

Effort vs. Insight: Maximising Power in marine Digital Aerial Surveys

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Effective study design and power analysis are critical to ensuring that data collected during environmental surveys are robust, defensible, and proportionate to consenting needs in offshore wind development. This presentation will focus on best practice approaches to designing Digital Aerial Survey (DAS) for marine mammals and seabirds, with particular emphasis on optimising transect configuration, survey effort, and statistical power. Combining our experience from UK offshore wind and designing surveys in new territories, it will highlight how early consideration of these factors can reduce uncertainty and improve confidence in abundance and density estimates.

Key aspects of study design include the spacing and orientation of transects, which should be configured to ensure representative spatial coverage while minimising bias. Transect orientation should sample across environmental gradients (e.g. depth, distance to shore), avoiding alignment that could introduce bias in encounter rates. The trade-off between transect density and survey extent will be explored, alongside implications for effort allocation and logistical feasibility in offshore environments.

The presentation will also address how different spatial distributions of animals can influence both survey design and analytical approaches. For highly clustered or patchily distributed species, common among both seabirds and marine mammals, additional survey design and analytical considerations may be required.

Finally, the session will outline approaches to conducting power analysis for DAS, including simulation-based methods to assess the ability to detect change over time or differences between distributions before and after construction. It will consider how key parameters affect statistical power, and how these can be optimised within practical constraints. Overall, the talk will provide applied guidance on designing efficient, statistically robust DAS that meet regulatory expectations while supporting evidence-based decision-making in offshore wind development.