Tundra to Tropics Part 2

Jeff Burgett

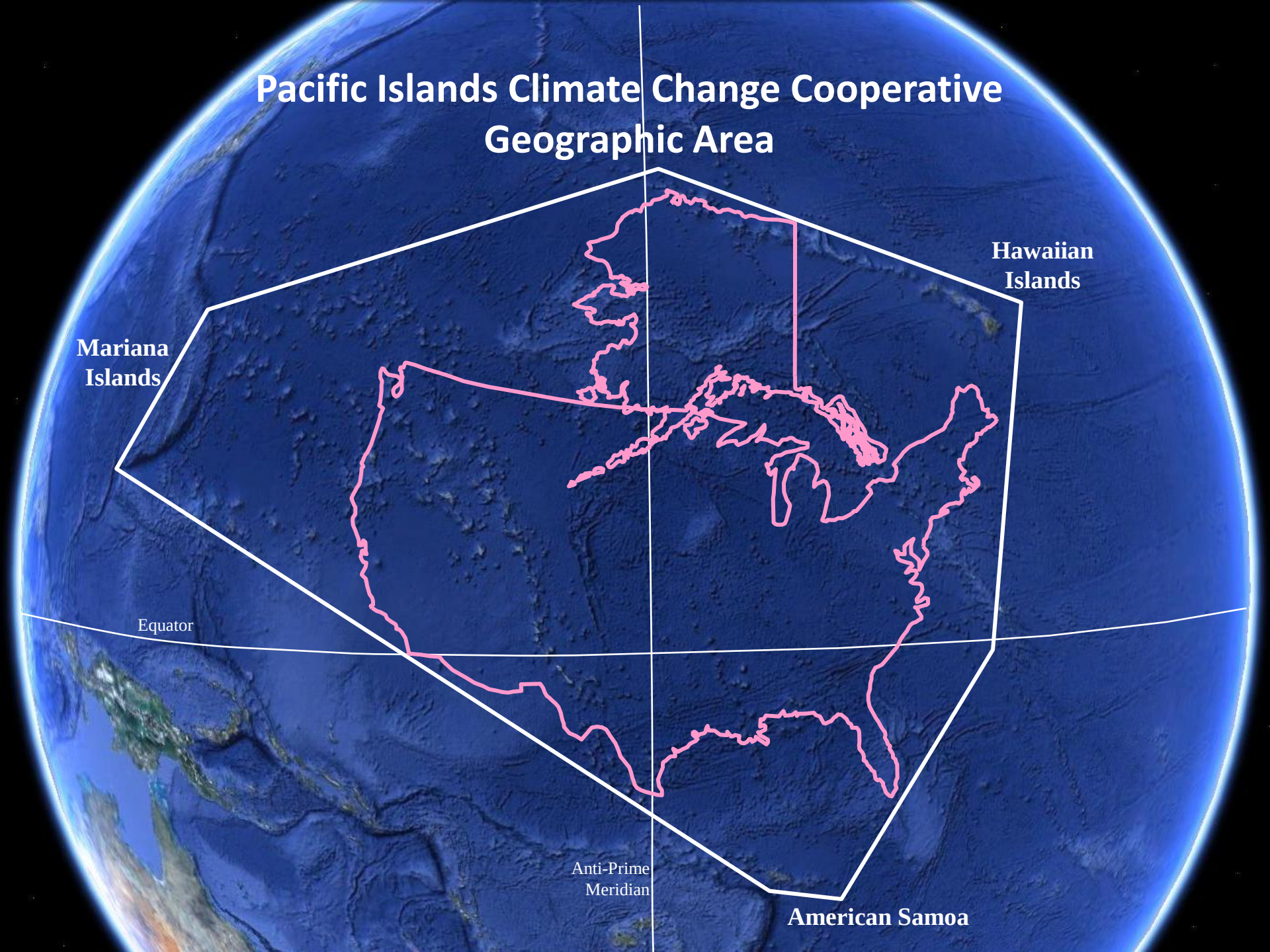
Deanna Spooner

