BirdLife Malta's comments on the SEA report for Malta's National Policy for the Development of Offshore Renewable Energy

22 April 2024

BirdLife Malta has analysed the published document in relation to the Strategic Environmental Assessment for Malta's National Policy for the Development of Offshore Renewable Energy and we would like to provide our input to the consultation process. We deem the SEA as incomplete on various aspects, especially on sections dealing with avifauna, and argue that the assessment requires major revisions to adequately assess the policy and its potential impacts.

BirdLife Malta seeks clarity in whether the proposed areas or any of the areas (Area 1 to 6) in the Policy document are being declared as Renewable Acceleration Areas under the RED III of the European Commision. If this is the case, we stress the immediate need for improvement of the SEA, its assessment of impacts, siting of areas and expected mitigation measures, and integration of the policy with an updated national Marine Spatial Plan. It is particularly concerning that the SEA is incomplete in terms of baseline data and repetitively states that further assessment would be needed "during project-specific environmental screening processes". However, this is rather contradictory given that the SEA also explicitly states that "renewable projects and their grid connection may be exempt from the EIA and from species protection assessments provided that…the project has been subjected to a SEA". This would mean that any approved renewable energy sources (RES) development would be based on an incomplete and weak SEA.

Background of BirdLife Malta's recommendations to offshore renewable energy policy

The implementation of the Policy is expected to have major impacts on the environment and avifauna, and BirdLife Malta has attempted to contribute to the process of developing the named policy by sharing our recommendations with the responsible entities.

BirdLife Malta submitted on 30th September 2023 feedback to the draft National Policy for the Deployment of Offshore Renewable Energy. Already in this document, maps from key datasets on the distribution of seabirds and migratory birds across the Maltese 25nm zone were presented. BirdLife Malta followed other BirdLife partners in Europe and BirdLife International, and with their shared methodology and experience mapped sensitivity of birds to offshore wind energy installations within the 25nm zone around Malta, following a data compilation process from entities across Europe. The importance of sensitivity mapping was discussed with the Ministry for the Environment, the Energy and Water Agency and InterConnect Malta at a meeting held on the 23rd November 2023. BirdLife Malta presented and shared the sensitivity map to offshore wind energy for the Maltese 25nm zone on the 11th January 2024. Our findings from the sensitivity mapping show areas ranging from 'Low' to 'Very High' risk to avifauna from offshore wind energy impacts including risks of collision and displacement (Annex 1). All designated areas for potential development of offshore renewables laid out in the policy include areas with 'High' to 'Very High' risk from offshore wind energy installations. Designated areas also include areas with Low risk, meaning that careful siting of projects and further studies can reduce the impact on avifauna.

General Comments to the SEA

BirdLife Malta agrees with the decision to avoid Natura 2000 sites (marine SPAs and SACs) from the list of areas considered for the deployment of renewables. However, we are concerned that no buffer zones have been included given that all the proposed areas are located on the border of one or several marine Natura 2000 sites. In case, offshore energy infrastructure is sited close to Natura 2000 sites, the impact on the respective protected area is likely to be high. Furthermore, the connection grid is likely to pass through one or two marine Natura 2000 areas.

We note that the SEA report mentions multiple times that the exercise "does not preclude the authorities from requesting further studies at project-level relating to any submitted planning applications for RES developments". We agree with the argument, however we question how the habitats, listed species and impacts were assessed in the SEA since the data is apparently very incomplete. In addition, the SEA should lay the foundation for identifying and predicting the impacts and necessitate mitigation measures from the successful bidder. The SEA should be a process which "evaluates reasonable alternatives and mitigation measures to avoid or minimise such environmental impacts"[1], however few to no concrete mitigation measures are provided in order to minimise the impacts on marine, terrestrial and coastal biodiversity.

Whilst it is appreciated that a list of stakeholders has been drawn up, there seems to have been no consultation with such stakeholders for the use of expert knowledge during the SEA. BirdLife Malta was not consulted during the writing up of the SEA, hindering the opportunity to drastically improve information on migratory birds and foraging areas of local seabirds.

[1] https://era.org.mt/topic/sea-overview/

Impacts on marine and coastal biodiversity

The environmental baseline data evaluated, is mainly sourced from documents prepared by the ERA, Eurostat, EU portals such as EMODNET and the National Statistics Office. These desk-based assessments clearly show that there are gaps in the baseline information available and point out the need for establishing a study area followed by in-situ data collection.

It should be stressed that the EUNIS-classified habitats are broad-scale predictive models. Whilst models prove to be a good information tool they should be validated by in-situ observations and data collection, and the SEA should make this a requirement from the successful bidder. Validation may be carried out through boat-based surveys, autonomous or remotely operated videos and scuba diving[2]. Hence, the statement wherein "the largest diversity of habitats is observed in Area 3, followed by Area 1, Area 2, Area 6, Area 4 and Area 5 in descending order", is not based on sound ecological assessments given that it is based only on the EUNIS predictive models. The SEA also states that "seafloor habitats in Areas 1, 2 and 3 are anticipated to consist mainly of unvegetated, fine sands, and muddy terrain". Again, this statement is based on a predictive model and unvegetated, fine sand and muddy terrains should not be considered as devoid of life as they do support a variety of infauna, benthic and demersal species[3].

In the determination of the best offshore cable route, the presented suggestions for the least impact possible are not based on appropriate assessments. Instead, the route with the shortest distance is being suggested which might not necessarily entail the least impact on habitats and biodiversity.

The SEA fails to give special attention to the national importance of *Posidonia oceanica* meadows and protected maerl habitats. Although clearly the impacts cannot be assessed in detail at the pre-project stage, the position of a SEA should be based on a precautionary principle and anticipate the most potential harm. *P. oceanica* is the most important endemic seagrass species from the Mediterranean basin in terms of supporting

[2] Vassallo, P., Bianchi, C. N., Paoli, C., Holon, F., Navone, A., Bavestrello, G., ... & Morri, C. (2018). A predictive approach to benthic marine habitat mapping: Efficacy and management implications. *Marine pollution bulletin*, *131*, 218-232.

[3] Terribile, K., Evans, J., Knittweis, L., & Schembri, P. J. (2016). Maximising MEDITS: Using data collected from trawl surveys to characterise the benthic and demersal assemblages of the circalittoral and deeper waters around the Maltese Islands (Central Mediterranean). *Regional Studies in Marine Science*, *3*, 163-175.

ecosystems services including its role in the ecology of coastal areas and the ability to sequester carbon for long-term storage[4].

The laying of cables close to the shore is expected to directly remove and indirectly impact whole strips of *P. oceanica* meadows. In addition, whilst in the SEA report, it is acknowledged that the laying of cables shall generate sediment plumes, it does not recognise how these may have an effect on *P. oceanica* meadows and what mitigation measures are necessary. *P. oceanica* is highly sensitive to turbidity and light attenuation, leading to decreased carbon sequestration and economic losses[5,6]. Turbidity plume models should be devised and mitigation measures such as the use of silt curtains during the construction phase should be a requirement from the successful bidder.

Moreover, while passing electrical currents, the grid cables are expected to contribute to increased temperatures of the surrounding sediment and water. This can have various effects on the marine environment including an increased risk for botulism in coastal areas resulting in higher death rate for water birds[7].

The SEA also fails to mention that RES projects might necessitate geophysical surveys for the mapping of the bathymetry. It is recognised that sound generated from geophysical survey sources, particularly seismic sources, have the potential to cause injury to marine mammals. Thus, any geophysical survey that has the potential to result in injury to marine mammals should apply mitigation measures to prevent deliberate injury offence[8.] Mitigation measures that may be used include bubble curtains and the presence of a dedicated marine mammal observer and/or passive acoustic monitoring operator during any offshore seismic activity. ACCOBAMS underwater noise mitigation measures apply for the Mediterranean and should be consulted for any geophysical survey required[9].

In the SEA, it is also stated that "cetacean migration routes within the Maltese EEZ are poorly understood and therefore the impact prediction requires further detailed studies".

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[4] El Zrelli, R., Hcine, A., Yacoubi, L., Roa-Ureta, R. H., Gallai, N., Castet, S., ... & Rabaoui, L. J. (2023). Economic losses related to the reduction of Posidonia ecosystem services in the Gulf of Gabes (Southern Mediterranean Sea). *Marine Pollution Bulletin*, *186*, 114418.
[5] El Zrelli, R., Hcine, A., Yacoubi, L., Roa-Ureta, R. H., Gallai, N., Castet, S., ... & Rabaoui, L. J. (2023). Economic losses related to the reduction of Posidonia ecosystem services in the Gulf of Gabes (Southern Mediterranean Sea). *Marine Pollution Bulletin*, *186*, 114418.
[6] Mazarrasa, I., Samper-Villarreal, J., Serrano, O., Lavery, P. S., Lovelock, C. E., Marbà, N., ... & Cortés, J. (2018). Habitat characteristics provide insights of carbon storage in seagrass meadows. *Marine pollution bulletin*, *134*, 106-117.
[7] Ospar Commission, 2004. Problems and Benefits Associated with the Development of Offshore Wind-Farms. https://www.ospar.org/documents?v=6991.
[8] JNCC (2017). Guidelines for minimising the risk of injury to marine mammals from geophysical surveys. https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf.
[9] https://accobams.org/wp-content/uploads/2019/04/MOP7.Doc31Rev1_Methodological-Guide-Noise.pdf

It is already well established that Maltese waters host a regular occurrence of bottlenose dolphins along with striped and common dolphins[10]. Sightings of fin whales have also been reported close to Maltese coasts[11,12]. In addition, data from deep diving species, like the inconspicuous *Ziphius cavirostris*, is hard to obtain in general, however their presence in the Mediterranean is confirmed through strandings[13]. Given that cetacean presence in Maltese waters is already known, it is pertinent that impact prediction on cetaceans and associated mitigations measures are addressed at the SEA stage and not delayed.

Impacts on avifauna

The information presented vis-à-vis avifauna is doubtful, confusing and not supported by any data collection or compilation. Whilst it is appreciated that an account of the African-Eurasian flyway routes is presented, we would like to stress that the SEA should focus on the impact and interactions that offshore renewable energy will have on migratory birds passing through or using the Maltese Islands and their waters. The Maltese islands lie along the central route of the European-African migratory flyway. More than 170 species regularly use Malta during the spring and autumn migrations, an indication of the importance of the Maltese islands as a stop-over[14].

The map with the "main routes of migratory land-birds on the central Mediterranean Flyway" (Figure 58, pg. 84) does not have any scientific reference and explanation. It is even more concerning that the mentioned map is used to draw conclusions on the level of impacts that offshore energy will have on migrating avifauna (pg. 154). This figure is not based on any cited or compiled data and cannot be used to determine the offshore renewable energy alternatives' level of impact for the 'main migration pathways' of avifauna around the Maltese Islands.

