Plan for the restoration of habitats of red and amber-listed Birds of Conservation Concern in Ireland under the EU Nature Restoration Regulation

Final Report

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Contents

Summary

This report contains a plan for the restoration of habitats of red and amber-listed Birds of Conservation Concern in Ireland under the EU Nature Restoration Regulation (Regulation (EU) 2024/1991). It focuses on the red and amber-listed species that are rare/threatened in Ireland due to pressures occurring within the country and therefore most likely to benefit from habitat restoration and re-establishment. The assessment prioritises species associated with habitats listed in Annex I of the Habitats Directive (92/43/EEC) and farmland habitats, while seabirds and urban birds are addressed in dedicated chapters. In line with the regulation's early implementation priorities, particular attention is given to opportunities within Natura 2000 sites and on publicly owned land. However, the focus on public land reflects early-phase implementation priorities under the regulation, rather than the full spatial extent of restoration required to achieve favourable outcomes for bird populations

A review of the red and amber lists identified 52 focal species: 28 for their breeding populations, 16 for wintering populations, and 8 for both. Their habitat requirements fall into four broad Annex I habitat groups, which together represent over 85% of focal species–Annex I associations: estuarine and intertidal, lake and turlough, moorland, and wet grassland / fen habitats. Existing classifications were used to derive a list of 25 farmland-associated species comprising widespread farmland birds, breeding species with restricted distributions, and wintering waterbirds.

Bird distribution and habitat distribution and condition datasets were used to identify areas of opportunity for restoration of habitats to benefit the bird species associated with the four Annex I habitat groups and the farmland-associated species.

The areas of opportunity for the estuarine / intertidal-associated focal species comprised ten estuarine SPAs: Dundalk Bay, Rogerstown Estuary, Baldoyle Bay, North Bull Island, South Dublin Bay and River Tolka Estuary, Cork Harbour, Castlemaine Harbour, Tralee Bay Complex, Inner Galway Bay and Lough Swilly. Eight of these SPAs have potential for large-scale implementation of managed realignment to restore over 91 km^2 of estuarine / intertidal habitats.

The areas of opportunity for Annex I lake, moorland and wet grassland / fen habitats included SACs containing over 55 km^2 of lake habitat, around 340 km^2 of moorland habitat and 40 km^2 of wet grassland / fen habitat. Around 45 km^2 of the moorland habitat but relatively little of the lake or wet grassland / fen habitat were within mapped areas of public lands.

The SPAs in the areas of opportunity included around 63 km^2 of lake habitat, around 117 km^2 of moorland habitat and 17 km^2 of wet grassland / fen habitat. Around 37 km^2 of the moorland habitat but relatively little of the lake or wet grassland / fen habitat were within mapped areas of public lands. Some of these SPAs had large overlaps with SACs.

The Connemara Bog Complex, Owenduff/Nephin Complex SACs and Galtee Mountains SAC are notable for having large areas of moorland habitat within public lands. The River Shannon Callows SAC, River Little Brosna Callows SPA, and Crosswood Bog SAC are notable for having large areas of wet grassland / fen habitat within public lands. The Dromore Woods and Loughs SAC had the largest area of lake habitat within public lands.

A wide variety of potential measures to restore the Annex I lake, moorland and wet grassland / fen habitats for the rare/threatened species associated with these habitats are outlined. These include measures that would also contribute to targets identified in the objectives for the relevant Annex I habitats and additional measures addressing factors relevant to the bird populations. However,

restoration of Annex I habitats will not, in itself, be sufficient to meet the ecological requirements of all focal bird species, and additional species-focused measures under Article 4.7 of the regulation will be required in many cases.

For farmland habitats, areas of opportunity varied depending on the relative weighting given to widespread farmland species versus rarer breeding species. When the farmland generalists were weighted higher, the areas of opportunity were mainly in the south and east of Ireland, presumably reflecting the influence of Stock Dove and Yellowhammer populations in these areas. As the contribution of the restricted distribution species increased, the areas of opportunity shifted to the north and west.

Seabirds and urban birds are considered separately in recognition of the distinct ecological contexts and restoration pathways relevant to these groups.

For seabirds, the report identifies priority breeding colonies and marine Important Bird Areas and concludes that, in the period to 2030, the most effective actions are likely to focus on site-based measures at colonies, such as predator management, disturbance reduction, vegetation management and, where appropriate, provision of artificial nesting habitat. While the regulation includes obligations relating to marine ecosystem restoration, significant knowledge gaps currently limit the scope for confidently targeting marine habitat restoration specifically for seabirds.

Although the structure of the assessment for urban birds differs from that used for Annex I, farmland and seabird habitats, reflecting the distinct policy framework and restoration mechanisms applicable in urban ecosystems, the measures identified contribute to the same overarching objective of restoring sufficient habitat quality and quantity for birds under the Nature Restoration Regulation. The report highlights the role of urban green space, building-integrated habitat and urban tree cover in supporting declining species, and situates these opportunities within the requirements of Article 8 of the regulation.

Overall, the report demonstrates that the Nature Restoration Regulation provides a strong framework for delivering targeted habitat restoration that can contribute meaningfully to halting and reversing declines in birds of conservation concern in Ireland, while also supporting wider ecosystem recovery. However, it also highlights a key structural challenge for implementation: a mismatch between the spatial focus and attributes of Annex I habitat conservation objectives and the ecological requirements of focal bird species. In several cases, habitats that meet Annex I condition targets may not fully align with the habitat structure, management or landscape context required by associated bird populations, while some areas of high importance for birds fall outside the habitats or attributes currently prioritised under Annex I objectives. Addressing this mismatch will require closer integration of habitat- and species-based objectives and a flexible, evidence-led approach to restoration planning to ensure that actions taken under the regulation deliver meaningful benefits for bird populations as well as for habitats.

1. Introduction

1.1. Scope

This report presents a science-based assessment intended to inform the strategic development of Ireland's National Nature Restoration Plan, with an emphasis on restoring habitats used by red- and amber-listed Birds of Conservation Concern in Ireland under the EU Nature Restoration Regulation (Regulation (EU) 2024/1991). The assessment addresses species that are rare or threatened in Ireland as a result of pressures operating within the country, together with the potential to restore habitats listed in Annex I of the Habitats Directive (92/43/EEC) and farmland habitats used by these species. It identifies areas of opportunity where restoration measures could be most effectively targeted to benefit concentrations of priority species, examines the distribution of Natura 2000 sites and public lands within these areas, and outlines potential restoration measures. Other chapters review restoration measures for seabirds and urban birds. The report also reviews key knowledge gaps relevant to restoration planning and sets out recommendations for future work.

1.2. Background and rationale

The EU Nature Restoration Regulation (Regulation (EU) 2024/1991) came into force in August 2024 and sets down rules for the long-term and sustained recovery of biodiverse and resilient ecosystems across the Member States' land and sea areas through the restoration of degraded ecosystems. It requires the restoration of at least 20% of EU land and sea by 2030, and all ecosystems by 2050.

It builds on and re-enforces existing commitments under EU nature legislation, particularly under the Birds and Habitats Directives. For the first phase of implementation each member state must prepare a draft National Restoration Plan (NRP) and submit it to the European Commission by September 1 2026 for review and approval. In meeting the regulation targets, member states have a degree of flexibility and can employ derogations particularly in the period up to 2030.

Much of the focus of the Nature Restoration Regulation is on habitat restoration, with an emphasis on the restoration of Annex 1 habitats. The regulation also requires the restoration of sufficient quantity and quality of habitats for birds (Articles 4.7 and 5.5) protected by the Birds Directive. This means all native/naturally occurring bird species. The regulation also includes requirements relating to habitat re-establishment, ecological connectivity, and the recovery of common farmland bird populations, as measured by the Common Farmland Bird Index. Collectively, these provisions present a significant opportunity to identify priority areas and define measures to halt declines in birds of conservation concern where they are supported by restored habitats (for example, breeding waders on machair), and to facilitate population recovery.

Ireland's wild bird populations are under considerable pressure from a range of factors, including habitat loss and degradation, pollution, declines in prey availability, predation, and the impacts of climate change. Species associated with farmland, peatlands and wetlands—such as breeding waders, birds of prey, seed-eating birds, riverine species and waterbirds—as well as some seabirds, are experiencing marked declines, with many now classified on the red or amber lists of Birds of Conservation Concern in Ireland (Gilbert *et al.* 2021). BirdWatch Ireland's Strategic Plan provides an important contextual framework, having already identified strategic goals for bird conservation in Ireland for the period 2024–2030.

Birds play a dual and valuable role in informing the identification of priority areas for restoration under the Nature Restoration Regulation in Ireland: they act both as sensitive indicators of ecosystem

condition and as practical tools for targeting locations where restoration can deliver biodiversity gains. Many bird species respond rapidly and predictably to changes in habitat extent, structure and management, meaning that their distribution and abundance integrate the effects of multiple environmental pressures, including land-use intensity, hydrology and landscape connectivity. Patterns in bird communities therefore provide a well-tested and accessible means of diagnosing habitat degradation, while also highlighting landscapes that retain high ecological potential but are currently underperforming.

At the same time, birds are not uniformly effective indicators across all habitat types or ecological processes, and their responses may not fully reflect the condition of less structurally complex habitats, early successional stages, or components of biodiversity such as invertebrates, plants or soil communities. For this reason, bird-based evidence should be interpreted alongside complementary ecological information where available. Nonetheless, because birds are often among the most visible beneficiaries of restoration and their ecological requirements frequently overlap with those of a wide range of other taxa, bird-based analyses can make an important contribution to a scientifically robust, spatially explicit and policy-relevant evidence base. Used in this way, birds can help to guide restoration towards habitats and locations where intervention is most likely to support wider ecosystem recovery and deliver lasting, multi-taxa biodiversity benefits, rather than outcomes limited to bird conservation alone.

1.3. Terms of reference

The objective was to prepare a plan to include background, legal context, status of wild birds in Ireland which sets out how and where the government might meet its legal requirements to restore sufficient quality and quantity of habitats for birds protected under the Birds Directive that now also fall under the scope of the Nature Restoration Regulation. The plan was to identify habitats and areas presented spatially in maps and in GIS shapefiles. Other legal requirements of the regulation which benefit wild birds were also to be considered, with a particular focus on red and amber-listed Birds of Conservation Concern in Ireland. Using the best available research and data sources, the plan was to set out opportunities for restoration measures that could contribute optimally to bird conservation in Ireland.

1.4. GIS data

Appendix 2 lists all spatial data sourced for this report, and summarises the initial processing applied to each individual dataset. Additional processing steps that were performed across various datasets are also outlined.

1.5. Limitations

There was a limited timeframe for preparation of this report and significant limitations created by the lack of availability, or time to acquire, some relevant bird distribution and habitat distribution and condition data (see Section 8.6).

1.6. Author contributions

Most of the research, analysis and reporting was carried out by Tom Gittings. John Kennedy compiled and processed the GIS datasets used for the analyses. Brian Burke wrote the chapter on seabirds and the sections on seabirds in the Conclusions. Tara Adcock, Oonagh Duggan and Cian O'Flaherty wrote the chapter on urban birds and the sections on urban birds in the Conclusions. Oonagh Duggan, Brian Caffrey and Anita Donaghy contributed the background and rationale and terms of reference and provided review and advice on the overall plan.

1.7. Terminology

Many of the Annex I habitats have long and cumbersome names. In this report, the short names for the Annex I habitats from NPWS (2019a) are used. The Annex I codes are included in the relevant tables and where habitats are first mentioned in the text.

The intertidal zone includes both unvegetated intertidal substrates (mudflats, sandflats and rocky shore) and vegetated saltmarsh. However, to avoid unwieldly terminology, in this report we use the term intertidal habitat to refer to unvegetated intertidal substrates only; i.e. this definition of the term intertidal habitat does not include saltmarsh habitats.

1.8. Acknowledgements

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2. Nature Restoration Regulation

2.1. Relevant sections of the Nature Restoration Regulation

2.1.1. Article 4

Article 4 requires member states to restore to good condition terrestrial, coastal, and freshwater habitats listed in Annex I of the Habitats Directive that are in poor condition (Article 4.1) and to re-establish these habitats in areas where they do not occur where this is required to reach the favourable reference range for the habitats (Article 4.4). The article also requires that once habitats reach good condition they do not subsequently deteriorate. The article includes specific targets: 30% of the total degraded area across all Annex I habitats should be under restoration by 2030, rising to 60% by 2040 and 90% by 2050. Similarly, re-establishment should be in place in 30% of the additional areas required to reach the favourable reference range by 2030, rising to 60% by 2040 and 90% by 2050. In the period up to 2030, the regulation emphasises the need to prioritise restoration measures in Natura 2000 sites (which includes SPAs).

Article 4.7 refers specifically to birds. It requires member states to put in place additional measures to restore terrestrial, coastal, and freshwater habitats of wild bird species covered by the Birds Directive (2009/147/EC), above those required by Articles 4.1 and 4.4. These measures should improve both the quality and quantity of those habitats (including through re-establishment) and enhance their ecological connectivity. The measures should be enacted until a "sufficient quality and quantity" of habitat is achieved. Sufficient quality refers to a habitat's ability to meet a species' ecological requirements at all stages of its life cycle, so that the species can sustain itself long-term, contributing to favourable conservation status (Article 3.9) while sufficient quantity means having enough habitat (in terms of area) to support the species' long-term viability in its natural range (Article 3.10).

Article 4.10 specifies that the measures required to restore Annex I habitats should enhance ecological connectivity between the Annex I habitats and must consider the ecological needs of the bird species associated with these habitats.

The importance of considering birds in the context of Article 4 is emphasised in paragraph 34 of the recital to the regulation, which stresses that areas subject to restoration must show continuous improvement in the quality and quantity of bird habitats, to make progress toward the targets.

2.1.2. Article 5

Article 5 addresses the restoration of marine ecosystems, requiring Member States to implement measures to improve the condition of degraded marine habitats. Specific habitat types that are the target of this article are listed in Annex II of the regulation and, as with Article 4, there are quantitative targets for areas to be restored by 2030, 2040 and 2050. Paragraph 5 specifies a requirement for additional measures to restore marine habitats for wild bird species covered by the Birds Directive (2009/147/EC). Paragraph 8 adds requirements addressing improved ecological coherence and connectivity between the marine habitats taking into account the ecological requirements of the bird species associated with these habitats.

2.1.3. Article 8

Article 8 requires Member States to ensure that there is no net loss in the total national area of urban green space or in urban tree canopy cover within urban ecosystem areas. In addition, Member States must deliver an increasing trend in the total national area of urban green space, including through the

integration of green space into buildings and other infrastructure, as well as an increasing trend in urban tree canopy cover. Unlike Articles 4 and 5, Article 8 does not specify quantitative targets.

2.1.4. Article 9

Article 9 specifies the requirements for "restoration of the natural connectivity of rivers and natural functions of the related floodplains". It requires that member states first identify and map artificial barriers in surface waters (like dams or weirs), then remove obsolete ones (i.e., those no longer needed for energy, navigation, flood protection, etc.) in order to help restore at least 25,000 km of rivers to a free-flowing state by 2030, while also restoring the natural functions of adjacent floodplains, and ensuring that this restored connectivity and floodplain function is maintained over time.

2.1.5. Article 11

Article 11 specifies the requirements for restoration of agricultural ecosystems. It requires member states to implement restoration measures in agricultural ecosystems (beyond those covered by other habitat-restoration obligations), balancing the needs of biodiversity with climate change, social and economic realities in rural areas, and sustainable food production.

The restoration measures specified in the article include measures aimed at restoring organic soils in drained peatlands, including on agricultural land, in peat extraction sites and other non-agricultural land. It includes the following specific targets: measures should be in place in 30% of drained peatlands, of which at least a quarter should be rewetted, by 2030, rising to 40% and a third by 2040 and 50% and a third by 2050.

The article also specifies the use of specific indicators to measure the success of the restoration measures in improving agricultural biodiversity, carbon storage and landscape diversity. One of these indicators is a common farmland bird index (Article 11.3). For member states which have "historically less depleted populations of farmland birds", which the regulation defines as including Ireland, there is a target of a 5% increase in the index by 2030, rising to 10% by 2040 and 15% by 2050. Annex V of the regulation includes a list of species to be included in the index for each member state.

2.1.6. Other articles

Other articles relevant to birds, but covering areas outside the scope of this review, include Article 12 (restoration of forest ecosystems; including a requirement to develop a forest bird index) and Article 13 (requirement for planting three billion additional trees by 2030).

Articles 14-19 deal with the national restoration plan, which each member state is required to prepare, while Articles 20-21 deal with monitoring and reporting. Other articles deal with general provisions (Articles 1-3), renewable resources and defence (Articles 6-7), pollinators (Article 10), and administrative, legal and procedural matters (Articles 22-28).

2.2. Interpretation and application

The Nature Restoration Regulation (NRR) establishes a legally binding framework that significantly reshapes how Ireland must approach the recovery of habitats for rare and threatened bird species.

Under Article 4, paragraph 1 requires the restoration of degraded terrestrial, coastal and freshwater Annex I habitats, beginning with at least 30% by 2030 and increasing steadily to 90% by 2050. This creates a long-term framework for landscape-scale habitat recovery across Ireland. Paragraph 4 extends this requirement beyond repairing damaged ecosystems: it compels the re-establishment of

habitat types in areas where they have been lost altogether, meaning Ireland must look not only to protect remaining fragments but also to recreate suitable ecological conditions in places where key habitats for birds have historically disappeared.

Paragraph 7 introduces species-specific obligations. In addition to restoring habitat types, member states must ensure that the habitats of species protected under the Habitats and Birds Directives are improved or expanded sufficiently to meet their ecological needs. This provision requires targeted restoration that may include measures outside the scope of the requirements for restoration of Annex I habitats. This is important because restoration of Annex I habitats will not, in itself, be sufficient to meet the ecological requirements of all threatened bird species.

Paragraph 10 reinforces this by insisting that restoration measures incorporate ecological connectivity. Habitats must be restored in a way that link fragmented patches, allowing bird populations to move, disperse and maintain genetic viability across landscapes. This is particularly relevant to many threatened bird species that have large home ranges (e.g. Hen Harrier and Merlin) or require connectivity between nesting sites and feeding habitat (e.g. Red-throated Diver and Golden Plover). However, while the provision also requires that the ecological requirements of associated species be taken into account, it is explicitly framed around the restoration of Annex I habitats. In practice, this is likely to result in a primary focus on Annex I habitats, albeit with scope to align restoration actions more closely with the needs of bird species associated with those habitats.

Article 9 introduces a freshwater dimension. Reconnecting rivers and floodplains, including the removal of artificial barriers, can markedly improve conditions for wetland and riparian birds. Restoring natural hydrology revives callows and wet grasslands, which are essential habitats for breeding waders and other threatened species.

Article 11 focuses on agricultural ecosystems. Paragraph 1 requires restoration measures to enhance farmland biodiversity, reflecting the fact that the decline of many Irish bird species is closely connected to agricultural intensification and other land use changes. The paragraph explicitly states that these measures should be additional to those required for Annex I habitats, providing greater flexibility to implement targeted restoration actions specifically aimed at farmland bird populations.

Paragraph 3 introduces national farmland-bird index targets. In theory, this creates a measurable benchmark for population recovery. However, the 5% increases specified for each 5–10 year period are unlikely to be distinguishable from expected sampling variation in the underlying monitoring data. In addition, systematic national monitoring of farmland birds in Ireland began only in 1998, after substantial declines of many species are likely to have occurred during the period of most rapid agricultural intensification in the 1970s and 1980s. As a result, the index is anchored to relatively recent baseline conditions and does not reflect historical population levels, meaning that meeting these targets would not necessarily imply a return to ecologically meaningful abundance for many species.

Paragraph 4 requires the restoration and partial rewetting of drained agricultural peatlands, a measure that can restore wetland habitats used by species such as Golden Plover, Curlew and Snipe, in addition to its contribution to climate targets.

Taken together, these provisions create a powerful, coordinated framework for restoring bird habitats in Ireland. Their effectiveness will depend on ambitious national planning, adequate funding, close cooperation with landowners and strong scientific guidance. Nonetheless, while the farmland bird index provides a useful policy and reporting tool, its limitations mean that progress towards numerical

targets should be interpreted with caution and complemented by species-specific assessments and habitat-based indicators to ensure that restoration efforts translate into genuine ecological recovery.

3. Review and identification of focal species associated with Annex I habitats and farmland habitats

3.1. Identification of focal species

3.1.1. Objective

The main objective behind the identification of focal species was to select species that are rare / threatened in Ireland due to factors related to the availability and condition of Irish habitats. These are the species that would potentially benefit the most from habitat restoration and creation under the Nature Restoration Regulation.

This objective was based on Article 4.7 of the Nature Restoration Regulation. This frames the function of habitat restoration as to create a "sufficient quality and quantity" of habitat to allow species to sustain themselves long-term. This implies that restoration measures should be focused on species that are rare / threatened in Ireland due to factors related to the availability and condition of Irish habitats. Species that are not rare / threatened in Ireland are likely to already have a "sufficient quality and quantity" of habitat to meet their ecological requirements.

Within the overall group of focal species, particular priority was given to those with strong associations with Annex I habitats, reflecting the emphasis on Annex I habitat restoration in the implementation of the Nature Restoration Regulation. Accordingly, the focus here is on species associated with terrestrial and coastal Annex I habitats and farmland habitats, with seabirds and urban birds considered separately (see Chapters 6 and 7).

3.1.2. Methodology

The conservation status of all regularly occurring wild bird species in Ireland was assessed by Birds of Conservation Concern in Ireland (Gilbert *et al.* 2021). This categorised the species in three lists: red-listed species are of the highest concern, followed by amber-listed species, while green-listed species are of low conservation concern. However, while all the red and amber-listed species are of significant conservation concern, they were selected by a range of different criteria, and not all of these criteria are relevant to the objective behind the identification of focal species for this report. Therefore, only those red- and amber-listed species that met specific criteria relating to their Irish distribution and population trends, and their sensitivity to habitat restoration, were selected. Seabirds were omitted from this process (see Section 3.1.1) but are assessed separately in Chapter 6.

A three stage process was used to identify and categorise focal species. The first stage involved application of strict criteria to screen species. This produced a list of candidate focal species. The candidate focal species were then reviewed to take account of species-specific factors, and a final list of focal species was produced. The association of the focal species with Annex I habitats and their likely responses to habitat restoration / creation were then categorised.

Expert judgement was used for several aspects of the process. This was considered to be justified because, as with all strategic-scale restoration planning, the resulting classifications are intended to identify broad, functionally meaningful patterns rather than to provide species-specific prescriptions.

A flow chart summarising the three stage process is shown in Figure 3.1.

Stage 1 screening

All the non-seabird species on the red and amber lists in Birds of Conservation Concern in Ireland (Gilbert *et al.* 2021) were assessed. Where species are listed in Birds of Conservation Concern in Ireland for two seasons (B/W), they were assessed separately for each season.

Three criteria were used to identify and categorise the candidate focal species: their status in Ireland, their association with Annex I habitats, and their likely response to habitat creation / management.

Status criteria formed the primary basis for identifying candidate focal species (Table 3.1). Only species categorised as rare or threatened due to Irish-specific factors (S1), or for which the causal factors underlying population declines were unclear (S2), were selected as candidates. Species not considered rare or threatened in Ireland were excluded, including those listed as red or amber solely on the basis of their European conservation status, their international importance in Ireland, or the localised nature of their Irish populations. Species with stable or increasing population trends in Ireland were also excluded, unless they were red- or amber-listed on the basis of historical declines. In both cases, investigation of the drivers of decline in Ireland is not relevant. Similarly, species that breed only occasionally, occur primarily as passage migrants, or have small peripheral wintering populations in Ireland were excluded, as any effects of habitat availability or condition are likely to be masked by stochastic variation in their occurrence patterns.

Species that are not likely to benefit from habitat creation / restoration would also not qualify as focal species, although no species were classified as such.

Table 3.1. Status criteria used to identify candidate focal species.

Code	**Criteria**
S1	rare or threatened due to Irish-specific issues
S2	rare or threatened but not clear whether this is due to Irish-specific issues
S3	rare or threatened due to non-Irish issues
S4	not rare or threatened
S5	occasional breeding species
S6	passage migrant
S7	small peripheral wintering population

Kennedy *et al.* (2023a) was used to assess the population trends of most non-breeding waterbird populations, Burke *et al.* (2021) for Whooper Swan, Burke *et al.* (2023) for Greylag Goose, Kelly *et al.* (2024) for Barnacle Goose, and Fox *et al.* (2025) for Greenland White-fronted Goose. For species covered by the Countryside Bird Survey, population trends were taken from that scheme. For other species, the BD and WD classifications in Gilbert *et al.* (2021) were used.

The discussions of British and international trends in Lewis *et al.* (2019) for non-breeding waterbird populations were reviewed to help assess whether declines were due to Irish-specific factors. For other species, the assessment was based on the personal knowledge and judgement of the senior author (TG).

To help assess whether rare breeding species should be categorised as occasional (S5), the relevant information in the breeding bird atlases and in Holloway (1996) was reviewed.

Species that only qualified for red or amber listing due to their European conservation status, their localised occurrence patterns, or their international importance (the SPEC, BL, WL, BI or WI criteria)

were not categorised as rare/threatened. However, these species may be revisited in future assessments.

Stage 2 review

The candidate list produced in Stage 1 was reviewed by BirdWatch Ireland staff and amendments were made to reflect BirdWatch Ireland conservation priorities. This produced the final list of focal species.

Stage 3 categorisation

The focal species were categorised to reflect their association with Annex I habitats and their likely response to habitat creation / restoration.

Table 3.2. Criteria used to categorise the association of focal species with Annex I habitats and their likely response to habitat creation / restoration.

Category	**Code**	**Criteria**
Annex I habitats	A1	dependent on Annex I habitats
	A2	associated with Annex I habitats
	A3	no significant association
Response	R1	demonstrated positive response to habitat creation / restoration
	R2	likely to benefit from habitat creation / restoration
	R3	uncertain
	R4	not likely to benefit

The application of the Annex I habitat association and response-to-management criteria was based largely on the personal knowledge and professional judgement of the senior author (TG), and necessarily involved a number of broad assumptions. While these classifications inevitably simplify complex species–habitat relationships, they are intended to reflect broad, functionally meaningful associations and the relative feasibility of habitat-based interventions, rather than precise predictions of species-specific responses. Importantly, categorisation within the response-to-management framework does not imply that habitat creation or restoration will be sufficient, on its own, to halt or reverse population declines, as many species are also affected by pressures operating beyond the scope of site- or habitat-scale interventions.

In applying the Annex I habitat association criteria (A1–A3), species were categorised according to the strength of their functional association with Annex I habitats. For example, Red Grouse was categorised as A1 because it is almost exclusively associated with bog and heath habitats, the vast majority of which are Annex I habitats. Hen Harrier was categorised as A2 because, although bog and heath habitats are important, the species is also strongly associated with non-Annex I grassland habitats and forestry. Swallow was categorised as A3 because it is a habitat generalist and, while foraging birds may occur over Annex I habitats, there are no strong functional associations with Annex I habitats.

In applying the response-to-management criteria (R1–R3), species were categorised according to the feasibility and likely effectiveness of habitat management or creation. This classification drew in part on evidence from Britain, where there is a longer history of large-scale habitat intervention. For example, most waterbirds associated with freshwater and intertidal habitats were classified as R1, reflecting the extensive experience of creating and managing suitable habitat for these species (e.g. on British nature reserves such as Minsmere and Titchwell). In contrast, waterbirds such as Common Scoter and Red-breasted Merganser were classified as R2 because their breeding populations are

associated with large lakes and/or river systems, where habitat creation or management is likely to be more complex. Wintering waterbirds associated with offshore marine habitats (e.g. Common Scoter, Scaup and Red-throated Diver) were classified as R3, as effective habitat creation or management is unlikely to be feasible in these environments, where population dynamics are influenced by diffuse and largely unmanageable pressures such as prey availability, climate variability and wide-scale disturbance.

The application of the Annex I habitats and response criteria could be refined by researching relevant literature for each species, but this was not feasible within the time available for this assessment.

3.1.3. Results

A total of 52 focal species were identified, including 28 species identified for their breeding population, 16 for their wintering populations and 8 for both breeding and wintering populations (Table 3.3).

Three focal species had their status classified as not rare or threatened: Brent Goose, Skylark and Meadow Pipit. These species were added in stage 2 of the process for the following reasons. Brent Goose was added because Ireland hosts most of the population that breeds in the Canadian High Arctic during winter. Skylark and Meadow Pipit were added because these are farmland birds with significant associations with Annex 1 habitats which are likely to benefit from habitat restoration measures. Both Skylark and Meadow Pipit are currently classified as showing a moderate decrease in the latest version of the CBS trends, although both species were classified as stable in the version of CBS trends that was used for the focal species assessment.

The focal species include 39 species that were identified as priority species in the *BirdWatch Ireland Strategic Plan 2024-2030* (BWI 2024) (Table 3.4). The 23 priority species that were not included consist of seabirds, which were outside the scope of this review, and species whose most recent conservation assessments show no evidence of decline in Ireland over the periods assessed, which vary between species and species groups (Section 3.1.2). Some of these species may have experienced historical declines prior to the assessment periods. One of these species (Black-tailed Godwit) also occurs in Ireland in internationally important numbers.

The focal species also includes five species that are on lists of candidate species for the Farmland Bird Index and 15 species that have been identified as priorities for LIFE funding (Table 3.4).

Table 3.3. Focal species identified for the analyses of areas of opportunity for restoration of Annex I habitats and farmland habitats in the BirdWatch Ireland Nature Restoration plan.

Status	Season	Annex I	Response	Species
S1	breeding	A1	R1	Red Grouse, Corncrake, Golden Plover, Dunlin
			R2	Common Scoter, Merlin
		A2	R1	Nightjar, Lapwing, Curlew, Snipe, Redshank, Kestrel, Twite, Hen Harrier, Chough
			R2	Whinchat, Kingfisher
		A3	R1	Grey Partridge, Stock Dove, Swift, Barn Owl, Yellowhammer
			R3	Greenfinch
S2	breeding	AI	R2	Ring Ouzel
			R3	Red-throated Diver
		A2	R1	Pochard, Teal, Coot, Common Sandpiper
			R2	Woodcock, Grey Wagtail, Red-breasted Merganser, Cormorant
		A3	R3	Swallow
	winter	AI	R1	Grey Plover, Bar-tailed Godwit, Knot, Dunlin, Ringed Plover, Turnstone
		A2	R1	Pochard, Shoveler, Golden Plover, Lapwing, Curlew, Barnacle Goose, Greylag Goose, Greater Greenland White-fronted Goose, Tufted Duck, Wigeon, Mallard, Pintail, Great Crested Grebe, Coot
			R3	Common Scoter, Scaup, Red-throated Diver
S4	breeding	A2	R1	Meadow Pipit, Skylark
	winter	A2	R1	Brent Goose

Species are listed in the sequence of their appearance in the red and amber-lists.

Table 3.4. Classification of species as BWI priority species, on lists for the farmland bird index (FBI species) or as priorities for LIFE funding (LIFE species).

Category	**Focal species**	**Species**
BWI priority species	YES	Red Grouse, Common Scoter, Pochard, Scaup, Shoveler, Stock Dove, Swift, Corncrake, Grey Plover, Golden Plover, Lapwing, Curlew, Dunlin, Snipe, Redshank, Barn Owl, Kestrel, Ring Ouzel, Whinchat, Meadow Pipit, Twite, Yellowhammer, Brent Goose, Tufted Duck, Wigeon, Mallard, Pintail, Teal, Red-throated Diver, Ringed Plover, Turnstone, Hen Harrier, Kingfisher, Merlin, Chough, Skylark, Swallow
	NO	Goldeneye, Oystercatcher, Black-tailed Godwit, Purple Sandpiper, Red-necked Phalarope, Kittiwake, Puffin, Razorbill, European Storm petrel, Manx Shearwater, Gannet, European Herring Gull, Little Tern, Roseate Tern, Common Tern, Arctic Tern, Sandwich Tern, Common Guillemot, House Martin, Sand Martin, Tree Sparrow
FBI species	YES	Stock Dove*, Kestrel, Yellowhammer, Swallow, Greenfinch
	NO	Starling*, House Sparrow, Linnet
LIFE species	YES	Red Grouse, Pochard, Scaup, Corncrake, Curlew, Bar-tailed Godwit, Knot, Dunlin, Redshank, Wigeon, Pintail, Turnstone, Hen Harrier, Merlin
	NO	Bewick's Swan, Velvet Scoter, Slavonian Grebe, Leach's Petrel, Balearic Shearwater, Oystercatcher, Black-tailed Godwit, Razorbill, Garganey, Ruff, Roseate Tern

FBI species are those listed for Ireland in Annex V of the Nature Restoration Regulation ("List of species used for the common farmland bird index in the Member States"). Most of these species are also included in BirdWatch Ireland's Common Farmland Bird Index, with the exception of the two species marked by asterisks.

3.2. Habitat associations

3.2.1. Annex I habitats

Methodology

Nairn and O'Halloran (2012) include a list that categorises Irish bird species by their association with twelve broad habitat types. Kirby *et al.* (2000) define 13 habitat-based assemblages of English bird species; these assemblages are largely applicable to the Irish avifauna (with some exceptions). These two classifications were used as a starting point for the categorisation of the habitat associations of the focal bird species. First, the Annex I habitats that fell into the broad habitat types in Nairn and O'Halloran (2012) and the habitat-based assemblages in Kirby *et al.* (2000) were identified. Then, the bird species classification in these sources were used to produce a long-list of Annex I habitats potentially associated with each focal species. A detailed review was then carried out for each focal species to refine the Annex I habitats included in the long-list, by removing ones that were not applicable and adding any missing ones.

The main sources for this review were the species lists in the BirdWatch Ireland Group Action Plans (BWI, 2010, 2011a-h), species accounts in Sharrock (1976), Hutchinson (1989), Lysaght (2002) and Crowe (2005), relevant information in Nairn and O'Halloran (2012), and distribution data from Balmer *et al.* (2013) and Lewis *et al.* (2019). Additional species-specific information used included McLoughlin (2009), Norriss *et al.* (2010), Mee (2018), and Lusby *et al.* (2022). Where relevant, the Irish distribution of the focal species was reviewed in relation to the distribution of the relevant Annex I habitats. The most recent Article 17 report and associated backing documents (NPWS 2019a, b) were used to help understand the interpretation and distribution of Annex I habitats in Ireland, while O Connor (2017) provided further information on the interpretation of the Annex I lake habitats.

Some Annex I habitats were not included in the review. These included the following habitats that occur at small scales, usually in association with other Annex I habitats: submarine structures (1180), drift lines (1210), vegetated shingle (1220), Calaminarian grassland (6130), Rhynchosporion depressions (7150) and petrifying springs (7220). They also included four mainly rare habitats that do not have obvious bird associations: Chenopodion rubri (3270), Juniper scrub (5130), caves (8130) and Yew woodland (91J0).

