

Invasive frogs give invasive birds a boost in Hawaii

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Coquis were introduced to Hawaii from Puerto Rico in the 1980s and may be giving a boost to the islands' invasive birds. Credit: R. Choi

Puerto Rican coqui frogs were accidentally introduced to Hawaii in the 1980s, and today there are as many as 91,000 frogs per hectare in some

locations. What does that mean for native wildlife? Concerns that ravenous coquis could reduce the food available for the islands' native insect-eating birds, many of which are already declining, spurred researchers to examine the relationship between frog and bird populations—but their results, published in *The Condor: Ornithological Applications*, weren't what they expected.

Working at fifteen sites on the island of Hawaii in 2014, Utah State University's Robyn Smith, Karen Beard, and David Koons determined whether coquis were present at each site by listening for their calls at night and then estimated coqui density in invaded plots through a visual search. Bird surveys at all sites recorded 20 [species](#), of which only 5 were native. To the researchers' surprise, [native birds](#) showed no response to coqui density or presence, but three of the nonnative species were more abundant in plots with coqui. The overall abundance of nonnative [birds](#) ranged from an average of 57 birds in coqui-free plots up to 97 where coqui density was highest.

Coquis forage mostly in leaf litter, while Hawaii's native insect-eating birds forage mostly in canopy and understory, so perhaps they aren't in direct competition for insects. Nonnative birds may be getting a boost directly by eating adult or juvenile coquis, or indirectly through coqui's effects on the ecosystem—coquis may alter nutrient cycling and even increase fly populations thanks to the extra biomass their excrement and carcasses create. "I was very surprised with the results for birds. It had been hypothesized before our study that coquis would compete with birds, particularly natives, because we know that coquis reduce insects where they invade," says Beard. "In retrospect, I guess it's not too surprising that predation is a more important interaction than competition—that is a common finding in invaded systems—but it was definitely not what we went in to test. The response that we see for Common Mynas and Red-billed Leiothrix is pretty convincing. We're pretty sure that some of this increase is due to these species eating live or

dead coquis, and we're suggesting that some non-native birds are likely consuming coquis and this novel resource appears to be increasing their populations."

"The findings presented in the study by Smith, Beard, and Koons, where abundances of some species of non-native birds in Hawaii are correlated with invasive coqui frogs, are very intriguing," according to the USDA's Aaron Shiels, an expert on invasive species in island ecosystems.

"Furthermore, their interesting findings beg for future experimental manipulations that would uncover the causal factors that explain the patterns that they have observed."

More information: "Invasive coqui frogs are associated with greater abundances of nonnative birds in Hawaii, USA" November 29, 2017.

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