

Sustainable development of wind energy in Ireland – challenges of biodiversity and ecosystem services.

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Outline

- Energy policy
- Impacts on biodiversity
 - National/international literature
 - Spatial analyses
- Key gaps/research questions

EPA STRIVE Project



SECTORAL IMPACTS ON BIODIVERSITY AND ECOSYSTEM SERVICES

Wind Energy

Wind energy is expected to contribute to over 90% of Ireland's 2020 renewable energy targets. Ireland has large onshore and offshore wind potential, with over 2000 MW of installed capacity to date, mostly at onshore locations, but offshore developments may significantly increase in the future. The potential impacts of these wind farm developments on Ireland's biodiversity remain largely unquantified. The aim of this paper is to highlight the potential positive and negative impacts of wind farms on Ireland's marine and terrestrial biodiversity, and identify areas for future research.

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Key Messages

- For maximum effectiveness, wind farms are most suited to upland, coastal and offshore areas, potentially affecting a wide range of species and habitats of high conservation value.
- Very little information exists on impacts of wind developments in Ireland. Access to existing monitoring datasets and grey literature is limited.
- International studies suggest that birds, bats, and marine mammals are most vulnerable to the direct impacts of wind turbines, with consequences for direct mortality, or changes to behaviour, condition and breeding success.
- Impacts on birds and bats include collision, displacement due to disturbance, barrier effects and habitat loss. Effects are variable and context specific.
- Positive impacts on marine species include habitat creation, and creation of no-take zones and aggregation areas for fish. Negative impacts include habitat change and loss, provision of habitat for non-indigenous species, noise pollution, electromagnetic fields affecting orientation, and construction impacts.
- No studies have focused on impacts on entire habitats, or ecosystem services or indirect impacts. Habitat ecological and physical integrity, habitat fragmentation and the facilitation of invasive species remain largely under researched.
- Spatial analyses reveal overlap between wind resources and wind farm developments with habitats and species of conservation value.


Key areas for future research:

1. Development of bird/bat sensitivity maps.
2. Studies of population-level impacts to disentangle wind farm impacts from other threats and pressures.
3. Species specific studies to establish species-specific sensitivities to several types of large-scale wind farms.
4. Identification of migration routes/corridors and stopping sites of bats in Ireland.
5. Assessment of cumulative effects on onshore and offshore wind farms on birds and bats.
6. Preliminary research into impacts on Ireland's marine species and habitats in advance of increased offshore wind farm developments.



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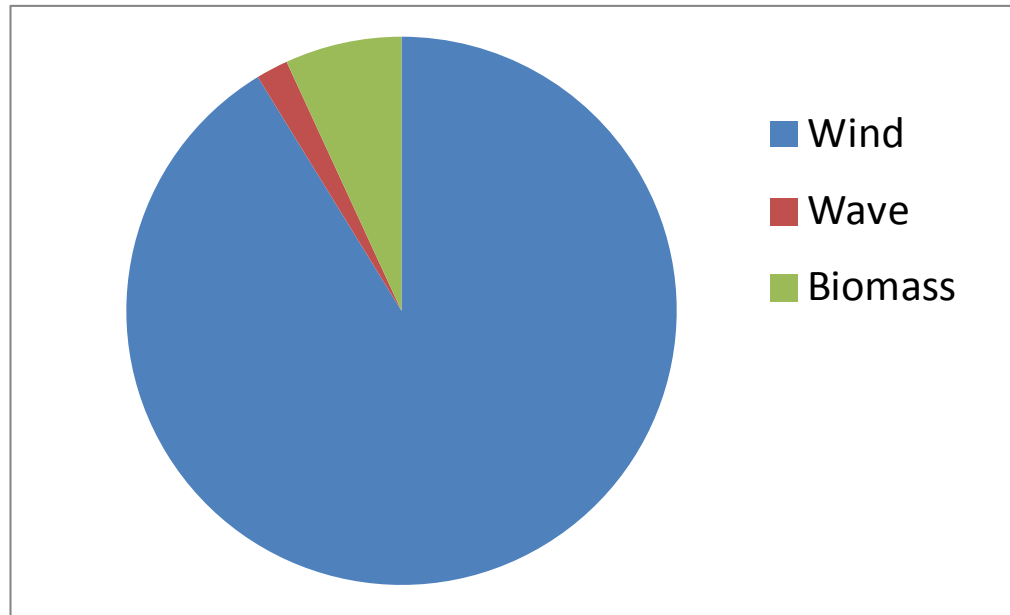
Policy Drivers



