)			Record Age		
	Breeding Confirmed	Breeding Probable	Breeding Possible	Breeding Non-Breeding	Breeding Present	Winter	Other	Breeding	Winter	Other	Cutoff Recent	Cutoff Old	Weight Old
Curlew	15	14	13	8	8	6	8	3.0	1.0	3.0	3	10	0.2
Dunlin	15	14	13	4	4	2	4	1.0	1.0	1.0	3	10	0.2
Lapwing	15	14	13	8	8	6	8	3.0	1.0	6.0	3	10	0.2
Redshank	15	14	13	4	4	2	4	3.0	1.0	2.0	3	10	0.2
Golden Plover	15	14	13	5	5	2	5	2.0	1.0	1.0	3	10	0.2
Snipe	15	14	13	4	4	5	4	1.0	1.0	1.0	3	10	0.2
Twite	15	14	13	10	10	8	8	1.0	1.0	1.0	3	10	0.2
Red Grouse	15	14	13	10	10	10	10	2.0	2.0	2.0	3	10	0.2
Meadow Pipit	15	14	13	10	10	10	10	1.0	1.0	1.0	3	10	0.2
Hen Harrier	15	14	13	10	10	10	10	6.0	6.0	6.0	3	10	0.2
Skylark	15	14	13	10	10	10	10	1.0	1.0	1.0	3	10	0.2
Greenland White-fronted Goose	0	0	0	0	0	10	9	0.0	2.0	2.0	3	10	0.2
Whinchat	15	14	13	10	10	2	5	1.0	1.0	1.0	3	10	0.2
Corncrake	15	14	13	10	10	0	2	0.5	0.0	0.5	3	10	0.2
Grey Partridge	15	14	13	10	10	10	10	1.0	1.0	1.0	3	10	0.2
Barn Owl	15	14	13	10	10	2	2	3.1	3.1	10.0	3	10	0.2
Bewick's Swan	6	6	5	4	4	10	7	2.0	2.0	2.0	3	10	0.2
Stock Dove	15	14	13	10	10	5	8	3.0	3.0	3.0	3	10	0.2
Kestrel	15	14	13	10	10	9	9	6.0	4.0	5.0	3	10	0.2
Chough	15	14	13	10	10	8	8	4.0	5.0	5.0	3	10	0.2
Quail	15	14	13	10	10	0	2	0.5	0.0	0.5	3	10	0.2
Yellowhammer	15	14	13	10	10	10	10	3.0	3.0	3.0	3	10	0.2
Tree Sparrow	15	14	13	10	10	10	10	1.0	1.0	1.0	3	10	0.2
Barnacle Goose	0	0	0	0	0	10	9	0.0	2.0	2.0	3	10	0.2
Greylag Goose	0	0	0	0	0	10	9	0.0	2.0	2.0	3	10	0.2
Brent Goose	0	0	0	0	0	10	9	0.0	2.0	2.0	3	10	0.2
Whooper Swan	6	6	5	4	4	10	7	2.0	2.0	2.0	3	10	0.2
Spotted Crake	15	14	13	10	10	0	2	0.5	0.0	0.5	3	10	0.2

Appendix 3: Species Relative Weighting Parameters

Table 8: Parameters to determine relative species weighting

Species	BOCCI 4 Parameters								Summary		
	SPEC1 - weight 6	HD - weight 4	BDP1 - weight 7	BDP2 - weight 5	WDP1 - weight 5	WDP2 - weight 4	BDR1 - weight 7	BDR2 - weight 5	BOCCI Total	Farm Mgmt - weight 10	Final Weighting
Curlew	10	0	10	10	5	10	10	10	365	8	445
Dunlin	5	0	10	10	10	10	10	5	335	7	405
Lapwing	10	0	10	10	10	10	0	5	295	8	375
Whinchat	5	0	10	10	0	0	5	10	235	8	315
Redshank	5	0	10	10	0	0	5	5	210	9	300
Corncrake	5	0	0	10	0	0	5	10	165	9	255
Grey Partridge	5	10	0	10	0	0	5	10	205	5	255
Golden Plover	0	0	5	10	5	0	5	5	170	6	230
Snipe	5	0	10	10	0	0	0	0	150	7	220
Barn Owl	5	0	5	10	0	0	0	5	140	8	220
Twite	0	0	0	10	0	0	5	10	135	7	205
Red Grouse	5	0	5	10	0	0	0	5	140	5	190
Bewick's Swan	5	0	0	0	10	10	0	0	120	7	190
Stock Dove	0	0	10	0	0	0	5	5	130	5	180
Kestrel	5	0	10	0	0	0	0	0	100	7	170
Chough	5	0	5	5	0	0	0	0	90	7	160
Quail	5	10	0	0	0	0	0	5	95	6	155
Yellowhammer	5	0	0	0	0	0	0	5	55	8	135
Meadow Pipit	10	0	0	0	0	0	0	0	60	7	130
Hen Harrier	5	0	0	5	0	0	0	0	55	7	125
Tree Sparrow	5	0	0	0	0	0	0	0	30	7	100
Skylark	5	0	0	0	0	0	0	0	30	7	100
Greenland white fronted	0	0	0	0	0	5	0	0	20	7	90
Barnacle Goose	0	0	0	0	0	0	0	0	0	7	70
Greylag Goose	0	0	0	0	0	0	0	0	0	7	70
Light-bellied Brent Goose	0	0	0	0	0	5	0	0	20	5	70
Whooper Swan	0	0	0	0	0	0	0	0	0	7	70
Spotted Crake	0	0	0	0	0	0	0	0	0	6	60

Appendix 4: Example Dataset Validation Report

Introduction

This extract from a validation report summarizes the records that have been derived from the Bird Track dataset provided by BWI. This report is designed to facilitate the validation of the records in the dataset. An interactive map of the same records has also been prepared to support more detailed review.

To reduce the size of this report, only the maps for Chough are displayed. The same set of maps have been produced for every species.

Summary

A summary of the dataset, by species.

Species	Records	Min Year	Max Year	Min Month	Max Month
Curlew	4800	2007	2019	1	9
Dunlin	1960	2007	2019	1	9
Lapwing	3364	2007	2019	1	9
Redshank	3469	2007	2019	1	9
Golden Plover	1613	2007	2019	1	9
Snipe	2613	2007	2019	1	9
Twite	117	2007	2019	1	9
Red Grouse	198	2007	2019	1	9
Meadow Pipit	6376	2007	2019	1	9
Hen Harrier	1107	2007	2019	1	9
Skylark	2851	2007	2019	1	9
Greenland White-fronted Goose	294	2007	2019	1	9
Whinchat	191	2007	2019	1	9
Corncrake	91	2007	2019	10	9
Grey Partridge	66	2008	2019	1	9
Barn Owl	220	2007	2019	1	9
Bewick's Swan	91	2007	2019	1	3
Stock Dove	738	2007	2019	1	9
Kestrel	3287	2007	2019	1	9
Chough	1022	2007	2019	1	9
Quail	61	2007	2019	10	8
Yellowhammer	1639	2007	2019	1	9
Tree Sparrow	421	2007	2019	1	9
Barnacle Goose	245	2007	2019	1	8
Greylag Goose	958	2007	2019	1	9
Brent Goose	545	2007	2019	1	9
Whooper Swan	1869	2007	2019	1	9
Spotted Crake	8	2007	2019	11	9

Species Maps

Static maps of the dataset, by species.

Chough records in Bird Track