Details of the interpretation of the focal species habitat associations with specific Annex I habitats are provided in Table 3.5.

Table 3.5. Interpretation of the focal species habitat associations with specific Annex I habitats.

Annex I	**Interpretation**
Estuaries (1130) and large shallow inlets and bays (1160)	Only included species associated with the subtidal component of these habitats; intertidal and saltmarsh components covered by other Annex I habitats: i.e. tidal mudflats and sandflats (1140), reefs (1170), *Salicornia* mud (1310), Atlantic salt meadows (1330), Mediterranean salt meadows (1410), and halophilous scrub (1420).
Lagoons (1150)	Excluded waders as most lagoons provide minor habitat for these species, although Tacumshin Lake is an exception.
Saltmarsh (1310-1420): *Salicornia* mud (1310), Atlantic salt meadows (1330), Mediterranean salt meadows (1410), halophilous scrub (1420)	All saltmarsh Annex I habitats grouped together. Only included species that make significant use of saltmarsh for foraging. Species that mainly use saltmarsh for roosting not included.

Annex I	Interpretation
Sand dunes (2110-2190): embryonic shifting dunes (2110), marram dunes (2120), fixed dunes (2130), decalcified *Empetrum* dunes (2140), decalcified dune heath (2150), dunes with creeping willow (2170), dune slacks (2190)	All sand dune habitats (except machair) grouped together.
Oligotrophic isoetid lake habitat (3110); mixed *Najas flexilus* lake habitat (3130); acid oligotrophic lake habitat (3160)	Nutrient-poor acid lakes without significant populations of wintering waterbirds. Note that Lough Leane is an exception: it is classified as mixed *Najas flexilus* lake habitat but has significant populations of wintering waterbirds.
Hard-water lake habitat (3140); rich pondweed lake habitat	Base-rich and/or nutrient-rich lakes with significant populations of breeding and wintering waterbirds.
Turloughs (3180)	Habitat associations based on reviews of Lysaght (2002) and data from relevant Irish Wetland Bird Survey sites.
Wet heath (4010); dry heath (4030); alpine and subalpine heath (4060); species-rich *Nardus* grassland (6230), *Molinia* meadows (6410); blanket bogs (7130); raised bogs (7110-7120); transition mires (7140)	Components of moorland habitat. For individual species, associations with specific Annex I habitats in this group were based on the importance of dwarf shrub cover for the species, their requirements for wet habitat, their tolerance of high altitude habitat, and their occurrence in the midlands raised bog landscape. The two raised bog Annex I habitats were grouped together as the differences between the two do not seem likely to affect their usage by the focal species (the degraded raised bog Annex I habitat does not include cutover bog).
Molinia meadows (6410); lowland hay meadows (6510); *Cladium* fens (7210); alkaline fens (7230)	Components of wet grassland breeding and wintering waterbird habitat; the fen habitats were included because these are often grazed. Transition mires can also occur in association with the fen habitats, but the conservation objectives mapping indicated that those selected for Special Areas of Conservation were associated with the moorland habitat group. Wintering waterbird focal species were only categorised as associated with these habitats if they have significant populations associated with callows. In coastal areas, wintering waterbirds using grassland habitat mainly use agriculturally improved grasslands.
Hydrophilous tall herb swamp (6430)	Only assessed the lowland sub-community. The other two sub-communities are small-scale.
Rocky slopes and screes (8110-8220): siliceous scree (8110), calcareous scree (8120), calcareous rocky slopes (8210), siliceous rocky slopes (8220)	All rocky slope and scree habitat grouped together.

Results

The detailed habitat classification for each focal species is shown in Appendix 1. The number of focal species that were classified as associated with each Annex I habitat are shown in Table 3.8. Over 85% of the associations fell into the four broad habitat groups shown in Table 3.7.

Table 3.6. Number of focal species associated with Annex I habitats.

Code	Habitat	Breeding	Winter
1130	Estuaries	1	9
1140	Tidal mudflats and sandflats	0	15
1150	Lagoons	2	12
1230	Vegetated sea cliffs	7	0
1310-1420	Saltmarsh	2	6
21A0	Machair	7	0
3110	Oligotrophic isoetid lake habitat	9	0
3130	Mixed *Najas flexilus* lake habitat	8	0
3140	Hard-water lake habitat	10	11
3150	Rich pondweed lake habitat	9	11
3180	Turloughs	6	9
4010	Wet heath	14	2
4030	Dry heath	10	1
4060	Alpine and subalpine heath	8	1
6230	Species-rich *Nardus* grasslands	13	1
6410	*Molinia* meadows	15	7
6510	Lowland hay meadows	7	7
7110-7120	Raised bogs	9	1
7130	Blanket bogs	12	2
7140	Transition mires	12	2
7210	*Cladium* fens	7	0
7230	Alkaline fens	7	0

Only Annex I habitats with at least five associated species in at least one season are included in this table. Other Annex I habitats (breeding season): sand dunes (3), acid oligotrophic lake habitat (4), vegetation of flowing waters (4), calcareous grassland (2), hydrophilous tall herb swamp (2), rocky slopes and screes (1), limestone pavement (2), sea caves (1), old oak woodland (2), bog woodland (2), alluvial woodland (2). Other Annex I habitats (winter): sandbanks (3), large shallow inlets and bays (3), reefs (2), vegetation of flowing waters (1).

Table 3.7. Focal species associated with Annex I groups.

Annex I habitat group	**Season**	**Species**
Estuaries and intertidal	Breeding	Teal, Coot, Snipe
	Winter	Greenland White-fronted Goose, Greylag Goose, Barnacle Goose, Brent Goose, Wigeon, Mallard, Pintail, Shoveler, Pochard, Tufted Duck, Scaup, Great Crested Grebe, Coot, Golden Plover, Grey Plover, Lapwing, Ringed Plover, Curlew, Bar-tailed Godwit, Turnstone, Knot, Dunlin
Lakes and turloughs	Breeding	Teal, Pochard, Common Scoter, Red-breasted Merganser, Red-throated Diver, Cormorant, Coot, Lapwing, Curlew, Common Sandpiper, Redshank, Snipe
	Winter	Greenland White-fronted Goose, Wigeon, Mallard, Pintail, Shoveler, Pochard, Tufted Duck, Great Crested Grebe, Coot, Lapwing, Curlew
Moorland	Breeding	Teal, Red-breasted Merganser, Red Grouse, Hen Harrier, Golden Plover, Curlew, Dunlin, Snipe, Nightjar, Kestrel, Merlin, Chough, Skylark, Ring Ouzel, Whinchat, Meadow Pipit, Twite
	Winter	Greenland White-fronted Goose, Golden Plover
Wet grassland	Breeding	Teal, Hen Harrier, Corncrake, Golden Plover, Lapwing, Curlew, Dunlin, Redshank, Snipe, Kestrel, Merlin, Skylark, Whinchat, Meadow Pipit, Twite
	Winter	Greenland White-fronted Goose, Wigeon, Mallard, Pintail, Shoveler, Golden Plover, Lapwing

Estuaries and intertidal: estuaries (1130), tidal mudflats and sandflats (1140), lagoons (1150), saltmarsh (1310-1420). Lakes and turloughs: oligotrophic isoetid lake habitat (3110), mixed *Najas flexilus* lake habitat (3130), hard-water lake habitat (3140), rich pondweed lake habitat (3150), acid oligotrophic lake habitat (3160), turloughs (3180). Moorland: wet heath (4010), dry heath (4030), alpine and subalpine heath (4060), species-rich *Nardus* grasslands (6230), raised bogs (7110-7120), blanket bogs (7130), transition mires (7140). Wet grassland: *Molinia* meadows (6410), lowland hay meadows (6510), *Cladium* fens (7210), alkaline fens (7230).

3.2.2. Farmland habitats

Three existing classifications of Irish bird species associated with farmland habitats were used: the species included in the BWI Group Action Plans for lowland farmland and dune and machair (BWI 2011a, c); the species listed as associated with lowland farmland in *Bird Habitats in Ireland* (Nairn and O'Halloran 2012); and the species used in the Farmland Bird Hotspot analyses (Kennedy *et al.* 2023b). The dune and machair group was included because these are mainly farmland habitats.

The focal species identified as associated with farmland habitats in these classifications are shown in Table 3.8.

Table 3.8. Focal species associated with farmland habitats.

Classification	Season	Species
BWI Group Action Plan	B	Grey Partridge, Stock Dove, Corncrake, Lapwing, Dunlin, Curlew, Snipe, Redshank, Common Sandpiper, Barn Owl, Kestrel, Whinchat, Twite, Yellowhammer, Chough, Skylark, Swallow
	W	Golden Plover, Lapwing, Curlew, Brent Goose, Barnacle Goose, Greylag Goose, Greater Greenland White-fronted Goose
Birds Habitats in Ireland	B	Corncrake, Lapwing, Snipe, Kestrel, Whinchat, Meadow Pipit, Skylark
	W	Golden Plover, Lapwing, Curlew, Barnacle Goose, Greylag Goose, Greater Greenland White-fronted Goose, Mallard
Farmland Bird Hotspots	B	Red Grouse, Stock Dove, Corncrake, Golden Plover, Lapwing, Curlew, Dunlin, Snipe, Redshank, Barn Owl, Kestrel, Whinchat, Meadow Pipit, Twite, Yellowhammer, Hen Harrier, Chough, Skylark
	W	Brent Goose, Barnacle Goose, Greylag Goose, Greater Greenland White-fronted Goose

Sources: BWI Group Action Plans for lowland farmland and dune and machair (BWI 2011a, c); Bird Habitats in Ireland (Nairn and O'Halloran 2012); Farmland Bird Hotspots (Kennedy *et al.* 2023b).

These classifications were combined to produce an overall list of farmland-associated focal species. The breeding species were then divided into three groups: widespread landbirds, breeding species with restricted distributions and wintering waterbirds (Table 3.9). The widespread landbirds occurred in most hectads in Ireland, or in southern and eastern Ireland (Stock Dove and Yellowhammer), in the Bird Atlas surveys. The breeding species with restricted distributions occurred in less than half of the hectads in the Republic of Ireland in the Bird Atlas surveys, apart from breeding Snipe (53%). The wintering waterbirds are species where farmland habitats support significant components of their Irish wintering populations.

Table 3.9. Classification of farmland focal species.

Species	Group	Breeding	Winter
Greenland White-fronted Goose	wintering waterbird		✓
Greylag Goose	wintering waterbird		✓
Barnacle Goose	wintering waterbird		✓
Brent Goose	wintering waterbird		✓
Mallard	wintering waterbird		✓
Red Grouse	restricted	✓	✓
Grey Partridge	restricted	✓	✓
Hen Harrier	restricted	✓	✓
Corncrake	restricted	✓	
Golden Plover	restricted	✓	
Golden Plover	wintering waterbird		✓
Lapwing	restricted	✓	
Lapwing	wintering waterbird		✓
Curlew	restricted	✓	
Curlew	wintering waterbird		✓
Dunlin	restricted	✓	
Common Sandpiper	restricted	✓	
Redshank	restricted	✓	
Snipe	restricted	✓	
Stock Dove	widespread	✓	✓
Barn Owl	restricted	✓	✓
Kestrel	widespread	✓	✓
Chough	restricted	✓	✓
Skylark	widespread	✓	✓
Swallow	widespread	✓	
Whinchat	restricted	✓	
Meadow Pipit	widespread	✓	✓
Twite	restricted	✓	
Yellowhammer	widespread	✓	✓

See text for explanations of the species groups.

3.3. Focal species distribution

3.3.1. Methodology

Species distribution

Focal species distribution was analysed using presence/absence at the hectad scale. Hectads are 10 x 10 km units of the Irish National Grid and are widely used for recording biological data in Ireland.

Two main sources were used to analyse the distribution of focal species: the hectad dataset from the Bird Atlas 2007-11 (Balmer *et al.* 2013) and a dataset from the Irish Wetland Bird Survey.

Breeding distributions of the focal species were analysed using the Bird Atlas dataset. The dataset was filtered to exclude non-breeding records. Each hectad that included a breeding or potential breeding record was included within the distribution of the relevant focal species.

The Irish Wetland Bird Survey dataset was used to analyse the distribution of most of the focal species wintering populations (all focal species included for their wintering populations were waterbirds). This dataset included mean annual peak counts for all Irish Wetland Bird Survey sites for the period 2018-19–2022/23. Because many focal species appeared in low numbers across numerous sites, the dataset required filtering. Sites were included if they ranked in the top 10% of counts, held ≥1% of the national wintering population, or fell within the upper natural break of the count distribution (Jenks clustering, four classes). This combined approach minimised reliance on any one threshold and captured ecologically important sites even where individual metrics were marginal. Thresholds were tested to yield roughly 20–30 sites per species.

Each hectad that included part of at least one qualifying site was included within the distribution of the relevant focal species. Multiple occurrences of qualifying sites within single hectads were not weighted higher as there are a number of complicating factors that affect the interpretation of such multiple occurrences (e.g. differences in the way Irish Wetland Bird Survey sites are defined, and populations using multiple sites).

Two of the focal species (Golden Plover and Lapwing) are very widespread in winter across the Irish countryside and the Irish Wetland Bird Survey dataset does not capture their full distribution. The Birds of Ireland, BirdTrack and eBird datasets were used to capture additional sites for these species. Hectads with at least one record exceeding any of the three thresholds defined above were added to the wintering-population distributions for these species.

The Irish Wetland Bird Survey dataset was not used for Greylag Goose. This species qualified as a focal species for its Icelandic-origin wintering population. However, there is also a large feral population in Ireland and the majority of records within the dataset refer to this population. Instead, the sites listed in Table 1 of Burke *et al.* (2023) were used to identify Irish Wetland Bird Survey sites used by the Icelandic wintering population.

The above differences in the treatment of breeding and wintering distributions reflect variation in data availability rather than differences in ecological importance.

Hectad species richness

The hectad species distribution data was used to compile hectad species richness maps for the species groups associated with the four Annex I habitat groups (Table 3.7), the farmland restricted distribution group and the farmland wintering waterbird group (Table 3.9).

The hectad species richness values for the Annex I groups excluded Kestrel, Skylark and Meadow Pipit. These species as well as Stock Dove, Swallow and Yellowhammer were excluded from the hectad species richness maps for the farmland species. These are very widespread species (breeding evidence from 85-98% of Irish hectads; Kestrel, Skylark, Meadow Pipit and Swallow), or very widespread in the south and east of Ireland (Stock Dove and Yellowhammer) and excluding these species made the patterns in hectad species richness of the more sensitive species clearer. The distribution abundance of these species contributed to the analyses of farmland-associated species through the Widespread Farmland Species Index (see below).

The hectad species richness values for the farmland restricted distribution group included winter occurrences for a subset of species (Table 3.9). These species are those that occur on farmland throughout the year, excluding species subject to substantial winter influxes of migrants. This approach reflects both the role of farmland habitats in supporting these species during winter and evidence that overwinter survival is often an important component of population regulation in many farmland birds (e.g. Peach *et al.* 1999).

The hectad species richness dataset for the estuaries and intertidal group was filtered by the Water Framework Directive mapping of coastal waterbodies and transitional waterbodies, so that only the hectads overlapping estuarine and coastal habitats were retained.

Widespread Farmland Species Index

Countryside Bird Survey data was used to develop an index for the abundance of the widespread farmland species. Interpretation of this index should take account of known limitations discussed below and in Section 8.6.1.

Around 44% of Irish hectads, or 56% of hectads with at least 50% land cover, include a monad surveyed by the Countryside Bird Survey. In all cases, these monads are located in the south-western corner of the hectad and share boundaries with the three adjacent hectads. As a result, each Countryside Bird Survey monad directly samples the contiguous landscape at the junction of four hectads. The bird community recorded within a monad was therefore assumed to provide information on the immediately adjoining areas of the three neighbouring hectads, as well as of the hectad in which the monad is located, while recognising that it represents only a small proportion of the total hectad area. On this basis, each Countryside Bird Survey monad was allocated to the containing hectad and to the three adjacent hectads. This resulted in CBS coverage for 80% of all Irish hectads and 94% of the hectads with land covering at least 50% of the hectad (Table 3.10). The degree to which a monad is representative of any given hectad is therefore expected to vary, particularly where only a single monad was allocated, and uncertainty is likely to be lower in hectads represented by multiple monads.

Table 3.10. Distribution of hectads by the number of CBS squares allocated to them for the calculation of the Widespread Farmland Species Index.

Number of CBS squares allocated to hectad	Percentage of hectads (all hectads)	Percentage of hectads (land area ≥ 50%)
0	20%	6%
1	24%	23%
2	27%	32%
3	17%	22%
4	13%	17%

See text for details of allocation of monads to hectads.

The mean peak count across three five-year periods between 2010 and 2024 was used to get an index value for each species in each monad (1 km square) surveyed by the Countryside Bird Survey. The mean monad index values for all monads assigned to a hectad was used to get an index value for each species in each hectad.

Because of its restricted spatial sampling, the Countryside Bird Survey may fail to detect all species present within a hectad, particularly those occurring at low densities. The Bird Atlas dataset was therefore used to supplement the Countryside Bird Survey data. Where a species was recorded within a hectad in the Bird Atlas dataset but was absent from the Countryside Bird Survey monads assigned to that hectad, it was assigned the minimum index value. Atlas-derived occurrences included winter records for species that are present year-round on farmland and are not subject to substantial winter influxes of migrants (see Table 3.9).

To reduce the influence of extreme values, the index values for each species were log(x + 1) transformed. They were then standardised using z-score transformation (subtracting the mean and dividing by the standard deviation). The overall index was then calculated as the mean of the standardised values across species. This approach ensured that differences in the absolute range of species abundances did not disproportionately influence the combined index. In the resulting index, negative values indicate hectads with below-average abundance, while positive values indicate hectads with above-average abundance.

3.3.2. Annex I species groups

The hectad species richness distributions were right-skewed with most hectads having zero or low numbers of focal species (Figure 3.2). The distributions for the lakes, moorland, and wet grassland / fen groups showed nearly linear decreases across their full ranges. The distribution for the estuaries / intertidal group had a sharp initial decrease followed by a long tail; this was due to the large influence of the Irish Wetland Bird Survey dataset on this group.

Not surprisingly, the highest hectad species richness for the estuaries / intertidal group occurred around major estuaries, with Lough Swilly having the highest hectad species richness (Map 3.1). The use of single Irish Wetland Bird Survey sites for large estuarine complexes such as the Shannon and Fergus estuaries resulted in large blocks of hectads with the same values for winter hectad species richness, which caused the long tail in the hectad species richness frequency distribution. Use of subsites for these large sites might produce more informative maps of hectad species richness. The highest breeding season hectad species richness for the estuaries / intertidal group occurred on the north Donegal coast.

The highest hectad species richness for the lakes group occurred along the Shannon, around the major Galway/Mayo lakes and in some coastal areas (Map 3.2). However, the latter reflected the overlap in focal species between the estuaries / intertidal and lakes groups.

The highest hectad species richness for the moorland group occurred in Connemara and Donegal (Map 3.3). The upland and raised bog areas in the midlands and south generally did not have high hectad species richness. The hectad species richness was driven by the breeding season focal species as there were only two focal species (Greenland White-fronted Goose and Golden Plover) with wintering populations associated with this habitat group.

The highest hectad species richness for the wet grassland / fen group occurred along the Shannon reflecting the importance of the Shannon Callows for many of the focal species in this group (Map

3.4). There were also high hectad species richness in winter in various coastal areas due to the overlap in focal species with the estuaries / intertidal group.

3.3.3. Farmland species

There were up to twelve restricted distribution farmland-associated focal species per hectad and up to six farmland-associated wintering waterbird species per hectad (Map 3.5). The main area of high hectad species richness of restricted distribution species occurred in the bog and callows landscape along the Shannon between Lough Derg and Lough Ree, with more scattered areas of high species richness in Connemara to northern Donegal. The hectads with the highest species richness of wintering waterbirds were associated with large estuaries reflecting the association of many of the farmland-associated wintering species with estuaries / intertidal habitat. Away from the coast, hectads with moderate species richness of wintering waterbirds formed a cluster that coincided with the main restricted distribution species cluster and stretched up the western shore of Lough Ree.

The highest index values for the abundances of widespread farmland species occurred in scattered locations cluster in the eastern half of Ireland and around the south-west coast (Map 3.5).

The species richness of restricted distribution species and wintering waterbirds and the abundance of widespread species tended to be higher in hectads that contained the Farmland Bird Hotspots defined by Kennedy *et al.* (2023) with the difference more pronounced when only the hectads containing the largest Farmland Bird Hotspots were included (the Farmland Bird Hotspots with areas above the 95th percentile of the area distribution) (Figure 3.3).

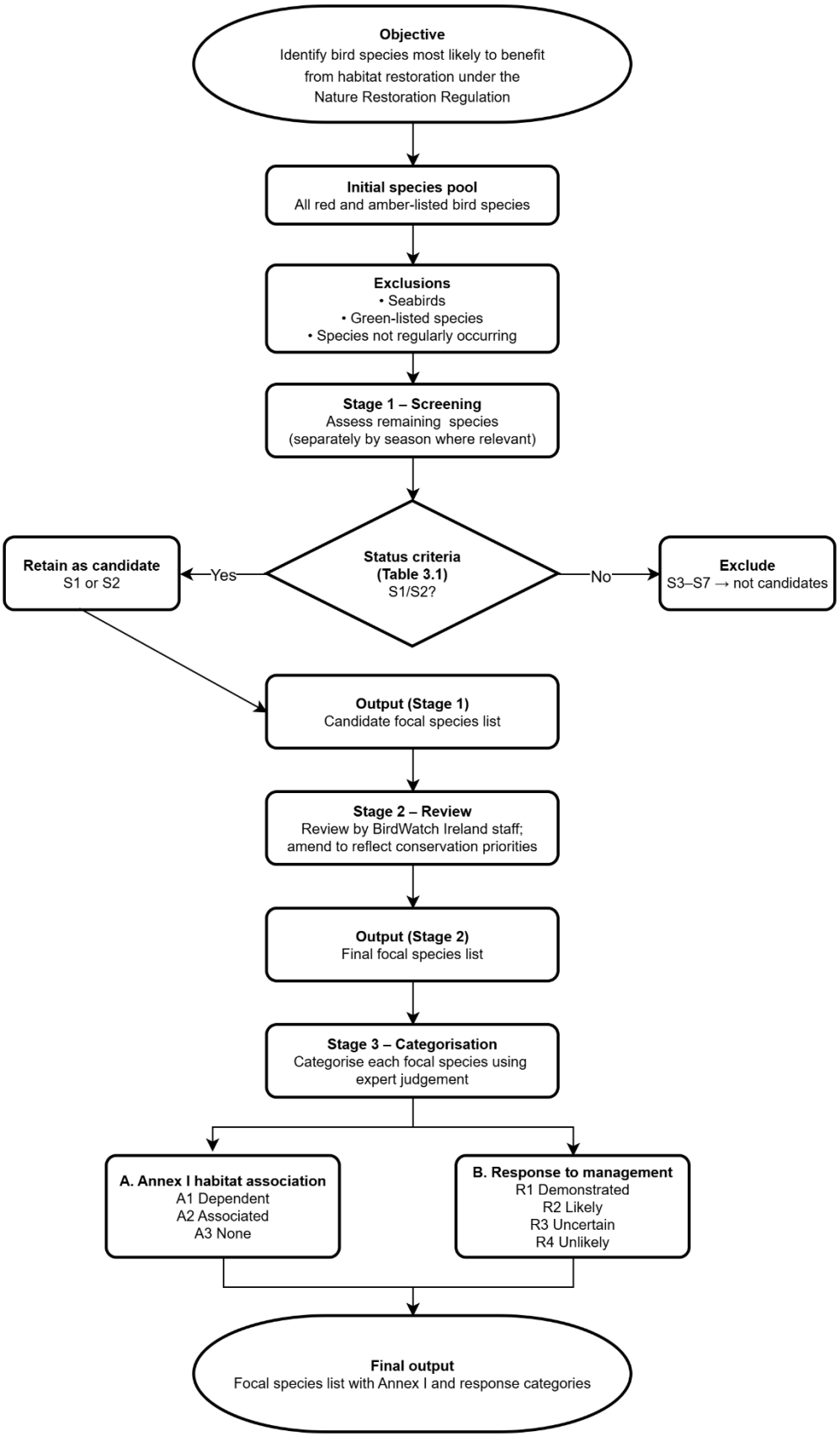


Figure 3.1. Overview of the three-stage methodology used to identify and categorise focal bird species for habitat restoration under the Nature Restoration Regulation, including status-based screening, expert review, and classification by Annex I habitat association and likely response to habitat restoration or creation.

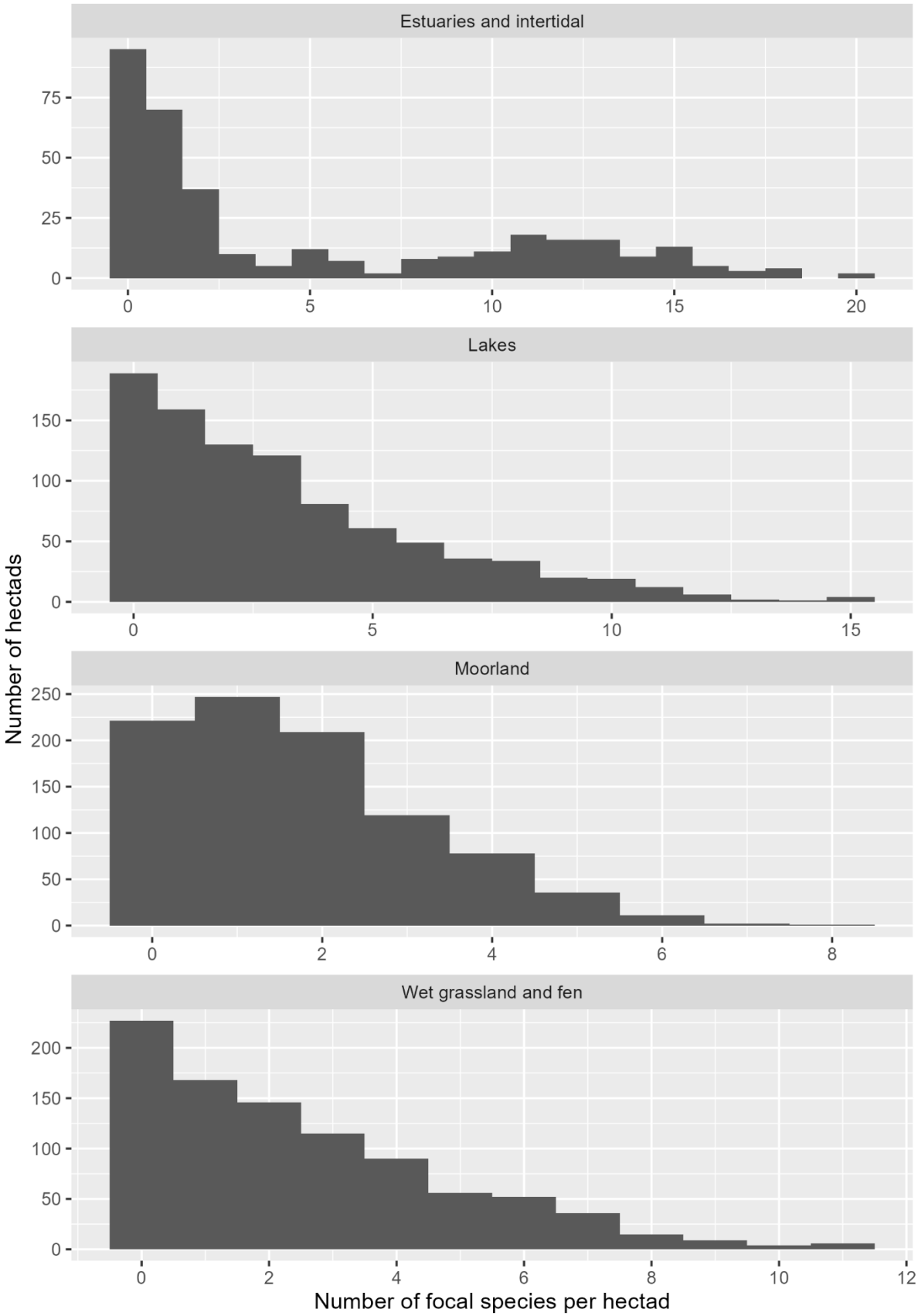
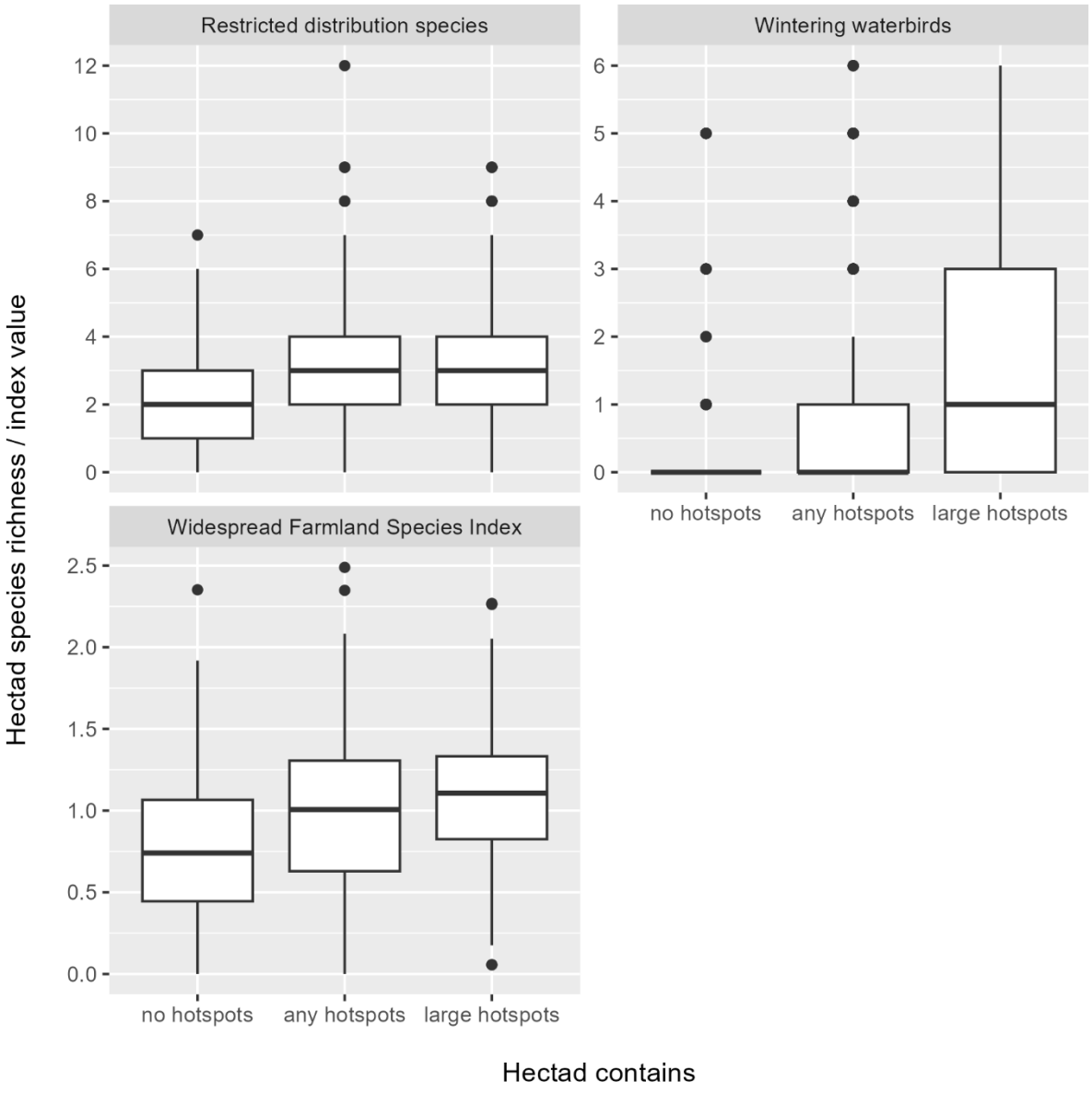
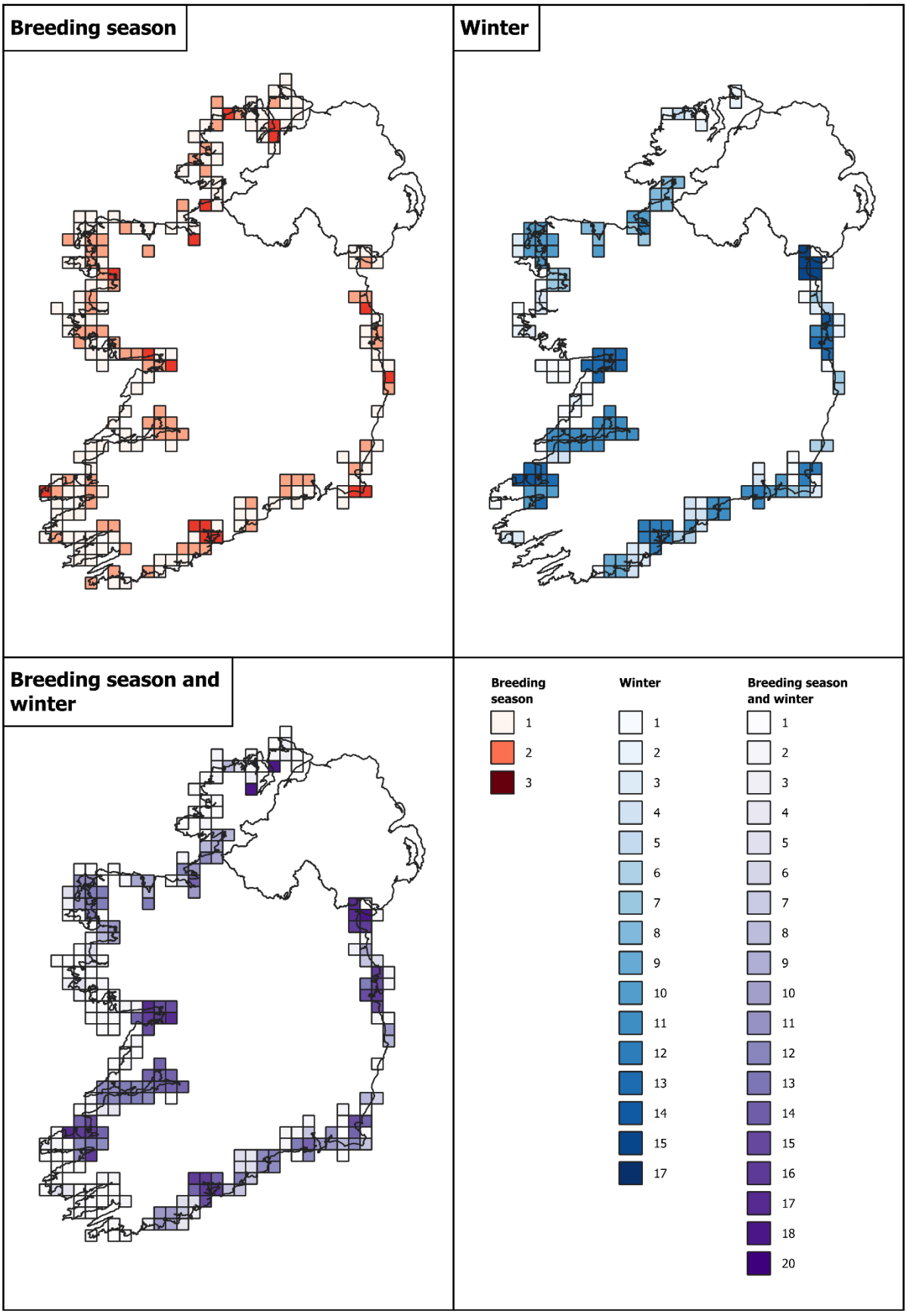


Figure 3.2. Distributions of the number of focal species per hectad for the Annex I focal species groups.