Moreover, the report states: "No comprehensive study has been carried out describing the movements of migratory land birds crossing the Maltese Islands and the Maltese FMZ". In that case, the SEA report should advocate for the precautionary approach to be

[10] Environment and Resources Authority. (2022). Long-term Monitoring Strategy for Marine Mammals and Marine Reptiles in Maltese waters. Report prepared by EcoMarine Malta Ltd for the Environment and Resources Authority as part of EMFF 8.3.1.
[11] Vella, A. (2010). First Research Sightings of Fin Whales (Balaenoptera physalus) in Coastal waters of the Maltese Islands, Central-Southern Mediterranean.
[12] https://www.independent.com.mt/articles/2021-04-06/local-news/Fin-whales-passing-by-Malta-is-not-rarity-but-common-occurrence-in-early-spring-marine-biologist-6736232354
[13] Karaa, S., Jerbi, H., Marouani, S., Bradai, M. N., & Rosso, M. (2021). First records of Cuvier's beaked whale (Ziphius cavirostris, G. Cuvier 1823) strandings along the Tunisian coast. *Marine Biodiversity Records*, *14*(1), 2.
[14] Raine, A. F., Gauci, M., & Barbara, N. (2016). Illegal bird hunting in the Maltese Islands: an international perspective. *Oryx*, *50*(4), 597-605.

taken by the successful bidder, where "lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation[15].

According to the SEA report, "up to 26 bird species have been recorded breeding on the Maltese Islands". Such information is incorrect and we strongly recommend consulting relevant literature, such as "The Breeding Birds of Malta" by J. Sultana, J.J. Borg, Ch. Gauci, V. Falzon and make necessary corrections.

Whilst discussing the specific impacts of offshore wind turbines on birds, the SEA report does not contain a comprehensive evaluation of impacts on the three breeding seabirds (*Calonectris diomedea*, *Puffinus yelkouan* and *Hydrobates pelagicus*) of which Malta holds populations of European and Global importance. The potential disruption of commuting corridors for breeding seabirds is correctly pointed out. However, the assessment seems to fail to highlight the potential displacement of seabirds from foraging areas (refer to Annex 1 for mapped foraging areas of central Mediterranean Yelkouan and Scopoli's shearwaters).

Furthermore, some information presented in the reports relating to avifauna is of secondary importance to the context. For example:

- P.151: "Many shearwaters and, to some degree, water birds exhibit a tendency to circumvent crossing extensive land expanses whenever feasible. This gives rise to a funnelling effect or bottleneck in sea channels, such as the Gozo channel". The paragraph is referring to avoidance of land masses by birds, however, the energy infrastructure is proposed offshore.
- P. 84: the summary of movements of birds on the Maltese Islands focusses on patterns on land but fails to describe movements to and from Malta across the sea which is more relevant in the context of offshore energy. Offshore renewable energy installations might not only impact birds stopping in Malta but also birds that migrate through the FMZ (Fig. 1).

Migratory birds and seabirds within the Maltese FMZ

Whilst it is true that specific studies are lacking as pointed out by SEA, there are published studies that could have been included and tracking data held in global depositories such as Movebank that could have been requested to better inform the assessment of

[15] United Nations. (1992). Rio Declaration on Environment and Development.

movements of birds across the Maltese FMZ[16,17]. In the process of sensitivity mapping of birds to offshore wind, BirdLife Malta requested data of GPS-tagged migratory birds to European researchers and BirdLife partners. These data, while still limited in species coverage, show that birds move across the entire Maltese FMZ (Fig. 1) and that the arrows presented in the SEA report Figure 58 might be too simplistic.

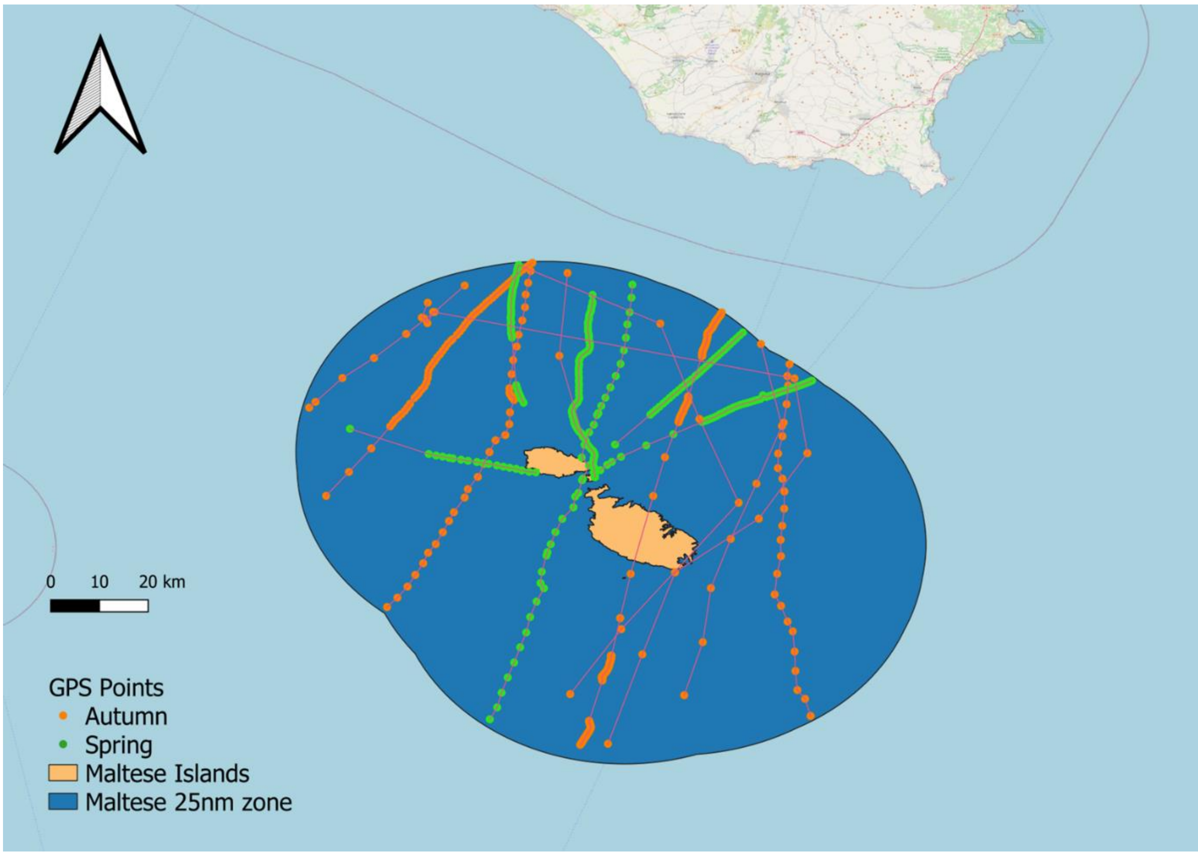

Figure 1. Examples of GPS-tracks of the migratory avifauna (Honey Buzzard, Marsh Harrier, Turtle Dove, Audouin's Gull) through the Maltese FMZ obtained through a compilation process by BirdLife Malta. For a list of data sources refer to Annex 1.

BirdLife Malta has collected, through various seabird-focused LIFE projects, standardised boat-based observations of all bird species within the FMZ and GPS-tracking data on the breeding seabirds. The boat-based observations of various seabirds and migratory land birds show that their presence occurs throughout the Maltese FMZ (Fig. 2). Ultimately, the data collected determined important commuting, rafting and foraging areas, essential information which has been omitted from the SEA.

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[16] Wikelski M, Davidson SC, Kays R (2023). Movebank: archive, analysis and sharing of animal movement data.

[17] Schumm, Yvonne R., Benjamin Metzger, Eric Neuling, Martin Austad, Nicholas Galea, Nicholas Barbara, and Petra Quillfeldt. "Year-round spatial distribution and migration phenology of a rapidly declining trans-Saharan migrant—Evidence of winter movements and breeding site fidelity in European turtle doves." *Behavioral Ecology and Sociobiology* 75 (2021): 1-16.

GPS-tracks and observations of migratory landbirds during boat-based surveys counteract concerning conclusions such as "Nevertheless, Area 3 and Area 6 do not appear to intersect directly with the indicative migratory routes shown in Figure 58, and therefore may induce less adverse impacts on avifauna if RES projects are developed exclusively in these two areas" (pg. 154). Several species migrate on a broad front and the impact on migrating avifauna from offshore energy installations can therefore be of major significance irrelevant whether it is the proposed Alternative A, B, C or D.

