

Bird Sensitivity Mapping

for wind energy developments in Ireland



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Overview

4pm (GMT)

- The journey to date
- Development of the mapping tool
- Mobilisation of mapping tool – delivery of training
- Successes so far
- Next steps



BirdWatch Ireland

Membership supported, science-based

- > 15,000 members and 28 branches
- Funded by membership subscriptions, donations, grants and sponsorship.
- Active in research and monitoring, practical conservation work, education, policy and advocacy.



Bird Study

Publication details, including instructions for authors and subscription information:
<http://www.informaworld.com/supp/title-content=1904369352>

Population trends of widespread breeding birds in the Republic of Ireland 1998-2008

Olivia Crowe^a, Richard H. Coombes^b, Liam Lysaght^c, Cliona O'Brien^d, Kingshek Roy Choudhury^e, Alyn J. Walsh^f, John H. Wilson^g, John O'Halloran^h
^a BirdWatch Ireland, Unit 20 Block D, Bullford Business Campus, Kilcoole, Co. Wicklow, Ireland ^b Department of Zoology, Ecology & Plant Science, University College Cork, Cork, Ireland ^c National Biodiversity Data Centre, Beechfield House, Carriganeer WIT West Campus, County Waterford, Ireland ^d The Heritage Council, Áras na hOidhreachta, Killoenny, Ireland ^e Statistics Department, University College Cork, Cork, Ireland ^f Wexford Wildfowl Reserve, Noerla Slab, Wexford, Ireland ^g National Parks and Wildlife Service, Dublin 2, Ireland



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In favour of wind energy

Supporting Ireland's renewable energy targets – Policy & legislative framework

- Climate change – threat to global biodiversity and human well-being.
- Ireland has obligations under the European Union's Birds and Habitats Directives. The **Birds and Habitats Directives** form the cornerstones of Europe's legislation on nature conservation.
- *“wildlife sensitivity maps will also help to avoid potential conflicts with the provisions of article 5 of the Birds Directive and 12 & 13 of the Habitats Directive as regards the need to protect species of EU importance throughout their entire natural range within the EU.”*

European Commission's Guidance on Wind Energy Development and Natura 2000 (2011)



In favour of wind energy

Ensuring compliance and strengthening protection



European Court of Justice Case "**The Birds Case**" (C-418/04):

Ireland found guilty of failing to properly transpose and implement obligations of **Birds** (2009/147/EC) and **Habitats** (92/43/EEC) **Directives** into Irish legislation

Key issue: **Lack of coherent strategy** for protection of "*priority, migratory and dispersed*" bird species in the wider countryside (i.e. outside of protected areas)



ACTION PLAN FOR
LOWLAND FARMLAND BIRDS
IN IRELAND 2011-2020



ACTION PLAN FOR
UPLAND BIRDS
IN IRELAND 2011-2020



ACTION PLAN FOR
MARINE AND SEA CLIFF BIRDS
IN IRELAND 2011-2020



ACTION PLAN FOR
WOODLAND AND SCRUB BIRDS
IN IRELAND 2011-2020

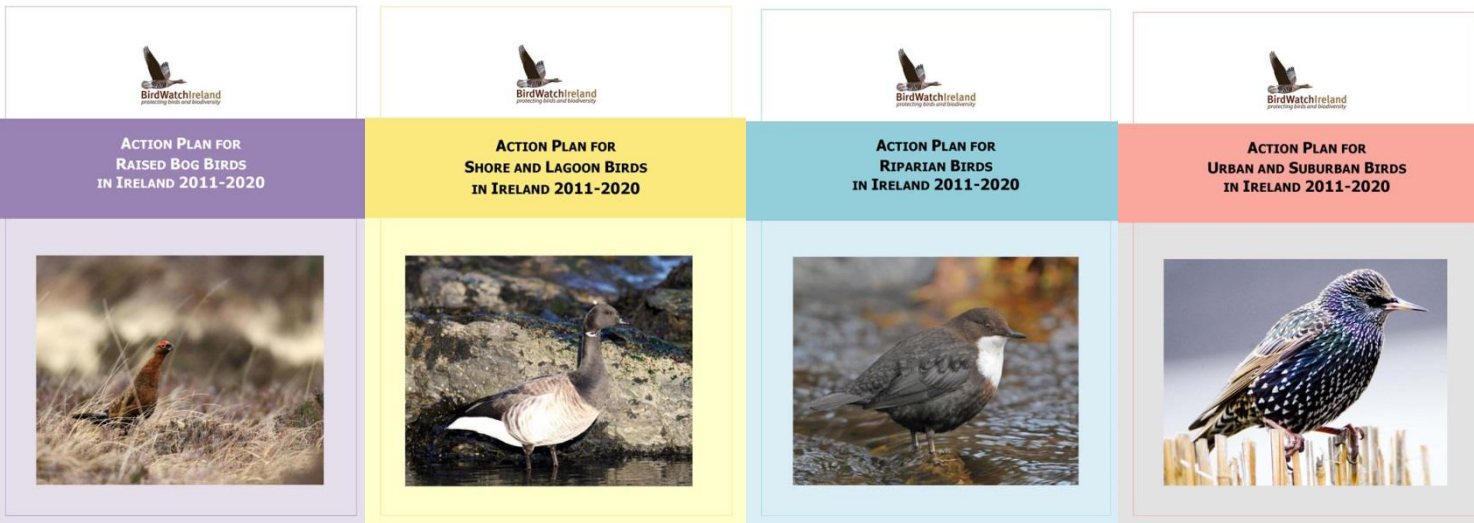


Group Species Action Plans

Ensuring compliance and strengthening protection

- **10 Group Action Plans (GAPS)** for Irish Birds developed by BirdWatch Ireland (Stakeholder consultation) – provide framework to help address **ECJ Judgement**
- Stakeholder input and support key to implementing actions: progress on cross-departmental and sectorial **cooperation vitally important**.
- Key cross-cutting priority across 10 GAPS = Develop ecologically sound land-use planning strategies using **spatial tools** e.g. Bird Sensitivity Mapping

→ **Identify the most vulnerable areas to Wind Energy Developments**



What is Sensitivity Mapping?

- A means to achieving our renewable energy targets without adversely impacting on our obligations under the European Union's Nature Directives
- Measured spatial indication of where protected species are likely to be perturbed by change
- Does not create no-go areas
- Not indicative of species presence/absence
- Uses existing data
- Stakeholder involvement



Potential impacts of wind energy on birds

- Collision
- Displacement disturbance
- Habitat loss/habitat change
- Barrier effects

