【4-1803】

Development of Bird Sensitivity Mapping for Protecting Main Colonies of Seabirds from Offshore Wind Farm

SEKIJIMA Tsuneo
Niigata University
8050, Ikarashi 2-no-cho, Nishi-Ku, Niigata 950-2181, JAPAN
E-mail: sekijima@gs.niigata-u.ac.jp

Key words: bird collision risk, environmental assessment, machine learning, seabird, sensitivity map, statistical spatial model, wind power generation

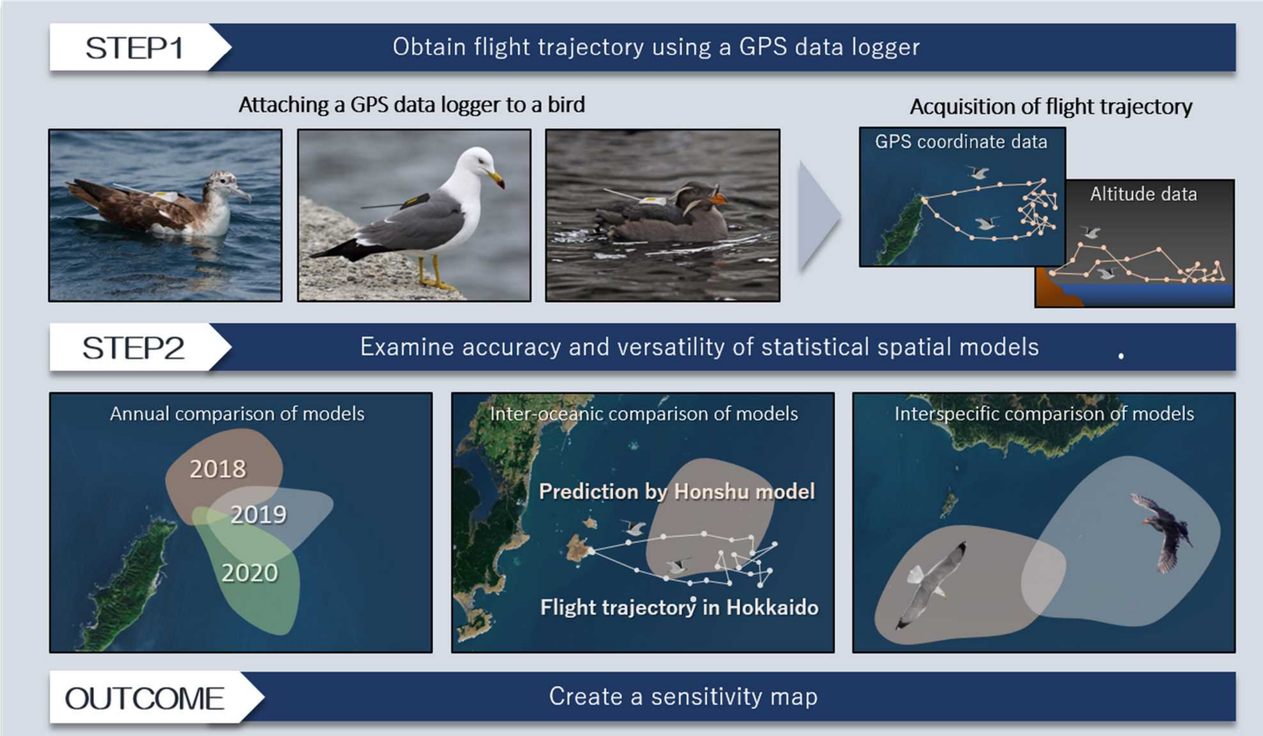
A sensitivity map provides effective information in advance to identify and avoid possible bird collision risks. In this study, we developed a model for predicting space of use based on highly accurate flight trajectory and altitude data obtained by GPS tracking techniques, and then used it to create sensitivities maps considering species-specific environmental selectivity of five major seabird species with domestic breeding populations: streaked shearwaters (STSH), little terns (LITE), black-tailed gulls (BTGU), slaty-backed gulls (SBGU), and rhinoceros auklets (RHAU).

Flight trajectories of STSH were obtained for 69 individuals from the Toshima Island colony in the Izu Islands. Given the characteristics of the flight trajectories, three sensitivity maps were made: collision mortality, loss of feeding sites and path obstacles. As for the collision mortality map, the area around the colony where flight in range of wind turbine blades could occur was highly vulnerable. For the two maps of feeding site loss and path obstacles, we developed a statistical spatial model for predicting feeding sites and a simulation method for predicting migration routes to feeding sites by applying machine learning, which provided high predictability of sensitivity. The LITE sensitivity map was created based on both of the foraging distance estimated by the central place foraging model and a map of potential suitable nesting sites nationwide predicted by MaxEnt analysis. The BTGU, SBGU and RHAU sensitivity maps were created based on GPS tracking data of 226 individuals from breeding colonies in six locations in northern and eastern Hokkaido. Collision mortality risk and displacement risk (probability of feeding on the sea surface) of each species-location were modelled separately using a statistical spatial model. The accuracy of the model for each species-location evaluated by correlation coefficient was generally high (0.5-0.9) but none of the models were applicable to the other regions. Overall, the collision risk was higher for BTGU than SBGU and RHAU. Reflecting differences between species in flying and feeding behavior, the modelled collision risk was high near the colonies, along the coast line and on the mainland shelf area of for BTGU, and just around the colonies for SBGU and RHAU, while the modelled displacement risk was high near the colonies and along the mainland coastal area for BTGU, just around the colonies for SBGU but on the larger mainland and slope shelf area for RHAU.

These sensitivity maps are expected to be a powerful tool in promoting wind power generation with reduced bird collision risks.

Development of Bird Sensitivity Mapping for Protecting Main Colonies of Seabirds from Offshore Wind Farm

A sensitivity map provides effective information in advance to identify and avoid possible bird collision risks. In this study, we developed a model for predicting space of use based on highly accurate flight trajectory and altitude data obtained by GPS tracking techniques, and then used it to create sensitivity maps considering species-specific environmental selectivity of five major seabird species with domestic breeding populations: streaked shearwaters, little terns, black-tailed gulls, slaty-backed gulls, and rhinoceros auklets.



Contribution to environmental policy

By identifying high-risk areas for bird collisions in advance and avoiding these area in the site selection process for wind farms, the sensitivity map contributes to promotion of offshore wind power generation with low environmental impact.