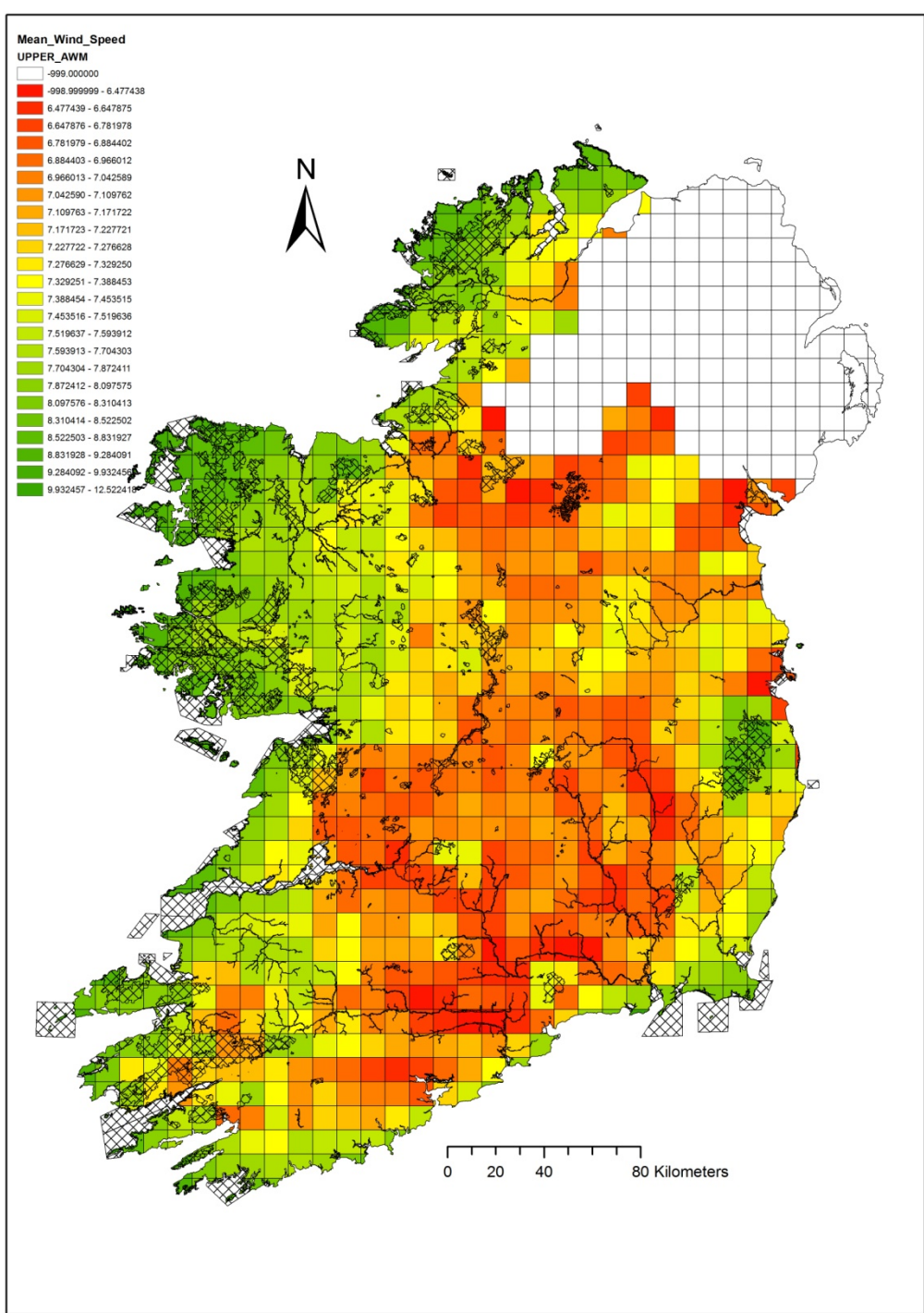
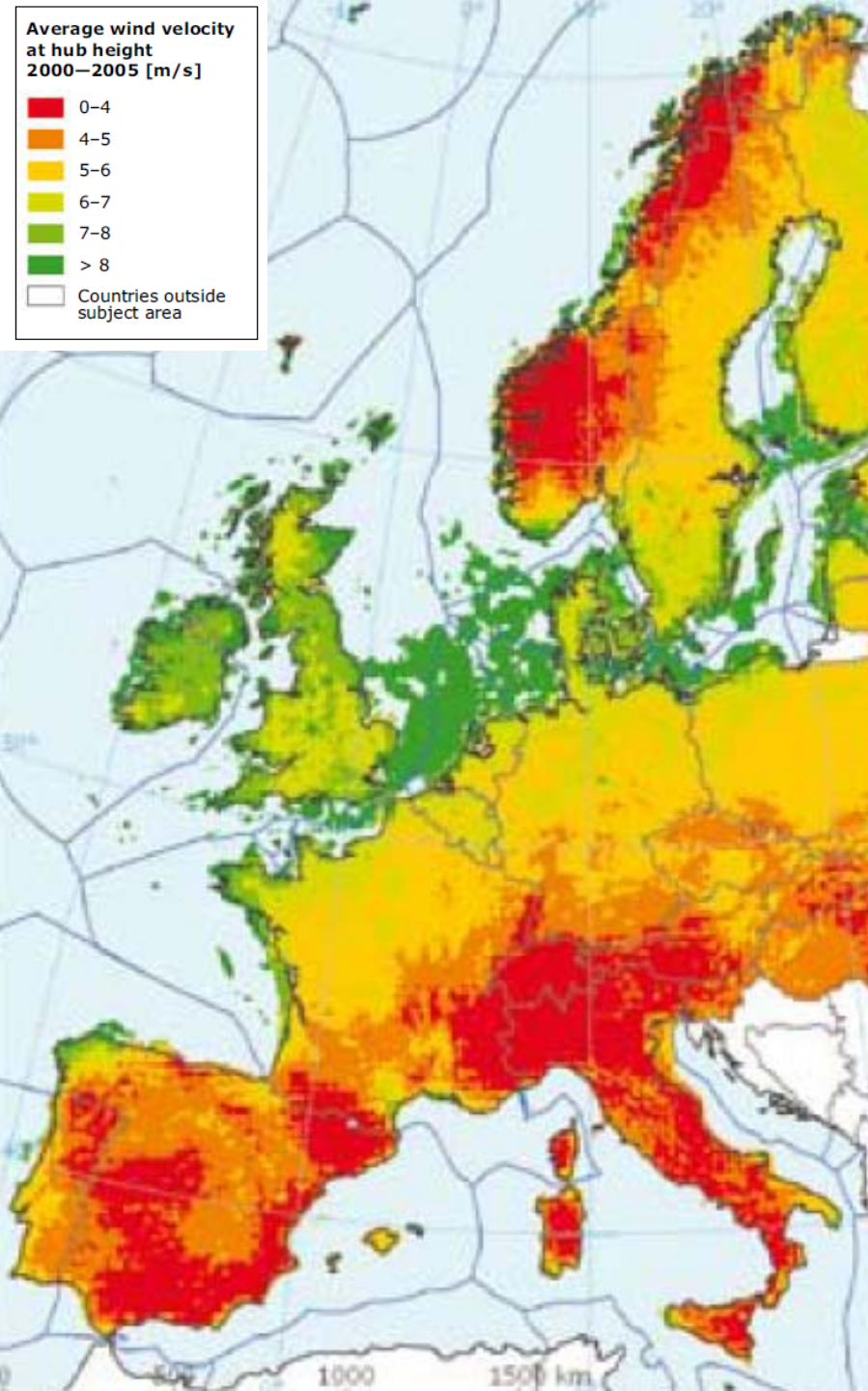
“Directive on the promotion of the use
of energy from renewable sources”



