Pacific Islands Climate Change Cooperative

PACIFIC ISLANDS CLIMATE CHANGE COOPERATIVE

Assessing vulnerability for native Hawaiian forest birds

One key to planning for terrestrial changes with regard to climate change impacts is to examine the projections of climate change to species already under significant threat. Hawaiian forest birds are already under substantial threat, as only half of native species currently remain. The main drivers of bird decline are disease, habitat degradation and predators. But now, climate change is threatening the already-vulnerable forest birds.

Disease, in particular avian malaria, constrains the habitat forest birds to high elevation. Temperature strongly influences the distribution of mosquitoes, as well as the development of malaria in mosquitoes. Because of this, forest birds are confined to the high elevation forest habitat where avian malaria is absent or rare.

Because there is a strong relationship between temperature and avian malaria, researchers can estimate how climate change will facilitate disease moving into increasingly higher elevations over time. This project worked to show the impact of climate change on the distribution of at-risk forest birds. These results will allow the prioritization of areas for management and conservation of Hawaiian forest birds.

In order to determine the future distribution of forest bird habitat and avian disease, this project focused on predictors related to temperature and rainfall. Using the Hawaiian Regional Climate Model, the projections showed an average of 2.5 C warming over the islands, but with increased warming at higher elevations over lower elevations.

Forest birds are strongly dependent on adequate habitat, so the project analyzed modeled species climate-based range shifts with respect to the distribution of currently available primary habitat for each species.

Based on comparisons between present and future climate-based range, all Hawaiian forest bird species are projected to suffer range loss by the end of the century. Seven species will suffer over 90% range loss and another 8 species will suffer more than 50% range loss.

The results indicate that actions beyond high elevation conversation areas must be considered over the long run. The project also discusses methods for averting some of the most severe impacts.

This project and model projections make clear that without a major concerted effort, the conservation landscape for forest birds will be dramatically reduced over this century. The status quo conservation strategy will no longer be enough, as native forests will be lost to disease with increasing temperature.

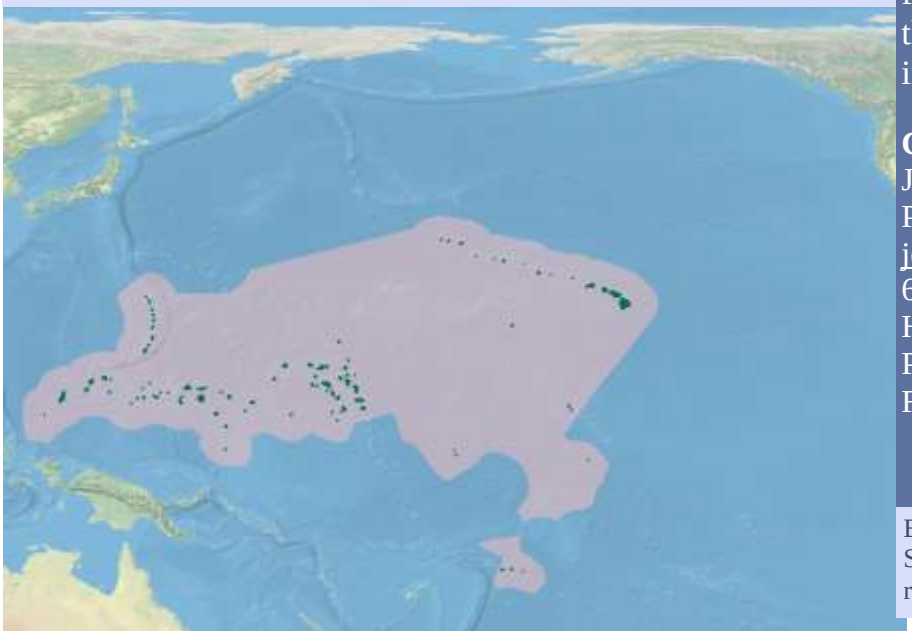
An effective strategy would likely have the following actions: dealing with non-climatic threats, addressing the causes of range loss, and delaying population decline. Strategies to address threats not related to climate change remain essential, including the reduction of habitat degradation, protection of high elevation habitat, and increase of food resources.

The authors advise that natural resource managers pursue actions that delay climate change impacts while long-term solutions are being developed. These actions to "buy time" include initiating reforestation and restoration at higher elevations, establishing captive populations of species before extreme endangerment, and considering inter island translocations.

The projections of climate change impacts to native forest birds provide one of the clearest examples of the vulnerability of terrestrial species to climate change. Although their future may appear dire, there is hope if preparations for these impacts begin now.

For more details about this project, visit the PICCC projects page: piccc.net/projects.

The map below depicts the PICCC geography, which includes Hawai'i, American Sāmoa, Guam, the Northern Mariana Islands, the Marshall Islands, the Federated States of Micronesia, Palau and 4 Marine National Monuments.



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The Pacific Islands Climate Change Cooperative (PICCC) was established in 2009 to assist those who manage native species, island ecosystems, and key cultural resources in adapting their management to climate change for the continuing benefit of the people of the Pacific Islands. The PICCC provides a range of services and tools to help managers in Hawai'i, the Mariana Islands, American Sāmoa, and other Pacific Island groups make informed decisions for conservation of natural and cultural resources including climate models at the scale of islands and archipelagos, ecological response models, and implementation and monitoring strategies for island species, resources, and communities. Our goal is to help managers reach explicit biological and cultural conservation objectives in the face of climate change and ongoing threats such as fire, land conversion, and invasive species.

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Banner photo of taro by Starr Environmental; Sophora Chrysophylla by David Eickhoff; Montane rainforests by Miguel Vieira