Sensitivity Mapping LIPU & BirdLife International

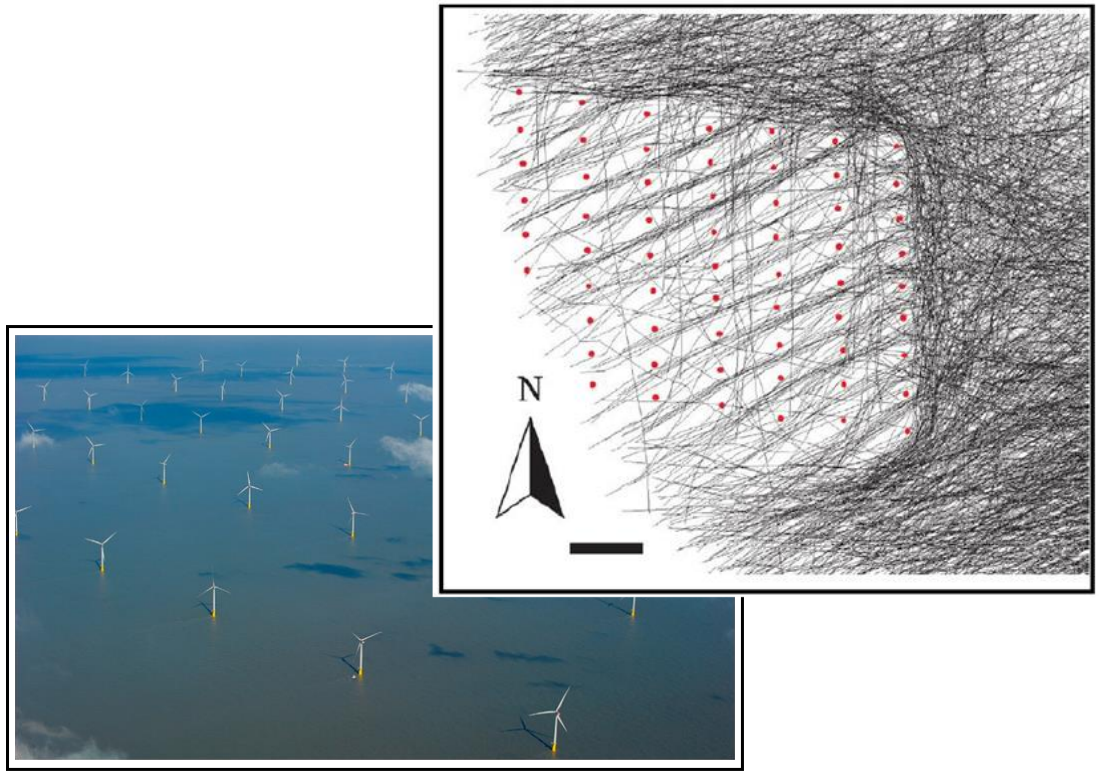
Ideas that fly.

Climate change is a major threat to biodiversity, including birds, and people.

We need a rapid and just transition to renewable energy.

Biodiversity impacts

- Collision with turbines
- Displacement from a favoured habitat or create a barrier to daily movements or migration



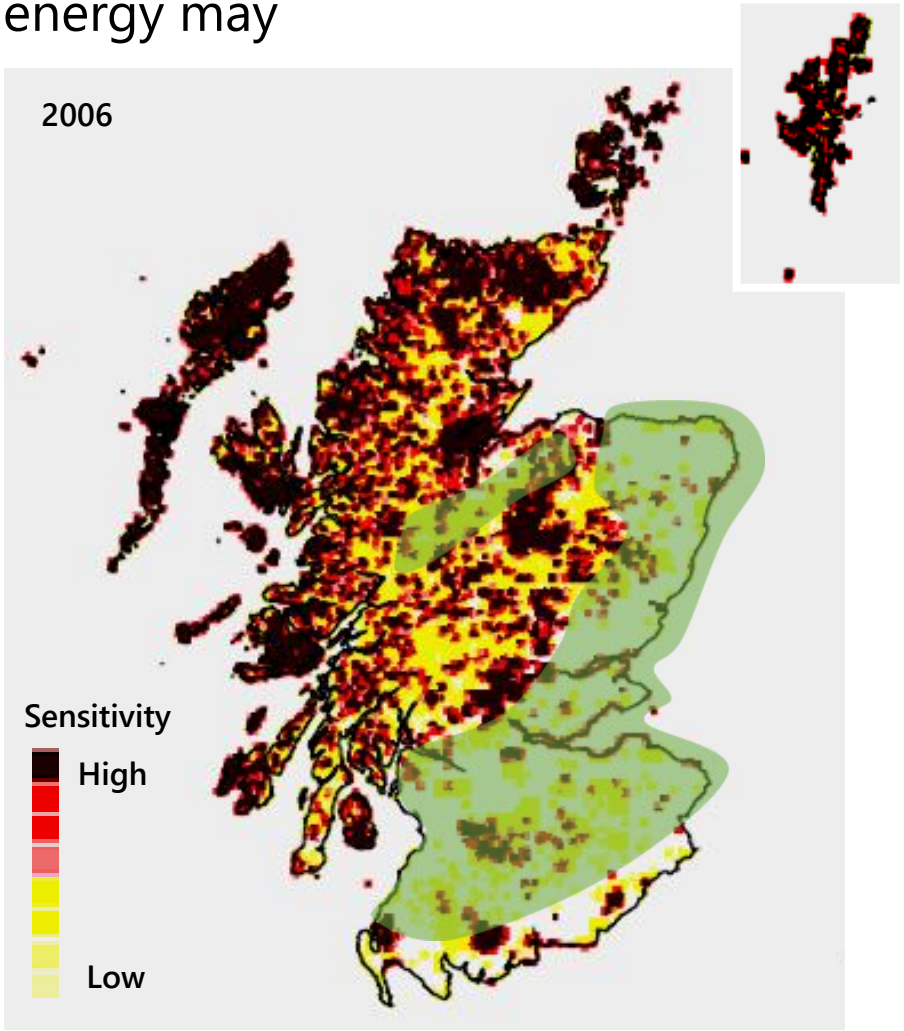
Wind and solar are widespread

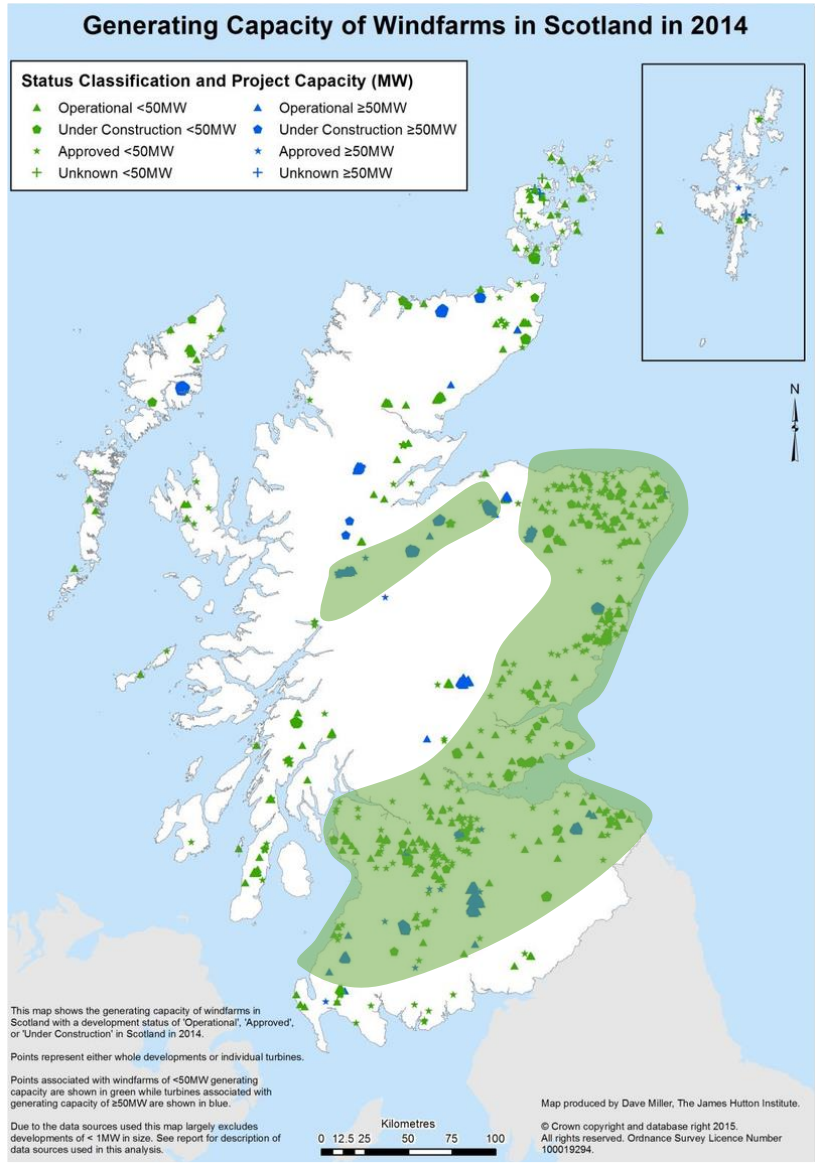
=

Renewables can avoid sensitive locations

Sensitivity Mapping

- An effective tool for identifying areas where developing wind energy may impact wildlife.
- One of the first was made for Scotland by the RSPB (UK BirdLife Partner).
- Turbines are now mainly in low sensitivity areas





Overall Framework

1) Identify species & calculate sensitivity

- Collision
- Displacement
- Conservation Status

26
SPECIES

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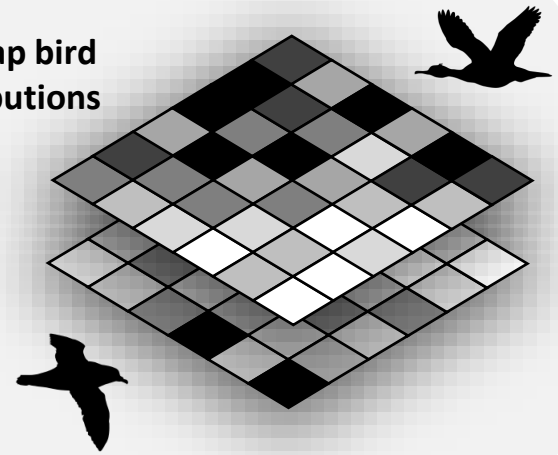
SPECIES