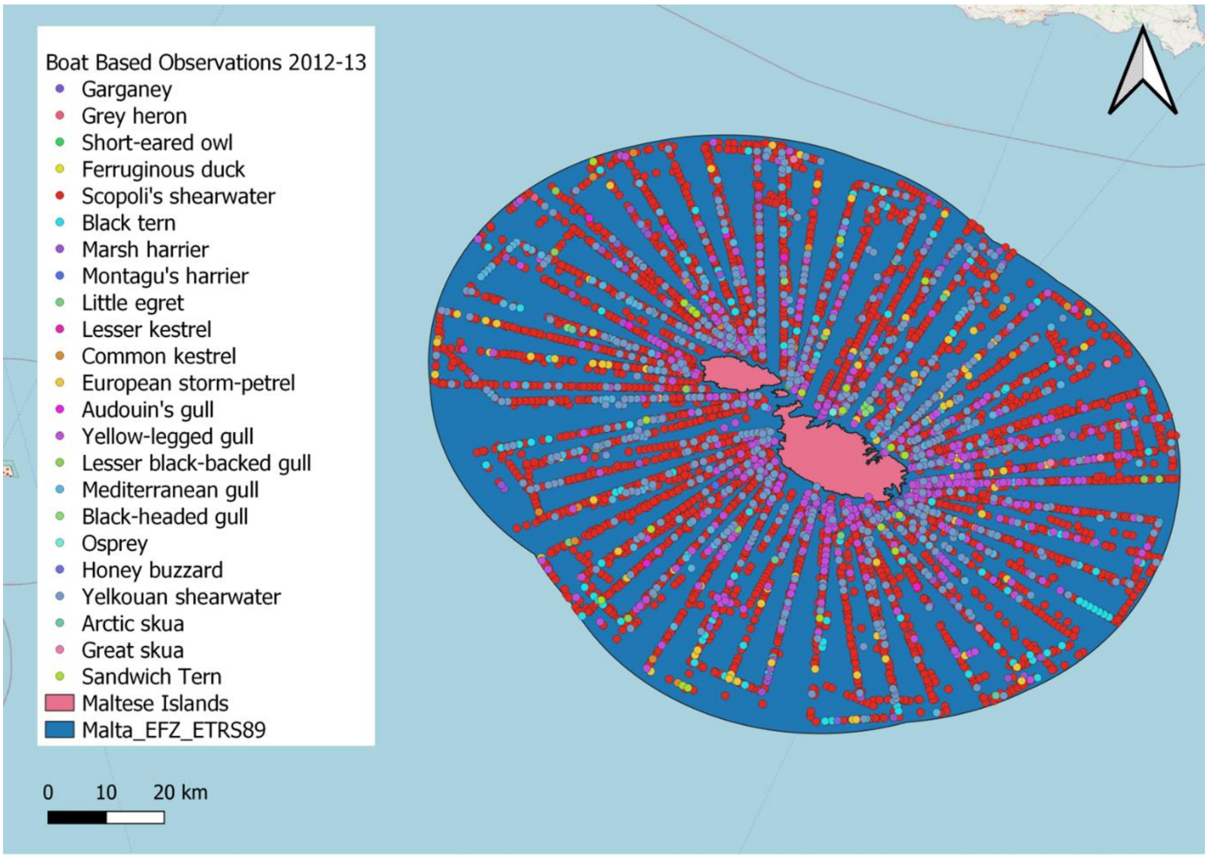

Figure 2. Standardised boat-based observation data collected by BirdLife Malta in 2012 and 2013 during LIFE+ Malta Seabird Project showing presence of avifauna species throughout the Maltese FMZ.

Sensitivity Mapping for Offshore Wind Energy

BirdLife Malta used boat-based observation data and GPS tracking data to carry out a sensitivity mapping exercise to better inform on where, within the Maltese FMZ, there are most occurrences of birds which would lead to higher risk. The sensitivity map is weighted by species characteristics such as vulnerability to collision and displacement from wind energy infrastructure, their conservation status and the proportion of populations occurring in Malta. Hence, the sensitivity map is specific to offshore wind energy and should not be translated into sensitivity to other installations. The methodology and sensitivity scores are based on those developed by BirdLife International and BirdLife partners who are currently working on publishing the methodology in scientific journals. The sensitivity map for Malta shows that areas with High and Very High risk to birds are found throughout the FMZ and in proximity to the six areas proposed for offshore RES (Fig. 3). The full report is presented in Annex 1. These overlaps between proposed offshore renewable energy designations and areas of high sensitivity call for:

- Revisions of proposed areas where these include particularly high number of sensitive spots
- Further site-specific studies prior to any proposed projects
- Improvement of mitigation measures and monitoring required during any project proposed by bidders and to be drawn up in the SEA report in question

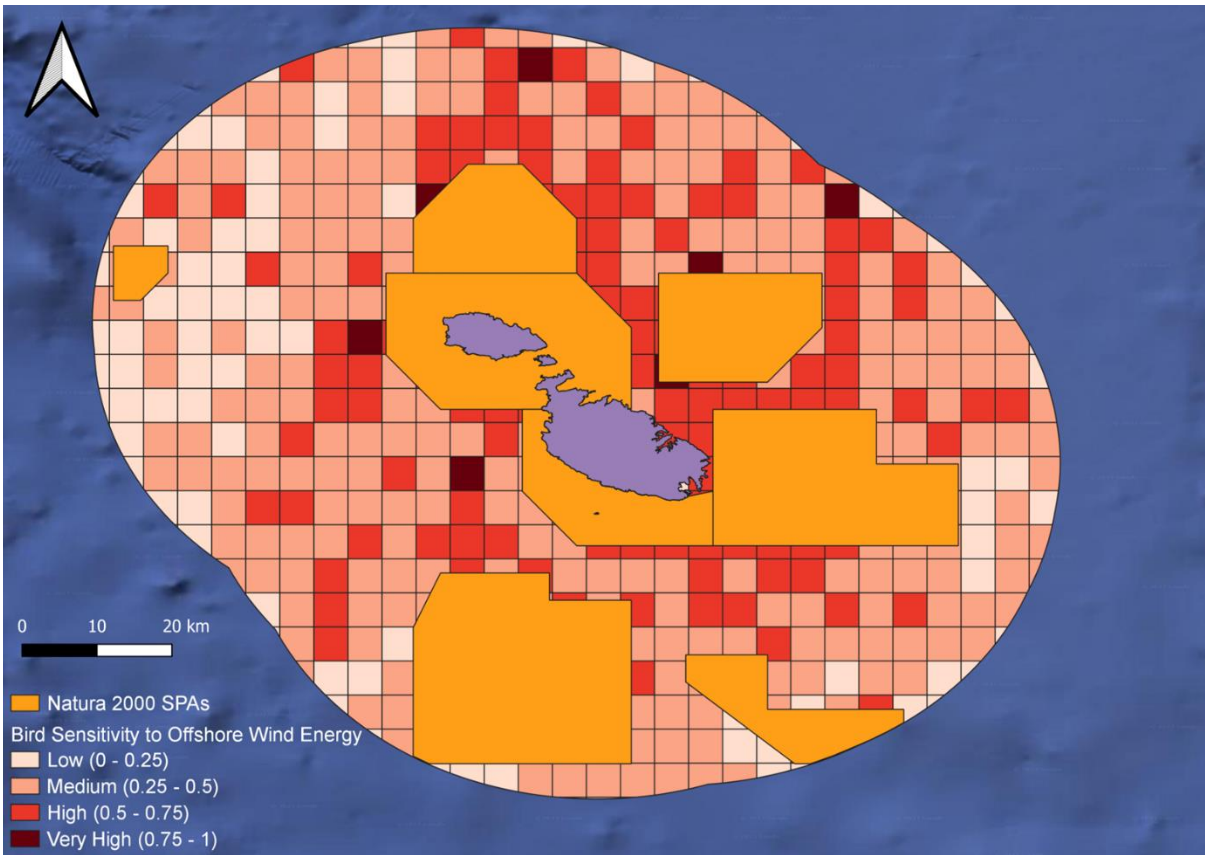

Figure 3. Bird sensitivity to offshore wind in the Maltese 25nm zone based on methodology and scores from BirdLife International and BirdLife partners (Annex 1). The sensitivity levels are delineated in different shades: 0-0.25 corresponds to "Low", 0.25-0.5 to "Medium", 0.5-0.75 to "High" and 0.75-1 to "Very High". The map also incorporates the Natura 2000 Special Protection Areas (SPAs), in orange.

The sensitivity mapping was carried out with the best available data and knowledge but can be improved in the future, especially in consideration of the following:

- Sensitivity was mapped to offshore wind installations but sensitivity to impacts from other types of renewable energy, cabling and related infrastructure needs to be assessed.
- Assessment of changes in behaviour dependent on meteorological conditions and species visual fields.
- Inclusion of further species or further data on the species included with generation of new tracking data and further miniaturisation of devices
- Update of collision and displacement scores with data collected at marine installations.

Therefore, sensitivity mapping should be updated regularly. Research on distribution and abundance, including tracking of individuals of priority species, should be promoted and performed regularly; such research should also focus on common species as well (especially if poorly studied) and key periods of their life cycles (such as migration).

Full List of Potential Impacts on Avifauna

A full list of impacts on avifauna from wind farm infrastructure can be found below. We suggest enhancing the SEA with these impacts, as the report focused mostly on habitat loss and collision impacts.

Source of potential impact	Impact
Turbines, mainly rotor blades and wakes Light emission	• Bird collision • Displacement • Attraction of birds due to illumination by navigational lights and subsequent increase in the risk of collision
Wind-farm as a whole	• Temporary or permanent habitat loss or change, including exclusion of habitat, e.g. sandbanks • Fragmentation of feeding, breeding and roosting areas, as well as migratory routes due to barrier effect • Change of food species availability • Ecological trap • Introduction of metallic pollutants into marine food chain impacting food source for seabirds
Boat traffic during construction and maintenance	• Disturbance • Stress and reduction of biological fitness • Temporary or permanent exclusion from habitat
Electric cable to shore - increase of temperature in sediments during operation	Increased risk for botulism in coastal areas (eulittoral) resulting in an increased death rate for wading birds and water birds

Source: OSPAR Commission, 2004[18] and BirdLife ECA Position paper Winds of Change: Powering Healthy Seas through a Nature Positive Energy Transition, 2023[19]

In reference to other potential types of offshore renewable energy other than wind, the SEA report claims "Additionally, if RES projects incorporate solar technology, the impacts described would be considerably less". We do agree that solar technology would not have the same risk of collision with blades as does offshore wind. However, solar technology can still have displacement impacts for foraging shearwaters and other unknown impacts due to the very limited deployment of such installations in the marine environment. Floating solar farms are likely to attract other groups of birds such as gulls, changing the composition of ecosystems[20]. In such a manner gulls could potentially make use of such floating installations, in turn increasing predation risk of various other avifauna. Other impacts such as those associated with shading are also difficult to predict at such face value.

Mitigation measures

The SEA does not provide a clear set of mitigation measures to reduce the environmental damage from the expected impacts. There are several mitigation measures which could be proposed at an early stage of planning and design, specifically when it comes to reducing and eliminating impacts for avifauna. The environmental impacts of each separate project should be assessed in due time and in line with national legislation mandating the need to conduct an EIA and AA. However, the SEA already should stress more on the prevention of environmental risks. Such measures have been suggested by BirdLife Malta in our recommendations to EWA, and as part of the consultation process initiated for the draft National Policy for the Development of Offshore Renewable Energy last year. These include:

- Micro-siting;
- Pre-construction options to avoid high-risk areas[21];
- and Co-location options to avoid additional take-up of pristine offshore areas.

Pre-conditioning is crucial, where the tender should be available only to those bidders who include environmental considerations in the project plan and design. Such criteria/conditions should include:

[18] OSPAR Commission, 2010. Assessment of the environmental impact of offshore wind farms. Microsoft Word - p00385_suppl_1_what is the problem.doc (ospar.org)
[19] BirdLife International (2023). Winds of Change. Winds-of-Change_BirdLife-Europe-Central-Asia.pdf
[20] Vlaswinkel, Brigitte, Pauline Roos, and Mei Nelissen. 2023. "Environmental Observations at the First Offshore Solar Farm in the North Sea" *Sustainability* 15, no. 8: 6533. https://doi.org/10.3390/su15086533
[21] Gartman, Mitigation Measures for Wildlife in Wind Energy Development, Consolidating the State of Knowledge — Part 1: Planning and Siting, Construction, 2016

- Non-polluting lighting scheme (avoiding non-mandatory illumination, adjusting the colour spectrum of lightning accordingly and using deflectors).
- Bird deterrent devices and solutions such as painting the turbines, as suggested in the SEA[22].
- Bird radars: Assists in studies of broad-scale aerial movements of birds and bats, useful in estimating their numbers and their behaviour near wind farm infrastructure[23].
- Mandatory curtailment mechanism in place[24].
- Automatic detection systems: These work by detecting incoming birds using a detection/classification process and triggering a specific reaction (scaring off the bird or shutting down the turbine)[25].
- Micro-siting exercise done prior to choosing the exact location.
- Decommissioning plan in place.