How will we meet the 2020 Renewable Energy targets?



2041 MW of installed wind capacity
– 174 onshore (1 offshore – 25 MW)

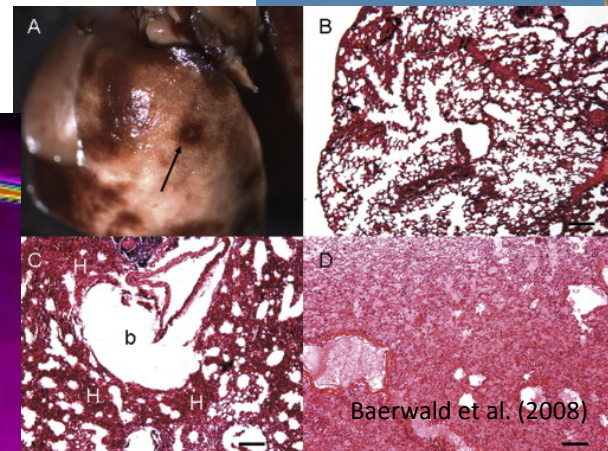


Impacts on Species & Habitats

- Birds & Bats
 - Collision
 - Avoidance (energetic costs)
 - Birds of prey, upland & waterbirds
 - Migration routes
 - Barotrauma - bats