2) Map bird distributions



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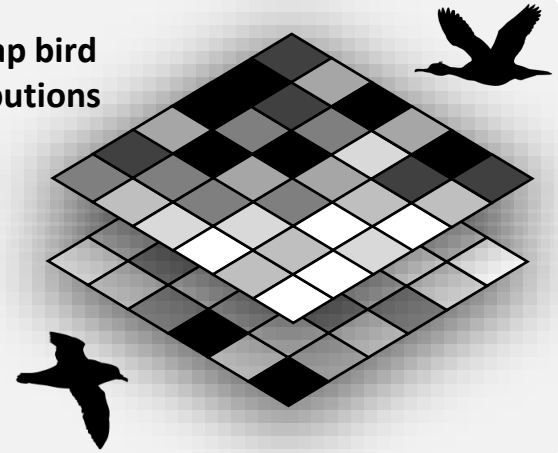

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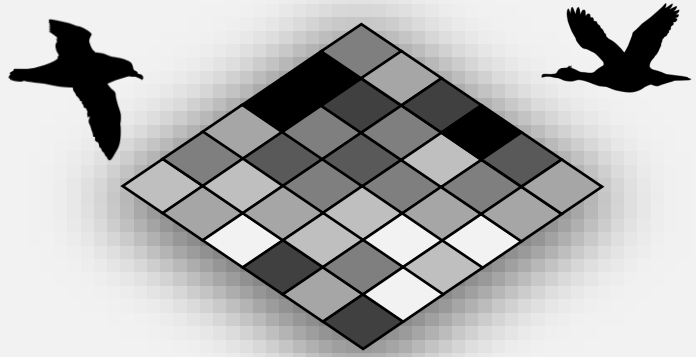

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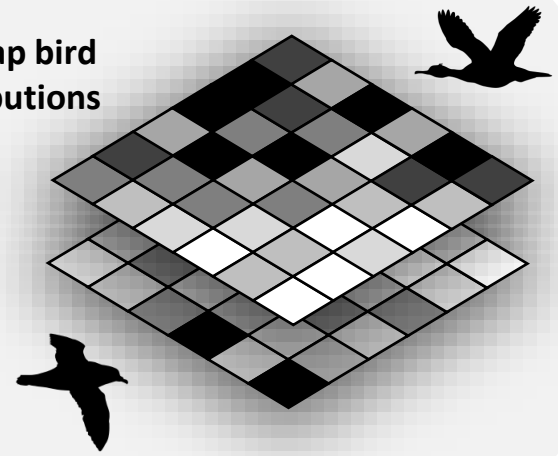

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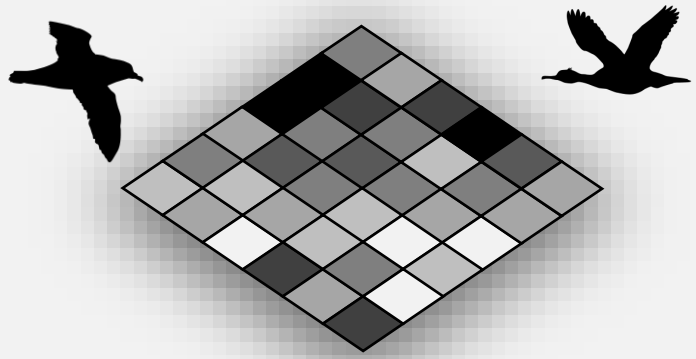
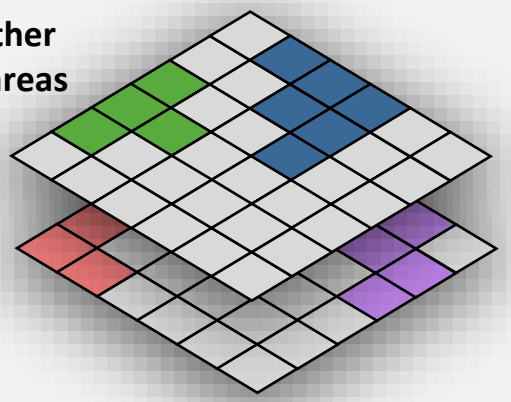


4) Add other sensitive areas

+



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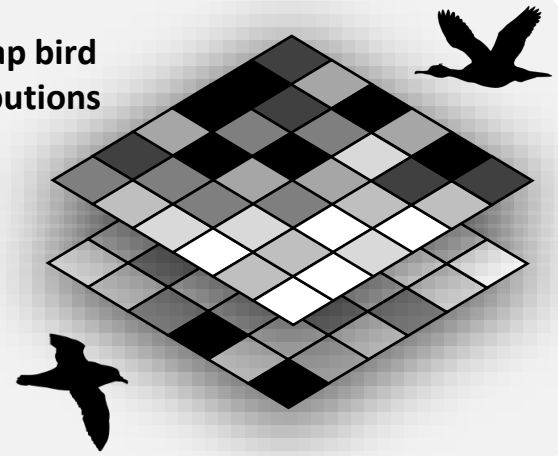

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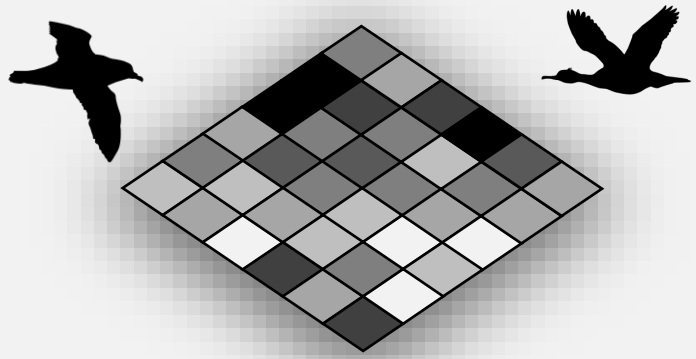

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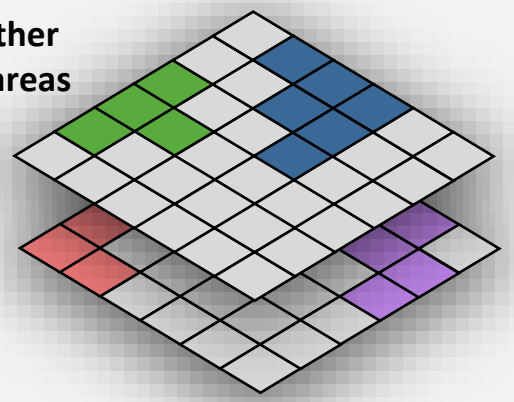

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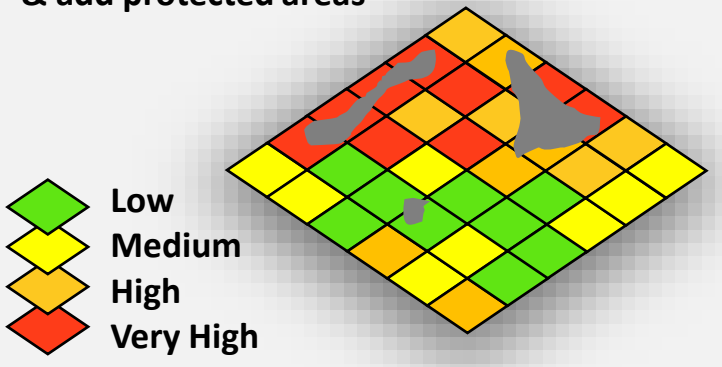

- Low
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- High
- Very High

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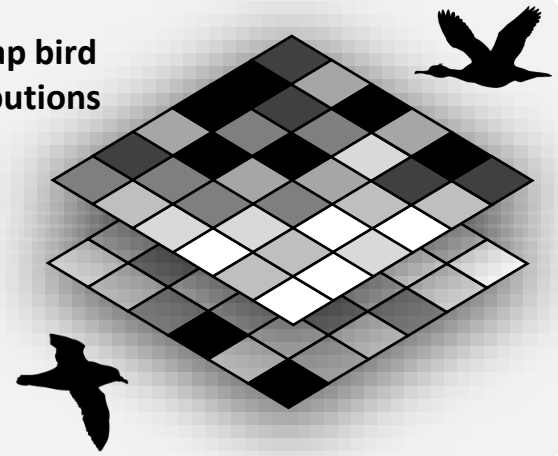

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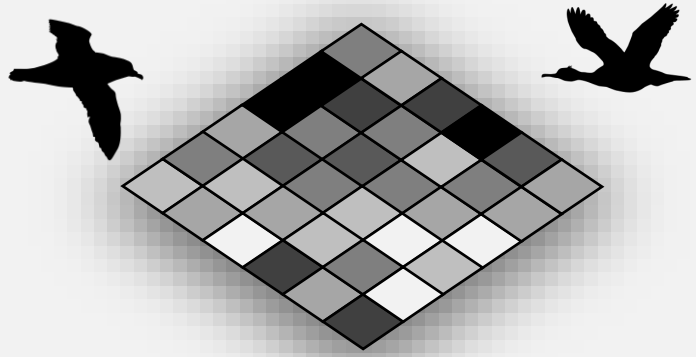

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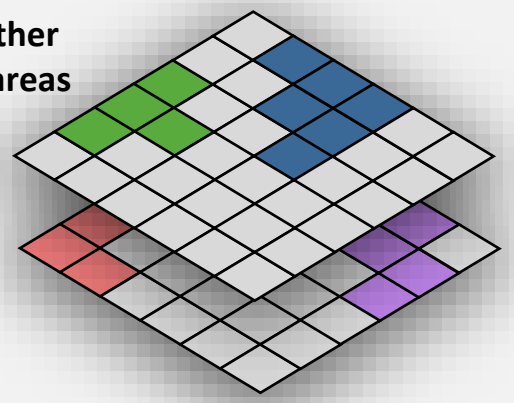