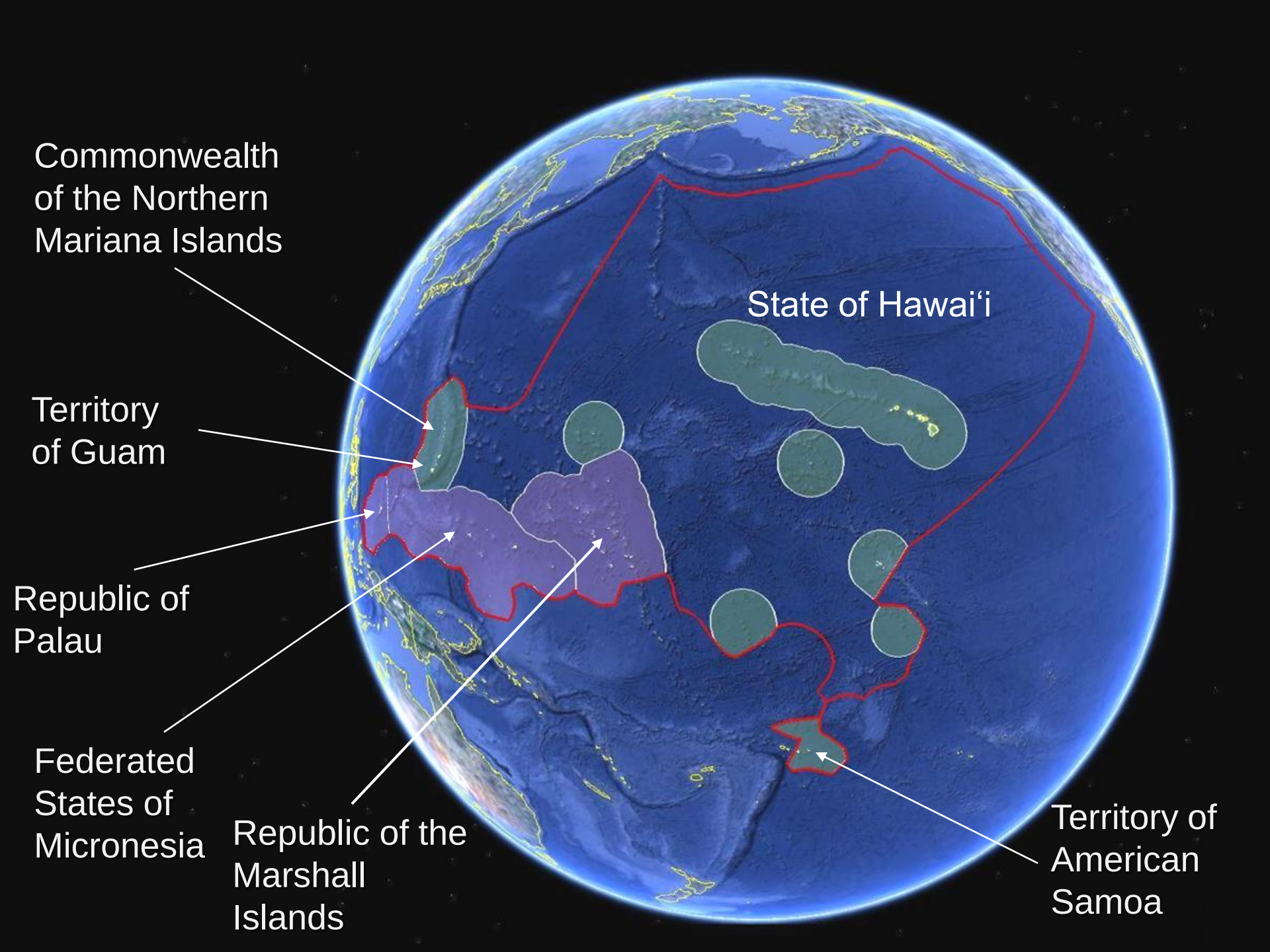
PACIFIC ISLANDS CLIMATE CHANGE COOPERATIVE