- Cetaceans/marine communities
 - Noise, habitat loss, collisions, habitat creation

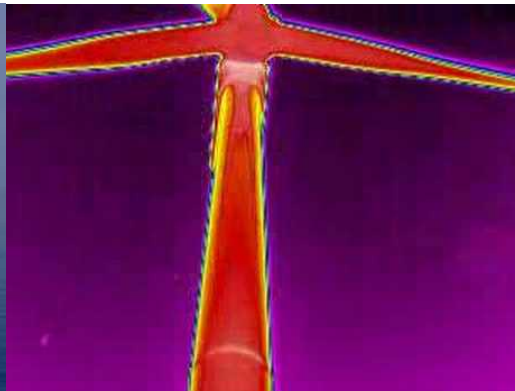
- Habitat disturbance, fragmentation



NPWS

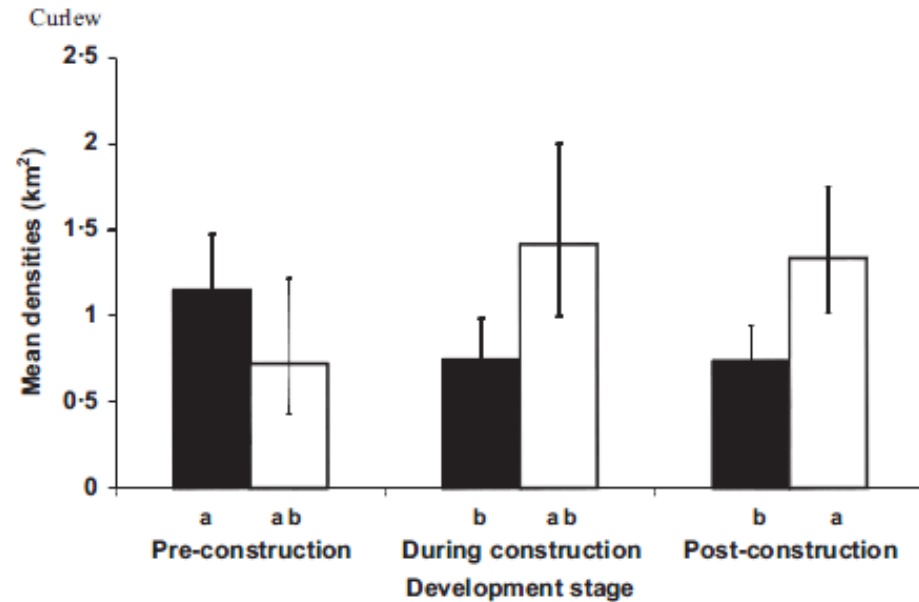
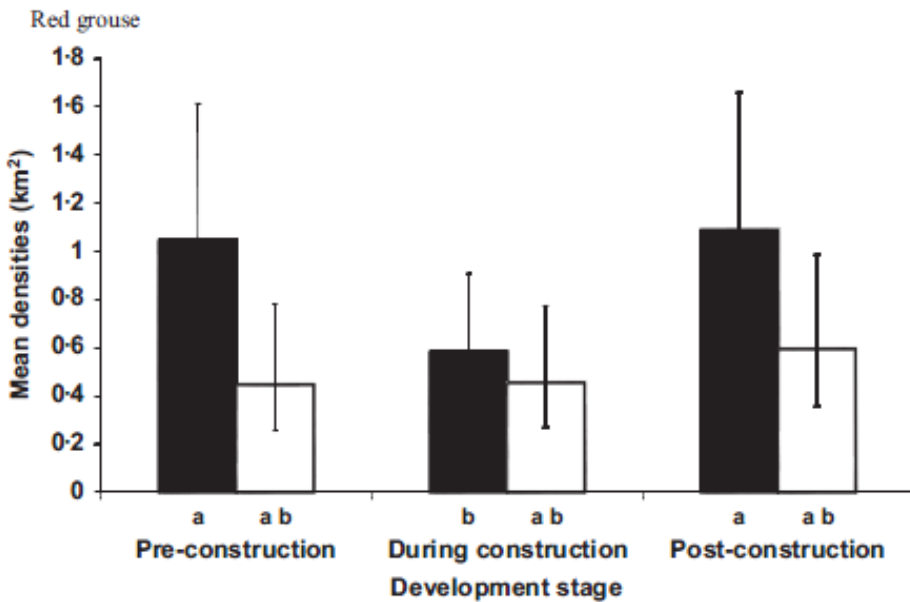
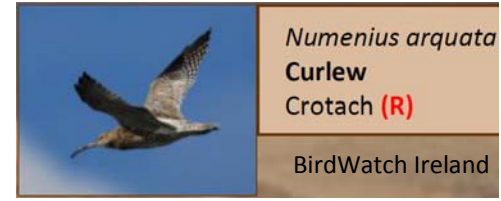


