FINE SCALE SENSITIVITY MAP OF SEABIRDS FOR OFFSHORE WIND FARM

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Development of infrastructure of renewable energy in the ocean is one of urgent issues in Japan. One option is wind farm. Before construction of offshore wind farms, assessments of the impact on marine wildlife are essential but have not been fully investigated. A number of seabirds are known to hit the blades and avoid the area of wind farms. Therefore, potential risks of collision and displacement have been a concern for planning of offshore wind farms. Mapping the fine scale sensitivity of species of seabirds is required most urgently. Recently Environmental Agency provides sensitivity map of seabirds basing on the location of colonies, foraging distance, and density along transects made by air plain. The map is globally useful but resolution is not accurate enough for planning the setting of the each windmill.

To explore environmental factors that increase the possibility of collision and displacement risk at fine scale, we 3D GPS tracked, at 1s to 15 min intervals, 117 Black-tailed gulls *Larus crassirostris* that nested in six colonies in two areas in northern Hokkaido in 2016 –2019. With GPS position moving speed was calculated. Birds were assumed to fly when they moved faster than 15 km/h and to sit on the water so feed or rest when they moved slower than this criterion. Detailed body movement measured by accelerometers on 5 of these birds confirmed this criterion was reliable.

With these data, we constructed spatial model explaining the time of flying, especially at the altitude of 20-140m height of blades and time of sitting water (feeding or resting), at 1km spatial scale to evaluate the risk of collision and displacement, respectively. Although the environmental factors and its effect size varied between colonies, Black-tailed Gulls showed higher risk of collision near the colony, shallow sea depth and near the coast line. The gulls showed higher risk of displacement in grid cells distant from the colony, with relatively cold water, with larger number of fishing ports in general. Thus areas with high risk of collision and those of displacement differed often.

Accuracy of the model was relatively high ($r>0.6$) and well predicted the distribution of birds from the own colony and year. However, a model constructed in a colony each year was hardly applicable to the other colonies in different years. This indicates that the sensitivity map made for a colony by this procedure can’ t be expanded easily to the other regions. Nevertheless with some sampling effort at major colonies, we made fine scale sensitivity map of Black-tailed Gulls over northern Honshu and Hokkaido.

Keywords: Habitat modelling, Biologging, collision risk