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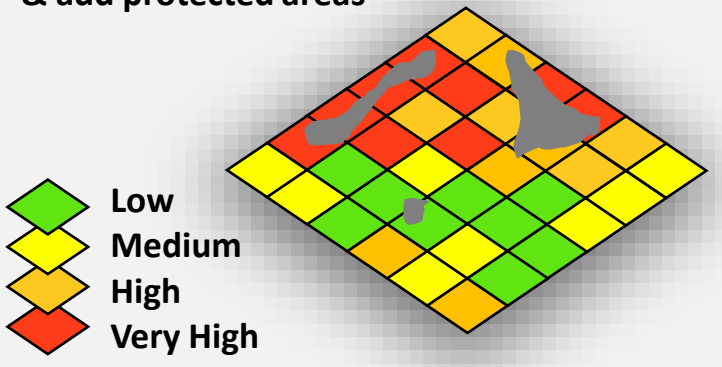

- Low
- Medium
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Calculating Sensitivity Index

- We don’t have data for collisions at sea because we cannot collect carcasses.
- So, we need proxy data

Certain et al. (2015)

Calculating Sensitivity Index - Collision

Collision

- % flight at Rotor Swept Zone
- % flight daytime
- & flight nocturnal
- flight manoeuvrability

Certain et al. (2015)

Calculating Sensitivity Index - Collision

- Collision
  - % flight at Rotor Swept Zone
  - % flight daytime
  - & flight nocturnal
  - flight manoeuvrability

- Conservation Status
  - Global Red List
  - National Red List
  - *Species of European Conservation Concern*
  - *% EU population (**Pop**)*
  - *Annual Adult Survival (**Su**)*

Certain et al. (2015)

Calculating Sensitivity - Displacement

- Displacement
- Disturbance: vessels and helicopters
- Disturbance: structures
- Habitat flexibility

- Conservation Status
- Global Red List
- National Red List
- *Species of European Conservation Concern*
- *% EU population (**Pop**)*
- *Annual Adult Survival (**Su**)*

Certain et al. (2015)

Collision & sensitivity scores for each species

Scientific name	Common name	Collision SI	Displacement SI
Aythya marila	Greater Scaup	0.15	0.35
Calonectris diomedea	Scopoli's Shearwater	0.30	0.30
Chlidonias niger	Black Tern	0.44	0.58
Gavia arctica	Arctic Loon	0.24	0.46
Gavia stellata	Red-throated Loon	0.18	0.41
Gelochelidon nilotica	Common Gull-billed Tern	0.23	0.29
Gulosus aristotelis	European Shag	0.20	0.32
Hydrobates pelagicus	European Storm-petrel	0.14	0.13
Larus audouinii	Audouin's Gull	0.54	0.28
Larus genei	Slender-billed Gull	0.16	0.31
Larus melanocephalus	Mediterranean Gull	0.42	0.35
Larus michahellis	Yellow-legged Gull	0.45	0.35
Larus ridibundus	Black-headed Gull	0.13	0.25
Melanitta fusca	Velvet Scoter	0.34	0.74
Melanitta nigra	Common Scoter	0.19	0.43
Mergus serrator	Red-breasted Merganser	0.12	0.26
Morus bassanus	Northern Gannet	0.28	0.32
Phalacrocorax carbo	Great Cormorant	0.31	0.45
Podiceps auritus	Horned Grebe	0.24	0.63
Podiceps cristatus	Great Crested Grebe	0.17	0.36
Podiceps nigricollis	Black-necked Grebe	0.17	0.38
Puffinus yelkouan	Yelkouan Shearwater	0.48	0.56
Somateria mollissima	Common Eider	0.24	0.55
Sterna hirundo	Common Tern	0.12	0.22
Sternula albifrons	Little Tern	0.17	0.38
Thalasseus sandvicensis	Sandwich Tern	0.32	0.36

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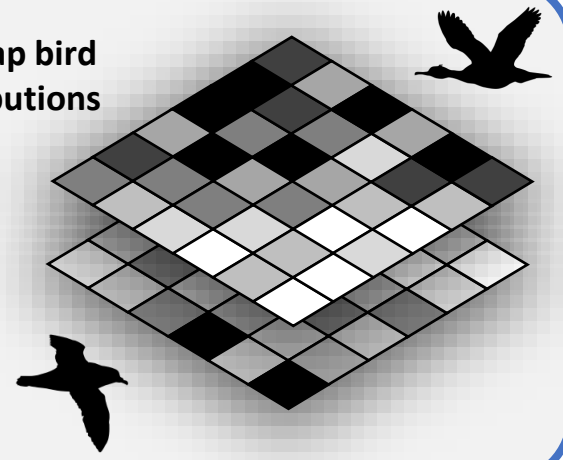
26 SPECIES

2) Map bird distributions



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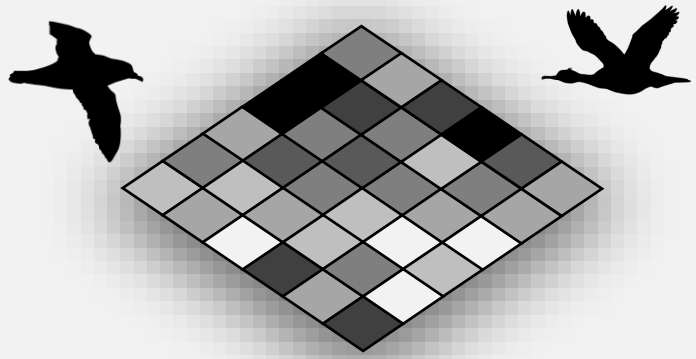

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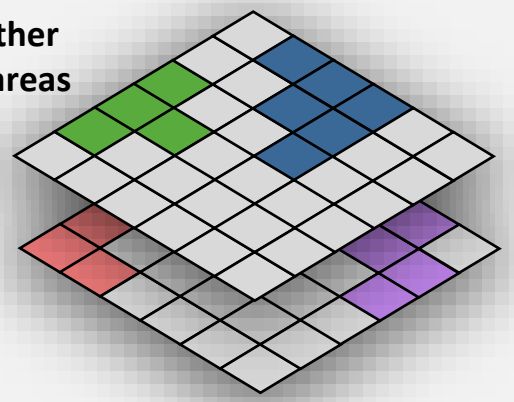
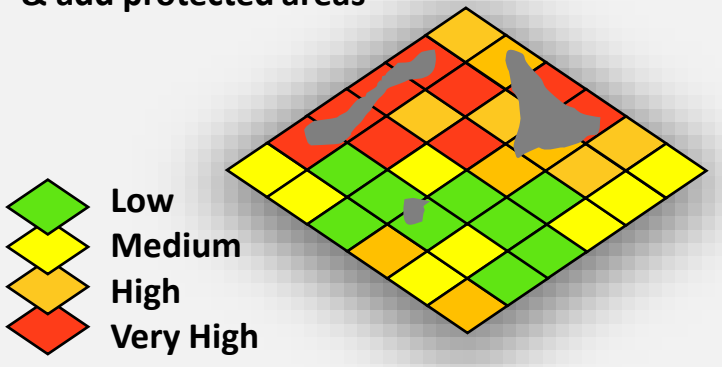