We recommend implementing a comprehensive surveillance system (radar, video, boat-based observations etc) at offshore energy facilities. Installation of these monitoring tools would serve several purposes:

- Generate data on the number and species utilising the area prior and during operation;
- Generate data on collision and displacement at sea which can inform mitigation measures;
- and Inform on migration events when impact can be reduced by curtailing turbines.

Other impacts

- The report fails to mention migratory bats (Chiroptera) and the potential impact of offshore renewable energy on this group which can be especially negative for offshore wind[26].

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22 https://reneweconomy.com.au/could-zebra-stripes-steer-birds-clear-of-offshore-wind-turbines/
23 Hüppop, O., Ciach, M., Diehl, R., Reynolds, D. R., Stepanian, P. M., & Menz, M. H. (2019). Perspectives and challenges for the use of radar in biological conservation. *Ecography*, *42*(5), 912-930.
24 Dutch shut down offshore wind turbines to save birds in 'international first' | Recharge (rechargenews.com)
25 Ballester, C., Dupont, S. M., Corbeau, A., Chambert, T., Duriez, O., & Besnard, A. (2024). A standardized protocol for assessing the performance of automatic detection systems used in onshore wind power plants to reduce avian mortality. *Journal of Environmental Management*, *354*, 120437.
26 Brabant, R., Laurent, Y., Jonge Poerink, B., & Degraer, S. (2021). The relation between migratory activity of Pipistrellus bats at sea and weather conditions offers possibilities to reduce offshore wind farm effects. *Animals*, *11*(12), 3457.

- The SEA lists other species, marine mammals and turtles, that are found within the respective designated Natura 2000 SACs but fails to mention that such marine megafauna migrate and might move outside protected areas. Hence the potential impacts should be better laid out holistically.

- An ecosystem-based approach is not incorporated. One cannot assess the impacts on the environment by simply listing the potential risks and threats - the environment operates as a whole, and a holistic approach should be applied to understand the cumulative impact of the policy and the projects it supports.

- The impacts on fishes and displacement of fisheries in not properly assessed in the SEA. The operational stage of offshore windfarms might alter the biodiversity and change ecosystem functions and processes. Moreover, it is expected that fishery exclusion zones are implemented in proximity to the wind farm location. This may lead to loss of fishing grounds, displacement of fisheries, decrease in income and increased competition in other areas. A robust MSP is essential in this regard. Consultation and compensation for fishermen are some of the strategies that have been implemented in previous projects. It has been suggested that fishermen should be represented by local representatives representing different types of fishermen (representing specific gear and vessel types), complemented by face-to-face meetings with developers with ample time for consultation[27].

- The assessment should also cater for the cumulative impacts of small-scale local effects (including associated on- and offshore development) in conjunction with other projects that may impact on the same flyway populations and marine areas (such as offshore aquaculture, bunkering areas, cable-laying, mineral extraction, shipping routes, etc).

- The impacts associated with decommissioning are not given enough attention.

- Light pollution from offshore substations, especially if these are manned, is not accounted for. Light pollution should be properly mitigated from any such stations since they could attract seabirds. Light pollution seems only to be assessed for the period of works but not during the operational phases. No mitigation measures are proposed but should include shielding of lights, blinds on any housing lights at

[27] Van Hoey, G., Bastardie, F., Birchenough, S., De Backer, A., Gill, A., de Koning, S., Hodgson, S., Mangi Chai, S., Steenbergen, J., Termeer, E., van den Burg, S., Hintzen, N., Overview of the effects of offshore wind farms on fisheries and aquaculture, Publications Office of the European Union, Luxembourg, 2021, p. 99.

night (ships & substation, maximum lumen level sufficient for operational safety and avoidance of short wavelength white light[28,29].

Final comments

The development of offshore wind must be informed by strategic government-led spatial planning and not the other way around, therefore we would like to stress on the urge to finalise the reviewed version of the Marine Spatial Plan (MSP), which would align with the current requirements and be based on the latest available scientific data.

Studies have shown there is a gap between the perceived and the actual risks of offshore wind farms, resulting from uncertainty or a lack of data about the real environmental impacts of ocean energy devices[30]. Therefore, the government should ensure continued improvement of existing knowledge on environmental impacts of the offshore renewables, including by establishing a comprehensive monitoring scheme such as through the use of video surveillance in any offshore energy installations to fill knowledge gaps and address uncertainties about the magnitude and extent of the long-term impacts of offshore energy installations[31].

28 Ronconi RA, Allard KA, Taylor PD (2015) Bird interactions with offshore oil and gas platforms: review of impacts and monitoring techniques. J Environ Manage 147:34–45. https://doi.org/10.1016/j.jenvman.2014.07.031

29 Syposz M, Padget O, Willis J et al (2021) Avoidance of different durations, colours and intensities of artificial light by adult seabirds. Sci Rep 11:1–13. https://doi.org/10.1038/s41598-021-97986-x

30 Galparsoro I., e. a. (2022). Mapping potential environmental impacts of offshore renewable energy. AND Galparsoro, I. e. (2022). Reviewing the ecological impacts of offshore wind farms. npj Ocean Sustain.

31 Ward, J. e. (2010). Assessing the effects of marine and hydrokinetic energy development on marine and estuarine resources. Oceans 2010. Seattle. AND Wilberforce, T. e. (2019). Overview of ocean power technology. Energy.

Annex 1

Mapping Bird Sensitivity to Offshore Wind Energy in the Maltese Islands

January 2024

Introduction

The development of offshore renewable energy is important in the face of the current climate crisis and there is international political momentum for accelerating the permitting for the setting up of offshore wind energy installations. Sensitivity mapping is an essential tool within the initial planning for offshore wind sites and can inform on which areas should be avoided to cause the least harm to nature[32]. Such exercises have been conducted around the globe to identify sensitive areas for birds, providing a chance to deliver a profitable energy transition that minimises threats to avifauna[33,34]. Sensitivity mapping does not replace site-specific assessments of environmental impacts but can reduce potential conflict with nature by identifying early on areas where the negative impacts of offshore wind infrastructure are expected to be higher.

BirdLife Malta, with the support of methodology developed and compiled by BirdLife International and Sociedade Portuguesa para o Estudo das Aves (SPEA)[35], carried out sensitivity mapping specifically for birds within Malta's potential Exclusive Economic Zone. The zone equates to 25 nautical miles around the Maltese Islands (also referred to as Malta's Fisheries Management Zone) and is henceforth referred to as the Maltese 25nm zone. The specific pressure considered was that of wind farms and therefore related to the threats of collision and displacement from wind installations with respect to the avifauna that frequent or make use of the Maltese 25nm zone. The exercise aims to inform the Government of Malta on the siting of offshore wind farms so that areas with particularly high sensitivity are avoided, and further studies and development can focus on areas with less likely impacts.

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32 Winds-of-Change_BirdLife-Europe-Central-Asia.pdf
33 Garthe S, Hüppop O (2004). Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. Journal of Applied Ecology 41(4):724-34.
34 Kelsey EC, Felis JJ, Czapanskiy M, Pereksta DM, Adams J (2018). Collision and displacement vulnerability to offshore wind energy infrastructure among marine birds of the Pacific Outer Continental Shelf. Journal of Environmental Management 1;227:229-47.
35 Guilherme JL, Morais B, Alonso H, Andrade J, Almeida A, Barros N & Dias MP (2023). Mapping seabird and marine biodiversity sensitivity to marine wind farm expansion in Portugal | Mapeamento da sensibilidade das aves marinhas à energia eólica no mar em Portugal (Version 1). Sociedade Portuguesa para o Estudo das Aves (SPEA). https://doi.org/10.5281/zenodo.10045918

1. Data Sources

Two main data sources were used to identify the distribution and occurrence of bird species within the Maltese 25nm zone:

- GPS tracking data
- Boat based observations covering the 25nm zone of Maltese Islands

These methods aimed at obtaining data both on the resident breeding seabirds but also on migrating birds considering the important position of Malta along the Central European Migratory Flyway. Such data was sourced by BirdLife Malta from past studies such as LIFE projects focussed on Malta's seabirds, or were requested off research contacts, institutions and BirdLife partners across Europe. In all cases, such studies were not specifically conducted for the purposes of wind-energy speculation, but rather we scoped for existing data, and were accordingly permitted to utilise this data, specifically to be able to undertake this sensitivity mapping exercise.

GPS tracking data

Over the past decades, GPS tracking methods for birds have evolved significantly. Advancements in GPS technology, such as lighter and more advanced tracking devices have enabled researchers to gather detailed data on birds' positions and behaviour. The miniaturization of GPS devices has expanded their use to a broader range of bird species, allowing scientists to study migration routes, foraging areas and other aspects of bird behaviour in greater detail.
Shearwaters breeding locally have been tagged as part of various LIFE projects (Figure 1), generating a substantial dataset on their foraging movements at sea. Due to their large foraging areas, sometimes beyond national waters, we also obtained gps-data from the neighbouring colony of Linosa. All datasets are found on the database https://www.seabirdtracking.org/ .

Figure 1: The GPS device, Axy-Trek (TechoSmart Inc, Rome, Italy) with a solar panel, attached to the back feathers of a Yelkouan Shearwater using Tesa® tape (Tesa SE, Hamburg, Germany). The picture shows an individual breeding within the largest colony of Yelkouan Shearwaters in Malta, situated Rdum Tal-Madonna. It was tracked as part of the project LIFE PanPuffinus! (LIFE19 NAT/MT/000982)

In difference to breeding shearwaters that return to their colonies after foraging trips, migrating birds might only pass through or stop for a short time on their migration. GPS-tracking data was therefore requested on an international basis to researchers and BirdLife partners. A main source of data was the Movebank (www.movebank.org) repository[36]. GPS-tracking data of migrating birds was obtained for 11 species (Table 1, with data sources and acknowledgements per species provided in Annex 1). An example of migratory movements are those of an Audouin's Gull (*Larus audouinii*) breeding in Croatia, where it was tagged as part of the project LIFE Artina (LIFE17 NAT/HR/000594), while migrating through the Maltese 25nm zone on three consecutive autumn-spring-autumn migrations (Figure 2).