PICCC

Pacific Islands Climate Change Cooperative

Pacific Islands Climate Change Cooperative Geographic Area

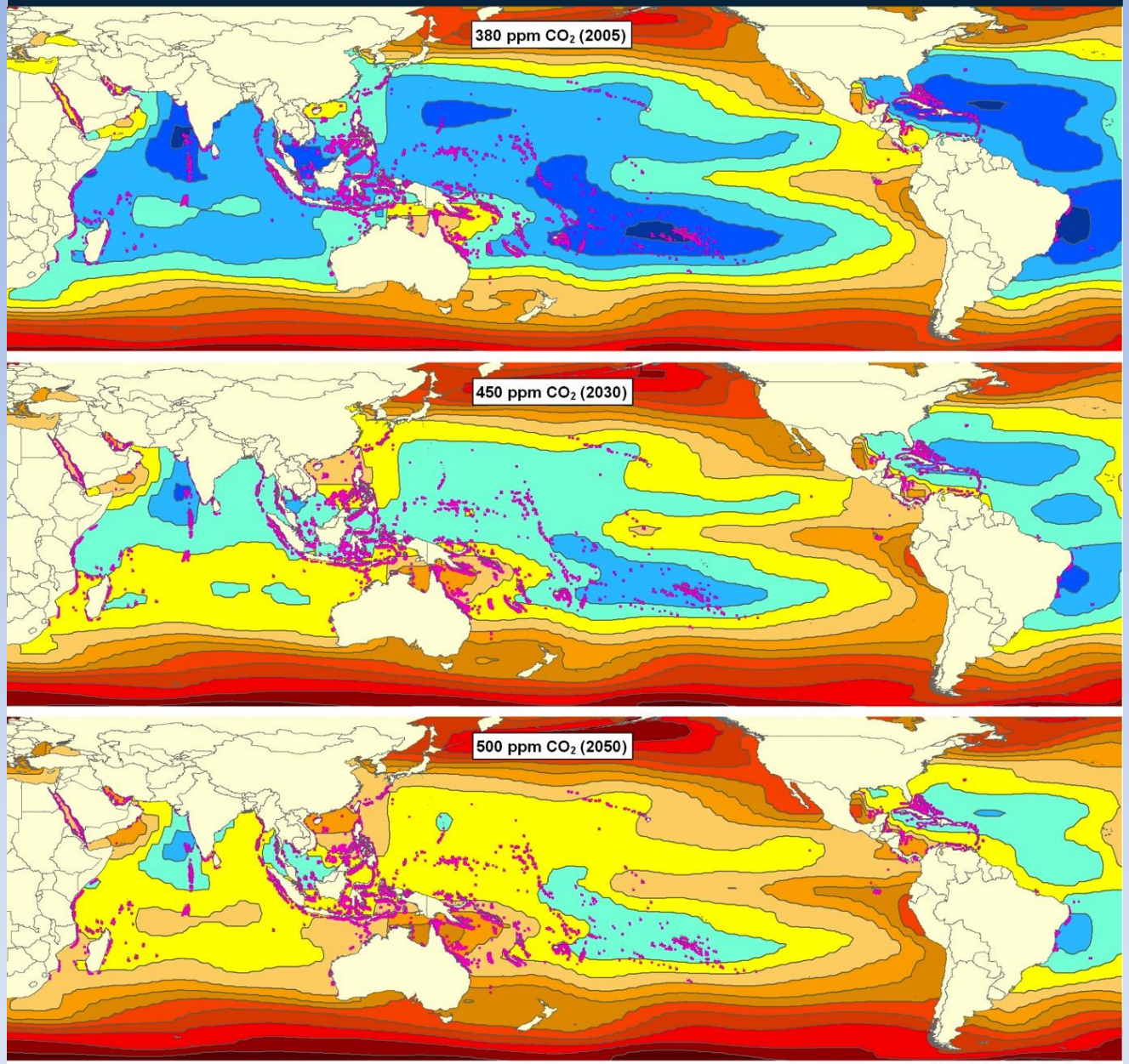



Commonwealth of the Northern Mariana Islands
State of Hawaiʻi
Territory of Guam
Republic of Palau
Federated States of Micronesia
Republic of the Marshall Islands
Territory of American Samoa