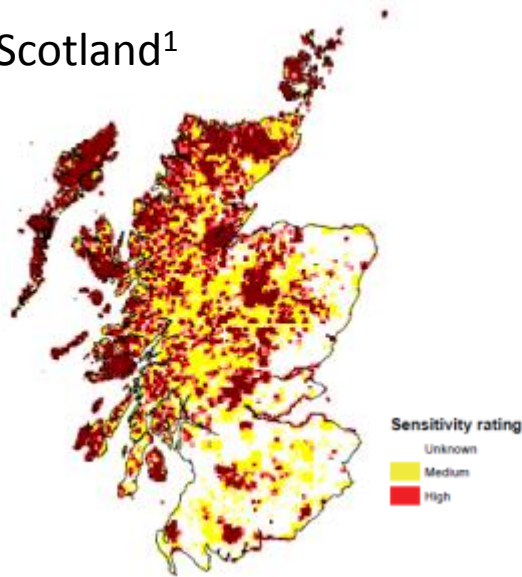


Sensitivity Mapping: International

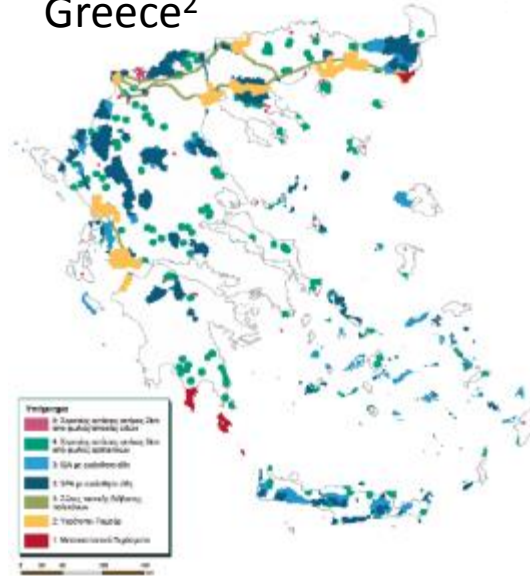
Country / Region	Species/areas mapped	Scoring criteria	Resolution	Sensitivity categories	Reference
Scotland	18 species of conservation concern	Literature and expert review	1 km square	High, Medium, Low/Unknown	Bright <i>et al.</i> (2008)
England	12 species of conservation concern	Literature and expert review	1 km square	High, Medium, Low/Unknown	Bright <i>et al.</i> (2009)
Netherlands	Group species approach	Species richness	1 km square	Highest , High, Average, Low	Aarts & Bruinzeel (2009)
South Africa	105 species	Literature and expert review	7.8 x 8 km "square"	High, Medium, Low	Retief <i>et al.</i> (2010)
USA	IBAs, migratory corridors, Critical Habitat locations, Range strongholds	Literature and expert review	50 km square	Critical importance, High importance, Potential risk	American Bird Conservancy
Rift Valley/Red Sea flyway	37 migratory soaring birds	Literature and expert review	50 km square	High, Medium, Low/Unknown	Strix <i>et al.</i> (in prep)
Greece	SPAs, IBAs, Ramsar Wetlands, Pelican flyways, Raptor nests, seabird colonies			Wind energy exclusion zones	Dimalaxis <i>et al.</i> (2010)
Germany	26 species of seabirds	Literature and expert review	c. 120 km square	Major concern, Less concern, Concern	Garthe & Huppopp (2004)
Denmark	38 migrants (seabirds, raptors, passerines etc.)	Literature review	case study of 1 wind farm	High, Medium and Low priority species	Desholm (2009)
Slovenia	35 species, congregatory areas and reserves	Literature and expert review	1 km square	High, Medium, Low/Unknown	Bordjan <i>et al.</i> (2012)
Flanders (Belgium)	Group species approach		500m square	High, Medium, Possible, Low	Everaert (2011)

Sensitivity Mapping examples

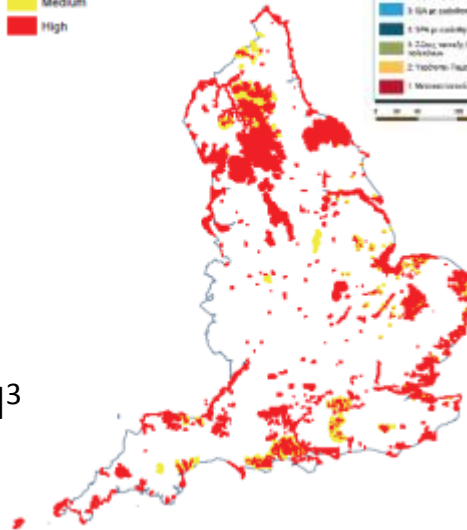
Scotland¹



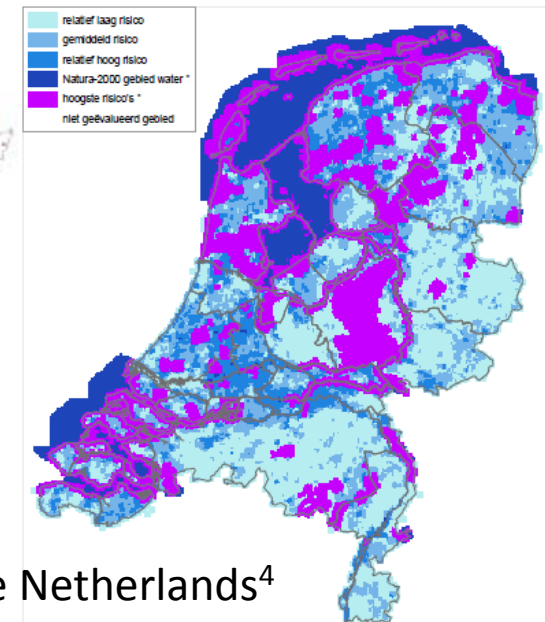
Greece²



England³



The Netherlands⁴



- 1 Bright et al. (2008). Map of bird sensitivities to wind farms in Scotland: A tool to aid planning and conservation. *Biological Conservation*, 141, 2342–2356.
- 2 Dimalexis et al. (2010). *Identification and mapping of sensitive bird areas to wind farms in Greece*. Athens: Hellenic Ornithological Society.
- 3 Bright et al. (2009). *Mapped and written guidance in relation to birds and onshore wind energy development in England*. RSPB Research Report No 35. A report by the Royal Society for the Protection of Birds, funded by the RSPB and Natural England.
- 4 Aarts & Bruinzeel (2008). *De nationale windmolenrisicokaart voor vogels*. Report commissioned by Vogelbescherming Nederland.

Previous work in Ireland

Piloting Sensitivity Mapping for Irish birds

- Pilot approach for Whooper Swan
- Funded by Irish Environmental Network, 2010

Scoping best practice and methodology required for a breeding wader Sensitivity Map

- Scoping methodology for mapping breeding waders
- Funded by the Heritage Council, 2012

Bird Sensitivity Map for Ireland (Phase 1)

- Methodology determined, three draft layers produced, High Level Stakeholder Group established
- Funded by Sustainable Energy Authority of Ireland, 2012