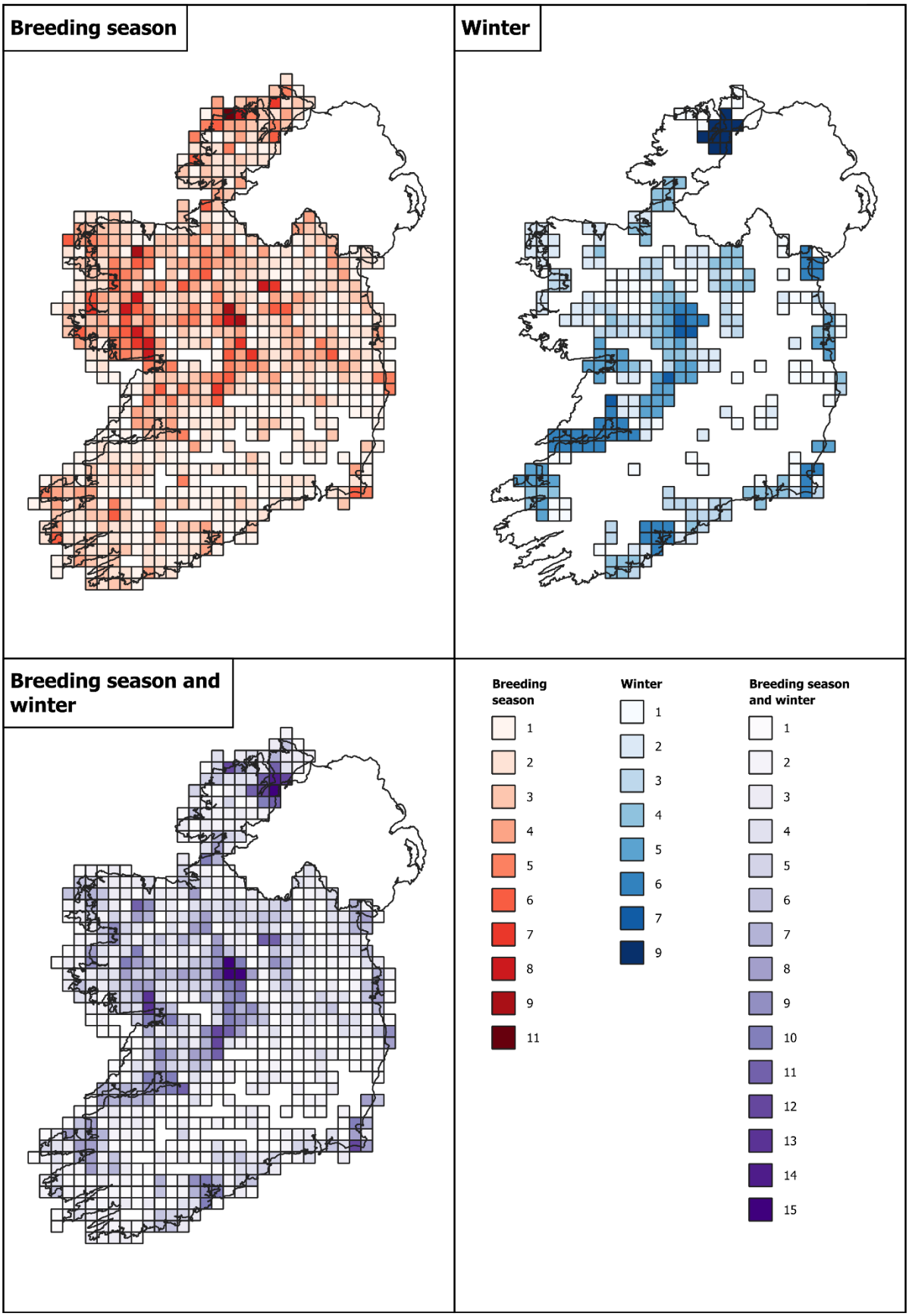


The Widespread Farmland Species Index represents breeding-season abundances of widespread farmland-associated focal species. Values shown in the boxplot are mean z-scores, calculated as the average across species of the standardised deviations of each species' hectad-level index value from its overall mean (see text).

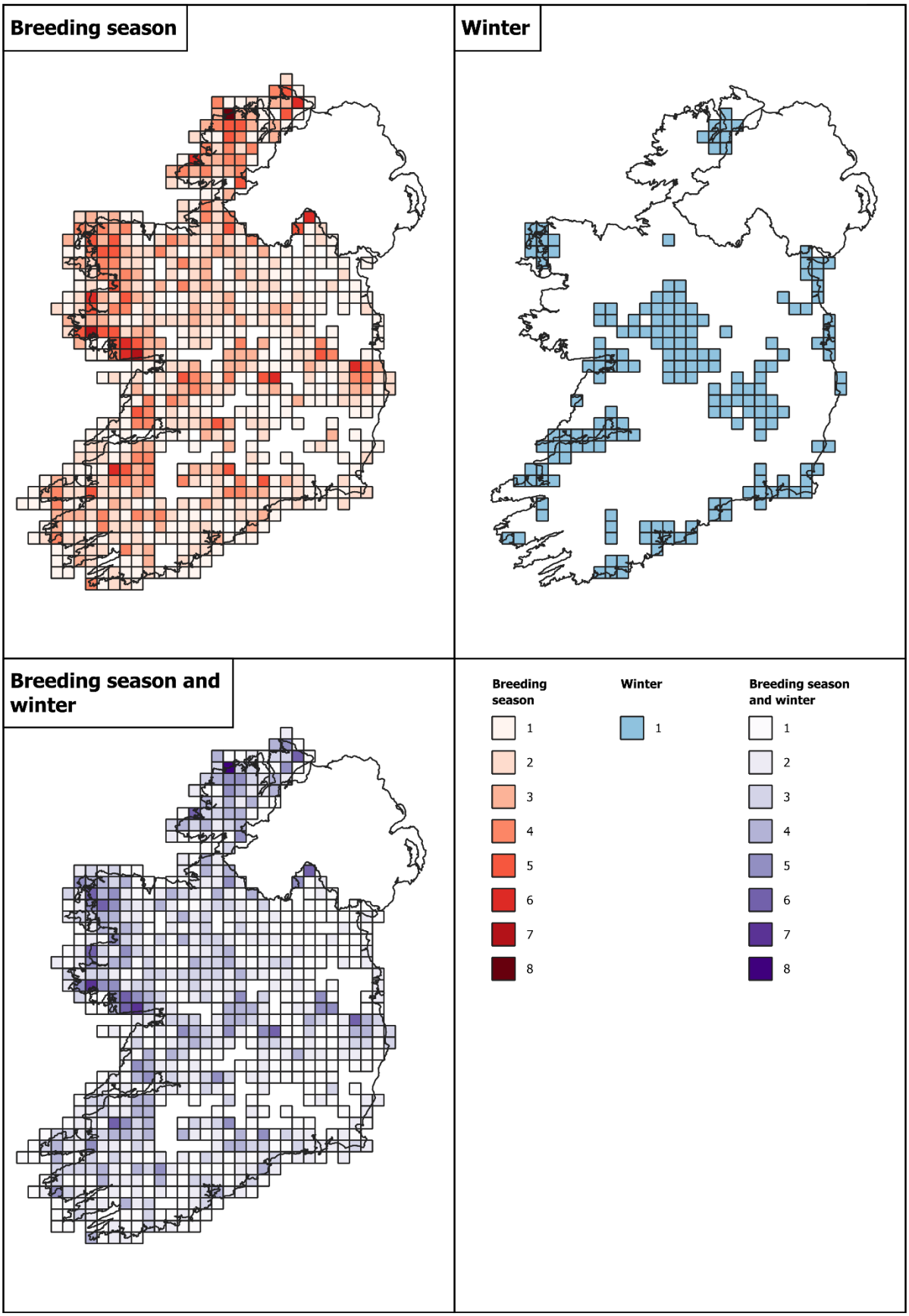
Figure 3.3. Comparison of farmland-associated focal species richness and abundance in hectads with and without Farmland Bird Hotspots.



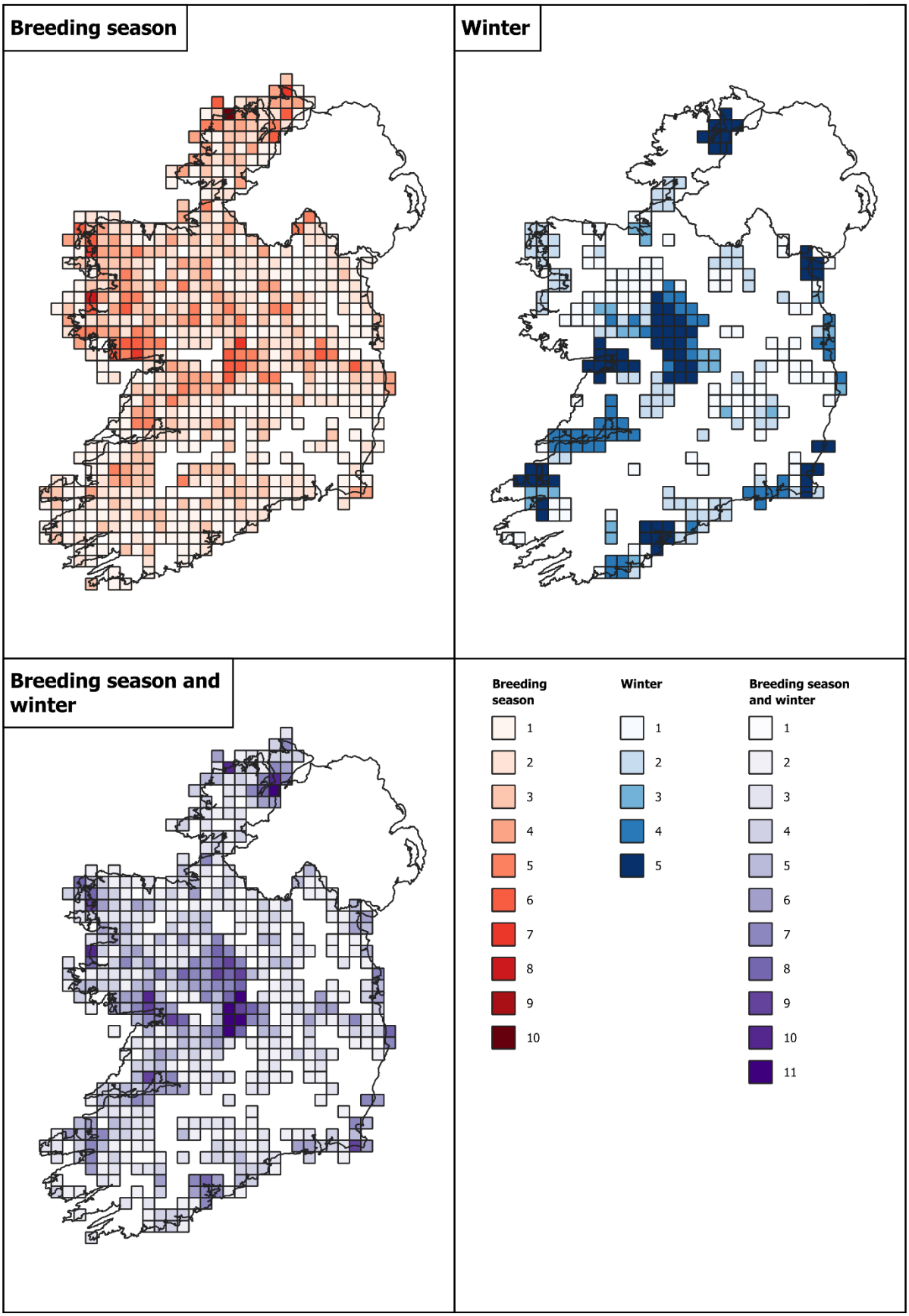
Map 3.1. Number of focal species per hectad classified as associated with Annex I estuary and intertidal habitats.



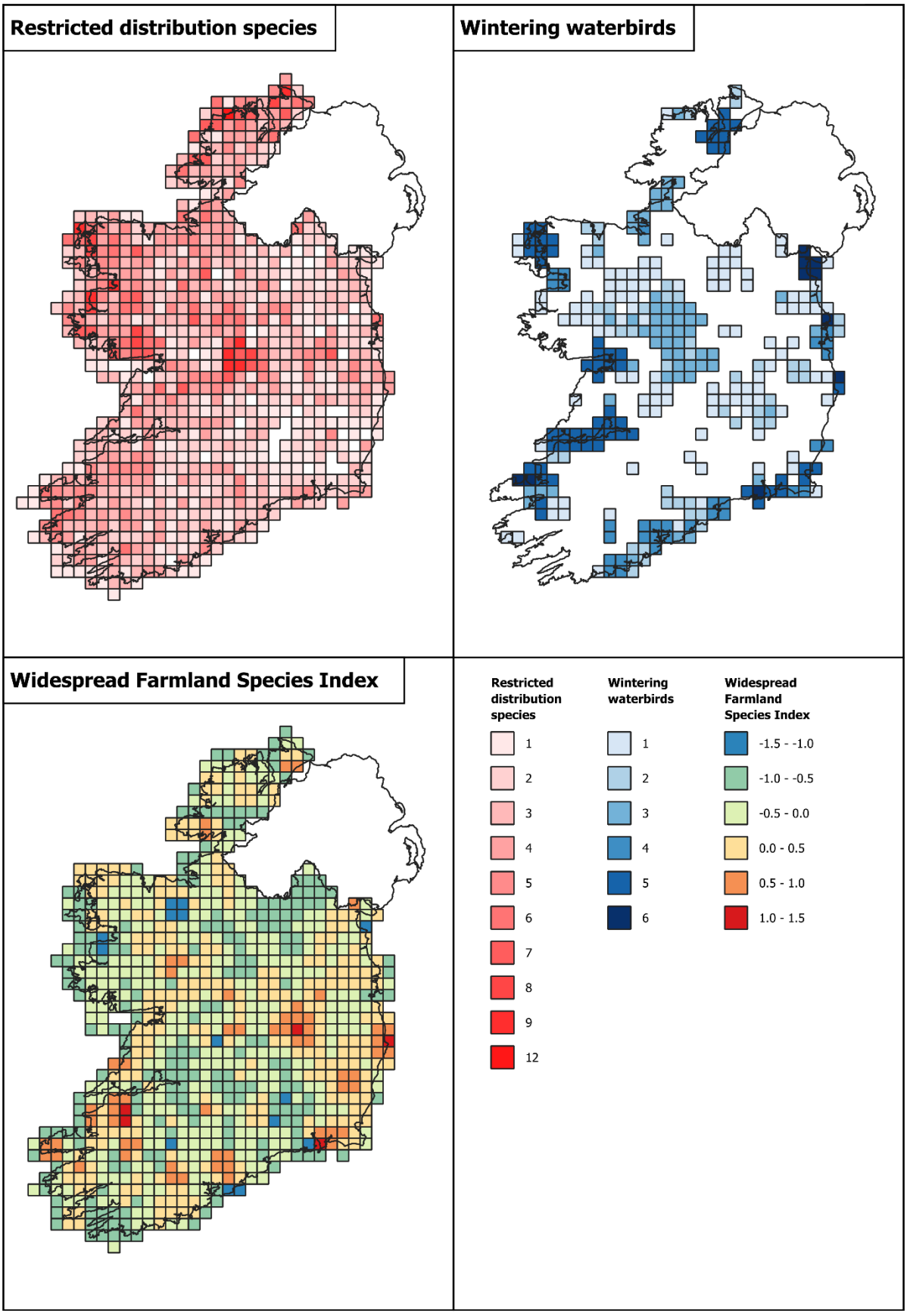
Map 3.2. Number of focal species per hectad classified as associated with Annex I lake habitats.



Map 3.3. Number of focal species per hectad classified as associated with Annex I moorland habitats.



Map 3.4. Number of focal species per hectad classified as associated with Annex I wet grassland / fen habitats.



Map 3.5. Number of restricted distribution and wintering waterbird focal species per hectad and hectad distribution of the abundance index for widespread farmland species (Farmland Generalists Index).

4. Creating/restoring Annex I habitats to benefit focal species

4.1. Introduction

This chapter identifies areas of opportunity where targeted habitat restoration has the potential to have benefits for significant assemblages of focal species and outlines some of the key restoration measures that could be implemented in these areas of opportunity. The areas of opportunity indicate locations where restoration may deliver disproportionate benefits; they do not represent ranked priorities or prescriptive site selections.

The analyses in this chapter are based on the four Annex I habitat groups identified in Table 3.7. These groups encompass most of the habitat associations between the focal species and Annex I habitats. The restoration measures were focused on general measures that would benefit most of the associated species, rather than species-specific measures targeted at particular species.

4.2. Methodology

4.2.1. General approach

Areas of opportunity for creating/restoring lake, moorland and wet grassland / fen Annex I habitats were identified by comparing the hectad species richness maps with the distribution and condition of the relevant Annex I habitats. The areas of opportunity for creating/restoring estuarine / intertidal Annex I habitats were identified using a more restricted analysis (see below).

The distribution and condition of the relevant habitats in the areas of opportunity, and in the portion of the areas of opportunity that were within Natura 2000 sites or public land were analysed.

4.2.2. Data sources

Information on the distribution and condition of Annex I habitats was obtained from the data sources listed in Table 4.1. These data sources were used to compile hectad distribution maps of habitat area and percentages of habitat in poor condition for the lakes, moorland and wet grassland / fen groups.

Other data sources used for the area of opportunity analyses are listed in Table 4.2. The PRA state assets mapping was combined with the National Park, Bord na Móna and Coillte mapping to produce a dataset of publicly owned land, with overlaps removed.

Table 4.1. Data sources used for information on the distribution and condition of Annex I habitats.

Annex I habitat group	**Source**	**Details**
Lakes; moorland; wet grassland / fen	NPWS conservation objectives mapping	Distribution of Annex I habitats that are Qualifying Interests of SACs; does not include assessments of condition
Lakes	Ordnance Survey Ireland mapping	Distribution of lakes mapped in the Ordnance Survey Discovery Series
Lakes	Water Framework Directive mapping	Distribution, classification and condition of lakes subject to assessment under the Water Framework Directive; the classification can be related approximately to the Annex I lake habitat types
Moorland; wet grassland / fen	Article 17 mapping	Distribution of Annex I habitats used for Article 17 reporting; some mapping can be cross-referenced to assessments of condition
Moorland; wet grassland / fen	Commonage mapping	Distribution and condition of habitats in commonage areas broadly corresponding to the moorland and wet grassland / fen Annex I habitats
Wet grassland / fen	Grasslands monitoring survey	Mapping from a survey of Annex I grasslands; can be cross-referenced to assessments of condition (Martin *et al.* 2018)
Wet grassland / fen	Floodplain / callows mapping	Mapping from a survey of floodplains and callows; can be cross-referenced to assessments of condition (Martin *et al.* 2023)

See Appendix 2 for details of GIS data sources.

Table 4.2. Other data sources used for the area of opportunity analyses.

Annex I habitat group	**Source**	**Details**
All	NPWS protected site data	Mapping of SACs and SPAs
All	NPWS National Park mapping	Mapping of National Parks
All	PRA state assets	Mapping of publicly owned land by the Land Development Agency derived from folios in the PRAI database
All	Bord na Móna owned land	As provided to the Irish Environmental Network under Access to Information on the Environment requests
All	Coillte owned land	As provided to the Irish Environmental Network under Access to Information on the Environment requests
Estuaries / intertidal	NASA SRTM	Digital surface model mapping used in the analyses of potential managed realignment land
Estuaries / intertidal	Copernicus Coastal Zones 2018	Land use mapping used in the analyses of potential managed realignment land

See Appendix 2 for details of GIS data sources and processing.

4.2.3. Habitat datasets

Estuaries / intertidal

The primary potential restoration measure for benefiting focal species in the estuarine and intertidal Opportunity Areas is managed realignment (see Section 4.4.1). Potential land for managed realignment around each estuarine SPA was identified as non-estuarine and non-marine habitat lying below a threshold corresponding to the mean annual peak high tide level for that estuary. Tidal thresholds were derived from OPW water level monitoring data (Table 4.5), and existing surface elevations were obtained from the NASA SRTM digital surface model.

The analyses were carried out within a 5 km buffer was applied around each SPA. Existing estuarine and marine habitats were excluded using the Water Framework Directive coastal and transitional waterbodies layer. Areas classified under codes starting with 11 or 12 in the Copernicus Coastal Zones 2018 dataset — which include urban fabric, industrial areas, roads, railways, ports, and similar land uses — were also removed. Additional manual edits were made to exclude low-lying inland wetlands that, while often of high ornithological value, are not relevant to managed realignment as a coastal restoration measure.

Table 4.3. Threshold levels for the managed realignment analyses based on mean annual peak high tide levels.

SPA	Data source	Threshold (m OD)
Dundalk Bay	Dundalk Port tidal monitoring station	3.07
Rogerstown Estuary	Baldoyle Bay threshold used	2.46
Baldoyle Bay	Gittings *et al.* (2024)	2.46
Cork Harbour	Ringaskiddy tidal monitoring station	2.41
Castlemaine Harbour	Castlemaine tidal monitoring station	3.00
Tralee Bay Complex	Blennerville tidal monitoring station	2.79
Inner Galway Bay	Wolfe Tone Bridge tidal monitoring station	3.18
Lough Swilly	Port Bridge tidal monitoring station	2.61

Tidal monitoring station data downloaded from https://waterlevel.ie/hydro-data. There is no tidal monitoring station in the Rogerstown Estuary so the threshold from Baldoyle Bay was used.

Lakes

The hectad distribution maps of lake area were compiled from a combination of the conservation objectives mapping, the Article 17 mapping of turloughs, the Water Framework Directive lake dataset and the Ordnance Survey Ireland lake dataset with overlaps removed.

The Water Framework Directive dataset includes a classification of lake type by geomorphology and water chemistry. The relationship between this classification and the Annex I lake classification was examined for lakes that were classified under both classifications. Comparison of the classifications shows that the WFD types 1-5 largely correspond to the more acidic Annex I lake types, while WFD types 9-12 largely correspond to the more base-rich / nutrient-rich lake Annex I habitats (Table 4.7). These relationships were used to provisionally classify Annex I types for Water Framework Directive lakes in analyses of lake Annex I habitats.

Table 4.4. Relationship between the Water Framework Directive and Annex I lake habitat classifications.

WFD type	Number of lakes classified as Annex I type:				
	3110	**3130**	**3140**	**3150**	**3160**
1	71	3	1		3
2	15	2			1
3	25	2			
4	22				1
5	1	4		5	
6		3		5	
7				1	
8	1	3	2	1	
9	2		7	15	1
10	1		8	3	
11			8	2	
12			10	4	
13	56				5

The Water Framework Directive lake dataset was used to compile hectad distribution maps of lake condition: lakes with bad or poor Ecological Status were categorised as in poor condition. This dataset does not include very small lakes but includes around 85% of the lake area mapped in the Ordnance Survey Ireland dataset.

Moorland

The Article 17 mapping, the conservation objectives mapping and the commonage mapping were combined to compile hectad distribution maps of moorland area. Overlaps between the mapping were removed. The commonage mapping was used to categorise the condition of moorland habitats.

The Article 17 and conservation objectives mapping is categorised by the Annex I habitats so selecting the relevant habitats was straightforward. In most cases the mapping included a percentage cover attribute; where this was included the habitat area was adjusted by this value.

The commonage habitat types I-IV (blanket bog, wet heath, dry heath and upland grassland) were categorised as moorland habitat. Many of the habitat parcels included in the commonage mapping were categorised as multiple habitat types. In these cases, they were counted as moorland if they contained at least one of the relevant habitat types.

The commonage mapping categorises the vegetation condition of each parcel as undamaged, moderately damaged (divided into three sub-categories) or severely damaged (divided into two sub-categories). This categorisation was used to calculate the percentage in poor condition in each hectad as the sum of the areas categorised as moderately damaged or severely damaged over the total area categorised (there were a few parcels that were not categorised). Some parcels were classified as multiple condition types; in these cases, the first condition type listed was used on the basis that this was likely to be the dominant condition. These analyses included all commonage mapping corresponding to moorland habitat types, including the mapping that overlapped the Article 17 and conservation objectives mapping.

There was no readily accessible NPWS data on the condition of specific sites included in the Article 17 and conservation objectives mapping of moorland habitats.

Wet grassland / fen

The grasslands monitoring survey mapping, the floodplain / callows mapping, the Article 17 mapping and the conservation objectives mapping were combined to compile hectad distribution maps of wet grassland / fen area. Overlaps between the mapping were removed. Where the mapping included a percentage cover attribute the habitat area was adjusted by this value. The grasslands monitoring survey and floodplain / callows mapping included some non-Annex I wet grassland / fen habitats and some classified as potential Annex I wet grassland / fen habitats. The non-Annex I wet grassland / fen habitats were removed while the potential Annex I wet grassland / fen habitats were included.

The grasslands monitoring survey mapping, the floodplain / callows mapping and the Article 17 mapping were used to categorise the condition of wet grassland / fen habitats. These datasets contain sites that can be matched to assessments of condition in Martin *et al.* (2018, 2023). The overall conservation status for each site was used and sites that were classified as unfavourable-inadequate or bad was categorised as in poor condition.

4.2.4. Criteria for selecting areas of opportunity

Estuaries / intertidal

The distribution of the major complexes of estuaries / intertidal habitats important for waterbird populations is well known. The condition of the habitats as measured by Water Framework Directive monitoring or NPWS assessments is not very relevant to their suitability for most waterbird populations (although there are some limited exceptions). Therefore, comparison of the hectad species richness maps with the areas and condition of estuarine / intertidal Annex I habitats would not be very informative.

The areas of opportunity for estuaries / intertidal-associated focal species were selected at the SPA-level, rather than the hectad level, to reflect the resolution of the waterbird count data used for the analyses. Estuarine SPAs that overlapped hectads with 14 or more estuaries / intertidal-associated species were selected.

Lakes, moorland and wet grassland / fen

Three types of areas of opportunity were identified: areas of opportunity for restoration in areas with high hectad species richness, areas of opportunity for restoration in areas with low hectad species richness, and areas of opportunity for creation in areas with high hectad species richness.

Areas with high hectad species richness, large areas of Annex I habitats, and large proportions of habitat in poor condition are prime targets for restoration of Annex I habitats to benefit the relevant focal species.

Areas with low hectad species richness, large areas of Annex I habitats, and large proportions of habitat in poor condition are also potential targets for restoration of Annex I habitats to benefit the relevant focal species as it is possible that the low hectad species richness is due to the poor condition of the habitats.

Areas with high hectad species richness but small areas of Annex I habitats are potential targets for habitat creation to benefit the relevant focal species. Areas of opportunity for habitat creation were

not selected for lakes as creation of new lakes is unlikely to be a practicable option at any scale that would have significant benefits to the lake-associated focal species.

The thresholds used in the selection of areas of opportunity are shown in Table 4.5. The thresholds for high and low hectad species richness were derived for each group by examining the frequency distributions (Figure 3.2) and selecting values that, in combination with the habitat thresholds produced around ten hectad in each area of opportunity category. The thresholds for small and large habitat areas were the 25th and 75th percentiles of the hectad habitat area distributions. The thresholds for high proportions of habitat in poor condition were the 75th percentiles of the hectad habitat condition distributions. The habitat condition threshold was not used for the selection of wet grassland / fen areas of opportunity as there was insufficient coverage to produce meaningful results.

Table 4.5. Thresholds used to select lake, moorland and wet grassland / fen areas of opportunity.

Annex I habitat group	**Parameter**	**Threshold value**
Lakes	Hectad species richness	High ≥ 6 Low ≤ 3
	Habitat area	High ≥ 112 ha
	Poor condition	Any lake in poor condition
Moorland	Hectad species richness	High ≥ 5 Low ≤ 1
	Habitat area	High ≥ 709 ha Low ≤ 25 ha
	Poor condition	Percentage ≥ 56%
Wet grassland / fen	Hectad species richness	High ≥ 5 Low ≤ 1
	Habitat area	High ≥ 18.7 ha Low ≤ 1.2 ha

4.2.5. Area of opportunity analyses

The areas of Natura 2000 sites within each area of opportunity that contain the relevant Annex I habitats (or, for estuarine and intertidal areas of opportunity, land with potential for managed realignment) were calculated. The subset of these areas that falls within public lands was then determined. The focus on public land reflects early-phase implementation priorities under the regulation, rather than the full spatial extent of restoration required to achieve favourable outcomes for focal species.

It is important to emphasise that the habitat areas presented in the relevant tables refer only to those portions of Natura 2000 sites that lie within the defined areas of opportunity, and do not represent the total extent of these habitats within Natura 2000 sites where those sites extend beyond the areas of opportunity.

4.2.6. Restoration measures

For each Annex I habitat group, the conservation objectives for the relevant Annex I habitats and focal species were first reviewed. The sources for these reviews were NPWS conservation objective documents for SACs and SPAs with the relevant habitats or species as qualifying interests; most Annex I habitats and bird species have very similar conservation objectives in each SAC or SPA where they are qualifying interests. Where available NPWS conservation objective supporting documents for the

relevant habitats were also reviewed. The focus of these reviews was on attributes and targets of the conservation objectives that are relevant to potential restoration measures.

Restoration measures were then identified that would address the general ecological requirements of the majority of the focal species associated with the Annex I habitat groups. These measures were identified from review of relevant guidance documents, as well as examples from specific projects, and input from relevant BirdWatch Ireland staff.

These measures were then reviewed to distinguish those that would contribute to the restoration of Annex I habitats, and are therefore more likely to be prioritised for implementation given the priorities of the initial phase of the Nature Restoration Regulation, from those that would be additional to the requirements of Annex I habitat conservation objectives. They were also reviewed in relation to the requirements of the conservation objectives for the relevant focal species.

4.3. Areas of opportunity

4.3.1. Estuaries / intertidal areas of opportunity

Ten estuarine Special Protection Areas overlap hectads with 15 or more estuarine / intertidal-associated focal species (Table 4.6). Of these, two (the North Bull Island SPA and the South Dublin Bay and River Tolka Estuary SPA) are in heavily urbanised areas where managed realignment would not be a practicable option. There is an estimated total area of around 91 km^2 of land potentially suitable for managed realignment around the other eight Special Protection Areas with Castlemaine Harbour and Dundalk Bay having the largest areas (Table 4.6).

Table 4.6. Potential extent of land suitable for managed realignment in estuaries / intertidal areas of opportunity.

SPA	Species richness of overlapping hectads		Managed realignment zone	
	median	max	total area (km^2)	public lands (km^2)
Dundalk Bay	16.0	17	18.6	0.18
Rogerstown Estuary	15.0	15	1.6	0.20
Baldoyle Bay	14.5	15	2.2	0.48
North Bull Island	15.0	15	-	-
South Dublin Bay and River Tolka Estuary	14.0	15	-	-
Cork Harbour	15.0	15	3.7	0.52
Castlemaine Harbour	11.0	15	19.6	0.26
Tralee Bay Complex	14.5	16	16.0	0.15
Inner Galway Bay	14.5	16	15.9	0.34
Lough Swilly	18.0	20	13.0	0.58

No potential managed realignment areas are given for the North Bull Island and South Dublin Bay and River Tolka Estuary SPAs as all the land at suitable elevation is urbanised.

Most of the land potentially suitable for managed realignment is outside Natura 2000 sites reflecting the fact that it is usually agriculturally improved land of low current ecological value. There are large blocks within the Special Protection Area at Lough Swilly: these are fields used by wintering Whooper Swan, Greylag Goose and Greenland White-fronted Goose. There are also some sand dune areas

included in the potential managed realignment zones at Baldoyle Bay, Castlemaine Harbour and the Tralee Bay Complex. These types of areas would be filtered out in site-specific reviews of the potential managed realignment zones.

Very little of the potential managed realignment zone is within public lands (Table 4.6).

The managed realignment zones were defined using digital surface model mapping. This provides data on the heights of vegetation and structures, rather than ground level elevations. Therefore, areas with tall vegetation would have been excluded from the mapped managed realignment zones, even when they were within areas that could potentially be suitable for managed realignment. Use of digital terrain model mapping would provide more accurate definitions of potential managed realignment zones, but suitable open-source data was not available for this project.

4.3.2. Lake areas of opportunity

The distribution of lake area per hectad was strongly right-skewed, meaning that most hectads contained little or no lake area while a small minority contained very large lakes; nevertheless, hectads with higher numbers of lake-associated focal species tended to have larger lake areas (Figure 4.1). The numbers and area of lakes in poor condition were small: 80% of the hectads with lake condition assessed had no lakes in poor condition and only 25% of the lake area assessed was in poor condition.

Most of the lakes in poor condition were in Cavan, Leitrim and Monaghan, and most of the areas of opportunity for restoration were in this area (Map 4.2). Other areas of opportunity for restoration were around the southern part of Lough Corrib, on the western side of Lough Derg, in mid-Clare and around Lough Allua in west Cork.

There are ten Special Areas of Conservation and seven Special Protection Areas with lake habitats that overlap the areas of opportunity (Table 4.7). Most of these overlapped the areas of opportunity with high hectad species richness. The only Natura 2000 site with lake habitat that overlapped an area of opportunity with low hectad species richness was the Boleybrack Mountain SAC. Most of the lake habitat in the Natura 2000 sites that overlapped the areas of opportunity corresponded to the base-rich / nutrient-rich lake Annex I habitats (Table 4.7), which are likely to support more of the lake-associated focal species.

Very little of the lake area within the Natura 2000 sites in the areas of opportunity was within mapped areas of public lands. The largest representation of public land was in the Dromore Woods and Loughs SAC (seven lakes with a total area of 38 ha). However, the public land mapping was based mainly on the Property Registration Authority database, and it may be that large areas of publicly owned lakes are not registered in that database.

