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Are auks the ideal birds to study offshore wind farm impact on seabirds?

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Offshore wind farms may impact local seabirds, both directly through lethal collisions and indirectly by displacing birds from built-up sites. The latter is probably insignificant at present given the relative vastness of the seas and the small sizes of current wind farms, but this is likely to change in the near future given current plans for offshore wind development. Important issues are whether birds are displaced and to what extent, and whether the design of wind farms might influence displacement. Another issue is how to measure displacement and how to compare different sites. Two recently constructed wind farms, built closely together in Dutch North Sea waters and of a different design, were used to address these questions. One site (named OWEZ) is rather open, having 36 turbines of 3 MW in an area of 27 km², while the other site (PAWP) has a much higher turbine density: 60 2-MW turbines within 14 km². There is about 5 km of open sea between the two sites and ambient conditions in the two parks are quite similar. We used two supplemental survey designs to record seabird distribution and density: a series of ten transect lines covering an area of circa 12 × 15 nautical miles with the two wind farms in the centre, and two sets of survey lines running parallel to the main isobaths in the general area and covering only the two sites and the immediate vicinity. Distribution patterns were studied 1 year pre-construction and 4 years post-construction. Most local seabird species turned out to be unsuitable to study wind farm impact. Divers, grebes and seaduck mostly occurred between the wind farms and the shoreline while Fulmars *Fulmarus glacialis* generally lived further offshore. Gulls and other ship-followers were too clumped for good in-site and outside-site comparisons. As fishing was banned from the wind farms, all major post-construction concentrations occurred around fishing vessels outside park limits. Auks (Guillemot *Uria aalge* and Razorbill *Alca torda*) occurred throughout the entire study area (winters only) and in good numbers that facilitated statistical analysis. Both species showed significant avoidance of the parks but also swam within park limits so avoidance was less than 100%. Effects of turbine density could be studied under otherwise similar conditions and background bird densities. Study design can be optimized in future studies by a comparison of the two designs within this study. As auks occur in good numbers all over the North Sea, and adjacent seas, these birds appear to be the ideal study objects to compare the impacts of various wind farms and wind farm designs in seabird avoidance studies.