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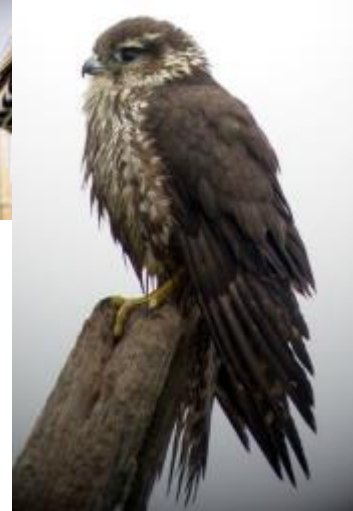
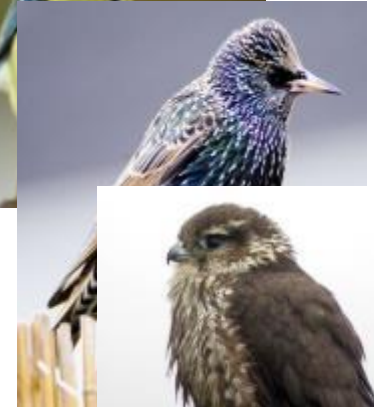
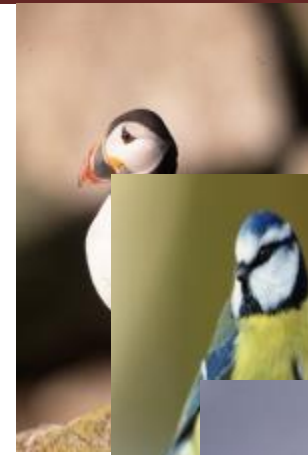
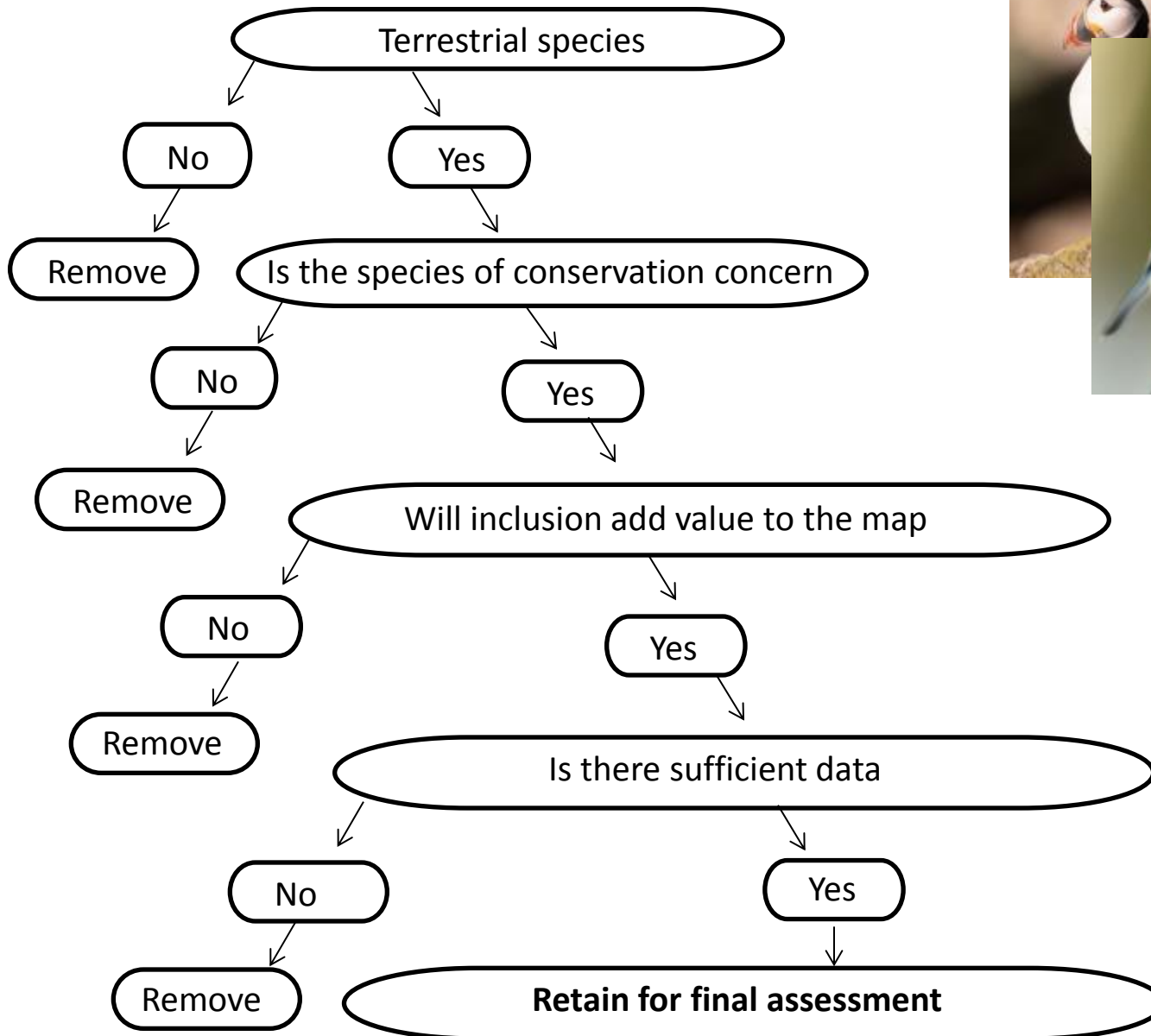
Full Republic of Ireland Sensitivity Map (Phase 2+3)

- Various funders and collaborators
- Scoping for All-Ireland map

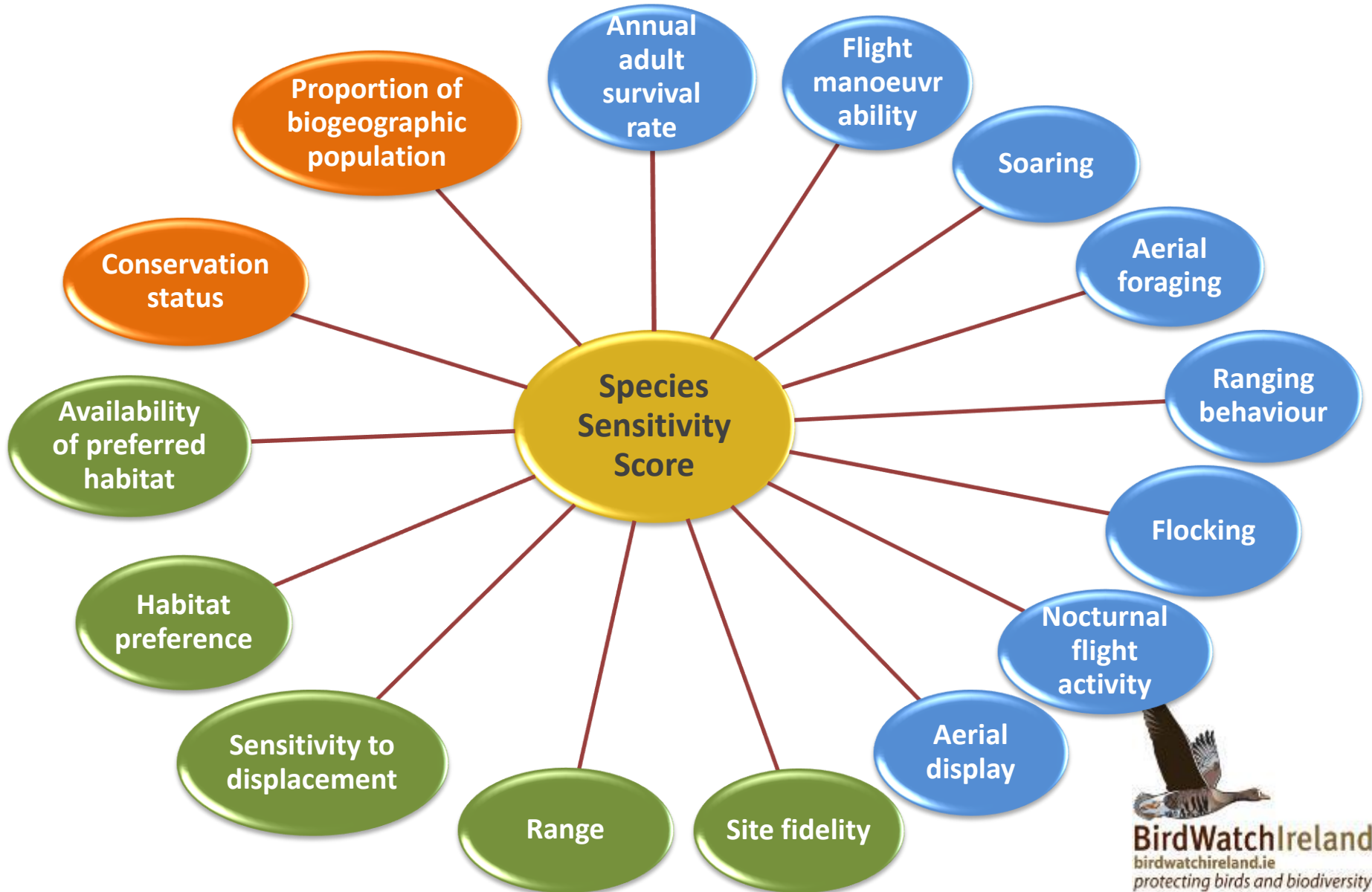


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Species selection



Species Sensitivity Index



Calculating the Sensitivity Index

Score	Annex I of the Birds Directive	EU SPEC	BoCCI	Proportion of flyway & BiE2 - (euro breeding/wintering) popn
Score 4	Yes	SPEC 1	Red	>50%
Score 3		SPEC 2		26-50%
Score 2		SPEC 3	Amber	11-25%
Score 1				1-10%
Score 0	No	SPEC 4	Green	<1%