For the purposes of these analyses, all lakes were treated as Annex I lake habitats. This does not imply that all lakes are Annex I; rather, based on the definitions of the Annex I lake habitat types, the majority of natural lakes in Ireland would be expected to qualify, with only a small proportion (e.g. artificial lakes) falling outside Annex I. The proportion of lake area that is non-Annex I is therefore likely to be low, and this simplification is unlikely to materially affect the results .

Table 4.7. Lake numbers and areas within Special Areas of Conservation and Special Protection Areas in lake areas of opportunity.

Category	Designation	Site	All lakes:		3140/3150 lakes:	
			number	area (ha)	number	area (ha)
Restoration1	SAC	Ballyallia Lake SAC	2	34	2	34
		Connemara Bog Complex SAC	18	96	0	0
		Dromore Woods and Loughs SAC	14	115	12	115
		East Burren Complex SAC	6	6	5	5
		Lough Corrib SAC	15	3725	1	3624
		Lough Derg, North-east Shore SAC	1	276	1	276
		Lough Oughter and Associated Loughs SAC	52	1280	41	1275
		Moyree River System SAC	1	1	0	0
		Ross Lake and Woods SAC	4	148	3	148
	SPA	Ballyallia Lough SPA	2	34	2	34
		Connemara Bog Complex SPA	2	18	0	0
		Corofin Wetlands SPA	4	4	4	4
		Lough Corrib SPA	6	3624	1	3623
		Lough Derg (Shannon) SPA	3	1616	1	1561
		Lough Oughter SPA	15	1033	14	1033
		Slieve Aughty Mountains SPA	3	5	0	0
Restoration2	SAC	Boleybrack Mountain SAC	1	2	0	0

Restoration1 = restoration in areas with high hectad species richness. Restoration2 = restoration in areas with low hectad species richness. The 3140/3150 lakes are lakes classified as hard-water lake habitat (3140) or rich pondweed lake habitat (3150) in the conservation objectives mapping, or as corresponding types in the Water Framework Directive lake dataset. Areas shown represent only the parts of Natura 2000 sites within the areas of opportunity, not the total habitat extent of those sites.

4.3.3. Moorland areas of opportunity

The overall distribution of moorland area per hectad was strongly right-skewed, but the groups of hectads with higher numbers of moorland-associated focal species tended to have larger moorland areas (Figure 4.1). These groups also had higher proportions of damaged moorland habitat.

The areas of opportunity for restoration were mainly in Connemarra reflecting the high incidence of habitat in poor condition in this region (Map 4.3). There were also high proportions of habitat in poor condition in the south-west, but this area had relatively low hectad species richness. Most hectads with high species richness already contained extensive areas of moorland habitat; consequently,

opportunities for habitat creation were limited and primarily restricted to scattered hectads where existing moorland habitat was relatively scarce.

There were large areas of moorland habitat within Natura 2000 sites in the areas of opportunity (Table 4.8). These included over 500 ha in public lands in the Mweelrea/Sheeffry/Erriff Complex SAC, the Mullaghanish to Musheramore Mountains SPA, the Connemara Bog Complex SAC, and the Twelve Bens/Garraun Complex SAC (Table 4.8).

Table 4.8. Moorland habitat extent within Special Areas of Conservation and Special Protection Areas in moorland areas of opportunity.

Category	Designation	Site	Moorland area (ha)	
			total area	public lands
Restoration1	SAC	Connemara Bog Complex SAC	7508	878
		Galtee Mountains SAC	2420	431
		Maumturk Mountains SAC	2359	144
		Mweelrea/Sheeffry/Erriff Complex SAC	1949	10
		Owenduff/Nephin Complex SAC	6677	3017
		Rosroe Bog SAC	216	0
		Slyne Head Peninsula SAC	226	0
		The Twelve Bens/Garraun Complex SAC	3493	16
	SPA	Connemara Bog Complex SPA	4323	689
		Mullaghanish to Musheramore Mountains SPA	356	46
		Owenduff/Nephin Complex SPA	6656	2999
Restoration2	SAC	Blackwater River (Kerry) SAC	321	61
		Caha Mountains SAC	372	44
		Clare Island Cliffs SAC	290	0
		Cloonee and Inchiquin Loughs, Uragh Wood SAC	189	1
		Connemara Bog Complex SAC	1505	30
		Derryclogher (Knockboy) Bog SAC	1433	0
		Glengarriff Harbour and Woodland SAC	205	59
		Keel Machair/Menaun Cliffs SAC	297	0
		Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC	2911	1
		Maulagowna Bog SAC	358	0
		Sheep's Head SAC	914	0
	SPA	Clare Island SPA	206	0

Restoration1 = restoration in areas with high hectad species richness. Restoration2 = restoration in areas with low hectad species richness. Special Areas of Conservation and Special Protection Areas with less than 100 ha of moorland habitat are excluded from the lists under the restoration categories. Areas shown represent only the parts of Natura 2000 sites within the areas of opportunity, not the total habitat extent of those sites: e.g. the small area of public land shown for the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC reflects the fact that the moorland areas of opportunity did not include Killarney National Park.

The dataset used to map the moorland habitats probably contains a large proportion of moorland habitats in the uplands and along the western seaboard. However, the coverage of raised bog habitat

may be more limited in this dataset, which may affect the identification of areas of opportunity in the midlands.

The assessment of habitat condition was based on the commonage mapping rather than the more detailed assessments that are carried out for Article 17 reporting (which were not available). However, the commonage mapping covered 78% of the moorland habitats in the Article 17 and conservation objectives mapping, so these assessments of habitat condition should provide a broad picture of the condition of the majority of the Annex I moorland habitats.

4.3.4. Wet grassland / fen areas of opportunity

The distribution of Annex I wet grassland / fen area per hectad was strongly right-skewed. Unlike with the lake and moorland groups, there was no clear relationship between hectad species richness and Annex I habitat area (Figure 4.1). This likely reflects a partial mismatch between the narrowly defined Annex I wet grassland / fen habitat types and the broader habitat requirements of the wet grassland / fen–associated focal species, which are not strongly dependent on Annex I habitats relative to non-Annex I wet grassland and fen habitats.

In line with this interpretation, the area of wet grassland / fen per hectad derived from the commonage mapping showed a clearer relationship with hectad species richness (Figure 4.1). This broader habitat definition better captures the range of wet grassland and fen habitats used by the focal species. However, the commonage dataset is not expected to be fully representative of the national distribution of wet grassland / fen habitats.

The areas of opportunity for restoration in areas with high hectad species richness were mainly in a single block along the Shannon Callows and Lough Ree with scattered hectads in Clare, Galway and Mayo (Map 4.4). The areas of opportunity for restoration in areas with low hectad species richness were concentrated in Westmeath. The areas of opportunity for habitat creation were widely scattered.

The areas of opportunity included large areas of Annex I wet grassland / fen habitat in several SACs and SPAs (Table 4.9). Not surprisingly, given the contribution of the floodplain / callows dataset to the habitat mapping, there was a particular concentration in the Natura 2000 sites covering the Shannon and Little Brosna Callows. These sites included significant areas of public land, and the Shannon Callows sites also contained substantial areas assessed as being in poor condition.

As a result of the partial mismatch between Annex I wet grassland / fen habitats and the habitat requirements of the focal species, the areas of opportunity analyses are likely to represent only a subset of potentially important areas for wet grassland / fen–associated species. While the distribution of Annex I wet grassland / fen habitats is directly relevant to Article 4.7 of the Nature Restoration, non-Annex I wet grassland and fen habitats will not qualify as priorities for restoration under the initial phase of implementation of the regulation.

Table 4.9. Wet grassland / fen habitat extent within Special Areas of Conservation and Special Protection Areas in wet grassland / fen areas of opportunity.

Category	Designation	Site	Wet grassland / fen area (ha)		
			total area	poor condition	public lands
Restoration1	SAC	Crosswood Bog SAC	401	0	84
		Fin Lough (Offaly) SAC	73	0	59
		Lough Corrib SAC	38	1	0
		Lough Ree SAC	322	5	0
		Mweelrea/Sheeffry/Erriff Complex SAC	339	0	0
		River Shannon Callows SAC	887	73	139
	SPA	Lough Ree SPA	280	5	0
		Middle Shannon Callows SPA	882	73	139
		River Little Brosna Callows SPA	283	3	112
		River Suck Callows SPA	126	3	0
Restoration2	SAC	Carlingford Mountain SAC	966	0	11
		Mount Hevey Bog SAC	625	0	35
		River Boyne and River Blackwater SAC	51	0	0
Creation	SAC	Mweelrea/Sheeffry/Erriff Complex SAC	27	0	0
		River Shannon Callows SAC	14	0	0
	SPA	Middle Shannon Callows SPA	14	0	0
		River Suck Callows SPA	146	0	0

Restoration1 = restoration in areas with high hectad species richness. Restoration2 = restoration in areas with low hectad species richness. Special Areas of Conservation and Special Protection Areas with Restoration measures. Special Areas of Conservation and Special Protection Areas with less than 10 ha of wet grassland / fen habitat are excluded from the lists under the restoration categories. Areas shown represent only the parts of Natura 2000 sites within the areas of opportunity, not the total habitat extent of those sites.

4.4. Restoration measures

4.4.1. Estuaries / intertidal

Conservation objective measures

The conservation objectives for the Annex I estuaries and tidal mudflats and sandflats habitats require maintenance of the habitat area and distribution of the characteristic benthic community types. For the Annex I coastal lagoon habitat the conservation objectives include maintaining natural salinity and hydrological regimes, sustaining water quality, aquatic plant communities, and populations of lagoonal-specialist species, and preventing or controlling reedbed encroachment. For saltmarsh habitats the conservation objectives focus on maintaining the physical structure, flooding regime, sediment supply, and vegetation communities and zonation.

The conservation objectives for wintering waterbird focal species associated with estuaries and intertidal habitat focus on the distribution and population trends of the species and don't refer to specific habitat attributes. The breeding populations of waterbird focal species associated with

estuaries and intertidal habitat are not qualifying interests of any SPAs, so no conservation objectives have been defined for these species.

Restoration measures

Restoration measures focused on meeting the targets in the conservation objectives for the estuarine / intertidal Annex I habitats will generally not be very relevant for the estuaries / intertidal-associated focal species. Most of these species are associated with the subtidal / standing water components of the estuaries and lagoon Annex I habitats, or with the tidal mudflats and sandflats Annex I habitat. The conservation objectives for these habitats focus on communities defined by benthic fauna (estuaries and tidal mudflats and sandflats). However, the link between these community-based targets and habitat suitability for waterbirds is often indirect, as the majority of the focal species inn this group tend to respond more strongly to changes in the biomass and availability of benthic prey than to changes in species composition. By contrast, a smaller subset of species grazing on saltmarsh or seagrass is likely to be more sensitive to changes in vegetation structure and composition, as discussed later.

The most effective restoration measure for estuarine and intertidal-associated focal species is managed realignment, with some additional measures of more limited scope. In addition to biodiversity benefits, managed realignment can deliver wider ecosystem services, including natural flood protection and coastal adaptation to sea-level rise. Although managed realignment may not fall within the initial phase of actions under the Nature Restoration Regulation, which is primarily focused on the restoration of Annex I habitats on public land prior to 2030, the long lead-in time required to plan, design and consent managed realignment projects means that it would be appropriate to begin preparatory work during this period, with a view to implementation beyond 2030.

Managed realignment

Managed realignment is a nature-based solution to flood defence. It involves the deliberate landward movement of coastal flood defences, allowing land historically claimed from the sea to revert to tidal habitats. It is now a widely accepted flood defence method but has not been implemented at a significant scale in Ireland to date. As well as providing economic and flood protection gains, it provides ecological benefits through intertidal and saltmarsh restoration. Therefore, managed realignment provides a potential mechanism for large-scale restoration of estuarine / intertidal Annex I habitats.

In theory, by restoring habitats that were originally tidal before they were claimed, managed realignment would address the habitat area attribute in the conservation objectives for the estuarine / intertidal Annex I habitats. However, the targets for this attribute are based on the mapped habitat areas in recent years and don’t account for historical habitat loss.

Implementation of managed realignment to restore these habitats requires careful selection of suitable sites that have the potential for natural tidal flooding providing suitable sediment supply and low exposure to wave erosion. Fine variation in elevations and gradients within the site will affect the tidal habitats that develop, and it is necessary to take account of shrinkage (i.e. drying out of land behind the sea wall can result in lower elevation than the mudflats and saltmarsh in front of the sea wall).

Implementation of managed realignment involves breaching or removing the sea wall. In many cases a new sea wall will be required to protect vulnerable land on the landward side of the managed realignment site. Regrading of land and modification of drainage channels may be required to facilitate development of the target habitats. Monitoring and adaptive management following implementation

is also important to track the development of the habitats, address potential issues such as erosion or excessive sedimentation and to adapt the hydrological regime accordingly (e.g. by modifying the breach or the drainage network).

Managed realignment also provides opportunities to develop coastal lagoon habitats: e.g. by excavating pools behind the new sea wall that are linked to the managed realignment zone by appropriate sluices.

Other restoration measures

Other restoration measures for estuarine and intertidal habitats are shown in Table 4.10.

Some of the measures are focused on reinstating the physical and ecological processes that underpin habitat extent, quality and functionality for waterbirds. Central to this is the restoration of natural tidal exchange and sediment dynamics through the removal or modification of structures such as embankments, sluices and causeways, allowing intertidal habitats to adjust naturally through erosion and accretion. Improvements to water quality through upstream nutrient and sediment management and control of point-source discharges are also important, as degraded water quality can reduce benthic invertebrate communities and lead to algal mats that limit prey availability, although localised increases in food resources may occur under eutrophic conditions. Together, these measures aim to restore the broad environmental conditions required to sustain productive intertidal feeding habitats.

A second group of measures addresses more direct pressures on intertidal feeding habitats. These include regulating intertidal aquaculture, managing bait-digging and shellfish collection, and controlling invasive plants and seaweeds that alter sediment structure and benthic communities. *Spartina* was formerly regarded as a major threat to mudflat habitats, but in many Irish sites its spread now appears limited. However, *Spartina* may still pose a significant problem in specific estuaries where active spread continues or where historical losses of mudflat have been substantial. In contrast, the invasions of *Sargassum muticum and Agarophyton vermiculophyllum* are more recent (Kraan 2008, Smiddy 2024) and, in some locations, are expanding rapidly, with the potential to smother intertidal sediments and reduce prey availability for feeding waders and wildfowl. Saltmarsh restoration and management, particularly through appropriate grazing regimes, is also important in maintaining short, open swards that provide high-quality feeding and roosting habitat for geese, swans, dabbling ducks and waders. Seagrass protection and restoration feature as complementary measures, given their importance for grazing wildfowl and their wider benefits for biodiversity and water quality.

Finally, several measures focus on reducing disturbance and ensuring the availability of key supporting habitats. The protection and creation of high-tide roost sites close to feeding areas is critical for maintaining the energy balance of wintering waterbirds. Controlling human disturbance through access management, zoning, signage and restrictions during sensitive periods is particularly important in estuaries with limited refuge areas. Collectively, these measures recognise that even where feeding habitats are in good condition, disturbance and loss of roosting opportunities can substantially reduce the suitability of estuaries and intertidal areas for waterbird populations.

Measures aimed at restoring natural hydrology and sediment dynamics, and at improving water quality, align closely with the conservation objectives for Annex I estuarine and intertidal habitats. The conservation objectives for Annex I saltmarsh habitats include specific targets relating to the control of *Spartina*; however, neither *Spartina* nor invasive seaweeds are explicitly addressed in the conservation objectives for the Annex I tidal mudflats and sandflats habitat. While the saltmarsh conservation objectives also include targets for vegetation condition and structure, it is not clear how

management actions designed to meet these targets would align with the habitat requirements of grazing and roosting waterbirds. In contrast, measures to control human disturbance fall largely outside the scope of the conservation objective requirements for Annex I estuarine and intertidal habitats.

Table 4.10. Restoration measures for estuarine and intertidal habitats.

Objective	**Measures**	**Notes**
Restore natural hydrology and sediment dynamics	Remove or modify structures that alter tidal exchange (sluices, embankments, causeways), subject to assessment of impact on localised features of importance for waterbirds. Allow natural sediment accretion and erosion processes to operate.	Estuarine and intertidal habitats depend on natural tidal regimes and sediment supply. Altered hydrodynamics reduce intertidal extent, simplify habitats and diminish feeding areas for waders and wildfowl.
Improve water quality	Reduce nutrient and sediment inputs from catchments through upstream nutrient management. Control point-source discharges affecting estuaries.	Poor water quality affects invertebrate communities and promotes algal mats, reducing prey availability and accessibility for feeding birds. However, in some cases, eutrophication may increase food resources for some waterbirds.
Intertidal feeding habitat	Regulate intertidal aquaculture (e.g. oyster trestles) to avoid loss or degradation of key feeding and roosting habitat for waterbirds. Manage bait-digging, shellfish collection and other mechanical disturbance in intertidal habitats.	These activities can alter intertidal sediments and benthic invertebrate communities, reducing prey availability and accessibility for feeding waders and wildfowl. Intertidal aquaculture structures such as oyster trestles can reduce feeding habitat availability.
Saltmarsh restoration and management	Implement appropriate grazing regimes to restore short, open swards. Prevent conversion to dense rank vegetation.	Grazed saltmarsh provides high-quality feeding habitat for geese, swans and dabbling ducks, and roosting habitat for waders at high tide.
Seagrass restoration	Protect existing seagrass (*Zostera*) beds from physical damage. Restore seagrass where conditions are suitable. Manage anchoring, dredging and aquaculture pressures.	Seagrass beds support grazing wildfowl (e.g. Light-bellied Brent Goose) and enhance invertebrate productivity for other species. Their restoration has strong co-benefits for biodiversity and water quality.
Control invasive plants and seaweeds	Control *Spartina* where it is actively spreading in mudflat habitats. Consider *Spartina* removal as a measure to restore mudflat habitat in areas with high levels of historical loss Manage invasive seaweeds (*Agarophyton vermiculophyllum* and *Sargassum muticum*) that smother intertidal sediments.	*Spartina* and invasive seaweeds can rapidly convert open feeding flats into unsuitable habitat for waders by altering sediment structure and prey availability.

Objective	Measures	Notes
Roosting habitat	Protect existing high-tide roosts on saltmarsh, islands and shorelines. Create alternative roost sites where disturbance or habitat loss has occurred.	The availability of safe, undisturbed roosts close to feeding areas is critical for energy budgets of wintering waterbirds.
Control human disturbance	Restrict access to sensitive intertidal and saltmarsh areas during peak winter periods. Manage human activities (walking, dogs, water sports, bait-digging and shellfish collection, etc.). Implement measures to control disturbance from licensing of hunting in state-owned foreshore. Provide zoning and clear signage where access is appropriate.	Repeated disturbance reduces feeding efficiency and increases energy expenditure, particularly in estuaries with limited refuge areas. Licensing of hunting in state-owned foreshore is currently uncontrolled and has the potential to cause severe disturbance impacts.

4.4.2. Lake restoration measures

Conservation objectives

The conservation objectives for Annex I lake habitats focus on restoring the habitats' area, distribution and ecological quality by maintaining or recovering healthy aquatic plant communities, their full natural zonation and the depth to which vegetation can grow. Achieving favourable condition requires stable, natural hydrological regimes, adequate water clarity for light penetration, and suitable soft-mud lake substrata with appropriate chemistry to support characteristic species.

The conservation objectives for Annex I turlough habitats focus on maintaining/restoring their natural hydrological regimes, water quality, vegetation communities, and associated species. This involves protecting the groundwater systems that drive their flooding and drying cycles, preventing pollution and damaging land-use changes, supporting the natural diversity of plant and animal communities adapted to turlough dynamics, and safeguarding their ecological functions and landscape context so that these rare, highly sensitive habitats continue to function naturally over the long term.

Three of the breeding waterbird focal species associated with lake and turlough habitats are qualifying interests of SPAs: Common Scoter, Cormorant and Red-throated Diver. They share a common set of conservation objectives that emphasise maintaining stable or increasing breeding populations through the provision of suitable nesting habitat, adequate breeding productivity, low disturbance, and effective functional connectivity with foraging areas. Across these species, restoration-relevant attributes focus on the extent, condition and spatial distribution of nesting habitat, whether lightly vegetated islands (Common Scoter) or small freshwater pools (Red-throated Diver) or secure wooded or island nesting sites (Cormorant). Disturbance management during the breeding season is a consistent priority. The objectives also highlight that breeding sites must remain functionally connected to productive foraging habitats, often located on larger lakes, rivers, estuaries or coastal waters and sometimes beyond SPA boundaries, with barriers or sustained disturbance along commuting routes capable of undermining breeding success. Collectively, these objectives point to restoration approaches that integrate site-level habitat management with landscape-scale connectivity and disturbance control, ensuring that SPAs support not just breeding presence but the long-term demographic viability of breeding waterbird populations.

The conservation objectives for wintering waterbird focal species associated with lakes and turloughs focus on restoring or maintaining stable or increasing long-term winter population trends through the provision of sufficient, well-distributed and seasonally available habitat that meets foraging and roosting requirements, while minimising disturbance and maintaining functional connectivity. Key attributes relevant to restoration include the spatial extent, quality and availability of foraging habitats (e.g. shallow lake margins, open water, wetlands, flooded grasslands and associated invertebrate or plant food resources), alongside adequate roosting habitat that reduces energetic costs and predation risk. Targets emphasise that disturbance from human activities should remain below levels that would affect population trends or habitat use. Collectively, these objectives point to restoration measures that enhance habitat extent and condition, improve food availability, safeguard roost sites, and reduce disturbance pressure as the most direct levers for supporting wintering populations.

Restoration measures

Key restoration measures for the lake-associated focal species include protecting and reinstating natural hydrological cycles, improving water quality, and maintaining a diverse mix of shallow water, open wet grassland and vegetated margins (Table 4.11).

The measures to restore hydrology and water quality are directly relevant to the Annex I habitats and address key attributes and targets in the conservation objectives for these habitats. The conservation objectives also include attributes and targets for marginal habitats, including specific reference to maintaining their suitability for bird populations in the turlough conservation objectives. However, restoration of wet grassland habitat in a wider zone around the lake shores and creation of scrapes and seasonal pools may be beyond the scope of the conservation objectives. Restoration of island and open water nesting/roosting habitat, and measures to control disturbance, are outside the scope of the conservation objectives for the Annex I habitats.

The restoration measures align closely with the conservation objectives for the focal breeding and wintering waterbird species by addressing the key ecological drivers that underpin habitat suitability, productivity and population stability. Measures to restore natural hydrological regimes and improve water quality will restore the water clarity, vegetation structure and invertebrate and fish prey bases that are essential for foraging waterbirds. Management of open water, islands and marginal habitats contributes to the availability and spatial distribution of nesting, roosting and feeding areas required by species such as Common Scoter, Red-throated Diver and wintering wildfowl, while invasive species control helps maintain the open, seasonally dynamic conditions on which both habitats and birds depend. Disturbance management measures are strongly aligned with the focal species' conservation objectives by reducing pressures that directly limit breeding success and winter survival.

Table 4.11. Restoration measures for lakes and turloughs.

Objective	Measures	Notes
Restore hydrology	Reverse or block artificial drains that disrupt seasonal flooding. Remove or modify culverts and outflow barriers where they alter natural water regimes. Protect surrounding karst features and groundwater recharge zones (turloughs). Avoid new drainage or water-level manipulation structures.	Turloughs depend on natural groundwater-driven flooding and drying cycles; hydrological alteration is the biggest threat to these systems. Lakes also depend on stable, clean water levels and intact littoral zone.
Water quality	Establish buffer strips around lake/turlough margins. Reduce direct livestock access where it causes siltation or nutrient loading, while maintaining or providing appropriate grazing regimes where required to support breeding waders. Promote upstream nutrient management (fertiliser reductions, slurry timing, constructed wetlands). Avoid fish-stocking or activities that disturb lake sediment.	Eutrophication affects aquatic plants, invertebrates, and water clarity, reducing the food base for diving and dabbling species.
Open water and islands	Maintain undisturbed islands, shallow spits, or exposed stony substrates in lakes. Protect nesting habitat and roost sites from disturbance or encroachment.	Wintering swans, geese, ducks and waders require undisturbed open water or wet ground for roosting near feeding areas, while undisturbed islands can provide important nesting habitat for breeding waders.
Marginal habitats	Implement appropriate grazing regimes to maintain suitable vegetation structure. Maintain marginal swamps and scattered scrub, with scrub management or removal where necessary to maintain suitable habitat for breeding waders.. Restore unimproved wet grassland around lake edge. Maintain or create scrapes and seasonal pools.	Light grazing helps maintain open wet grassland and margin vegetation used by feeding waterbirds without causing poaching or sward homogenisation. Marginal swamps, scrub and wet grassland provide nesting habitat for various waterbird species. Scrapes and seasonal pools provide feeding habitat for breeding and wintering waterbirds.
Control invasive and encroaching species	Remove invasive aquatic plant species. Control encroaching scrub and bracken on islands and in marginal zones.	Invasive plants and aggressive scrub reduce the open, seasonally inundated character of turloughs and affect the suitability of lake islands and shorelines used by birds.
Disturbance	Restrict access to sensitive shorelines during peak overwintering periods. Avoid construction, machinery use, or major land operations in breeding season. Implement dog-control and recreation management where needed.	Waterbirds are highly sensitive to repeated disturbance. This can be particularly significant in small, isolated lakes and turloughs without adequate disturbance refuges.

4.4.3. Moorland restoration measures

Conservation objectives

The conservation objectives for Annex I wet heath, dry heath, and alpine and subalpine heath focus on preventing habitat loss, controlling invasive species, and sustaining natural processes such as grazing and hydrology that support heathland diversity. The objectives for raised bogs, blanket bogs, and transition mires with quaking bogs require the protection of hydrological regimes, peat-forming processes, and typical flora and fauna. The objectives for species-rich *Nardus* grasslands aim to conserve traditional low-intensity management practices, prevent nutrient enrichment or overgrazing, and support the survival of rare and characteristic plant species.

The moorland-associated focal species that are qualifying interests of SPAs (Hen Harrier, Golden Plover, Dunlin, Merlin and Chough) share conservation objectives that centre on maintaining or restoring stable or increasing breeding populations through the protection, management and restoration of extensive open habitats, adequate productivity, low disturbance and functional habitat connectivity. Across these species, restoration-relevant attributes consistently emphasise the extent, condition and spatial coherence of open upland habitats, including blanket bog, heath, rough grassland and low-intensity managed grasslands, which provide nesting, foraging and prey resources; inappropriate vegetation structure, drainage, afforestation, agricultural intensification or habitat fragmentation can directly limit breeding success. Breeding productivity is explicitly required to be sufficient to sustain populations and is implicitly linked to prey availability, habitat quality and disturbance pressure. Disturbance during the breeding season, and the non-breeding season for Chough, is a recurrent issue, with objectives requiring that its intensity, timing and frequency do not compromise breeding success. For wide-ranging species such as Hen Harrier and Merlin, objectives also stress the importance of landscape-scale habitat mosaics and connectivity between nesting areas and foraging grounds, including the availability of suitable forest age structure (for Hen Harrier) and open foraging habitats within typical ranging distances. For inland Chough populations, objectives highlight the maintenance of short-sward, grazed upland habitats with accessible soils and high invertebrate prey biomass, close to nesting cliffs or inland breeding sites, rather than coastal grasslands. Collectively, these objectives point to restoration approaches that integrate large-scale habitat restoration and management, disturbance control, and the maintenance of prey-rich, structurally suitable habitats across entire SPAs, with success measured by sustained breeding occupancy and productivity rather than simple presence alone.

Wintering Greenland White-fronted Goose populations in peatland SPAs have conservation objectives that focus on restoring a stable or increasing winter population across a network of sites (which may include non-peatland sites as well). From a restoration perspective, the most relevant attributes relate to the availability, spatial distribution and quality of bog habitats, particularly raised and blanket bogs, which historically provided important winter foraging areas. Targets emphasise the need for sufficient areas of suitable bog vegetation that offer accessible forage at appropriate times during the winter, alongside the maintenance of low disturbance levels, as disturbance can increase energetic costs and lead to site abandonment. The objectives also highlight the importance of functional connectivity between bogs, roost sites and other supporting habitats outside the SPA. Together, these objectives point to restoration measures centred on bog rewetting and vegetation recovery, disturbance management, and the reconnection of bogs within a coherent wintering habitat network.

Restoration measures

The key measures required to restore moorland habitats for the moorland-associated focal species include re-wetting drained peatlands, removing forestry and peat-extraction, restoring peat-forming vegetation and controlling invasive species and scrub encroachment to maintain open conditions (Table 4.12). These measures all contribute to the restoration of the Annex I habitats and address targets of the conservation objectives for the relevant habitats. Additional measures required specifically for bird populations, but which don't contribute to the restoration of the Annex I habitats involve reducing disturbance and predation pressure (Table 4.12). Landscape connectivity is also important for raptors with large home ranges, and for sedentary species such as Red Grouse whose populations can become isolated, and may therefore require habitat creation or restoration beyond Natura 2000 sites.

The moorland restoration measures strongly reflect the shared conservation objectives of the moorland-associated focal species by targeting the extent, condition and connectivity of open upland habitats that underpin breeding occupancy and productivity. Re-wetting peatlands, removing forestry and restoring peat-forming vegetation will improve prey availability, nesting and feeding habitats for breeding waders and upland specialists such as Golden Plover, Dunlin and Red Grouse. Measures to manage vegetation structure through appropriate grazing and heather management help maintain the habitat heterogeneity required by species such as Hen Harrier, Merlin and Chough across their breeding and foraging ranges. Control of invasive species and scrub encroachment supports both habitat restoration and reduced predation risk for ground-nesting birds. Disturbance reduction and predator management are clearly aligned with focal-species objectives by addressing constraints on productivity and survival. The emphasis on large, connected habitat blocks further reflects the emphasis in the conservation objectives landscape-scale requirements of wide-ranging species, linking site-level restoration to population-level conservation outcomes.

Table 4.12. Restoration measures for moorland habitats.

Objective	Measures	Notes
Restore open habitats	Remove forestry on peat soils.	Forest-to-bog restoration has the potential to deliver substantial gains, given the extensive areas of forestry established on peat soils.
Restore hydrology	Block drains to raise water tables. Reprofile cutover or eroded peat faces to slow water loss and encourage *Sphagnum* recovery. Restore wet flushes in upland grasslands. Remove forestry or scrub.	Higher water tables are critical for Curlew, Golden Plover, Snipe, and other peatland specialists that require soft, wet ground for feeding and nesting.
Re-establish peat-forming vegetation	Prevent wildfires. Reintroduce *Sphagnum* if required.	A healthy *Sphagnum* layer increases insect abundance and provides key nesting habitat for waders and Red Grouse.
Manage vegetation structure	Low-intensity, rotational grazing using sheep or native breeds to maintain a mosaic of young and mature heather in bog and heath habitats and a diverse sward structure in upland grasslands. Heather cutting to maintain structural diversity. Prevent overgrazing, which leads to heather loss and erosion.	Red Grouse, Hen Harrier, Merlin, Skylark, and Meadow Pipit depend on a mix of heather ages and open areas for feeding and nesting.
Control invasive and encroaching species	Remove Rhododendron, encroaching scrub and birch regeneration. Suppress conifer regeneration from adjacent forestry.	Maintains open moorland character, supports re-wetting, prevents shading and habitat conversion, and reduces predator pressure on ground-nesting birds associated with this habitat, including Red Grouse, Hen Harrier, Merlin and breeding waders.
Reduce disturbance and predation pressure	Limit recreational disturbance in sensitive breeding zones. Install seasonal visitor controls in high-traffic areas. Implement targeted predator management where appropriate and legally permitted.	Ground-nesting birds in moorlands are highly vulnerable to disturbance and predation.
Protect large, connected open habitats	Improve connectivity between fragmented habitats by targeted habitat creation/restoration, including outside Natura 2000 sites.	Supports wide-ranging species such as Hen Harrier and Merlin.

4.4.4. Wet grassland restoration measures

Conservation objectives

The conservation objectives for Annex I *Molinia* meadows, focus on maintaining the composition and diversity of the plant communities while preventing overgrowth of *Molinia caerulea* that can dominate and reduce biodiversity. The objectives for lowland hay meadows require management to sustain their rich assemblage of flowering plants and associated fauna through traditional mowing and grazing regimes. The objectives for *Cladium* fens aim to conserve hydrological conditions, prevent nutrient enrichment, and support characteristic fen flora and fauna. The objectives for alkaline fens seek to maintain water chemistry, peat formation, and the diversity of rare plant and invertebrate species, while avoiding drainage, overgrazing, or invasive species encroachment. Collectively, these objectives emphasize preserving habitat integrity, hydrological balance, and species diversity.

The conservation objectives for focal species with breeding populations associated with wet grassland / fen habitats (Hen Harrier, Corncrake, Golden Plover, Dunlin and Merlin), highlight wet grasslands and associated low-intensity grassland mosaics as functionally important habitats whose extent, condition and management strongly influence population size, productivity and spatial use. For all five species, targets emphasise maintaining or restoring sufficiently large, coherent areas of wet or damp grassland with appropriate vegetation structure, soil moisture and prey availability, while avoiding drainage, agricultural intensification and fragmentation. Wet grasslands are particularly critical for Corncrake, where tall, well-structured vegetation, delayed and wildlife-friendly mowing, early/late cover areas and high invertebrate availability are central to meeting population and spatial utilisation targets, but they also underpin breeding waders (Golden Plover and Dunlin) by providing shallow, moist soils rich in surface invertebrates for chick foraging and by supporting suitable nesting–foraging mosaics. For Hen Harrier and Merlin, wet grasslands contribute primarily as part of wider open foraging landscapes, supporting prey populations and habitat connectivity within typical foraging range distances, thereby influencing productivity and territory occupancy. Across species, disturbance limits during the breeding season, maintenance of hydrological conditions, retention of structural heterogeneity, and integration of wet grasslands within larger networks of semi-natural habitats are repeatedly identified as the restoration-relevant levers most likely to deliver favourable conservation condition.

The conservation objectives for focal species with wintering populations associated with wet grassland / fen habitats (Greenland White-fronted Goose, Wigeon, Pintail, Shoveler, Golden Plover and Lapwing[1]) place wet grasslands and seasonally flooded callows at the core of maintaining or restoring favourable conservation condition, through their combined roles as foraging habitat, daytime roosting areas and elements of a wider functional habitat network. For all six species, targets emphasise maintaining sufficient extent, spatial distribution and seasonal availability of wet grassland habitats with appropriate sward structure, soil moisture and food resources, such that long-term winter population trends are stable or increasing. Wet grasslands are particularly critical for Greenland White-fronted Goose, which relies on suitable grasslands and callows for grazing within a limited foraging range of secure roosts, and for Golden Plover and Lapwing, which depend on open wet grasslands with high surface and sub-surface invertebrate availability for feeding and ground-level roosting. For Wigeon, Pintail and Shoveler, wet grasslands function both as feeding areas—supporting aquatic vegetation, seeds and invertebrates—and as part of a mosaic with shallow wetlands and floodwaters that allows flexible responses to changing water levels. Across all species, objectives consistently highlight the need to ensure disturbance levels remain below thresholds that would

[1] Mallard is not a qualifying interest of any wet grassland SPAs.

displace birds or increase energetic costs, and to retain connectivity with supporting habitats inside and outside the SPA.

