

## **EFFECTS OF WIND TURBINES ON BIRD AND BAT MORTALITY RATES ON A WIND FARM NEAR TIERRAS MORENAS DE TILARÁN, COSTA RICA**

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Renewable energy sources are gaining popularity as alternative methods of energy production. In Costa Rica hydro, geothermal, and wind energy are the most common sources of green energy. The impacts of windfarms on birds and bats has been studied extensively in other parts of the world, but very little research has been done on this topic in Central America. I examined the bird and bat mortality rates caused by the wind turbines at MOVASA windfarm in Tierras Morenas de Tilarán, Guanacaste, Costa Rica, about 15 km north of Tilarán on the continental divide. Average wind speed during the study period, March-April 2015, was 13.28 m/s. I conducted bird and bat mortality searches around the base of each turbine and conducted visual and auditory observations near the turbines and in nearby pastures and forests. I searched 28 towers 4 times each for a total of 112 mortality searches, and found no carcasses. The forest had significantly more individual calls ( $P < 0.0001$ ), birds seen ( $P = 0.0032$ ), and species heard ( $P < 0.0001$ ) than close to the towers or in the pasture. The time of day did not have a significant impact on individual calls ( $P = 0.8060$ ), birds seen ( $P = 0.8193$ ), or species heard ( $P = 0.7541$ ). There was a significant difference in species heard depending on the time of year ( $P = 0.0474$ ), but no difference in birds seen ( $P = 0.8952$ ) or individuals heard ( $P = 0.1622$ ). Of the birds observed flying near the wind turbines (turkey vultures, songbirds and toucans), only the turkey vultures flew in the danger zone. The vultures were observed in the danger zone 3 times out of 12 sightings. The scavenger removal rate experiment showed that 50% of the carcasses were removed after one day, 60% were gone after 2 days, 70% were gone after 3 days and 100% were gone after 9 days. The turbines do not seem to pose a threat to the birds. The strong wind may deter birds from flying in the area, and most of the birds observed were in the forest, not close to the towers.