Guy Ragosta
Ko'olau Mts. Watershed

PACIFIC ISLANDS CLIMATE CHANGE COOPERATIVE

THREAT TO CORAL REEFS FROM OCEAN ACIDIFICATION IN THE PRESENT, 2030, AND 2050



Coral Reefs

Aragonite Saturation State

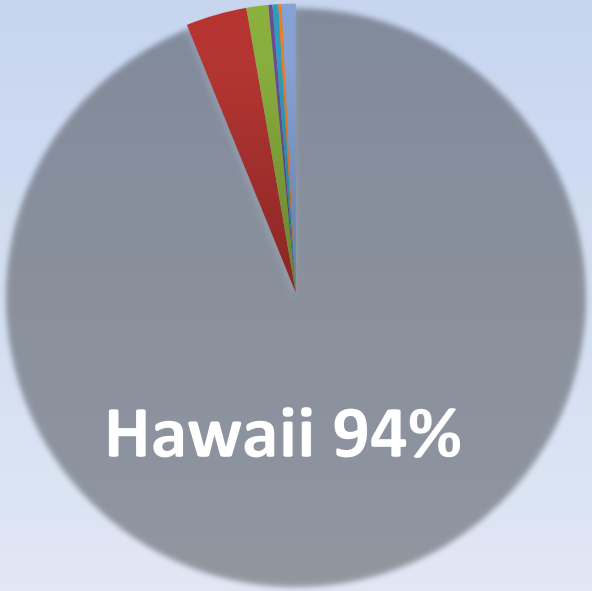
1 1.25 1.5 1.75 2 2.25 2.5 2.75 3 3.25 3.5 3.75 4 and >

Extremely Marginal — Marginal — Adequate — Optimal

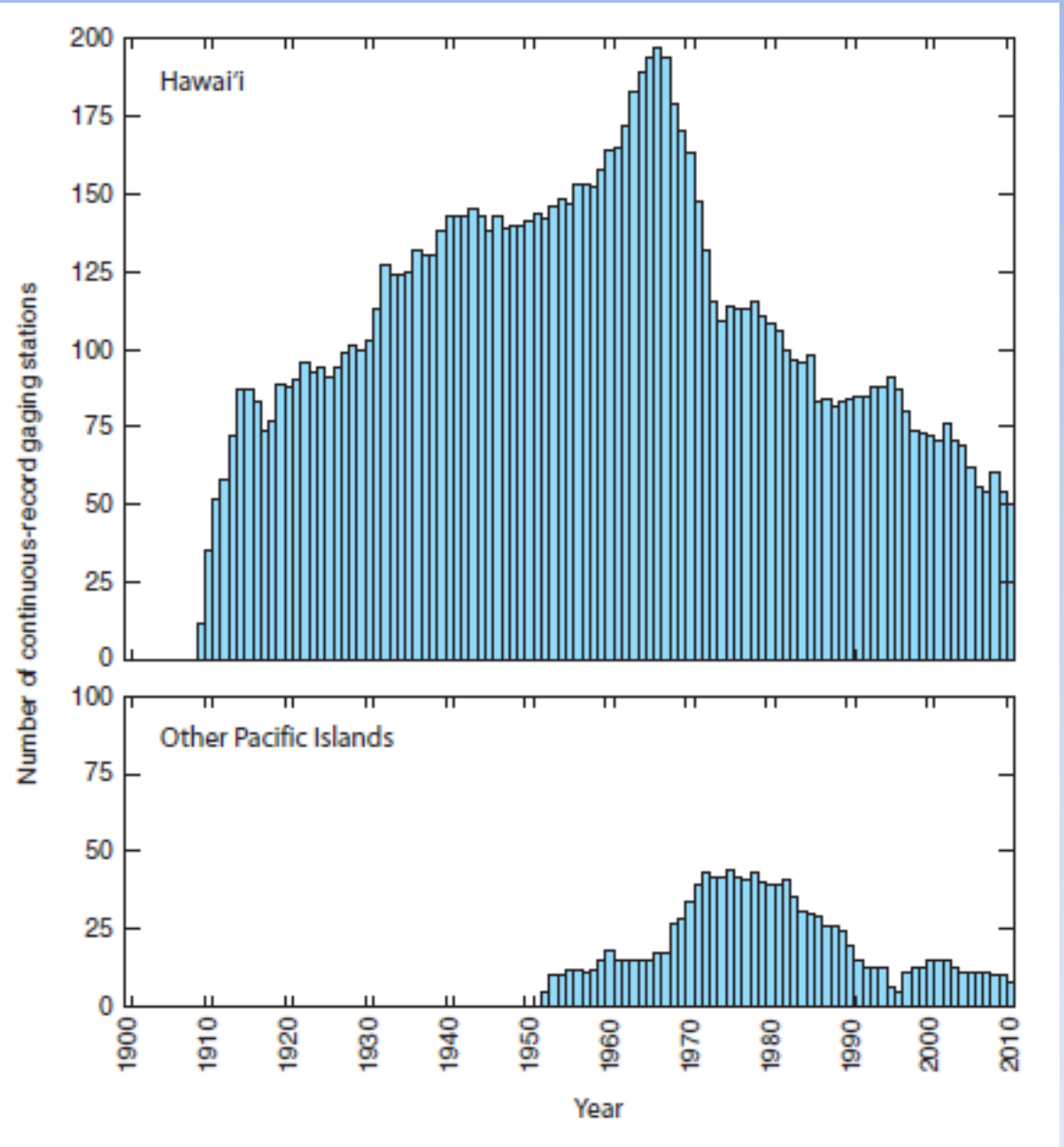
Source: Adapted from Cao, L. and K. Caldeira. 2008. "Atmospheric CO_2 Stabilization and Ocean Acidification." Geophysical Research Letters 35: L19609 for use in the *Reefs at Risk Revisited* project.