(Inger et al., 2009; Maar et al., 2009)



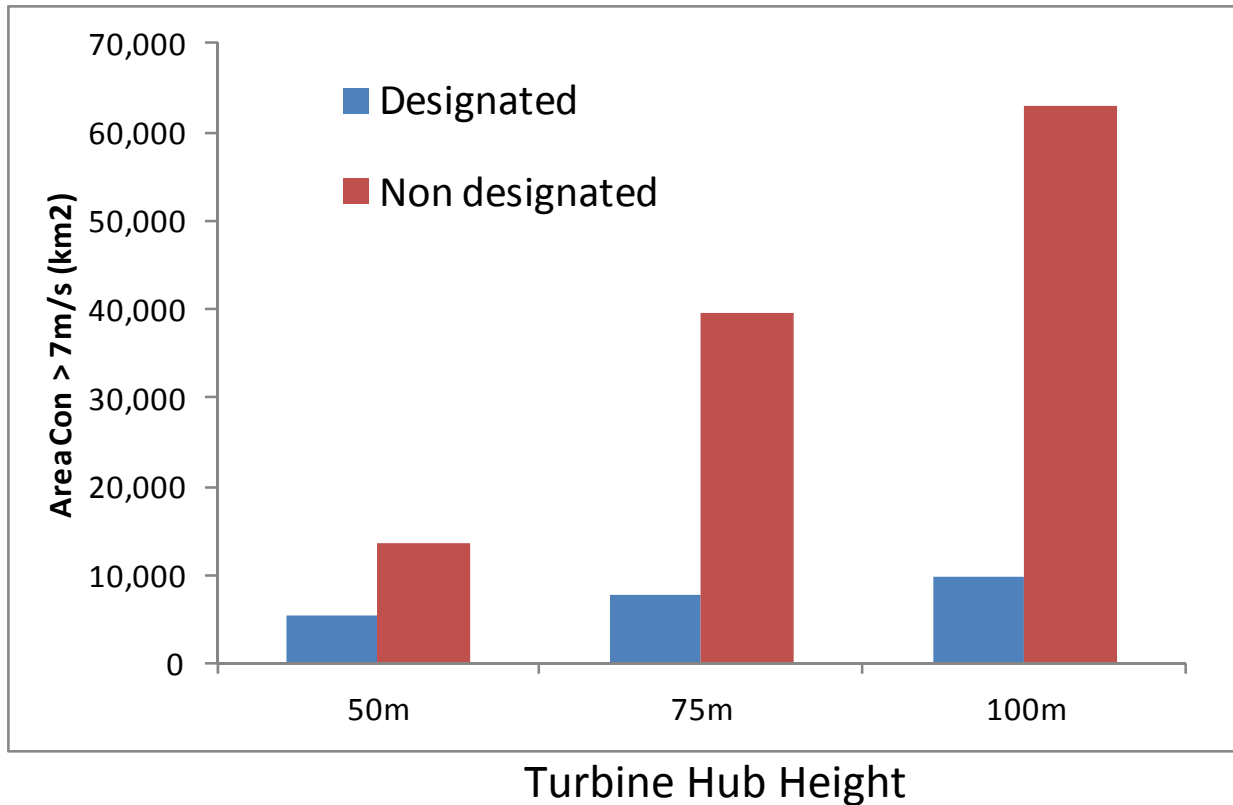
(Drewitt and Langston, 2006; Stewart et al. , 2007; Masden et al. 2010)

Effects on birds are variable and context specific.

