

Most island vertebrate extinctions could be averted, new study concludes

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The critically endangered Ricord's iguana, native to Cabritos Island, Dominican Republic, is one of the most threatened lizards in the world. Island Conservation is working with the DR's Ministry of Environment and Natural Resources and SOH Conservation to remove invasive species from Cabritos Island to prevent the extinction of this rare reptile. Credit: Island Conservation

Eight of every ten species extinctions has occurred on islands, and invasive mammals are the leading reason for those losses. Currently, 40 percent of species at risk of global extinction are island inhabitants.

In the most thorough study of its kind, scientists have now analyzed global patterns of island vertebrate extinctions and developed predictive models to help identify places where conservation interventions will provide the greatest benefits to threatened island biodiversity.

Control and eradication of invasive species are effective conservation tools, but conservation scientists have lacked tools for identifying where these efforts will have the greatest impact. The new study, published August 18 in *Nature Communications* and led by UC Santa Cruz researcher Erin McCreless, closes that gap.

Humans have introduced non-native rodents, destructive herbivores such as goats, and predators like feral cats and foxes to [islands](#) around the world. These novel disturbances decimate native island wildlife and change entire island ecosystems. At the same time, islands are hotspots of biodiversity and often support rare and unique species occurring nowhere else in the world.

Controlling invasive mammal populations, or removing them entirely from islands, is a highly effective tool for conserving island species and ecosystems, and such actions have contributed greatly to the recovery of many threatened island species. Conservation dollars are limited, however, and it is important that invasive mammal management efforts be focused on the islands where they will go the furthest toward conserving native island biodiversity.



The Juan Fernandez Firecrown is endemic to Robinson Crusoe Island. Key threats to this critically endangered species include habitat loss, due in part to invasive herbivores, and predation by invasive rats and feral cats. Credit: Island Conservation

"Until now, conservation scientists have chosen islands for invasive mammal management largely based on the need to protect a particular [native species](#), or on broader assumptions about how native species are likely being affected," McCreless said. For example, invasive rats are often eradicated on islands where they have been seen eating native birds and their chicks.

"However, as these conservation efforts increase globally, conservationists need to take a more strategic approach and choose islands based on a more complete, larger-scale understanding of how different invasive mammals affect native species on different types of islands around the world," McCreless explained.

Are rats more likely to cause bird extinctions on smaller, colder, or wetter islands than on other types of islands? Are native reptiles more vulnerable to the impacts of pigs than to those of rats or cats, and on what kinds of islands are these impacts seen most strongly? Answering such questions can help scientists understand the nuances of invasive mammal impacts on islands worldwide, and then use this information to direct limited resources to the places where management efforts will have the greatest benefits for native species.

In the new paper, McCreless and colleagues fill in many of these knowledge gaps by analyzing the Threatened Island Biodiversity

Database, a recently developed, global dataset of threatened native species and invasive mammals on islands. "We analyzed, for the first time at such a large scale, global patterns of island vertebrate extinctions in relation to different types of invasive mammals and physical island conditions," McCreless said.

The study included more than 1,200 globally threatened or extinct vertebrate species that live (or lived) on more than 1,000 islands around the world. The authors found that just a few types of invasive mammals - rats, cats, pigs, mongooses, and weasels - are most strongly associated with the extirpation of native species (island-level extinction).



For 150 years, hatchling Pinzón Tortoises were not surviving in the wild due to predation by invasive rats. Following the successful removal of rats, young hatchling Pinzon Tortoises are now surviving and being observed in the wild again. Credit: Island Conservation

Importantly, the study shows that the impacts of each mammal varied widely across both the type of native species being affected (native amphibians, birds, reptiles, or mammals) and the conditions of the islands on which they occurred.

The authors used modeling approaches to predict how removing invasive mammals on different islands could reduce extinction risk for threatened [species](#). In one of many examples, they showed that removing invasive mammals from small, dry islands could halve the extirpation risk for threatened native birds and mammals, but doing so on large, wet islands may have less benefit.

"This kind of information is critical for conservationists trying to decide where to spend limited funds," said coauthor Donald Croll, professor of ecology and evolutionary biology at UC Santa Cruz.

Finally, the paper highlights the global degree of the threat from [invasive mammals](#) on islands and the potential of management efforts to mitigate these threats. "We were able to estimate that up to 45 percent of globally threatened vertebrate populations on islands may be extirpated in the absence of conservation interventions, but that targeted invasive mammal control and eradication could prevent 41 to 75 percent of these predicted future extirpations," said McCreless. "That is critical knowledge for both conservationists and funders."

Coauthor Nick Holmes, science director of Island Conservation, said the study provides valuable guidance for conservation interventions by his and other groups. "This study is a valuable contribution for island restoration and conservation planning, and highlights the value of tackling [invasive species](#) challenges to prevent extinctions on islands," Holmes said.

More information: Erin E. McCreless et al, Past and estimated future impact of invasive alien mammals on insular threatened vertebrate populations, *Nature Communications* (2016). [DOI: 10.1038/NCOMMS12488](#)

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