Conservation Score

Flight Vulnerability

Species	Adult annual survival rate	Flight Manoeuvrability	Soaring	Predatory / aerial forager	Ranging Behaviour	Flocking	Nocturnal flight activity	Aerial Display
Score 4	>0.85-1.00	Very Low	Always		Very wide range		Act at night	
Score 3	>0.70-0.85	Low	Usually	Highly	Long, daily commuter			
Score 2	>0.60-0.70	Medium	Regularly		Wide	Always	Crepuscular	Frequent
Score 1	>0.50-0.60	High	Sometimes	Partially	Local movements	Sometimes		Occasional
Score 0		Very High	Never	Never	Sedentary	Never	Diurnal	Never

Species	Range in Ireland	Site fidelity	Availability of preferred habitat	Habitat Preference	Sensitivity to displacement
Score 4	Very limited range	High	Low	Open	High
Score 3	Limited range				
Score 2	Localised	Med	Med	Semi-open	Medium
Score 1	Widely distributed				
Score 0	Very widely distributed	Low	High	Closed	Low

Habitat Vulnerability



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Calculating the Sensitivity Index

Species Sensitivity Score (SSS) =

Max. Conservation Score

X

Average [Flight Vulnerability Scores]

+

Average [Habitat Vulnerability Scores]

- Characteristics often overlap (i.e. collinear)
- Avoid inflation / stretching of range



Species List

Top 30 Species

Golden Eagle	Whooper Swan
Common Scoter	Chough
Red-throated Diver	Hen Harrier
Twite	Curlew (Breeding)
Dunlin (Breeding)	Red Kite
Golden Plover (Breeding)	Merlin
Sandwich Tern	Barn Owl
Bewick's Swan	Light-bellied Brent Goose
Common Tern	Black-headed Gull
White-tailed Eagle	Peregrine Falcon
Barnacle Goose	Common Gull
Greenland White-fronted Goose	Greylag Goose
Lapwing (Breeding)	Red Grouse
Redshank (Breeding)	Lesser Black-backed Gull
Corncrake	Grey Partridge



External consultation

7 factors - more subjective in nature:

Flight Vulnerability

1. Flight manoeuvrability
2. Soaring/flying at turbine height
3. Ranging behaviour
4. Aerial display

Habitat Vulnerability

1. Site fidelity
2. Availability of preferred habitat
3. Sensitivity to disturbance/displacement



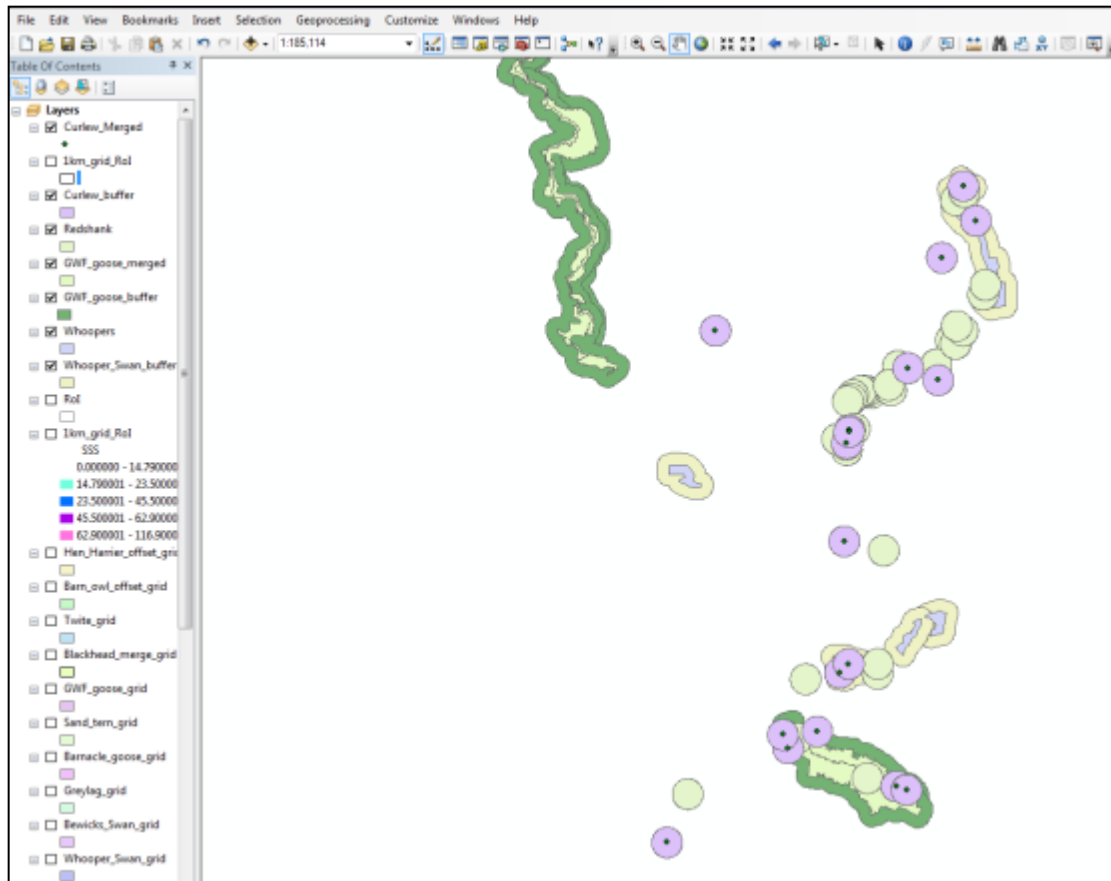
External consultation

	A	B	C	D	E
1	Site fidelity: This factor was included to account for disturbance displacement associated with species with high levels of site fidelity. Species that exhibit site fidelity are likely to incur greater negative impacts as a result of habitat damage compared to species that are less tied to specific sites.			Proposed change	Comments If you have any comments or information you would like to share please do so here or on a separate page.
2			High	If you think a change should be made please do so using the drop down menu in the cells below.	
3			Medium		
4			Low		
5					
6	Golden Eagle	<i>Aquila chrysaetos</i>	High	High	
7	Red-throated Diver	<i>Gavia stellata</i>	High	No Change	
8	Sandwich Tern	<i>Sterna sandvicensis</i>	High	High	
9	Breeding Curlew	<i>Numenius arquata</i>	High	Medium	
10	Breeding Dunlin	<i>Calidris alpina</i>	High	Low	
11	Breeding Golden Plover	<i>Pluvialis apricaria</i>	High	No Change	
12	Common Tern	<i>Sterna hirundo</i>	High	No Change	
13	Bewick's Swan	<i>Cygnus columbianus bewickii</i>	High	No Change	
14	Barnacle Goose	<i>Branta leucopsis</i>	High	No Change	
15	White-tailed Eagle	<i>Haliaeetus albicilla</i>	High	No Change	
16	Greenland White-fronted Goose	<i>Anser albifrons flavirostris</i>	High	No Change	
17	Breeding Lapwing	<i>Vanellus vanellus</i>	High	No Change	
18	Whooper Swan	<i>Cygnus cygnus</i>	High	No Change	
19	Breeding Redshank	<i>Tringa totanus</i>	High	No Change	
20	Greylag Goose	<i>Anser anser</i>	High	No Change	
21	Chough	<i>Pyrrhocorax pyrrhocorax</i>	High	No Change	
22	Hen Harrier	<i>Circus cyaneus</i>	High	No Change	

