

# Pacific Islands Climate Change Cooperative



## Comprehensive vulnerability assessment concludes climate smart conservation can make a difference for native Hawaiian plants

An interdisciplinary team of scientists has completed what may be the [largest vulnerability assessment](#) ever for the US, estimating the likelihood and degree of climate change impacts on all native Hawaiian plants (over 1,000 species). Led by the [Pacific Islands Climate Change Cooperative](#) and the US Geological Survey, the team addressed a critical knowledge gap for resource managers in the region.

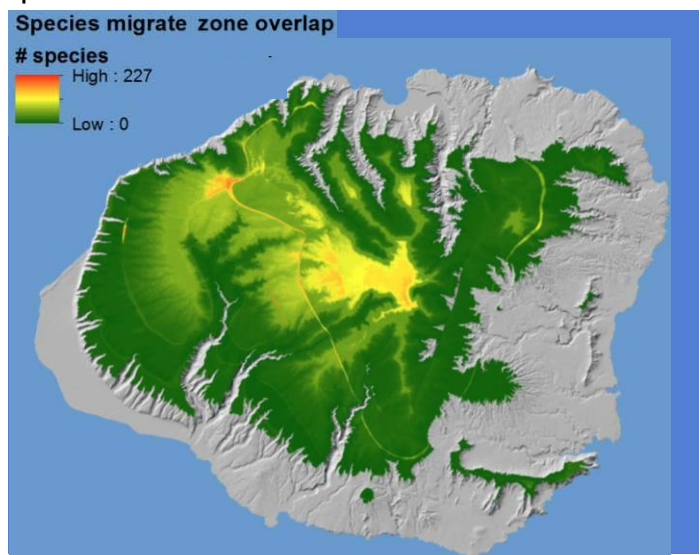
The investigators defined climate change vulnerability as the inability of a species to exhibit the possible responses necessary for persistence under climate change. They identified the change in species' ranges under current and projected future climate conditions by considering three responses that plants can exhibit:

- tolerance of changes in temperature, precipitation, and sea level;
- endurance in microrefugia, or relatively small areas where structurally complex habitat creates micro climatic conditions that allow species to persist; and
- migration (through seed dispersal) to new climate-compatible areas.

### The ability of species to respond to climate change

Over the last several centuries, humans have brought invasive competitors, predators, and disease along with huge land use changes to the globally unique species of Hawai'i. The Islands have suffered 109 plant extinctions and currently have 319 threatened or endangered native plant species. The first

iteration of this assessment, which is designed to allow updating with new data and models, indicates an overall average 39% decrease in the area where native plants are likely to persist.



Migration zone overlap for all Kaua'i native plant species by 2100. 'Warmer' colored areas are more likely to be newly suitable for native species not currently present.

through the year 2100. Moreover, for 15% of species, no significant portion of their current range is likely to be climate compatible, with 5% at high risk of extinction.

The native plant species most vulnerable to future climate change include those that are:

- unique to Hawai'i, especially those inhabiting single islands;
- already under conservation concern (e.g., endangered, rare, or vulnerable);
- primarily associated with dry habitats;
- with currently narrow distributions;
- found only on lower elevation islands

## Management for habitat quality: a crucial response to future change

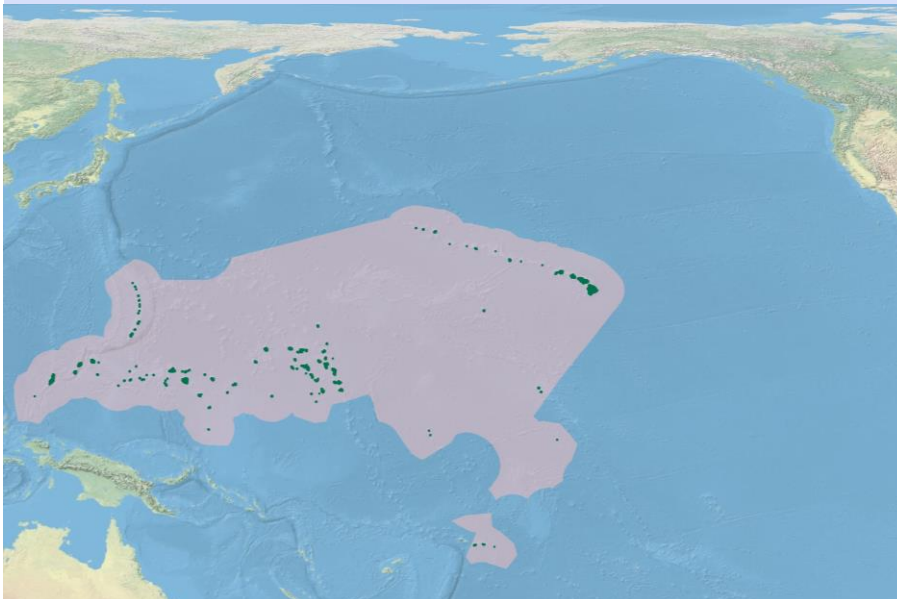
To assess the potential ability of management to improve conservation outcomes, the investigators developed habitat quality scenarios incorporating 5 key management components. If habitat quality were improved to the maximum extent, the number of climate-vulnerable species would drop from 542 to 233, and under the worst management scenario it would increase to 760 species.

The researchers conclude that the most important component of a climate-smart conservation strategy is continued management, particularly the control of grazing animals, invasive plants, and fire across large landscape units, especially in dry and moderately moist habitats. Additionally, the assessment can also improve plants' long-term chances of withstanding climate change when the results are used as an additional filter in conservation prioritization.

### Tools for managers, planners and researchers

Access [response zone maps for all species](#). ~ High resolution map packages on Google Earth are also available for individual species upon request. Download [an example for \*Bonamia menziesii\*](#). ~ For management-specific information, [download an ArcGIS extension](#) that allows the user to determine the set of species that may gain, lose, or maintain within their area of interest, along with associated vulnerability scores and habitat quality/area metrics. For more information, visit the PICCC projects page: [piccc.net/our-projects](http://piccc.net/our-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.



Banner photo of taro by Starr Environmental; Species migration zone overlap map for Kaua'i by Fortini

## Principal Investigator

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## Partners

[The Nature Conservancy, Hawai'i](#)

[USDA Natural Resources Conservation Service, Pacific Islands Area](#)

[US Fish & Wildlife Service, Ecological Services, Pacific Region](#)

[Univ. of Hawai'i - Hilo](#)

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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