5) Categorize sensitivity & add protected areas



- Low
- Medium
- High
- Very High

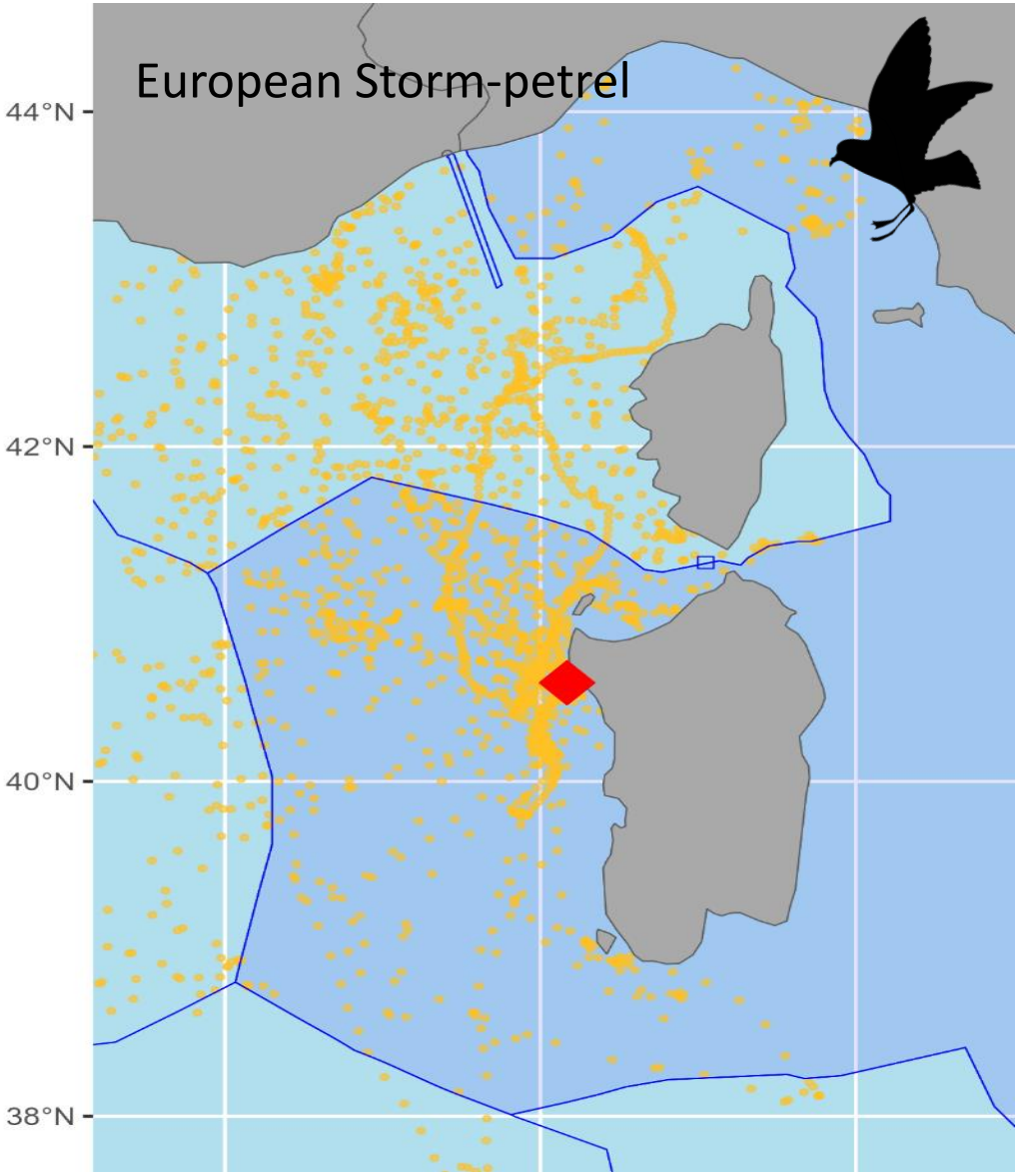
Non-breeding species

Range maps from BirdLife/IUCN Red List

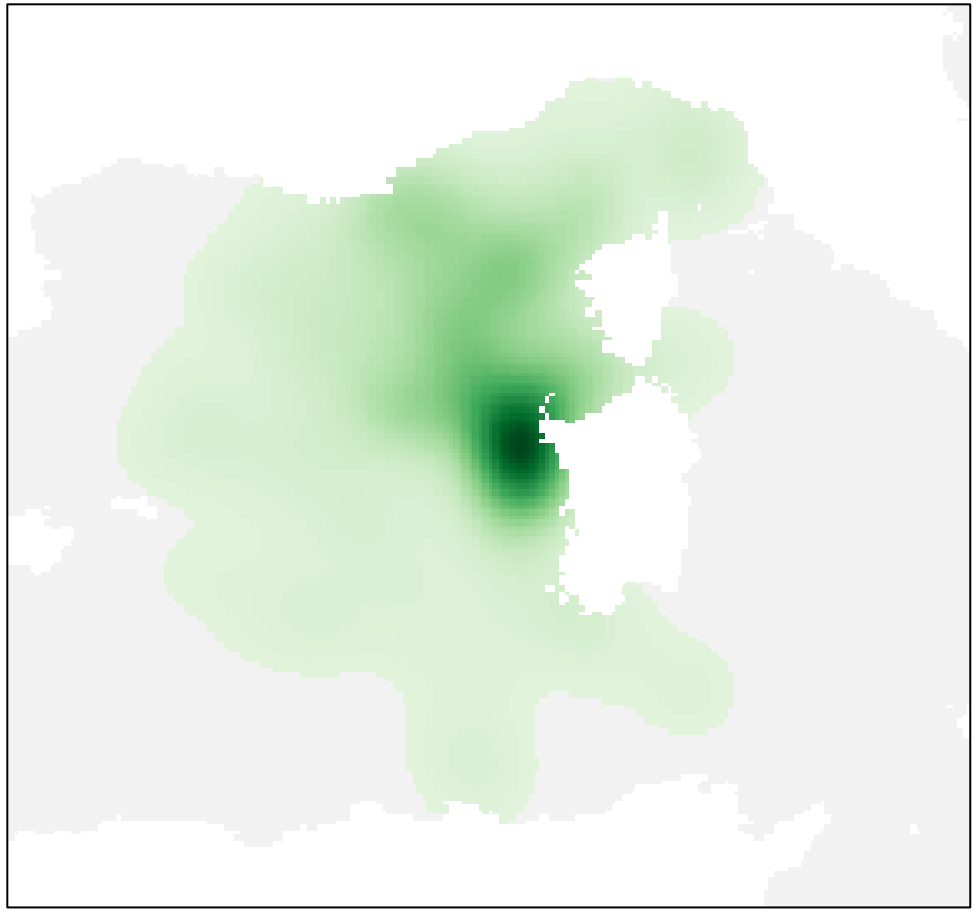
e.g. Great Crested Grebe

EXTANT (RESIDENT)
EXTANT (BREEDING)
EXTANT (NON-BREEDING)
EXTANT (PASSAGE)

Breeding species foraging at sea: tracking data



Convert tracks into a grid



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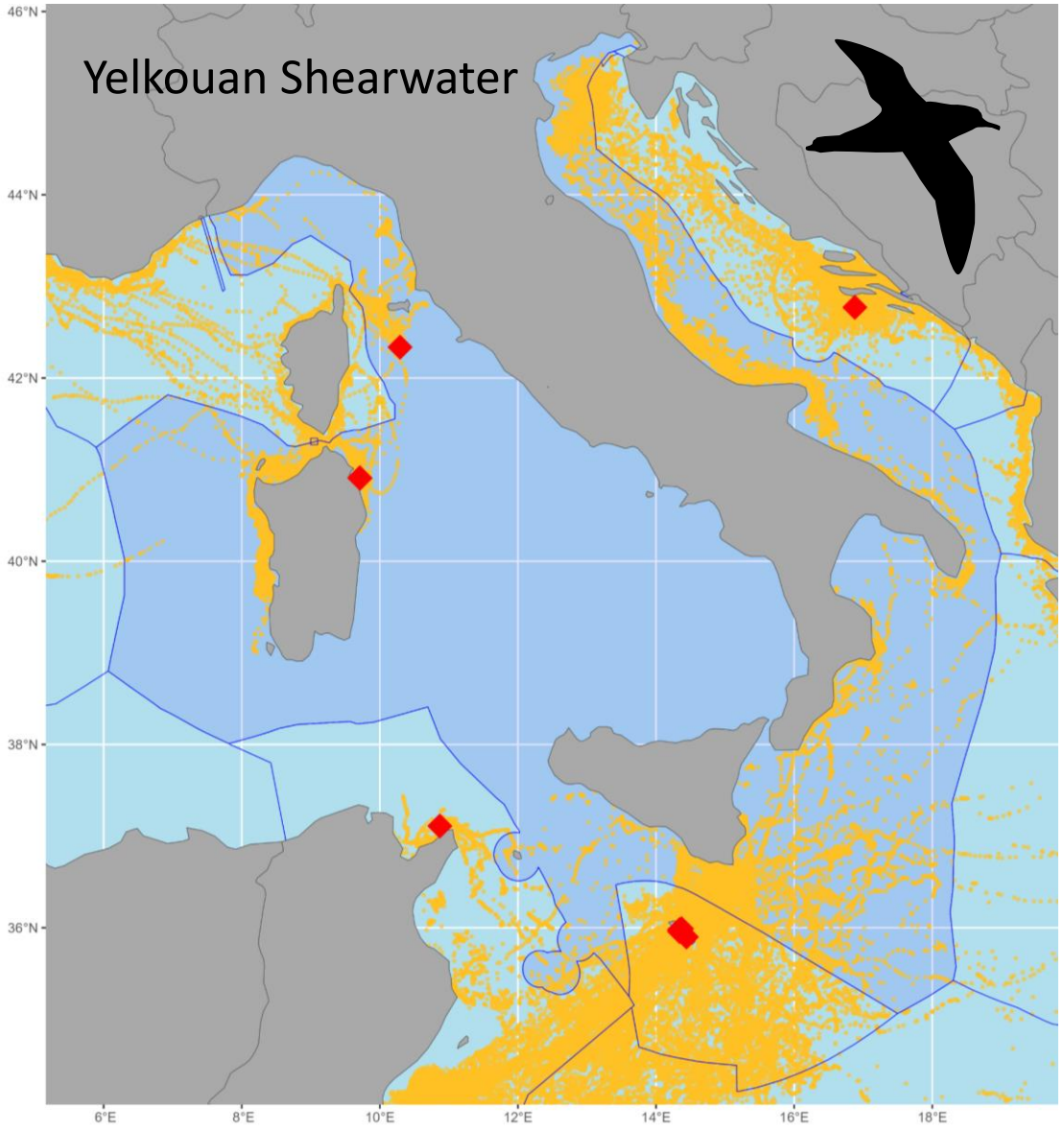
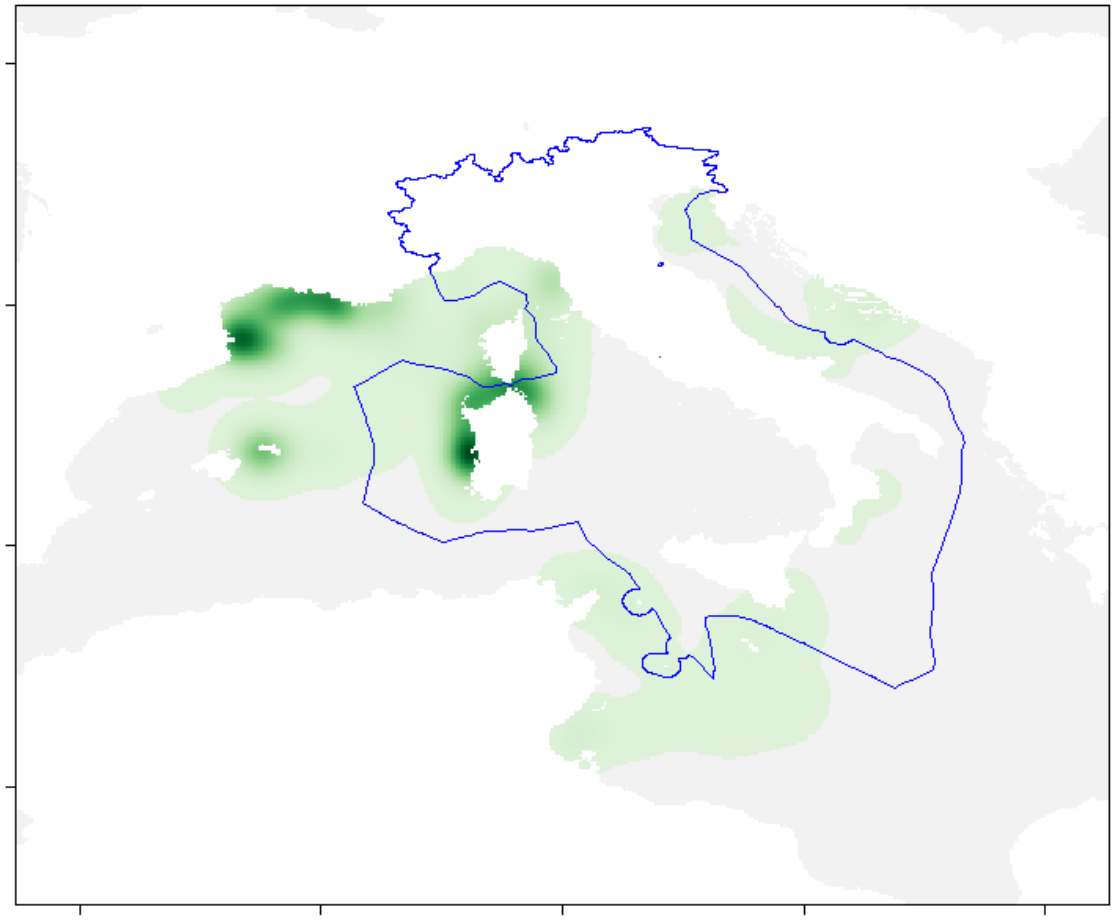
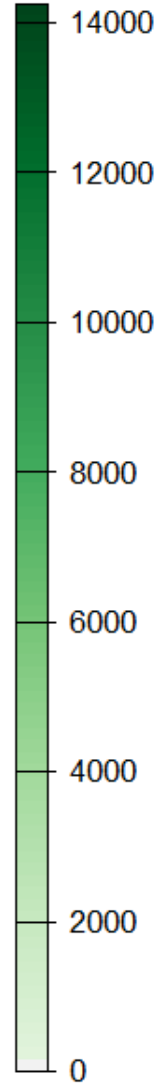