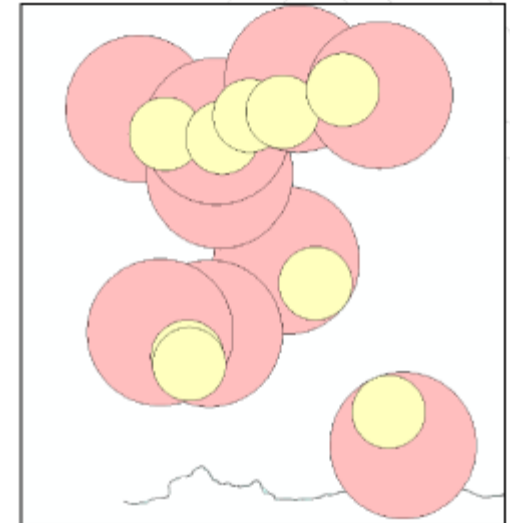


Zones of sensitivity

- Internal + external consultation and consensus
- Individual radius distance for each



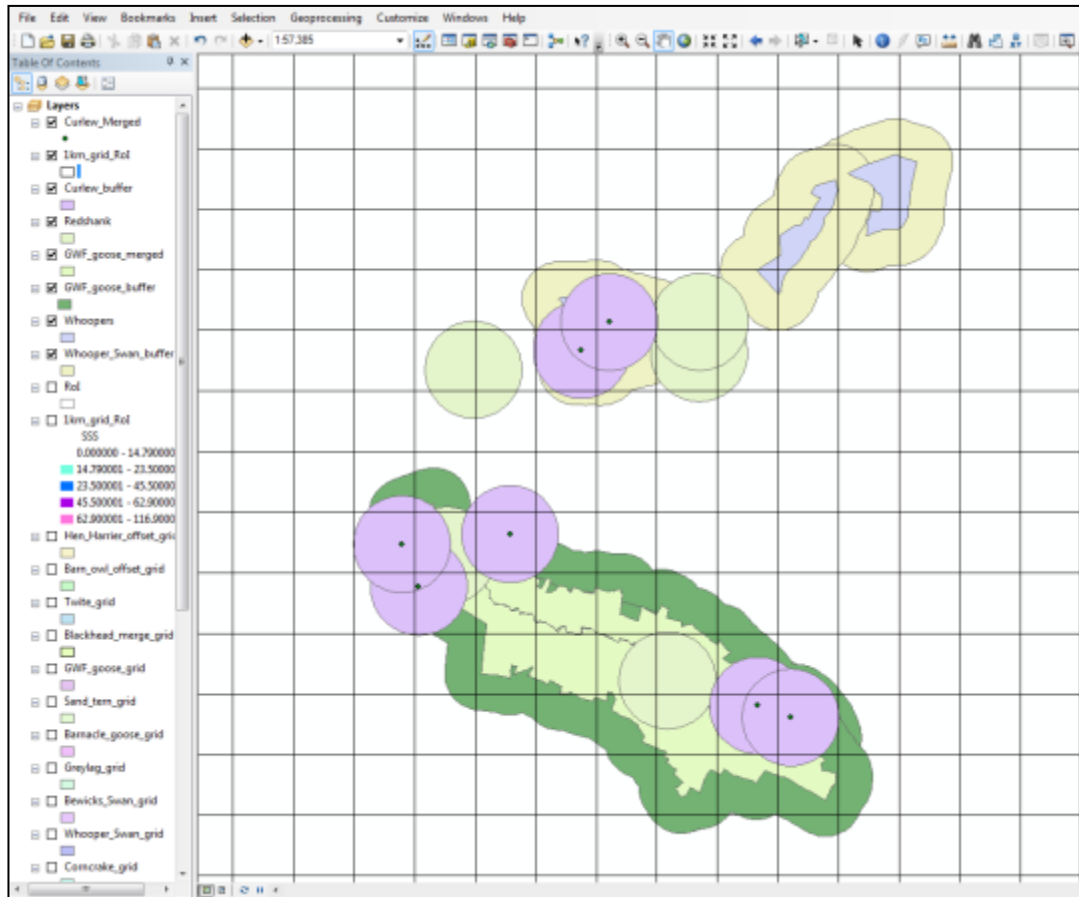
Raptors: Random offset



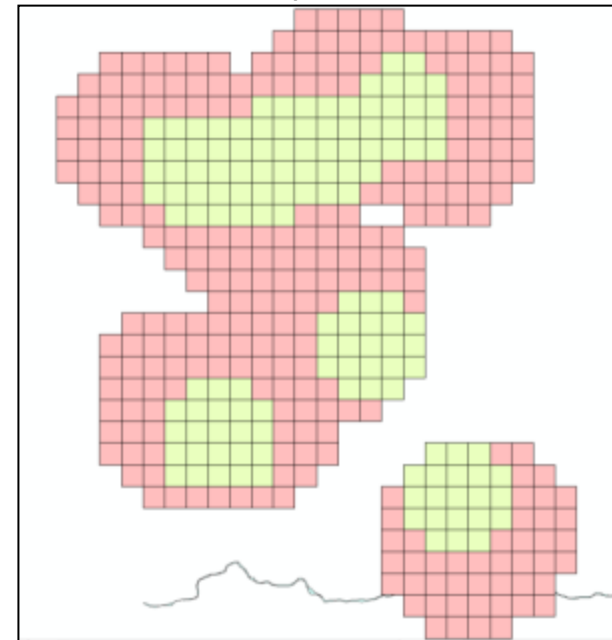
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Sensitivity Mapping