Pacific Islands Realities

Pacific Islands GDP = New Orleans



Stream gauge $ has declined



Hawai‘i:
50 streams

Other islands combined:
10 streams

PICCC MEMBERS

American Bird Conservancy
Bishop Museum
Hawai‘i Conservation Alliance
Hawai‘i Wetland Joint Venture
Kamehameha Schools
National Park Service Inventory and Monitoring
National Park Service Pacific West Region
NOAA National Marine Fisheries Service
NOAA NESDIS NCDC Climate Services Pacific Region
NOAA Office of National Marine Sanctuaries
NOAA Pacific Services Center
Office of Hawaiian Affairs
Pacific Science Association
State of Hawai‘i Department of Land and Natural Resources
  Division of Aquatic Resources
State of Hawai‘i Department of Land and Natural Resources
  Division of Forestry and Wildlife
The Nature Conservancy Hawai‘i Office
Trust for Public Lands Hawai‘i Office
U.S. Army Garrison Hawai‘i Natural Resource Program
U.S. Department of Agriculture Forest Service
  Pacific Southwest Research Station
U.S. Department of Agriculture Natural Resources Conservation Service
U.S. Department of Interior Office of Insular Affairs
U.S. Fish and Wildlife Service Ecological Services
  Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service Migratory Birds
U.S. Fish and Wildlife Service National Wildlife Refuge System
  Hawaiian and Pacific Islands National Wildlife Refuges
U.S. Fish and Wildlife Service Wildlife and Sport Fish Restoration Program
U.S. Geological Survey Pacific Basin Information Node
U.S. Geological Survey Pacific Island Ecosystems Research Center
University of Hawai‘i at Mānoa Center for Conservation Research
  and Training
University of Hawai‘i at Mānoa Social Science Research Institute