Weight by population size





Breeding species foraging at sea: colony extensions

- No tracking data?

Breeding species foraging at sea: colony extensions

- Model based on distance to the colony
- More likely to find birds close to the colony

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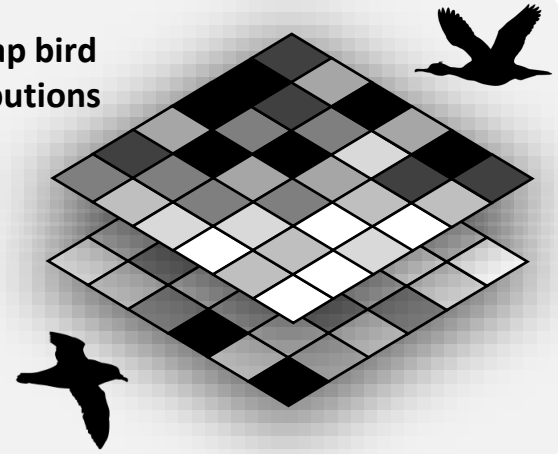

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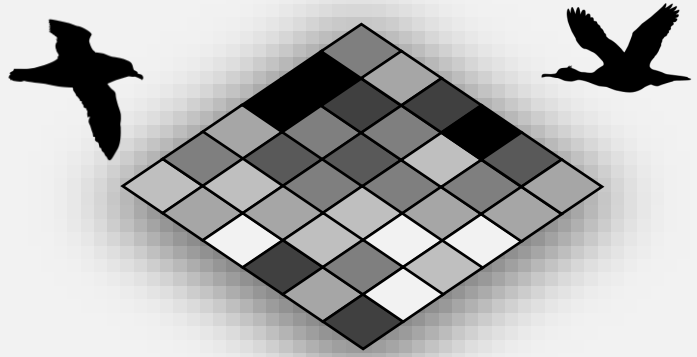

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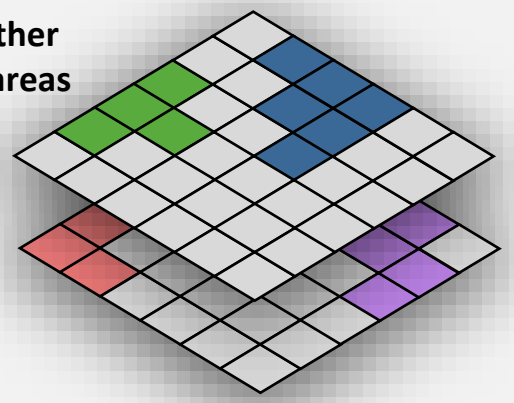

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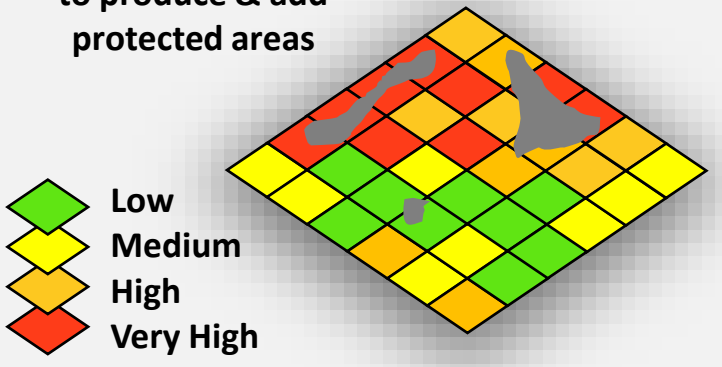

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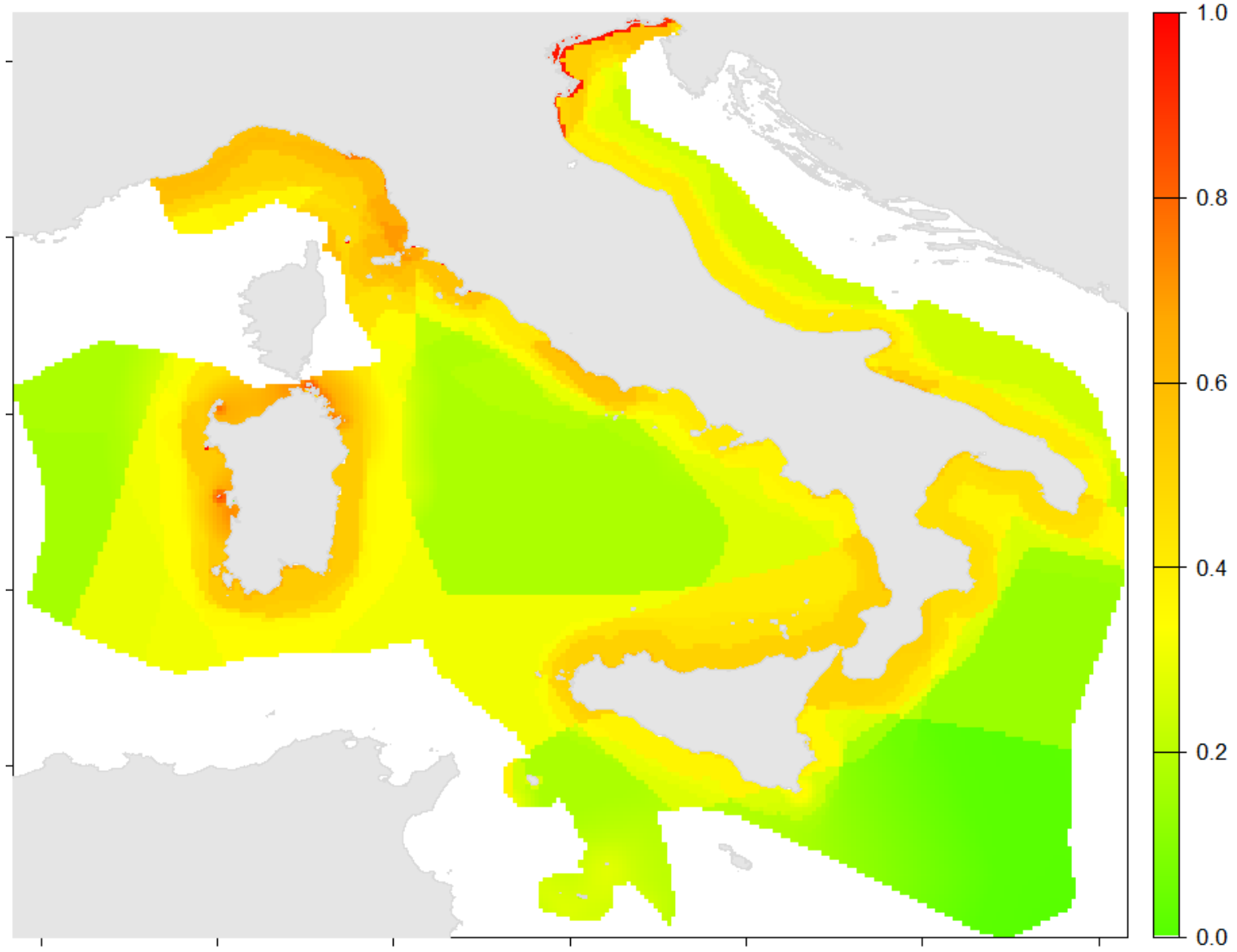
- Medium
- High
- Very High

Combine breeding & non-breeding seabirds

Max values of either breeding or non-breeding



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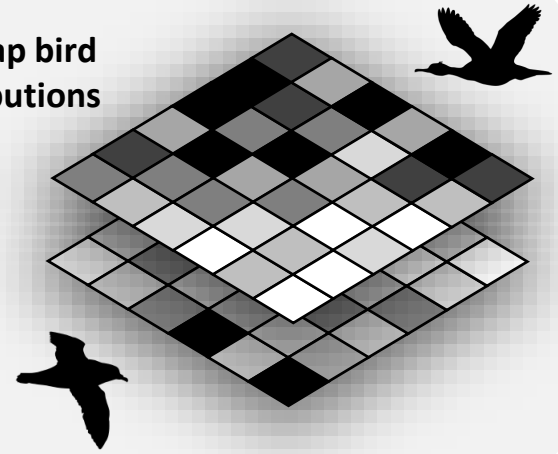