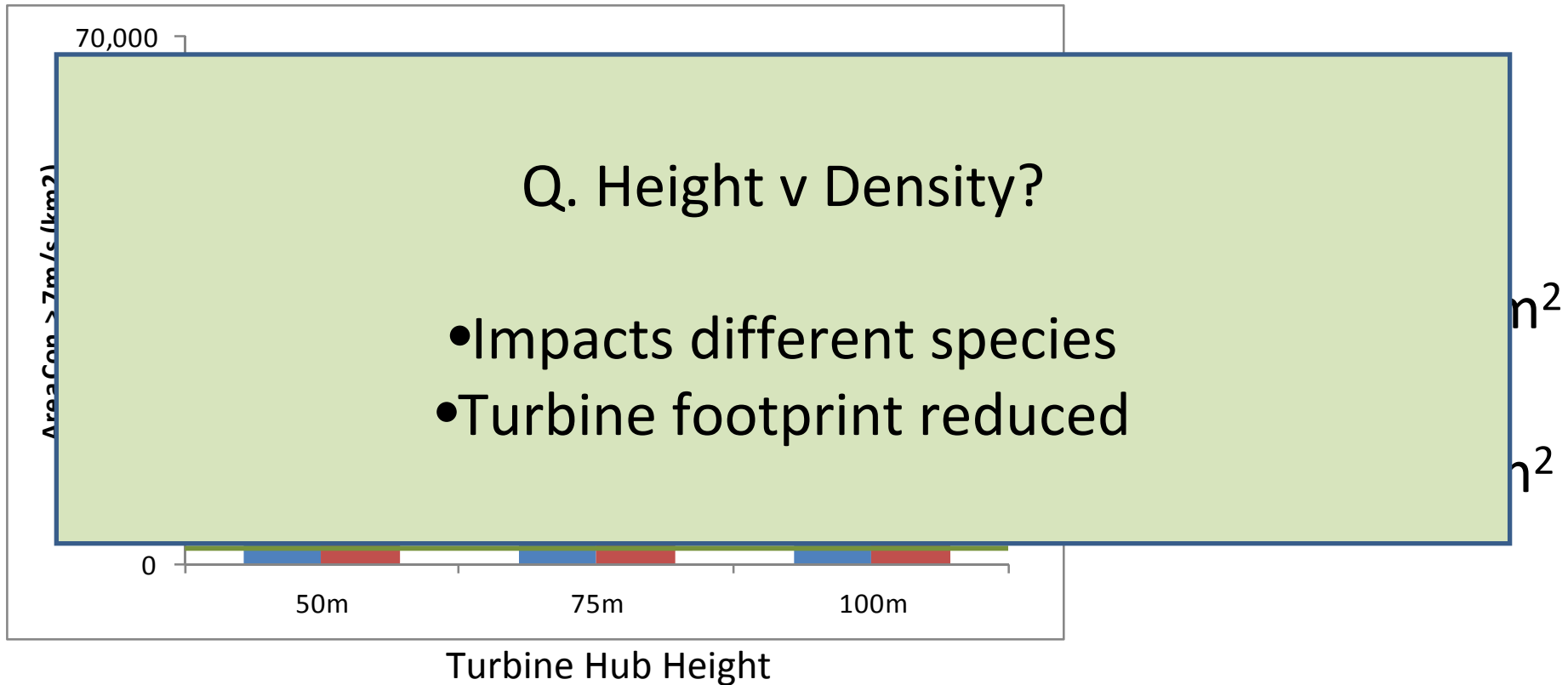


Pearse-Higgins et al.
(2012)