Restoration measures

The key measures required to restore wet grassland / fen habitats for the wet grassland / fen associated focal species include restoring natural hydrology, maintaining shallow winter floods and summer high water tables, creating a mosaic of short and medium sward through carefully timed grazing and mowing, provision of safe roosting and feeding areas, reducing disturbance and predation, and removing scrub encroachment where necessary (Table 4.13).

The conservation objectives for the Annex I wet grassland / fen habitats include attributes and targets relating to restoring vegetation structure and species composition. These are focused on maintaining/restoring the relevant vegetation communities but there is likely to be a lot of overlap between the restoration measures required for this purpose and the restoration measures required for the creating suitable vegetation structure for the wet grassland / fen associated focal species. The conservation objectives for the Annex I fen habitats include attributes and targets relating to restoring natural hydrology although there are no explicit references to restoring floodplain connectivity or winter flooding. The restoration measures for creating shallow scrapes and pools, restoring wintering waterbird habitat and reducing disturbance and predation impacts are outside the scope of these conservation objectives.

The restoration measures closely support the conservation objectives of both breeding and wintering focal species by restoring the hydrological and management conditions that determine habitat availability, structure and food resources. Actions to reinstate natural hydrology, seasonal flooding and high water tables will sustain the damp soils, shallow floods and invertebrate productivity required by breeding waders and wintering waterbirds. Grazing and mowing regimes aimed at restoring vegetation structure and composition contribute to the creation of heterogeneous swards that meet the contrasting requirements of species such as Corncrake, Golden Plover, Lapwing and Greenland White-fronted Goose. Measures to maintain open, treeless landscapes, provide roosting features and reduce disturbance and predation pressures align strongly with focal-species objectives by improving breeding success, winter habitat use and energetic efficiency.

Table 4.13. Restoration measures for wet grassland / fen habitats.

Objective	Measures	Notes
Restore natural hydrology	Remove or set back embankments to connect rivers to floodplains. Block drains and reprofile ditches to raise water levels. Allow shallow winter flooding for several weeks/months. Create shallow scrapes and ephemeral spring/summer pools.	Seasonal flooding maintains the short, damp sward and nutrient dynamics that produce invertebrate food and feeding microhabitats for waders. Shallow scrapes provide habitat for breeding and wintering waterbirds. Spring/summer pools provide feeding habitat for breeding waders.
Restore vegetation structure	Implement an appropriate grazing or mowing regime. Carry out rush, reed, *Molinia* and scrub control where required.	Grazing or mowing maintains open vegetation structure, and prevents scrub encroachment, creating optimal conditions for breeding and wintering wetland birds. Removal of dominant vegetation provides open, heterogeneous wetland areas that support breeding and foraging for wetland birds.
Restore vegetation composition	Manage mowing and grazing regimes, including the timing and frequency of grass cuts, to restore appropriate species composition, and control nutrient enrichment or additions where necessary. Use green hay strewing or other suitable restoration measures where required to re-establish target plant communities.	Species composition influences sward structure and food availability for wintering and breeding birds, particularly breeding waders. Unsuitable hydrology or management can lead to dominance by a few plant species and reduced botanical diversity. Adjusting mowing timing and, where appropriate, increasing cutting frequency can help restore vegetation balance. Species composition that has been degraded can often be improved relatively quickly through the addition of locally sourced seed.
Breeding and wintering waterbird / wader habitat	Create open, treeless landscapes. Create islands or mounds within flooded areas for roosting. Create suitable habitat for night roosts.	Breeding waders favour open, treeless landscapes and generally avoid nesting or feeding near trees or scrub. Most wintering waterbirds likewise prefer open habitats with long sightlines to detect predators. Secure roosting areas provide disturbance refuges. Some species commute to communal night roosts on rivers, lakes or floodplains, which need to be within suitable distances of feeding areas.

Objective	Measures	Notes
Reduce impacts from predation	Carry out targeted habitat restoration works to remove predator habitat where appropriate. Use electric fencing to protect key nesting areas. Carry out targeted or landscape-level predator control where appropriate.	The presence of trees/scrub can increase predator pressure on breeding species. Electric fencing deters predators and prevents trampling by livestock or people, improving breeding success. Targeted / landscape level predator control may be where populations are critically low and/or there is a time lag before the benefits of habitat restoration are realised.
Reduce impacts from disturbance and predation	Manage farm operations and public access to minimise disturbance at key times. Use electric fencing to protect key nesting areas.	Controlling farming activities and public access reduces disturbance, increasing nesting success and survival. Electric fencing deters predators and prevents trampling by livestock or people.

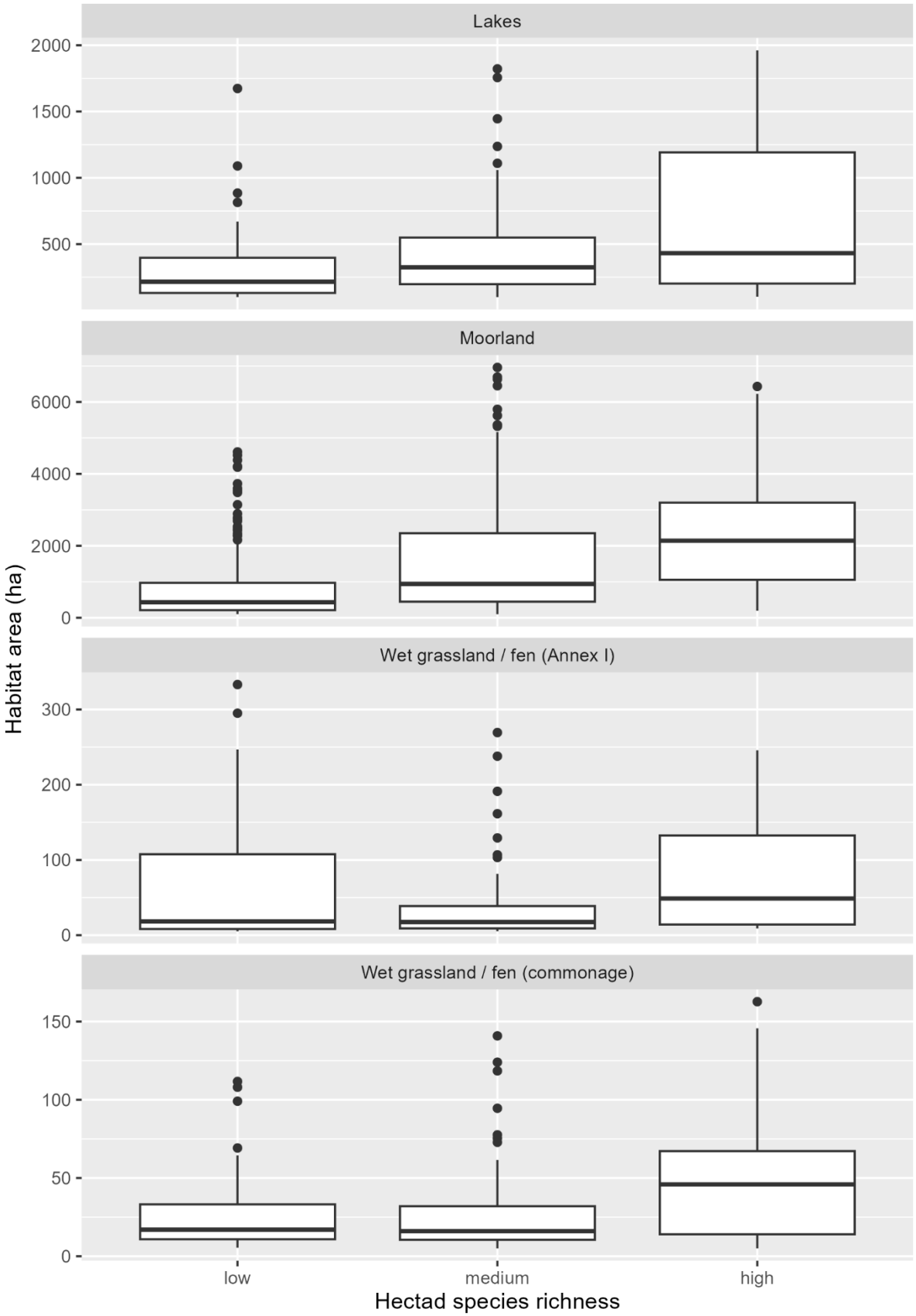
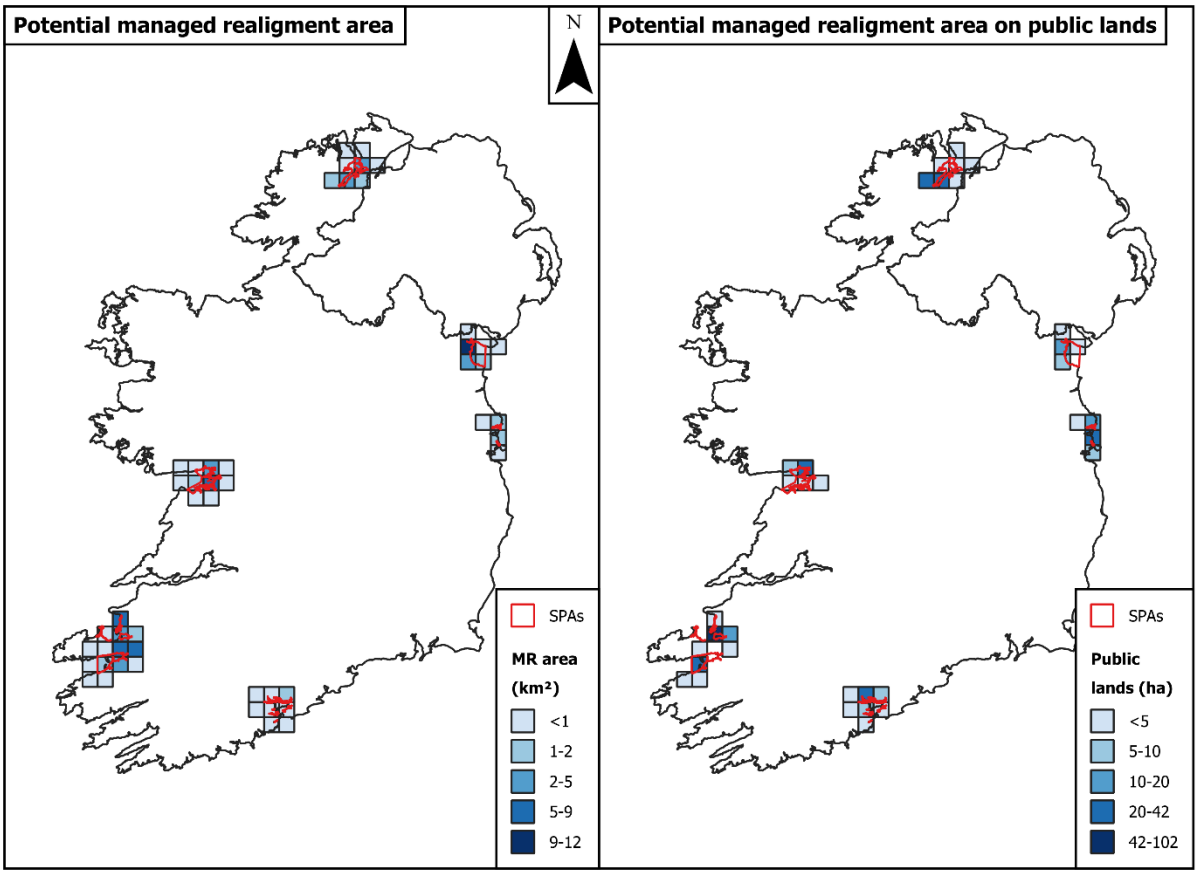
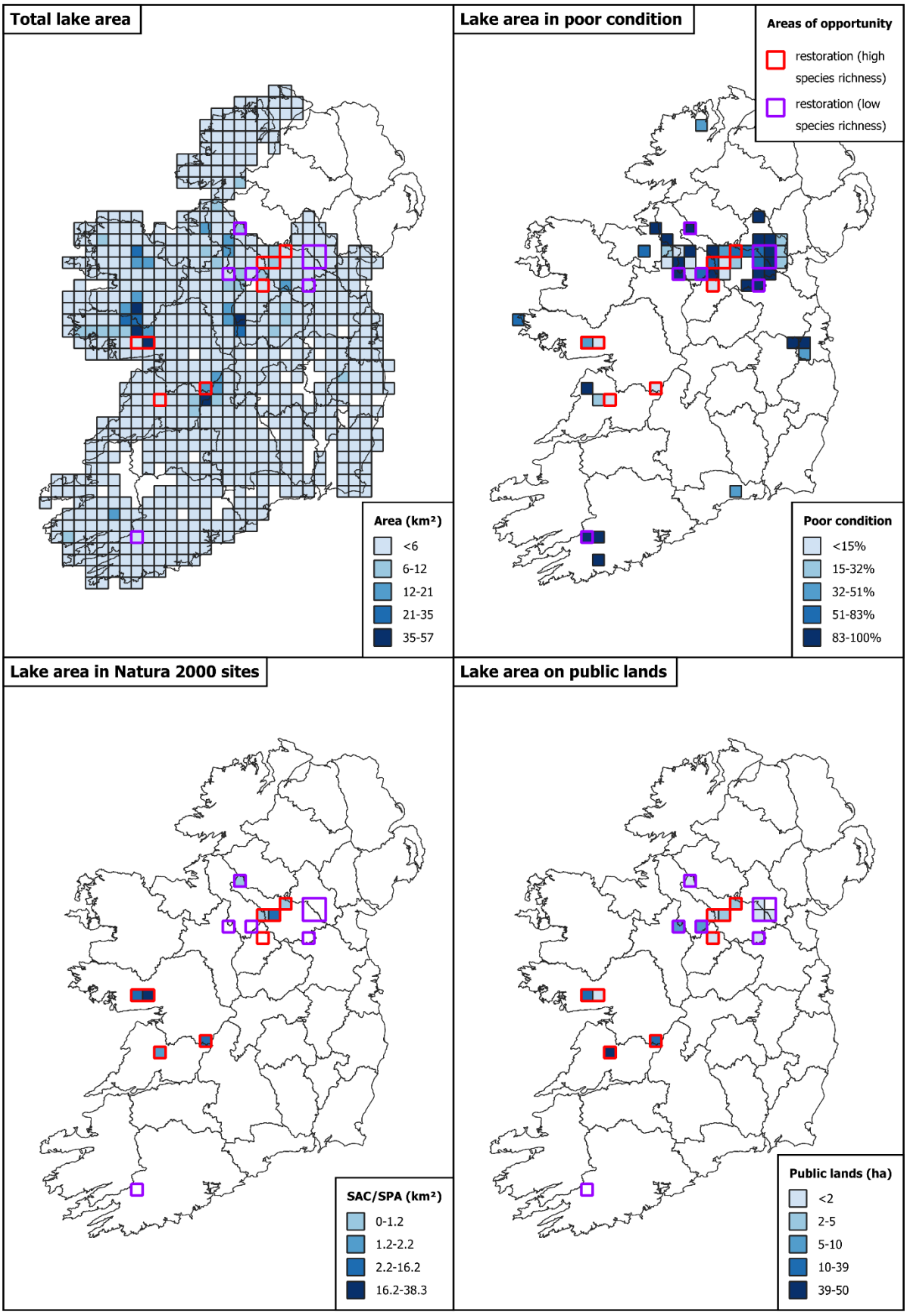


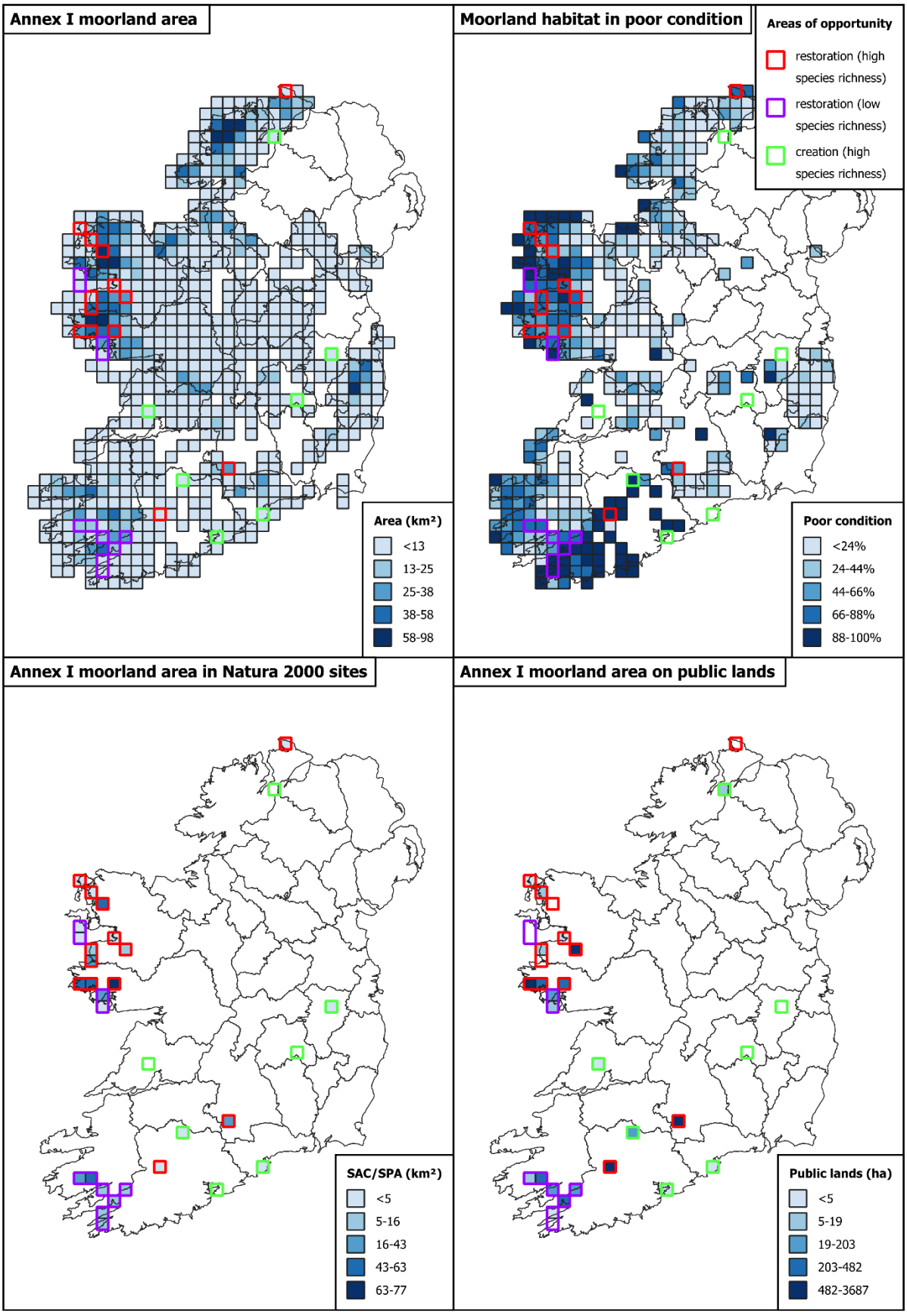
Figure 4.1. Distribution of habitat area by hectads categorised by the number of focal species per hectad.



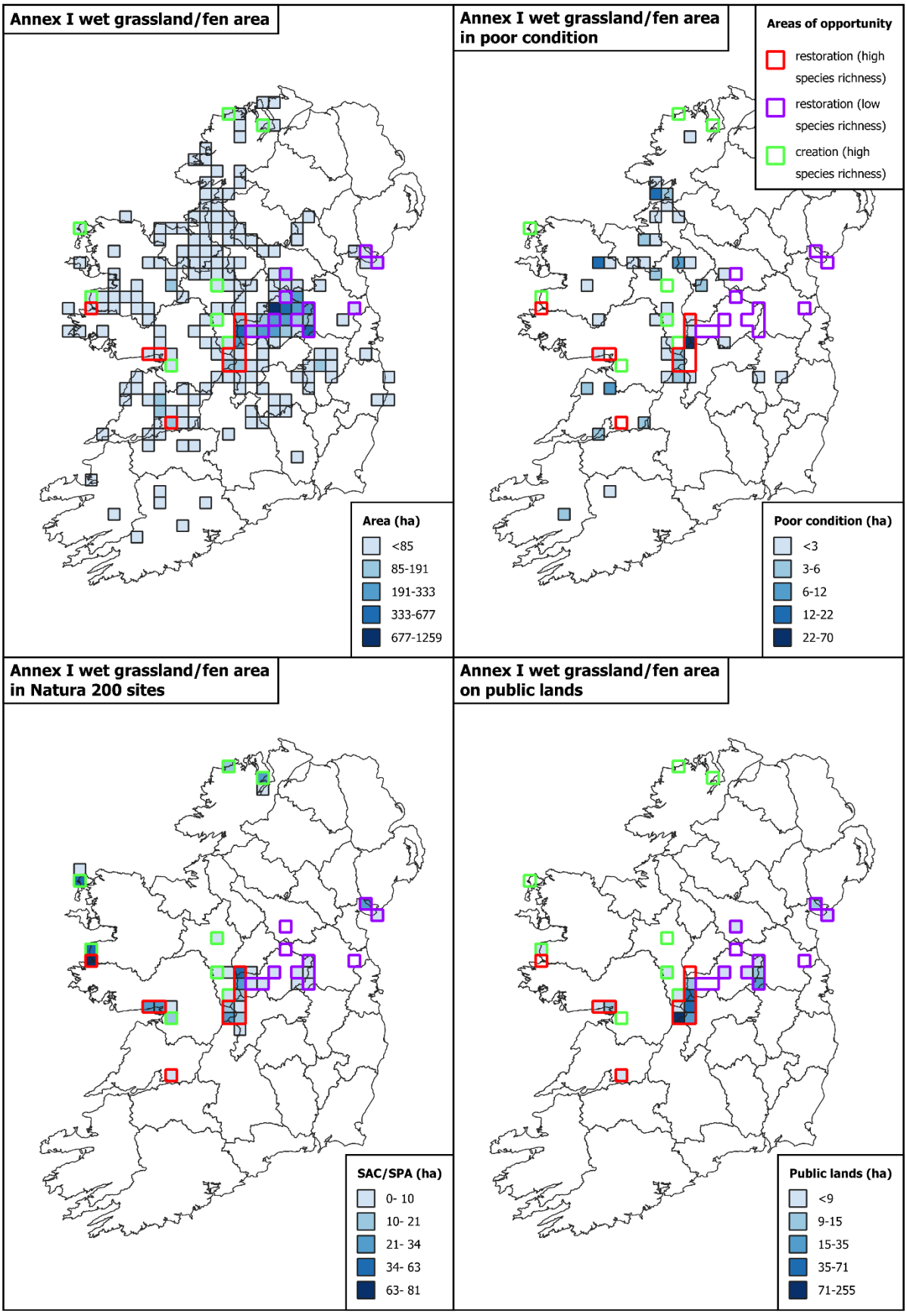
Map 4.1. Areas of opportunity for estuarine / intertidal associated focal species in relation to the availability of land that is potentially suitable for managed realignment.



Map 4.2. Areas of opportunity for lake-associated focal species in relation to lake area and condition and the extent of Natura 2000 sites and public lands within these sites.



Map 4.3. Areas of opportunity for moorland-associated focal species in relation to moorland area and condition and the extent of Natura 2000 sites and public lands within these sites.



Map 4.4. Areas of opportunity for wet grassland / fen associated focal species in relation to wet grassland / fen area and condition and the extent of Natura 2000 sites and public lands within these sites.

5. Areas of opportunity for restoring farmland habitats

5.1. Methodology

The areas of opportunity for restoring farmland habitats were identified from the datasets of hectad species richness of restricted distribution species and hectad abundances of widespread species (Widespread Farmland Species Index). The hectad species richness of farmland-associated wintering waterbirds was not used for identifying areas of opportunity, because its distribution pattern was strongly dominated by the influence of large coastal wetlands.

First, the two parameters were rescaled to scales of 0:100 and combined to produce a single index value. Three index values were created using 25/75, 50/50 and 75/25 weightings for the contributions of the restricted distribution species and the Widespread Farmland Species Index.

The distributional properties of the resulting indices were assessed using skewness statistics calculated with the skewness() function in the e1071 package (Meyer *et al.* 2024) in R (R Core Team 2024). Skewness was evaluated for indices constructed using three alternative weightings of abundance data from widespread species and distribution data from restricted-distribution species (25:75, 50:50 and 75:25 ratios of widespread:restricted).

Areas of opportunity were then identified for each weighting by selecting the hectads that had Farmland Focal Species Index values exceeding the 90th percentile of the distribution of these values.

5.2. Farmland areas of opportunity

Skewness is a measure of how asymmetric a distribution is, indicating whether values are evenly spread or dominated by many low values and a small number of high values. The hectad distributions of the index values showed low to moderate positive skewness (0.17, 0.23 and 0.66). Skewness increased systematically with increasing weight given to restricted-distribution species, reflecting the greater spatial clustering and prevalence of low values associated with these species (Figure 5.1).

The distribution of the areas of opportunity is shown in Map 5.1. The distribution of the areas of opportunity shifted with the weightings used for the relative contributions of the breeding season abundance of farmland generalists and hectad species richness (Map 5.1). When the Farmland Focal Species Index was dominated by the widespread species, the areas of opportunity were mainly in the south and east of Ireland. As the contribution of the restricted distribution species increased, the areas of opportunity shifted to the north and west.

We suggest that when focusing on restoration measures, areas for inclusion should be targeted at those hectads identified in the 50/50 and 75/25 weightings. This will help focus efforts on the more restricted distribution species (including Hen Harrier, Barn Owl, Chough, Curlew), while also including areas important for the more widespread red-listed farmland birds, including as Kestrel, Stock Dove and Yellow hammer).

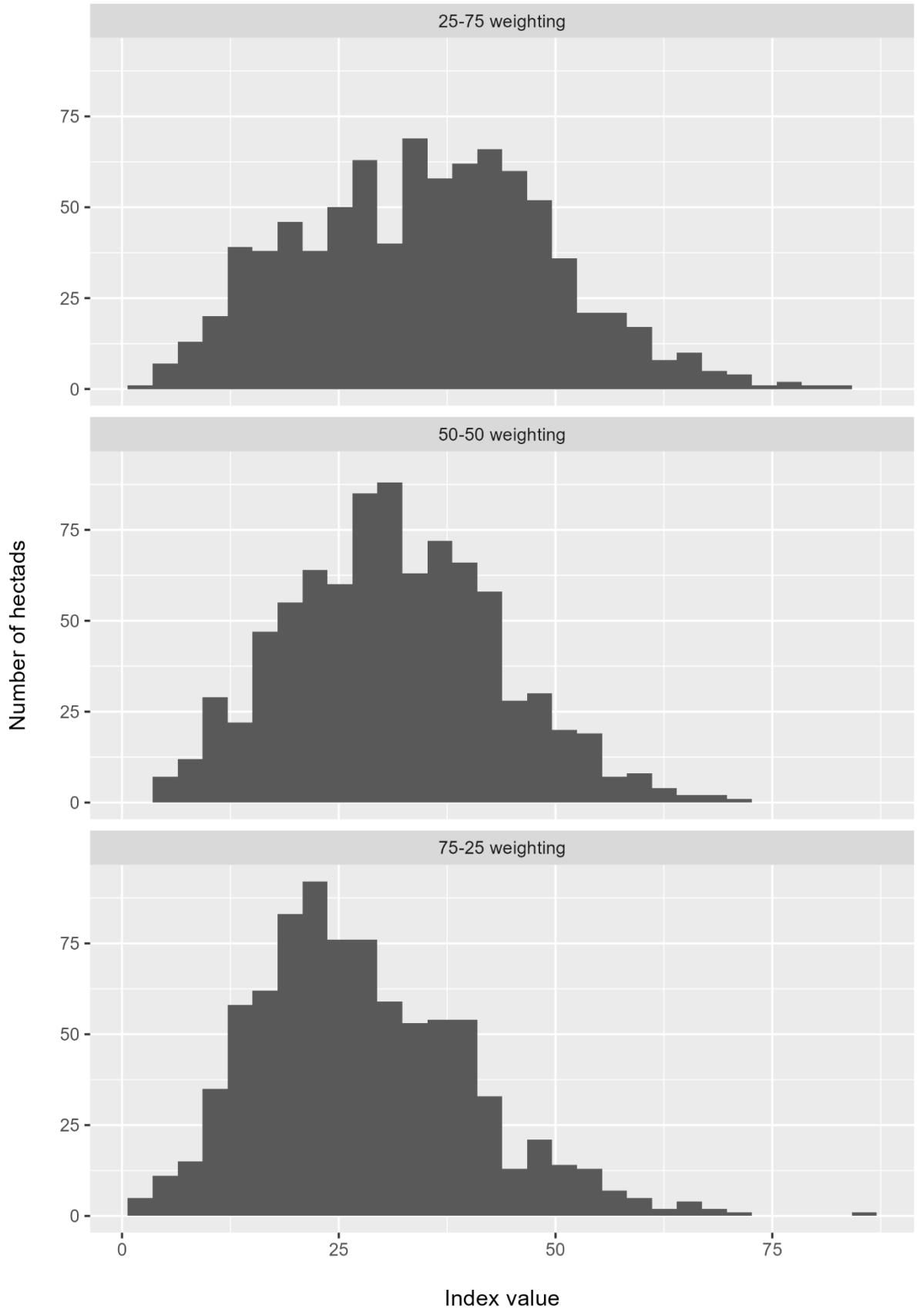
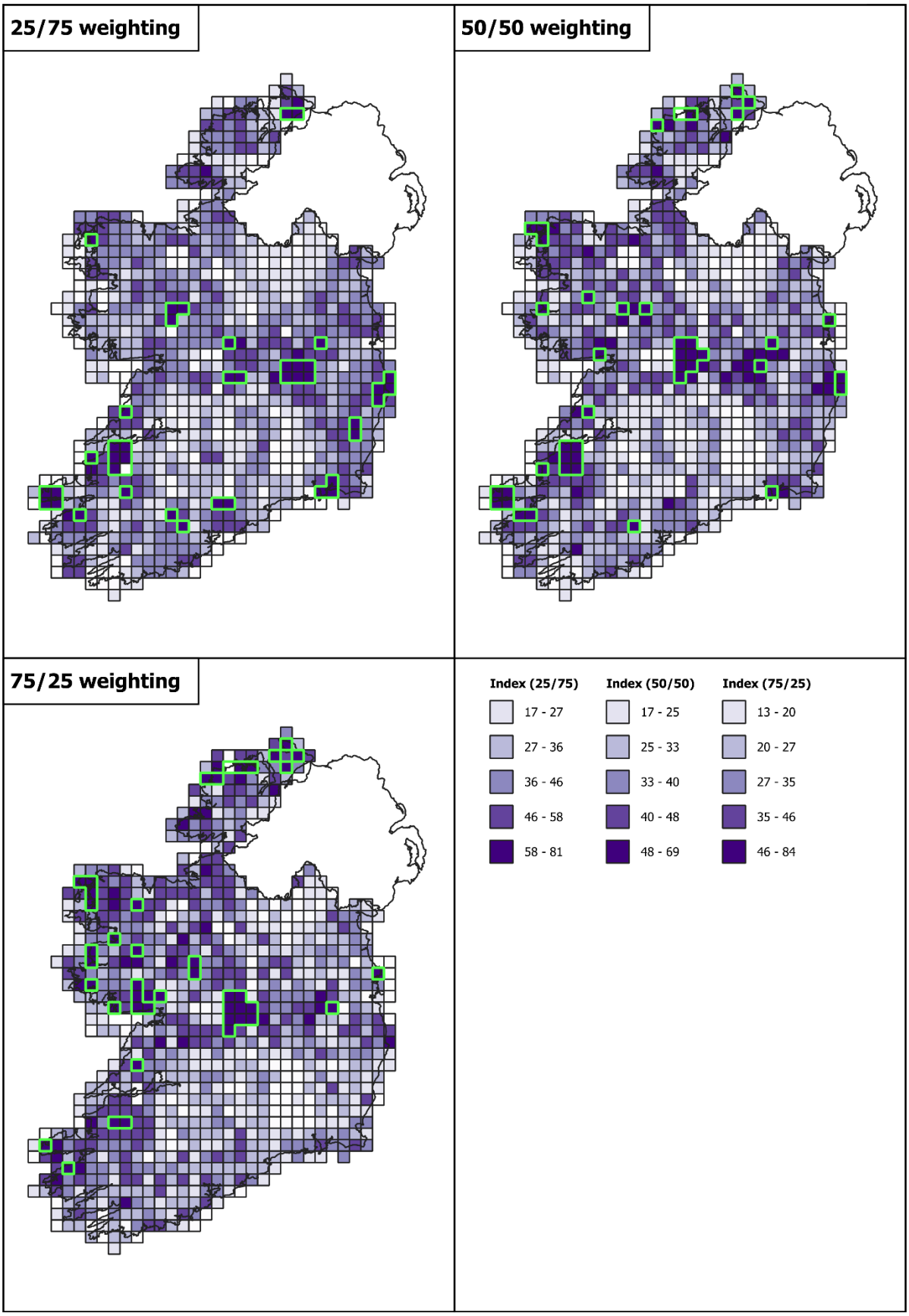


Figure 5.1. Distribution of Farmland Focal Species Index values by hectads categorised by the relative weightings used for the contributions of the abundance of widespread species and the species richness of restricted distribution species to the index.



Map 5.1. Areas of opportunity for farmland-associated focal species in relation to the distribution of the Farmland Focal Species Index, categorised by the relative contributions of abundance of widespread species and the species richness of restricted distribution species to the index.

6. Seabirds

6.1. Introduction

6.1.1. Scope

This section focuses on how the Nature Restoration Regulation can address the requirements of breeding seabirds in Ireland. It identifies areas of opportunity where initial restoration measures should be targeted to benefit hotspots of target species with a particular focus on existing Special Protection Areas (SPAs). It also provides outline restoration measures, reviews knowledge gaps relevant to these restoration measures and provides recommendations for future work.