Overlaid with 1km grid

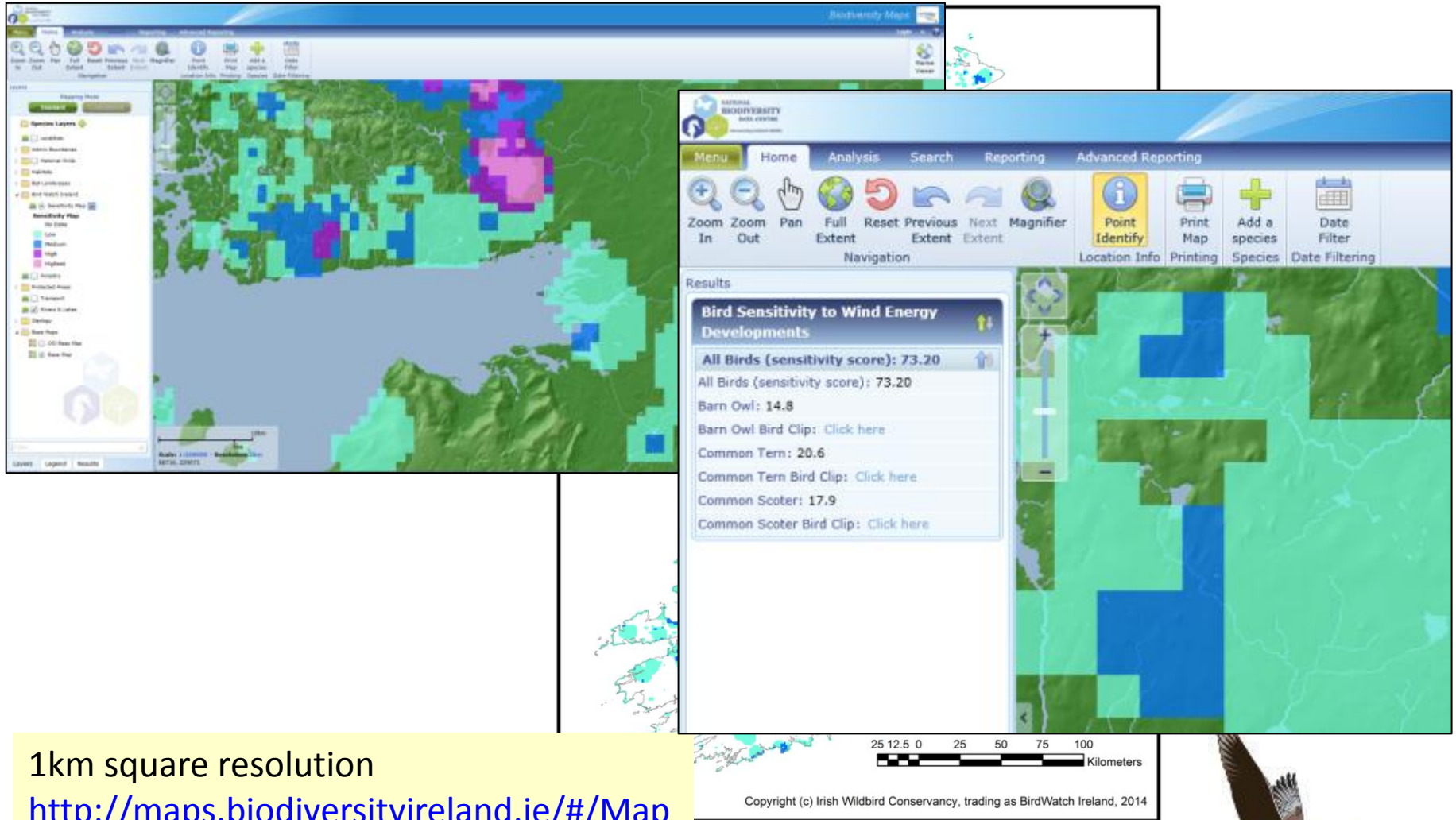


Raptors



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Online Mapping Tool



1km square resolution

<http://maps.biodiversityireland.ie/#/Map>

Graduated colour scheme used according to Species Sensitivity and Species Richness



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Sensitivity Mapping

Greylag Goose *Anser anser*



Conservation Status in Ireland: Amber listed

BirdWatch Ireland Species Sensitivity Score: 19.0

Vulnerability attributes/assessment: Sensitive to habitat loss

References/metadata: Irish Wetland Bird Survey (I-WeBS)

Status in Europe: Secure

Typical Lifespan: 8 years

Diet: Roots of rushes and sedges, though increasingly cereal stubble, potatoes and grassland

Habitat: Reedbeds and marshes of estuaries and lakes, low-lying wetlands and grasslands

For further information click below

[Greylag Goose Species Guidance \(300KB pdf\)](#)

[Guidance Document - Bird Sensitivity Mapping for Wind Energy Developments \(3MB pdf\)](#)

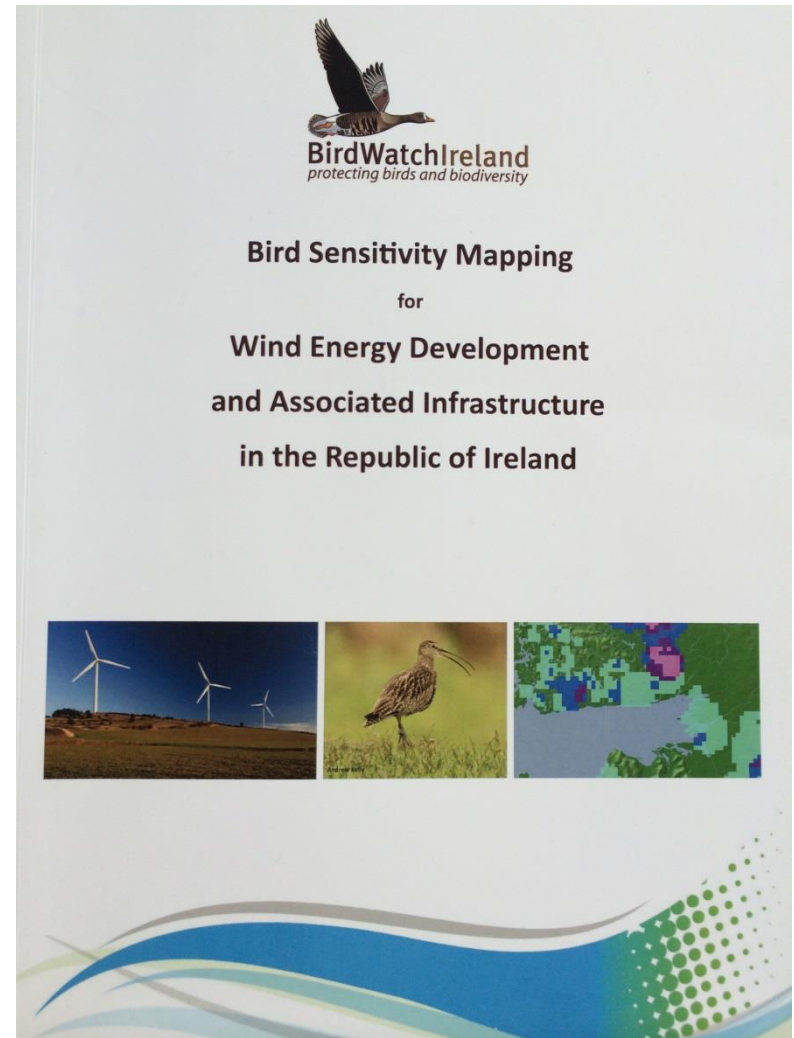


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Guidance document

- Detailed guidance document
Requirement for mapping
 - Existing research
 - Detailed methodology
 - Species-level guidance

http://www.birdwatchireland.ie/portals/0/POLICY/Guidance_document.pdf



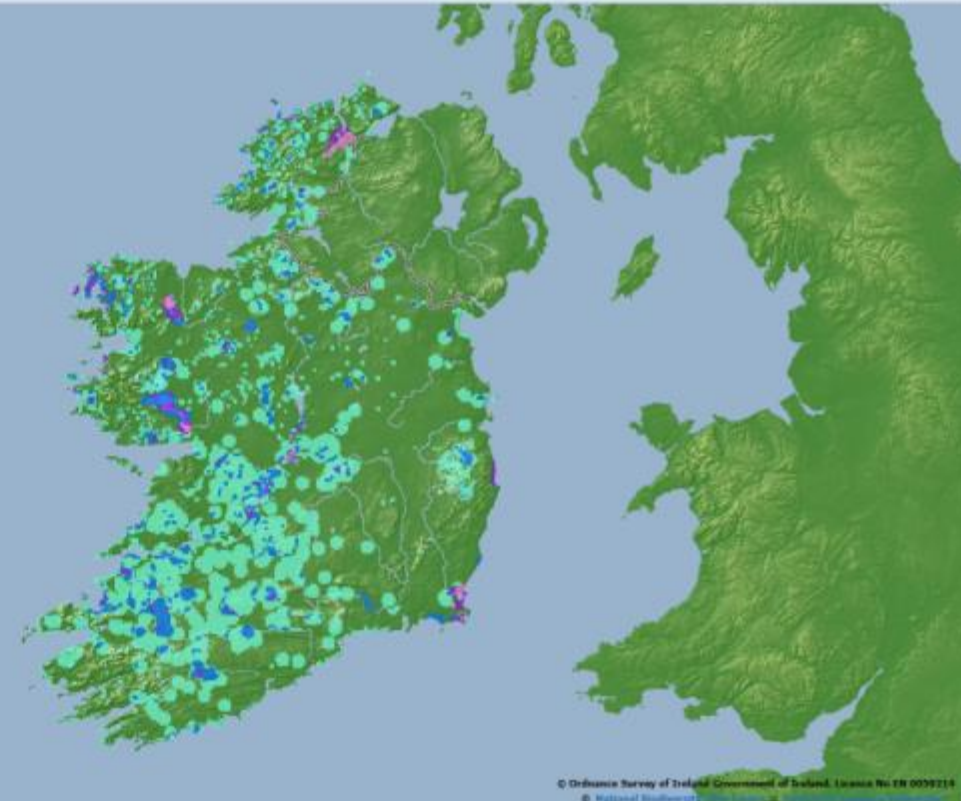
Layers

Mapping Mode: **Standard** | Customised

- Species Layers
 - Localities
 - Admin Boundaries
 - National Grids
 - Habitats
 - Bat Landscapes
 - BirdWatch Ireland
 - Bird Sensitivity to Wind Energy Develop
 - Bird Sensitivity to Wind Energy Devel**
 - No Data
 - Low
 - Medium
 - High
 - Highest
 - Forestry
 - Protected Areas
 - Transport
 - Rivers & Lakes
 - Denlogy
 - Base Maps
 - OS Base Map
 - Base Map