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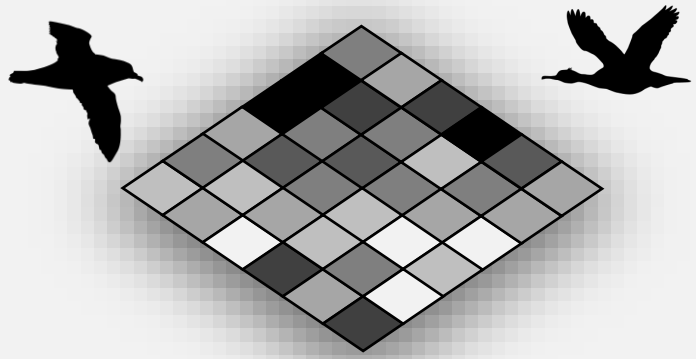

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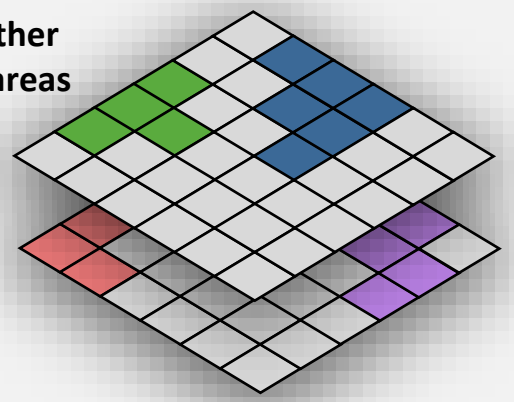

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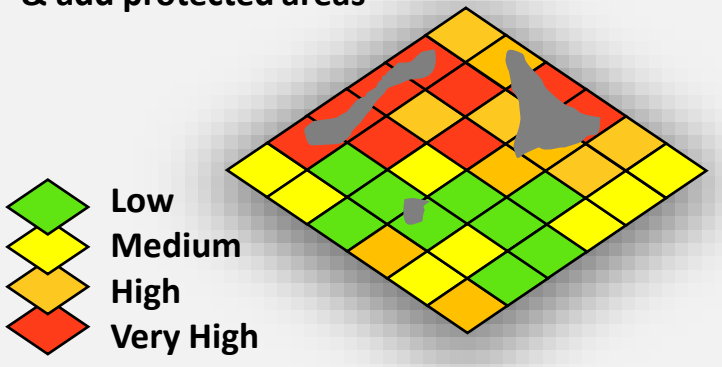

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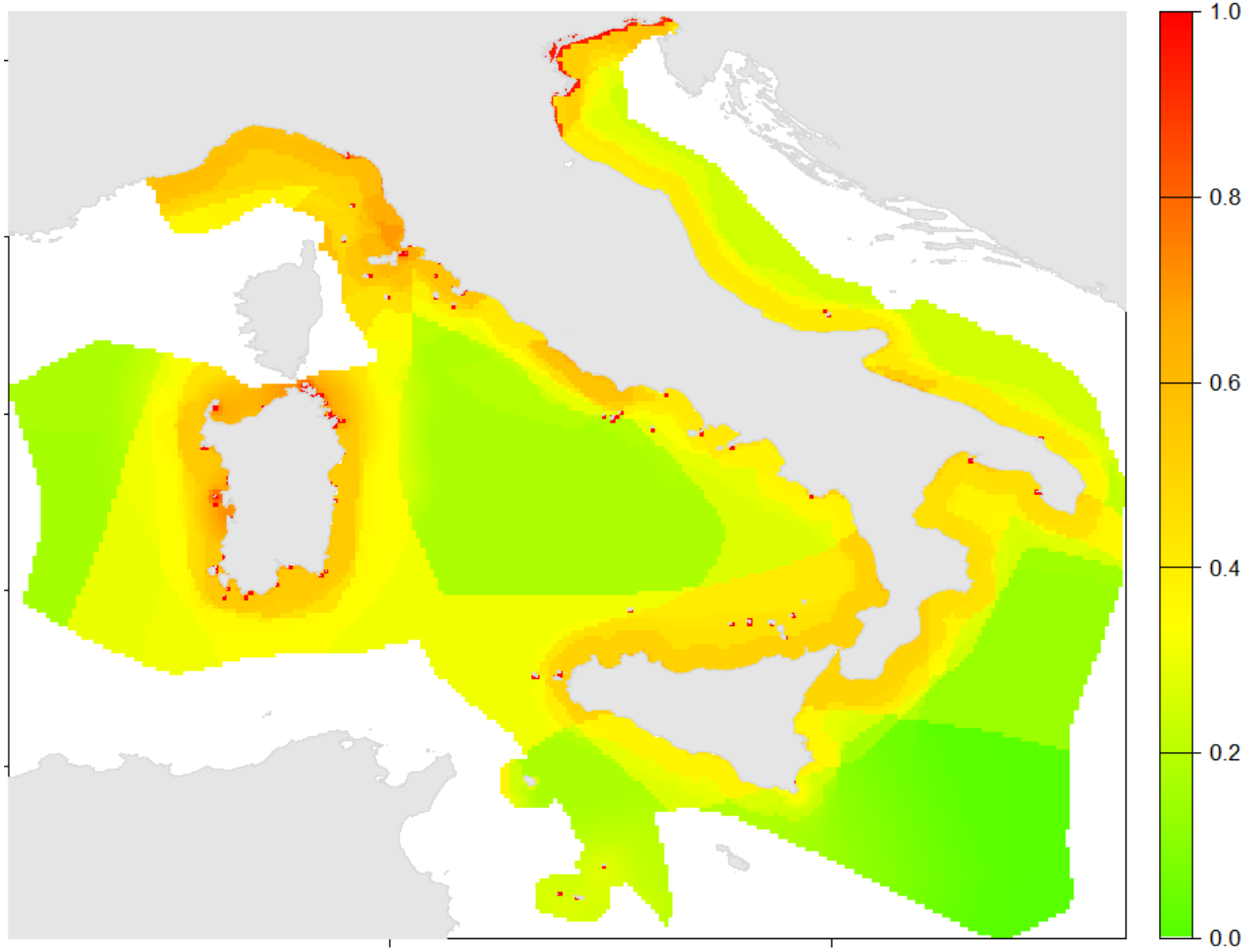
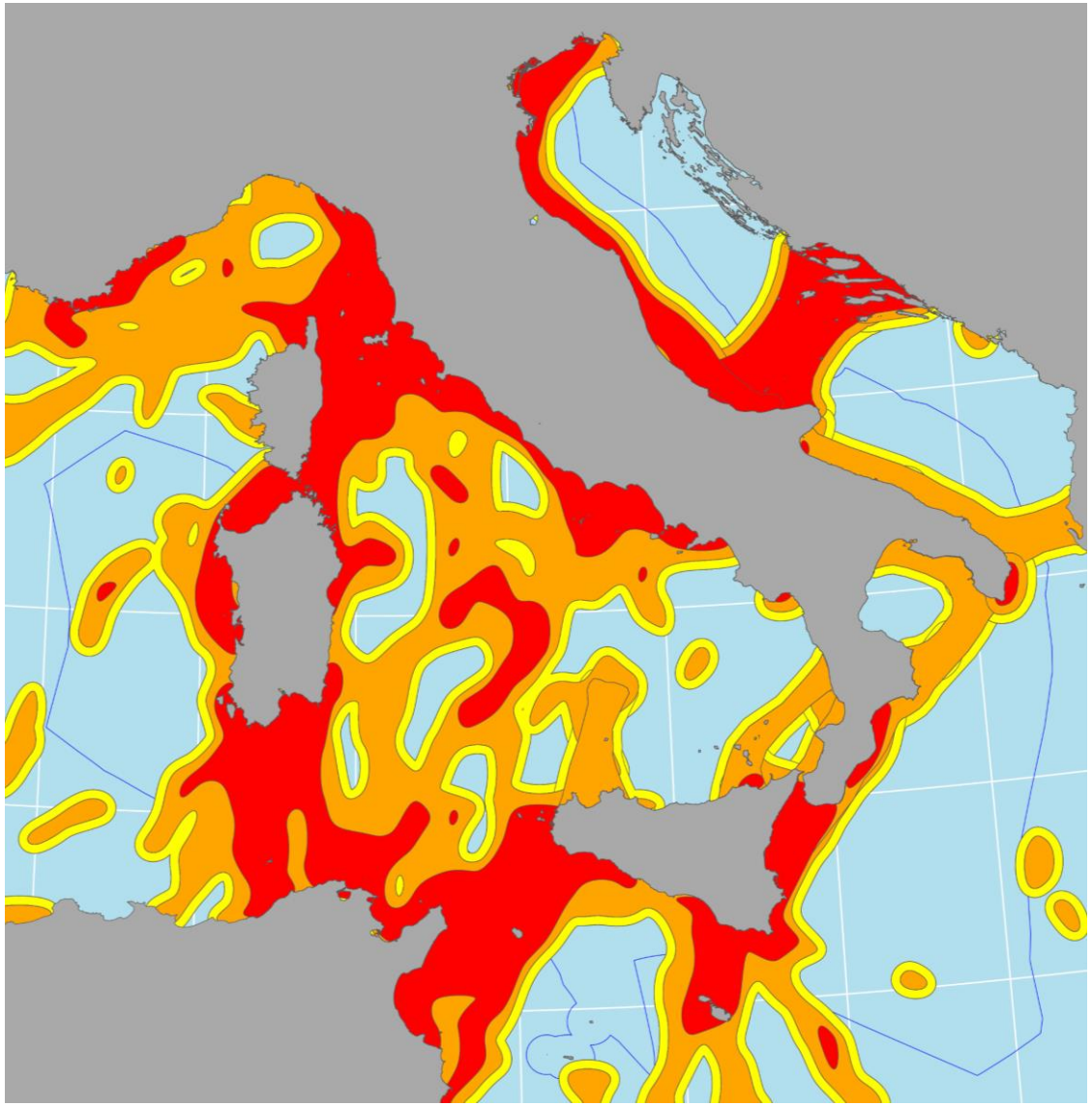
Combine breeding & non-breeding seabirds