6.1.2. Background and rationale

Ireland's marine environment plays host to a huge diversity of avian life year-round. In summer, our mainland coastline and offshore islands host seabird breeding colonies, many of which are of international importance or regional significance. However, 23 of 24 breeding seabirds in Ireland are either red- or amber-listed Birds of Conservation Concern (Gilbert *et al.* 2021). Trends in population and range for some species show concerning declines (Burnell *et al.* 2023). They are highly vulnerable, facing current pressures and future threats, from a variety of ecological and anthropogenic sources including predation, recreational disturbance, commercial fishing, renewable energy development, climate change (Cummins *et al.* 2019) as well as disease (Burke *et al.* 2024). Seabirds, as apex marine feeders, are exposed to all threats affecting the ocean and are excellent biodiversity indicators, providing us with an insight into the health of, and pressures facing, our marine environment (Lescroel *et al.* 2016). Though the direct links between seabirds and specific marine habitats are poorly understood, protection of habitats in marine seabird 'hotspots' as well as conservation efforts at seabird colonies will ensure the restoration of this key aspect of Ireland's nature.

The restoration of seabird habitats, both at terrestrial and coastal locations (Article 4) and in the marine (Article 5) are therefore part of the broad and ambitious scope of this legislation. Achieving the targets set out in the Nature Restoration Regulation will require ambitious national planning, adequate funding, close cooperation with landowners and sea-users and strong scientific guidance, but they provide an unprecedented opportunity to rebuild ecosystems capable of sustaining the country's most threatened bird species.

6.2. Species review

6.2.1. Identification of focal seabird species

Objective

The main objective behind the identification of focal species was to select seabird species that are rare / threatened in Ireland due to factors related to the availability and condition of Irish habitats. These are the species that would potentially benefit the most from habitat restoration and creation under the Nature Restoration Regulation.

This objective was based on Article 4.7 of the Nature Restoration Regulation. This frames the function of habitat restoration as to create a "sufficient quality and quantity" of habitat to allow species to sustain themselves long-term. This implies that restoration measures should be focused on species that are rare / threatened in Ireland due to factors related to the availability and condition of Irish habitats. Species that are not rare / threatened in Ireland are likely to already have a "sufficient quality and quantity" of habitat to meet their ecological requirements.

Methodology

The methodology used to select focal seabird species was based on that used for the main species review (Section 3.1.2), with some adjustments to better account for the status and needs of seabird populations. Seabird species were initially categorised according to their population status, based on the most recent national (ROI) breeding population assessments from Burnell *et al.* (2023). Only those species listed as being of high or medium conservation concern (i.e. red- or amber-listed) in the most recent 'Birds of Conservation Concern in Ireland' assessment (Gilbert *et al.* 2021) were considered. The status categories used are listed in Table 6.1, and include one new category (S8) in addition to the seven considered in Section 3.1.2.

Table 6.1. Status criteria used to identify candidate focal seabird species.

Code	Criteria
S1	rare/threatened due to Irish-specific issues
S2	rare/threatened but not clear if this is due to Irish-specific issues
S3	rare/threatened due to non-Irish issues
S4	not rare or threatened
S5	occasional breeding species
S6	passage migrant
S7	small peripheral population
S8	internationally important numbers in Ireland

For S1, in general species were considered threatened if the species was declining in Ireland as recorded in Seabirds Count and/or their breeding population or range declines were greater than 50% during the time periods considered in BOCCI. (1998-2018 or since 1980). Exceptions to these criteria were made for two species (see below).

Category S8 is for species with internationally important numbers in Ireland. The population trend of these species may not necessarily be in decline but given the relative importance of Ireland to their broader flyway population there is an onus on us to safeguard their numbers.

Note that category S7 here (Table 6.2) refers to 'small peripheral population' rather than specifically wintering population, as used for the assessment of other species groups.

Each of Ireland's Seabird species is categorised in Table 6.2. Those species falling under categories S1 and S8 are deemed the most likely to benefit from habitat conservation actions as required under the Nature Restoration Regulation and the reasons for their inclusion are outlined further below.

Table 6.2. Status of seabird populations in the Republic of Ireland.

Species	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**
Fulmar				Yes					
Manx Shearwater				Yes				Yes	
European Storm Petrel				Yes				Yes	
Leach's Storm Petrel			Yes	Yes					
Gannet				Yes					
Cormorant				Yes					
Shag				Yes					
Great Skua				Yes					
Mediterranean Gull							Yes		Yes
Black-headed Gull	Yes								Yes
Common Gull				Yes					
Lesser Black-backed Gull				Yes					
European Herring Gull				Yes					
Great Black-backed Gull				Yes					
Kittiwake	Yes								
Sandwich Tern	Yes								Yes
Roseate Tern	Yes							Yes	Yes
Common Tern	Yes								Yes
Arctic Tern	Yes								Yes
Little Tern	Yes								Yes
Common Guillemot				Yes					
Razorbill				Yes					
Black Guillemot				Yes					
Puffin	Yes								
Little Gull						Yes			
Black Tern						Yes			
Cory's Shearwater						Yes			
Balearic Shearwater						Yes			

S1 – Rare/threatened due to Irish-specific issues (8 species)

Kittiwake, Sandwich Tern, Roseate Tern, Common Tern, Arctic Tern, Little Tern, Puffin and Black-headed Gull.

Though each of the tern species have showed stable or increasing trends in recent years, these have been largely due to significant long-term conservation efforts at a small number of sites. Given that

these species are heavily dependent on these efforts continuing, they are considered 'threatened' for the purposes of this analysis. This means that both Sandwich Tern and Arctic Tern were also included in this category, in addition to Roseate, Common and Little Terns which also met other criteria within this category.

S8 – Internationally important numbers in Ireland (3 species)

Manx Shearwater, European Storm Petrel, Roseate Tern (also qualifies under S1 due to loss of breeding range).

>85% of the north-west European population of Roseate Terns nest in ROI, at two sites in Dublin and Wexford, where they are completely dependent on conservation efforts during the breeding season (ongoing since mid/late 1980's).

13.5% of the international population of Manx Shearwater nest in ROI, the vast majority of which breed at a small cluster of sites in Kerry. The recent population assessment shows a significant increase in the national population but differences in survey methodology between 'Seabird 2000' and 'Seabirds Count' complicate comparisons.

23% of the international population of European Storm Petrels nest in ROI, the majority of which breed at a small cluster of sites in Kerry, though with some other significant sites on the west coast. The recent population assessment suggests a modest increase, but confidence is hampered by differing survey methods over time and logistical difficulties in censusing this species.

6.2.2. Results

The final list of focal seabird species therefore includes five tern species, two gulls and three burrow-nesting species.

1) Manx Shearwater
2) European Storm Petrel
3) Black-headed Gull
4) Kittiwake
5) Sandwich Tern
6) Roseate Tern
7) Common Tern
8) Arctic Tern
9) Little Tern
10) Puffin

6.3. Opportunities for restoration of focal seabird species

The Nature Restoration Regulation requires the restoration of seabird populations (Articles 4.7 and 5). For seabirds this will require conservation efforts to improve habitat suitability both at coastal terrestrial breeding colonies (Article 4.7), but also habitats in the marine environment (Article 5). Both aspects are crucial to the survival and reproductive success of seabird species. The regulation also puts an emphasis on restoration efforts to be targeted within the Natura 2000 network, at least initially. Article 5 also lists specific marine habitats which should receive focus. Here we outline initial steps which should be taken to restore the populations of those focal seabird species listed in Section 3, considering existing data, knowledge gaps and the obligations on Ireland to 2030.

6.3.1. SPA designation

According to the regulation, "…Member States should, as appropriate, until 2030, give priority to areas of habitat types that are not in good condition and that are located in Natura 2000 sites when putting in place restoration measures, given the essential role of those sites for nature conservation…".

In Table 6.4, particularly important SPAs for seabirds are identified. These SPAs require proactive measures and more resources to ensure that the seabird populations at these sites are adequately protected and restored and/or do not deteriorate.

6.3.2. IBAs for seabirds and expanding the SPA network for seabirds

In 2025, BirdWatch Ireland and BirdLife International identified 75 Important Bird and Biodiversity Areas (IBAs) for seabirds in Ireland. These were identified after collating and analysing the best available science and data on the ecology, distribution and movement of seabirds in Ireland. The resulting distributions were analysed against BirdLife International's standardised IBA criteria, which have been recognised by the European Court of Justice due to their identification based on robust and internationally recognised scientific criteria. Given that Special Protection Areas (SPAs) must be designated by Member States to cover the most suitable land and sea areas used by Annex I bird species using scientifically based ornithological criteria, IBAs have been used as an important reference for the designation of SPAs, to assess whether Member States have classified a sufficient number and size of territories as SPAs.

A recent IBA analysis of Irish seabird colonies and marine waters within the Irish EEZ identified 75 sites that support seabird populations meeting IBA criteria, comprising 51 colonies (terrestrial IBAs) and 24 marine areas (marine IBAs). There is now an urgent need to update Ireland's SPA network in light of the IBA analysis, to ensure all terrestrial and marine IBAs are protected and managed for their respective seabird species. This will mean expanding some existing SPAs, adding some species to the qualifying interests for SPAs and setting appropriate conservation objectives, and in some cases (particularly in the marine) it will require establishing new SPAs (Table 6.3).

Table 6.3. Summary table of the IBAs for seabirds in Ireland, outlining which marine and colony IBAs need SPA designation and which IBAs have corresponding SPAs that need additional QI species in order to protect and conserve seabird populations sufficiently. For purposes of the Nature Restoration Regulation, the table also highlights which IBAs have seabird focal species (as listed in Section 6.2.2) as the species that triggered the IBA designation.

IBA type	Total IBAs	IBAs with NRR focal species
Marine IBAs that need SPA designation	18	15
Marine IBAs with corresponding SPAs that need additional QI species to appropriately protect all IBA triggering species	4	1
Colony IBAs that need SPA designation	9	7
Colony IBAs with corresponding SPAs that need additional QI species to appropriately protect all IBA triggering species	19	15

Ensuring Ireland's SPA network, and thus our Natura 2000 network, is up to date and covers our seabird populations sufficiently is an important precursor to the work that has to be done under the Nature Restoration Regulation, as well as the Birds Directive.

Offering these key sites formal legal protection would be passive restoration, assuming a suitable management plan is outlined and sufficient restrictions on activities are put in place.

6.3.3. Conservation of marine habitats under Article 5

Article 5 identifies seven groups of marine habitats as priorities for restoration. These are 1) seagrass beds, 2) macroalgal forests, 3) shellfish beds, 4) maerl beds, 5) sponge, coral and coralligenous beds, 6) vents and seeps, and 7) soft sediments (not deeper than 1,000 m deep). The links between these habitats and Ireland's seabirds are not well understood. Regardless, it can be expected that the restoration and re-establishment of these habitats will have a positive 'bottom-up' effect on seabird populations in the long-term, through the benefits accrued by invertebrates and fish species at lower trophic levels.

It may be beneficial to examine the distribution of these seven habitat groups and those marine species referred to in Article 5(5) against the recently identified seabird IBAs, to best target areas for restoration and maximise the benefits across taxa. Of the 24 marine IBAs, 22 have triggering species that are listed as NRR focal species as outlined in Section 6.2.2. and would be ideal target areas for restoration (Appendix 3).

6.3.4. Priority seabird colonies to 2030

With a view to prioritising Natura 2000 sites for restoration efforts to 2030, we reviewed those SPAs which have our focal seabird species as qualifying interests and identified locations where declines have occurred. In most cases these declines occurred between census periods for Seabirds Count (2015-2021; Burnell *et al*. 2023) and Seabird 2000 (1998-2002; Mitchell *et al.* 2004). Where data for one of these censuses was lacking, we selected sites based on declines from surveys detailed in SPA site conservation objectives documents or census data from the 1980's ('Seabird Colony Register'; Lloyd *et al.* 1991).

In addition, we included as a priority those sites that are already subject to long-term conservation projects for the focal species (e.g. Rockabill in Dublin, The Murrough in Wicklow), and it is important that these be continued. These projects not only benefit breeding numbers at the site but also act as sources for existing colonies that may not be self-sufficient, as well as providing additional birds that

may colonise other sites if habitat is made suitable. At some sites the pressures acting on the nesting seabirds, thereby rendering the habitat as sub-optimal, are well known. Elsewhere, recent pressures are not documented though likely fall into relatively few categories including predation and changes to vegetation inhibiting seabirds from nesting.

Initial conservation efforts will reap the highest rewards in terms of the number of birds protected and the number of chicks produced at those colonies with the highest numbers of the respective focal species, thereby having the greatest short-term impact on the Irish population as a whole. The increase in the number of chicks that fledge from these sites will also increase the chances of colonisation of new or restored seabird colony sites in later stages of action under the Nature Restoration Regulation, as well as helping to bolster existing colonies through natal dispersal. Smaller sites should not be excluded or forgotten, however. As an example, the Little Tern colony at Portrane in north Dublin has gone from 5 pairs in 2020 to nearly 50 pairs in 2025 as a result of conservation efforts, making it the 4th most important site for Little Terns in Ireland in a very short space of time. There is, therefore, potential to make valuable gains quickly even starting with small numbers, depending on the species and scale of the pressures they face.

Those seabird colony sites we consider a priority for seabird population restoration to 2030 are listed in Table 6.4.

Active ongoing conservation efforts are in place at a small number of SPAs important for seabirds. These include:

- Lady's Island Lake SPA (#004009). Long-term conservation efforts at this site have seen a steady increase in Roseate Tern numbers and sustained the populations of Sandwich and Common Terns, although there have been recent concerning declines in Arctic Terns. There has also been a gradual overall increase in the numbers of Black-headed Gulls and Mediterranean Gulls.
- Lough Swilly SPA (#004075). Conservation efforts here have seen an increase in Black-headed *Gulls* and Sandwich Terns.
- At Rockabill SPA (#004014), the Roseate and Common Tern population increases are completely due to long-term conservation efforts, though Arctic Terns have declined.
- At Kilcoole SPA, the increase in Little Tern populations is completely due to conservation efforts and significant increases have followed since Seabirds Count at other east coast conservation project sites.
- Conservation efforts at Lough Ree SPA (#004064) have resulted in increases in Common Terns and Black-headed Gulls (though the latter is not a QI species).
- Although Black-headed Gull is not a QI, at Lough Carra SPA (#004051) conservation efforts here have seen an increase in this species.

Were these conservation projects to cease, there would be a significant impact on the national populations in a relatively short period. These colonies and conservation projects are also likely to be benefitting colonies elsewhere, as their high and consistent levels of productivity lead to natal dispersal to sites that may not be self-sustaining. Furthermore, the Nature Restoration Regulation provides an opportunity to expand the breeding range of these species and help improve the viability of the population into the future.

Table 6.4. Priority sites for restoration of seabird populations to 2030. Note that figures are provided in one of the standard measuring units for that species and are generally consistent at sites over time (e.g. AONs used for Kittiwakes).

SPA Name	SPA Code	Area (ha)	Focal Species	QI Species for SPA	Seabird 2000	Seabirds Count	% Change
Blasket Islands SPA	#004008	3620	Arctic Tern	Yes	No Data	No Data	0 [1]
Blasket Islands SPA	#004008		European Storm Petrel	yes	34141	20512	-39
Boyne Estuary SPA	#004080	593	Little Tern	Yes	14	3	-79
Clare Island SPA	#004136	1006	Kittiwake	yes	1785	840	-53
Cliffs of Moher SPA	#004005	874	Atlantic Puffin	Yes	1635	195	-88
Cliffs of Moher SPA	#004005		Kittiwake	yes	7698	3981	-48
Cork Harbour SPA	#004030	2677	Common Tern	yes	11	220	1900
Cruagh Island SPA	#004170	292	Manx Shearwater	yes	3286	3285	-0.3
Dalkey Islands SPA	#004172	83	Arctic Tern	Yes	8	2	-75
Deenish & Scariff Island SPA	#004175	845	Arctic Tern	Yes	54	0	-100
Horn Head to Fanad Head SPA	#004194	2385	Kittiwake	yes	3853	1820	-57
Howth Head Coast SPA	#004113	208	Kittiwake	yes	1906	1773	-7
Illancrone & Inishkeeragh SPA	#004132	419	Arctic Tern	Yes	224	No Data	[2]
Illanmaster SPA	#004074	165	Atlantic Puffin	no	1367	250	-81
Illanmaster SPA	#004074		European Storm Petrel	yes	No Data	2400	[3]
Inishbofin, Inishdooey & Inishbeg SPA	#004083	601	Arctic Tern	Yes	72	10	-86
Inishbofin, Inishdooey and Inishbeg SPA ; High Island, Inishshark and Davillaun SPA	#004083 ; #004144		Kittiwake	no	230	43	-81
Inishkea Islands SPA	#004004	1330	Arctic Tern	Yes	182	150	-18
Inishkea Islands SPA	#004004		Little Tern	Yes	27	16	-41
Inishmore SPA	#004152	1918	Little Tern	Yes	13	9	-31
Inishmurray SPA	#004068	235	Arctic Tern	Yes	113	0	100

SPA Name	SPA Code	Area (ha)	Focal Species	QI Species for SPA	Seabird 2000	Seabirds Count	% Change
Inner Galway Bay SPA	#004031	13262	Common Tern	yes	46	124	169
Ireland's Eye SPA	#004117	214	Kittiwake	yes	941	455	-51
Iveragh Peninsula SPA	#004154	3487	Kittiwake	yes	1150	No Data	[4]
Lady's Island Lake SPA	#004009	479	Arctic Tern	Yes	235	844	259
Lady's Island Lake SPA	#004009		Common Tern	yes	No Data	1012	+
Lady's Island Lake SPA	#004009		Roseate Tern	Yes	116	227	96
Lady's Island Lake SPA	#004009		Sandwich tern	yes	1048	1799	71
Lambay Island SPA	#004069	599	Manx Shearwater	no	25	>30	20 [7]
Lambay Island SPA	#004069		Atlantic Puffin	Yes	289	144	-50
Lambay Island SPA	#004069		Kittiwake	yes	4091	3320	-18
Lough Corrib SPA	#004042	18624	Arctic Tern	Yes	61	10	-84
Lough Derg (Shannon) SPA	#004058	12710	Common Tern	yes	No Data	17	[1]
Lough Swilly SPA	#004075	8560	Common Tern	yes	89	57	-35
Lough Swilly SPA	#004075		Sandwich tern	yes	258	400	55
Magharee Islands SPA	#004125	417	Arctic Tern	Yes	232	58	-75
Magharee Islands SPA	#004125		Common Tern	yes	No Data	33	[5]
Magharee Islands SPA	#004125		European Storm Petrel	yes	27297	923	-96
Magharee Islands SPA	#004125		Little Tern	Yes	20	6	-70
Old Head of Kinsale SPA	#004021	54	Kittiwake	yes	1188	711	-40
Puffin Island SPA	#004003	349	Atlantic Puffin	Yes	5125	2250	-56
Puffin Island SPA	#004003		European Storm Petrel	yes	5177	5175	-0.3
Puffin Island SPA	#004003		Manx Shearwater	yes	6329	3381	-46
Rockabill SPA	#004014	5227	Arctic Tern	Yes	89	60	-33

SPA Name	SPA Code	Area (ha)	Focal Species	QI Species for SPA	Seabird 2000	Seabirds Count	% Change
Rockabill SPA	#004014		Common Tern	yes	610	2029	232
Rockabill SPA	#004014		Kittiwake	no	111	165	49
Rockabill SPA	#004014		Roseate Tern	Yes	618	1642	166
Saltee Islands SPA	#004002	871	Atlantic Puffin	Yes	1822	819	-55
Saltee Islands SPA	#004002		Kittiwake	yes	2125	1038	-51
Skelligs SPA	#004007	624	European Storm Petrel	yes	9994	7657	-23
Skelligs SPA	#004007		Manx Shearwater	yes	738	573	-22
Slyne Head to Ardmore Point Islands	#004159	3400	Arctic Tern	Yes	582	229	-61
South Dublin Bay and River Tolka Estuary SPA	#004024	2193	Common Tern	yes	172 [6]	204 [6]	19
Stags of Broad Haven SPA	#004072	136	Atlantic Puffin	No	1160	750	-35
Stags of Broad Haven SPA	#004072		European Storm Petrel	yes	1912	503	-73
The Murrough SPA	#004186	941	Little Tern	Yes	40	143	258

[1] SPA Conservation Objectives document suggest loss of this colony in recent years.

[2] SPA Conservation Objectives document suggests decline in this colony in recent years (60 pairs in 2023).

[3] Historically held up to 10,000 pairs.

[4] SPA Conservation Objectives document suggests further decline.

[5] Seabirds Count total represents a significant decline from 128-136 pairs in 2007 (O'Clery 2007).

[6] Numbers refer to Common Terns breeding on the ESB platform only, and not the other structures that host tern colonies in Dublin Port which are not designated as SPAs. Totals presented are from the year 2000 and 2020, though numbers have declined there since.

[7] Lambay Island had around 100 pairs of Manx Shearwater in the 1970's and the population has long been constrained by rat predation.

Table 6.5. Priority colony IBA sites for restoration of seabird populations to 2030 that are not covered by the current SPA network.

IBA Name	Focal Species	Seabird 2000	Seabirds Count	Units	% Change
Kid Island (Mayo)	Kittiwake	294	151		-49
Bills Rocks (Mayo)	Kittiwake	105	43		-59
Bills Rocks (Mayo)	Atlantic Puffin	1500	150	AOB	-90
Dunmore East	Kittiwake	913	401	AON	-56

6.4. Restoring habitats for focal seabird species

A lack of good quality breeding habitat is a limiting factor for many seabird populations, with many of the focal species reliant on a very small number of suitable breeding sites which leaves them vulnerable to threats such as changes to food availability and disease. Elsewhere, predation, disturbance and habitat loss through development and changes in vegetation have limited breeding space and breeding success at seabird colonies. Given that seabirds are long-lived, the effects of low breeding success may not be evident in the size of the breeding population for many years. Here we outline some of the measures which could be taken to restore seabird breeding colony habitats to sufficient quality to increase breeding success, which should lead to population recovery and robustness. While the factors negatively impacting seabirds are well known at a few key sites (e.g. rodent predation on Lambay Island), others will need rapid assessment so that conservation actions can be set out. In many cases, the actions recommended below will provide similar to benefits to the entire seabird community at a site, both for focal species and non-focal species. Similarly, benefits will be seen beyond a single colony as successful breeding results in more birds breeding in later years, some of which will disperse to neighbouring colonies and further afield around the Irish coast.

6.4.1. Predation by invasive alien species and problematic native species

One of the most immediate pressures impacting nesting seabirds is predation of eggs and chicks at the nest. Brown Rat and American Mink are two of the most common and problematic nest predators and conservation projects elsewhere have recorded improved breeding success, increases in population size and recolonisation by seabirds where such predators have been removed. Eradication projects for rats, Mink, Ferrets and similar predators have been carried out in recent years on offshore islands such as Great Saltee (Co. Wexford) and Rathlin Island & Isle of Muck (Antrim) amongst others. These should be replicated at other important colony sites such as Lambay Island (Dublin), where Rats are well established and known to be limiting seabird populations, and other islands on the west coast.

As well as invasive non-native species, many ground nesting seabirds such as terns and gulls suffer significant losses to native predator species too, such as Red Fox, Hooded Crow, Magpie, Rook, Badger, *Larus* gulls and others. In these instances, ongoing predator control efforts and exclusion infrastructure (i.e. fences) will be necessary and these actions have proved to be effective at sites like the Kilcoole Little Tern colony in Wicklow, where the increased predator control efforts since the early/mid-2000's has helped ensure high productivity in most years, and fuelled unprecedented population growth at Kilcoole and other sites on the east coast . Regular wardening, as carried out at sites such as the Rockabill Tern colony (Dublin), Kilcoole Little Tern colony (Wicklow) and the Tern and Gull colony at Lady's Island Lake (Wexford) will also have an important part to play at certain colonies, to deter and monitor predators.

6.4.2. Disturbance

Disturbance of breeding seabirds at their nesting colony is a well-documented cause of low breeding success in seabirds. Disturbance at the colony often results in adult birds coming off the nest, increasing the risk of eggs chilling, chicks dying through exposure, eggs get cracked or rolling away, chicks wandering and getting lost or attacked, and can stop parents from feeding their chicks. Furthermore, it creates opportunities for predators to depredate eggs and chicks. Even in cases where adult birds remain on the nest, disturbance can be a cause of significant metabolic stress (e.g. Ellenberg *et al.* 2006). Depending on the habitat, disturbance can also be associated with underground burrows being crushed by visitors. The solutions to disturbance may involve closing off seabird nesting

areas to public access or enforcing setback distances in combination with wardening to ensure compliance (Allbrook and Quinn 2020). These approaches have been used to good effect in Ireland at seabird colonies such as Kilcoole Beach (Little Terns), Ireland's Eye (Cliff-nesting species, Puffins, Gulls) and Great Saltee (Cliff-nesters, Gulls, Puffins, Manx Shearwaters).

As well as human disturbance to nesting seabirds in colonies on beaches, islands and cliffs, disturbance of seabirds on the water can also put them under pressure by increasing energy expenditure or inhibiting feeding opportunities (e.g. Velando and Munilla 2011), which may in turn impact breeding success or adult survival. Boat traffic from recreational craft, offshore developments (e.g. windfarms), transport and trade and fishing can disrupt seabird rafting close to colonies.

Enforcing setback distances in key feeding and roosting locations, particularly those in the immediate vicinity of colonies, can minimise the impact of such disturbance (e.g. Chatwin *et al.* 2013). Limiting the number of boats in key feeding areas is also recommended, where possible (Velando and Munilla 2011). Some species are more sensitive to disturbance than others, and management efforts to provide disturbance-free habitat will need to consider this.

6.4.3. Vegetation management

At some key seabird colony sites, suitable breeding habitat has been lost or reduced due to changes in vegetation. This can be due to overgrazing, particularly by species such as sheep, and this has been at least partly implicated in the recent loss of nesting Arctic Terns from the Blasket Islands SPA (NPWS 2025). In other cases, excessive vegetation growth may exclude species with a preference for open nesting areas (e.g. Tree Mallow excluding Common Terns on Rockabill). It can also inhibit access to burrows for Puffins, Shearwaters and Petrels. The spread of invasive Tree Mallow at Craigletih in Scotland caused a decline in breeding Puffins from over 5,000 pairs to a few hundred (Anderson 2025). Lamb (2015) outlined three categories of vegetation management in relation to breeding tern colonies, namely: 1) vegetation control during the period of plant growth; 2) vegetation control prior to the period of plant growth, and 3) habitat construction (covering existing soil and vegetation with new substrate to prevent regrowth). Mechanical removal of existing vegetation, or changes to increase or reduce grazing pressure, will therefore be important habitat restoration techniques for many of the focal seabird species considered here.

6.4.4. Potential measures for marine IBAs

In addition to removing or minimising potentially disturbing activities in key seabird areas at sea (i.e. marine IBAs), it will be important to restore the quality and extent of those benthic habitats that underpin them. Cessation of damaging fishing activities such as trawling would likely provide rapid benefits. These key areas should also be avoided for any future development. The precise reasons that seabirds are drawn to these key areas, and any associations with specific habitat types, will require further research, before restoration of underlying habitats can be achieved.

6.4.5. Creation and maintenance of artificial habitat

In some instances, it may be necessary to replicate suitable nesting habitat in alternative locations, either because restoration of existing habitat is not feasible or to 'future-proof' nesting habitat. As an example, a small artificial nesting beach was created for Little Terns in fields at Cooldross (Wicklow) adjacent to the existing coastal Little Tern colony. This new beach provides nesting habitat that is less likely to flood with storm surges as has been seen on the main beach. This project has demonstrated that Little Terns will take to nesting on newly created beaches in this way, which may be an important option at Kilcoole and other sites given the potential for coastal erosion in the coming years. Similarly,

in Northern Ireland and England there are examples of new islands being created (from dredging spoil and similar materials) in freshwater lakes to provide better nesting habitat for other tern and gull species.

Artificial nesting structures are increasingly being used in tern conservation to quickly provide safe nesting habitat. Common Terns nest on artificial structures in Dublin Port, Cork Harbour, Lough Atalia and Lough Ree in the Republic of Ireland, and at many sites in the UK and further afield. Arctic Terns also nest on one of the concrete mooring dolphins in Dublin Bay. And while there are no examples of Little Terns nesting on floating platforms in Ireland or the UK, these have been deployed successfully in Portugal. The creation and deployment of these artificial nesting structures, be they floating pontoons or platforms, or adapted permanent structures such as mooring dolphins, should be considered a last resort at sites where the restoration of existing habitat is not possible or would be prohibitively difficult. These habitats should be designed to exclude terrestrial predators, and avian predators where possible. They can also provide an effective solution for colonies prone to flooding from high tides, storm surges or rising water levels in freshwater lakes.

Kittiwakes are also known to nest on artificial structures including bridges, commercial buildings and purpose-built Kittiwake 'towers' as well as offshore oil platforms (Delahay *et al.* 2025). Artificial nesting walls have also been created with success for European and Leach's Storm Petrels.

In addition to providing nesting habitat at sites where restoring safe nesting space is otherwise not feasible, providing artificial nesting habitat in suitable locations can help enhance connectivity between existing colonies and populations.

7. Urban birds

7.1. Introduction

This chapter considers opportunities for restoring and creating habitats to benefit focal urban bird species under the Nature Restoration Regulation. Although the structure of the assessment for urban birds differs from that used for Annex I habitats, farmland habitats and seabirds, this reflects the distinct policy framework and restoration mechanisms applicable in urban ecosystems, particularly under Article 8 of the Regulation. Accordingly, the chapter adopts a more targeted and illustrative approach, focusing on species-specific opportunities and practical measures within urban environments, rather than the spatially explicit, habitat-led analyses used elsewhere in the report.

Protecting wildlife populations in urban environments is a complex issue. Stresses include light, noise and air pollution, disturbance, and habitat fragmentation. Understanding the impact of these factors on local populations can be difficult. However, research indicates that one of the most effective ways to safeguard and increase biodiversity in urban centres is by increasing the area of habitat and providing corridors between habitat patches (Bierwagen 2007).

The Nature Restoration Law stipulates that by 2030, EU member states will ensure 'that there is no net loss in the total national area of urban green space and of urban tree canopy cover in urban ecosystem areas…'. This is a welcome first step in protecting urban ecosystems. In addition, from January 1st 2030, urban green space and tree canopy cover must show an increasing trend within EU member states.

While these measures are welcome, we would urge that urban spaces are greened appropriately, with consideration for the symbiotic relationships between species used to 'green' a space and the species already present, and/or being provided for. For instance, species such as laurel - while technically 'greening' a space - do not provide any real ecosystem benefits, while a native species such as hawthorn will provide shelter, nesting, and foraging habitat for a wide range of species. Careful consideration and selection of species to green a space is therefore required. In addition, older native trees, hedgerows or meadows will cater to a wider range of species which are already dependent on that existing ecosystem than new saplings or green fields put in their place.

Common Swift and Light-bellied Brent Goose have been selected as focal species for the urban environment in Ireland. Swifts have been put forward due to their dependence on urban environments for nesting and their status as a red-listed species of conservation concern in Ireland. Light-bellied Brent Goose have been selected as Ireland supports ~95% of the East Canadian High Arctic Population, and due to their dependency on playing pitches and amenity grasslands for foraging, and their subsequent vulnerability to human disturbance in highly urbanised environments. Any changes to habitat or circumstances in Ireland have the potential to affect an entire flyway population of a species.

Other species will benefit from measures put in place to protect Common Swift and Light-bellied Brent Goose. These include House Sparrow, an amber-listed, cavity-nesting species which benefits from Common Swift breeding habitat creation (Schaub, T *et al*. 2016), and those winter waders such as the red-listed Curlew, Oystercatcher, and Black-tailed Godwit, all of which utilise playing pitches and other sporting and amenity grasslands for foraging opportunities over the winter months (Lewis *et al*. 2020; Veenstra *et al*. 2026).

7.2. Nature Restoration Regulation

The regulation recognises urban ecosystems as essential for biodiversity and outlines legally binding obligations for member states within the EU. Urban areas make up approximately 22% of EU land. The regulation outlines many urban ecosystems, such as parks, gardens, hedges, treelines, meadows, ponds, and green roofs, as important green spaces for a variety of wildlife, including birds. These urban ecosystems serve as breeding grounds for birds and important roosting/foraging habitat for migratory waterbirds. They may also act as stepping stones, maintaining connectivity to surrounding habitats.

As part of the 'No net loss by 2030' mandate, EU member states must ensure no net loss of urban green space and urban tree canopy cover by 31 December 2030. Following on from this, from 1 January 2031, EU Member States must ensure that there is an increase in the national trend of urban green spaces and an increasing trend in tree canopy cover associated with urban ecosystems until satisfactory levels are achieved. Urban green spaces, green walls and green roofs are all metrics used to expand and enhance urban ecosystems.

7.3. Species review

7.3.1. Focal urban species

Selecting target species for prioritisation is the next step. These species may be selected based on several criteria such as Annex I status, Birds of Conservation Concern Ireland (BoCCI) status and local protection status. Common Swift and Light-bellied Brent Goose have been identified as species worthy of focus in urban ecosystems.

Swift

Swifts have undergone large-scale declines in Ireland and across much of Europe. In the Republic of Ireland, 76% of the Swift population was lost between 1998 and 2024 according to the Countryside Bird Survey, operated by BirdWatch Ireland on behalf of National Parks and Wildlife Service. As a result, the Swift is now on Ireland's endangered or Birds of Conservation Concern Red List. Swifts are an urban species which breed throughout Ireland, nesting in buildings. A loss of nesting habitat alongside factors associated with climate change including a reduction in insect populations, are assumed to be principal factors behind these declines (Rajchard *et al.* 2006; Whelan *et* al. 2019; Finch *et al*. 2023). Protection of existing nest sites and the provision of artificial nesting habitat through in-built nest bricks and externally mounted nest boxes on buildings are important to addressing these declines.

Light-bellied Brent Goose

Almost the entirety (~95%) of the East Canadian High Arctic Light-bellied Brent Goose population migrates to Ireland for the winter months. Along with disturbance, the primary threats to Light-bellied Brent Geese in Ireland are habitat loss and habitat degradation, particularly in urban environments where they rely on a variety of green spaces such as amenity and improved grasslands. Since the 1990's there has been an observed increase in their use of amenity grasslands in Dublin, which is where a large proportion of the winter population occurs. This switch to grass as the winter progresses is at least partly in response to a decrease in their preferred intertidal food sources, such as eelgrass. It is their extensive use of urban grasslands that warrants their inclusion as a focal urban species. Despite a long-term increasing population trend, the species is now classified as amber-listed according to BoCCI, indicating growing concern for its conservation status. With the seemingly increasing rate of conversion of sports pitches to astro-turf and development their foraging habitat is

continually being eroded and there is no overall coherent strategy for the protection of ex-situ sites for Brent Geese.

7.3.2. Non-focal urban species

Although Light-bellied Brent Geese and Swifts are identified as priority species in the urban environment, conservation efforts should extend beyond these species. However, it is noteworthy that focused conservation measures taken on their behalf would also support some other amber and red-listed species.

Winter waders

A focused conservation effort on Light-bellied Brent Goose through the retention and expansion of green spaces would have an additional benefit for a range of winter waders that also utilise these spaces. A host of red-listed species such as Oystercatchers, Black-tailed Godwit, Redshank and Curlew also spend much of the winter months foraging and roosting on urban green spaces, particularly during periods of poor weather or when high tide has restricted access to mudflats.