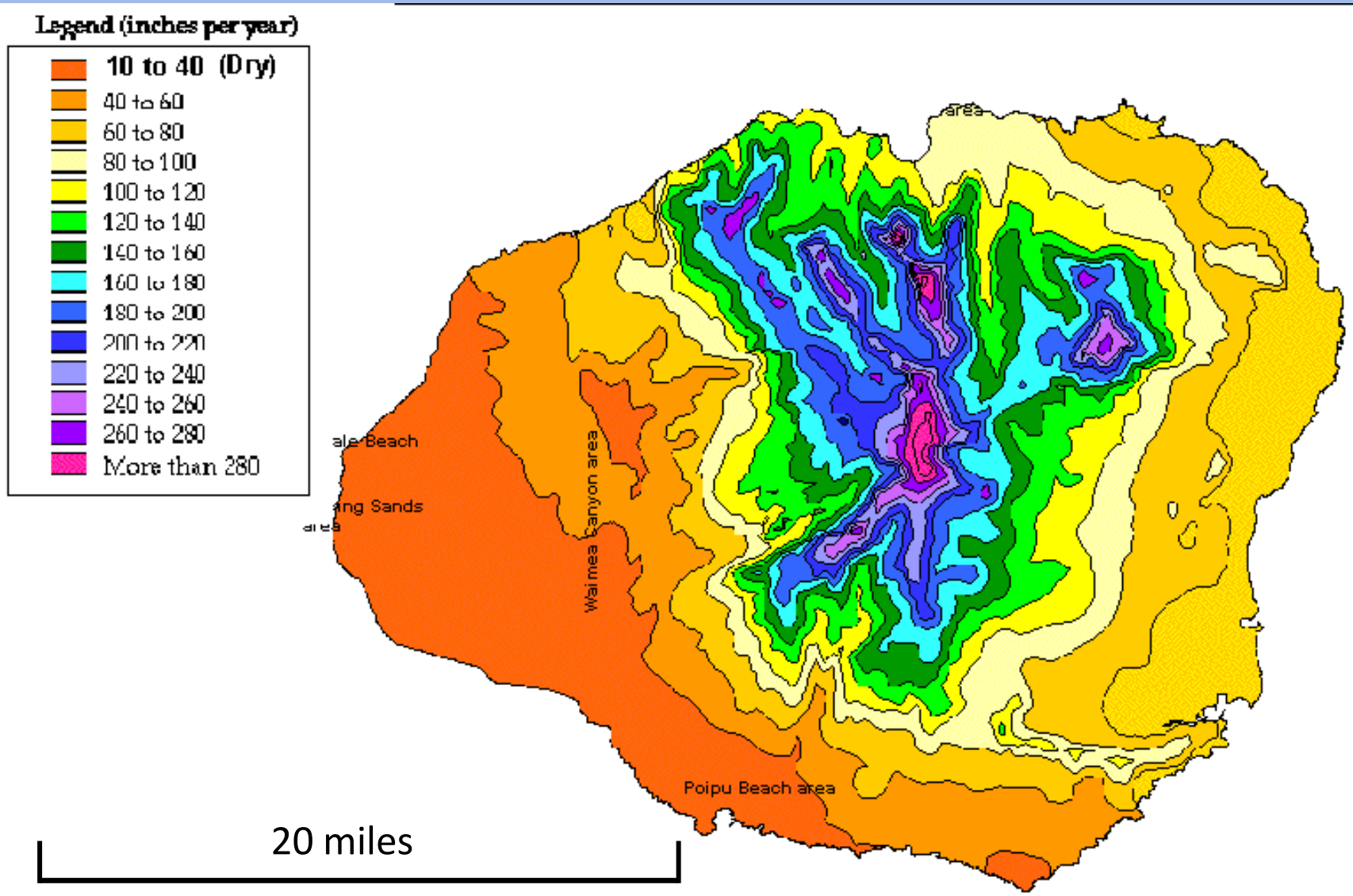
Integrated Science Framework

- Maintain or Improve Ecosystem Function
- Maintain or Improve Status of At-Risk Species
- Preserve Key Cultural and Natural Resources and their Uses

- Data and models of geophysical drivers
- Data on ecological/cultural responses
- Models of resource response
- Visualization tools

