Design and Testing of an Integrated Wildlife-Wind Turbine Interactions Detection System

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Abstract

Bird and bat mortalities caused by interactions with wind turbines is a critical concern that requires addressing for conservation purposes. While carcass surveys are the standard method for measuring wildlife mortality for onshore sites, the method is inadequate due to factors such as carcass removal. For off-shore wind turbines, there is no industry adopted method for evaluating wildlife mortality. A near-real-time detection system could quantify wildlife interaction rates of both onshore and offshore wind facilities. This US Department of Energy funded project covers the development and testing of a multi-sensor instrumentation package capable of detecting avian and bat interactions with the blades, nacelle, and tower of wind turbines. The onboard, integrated sensor package includes contact microphones, accelerometers, visual and infrared spectrum cameras and bioacoustics monitoring. Selection, testing and evaluation of the accelerometers and contact microphones will be described, as well as camera placement, settings and image quality used for event confirmation and taxonomic classification. System tests were carried out by simulating impacts using tennis balls on the wind turbines at the North American Wind Research and Training Center, Mesalands Community College, New Mexico, and the National Wind Technology Center, National Renewable Energy Lab, Colorado. During the field tests, the individual components were evaluated and successful in recording generated impacts. A library of these impact recordings was compiled for future work in algorithm development. Deploying a low cost sensor array will be instrumental during site permitting, conducting impact assessments of existing wind farms, and assessing efficacy of wildlife mortality mitigation or wildlife deterrent technologies.

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