Vertical scroll bar

Scale: 1:2500000 - Resolution: 10km
-419066, 439500



Navigation icons: Zoom In, Zoom Out, Pan, Full Extent, Reset Extent, Previous Extent, Next Extent, Magnifier

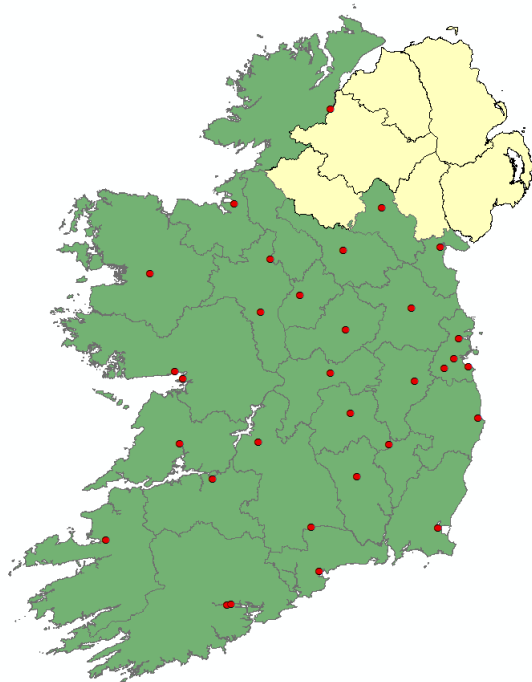
Advanced Reporting icons: Point Identify, Print Map, Add a species, Date Filter

Results
Bird Sensitivity to Wind Energy Developments
All Birds (sensitivity score): 56.40
All Birds (sensitivity score): 56.40
Barnacle Goose: 18.7
Barnacle Goose Bird Clip: [Click here](#)
Whooper Swan: 19.8
Whooper Swan Bird Clip: [Click here](#)
Corncrake: 17.9
Corncrake Bird Clip: [Click here](#)



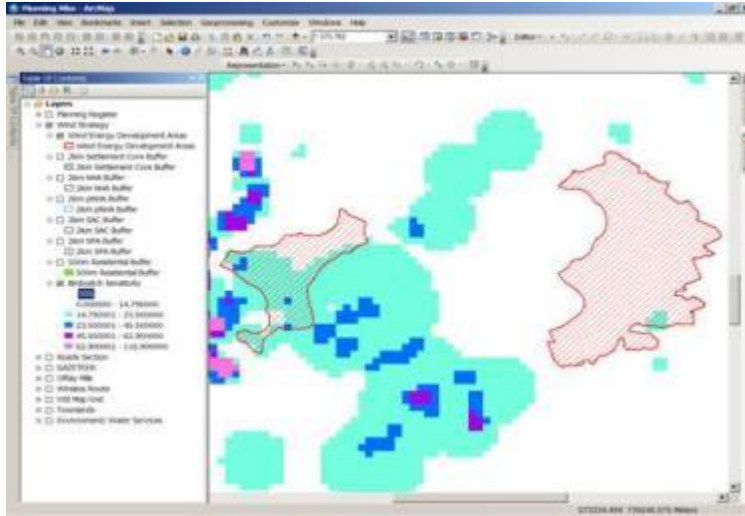
Mobilisation of the tool

- 27 / 31 Local Authorities + DECLG
- 10 workshops
- 100 participants
- All 26 counties