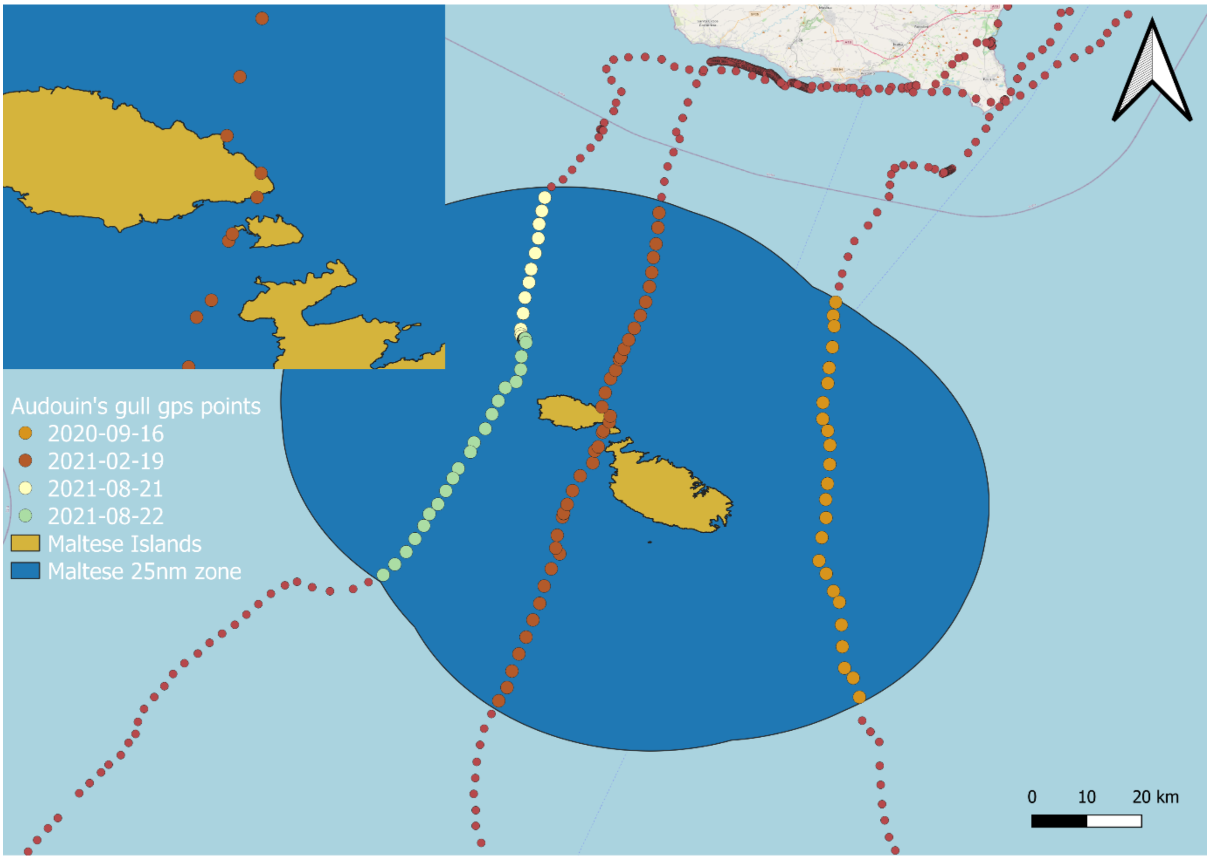

Figure 2: One of two Audouin's Gulls migrating through the Maltese 25nm zone from their breeding grounds in Croatia as provided by Kapelj S and Engelen D from Croatian BirdLife partner BIOM. The particular invidual passed through the Maltese 25nm zone on three consecutive migrations.

Additionally, three gulls tagged locally by BirdLife Malta, funded under the Conservation of Wild Birds Funding Scheme, were included in the analysis. These included one wintering Mediterannean Gull (*Larus melanocephalus*) and two breeding Yellow-legged Gulls (*Larus michahellis*).

Boat based observations

Systematic boat-based observations have been carried out during the LIFE+ Malta Seabird Project (LIFE10 NAT/MT/000090) in 2012 and 2013[37]. Boat-based bird counts serve as a fundamental method for mapping the offshore distribution of seabirds and migratory birds.

[36] Wikelski M, Davidson SC, Kays R (2023). Movebank: archive, analysis and sharing of animal movement data. Hosted by the Max Planck Institute of Animal Behavior. www.movebank.org, accessed on 18.12.2023.
[37] https://birdlifemalta.org/wp-content/uploads/2018/03/LIFE10NATMT090-MSP-A8_mIBA_Report_final.pdf.

Over a two-year period, the project team spent 224 days aboard a research yacht. Transects at sea were systematically followed to cover the majority of Maltese 25nm zone (Figure 3). Trained surveyors meticulously documented all bird species observed following the standardized Europe-wide protocol known as European Seabirds at Sea (ESAS)[38].

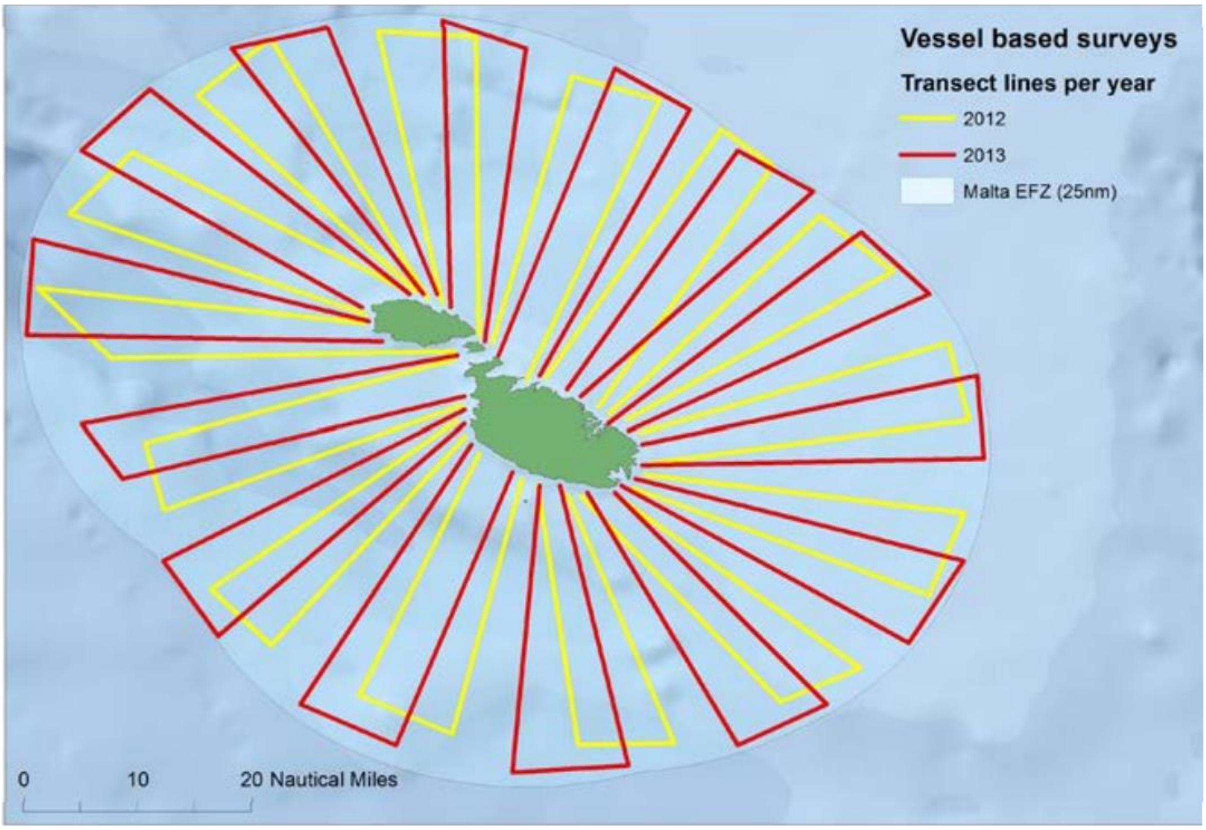

Figure 3: The extent of coverage of transect lines used during boat-based observations in 2012 and 2013 carried out during the LIFE+ Malta Seabird Project in the Maltese zone[6].

Species selection criteria

The selection of species for the assessment of sensitivity to offshore windfarms was conducted primarily based on available distribution data, set at a minimum of four data points within the Maltese 25nm zone (Table 1).

Secondly, species were retained based on the availability of compiled sensitivity indices made available by BirdLife International and SPEA. The computation of these indices is based on existing literature and studies that determine species-specific indices based on a species' likelihood of collision or displacement from wind farm installations. The Little Gull (*Hydrocoloeus minutus*) lacked estimated collision or displacement indices and was removed from the study.

The combination of these criteria ensured a comprehensive representation of avian species, with a focus on those with sufficient data and established sensitivity indices. In fact the

[38] Camphuysen CJ, Fox AD, Leopold MF, Petersen IK (2004). Towards Standardised Seabirds at Sea Census Techniques in Connection with Environmental Impact Assessments for Offshore Wind Farms in the UK: a comparison of ship and aerial sampling methods for marine birds and their applicability to offshore wind farm assessments.

resulting bird list comprised of 28 bird species across several different bird taxonomical families.

Table 1. The species with at least four data points within the Maltese 25nm zone, derived from boat-based observations and GPS-fixes of tracked individuals. In the case of the Scopoli's shearwater LN refers to birds tracked from colonies on Linosa and MT refers to birds tracked from colonies on Malta.