Q. How much viable wind do we have inside and outside of designated areas?

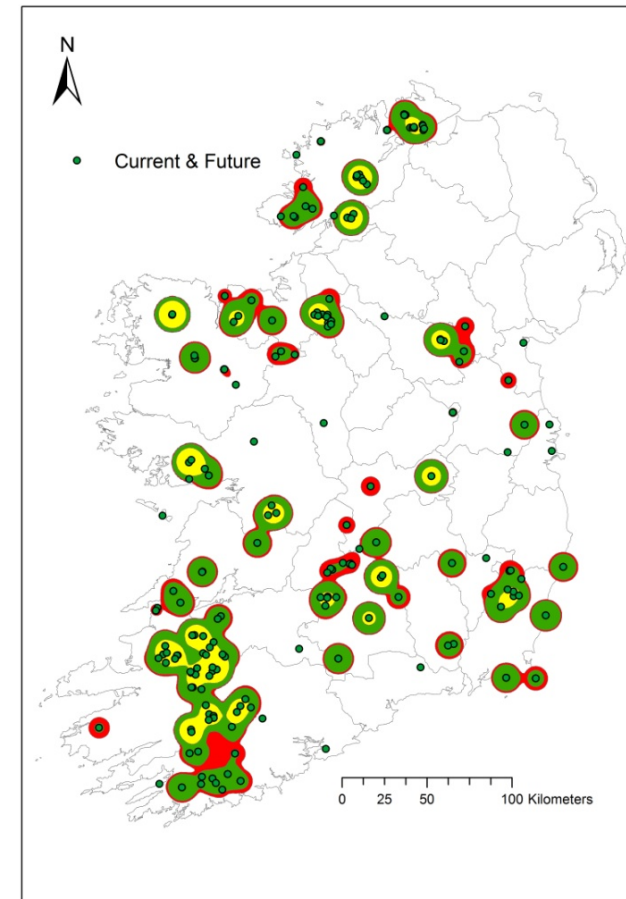
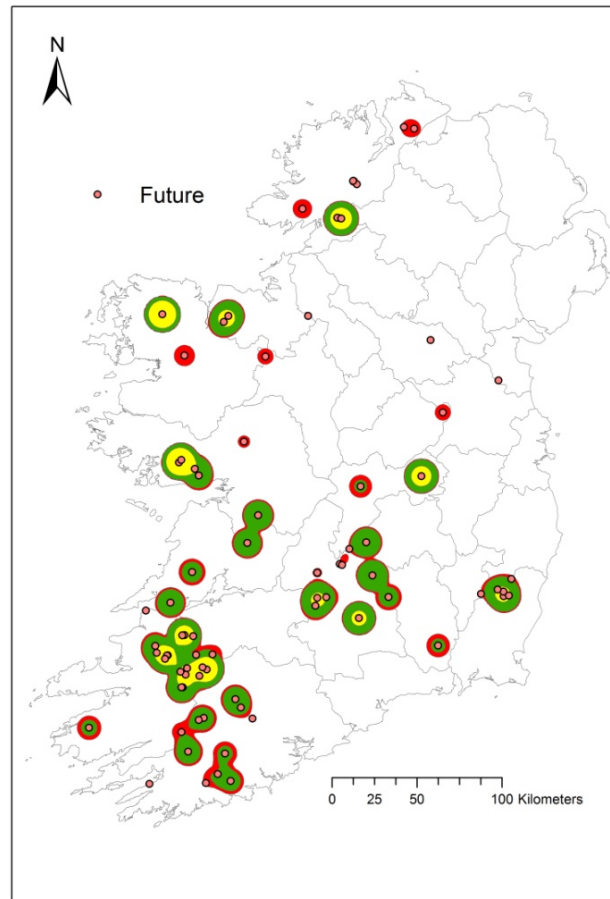
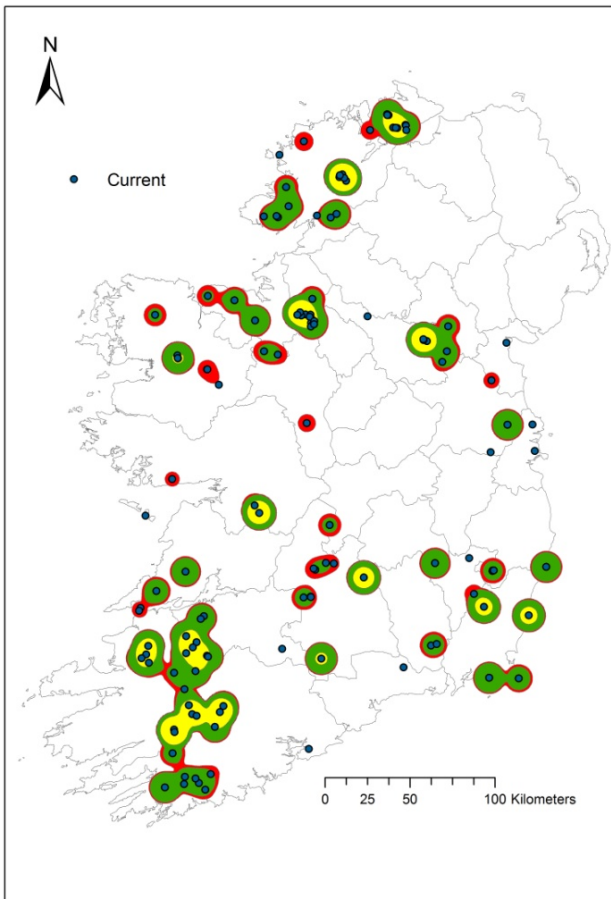


Q. Can we meet renewable energy targets without developing designated areas?



Q. Where are wind farms located and planned in the future?

Q. Is the density of wind farm development a problem and is it in the “right or wrong places”?



Future Challenges (1)

- Adequate evidence to provide sound advise
- More publishing of data
- Inaccessible grey literature/internal reports
- Many gaps in our knowledge
 - Fundamental ecological understanding
 - Impacts on species?
 - Impacts on habitats?