Preening/rafting areas

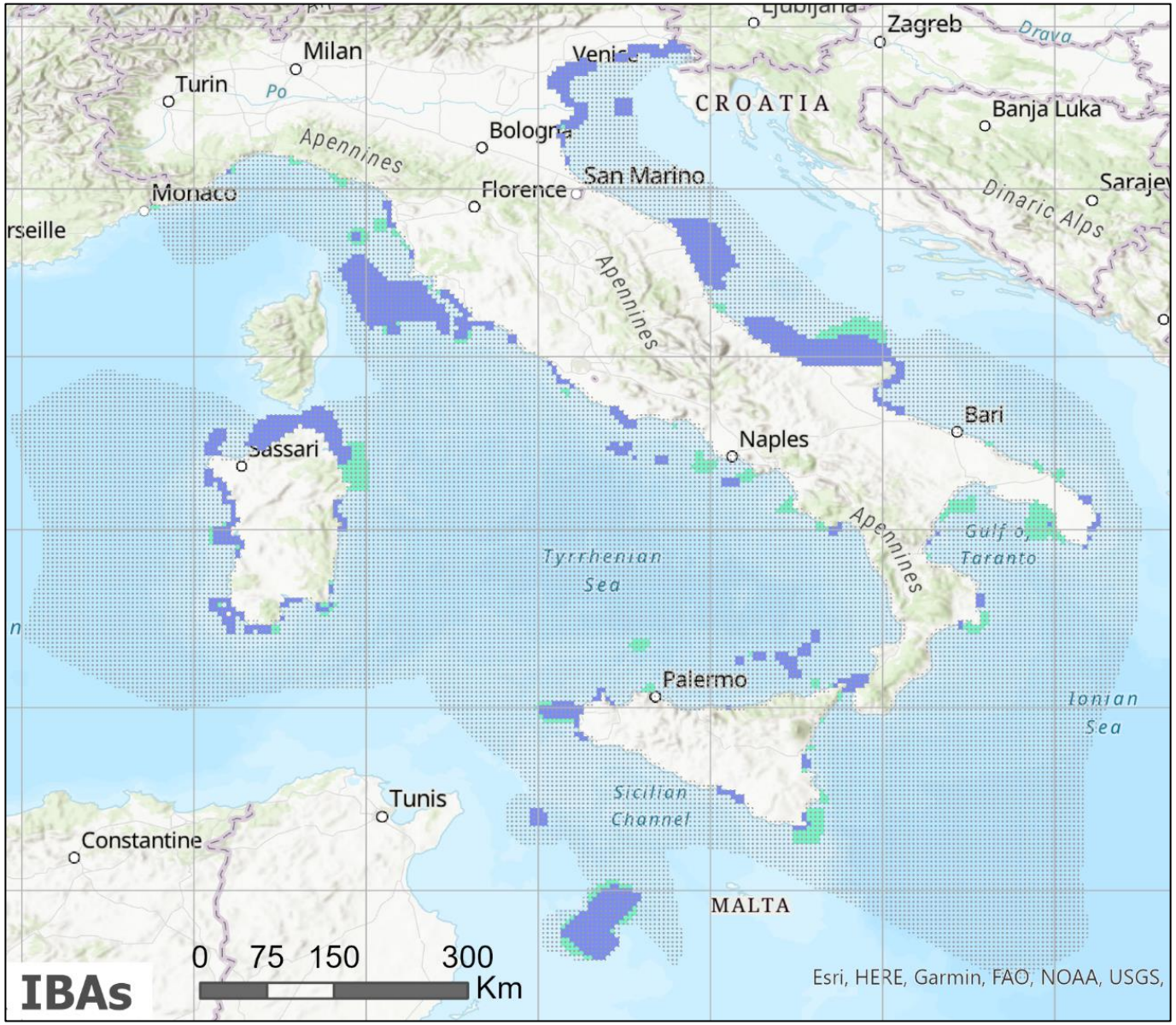


Landbirds: Main migratory bridges

- Tracking data
- Expert knowledge



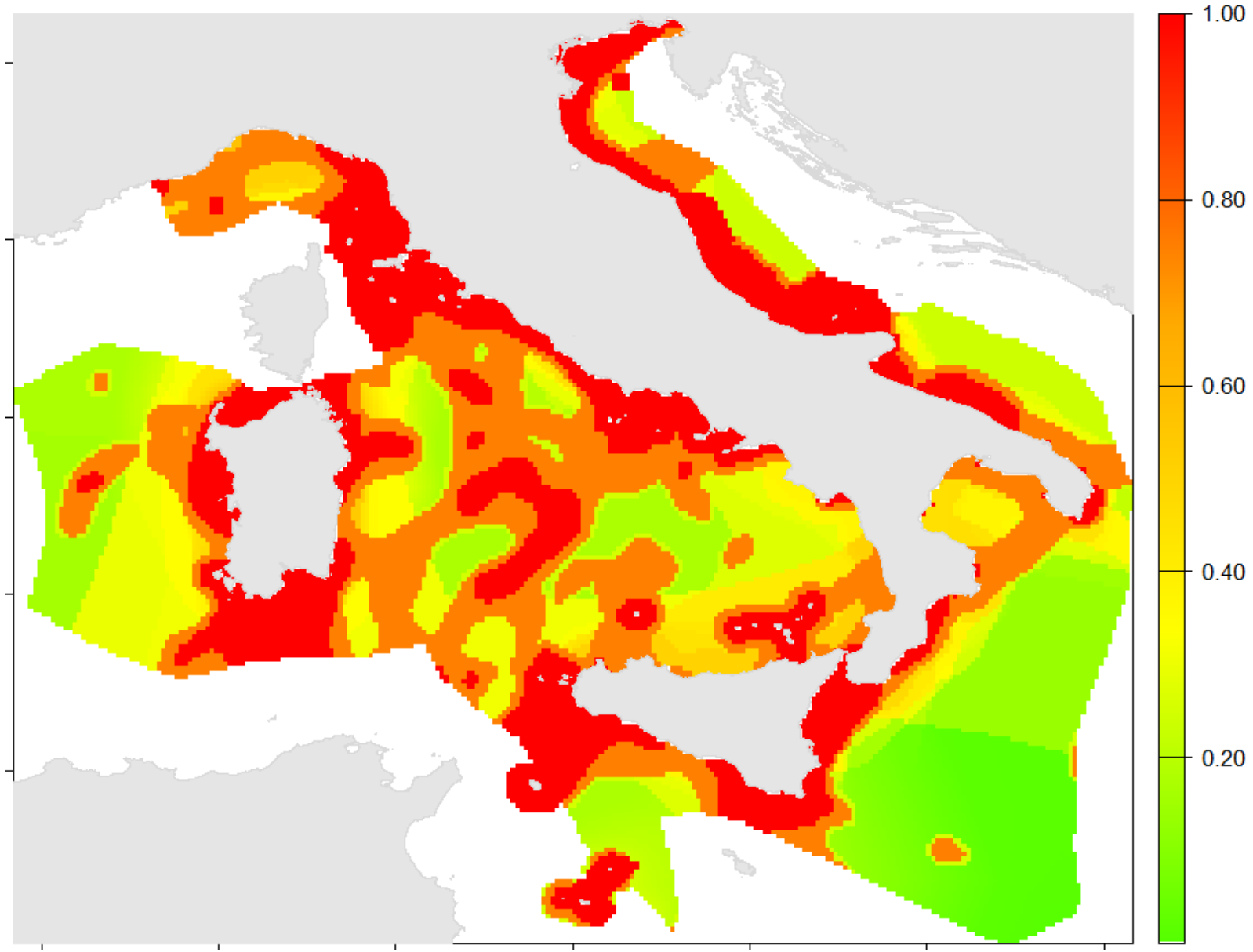
IBAs



Important Bird & Biodiversity Areas

Include with the maximum sensitivity of 1 (red)

Combined (preliminary)



- Breeding seabirds
- Non-breeding seabirds
- Migrating landbirds
- Small islands
- IBAs

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- Collision
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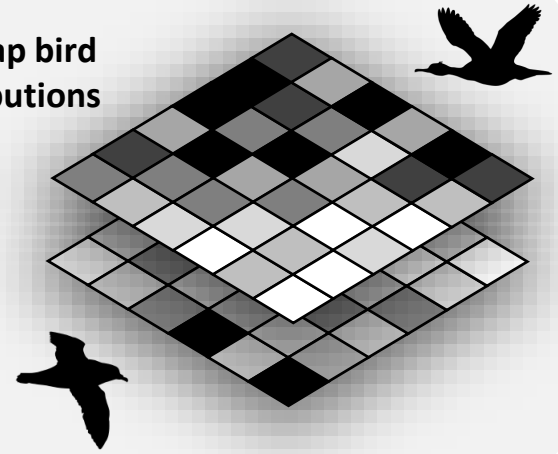

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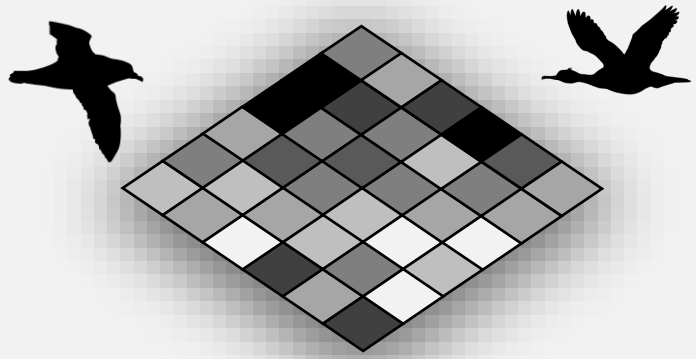