Cavity-nesters

Nesting habitat creation via the installation of Swift boxes and bricks in urban environments is currently the primary focus of Swift conservation in Ireland. Amber-listed species which are also likely to benefit from the installation of nest boxes include the House Sparrow, which readily uses Swift nest boxes and bricks, and the Starling, which requires bespoke nest boxes. (Whelan *et al*. 2019).

Overview of nature restoration for Swifts

In Ireland, several factors are considered to be driving the large-scale declines we are witnessing in Swifts. These are loss of breeding habitat, insect declines and factors associated with climate change. To best protect this species a multi-pronged conservation approach is required. The various elements of the required approach are listed below.

- Strengthened national legislation to ensure protection of existing nest sites.
- Introduction of legislation to provide built in Swift nest bricks in all suitable new builds.
- Installation of externally mounted Swift nest boxes on all suitable, existing public buildings.
- Dietary studies including diet composition, foraging range and pesticide/herbicide contaminant load to inform policy (including agriculture) at the landscape level.
- Research into climate associated factors impacting Swift conservation.

The latter two actions are discussed further in the ‘Knowledge Gaps’ section of this document.

Nature restoration through the retention of Swift nest sites

In Ireland, the legislation regarding the protection of nest sites outside the breeding season under the Wildlife Act 1976 (amended) is not in line with the strict protection for birds under Article 5 of the Birds Directive and established case law. This has significantly undermined conservation of cavity nesting species including the Swift. We propose that the relevant articles in the Wildlife Act are reviewed and brought in line with the EU Birds Directive and case law to ensure that existing cavity nest sites are protected. This is of particular concern for the Swift as it is a highly site-faithful species, and as such re-establishing colonies once lost due to loss of breeding habitat can be extremely difficult. Therefore, retaining nest sites in the first instance is of utmost importance and it is a legal obligation.

BirdWatch Ireland has been gathering Swift nest site data since 2015, which is provided to county/city councils and/or the Office of Public Works. If legislation in Ireland regarding nest site protection is strengthened, this nest site database would be an important tool to help ensure that nest sites are protected during renovation works, which if implemented could reduce Swift nest site loss.

The move towards more energy efficient and warmer homes is welcome. However, the nest sites of cavity nesting birds such as Swift, can be lost in many instances due to retrofitting. Funding to provide training and guidance to the staff of the Sustainable Energy Authority of Ireland, building industry and other stakeholders, on how to retain nest sites and build in Swift nest bricks, would make a significant impact on the rate of loss of cavity nesting species from buildings.

Compensation for Swift nest site loss is mandatory in several countries including Germany and Poland (Schaub *et al*. 2016). If retention of nest sites (which is always best practice in the first instance) is not possible and if the developer has sought a derogation under the law to remove the nest, we propose that it be required that adequate nest site compensation be made on site through the provision of nest bricks/boxes and calling systems, with guidance from expert ecologists.

Nature restoration through the installation of Swift nest bricks and boxes

In addition to loss of existing nesting habitat a lack of new, suitable breeding habitat is also a factor driving declines in Swifts. Energy efficient air-tight buildings typically do not have any spaces for cavity nesting species such as Swifts. Installing Swift bricks into all suitable, new buildings would resolve this issue and would align with the governments focus on restoration of habitats (breeding habitat) on public lands or buildings.

We propose that legislation is put in place to ensure that Swift bricks are included in all suitable, new builds. This is a cost-effective and straight-forward means of creating breeding habitat for a critically endangered species and has been introduced with great success in Gibraltar. The Netherlands and Scotland also introduced similar measures in 2024 and 2026, respectively. Swift bricks are referred to as the 'universal brick' as they have benefits for other species such as the amber-listed House Sparrow and also more common species such as the Blue Tit and Great Tit. Swift bricks rather than nest boxes are appropriate in this instance as they are built into the wall, making them permanent nesting spaces for Swifts. Examples include Skerries Library, Co. Dublin, Castlebar Leisure Centre, Co. Mayo, Portlaoise library, Co. Laois and the Crescent Arts Centre, Belfast, Co. Antrim.

Public Buildings

With the government focus on restoration of habitats on public lands, there is also a significant opportunity to restore habitats on existing public buildings and new public buildings. On existing public buildings, the installation of Swift nest boxes and callers would provide a significant boost to Swift nest sites across the country. Dublin City Council has installed Swift nest boxes on its main offices on Wood Quay in Dublin.

For all new public buildings there should be a national mandate to include Swift bricks in their construction e.g. Swift bricks have been installed in the new public library in Portlaoise. Externally mounted nest boxes should not be installed in place of nest bricks as they do not provide the same level of nesting security for this critically endangered species, but their installation can complement nest brick projects and provide a significant boost to Swift nest sites across the country. Examples of externally mounted Swift nest box projects on public land include Dublin City Council offices on Wood Quay, Dublin City, and Dundalk Library and Museum complex, Co. Louth.

Nest creation for other species in the built environment

Nest site creation for cavity nesting species is often very straightforward. The inclusion of Swift nest bricks and boxes will cater to species such as House Sparrows, Great Tits, and Blue Tits.

Other cavity nesting species that should be catered for in the urban environment include the European Starling, an amber-listed species, which readily takes to nest boxes. These boxes can be fixed to or built into the walls of buildings. The entrance-ways of Swift nest boxes and bricks are too narrow for Starlings to enter, and so nest boxes would need to be installed specifically for this species.

Black Guillemot is a charismatic, amber-listed seabird that nests in built structures such as harbour and weir walls. It takes readily to nest boxes. We propose that all suitable walls in harbours and weirs have Black Guillemot nest boxes built into them during building works at a suitable height.

Grey Wagtail, a red-listed species of conservation concern, takes readily to nest boxes fixed under bridges spanning suitable sections of rivers. Nest boxes for this species could easily be incorporated into new bridges. These nest boxes will also accommodate Dipper and thus have multi-species benefits.

Sand Martins nest in built structures and very easily take to artificial nest banks. Incorporating nest banks into all suitable river embankments, bridges, etc., would greatly benefit this amber-listed species.

Kingfisher is an Annex 1 species, which nests in burrows in river embankments. Incorporating Kingfisher nesting tunnels into river embankment walls would be a very simple measure to create safe breeding habitat for this amber-listed species.

The Peregrine is a charismatic, Annex 1 falcon species which has adapted well to the urban environment. The addition of Peregrine open-fronted nest boxes or nesting platforms at suitable locations is a low-cost and effective means of providing safe habitat for this species.

House Martins are a small African migratory species which nest in dome-shaped nest cups on buildings, often on gable walls, with the rim of the nest cup adhering to the building's soffit. The increased use of plastic or PVC soffit, to which House Martin nests do not adhere well, is negatively impacting the breeding success of this species in many instances. A citizen science survey carried out between 2016-2017 found that the likelihood of House Martin pairs successfully fledging a brood or attempting a second brood was negatively associated with nest cups built on plastic soffits. They also found that both parameters of nest success were higher in artificial nests than in nests built on plastic soffit (Kettel et al., 2021). The installation of House Martin nest cups would benefit this species and provide nesting habitat to try and retain this species at its current level rather than responding to a fall in its population which may be more difficult to reverse.

Barn Swallows readily take to artificial nest cups when installed at breeding sites, while mean clutch size and the number of chicks fledged is on average higher in artificial nests than in natural nests (Teglhøj, 2018), indicating the potential benefits of this intervention. This is particularly pertinent given the decline the Countryside Bird Survey has recorded in this species, leading to its inclusion on the amber-list of Birds of Conservation Concern in Ireland.

7.3.3. Light-bellied Brent Goose

Nature restoration through green space retention

With the continued piecemeal approach to the conversion of grasslands, to either astro-turf or other development, loss of feeding habitat for Light-bellied Brent Geese is a very significant threat, particularly in Dublin, where a large proportion of this population occurs (Handby 2023).

We understand that a plan is being developed with the local authorities in Dublin to address the knowledge gaps that exist in relation to the extent of ex-situ grasslands used by Light-bellied Brent Geese. We welcome this and emphasise the importance of a comprehensive and suitably robust set of surveys and associated analyses - used in conjunction with existing datasets about goose usage of urban grasslands in Dublin - to develop an understanding of the extent of grassland habitat that is required to maintain and enhance this population of Light-bellied Brent Geese. We emphasise the need for this work to underpin the development of a strategy in relation to the conversion of grasslands to astro-turf so that there is no net loss of urban green space to comply with the Nature Restoration Regulation. A holistic approach is required to prevent the piecemeal_loss of these grasslands so that a range of suitable and adequate feeding sites are available to this species. Under the Conservation Objectives of the SPAs for which Light-bellied Brent Goose is a Qualifying Interest, there is a legal obligation to protect ex-situ feeding sites and maintain favourable conservation condition of habitats.

Nature restoration through improved management of designated sites

Light-bellied Brent Geese are listed as a Qualifying Interest in several Irish coastal SPAs, and it is a legal requirement that the conservation status of these Qualifying Interests is maintained and enhanced, including through appropriate management of the SPAs. However, management and control of human-related disturbance in many of the relevant urban SPAs is inadequate. Control of disturbance through restriction of access to sensitive areas and associated enforcement of the measures are restoration measures that would benefit the species, and many other associated species. Directing increased resources to address this issue will help to restore the habitats to a more favourable condition.

Nature restoration through seagrass restoration

Brent Geese are coastal herbivores, feeding on seagrasses in the intertidal area. *Zostera* is the dominant seagrass in Ireland and is important for marine biodiversity, acting as foraging and refuge habitat, as well as aiding in carbon sequestration, and the prevention of eutrophication and coastal erosion. Over many years there have been significant declines in *Zostera* in Ireland, from a type of wasting disease in the 1930s with the more recent declines due to anthropogenic reasons. We recommend the development and trialling of seagrass restoration methods in Ireland, building on any existing work.

Landscape features

Rivers in urban areas are often canalised, or the riparian zone is severely limited, leaving little to no space for wildlife, and resulting in fragmentation of this habitat type. We propose that rivers are returned to their natural state where possible within the urban environment leaving a sufficient riparian zone to absorb any flooding and support biodiversity.

Playing pitches provide for both human recreation and the foraging needs of species such as Light-bellied Brent Goose, Oystercatcher, Black-tailed Godwit, and Curlew. Human disturbance and

conversion of playing pitches from grass to astro-turf is undoubtedly having an egregious impact on these species, depriving them of foraging habitat and fragmenting the foraging landscape.

Brown field sites are often wildlife-rich habitats within an urban environment. These sites are generally earmarked for development, which can slow urban sprawl, but also often removes the last vestiges of habitat for some very vulnerable species. Developments within brown field sites should aim to keep any natural conditions possible as part of the development (e.g., mature native trees/ hedgerows, wetland features, species-rich grasslands) and where these are removed, mitigated for in a like-for-like fashion. Better ecological oversight of these developments by independent ecological bodies is required, which will require adequate funding.

8. Conclusions

8.1. Areas of opportunity for Annex I habitats

8.1.1. Estuarine / intertidal areas of opportunity

The areas of opportunity for Annex I estuarine / intertidal-associated species identified the estuarine SPAs with the highest species richness of rare and threatened breeding waterbirds, and of significant populations of wintering waterbirds.

There were ten estuarine SPAs selected: Dundalk Bay, Rogerstown Estuary, Baldoyle Bay, North Bull Island, South Dublin Bay and River Tolka Estuary, Cork Harbour, Castlemaine Harbour, Tralee Bay Complex, Inner Galway Bay and Lough Swilly.

The North Bull Island and South Dublin Bay and River Tolka Estuary SPAs are in urbanised areas. The other eight SPAs had potential for large-scale implementation of managed realignment to restore estuarine / intertidal habitats. The potential managed realignment zone across these SPAs covers over 91 km^2 of which around 3 km^2 was within mapped areas of public lands.

Managed realignment qualifies as re-establishment of Annex I estuarine / intertidal habitats, as referred to in Article 4.4 of the Nature Restoration Regulation, because it involves reverting land that was historically claimed from the sea to tidal habitats. However, as the historical land-claim long predates the assessments that were carried out for the development of conservation objectives, managed realignment would not usually contribute to targets identified in the objectives for the relevant Annex I habitats.

The scale of potential managed realignment identified reflects biophysical opportunity rather than short-term deliverability, which will be constrained by consenting, engineering and social factors

Other restoration measures that could be implemented at smaller-scales, depending on site-specific factors, include removal of invasive *Spartina*, *Agarophyton* and *Sargassum*, restoration of saltmarsh habitats to provide grazing habitat for geese and dabbling ducks, and management of human disturbance.

8.1.2. Lake, moorland and wet grassland / fen areas of opportunity

The areas of opportunity for Annex I lake, moorland and wet grassland / fen habitats identified the hectads (10 x 10 km squares) with the highest species richness of rare and threatened breeding birds, and of significant populations of wintering waterbirds, associated with these habitats.

The SACs in the areas of opportunity included over 55 km^2 of lake habitat, around 340 km^2 of moorland habitat and 40 km^2 of wet grassland / fen habitat (Table 8.1). Around 47 km^2 of the moorland habitat but very little of the lake or wet grassland / fen habitat were within mapped areas of public lands.

The SPAs in the areas of opportunity included around 63 km^2 of lake habitat, around 117 km^2 of moorland habitat and 17 km^2 of wet grassland / fen habitat (Table 8.2). Around 37 km^2 of the moorland habitat but very little of the lake or wet grassland / fen habitat were within mapped areas of public lands. Some of these SPAs had large overlaps with SACs.

The top ten Natura 2000 sites in each Annex I habitat group, ranked by the total area of the relevant Annex I habitat within each site, are shown in Table 8.3. There was little overlap between habitat groups: only the Connemara Bog Complex SAC was selected for more than one group (the lakes and moorland groups). Table 8.4 shows the three additional Natura 2000 sites that ranked in the top ten

for public land area within the moorland group but did not appear in the top ten when ranked by total Annex I habitat extent. No such additional sites were identified in the lakes or wet grassland/fen groups.

The Connemara Bog Complex, Owenduff/Nephin Complex SACs and Galtee Mountains SAC are notable for having large areas of moorland habitat within public lands. The River Shannon Callows SAC, River Little Brosna Callows SPA, and Crosswood Bog SAC are notable for having large areas of wet grassland / fen habitat within public lands. The Dromore Woods and Loughs SAC had the largest area of lake habitat within public lands.

Table 8.1. Number of SACs in areas of opportunity for each Annex I habitat group and total areas of relevant Annex I habitats within the sites and within public lands in the sites.

Annex I habitat group	Category	Number of sites	Area (ha)	
			SAcs	Public lands
Lakes	restoration (high species richness)	9	5682	63
	restoration (low species richness)	1	2	0
Moorland	restoration (high species richness)	15	24985	4496
	restoration (low species richness)	16	8833	198
	creation (high species richness)	4	29	9
Wet grassland / fen	restoration (high species richness)	8	2064	282
	restoration (low species richness)	4	1648	46
	creation (high species richness)	4	42	0

The creation (high species richness) category was not used to select lake areas of opportunity. The numbers of sites exclude sites with < 100 ha of relevant habitats for the moorland group and less than 10 ha of relevant habitats for the wet grassland / fen group.

Table 8.2. Number of SPAs in areas of opportunity for each Annex I habitat group and total areas of relevant Annex I habitats within the sites and within public lands in the sites.

Annex I habitat group	Category	Number of sites	Area (ha)	
			SPAs	Public lands
Lakes	restoration (high species richness)	7	6334	25
	restoration (low species richness)	0	0	0
Moorland	restoration (high species richness)	8	11355	3737
	restoration (low species richness)	3	303	0
	creation (high species richness)	1	1	0
Wet grassland / fen	restoration (high species richness)	6	1578	251
	restoration (low species richness)	0	0	0
	creation (high species richness)	3	161	0

The creation (high species richness) category was not used to select lake areas of opportunity. The numbers of sites exclude sites with < 100 ha of relevant habitats for the moorland group and less than 10 ha of relevant habitats for the wet grassland / fen group.

Table 8.3. Top ten Natura 2000 sites in each Annex I habitat group selected by the total area of relevant Annex I habitat within the sites.

Annex I habitat group	Site	Natura 2000 area (ha)	Public land area (ha)
Lakes	Lough Corrib SAC	3725	0
	Lough Corrib SPA	3624	0
	Lough Derg (Shannon) SPA	1616	13
	Lough Oughter and Associated Loughs SAC	1280	5
	Lough Oughter SPA	1033	0
	Lough Derg, North-east Shore SAC	276	0
	Ross Lake and Woods SAC	148	1
	Dromore Woods and Loughs SAC	115	37
	Connemara Bog Complex SAC	96	10
	Ballyallia Lake SAC	34	11
Moorland	Connemara Bog Complex SAC	9013	908
	Owenduff/Nephin Complex SAC	6677	3017
	The Twelve Bens/Garraun Complex SAC	3493	16
	Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC	2911	1
	Galtee Mountains SAC	2420	431
	Maumturk Mountains SAC	2359	144
	Mweelrea/Sheeffry/Erriff Complex SAC	1949	10
	Derryclogher (Knockboy) Bog SAC	1433	0
	Sheep's Head SAC	914	0
	Caha Mountains SAC	372	44
Wet grassland / fen	Carlingford Mountain SAC	966	11
	River Shannon Callows SAC	901	139
	Mount Hevey Bog SAC	625	35
	Crosswood Bog SAC	401	84
	Mweelrea/Sheeffry/Erriff Complex SAC	366	0
	Lough Ree SAC	322	0
	River Little Brosna Callows SPA	283	112
	River Suck Callows SPA	272	0
	Fin Lough (Offaly) SAC	73	59
	River Boyne and River Blackwater SAC	51	0

The following five SPAs that largely overlap SACs included in this table were excluded from the rankings: Ballyallia Lough SPA, Connemara Bog Complex SPA, Lough Ree SPA, Middle Shannon Callows SPA, Owenduff/Nephin Complex SPA.

Table 8.4. Natura 2000 sites in the top ten for public land area within each Annex I habitat group, but not in the top ten based on Annex I habitat extent.

Annex I habitat group	Site	Natura 2000 area (ha)	Public land area (ha)
Moorland	Blackwater River (Kerry) SAC	321	61
	Glengarriff Harbour and Woodland SAC	205	59
	Mullaghanish to Musheramore Mountains SPA	356	46

8.2. Restoration measures for Annex I habitats

8.2.1. Estuarine / intertidal restoration measures

Managed realignment qualifies as the re-establishment of Annex I estuarine and intertidal habitats, as referred to in Article 4.4 of the Nature Restoration Regulation, because it involves reverting land that was historically claimed from the sea back to tidal conditions. However, because most land claim pre-dates the assessments used to define conservation objectives, managed realignment would not usually contribute directly to the targets set out in those objectives for the relevant Annex I habitats. As a result, managed realignment is unlikely to fall within the initial phase of actions under the Nature Restoration Regulation, which is primarily focused on restoring Annex I habitats on public land prior to 2030. Nevertheless, given the long lead-in time required to plan, design and consent managed realignment projects, and the wider ecosystem services that the projects will deliver, it would be appropriate to begin preparatory work during this period, with a view to implementation beyond 2030.

Other restoration measures that could be implemented at smaller-scales, depending on site-specific factors, include removal of invasive *Spartina*, *Agarophyton* and *Sargassum*, restoration of saltmarsh and seagrass habitats to provide grazing habitat for geese and dabbling ducks, and management of human disturbance.

8.2.2. Lake, moorland and wet grassland / fen areas restoration measures

A wide variety of potential measures to restore the Annex I lake, moorland and wet grassland / fen habitats for the rare/threatened species associated with these habitats were identified. These included measures that would also contribute to targets identified in the objectives for the relevant Annex I habitats and additional measures addressing factors relevant to the bird populations.

While the restoration of Annex I habitats is addressed explicitly under Article 4 of the Nature Restoration Regulation, some of the restoration measures proposed for Annex I habitats in this report contribute to targets set out in other sections of the regulation, including the restoration of floodplain connectivity (Article 9) and the rewetting of drained peatlands (Article 11.4).

The measures were selected to address the general ecological requirements of the majority of the focal species associated with the Annex I habitat groups. Additional measures may be required for certain species, e.g. Nightjar, Chough and Ring Ouzel in the moorland group and Whinchat and Twite in the wet grassland / fen group.

8.2.3. Issues

The restoration measures proposed in this report generally align with the conservation objectives for focal species, particularly in their emphasis on hydrology, habitat extent and condition, vegetation structure, and disturbance management as the principal ecological levers underpinning population stability and recovery. However, the analysis also highlights several recurring structural and practical issues that have important implications for how restoration under the Nature Restoration Regulation is interpreted, prioritised and evaluated.

A consistent theme is the partial mismatch between the scope of Annex I habitat conservation objectives and the measures most directly required to deliver favourable condition for the focal bird species. In all habitat types, key actions such as disturbance management, predator control, provision of nesting or roosting features, and creation of scrapes or seasonal pools fall outside the formal objectives for Annex I habitats. While this distinction is ecologically reasonable, it creates a policy and implementation tension: measures that are important for meeting species-level objectives may not be prioritised if assessment frameworks focus narrowly on habitat attributes. This reinforces the need for restoration planning to explicitly recognise birds (and other species) as functional indicators of ecosystem recovery, rather than treating species-focused measures as ancillary or optional additions to habitat restoration.

A second cross-cutting issue concerns the reliance on vaguely defined population outcomes. The conservation objectives for the focal species generally state that populations should be stable or increasing, and that breeding success should be “sufficient” to maintain those populations. However, these outcomes are rarely linked to clear numerical targets or thresholds. As a result, many restoration measures can be well justified in ecological terms but remain difficult to evaluate in terms of whether they have actually succeeded. This is particularly important where actions such as reducing disturbance or controlling predators are intended to improve breeding success and survival, rather than to produce easily measurable changes in habitat. Without clear population benchmarks (e.g., target numbers of birds or levels of breeding success) there is a risk that restoration may be judged successful based mainly on improvements in habitat condition, even if the populations themselves show little response or respond only after a long delay.

Landscape-scale dependency is another recurrent issue, especially for wide-ranging species and for habitats that function as part of broader ecological networks and is recognised in the conservation objectives for several of the focal species. Functional connectivity between breeding sites, foraging areas and roosts is a key requirement for many of the focal species in lakes, moorlands and wet grasslands, yet most restoration measures are likely to be implemented at site level and often restricted to within the boundaries of designated sites. This creates a potential disconnect between ecological need and delivery mechanisms, particularly where key foraging areas, commuting routes or supporting habitats lie outside Natura 2000 sites. Therefore, it is important to integrate site-based restoration with wider landscape planning, including habitat creation or restoration beyond designated sites where necessary to support viable populations.

Finally, several measures rely heavily on ongoing, adaptive management—most notably grazing and mowing regimes—to achieve desired vegetation structure and habitat heterogeneity. While these approaches are ecologically well founded, their effectiveness depends on sustained management and responsiveness to site-specific conditions. In practice, achieving and maintaining this balance may be challenging, particularly where land-use objectives, agricultural pressures or resource constraints vary over time. This introduces an additional layer of uncertainty that should be acknowledged when interpreting both habitat condition and species responses to restoration.

Overall, while the proposed restoration measures are ecologically coherent and strongly aligned with focal-species conservation objectives, their effectiveness will depend on recognising and addressing these structural issues. Explicit acknowledgement of mismatches between Annex I objectives and the ecological requirements of the focal species, clearer links between restoration measures and demographic outcomes, attention to landscape-scale connectivity, and realistic appraisal of management dependencies will be essential if restoration is to deliver sustained biodiversity gains rather than short-term improvements in habitat condition alone.

8.3. Areas of opportunity for farmland habitats

The analyses of areas of opportunity for farmland habitats integrated data on the distribution of rare and threatened breeding birds, and on significant populations of wintering waterbirds, with data on the breeding abundance of more generalist species.

The distribution of the areas of opportunity identified varied depending on the relative weighting used between the distribution and abundance data. When the farmland generalists were weighted higher, the areas of opportunity were mainly in the south and east of Ireland, presumably reflecting the influence of Stock Dove and Yellowhammer populations in these areas. As the contribution of the restricted distribution species increased, the areas of opportunity shifted to the north and west.

The only explicit requirement in the Nature Restoration Regulation concerning the restoration of farmland habitats for birds is to increase an index of the abundance of breeding farmland bird species. In Ireland, both versions of the species proposed for this index are dominated by widespread generalist species (Table 3.4). As a result, the areas of opportunity identified through higher weighting of farmland generalists may align more closely with the formal requirements of the regulation. However, prioritising areas based on higher weighting of rare and threatened breeding species and wintering waterbirds would be likely to deliver greater overall conservation benefits. In addition, the targets for measuring increases in farmland birds under the regulation may lack statistical robustness (see Section 2.2). Taken together, these considerations suggest that reliance on the farmland bird index as the primary basis for guiding restoration priorities may warrant reconsideration, particularly where broader biodiversity outcomes are sought.

8.4. Seabirds

Seabirds pose particular challenges under the Nature Restoration Regulation because they rely on both terrestrial breeding sites and wide-ranging marine foraging habitats, while many of the pressures affecting their populations operate at broad spatial scales. In the absence of stronger ecological evidence linking seabird populations to specific marine habitats, marine IBAs currently provide the most appropriate spatial proxy for aligning seabird conservation with Article 5 obligations. For most focal seabird species in Ireland, the greatest scope for effective action up to 2030 therefore lies in targeted, site-based measures at breeding colonies, rather than in large-scale restoration of marine habitats.

Priority measures for seabirds therefore include the control or exclusion of invasive alien predators, management of problematic native predators where evidence supports this, reduction of human disturbance, and appropriate vegetation management at colonies. The maintenance and, where appropriate, creation of artificial nesting habitat may also provide benefits for some species. These actions are well established, can be implemented within existing conservation frameworks, and are likely to deliver measurable benefits over relatively short timescales.

Although the regulation includes obligations relating to the restoration of marine ecosystems, current knowledge gaps regarding seabird foraging areas, prey availability and the links between seabird population dynamics and specific marine habitats limit the scope for confidently targeting marine habitat restoration specifically for seabirds at present. As a result, marine actions are likely to focus initially on safeguarding ecological coherence and avoiding further degradation rather than on species-specific restoration.

Overall, effective delivery of seabird conservation under the Nature Restoration Regulation will depend on combining immediate, colony-focused measures with longer-term efforts to improve understanding of seabird–marine habitat relationships. Continued monitoring of colony size and breeding success will be essential to assess the effectiveness of measures and to support adaptive management over time.

8.5. Urban birds

Urban spaces provide a refuge for many species. However, the pressures these species face are quite complex and more research is required to better understand their unique needs.

Several cavity nesting species occur within the urban environment, including the Swift. Cavity nesting species are often amber and red-listed with a lack of breeding habitat considered a critical factor in their poor conservation status. Building in nesting habitat for these species would be a very simple, cost-effective means of addressing this conservation need This has been successfully trialled for Swifts in Gibraltar, with a Swift brick planning policy introduced in the 1990s, while the Netherlands introduced a similar measure in 2024 for this species.

Several species, including the target species, Light-bellied Brent Goose, are dependent on greenfield sites such as playing pitches during the non-breeding season. These sites are vulnerable to human disturbance and conversion to astro-turf and development, which deprive these species of much-needed habitat. These factors also further fragment the foraging landscape for these species, placing them under additional pressure.

In addition, there is evidence that urban areas can be more ecologically complex and provide more biodiverse habitat than much of our intensively farmed agricultural habitat, due in large part to the prevalence of urban gardens, parks and brownfield sites. As such, the ecological benefits associated with brownfield sites should be maintained rather than replaced where possible. For instance, retaining mature hedgerows, wetland features, mature trees, etc. In addition, more research is needed in Ireland to better understand the ecological diversity and health of our urban spaces.

8.6. Limitations

8.6.1. Bird distribution and abundance datasets

The selection of areas of opportunity was based on limited generic datasets on bird distribution, which, for the breeding birds, was over ten years old. As a result, the effects of more recent restoration initiatives, such as the rehabilitation of industrial peat-cutting sites, are unlikely to be captured, and more recent population declines may also be under-represented. Conversely, the use of older datasets helps to identify areas that were formerly occupied by priority species and that may still have potential for successful restoration, which might not be highlighted using more recent data alone.

Inclusion of species-specific datasets would improve the analyses and would allow examination of finer-scale distribution patterns of breeding populations than the hectad scale used in this assessment. Similarly, use of subsite waterbird count data for large Irish Wetland Bird Survey sites might produce

more informative maps of species distribution although there are some issues that would need to be resolved about how to assess the significance of subsite counts.

Countryside Bird Survey data were used to assess the abundance of widespread farmland-associated focal species. However, the restricted spatial sampling of the survey means that not all species present within a hectad may be detected, particularly those occurring at low densities. For this assessment, between one and three Countryside Bird Survey monads were assigned to each hectad, depending on spatial coverage. As a result, the representativeness of the data is likely to vary between hectads, with greater uncertainty where only a single monad was allocated and lower uncertainty where multiple monads were available. Analysing the data at a coarser 20 × 20 km grid scale would reduce this uncertainty, albeit at the cost of spatial resolution.

8.6.2. Habitats

The analyses of potential management realignment zones were based on digital surface model mapping. This provides data on the heights of vegetation and structures, rather than ground level elevations. Therefore, areas with tall vegetation would have been excluded from the mapped managed realignment zones, even when they were within areas that could potentially be suitable for managed realignment.

The datasets used for the distribution of Annex I habitats had various limitations, which are discussed in the relevant sections of this report. Most significant were the limited data on habitat condition for moorland and wet grassland / fen habitats Annex I habitats. For moorland habitats, data on habitat condition of commonage habitats was used. While this had a large overlap with the Annex I moorland habitats mapped by NPWS, it is not clear how rigorously habitat condition was assessed in the commonage surveys. For the wet grassland Annex I habitats, it was possible to use assessments of habitat condition that were carried out for Article 17 reporting, but the spatial coverage was too limited to contribute to the identification of areas of opportunity.

8.6.3. Restoration measures

Although a wide range of potential restoration measures are identified in this report, the evidence base for the effectiveness of many of these measures in an Irish context remains limited or uneven. In several cases, proposed actions are supported by general ecological principles, expert judgement, or evidence from other jurisdictions, rather than by robust, species-specific evaluations of outcomes in Ireland. As a result, there is uncertainty regarding the magnitude and timescale of population responses for some focal species, particularly where pressures operate across large spatial scales or where multiple limiting factors interact. To address this uncertainty, the implementation of restoration measures should be accompanied by appropriate monitoring of both habitat condition and bird population responses, allowing the effectiveness of interventions to be assessed and approaches to be refined over time within an adaptive management framework.

In parallel, this assessment focused on identifying large aggregations of suitable habitat where restoration measures could deliver the greatest benefits through economies of scale and ecological synergies. While this approach is appropriate for strategic planning under the Nature Restoration Regulation, it does not imply that smaller sites are unimportant. Smaller sites can make significant contributions to biodiversity recovery, particularly where they support key populations, act as stepping stones, or complement larger restored areas. Accordingly, additional and complementary approaches will be required to identify and prioritise such sites alongside those highlighted through this analysis.

8.7. Knowledge gaps

8.7.1. Bird data

Farmland habitats support significant winter populations of many focal species, and overwinter survival is often an important component of population regulation in farmland birds (e.g. Peach *et al.* 1999). While the Bird Atlas datasets provide information on winter distribution patterns, there is no equivalent to the Countryside Bird Survey for estimating winter abundances. As a result, for widespread species—where distribution patterns alone are of limited value—it is difficult to identify areas of particular importance for their winter use.

8.7.2. Habitats

The relationship between bird species habitat associations and the Annex I habitat classification appears to be poorly known. In fact, this report appears to be the first attempt to systematically classify the Annex I habitat associations of Irish bird species. While some associations were clear and obvious, others required fine judgement (see notes in Table 3.5). Undoubtedly, some of the associations used in this review could be questioned.

A related knowledge gap concerns the interaction between the restoration measures required to meet conservation objectives for Annex I habitats and those needed to support the bird species associated with those habitats. For species that are qualifying interests of SPAs, these requirements may be indicated, in whole or in part, by the targets set out in their conservation objectives. For many Annex I habitats, conservation objective targets are defined in terms of specific vegetation attributes derived from detailed vegetation surveys. However, it is not always clear how closely these targets align with the ecological requirements of associated bird species (e.g. geese and dabbling ducks grazing on saltmarsh; see Section 4.4.1). In some cases, degraded habitats may provide more suitable conditions for certain species than restored examples of the same habitat (e.g. Lapwing breeding on cutover bog).

This issue is further compounded by limited knowledge of the distribution, extent and condition of some ecologically important non-Annex I habitats that support significant bird populations, such as non-Annex I wet grassland. Because these habitats are not subject to the same mapping, monitoring and conservation-objective frameworks as Annex I habitats, they may be under-represented in restoration planning. As a result, there may be limited information for effective targeting of restoration measures for species that are dependent on wider habitat networks extending beyond Natura 2000 sites.

Evidence of bird responses to habitat restoration at the landscape scale is also limited and varies among habitats and species. For example, there is little information on how breeding bird communities respond to large-scale forest-to-bog or raised bog restoration. In this context, monitoring bird populations alongside the implementation of restoration measures will be essential to improve understanding of species responses and to refine restoration approaches over time.

A key issue in this assessment was interpreting how focal species are associated with Annex I wet grassland habitats, and the extent to which this classification meaningfully reflects the habitat needs of breeding waders and other species. Annex I wet grassland types represent only a small proportion of the overall wet grassland resource in Ireland, and factors such as landscape context may be more important for these bird species than the specific vegetation communities that define the Annex I categories.

8.7.3. Seabirds

In many cases, seabird colonies will first need to be assessed for the presence of invasive or introduced predators, such as mink and rats, which may be negatively affecting breeding success and limiting population recovery. At a broader scale, there remains a poor understanding of the relationships between seabird foraging areas and specific marine habitats. Further research is therefore needed to document the fish species that comprise the diets of Irish seabirds in different regions, and to examine potential links between changes in seabird populations and productivity and changes in fish stock abundance and distribution. This knowledge gap is particularly acute in the Irish Sea, where there are currently no data on stocks of key forage fish species, highlighting an urgent need for targeted assessment.

Expanded GPS tagging and tracking of seabirds from colonies around the Irish coast would substantially improve understanding of the foraging areas on which different species depend, and would help to identify the marine habitats and prey resources that may need protection or restoration. In parallel, it will be important to closely monitor colony size and breeding productivity at seabird sites subject to restoration measures, in order to evaluate their effectiveness. Improved monitoring of adult survival rates would further support this work by helping to disentangle the relative contributions of breeding success and adult mortality to seabird population trajectories.