Species Latin name	**Species English name**	**Number of obersvations**	**Number of tracked individuals**	**Number of GPS fixes**	**Sum of data points**
Anas querquedula	Garganey	12	NA	NA	12
Ardea cinerea	Grey Heron	18	NA	NA	18
Asio flammeus	Short-eared Owl	7	NA	NA	7
Aythya nyroca	Ferruginous Duck	4	NA	NA	4
Calonectris diomedea	Scopoli's Shearwater	6131	LN: 227; MT: 66	LN: 345624; MT: 49756	401511
Catharacta skua	Great Skua	6	NA	NA	6
Chlidonias niger	Black Tern	131	NA	NA	131
Circus aeruginosus	Western Marsh-Harrier	71	3	3382	3453
Circus pygargus	Montagu's Harrier	4	1	2	6
Egretta garzetta	Little Egret	5	NA	NA	5
Falco eleonora	Eleonora's Falcon	0	4	30	30
Falco naumanni	Lesser Kestrel	3	11	41	44
Falco tinnunculus	Common Kestrel	27	NA	NA	27
Hydrobates pelagicus	European Storm-petrel	135	NA	NA	135
Hydrocoloeus minutus	Little Gull	22	NA	NA	22
Larus audouinii	Audouin's Gull	7	2	223	230
Larus fuscus	Lesser Black-backed Gull	10	NA	NA	10
Larus melanocephalus	Mediterranean Gull	124	1	2736	2860
Larus michahellis	Yellow-legged Gull	606	2	3322	3928
Marmaronetta angustirostris	Marbled Teal	0	2	14	14
Milvus migrans	Black kite	0	1	4	4
Pandion haliaetus	Osprey	3	3	192	195
Pernis apivorus	European Honey-buzzard	9	3	21	30
Puffinus yelkouan	Yelkouan Shearwater	602	99	59136	59738
Neophron percnopterus	Egyptian Vulture	0	7	191	191

Stercorarius parasiticus	Arctic Skua	5	NA	NA	5
Streptopelia turtur	European turtle dove	0	6	268	268
Thalasseus sandvicensis	Sandwich Tern	21	NA	NA	21

2. Processing of Spatial Data

Due to the substantial number of tracked individual shearwaters from known colonies we applied kernel utilisation distribution analysis to identify core foraging areas by each species. We conducted our analyses using R software, version 4.1.1-4.2.3[39], within the workflow implemented in the 'track2KBA' package[40,41].

Initially, we formatted the data to align with the 'track2KBA' package requirements using the *formatFields* function. Subsequently, we checked the data, eliminating spatiotemporal duplicates through the 'dplyr' package[42] as well as fixes with unrealistic ground speed using the McConnel speed filter through the 'trip' package[43]. Moreover, incomplete trips were eliminated using the *tripSplit* function[9], as were trips with less than five points. Points within 5000m of colonies were eliminated to remove bias towards rafting areas. This filtering resulted in 223 trips by 77 Yelkouan Shearwaters and 982 trips by 255 individual Scopoli's Shearwaters remaining for further analysis.

For the computation of 50% utilisation distribution (UDs), we utilized the *estSpaceUse* function from the 'track2KBA' package[9] and UDs were estimated per individual track with a smoothing parameter obtained through the *findScale* function for each species dependent on foraging behaviour[9] (Yelkouan Shearwater smoothing parameter used = 13; Scopoli's Shearwater smoothing parameter used = 4). The resulting utilisation distributions represent the areas where each shearwater spends 50% of its time, representing core foraging areas spanning the central Mediterranean (Figure 4 and 5).

All mapping and subsequent visualisation were done in WGS 84 4236.

[39] R Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing.
[40] Beal M, Oppel S, Handley J, Pearmain EJ, Morera-Pujol V, Carneiro AP, Davies TE, Phillips RA, Taylor PR, Miller MG, Franco AM (2021). track2KBA: An R package for identifying important sites for biodiversity from tracking data. Methods in Ecology and Evolution 12(12):2372-8.
[41] https://cran.r-project.org/web/packages/track2KBA/vignettes/track2kba_workflow.html
[42] Hadley W, Romain F, Lionel H, Müller K (2021). dplyr: A Grammar of Data Manipulation. R package version 1.0.7. https://CRAN.R-project.org/package=dplyr
[43] Sumner MD, Wotherspoon SJ, Hindell MA (2009). Bayesian estimation of animal movement from archival and satellite tags. PLoS One 4(10), e7324.

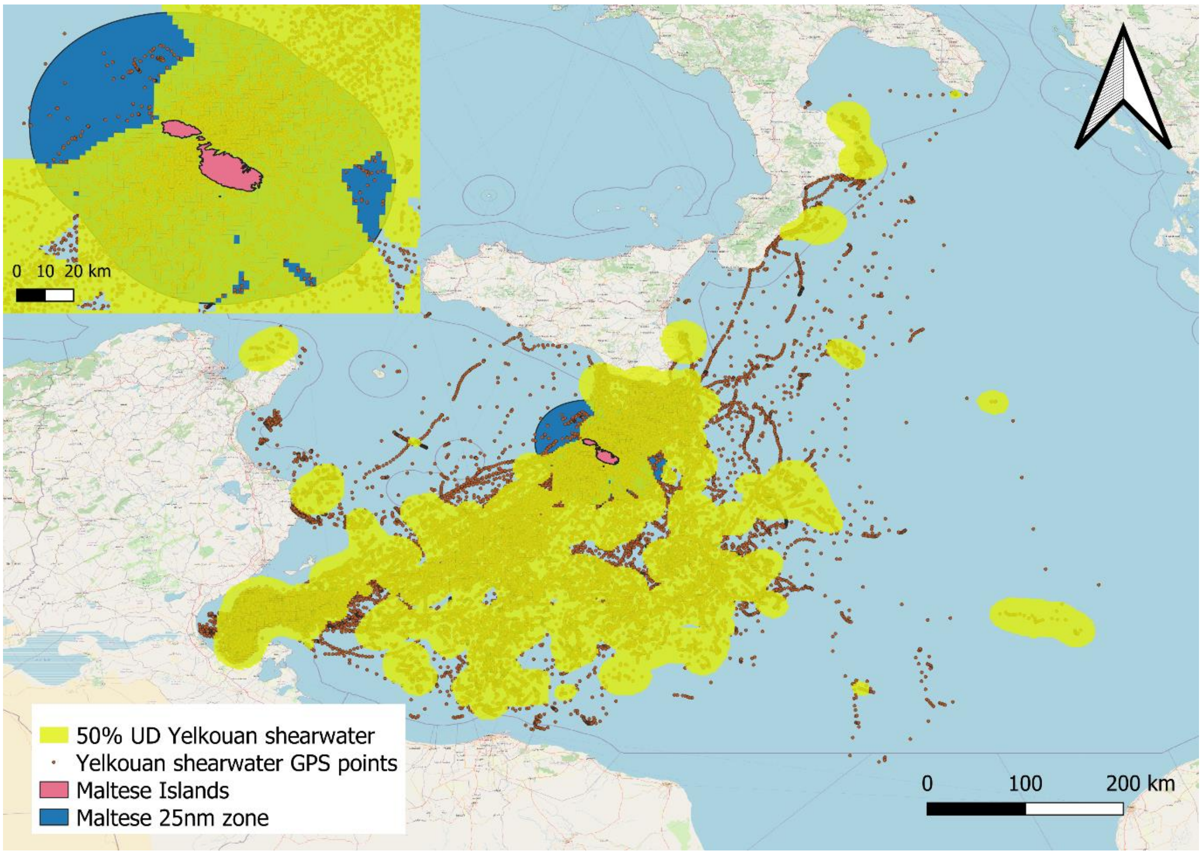

Figure 4: 50% Utilisation Distribution (UDs) for GPS-tracked Yelkouan Shearwater breeding on the Maltese Islands

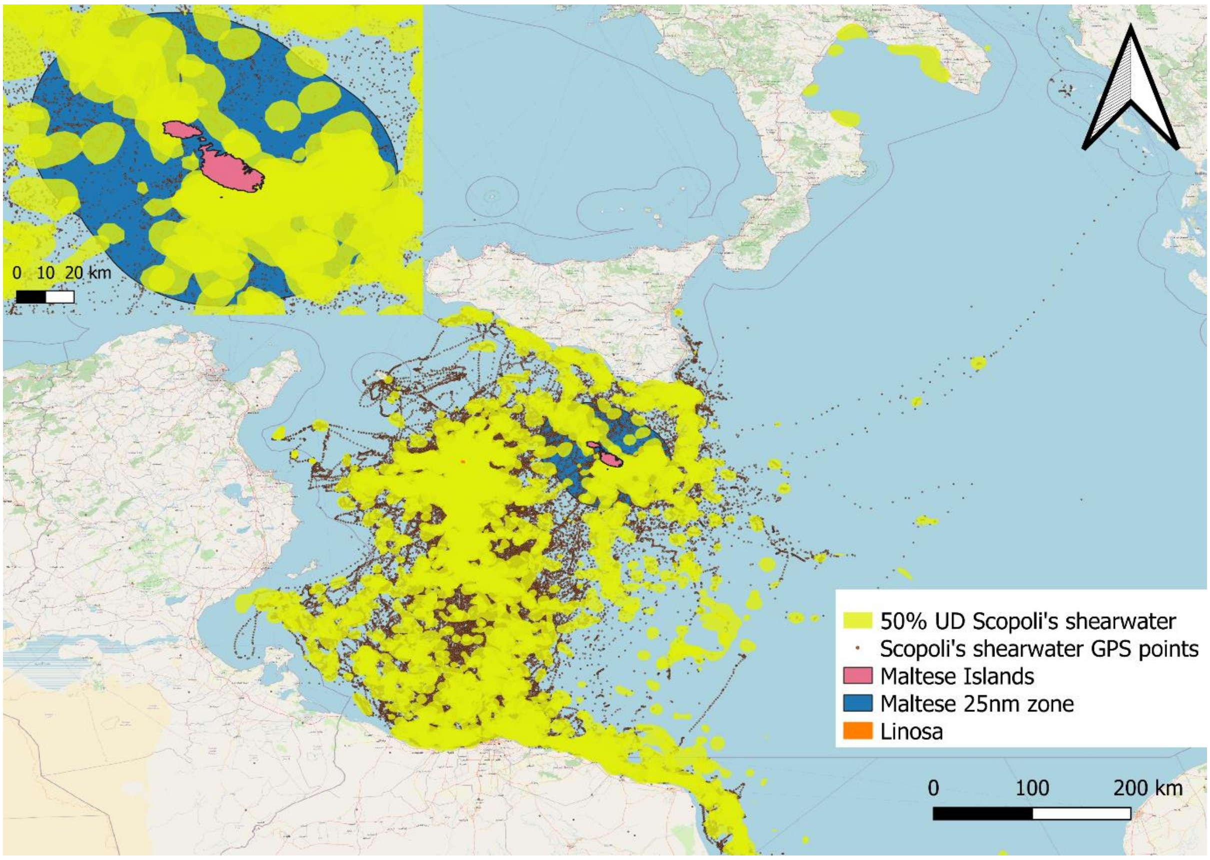

Figure 5: 50% Utilisation Distribution (UDs) for GPS-tracked Scopoli's Shearwaters breeding on the Maltese Islands and Linosa

Each layer of Yelkouan Shearwater and Scopoli's Shearwater 50% UDs were overlaid a 0.05° grid (~4.5km) restricted to the Maltese 25nm zone. In QGIS 3.34[44] the 'Join Attributes by Location' function (grid intersects and overlaps with UD polygons) was used. Thus, we obtained the presence or absence of shearwater core foraging areas per grid cell, with the case of the Yelkouan Shearwater shown as an example (Figure 6).