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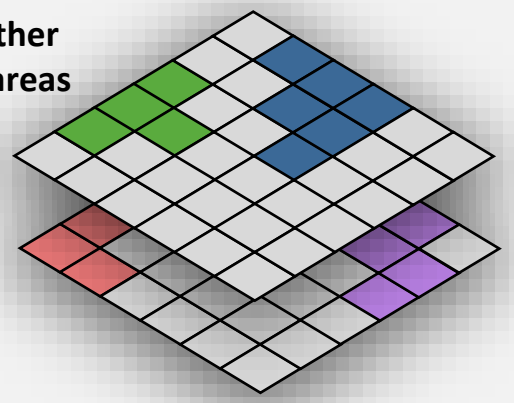

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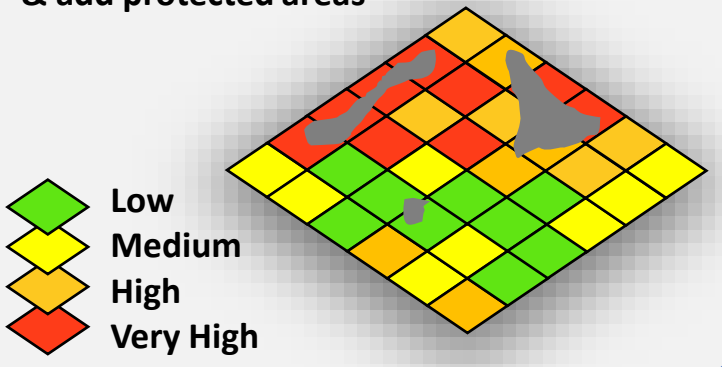
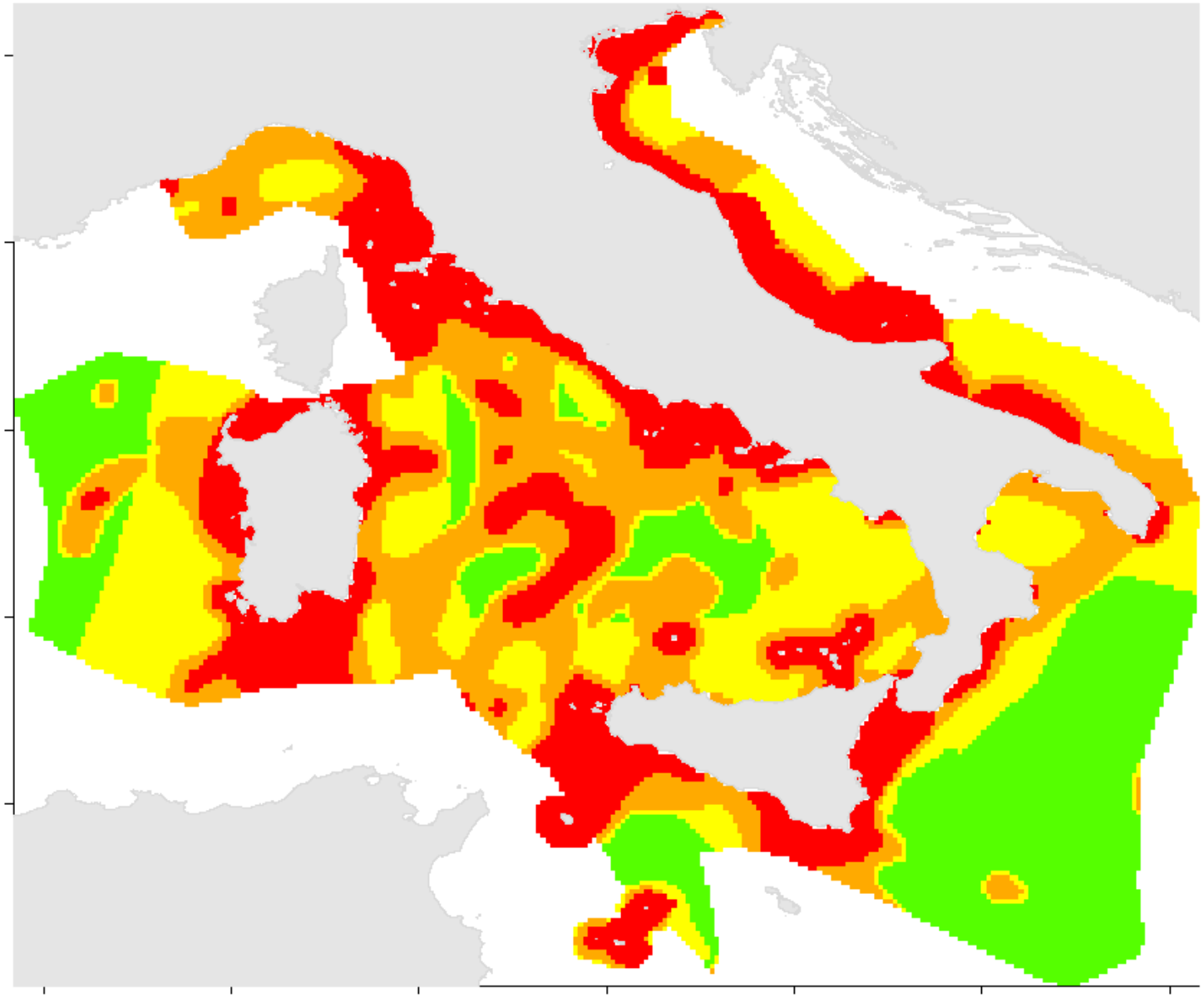


- Low
- Medium
- High
- Very High

Combined: Categories

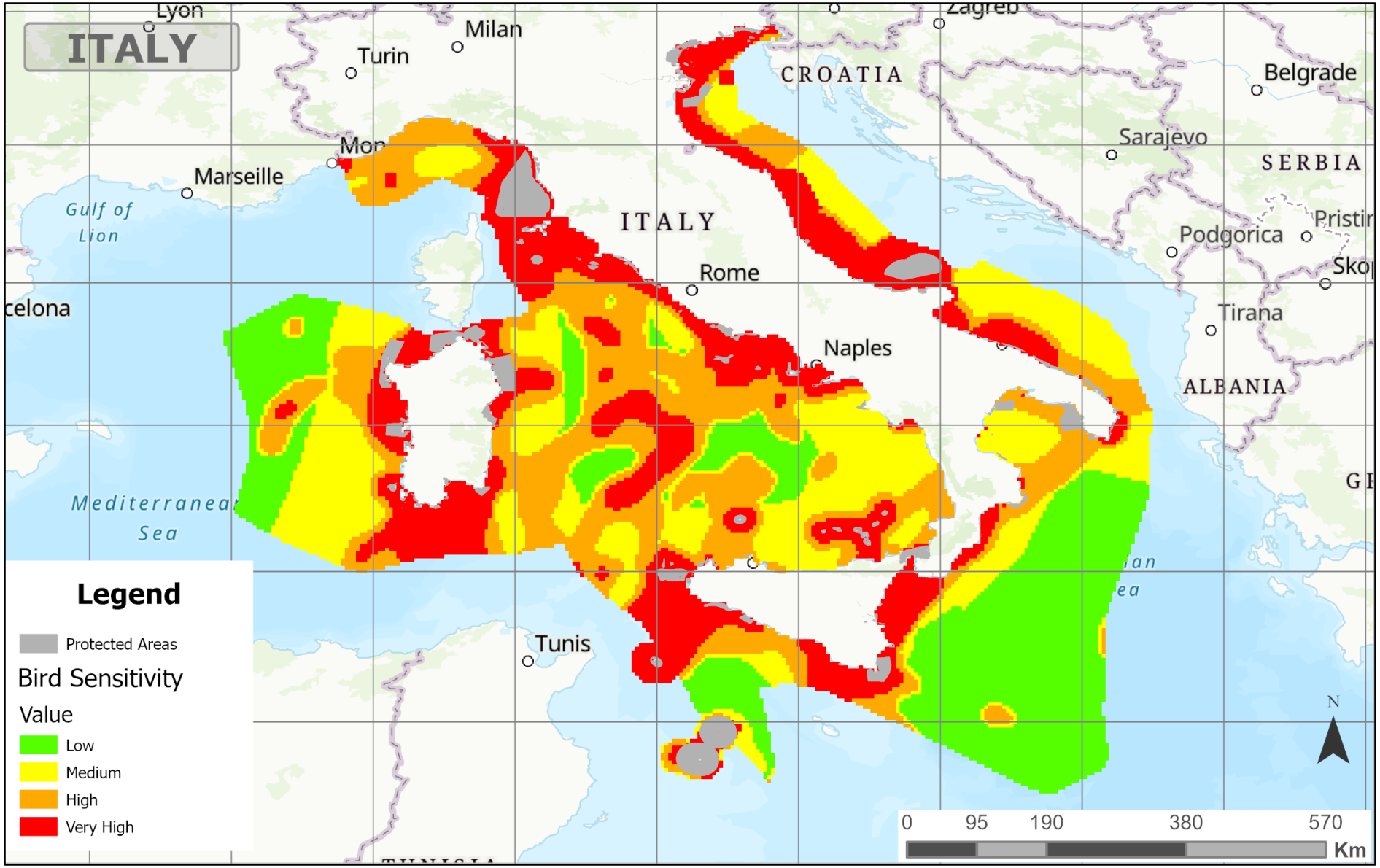


Use Jenk's natural breaks algorithm to categorise the cells

Avian sensitivity to wind energy development

- Low
- Medium
- High
- Very High

Combined: Protected Areas Overlaid



- Birds & biodiversity should be considered alongside other routinely-used spatial data.

- Sensitivity maps are not barriers to wind energy development – they can help to identify good locations.

- Sensitivity maps should not replace Environmental Impact Assessments.

BirdLife INTERNATIONAL

Thank you!

Tris Allinson
Bethany Clark
Larissa Biasiotto
Juan Serratosa Lopez
Antonio Vucano

Claudio Celada
Marco Gustin
Giorgia Gaibani

Ideas that fly.