

Short-term effects of hurricanes Irma and Maria on Puerto Rico's forest birds

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Hurricane damaged forest in Puerto Rico. Credit: Chris Rimmer

In September of 2017, hurricanes Irma and Maria delivered a devastating one-two punch to Puerto Rico, causing significant defoliation of the island's forests. While the detrimental effects of these

storms on human populations was well-documented, little was known about how the island's bird populations were affected - until now. A new paper published in *PLOS ONE* by Vermont Center for Ecostudies (VCE) and colleagues compares occupancy of birds in forested areas across Puerto Rico during a winter before (2015) and shortly after (2018) the passage of these hurricanes. Using dynamic community models analyzed within a Bayesian framework, the authors find significant changes in species detectability, with some species becoming more readily detected after the storms and others becoming more difficult to detect.

In 2015, VCE biologists Chris Rimmer and John Lloyd (now of American Wind Wildlife Institute), along with José Salguero-Faría of Sociedad Ornitológica Puertorriqueña, conducted geographically extensive surveys across Puerto Rico to study the winter distribution of Bicknell's Thrush (*Catharus bicknelli*). Although focused on locating Bicknell's, the team recorded all avian species detected during its 211 point count surveys, for general insight into the assemblage of forest birds present on Puerto Rico during winter. Unbeknownst to the researchers then, their cross-species data would prove invaluable to assess the impacts of catastrophic weather on the island's birds.

"You can't plan a study of a [hurricane](#)," stated John Lloyd, lead author on the paper. "We happened to have counted birds across the island in 2015 as part of an unrelated project, and when the scope of the damage caused by Irma and Maria became clear, we realized that we needed to return to our study sites and see what had changed."

With support from the National Fish and Wildlife Foundation, the U.S. Fish and Wildlife Service, the USDA Forest Service Office of International Programs, and the Farallon Islands Foundation, the team returned to Puerto Rico in 2018 to resurvey 186 points from the 2015 survey. After accounting for differences in detectability among species and between survey periods, they found that roughly 50% of the 35

species analyzed showed [significant changes](#) in occupancy between pre- and post-hurricane surveys. Furthermore, far more species appeared to have declined as a result of hurricanes Irma and Maria than to have increased, and the magnitude of the change in occupancy was greater for decreasing species than it was for increasing species.

Lloyd noted, "The most obvious difference was that birds that depend on fruit had become incredibly scarce, probably because wind and heavy rain stripped most of the trees of their fruits and flowers. Scaly-naped Pigeon, for example, was common across our sites in 2015, but we found it in only a handful of places after the hurricanes. We saw the same thing with Ruddy Quail-Dove and Antillean Euphonia. The good news, though, is that these birds - and the island's forests - are pretty resilient to the effects of hurricanes. We've seen in studies of previous hurricanes, like Hugo or Gilbert, that [bird populations](#) may crash immediately after a storm, but, as the forests recover, populations of most species eventually rebound."

These results add to the body of empirical findings regarding the effects of hurricanes on [birds](#), and support the general conclusion that impacts are species-specific, as most [species](#) respond independently and in response to changes in forest structure caused by these storms. Further, the authors found that detectability was a potentially significant source of bias in comparisons of pre- and post-storm occupancy.

More information: John D. Lloyd et al. Short-term effects of hurricanes Maria and Irma on forest birds of Puerto Rico, *PLOS ONE* (2019). [DOI: 10.1371/journal.pone.0214432](https://doi.org/10.1371/journal.pone.0214432)

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