Future Challenges (2)

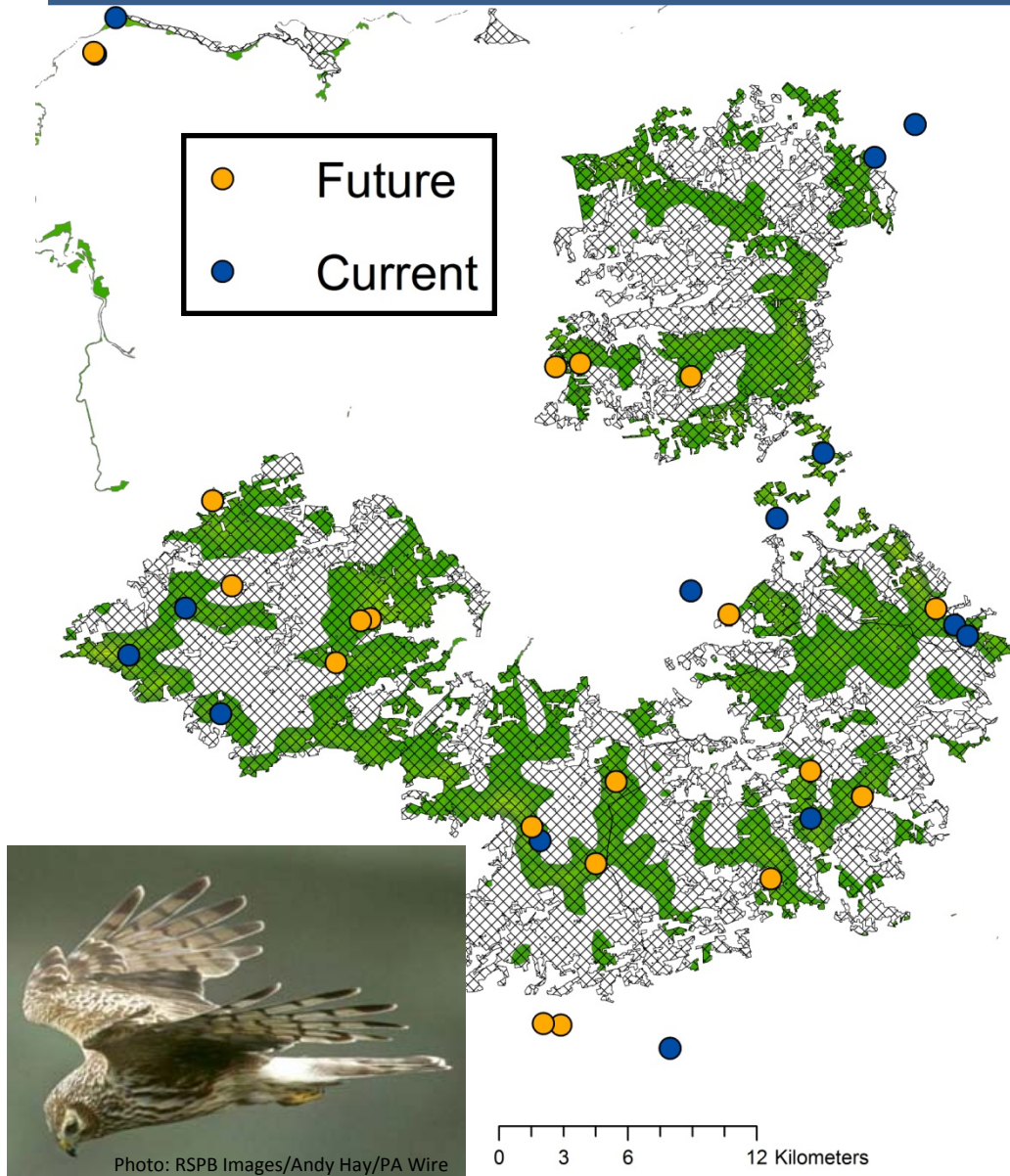
Multiple stressors & cumulative effects

- Development (e.g. wind farms, roads)
- Climate change
- Land-use change
- Invasive species
- Habitat loss

Future Challenges (3)

- Planning
- Assessment
- Monitoring

Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA



Key areas for future research

- Bird/bat sensitivity maps
- Population-level impacts
- Species specific studies
- Identification of migration routes/corridors and stepping stones of bats in Ireland
- Cumulative effects
- Preliminary research into impacts on marine species and habitats

A collage of four images: a wind turbine at sunset, a butterfly on a flower, a mountain range with snow, and a bird of prey in flight.

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Bird Watch Ireland