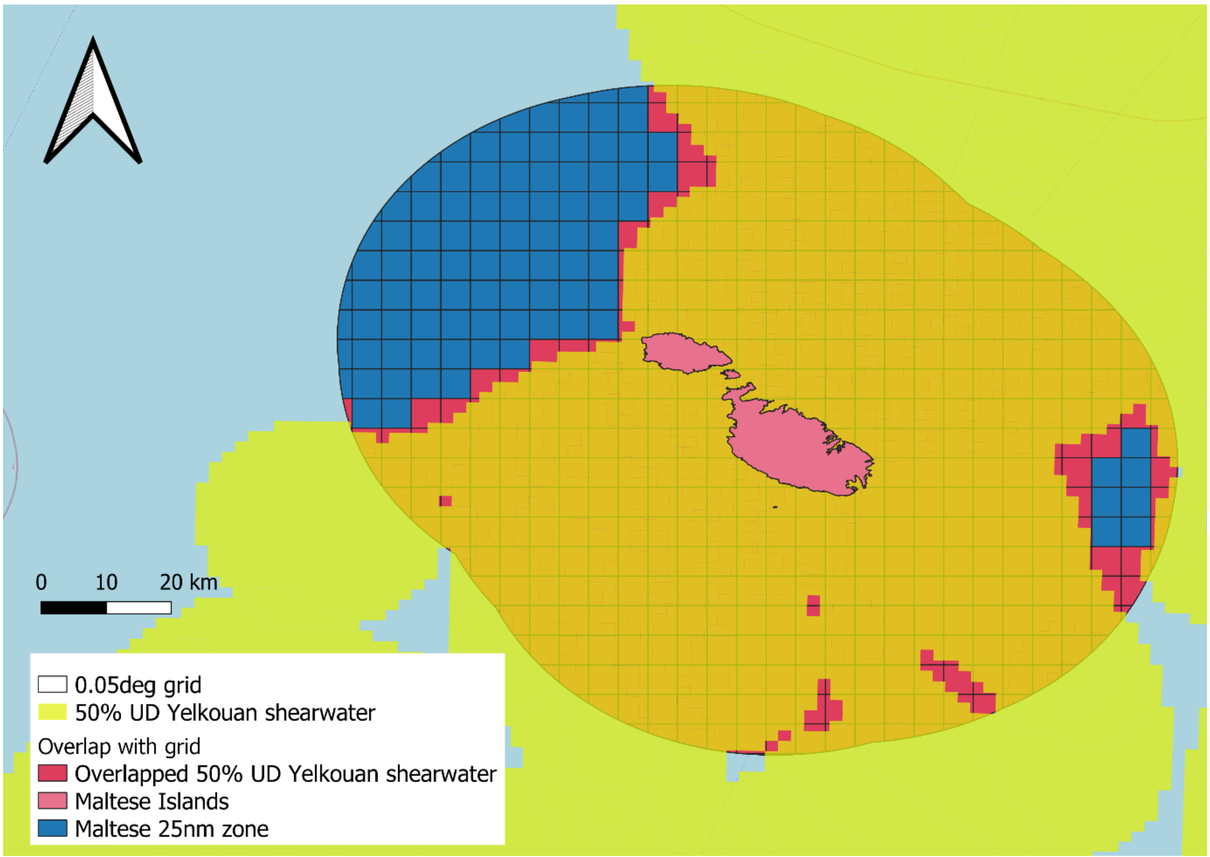

Figure 6: The utilisation distribution (UD) polygons of Yelkouan Shearwaters, depicted in bright yellow, overlaid onto a 0.05° grid restricted to the Maltese 25nm zone. Presence (pink) or absence (blue) was determined per grid cell depending on whether polygons intersected the grid cell.

For boat-based observations and GPS-points from all other species, data points were similarly overlaid the same 0.05° grid restricted to the Maltese 25nm zone. All species detections were summarised per grid cell, meaning that for each grid cell a list of species detected within the cell was generated.

In this context the two shearwater species were given double weight, once as UDs representing foraging areas of colonies and once from boat-based observations. It was important to keep boat-based observations in addition to the foraging areas, so that any shearwater distributions from colonies in the Maltese Islands and elsewhere in the Mediterranean where tagging was not possible, were also represented. All other species were considered once.

[44] QGIS. Geographic Information System. QGIS Association. Available from: http://www.qgis.org/en/site/about/index.html.

3. Species Sensitivity Index Computation

The sensitivity index was computed using data compiled by BirdLife International and SPEA. The calculation of the sensitivity index formula involved a multi-parameter approach. Metrics such as collision risk with wind turbines, displacement due to wind farms in the area, conservation status and annual adult survival were integrated based on the methodology adapted from Certain et al. (2015)[45] by BirdLife International:

$$SI = (Co + (Di/5))* ((GRL + NRL)/2)^{(1-((SPEC + Pop+Su)/3)/(((SPEC + Pop + Su)/3)+ 0.5))}$$

[14,46]

- Collision (Co)[47]
- Displacement (Di)
- Conservation Status
  - Global Red List (GRL)
  - National Red List (NRL)
- Species of European conservation concern (SPEC)[48]
- % European population (Pop)
- Annual Adult Survival (Su)[49]

Since a national red list is unavailable, the European or, if present the Mediterranean-level IUCN category was assumed to enable a level of discernment based on the conservation status of the species (i.e. a critically endangered species is given a higher weighting versus a least concern species).

The percentage of the European population was estimated using the mean of Birdlife Malta sightings from 2021 to 2023. In the specific case of the European Turtle-dove, information from the Spring Hunting Derogation report for 2023 was utilized[50].

For seabirds, breeding population estimates were derived from:

1. Malta's MSFD Art. 17 Update[51]
2. Seabird Fieldwork Report 2021[52]

This comprehensive approach ensured that the sensitivity index calculation incorporated the most relevant and up-to-date data, considering both European and Mediterranean contexts

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[45]Certain G, Jørgensen LL, Christel I, Planque B, Bretagnolle V (2015). Mapping the vulnerability of animal community to pressure in marine systems: disentangling pressure types and integrating their impact from the individual to the community level. ICES Journal of Marine Science 72(5), 1470-1482.

[46] Critchley EJ, Grecian WJ, Kane A, Jessopp MJ, Quinn JL (2018). Marine protected areas show low overlap with projected distributions of seabird populations in Britain and Ireland. Biological Conservation 224:309–317

[47] Thaxter CB, Lascelles B, Sugar K, Cook AS, Roos S, Bolton M, Langston RHW, Burton NH (2012). Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. Biological Conservation 156, 53-61.

[48] European_Birds_of_Conservation_Concern.pdf (birdlife.ch)

[49] Bird JP, Martin R, Akçakaya HR, Gilroy J, Burfield IJ, Garnett ST, Symes A, Taylor J, Şekercioğlu ÇH, Butchart SH (2020). Generation lengths of the world's birds and their implications for extinction risk. Conservation Biology 34(5), 1252-1261.

[50]https://ministryforgozo.gov.mt/en/Documents/WBRU/Spring%20Hunting%20Derogation/2023/anx4SprHunRep23.pdf

[51] https://era.org.mt/wp-content/uploads/2020/06/MSFD-Art.-17-Update-Malta_FINAL.pdf

[52] https://era.org.mt/wp-content/uploads/2022/11/Seabird-Fieldwork-Report-2021-public.pdf

where national data were lacking. The resulting sensitivity index per species is presented in Table 2.

Table 2. Offshore species list and sensitivity scores for the Maltese Islands (in descending order)

Species latin name	Sensitivity index
Neophron percnopterus	0.860040
Larus audouinii	0.661529
Circus pygargus	0.590918
Puffinus yelkouan	0.560009
Circus aeruginosus	0.427358
Pernis apivorus	0.415295
Larus michahellis	0.408962
Milvus migrans	0.402553
Larus melanocephalus	0.384036
Falco naumanni	0.325749
Calonectris diomedea	0.318026
Pandion haliaetus	0.313322
Stercorarius parasiticus	0.311731
Chlidonias niger	0.300651
Larus fuscus	0.271393
Marmaronetta angustirostris	0.271246
Streptopelia turtur	0.262354
Thalasseus sandvicensis	0.251489
Falco tinnunculus	0.223006
Aythya nyroca	0.218729
Falco eleonorae	0.201098
Larus ridibundus	0.178782
Hydrobates pelagicus	0.162180
Anas querquedula	0.160750
Catharacta skua	0.143988
Asio flammeus	0.133829
Ardea cinerea	0.116557
Egretta garzetta	0.115659

4. Generation of Sensitivity Map

The final stage involved the integration of spatial data and the sensitivity index (SI) of different species. The SI values were merged with spatial data on a species basis. Thus, data for each cell consisted of the species present and overlapping shearwater UDs together with the associated species SI.

The next step was to compute the sum of species sensitivity scores for each cell. The maximum value (4.928454439) was used to rescale all summed values to between 0 and 1.

Subsequently, the rescaled values were categorized into four classes using equal intervals: 0-0.25 (Low), 0.25-0.5 (Medium), 0.5-0.75 (High), and 0.75-1 (Very High).

Special Protection Areas as part of the Natura 2000 network were overlaid the final sensitivity map to take into consideration the protection these sites should receive from offshore wind development (Figure 7).