8.7.4. Urban birds

The approach used to assess knowledge gaps within the context of urban birds is species-led rather than the habitat-led assessments used for Annex I habitats, farmland habitats and seabirds. This reflects the different approach adopted for urban environments compared to the other three groups under Article 8 of the Regulation. This section will outline measures to inform species conservation within the urban context.

Crucial aspects of the breeding ecology of several bird species associated with the urban environment are not captured by national monitoring schemes such as the Countryside Bird Survey and the Bird Atlas Survey, both of which account for breeding birds in Ireland. These breeding species include Swift, Sand Martin, House Martin, Barn Swallow, House Sparrow and Starling, all of which would benefit from species-specific surveys.

Similarly, while the Irish Wetland Bird Survey provides invaluable data, it does not typically capture waterbird use of urban greenfield sites. Several waterbird species including the Brent Goose, Curlew, Oystercatcher and Black-tailed Godwit depend on these sites for foraging, particularly in late winter. Collating data on the location, frequency, species and numbers of birds using these sites is crucial to protecting these sites and the species depending on them, over the long-term.

National monitoring of Swift populations

National coordinated surveys of Swifts would provide a countrywide population estimate for this species. This would allow us to assess variation in Swift population abundance and distribution at the landscape scale and to investigate the reasons behind any observed differences. Repetition of these surveys over short timeframes (e.g. every 5 years) would provide robust data to assess the efficacy of conservation measures, such as breeding habitat creation, in reversing declines in Swifts, rate of nest site loss or recovery over time and fluctuations in nesting numbers.

Surveys for Swifts have been carried out by BirdWatch Ireland since 2015 at the County Council and heritage site level. While these surveys provide accurate data for select areas, they do not allow us to

adequately capture Swift breeding populations at the national level, rate of nest site loss over time, fluctuations in nesting numbers or the efficacy of conservation measures.

The Countryside Bird Survey monitors all breeding birds, including Swifts, at the national level via monitoring stratified randomly selected 1 km grid squares. However, this survey depends on species being widely distributed across the landscape during the breeding season. Given that Swifts are closely linked to the built environment and thus not widely distributed, it is acknowledged that this monitoring method does not best capture this species abundance and distribution.

Given the significant declines we have witnessed in this species, repeated, national survey efforts are required to better understand the reasons behind the decline of this species and to best implement conservation measures to reverse this decline.

Monitoring of Swift foraging behaviour and diet

Conservation measures for Swifts have typically focused on breeding habitat creation. However, the factors driving declines in Swifts are assumed to also include declines in insect abundance and factors associated with climate change.

Although some work has been carried out regarding Swift foraging behaviour and diet, (e.g., Finch *et al.* 2023; Romanowski *et al.* 2024), this aspect of the Swifts ecology is still poorly understood. Lightweight GPS tracking units could be used to examine key foraging habitats, foraging ranges, the impact of weather on foraging ranges, the impact of changes in farming practices, land use and pesticide use, etc. Dietary studies using for instance boluses or faecal sampling, could also provide data on the prey preferred by this species; while assessing contaminant loads in both Swifts and their prey would provide much-needed data on the impacts of pesticide and herbicide use.

Understanding the foraging distribution, ranges, dietary needs and contaminant loads of this species would allow us to manage foraging habitat on the landscape level in a more holistic manner and inform agricultural policy for a range of insectivorous species.

Monitoring of Swift productivity and recruitment rates

Research by the British Trust for Ornithology indicates that a reduction in first-year survival rates, in part related to wetter summers, may be one of the principal factors driving declines in Swifts. The same study also concluded that wetter summers are linked to smaller clutch sizes and lower chick survival rates (Finch *et al*. 2023). To better understand and address the conservation needs of this species and the impact of climate change, increased data on productivity levels and recruitment into the breeding population is needed.

Nest boxes fitted with internal cameras, and colour ringing projects provide a means of investigating these variables. Nest box cameras have been trialled with success at for instance, ATU, Castlebar, Co. Mayo by Swift Conservation Ireland, and a private residence at Maguiresbridge, Co. Fermanagh. These projects enabled a masters' thesis to be undertaken in ATU Mayo, which detailed the breeding biology of this species in Ireland (Majkusiak, 2022). Colour ringing at the colony in Maguiresbridge is also providing additional data on Swift breeding biology and return rates. Expanding this work would facilitate the conservation of the Swift.

National monitoring of Sand Martin populations

Similarly to the Swift, the Sand Martin is not widely distributed across the landscape but is tied to waterway habitats during the breeding season. As such, the Countryside Bird Survey methodology,

which surveys 1km randomly selected squares, may underestimate the population density of this species. The Bird Atlas Survey (2007-2011), which surveys randomly selected 10km grid squares, confirmed a wider distribution and higher estimated population density of Sand Martins compared to CBS data from the same period (Balmer et al. 2013). However, Bird Atlas Surveys do not specifically target waterway habitats, and so also potentially underestimate Sand Martin populations. In addition, Bird Atlas Surveys occur once every twenty years. Even if they accurately account for Sand Martin populations, the gap between survey years is too long to react to any further declines in amber-listed species such as Sand Martin, which are of conservation concern.

As such an accurate assessment of the Sand Martin population at the national level is required to better address conservation measures and their effectiveness for this species. Repeated surveys over relatively short time intervals (e.g. every five years) will allow us to measure fluctuations in the national population over time and respond accordingly.

National monitoring of House Martin populations

The House Martin population in Ireland is moderately increasing over time, although Countryside Bird Survey data shows large fluctuations between survey years. Given the House Martins colonial nesting ecology and reliance on the built environment, species-specific surveys have been recommended to better account for House Martin populations at the national level (Heywood *et al.* 2025).

Assessment of nest site substrate and nesting success

The increased use of plastic or PVC soffit is negatively impacting the breeding success of this species in many instances. House Martin nest cups do not adhere well to PVC, and there is evidence that pairs which build nest cups on this material comparatively fledge fewer chicks overall (Kettel *et al*. 2021).

BirdWatch Ireland carried out a limited House Martin survey for Fingal County Council in 2025 and found that 84% of nests recorded were built on PVC soffit (Adcock *et al*. 2025). This species would benefit from a citizen science survey examining the prevalence of nests built on this substrate, and a comparison of nesting success between nests built on differing soffit types. This would inform conservation efforts to maintain House Martin populations.

National monitoring of Barn Swallow populations and breeding success/ biology

The factors driving Barn Swallow declines are not well understood but are thought to include factors associated with climate change, declines in insect populations, changes on the wintering grounds, and loss of nesting and roosting habitat (Nova Scotia Department of Lands and Forestry 2020).

Like the House Martin, the Barn Swallow is a loosely colonial nesting species which is tied to the built environment. It would therefore benefit from a nation-wide citizen science survey, which could for instance assess number of broods and number of chicks fledged. Repetition of surveys would enable numerous variables to be examined including the impact of weather on chick survival rates, influence of habitat variables on productivity, return and departure dates, rate of uptake of artificial nests vs natural nests, and associated productivity, etc. Ringing studies would complement this work.

Assessment of foraging sites for Hirundine species

Foraging studies would be of benefit for all three Hirundine species. Swallow and House Martin could be targeted simultaneously as they have been shown to use similar landscapes for foraging (e.g., Henderson *et al.* 2007). Dedicated surveys targeting waterways would be required for Sand Martins. Understanding the range, and spatial and temporal distribution of these species would enable us to

better direct agricultural policy and management of green spaces within the urban context. It could also provide much needed data regarding differences in foraging behaviour in urban vs rural systems for these species.

Post-breeding roost surveys

Post-breeding roost surveys would benefit Swallow and Sand Martin, both of which are communal roosting species which form mixed species post-breeding roosts. Identifying the locations and sizes of these roosts, alongside any changes over time could inform management strategies for these sites.

Comparison of urban and rural population demographics in the House Sparrow

While Countryside Bird Survey data shows that the House Sparrow population in Ireland is moderately increasing, data from other European countries indicates that populations in urban areas are declining (Shaw *et al.* 2011). As such, the moderate increase observed in House Sparrows overall, may mask disparities in urban, rural and suburban populations in Ireland.

Citizen science surveys would provide data to compare urban, suburban and rural breeding population densities, as well as the habitat features and other factors potentially impacting the breeding success of this species. This would better inform conservation measures at the landscape level for this amber-listed species.

Comparison of urban and rural population demographics in the Starling

The European Starling is considered stable in Ireland according to the latest Countryside Bird Survey population data. However, in the United Kingdom, it has been found that urban Starling populations are declining more rapidly than rural populations (Robinson *et al*. 2005a) and that on average urban populations fledge fewer young than their rural counterparts (Siriwardena & Crick 2002). To our knowledge no research has been conducted regarding a comparison of Starling survival rates and population dynamics in urban and rural contexts in Ireland. Such research would greatly benefit this species identifying any changes in population dynamics and informing conservation measures, accordingly.

National monitoring of green spaces utilised by Brent Geese

The Irish Wetland Bird Survey monitors wintering waterbirds at wetland sites i.e., estuarine habitats, shorelines and lakes. This survey does not adequately monitor the use of inland feeding sites by Brent Goose throughout the winter. For this reason, local authorities in Dublin have recently begun monitoring green spaces utilised as foraging habitat by Brent Goose to fill this knowledge gap. However, it is important that this monitoring is carried out throughout the country at other known ex-situ sites beyond Dublin. The highest concentration of inland feeding sites are in Dublin, however, Brent Goose may disperse from Dublin Bay to neighbouring regions such as Meath and Wicklow. In addition, other counties such as Cork, Limerick and Galway also host internationally important numbers of Brent Goose, who also utilise inland feeding sites. Any region with regular Brent Goose use has the same conservation implications, the need to identify, map and quantify the use of inland green spaces.

Monitoring of dietary shift mid-winter

Brent Goose become more reliant on inland feeding sites as the winter progresses and their primary food source, *Zostera*, is depleted from coastal sites. Monitoring these green spaces throughout the

winter would outline key dates when seasonal shifts occur between the coastal and inland food sources. This would provide more fine-scale, site-specific details on when this shift occurs.

National monitoring of green spaces utilised by waders

Waders such as Oystercatchers, Curlew and Black-tailed Godwit also utilise green spaces, as key foraging sites and refuges during high-tide. The Irish Wetland Bird Survey also monitors these waders, but not at inland sites such as green spaces. Records of these waders should be gathered during Brent Goose surveys in order to maximise survey effort. This represents an efficient way of running a coupled monitoring programme for both Brent Goose and associated waders at green spaces.

Minimise disturbance at key green spaces by implementing conservation measures

Recreational disturbance levels at key inland feedings sites, particularly in densely populated cities such as Dublin, is a huge pressure imposed upon the Brent Goose and wader populations throughout the winter. The implementation of conservation measures such as the creation of buffer zones, erection of clear signage, deployment of designated walking routes, and continued community engagement should be applied where appropriate. In doing so, recreational activities may be minimised or directed away from high-value feeding areas or, at least, it will advise continuing recreational pursuits in a measured manner. Managing dogs, ideally keeping them on leads and away from large feeding flocks, would also significantly reduce disturbance. At a broader level, maintaining a network of undisturbed terrestrial sites is important because increasing development has pushed wintering birds to rely more on green spaces, making disturbance management even more critical.

8.8. Recommendations for further work

The analytical approach used in this report provides a model for the identification of areas of opportunity for restoring Annex I and farmland habitats for amber and red-listed Birds of Conservation Concern in Ireland. The analyses could be developed further by integrating additional datasets on bird distribution and habitat distribution and condition and refining the analyses used to identify potential managed realignment zones.

The approach adopted here prioritises areas that are important for priority species based on recent or current distributions. While this has clear merit, it may under-represent areas that formerly supported priority species and that could again do so if suitable restoration measures were implemented. Repeating the analysis using historical datasets (e.g. the first and second breeding bird atlases; Sharrock 1976, Gibbons *et al.* 1993) would therefore be valuable in identifying areas of former importance with restoration potential.

As discussed above, this exercise focused primarily on identifying large aggregations of suitable habitat where restoration could deliver benefits through economies of scale and ecological synergies. Further work is needed to complement this with approaches that better capture the potential value of smaller sites. This could include the development of explicit criteria for identifying sites suitable for restoration, based on factors such as habitat type and condition, restoration feasibility, connectivity to other habitats, and the presence (or former presence) of priority species.

Additional work would also be valuable to improve understanding of the relationships between bird species' habitat requirements and the Annex I habitat classification, and of the interactions between the restoration measures needed to achieve Annex I habitat conservation objective targets and those required by associated bird species. In particular, further investigation of changes in habitat condition and water quality, alongside corresponding changes in bird populations over the same periods, would

help to clarify causal relationships and improve the targeting of restoration measures. Input from species and habitat specialists, supported by targeted literature review, would substantially strengthen this work.

Due to time limitations, this report had to focus on the species associated with four Annex I habitat groups that comprised around 85% of the bird species–Annex I associations. Further work could be carried out to develop plans for bird-focused restoration of other Annex I habitats, particularly vegetated sea cliffs and machair, which were the next most frequently associated habitats in bird species–Annex I relationships.

9. References

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Appendix 1 Annex I habitat associations of focal species

Table A1.1. Annex I habitat associations of focal species.

Species	**Season**	**Habitat**
Greenland White-fronted Goose	W	Lagoons (1150); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Turloughs (3180); Wet heath (4010); *Molinia* meadows (6410); Lowland hay meadows (6510); Raised bogs (7110-7120); Blanket bogs (7130); Transition mires (7140)
Greylag Goose	W	Estuaries (1130)
Barnacle Goose	W	Estuaries (1130); Tidal mudflats and sandflats (1140); Lagoons (1150); Saltmarsh (1310-1420)
Brent Goose	W	Estuaries (1130); Tidal mudflats and sandflats (1140); Lagoons (1150); Saltmarsh (1310-1420)
Wigeon	W	Estuaries (1130); Tidal mudflats and sandflats (1140); Lagoons (1150); Saltmarsh (1310-1420); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Turloughs (3180); *Molinia* meadows (6410); Lowland hay meadows (6510)
Teal	B	Estuaries (1130); Lagoons (1150); Oligotrophic isoetid lake habitat (3110); Mixed *Najas flexilus* lake habitat (3130); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Acid oligotrophic lake habitat (3160); Turloughs (3180); *Molinia* meadows (6410); Hydrophilous tall herb swamp (6430); Lowland hay meadows (6510); Raised bogs (7110-7120); Blanket bogs (7130); Transition mires (7140); *Cladium* fens (7210); Alkaline fens (7230)
Mallard	W	Estuaries (1130); Tidal mudflats and sandflats (1140); Lagoons (1150); Saltmarsh (1310-1420); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Turloughs (3180); Vegetation of flowing waters (3260); *Molinia* meadows (6410); Lowland hay meadows (6510)
Pintail	W	Estuaries (1130); Tidal mudflats and sandflats (1140); Lagoons (1150); Saltmarsh (1310-1420); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Turloughs (3180); *Molinia* meadows (6410); Lowland hay meadows (6510)
Shoveler	W	Estuaries (1130); Tidal mudflats and sandflats (1140); Lagoons (1150); Saltmarsh (1310-1420); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Turloughs (3180); *Molinia* meadows (6410); Lowland hay meadows (6510)
Pochard	B	Hard-water lake habitat (3140); Rich pondweed lake habitat (3150)
Pochard	W	Lagoons (1150); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150)
Tufted Duck	W	Lagoons (1150); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Turloughs (3180)
Scaup	W	Estuaries (1130); Lagoons (1150)
Common Scoter	B	Oligotrophic isoetid lake habitat (3110); Mixed *Najas flexilus* lake habitat (3130); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150)
Common Scoter	W	Sandbanks (1110); Large shallow inlets and bays (1160)
Red-breasted Merganser	B	Vegetated sea cliffs (1230); Oligotrophic isoetid lake habitat (3110); Mixed *Najas flexilus* lake habitat (3130); Hard-water lake habitat (3140); Vegetation of flowing waters (3260); Transition mires (7140)
Red Grouse	B	Wet heath (4010); Dry heath (4030); Alpine and subalpine heath (4060); Raised bogs (7110-7120); Blanket bogs (7130)

Species	Season	Habitat
Red-throated Diver	B	Oligotrophic isoetid lake habitat (3110); Acid oligotrophic lake habitat (3160)
Red-throated Diver	W	Sandbanks (1110); Large shallow inlets and bays (1160)
Cormorant	B	Vegetated sea cliffs (1230); Rich pondweed lake habitat (3150)
Great Crested Grebe	W	Sandbanks (1110); Estuaries (1130); Lagoons (1150); Large shallow inlets and bays (1160); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150)
Hen Harrier	B	Wet heath (4010); Dry heath (4030); Alpine and subalpine heath (4060); Species-rich *Nardus* grasslands (6230); *Molinia* meadows (6410); Blanket bogs (7130); Transition mires (7140)
Corncrake	B	*Molinia* meadows (6410); Lowland hay meadows (6510)
Coot	B	Lagoons (1150); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Turloughs (3180)
Coot	W	Lagoons (1150); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Turloughs (3180)
Golden Plover	B	Wet heath (4010); Species-rich *Nardus* grasslands (6230); *Molinia* meadows (6410); Blanket bogs (7130); Transition mires (7140)
Golden Plover	W	Tidal mudflats and sandflats (1140); Wet heath (4010); Dry heath (4030); Alpine and subalpine heath (4060); Species-rich Nardus grasslands (6230); Molinia meadows (6410); Lowland hay meadows (6510); Blanket bogs (7130); Transition mires (7140)
Grey Plover	W	Tidal mudflats and sandflats (1140)
Lapwing	B	Oligotrophic isoetid lake habitat (3110); Mixed Najas flexilus lake habitat (3130); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Turloughs (3180); Molinia meadows (6410); Lowland hay meadows (6510); Cladium fens (7210); Alkaline fens (7230)
Lapwing	W	Tidal mudflats and sandflats (1140); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Turloughs (3180); Molinia meadows (6410); Lowland hay meadows (6510)
Ringed Plover	W	Tidal mudflats and sandflats (1140)
Curlew	B	Oligotrophic isoetid lake habitat (3110); Mixed Najas flexilus lake habitat (3130); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Wet heath (4010); Species-rich Nardus grasslands (6230); Molinia meadows (6410); Lowland hay meadows (6510); Raised bogs (7110-7120); Blanket bogs (7130); Transition mires (7140); Cladium fens (7210); Alkaline fens (7230)
Curlew	W	Tidal mudflats and sandflats (1140); Reefs (1170); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Turloughs (3180)
Bar-tailed Godwit	W	Tidal mudflats and sandflats (1140)
Turnstone	W	Tidal mudflats and sandflats (1140); Reefs (1170)
Knot	W	Tidal mudflats and sandflats (1140)
Dunlin	B	Machair (21A0); Wet heath (4010); Species-rich Nardus grasslands (6230); Molinia meadows (6410); Blanket bogs (7130); Transition mires (7140)
Dunlin	W	Tidal mudflats and sandflats (1140)
Common Sandpiper	B	Oligotrophic isoetid lake habitat (3110); Mixed *Najas flexilus* lake habitat (3130); Hard-water lake habitat (3140); Acid oligotrophic lake habitat (3160); Turloughs (3180); Vegetation of flowing waters (3260)

Species	Season	Habitat
Redshank	B	Machair (21A0); Oligotrophic isoetid lake habitat (3110); Mixed *Najas flexilus* lake habitat (3130); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Turloughs (3180); *Molinia* meadows (6410); Lowland hay meadows (6510); *Cladium* fens (7210); Alkaline fens (7230)
Woodcock	B	Old oak woodland (91A0); Bog woodland (91D0); Alluvial woodland (91E0)
Snipe	B	Saltmarsh (1310-1420); Machair (21A0); Oligotrophic isoetid lake habitat (3110); Mixed *Najas flexilus* lake habitat (3130); Hard-water lake habitat (3140); Rich pondweed lake habitat (3150); Acid oligotrophic lake habitat (3160); Turloughs (3180); Wet heath (4010); Species-rich *Nardus* grasslands (6230); *Molinia* meadows (6410); Hydrophilous tall herb swamp (6430); Lowland hay meadows (6510); Raised bogs (7110-7120); Blanket bogs (7130); Transition mires (7140); *Cladium* fens (7210); Alkaline fens (7230)
Nightjar	B	Wet heath (4010); Dry heath (4030); Raised bogs (7110-7120); Blanket bogs (7130); Transition mires (7140); Old oak woodland (91A0); Bog woodland (91D0); Alluvial woodland (91E0)
Kingfisher	B	Vegetation of flowing waters (3260)
Kestrel	B	Vegetated sea cliffs (1230); Wet heath (4010); Dry heath (4030); Alpine and subalpine heath (4060); Species-rich *Nardus* grasslands (6230); *Molinia* meadows (6410); Raised bogs (7110-7120); Blanket bogs (7130); Transition mires (7140)
Merlin	B	Wet heath (4010); Dry heath (4030); Alpine and subalpine heath (4060); Species-rich *Nardus* grasslands (6230); *Molinia* meadows (6410); Raised bogs (7110-7120); Blanket bogs (7130); Transition mires (7140)
Chough	B	Vegetated sea cliffs (1230); Sand dunes (2110-2190); Machair (21A0); Wet heath (4010); Dry heath (4030); Species-rich *Nardus* grasslands (6230); Sea caves (8330)
Skylark	B	Sand dunes (2110-2190); Machair (21A0); Wet heath (4010); Dry heath (4030); Alpine and subalpine heath (4060); Calcareous grassland (6210); Species-rich *Nardus* grasslands (6230); *Molinia* meadows (6410); Raised bogs (7110-7120); Blanket bogs (7130); Transition mires (7140); *Cladium* fens (7210); Alkaline fens (7230); Limestone pavement (8240)
Ring Ouzel	B	Alpine and subalpine heath (4060); Species-rich *Nardus* grasslands (6230); Rocky slopes and screes (8110-8220)
Whinchat	B	Wet heath (4010); Dry heath (4030); Species-rich *Nardus* grasslands (6230); *Molinia* meadows (6410); Lowland hay meadows (6510)
Grey Wagtail	B	Vegetation of flowing waters (3260)
Meadow Pipit	B	Sand dunes (2110-2190); Machair (21A0); Wet heath (4010); Dry heath (4030); Alpine and subalpine heath (4060); Calcareous grassland (6210); Species-rich *Nardus* grasslands (6230); *Molinia* meadows (6410); Raised bogs (7110-7120); Blanket bogs (7130); Transition mires (7140); *Cladium* fens (7210); Alkaline fens (7230); Limestone pavement (8240)
Twite	B	Vegetated sea cliffs (1230); Saltmarsh (1310-1420); Wet heath (4010); Dry heath (4030); Alpine and subalpine heath (4060); Species-rich *Nardus* grasslands (6230); *Molinia* meadows (6410)

Appendix 2 Data sources

This appendix lists all spatial data sourced for this report, and summarises the initial processing applied to each individual dataset. Additional processing steps that were performed across various datasets are also outlined.

All datasets were transformed to the Irish Transverse Mercator coordinate reference system where appropriate, and consistent names were given to key attributes. All hectad and monad grids created were aligned with the Irish Grid. All bird species or sub-species names and codes were translated to equivalent British Trust for Ornithology 2-character species codes. All bird breeding status or presence codes were translated to the equivalent Bird Atlas presence code (Present, Non-breeding, Breeding Possible, Breeding Probable, Breeding Confirmed).

Source data and initial processing

Protected site data

Natura 2000 Site Boundaries

National Parks and Wildlife Service

https://www.npws.ie/maps-and-data/designated-site-data/download-boundary-data

One spatial layer was created for each type of designated site (SAC Terrestrial, SAC Offshore, SPA Terrestrial, SPA Marine), with associated qualifying interest habitat codes, habitat names, species codes and species names appended as attributes.

Site Specific Conservation Objectives

National Parks and Wildlife Service

https://www.npws.ie/maps-and-data/designated-site-data/ssco-data

One spatial layer was created for each available habitat code associated with focal species, as per Appendix 1. All associated attributes were retained.

SAC and SPA Qualifying Interests

National Parks and Wildlife Service

https://www.npws.ie/maps-and-data/designated-site-data/sac-and-spa-datasheets-downloads

One spatial layer was created for each of SAC Habitat, SAC Species, SPA Species and SPA Type (bird or wetland), with one feature for each site for each habitat, species or type. All associated attributes were retained.

Bird Observations

Bird Atlas 2007-2011

BirdWatch Ireland

All relevant records were consolidated at hectad resolution per species per season type per 5-year span. Summary statistics included highest level of breeding status recorded.

Bird Track

BirdWatch Ireland / British Trust for Ornithology

https://birdwatchireland.ie/our-work/surveys-research/research-surveys/birdtrack/

All relevant records since 2010 were consolidated at hectad resolution per species per season type per 5-year span. Summary statistics included highest level of breeding status recorded.

eBird Basic Dataset

Cornell Lab of Ornithology

https://science.ebird.org/en/use-ebird-data/download-ebird-data-products

All relevant records were consolidated at hectad resolution per species per season type per 5-year span. Summary statistics included highest level of (standardised) breeding status recorded.

Birds of Ireland

National Biodiversity Data Centre

https://maps.biodiversityireland.ie/Dataset/155

All relevant records since 2010 were consolidated at hectad resolution per species per season type per 5-year span. Summary statistics included highest level of (standardised) breeding status recorded.

Countryside Bird Survey

BirdWatch Ireland / National Parks and Wildlife

https://countrysidebirdsurvey.ie/

All relevant records since 2010 were consolidated at monad resolution per species per 5-year span. Summary statistics included number of years of observations with the 5-year span. Records of birds "flying over" were ignored.

Irish Wetland Bird Survey

BirdWatch Ireland / National Parks and Wildlife Service

https://irishwetlandbirdsurvey.ie/

One spatial layer was created with all relevant site mean counts and site peak counts per species for the period 2018/19-2022/23 (as calculated for Article 12 reporting in 2025) allocated to relevant site polygons. All associated attributes were retained.

Bird Hotspots

Farmland Bird Hotspots

BirdWatch Ireland

https://birdwatchireland.ie/our-work/species-habitat-conservation/countryside-wetlands/hotspot-mapping/

One spatial layer at monad resolution was created for each of hotspots and cell scores. All associated attributes were retained.

Habitat Data

Grasslands Monitoring Survey 2015-2017

National Parks and Wildlife Service

https://www.npws.ie/maps-and-data/habitat-and-species-data

One spatial layer per survey per year was created, with each Annex 1 grassland habitat on each site having associated site habitat assessment details assigned.

Floodplain and Callows Grasslands in Ireland 2023

National Parks and Wildlife Service

https://www.npws.ie/maps-and-data/habitat-and-species-data

One spatial layer was created for each of 5 available point and polygon layers. All associated attributes were retained.

Commonage

National Parks and Wildlife Service

https://www.npws.ie/maps-and-data/habitat-and-species-data

One spatial layer was created with one feature per area of commonage, with presence of habitat types I through XVI indicated alongside level of damage where available and relevant. Invalid habitat types in the original dataset were corrected where possible, otherwise ignored. All associated attributes were retained.

Coastal zones

Managed Realignment Area Extents

An extent for managed realignment analysis was created for each of Baldoyle Bay SPA, Castlemaine Harbour SPA, Cork Harbour SPA, Dundalk Bay SPA, Inner Galway Bay SPA, Lough Swilly SPA, Rogerstown Estuary SPA and Tralee Bay Complex SPA. Each extent was defined as being the minimum rectangle - aligned with the ITM coordinate reference system - containing all land withing a 5 km buffer around the exterior of the relevant SPA boundary.

Coastal Zones Land Cover/Land Use 2018 (vector), Europe, 6-yearly

Copernicus Land Monitoring Service

https://land.copernicus.eu/en/products/coastal-zones

A spatial layer was created indicating all developed land within the Managed Realignment Extents. Developed land was deemed to include category codes beginning with 11 (urban, residential, commercial, industrial etc) or 12 (road, rail, port etc).

Water

Rivers and Lakes

Environmental Protection Agency

https://gis.epa.ie/GetData/Download

One spatial layer was created with one polygon feature per lake. All associated attributes were retained.

One spatial layer was created with one line feature per river segment. All associated attributes were retained.

Water Framework Directive Waterbody Status 2016-2021

Environmental Protection Agency

https://gis.epa.ie/GetData/Download

One spatial layer was created for each of coastal, ground, lake, river and transitional water bodies. One feature was created for each waterbody site, with relevant waterbody site status information assigned where available. All associated attributes were retained.

Land Ownership

PRA state assets

Land Development Agency

https://data.gov.ie/dataset/pra-state-assets

One spatial layer was created with one multi-polygon feature per registered owner.

Coillte owned land

Coillte

As provided to the Irish Environmental Network under Access to Information on the Environment requests.

Bord na Móna owned land

Bord na Móna

As provided to the Irish Environmental Network under Access to Information on the Environment requests.

National Park Boundaries

National Parks and Wildlife Service

https://data.gov.ie/dataset/?tags=national+park

One spatial layer was created with one multi-polygon feature for each of the National Parks for which boundary data was available: Wild Nephin, Wicklow Mountains, Killarney, Connemara, Glenveagh and Burren.

Elevation

Digital Terrain Model

NASA

https://www.earthdata.nasa.gov/data/instruments/srtm

The Shuttle Radar Topography Mission (SRTM GL1) at 30 m resolution was reprojected to ITM and used as a measure of land elevation for the managed realignment analysis.

Additional Processing

Specific Species Observations

One spatial layer was created for each of Golden Plover and Lapwing, containing all relevant point observations extracted and consolidated from eBird, Birds of Ireland (NBDC) and Bird Track (BTO) datasets. For Golden Plover, flocks of at least 100 birds observed between the months of October and March inclusive were included. For Lapwing, flocks of at least 100 birds observed between the months of November and February inclusive were included.

Datasets with Habitats Grouped

Versions of the Qualifying Interests, Sand Dune Monitoring Project, Grasslands Monitoring Survey, Article 17 2019 Species Distributions, Article 17 2019 Species Ranges, and Site Specific Conservation Objectives datasets were created with relevant habitat codes grouped into one of Saltmarsh (habitat codes 1310, 1330, 1410, 1420), Sand Dune (2110, 2120, 2130, 2140, 2150, 2170, 2190), Raised Bog (7110 and 7120), or Rocky Slopes and Screes (8110, 8120, 8210, 8220).

Commonage Outside Article 17 Locations

A version of the commonage dataset outside of Article 17 species or habitat distributions was created using all Article 17 distributions defined by actual boundary polygons rather than rectangular approximations.

Article 17 Merging of Floodplain and Callows

One spatial layer was created containing all available polygon definitions of floodplain and callows sites spatially merged with all available polygon definitions of floodplain and callows vegetation. All associated attributes were retained.

Public Land

Public land was identified by incrementally appending additional parcels of Coillte owned land, then Bord na Móna owned land, then National Park boundaries, to the polygon definitions of state-owned land as published by the Property Registration Authority.

Managed Realignment

Within the defined Managed Realignment Area Extents, Water Framework Directive spatial definitions of coastal and transitional water were removed to define available land. The SRTM GL1 digital terrain model published by NASA was used to identify the subset of such land that exists at an elevation suitable for managed realignment based on site-specific sea-water threshold elevations. Developed land (based on Coastal Zones Land Cover/Land Use 2018 data published by Copernicus) was then excluded. The remaining land was deemed potentially suitable for managed realignment.

Appendix 3 Marine IBAs for seabirds that have triggering species that are listed as focal species

The marine IBAs for seabirds that have triggering species that are listed as focal species as in Section 6.2.2 and would be ideal target areas for restoration or further investigation are listed below. The protection status of these IBAs (whether they need SPA designation or their corresponding SPAs need additional QI species) is also listed here. Additional seabirds have also triggered these IBAs or can be found at these IBAs but are not listed here.

Marine IBA name	**IBA triggering species**	**Protection Status**
North Donegal coast and islands marine extension	Atlantic Puffin, Black-legged Kittiwake, Sandwich Tern	Needs SPA designation
Árainn Mhór marine extension	Black-legged Kittiwake	Needs SPA designation
Roaninish marine extension	Arctic Tern, Black legged Kittiwake, European Storm petrel	Needs SPA designation
Rathlin O'Birne - Malin Beg marine extension	Black-legged Kittiwake	Needs SPA designation
Outer Donegal Bay (marine extension)	Black-legged kittiwake	Needs SPA designation
North Mayo coast and islands marine extension	Atlantic Puffin, Black-legged Kittiwake, European Storm-petrel	Needs SPA designation
Inishkea Inishglora Duvillaun complex marine extension	Arctic Tern, European Storm-petrel	Needs SPA designation
Clew Bay	Little Tern	Needs SPA designation
South Mayo - North Connemara Islands marine extension	Arctic Tern, Atlantic Puffin, Black-legged Kittiwake, European Storm petrel, Manx Shearwater	Needs SPA designation
Northeast Irish Sea	Black-legged Kittiwake, Manx Shearwater	The Northwest Irish Sea cSPA partially covers this IBA. There are missing QI species, but none are NRR focal species.
Dublin Islands & cliff marine extension	Atlantic Puffin, Black-legged Kittiwake, Common Tern, Manx Shearwater, Roseate Tern	The Northwest Irish Sea cSPA partially covers this IBA. There are missing QI species, but none are NRR focal species.
Wicklow Murrough marine extension	Little Tern,	The Murrough SPA covers this IBA, but there are no Little Terns or seabirds on the QI list.
Greater Galway Bay Inner marine extension	Arctic Tern, Atlantic Puffin, Black-legged Kittiwake, Common Tern, Little Tern, Manx Shearwater, Sandwich Tern	Needs SPA designation

Marine IBA name	IBA triggering species	Protection Status
Greater Galway Bay Outer marine extension	Manx Shearwater	Needs SPA designation
Magharees and Tralee Bay marine extension	Manx shearwater	Needs SPA designation
Blasket Islands marine extension	Black-legged Kittiwake, European Storm-petrel, Manx Shearwater	Needs SPA designation
Mid Waterford marine extension	Black-legged kittiwake	Needs SPA designation
Saltees- Lady's Island marine extension	Arctic Tern, Atlantic Puffin, Black-legged kittiwake, Common Tern, Little Tern, Manx Shearwater, Roseate Tern, Sandwich Tern	The Seas of Wexford cSPA partially covers this IBA. All IBA triggering species are included in the QI list.
Skelligs - Doulus - Lamb's Head marine extension	Atlantic Puffin, Black-legged Kittiwake, European Storm-petrel, Manx Shearwater	Needs SPA designation
Northeast Celtic Sea	Black-legged kittiwake, Manx Shearwater,	The Seas of Wexford cSPA partially covers this IBA. All IBA triggering species are included in the QI list.
Old Head of Kinsale marine extension	Black-legged kittiwake,	Needs SPA designation
Bull and Cow Rocks marine extension	Black-legged Kittiwake, European Storm-Petrel	The Bull and The Cow Rocks SPA covers this IBA, but Black-legged Kittiwakes are not included in the QI list.