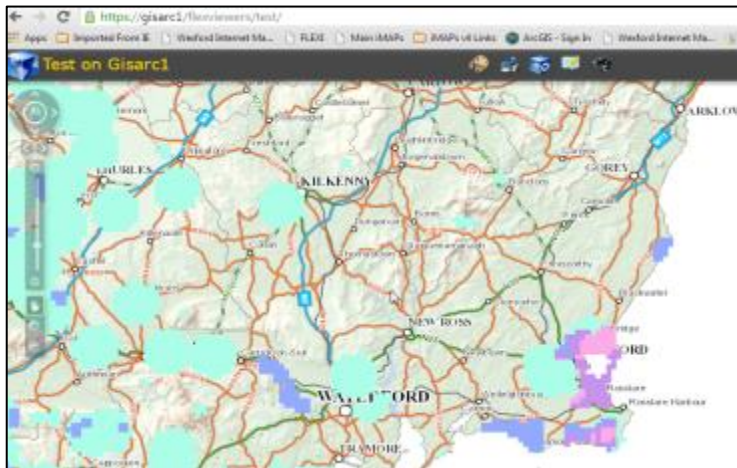


Local Authority GIS

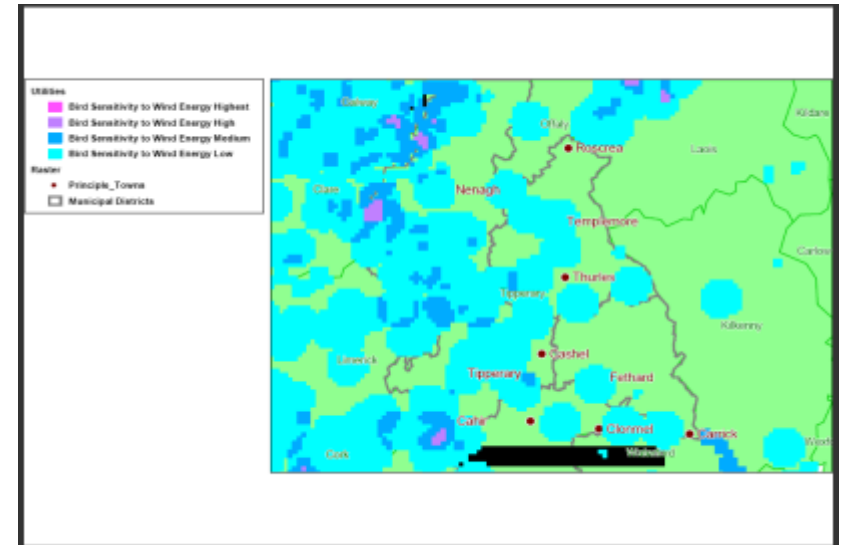
Offaly Local Authority



Wexford Local Authority



Tipperary Local Authority

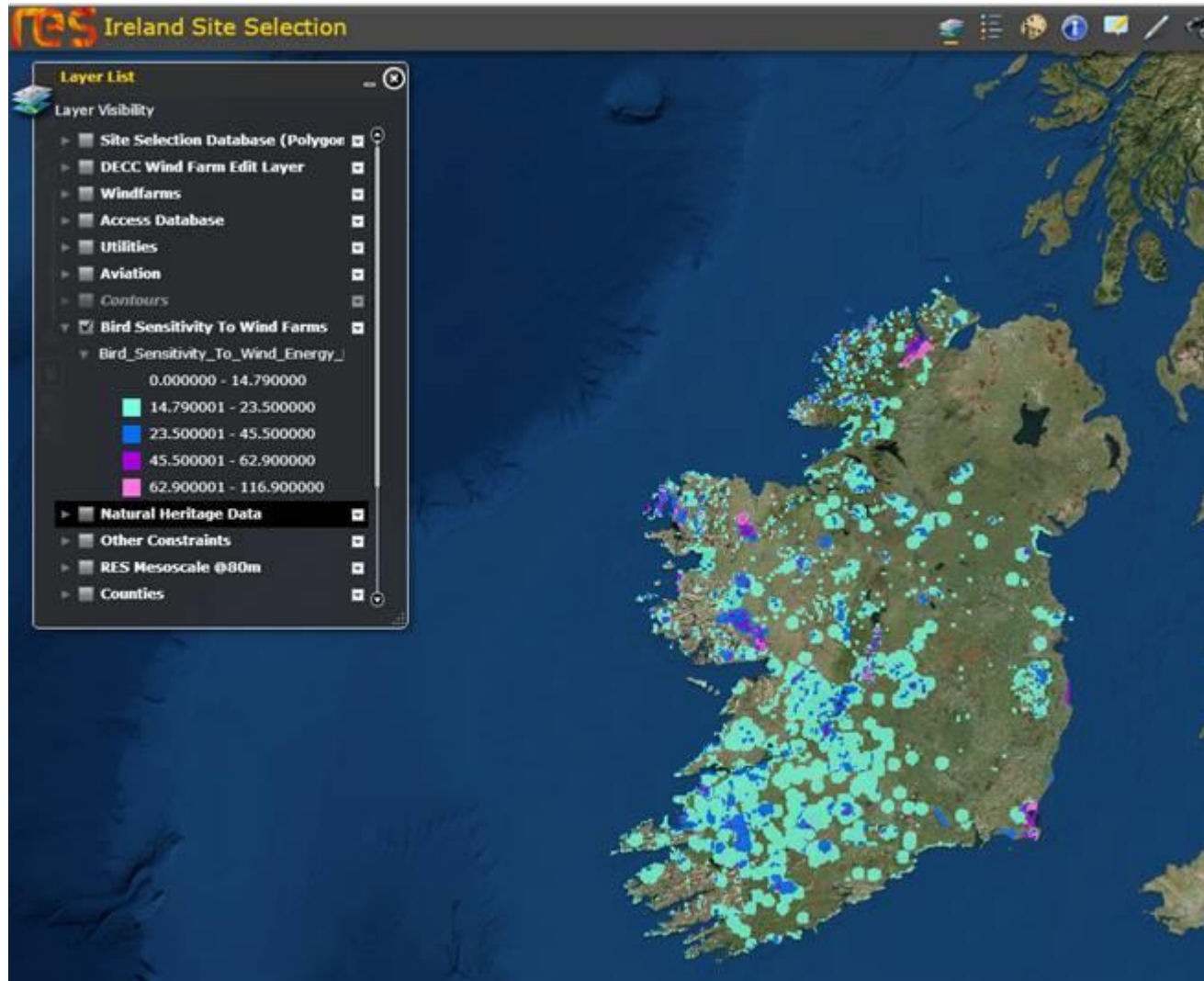


REST Service Endpoint – on request



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Industry



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Wider Awareness Raising

CONFERENCES & SUBMISSIONS

- *BirdLife International Workshop – Wildlife Spatial Planning*, Cambridge, UK, Sept 2015.
- *Conference on Wind Energy and Wildlife Impacts* – Berlin, March 2015
- *Planning for Energy Infrastructure* – October 2014
- *Green Paper - Priority 3 'Planning and Implementing Essential Energy Infrastructure'* – October 2014
- *Green Paper - Priority 5: "Putting the Energy System on a Sustainable Pathway"* – November 2014

Publications – “Spatial Planning for Wildlife” –

Book Chapter (in prep). Authors: Jenny Bright (Bright Ecology) & Caoimhe Muldoon (BirdWatch Ireland)



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Next steps – Map for Offshore Renewables in Ireland

Example- Mapping Seabirds Sensitivity to Offshore Windfarms in English territorial waters

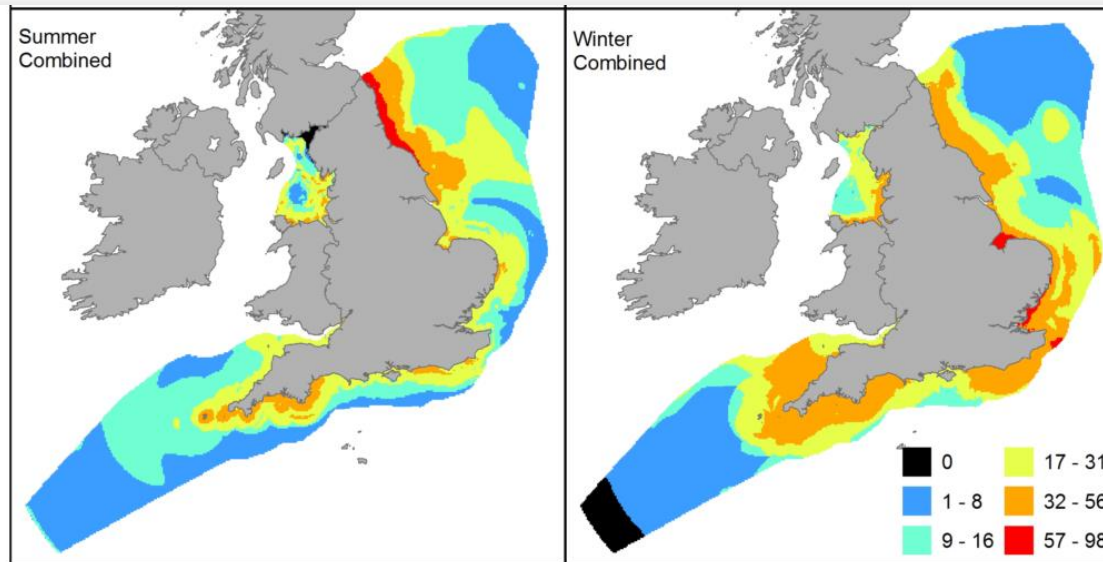


Figure 6. Wind farm sensitivity maps from SeaMaST. The maps were produced by using highest densities from either the boat or aerial density predictions where the CV was less than 0.3 and excluding predictions with CVs higher than 0.5. The natural log of the density (plus one) was then multiplied by each species wind farm collision sensitivity or displacement score and the resulting value summed across species in each 3 km×3 km grid cell. Note where neither dataset had predicted densities with CVs <0.5 the resulting score is exactly zero and highlights areas where across all species coverage and model fits were poor. Summer and winter maps use the same scale.

doi:10.1371/journal.pone.0106366.g006

* Bradbury, G. et al., 2014. Mapping Seabird Sensitivity to Offshore Wind Farms. *PLoS ONE*, 9(9)



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Acknowledgements

Thank you



Sinéad Cummins
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Policy, Communications & People Engagement
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www.birdwatchireland.ie

Picture credits

Chough (Shay Connolly), Curlew (Shay Connolly), Yellowhammer (Andrew Kelly), Grey Heron (Oran O'Sullivan), Redshank (Brian Caffrey), Sparrowhawk (Andrew Kelly), Great Black-backed Gull, Ringed Plover (Alan Lauder), Yellowhammer (Billy Clarke), Greenland White-fronted Goose (John Carey), Puffin (Shay Connolly), Red-throated Diver (Ken Kinsella), Lapwing (Anthony McGeehan), birdwatchers (John Lombard), Red Kite (John Carey), Kestrel (Shay Connolly), wind turbine (Dick Coombes), Puffin over sea pool (Shay Connolly)