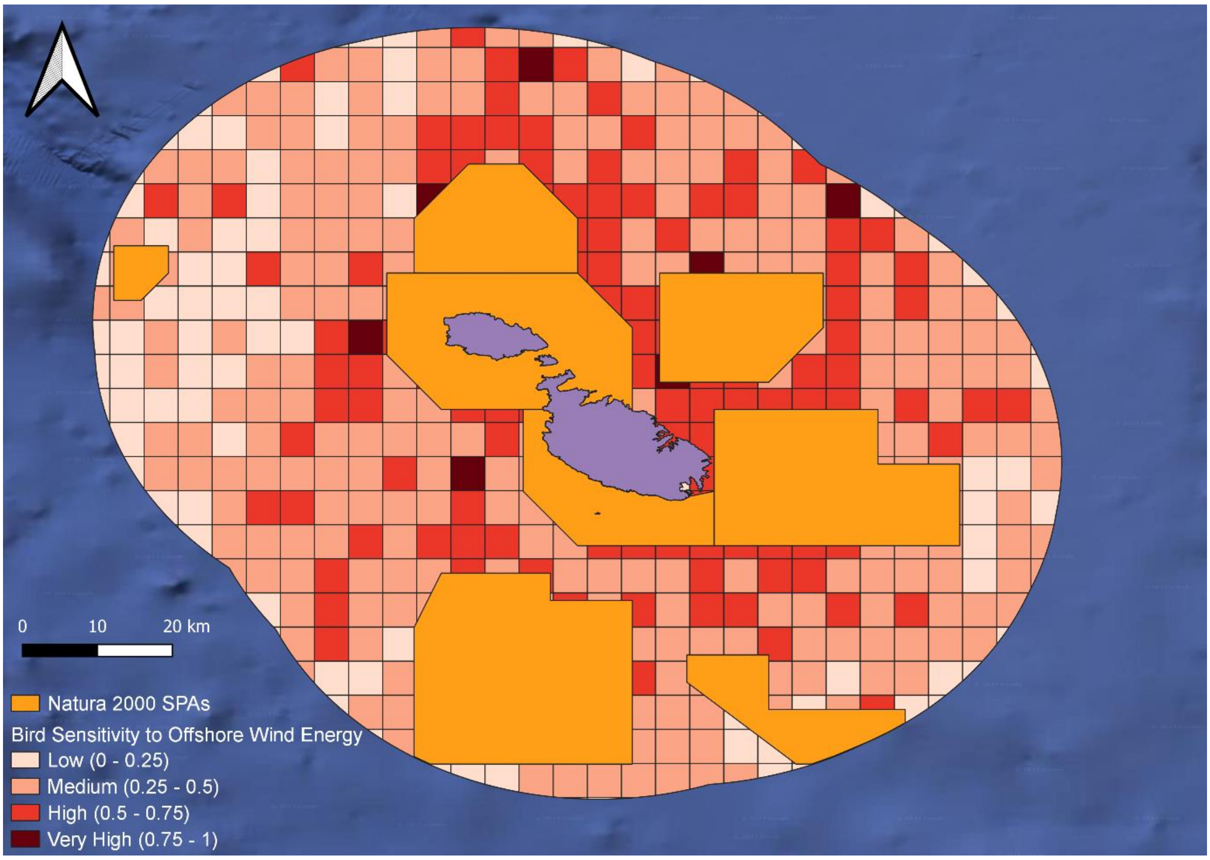

Figure 7: Bird sensitivity to offshore wind in the Maltese 25nm zone. The sensitivity levels are delineated in different shades: 0-0.25 corresponds to "Low", 0.25-0.5 to "Medium", 0.5-0.75 to "High" and 0.75-1 to "Very High". The map also incorporates the Natura 2000 Special Protection Areas (SPAs), in orange.

Recommendations

The bird sensitivity map to offshore wind installations for the Maltese 25nm zones serves as a good basis for the planning process of siting off-shore wind energy installations and to avoid areas with high risk of negative impact on avifauna. BirdLife Malta strongly recommends avoiding areas with 'High' and 'Very High' (coloured red and dark red) sensitivity since these are likely to have the highest negative impact.

In terms of references in the policy to Malta's Maritime Spatial Plan (MSP), it is worth emphasising once again that Malta's MSP is currently outdated and is under revision. We urge that the findings of this sensitivity mapping exercise are taken into consideration in the wider strategic government-led spatial planning in finalising the reviewed version of the MSP.

Selection of sites in 'Low' and 'Medium' risk areas does not preclude any negative impact to avifauna and detailed studies should take place at selected sites.

The following limitations to the current study should also be considered in this respect:

- insufficient distribution data on several species excluding inclusion in the study;
- low number of data points for some of the species included;
- lack of data to generate sensitivity indices for some species of interest, which may still be impacted by a wind-energy installation;
- sensitivity index data being in cases inferred from onshore installations in face of lack of data on collisions offshore;
- lack of flight height data of several species at sea.

In comparison to the 28 species included in this sensitivity mapping exercise, while comparable to similar studies currently conducted in Europe, about 390 species of birds have been recorded in the Maltese islands as breeding, migratory, wintering or vagrant species[53]. The number of additional species which might be impacted emphasises the need for further on-site studies in any areas selected.

According to the Environmental Impact Assessment Regulations (S.L. 549.46) and given the nature and scale of the proposed project, no development consent shall be granted authorising any such project unless the required assessment has been duly undertaken and completed in accordance with the law. Having said that, we would like to emphasise that the sensitivity mapping exercise results present in this document should not be treated as part or substitution of the Environmental Impact Assessment (EIA) for the project or projects in question. The prepared map is rather a preliminary analysis with the purpose to guide the planning process and avoid at an early stage the most sensitive areas.

Separate in-depth assessment of impacts on avifauna will be required for each chosen area as part of the EIA process to ensure that potential impacts are duly evaluated and avoided or efficiently mitigated. Suitable assessments to anticipate ecological impacts should ideally cover all seasons for two complete years prior to construction and extend such monitoring throughout the entire construction and the operational phases. Surveys should cover the entire area being considered, a buffer and at least one control site. Data received during monitoring and surveys can feed into the planning and design of the future wind farms in the Mediterranean, such as:

- optimal height of the support structure and the length of the blades;
- optimal distance between turbines;
- optimal bird deterrent devices.

Comprehensive studies are also important to gather data on the cumulative impacts of windfarms across the Mediterranean.[54] Moreover, we would like to highlight that other species groups such as Cetaceans and Chiroptera should feature strongly in the planning, monitoring, and mitigation phases as well.

We recommend implementing a comprehensive and long-lasting video and radar surveillance at offshore wind energy facilities. Installation of these monitoring tools would serve several purposes:

- generate data on the number and species utilising the area prior and during operation;

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[53] Sultana J, Borg JJ, Gauci C, Falzon V (2011). The breeding birds of Malta. BirdLife Malta

[54] Winds-of-Change_BirdLife-Europe-Central-Asia.pdf

- generate data on collision and displacement at sea which can inform mitigation measures;
- inform on migration events when impact can be reduced by curtailing turbines.

Such data collection efforts could be further complemented by on-board observations and tracking studies.

All wind farms should be required to minimise impacts on birds by using mitigation measures to decrease attraction and/or increase avoidance of turbines and implementing mandatory turbine curtailment (rotor lock)[55] allowing for rapid response during mass migration events (particularly, migrations of particularly rare raptors which often have live position transmission devices) and weather conditions that increase the risk of collision.

As a final recommendation BirdLife Malta urges the Maltese Government to take on the pledges under the Biodiversity Strategy[56] to contribute to 10% strict protection of marine areas.

[55] Dutch shut down offshore wind turbines to save birds in 'international first' | Recharge (rechargenews.com)
[56] https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en

Acknowledgements

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seabird and marine biodiversity sensitivity to marine wind farm expansion in Portugal | Mapeamento da sensibilidade das aves marinhas à energia eólica no mar em Portugal (Version 1). Sociedade Portuguesa para o Estudo das Aves (SPEA). https://doi.org/10.5281/zenodo.10045918

Handley J, Clark B (2023). Marine IBA toolkit. BirdLife International

Species Latin name	**Species English name**	**Data Acknowledgements**
Circus aeruginosus	Western Marsh Harrier	Matthias Schmidt (BirdLife Austria)
Falco naumanni	Lesser Kestrel	Jacopo G. Cecere (ISPRA); Diego Rubolini (University of Milan); Michelangelo Morganti (CNR-IRSA); data partially collected within the framework of LIFE FALKON LIFE17 NAT/IT/000586
Larus audouinii	Audouin's Gull	Sven Kapelj (BIOM); Andreas Engelen (BIOM)
Larus michahellis	Yellow-legged Gull	Mark Gauci (BLM); Emanuel Mallia (BLM)
Larus melanocephalus	Mediterranean Gull	Mark Gauci (BLM); Emanuel Mallia (BLM)
Pandion haliaetus	Osprey	Flavio Monti (Parco Naturale de la Maremma); Olivier Duriez (CNRS-CEFE); Andrea Sforzi (Parco Naturale de la Maremma); Jean-Marie Dominici (Parc naturel régional de Corse); Rafel Triay Bagur (Institut Menorqui d'Estudis), Antoni Munoz Navarro (Grup Balear d'Ornitologia i Defensa de la Naturalesa)
Streptopelia turtur	European Turtle Dove	Nicholas Galea (BLM); Frédéric Jiguet (MNHN)
Neophron percnopterus	Egyptian Vulture	Guido Ceccolini (CERM); Andrea Ferri (ISPRA)
Falco eleonora	Eleonora's Falcon	Jacopo G. Cecere (ISPRA); Federico De Pascalis (ISPRA); Lorenzo Serra (ISPRA); Carla Zucca (Anthus); Sergio Nissardi (Anthus); data partially collected within the framework of an Agreement between ISPRA and MASE
Milvus migrans	Black Kite	Ivan Literák (University of Veterinary Sciences Brno)

Pernis apivorus	European Honey-buzzard	Finland: Nourani Elham (Max-planck Institute); Patrick Bylhom (Novia University of Applied Sciences) Poland: Pawel Mirski (University of Bialystok); Marshall Office of Podlasie Voivodeship; Tomasz Tumiel; Eugeniusz Pugacewicz; Ervin Komar Study supported by Marshall Office of Podlasie Voivodeship under project'Monitoring i ochrona trzmielojada na obszarach chronionego krajobrazu "Wzgórza Sokólskie" i "Puszcza Białowieska"
Circus pygargus	Montagu's Harrier	Pawel Mirski (University of Bialystok)
Marmaronetta angustirostris	Marbled Teal	Carlo Cappuzzello (Fondazione Pro Biodiversita'); data partially collected within the framework of LIFE Marbled Duck PSSO
Calonectris diomedea	Scopoli' shearwater	Linosa: Jacopo G. Cecere (ISPRA); Giorgia Gaibani (LIPU); Simona Imperio (ISPRA); Marco Cianchetti-Benedetti (Ornis Italica); Malta: Benjamin Metzger (BLM); Martin Austad (BLM & JLU); Data partially collected under the framework of EU-LIFE+ Malta Seabird Project (LIFE10NAT/MT/090) and EU-LIFE Artina (LIFE17 NAT/HR/000594)
Puffinus yelkouan	Yelkouan shearwater	Benjamin Metzger (BLM); Martin Austad (BLM & JLU); Hannah Greetham (BLM); Petra Quillfeldt (JLU); Paulo Lago (BLM) Data partially collected under the frameworks of EU-LIFE+ Malta Seabird Project (LIFE10NAT/MT/090), EU-LIFE Arċipelagu Garnija (LIFE14 NAT/MT/991), EU-LIFE Artina (LIFE17 NAT/HR/000594) and EU-LIFE PanPuffinus! (LIFE19 NAT/MT/000982)