Using diverse data sources to detect elevational range changes of birds on Mount Kinabalu, Malaysian Borneo

Abstract

Few empirical studies have measured the effects of climate change on tropical biodiversity, and this paucity has contributed to uncertainty in predicting the severity of climate change on tropical organisms. With regards to elevational changes, most studies have either re-sampled historical systematic survey sites or analyzed time series of occurrence data at long-term study sites. Such data sources are unavailable for most tropical mountains, so other methods of detecting elevational changes must be sought. Here we combine data from published checklists, recent fi eld work, peer-reviewed literature, unpublished reports, birdwatchers' trip reports, databases of birdwatchers' observations, audio recordings, and photographs to compare historical (pre-1998) and current (post-2006) bird distributions on Mt. Kinabalu in Sabah, Malaysian Borneo. Records were carefully checked by experts on Bornean birds. More species are now known from Mt. Kinabalu, but historical data provided elevational range estimates for more species than current data because of extensive mountain-wide collections and surveys. Most elevational comparisons for this study had to be limited to the 1450-1900 m elevational band, where most of the recent work has been done. Information was compiled into an annotated list of 342 species from 200-4095 m. We present this list to encourage refi nement of the dataset and future work on elevational distributions on the mountain. Of 58 species with suffi cient data from 1450 m to the summit, 38 appear to have shifted their ranges (24 species upslope and 14 downslope). A total of 22 resident species have recently been observed above their published maximum elevation for Borneo. Some species that have shifted upwards, such as Chalcophaps indica and Pellorneum pyrrogenys, are now common or breeding at elevations above their published maximum. Fifteen species appear to have declined on the mountain, probably as a result of habitat loss outside the protected area. Several of the upslope shifts are probably attributable to climate change, but many downslope shifts may be artifacts of incomplete recent sampling. The upward shifts agree with the few other

tropical range comparisons that have been published. Our approach demonstrates the viability of combining diverse data sources (of varying accuracy and bias) to detect distributional shifts from climate change.