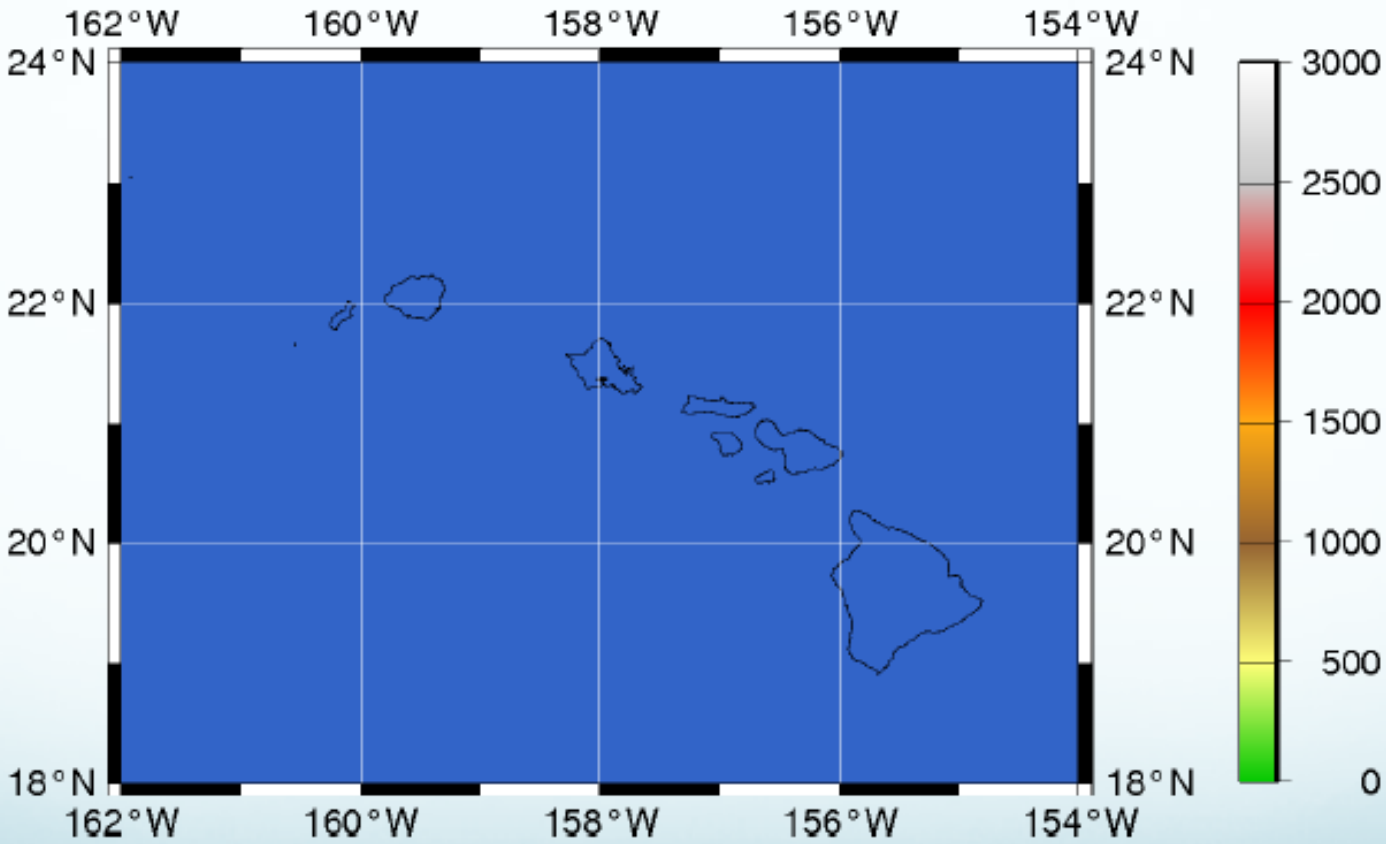
PACIFIC ISLANDS CLIMATE CHANGE COOPERATIVE

Topography and Microclimates



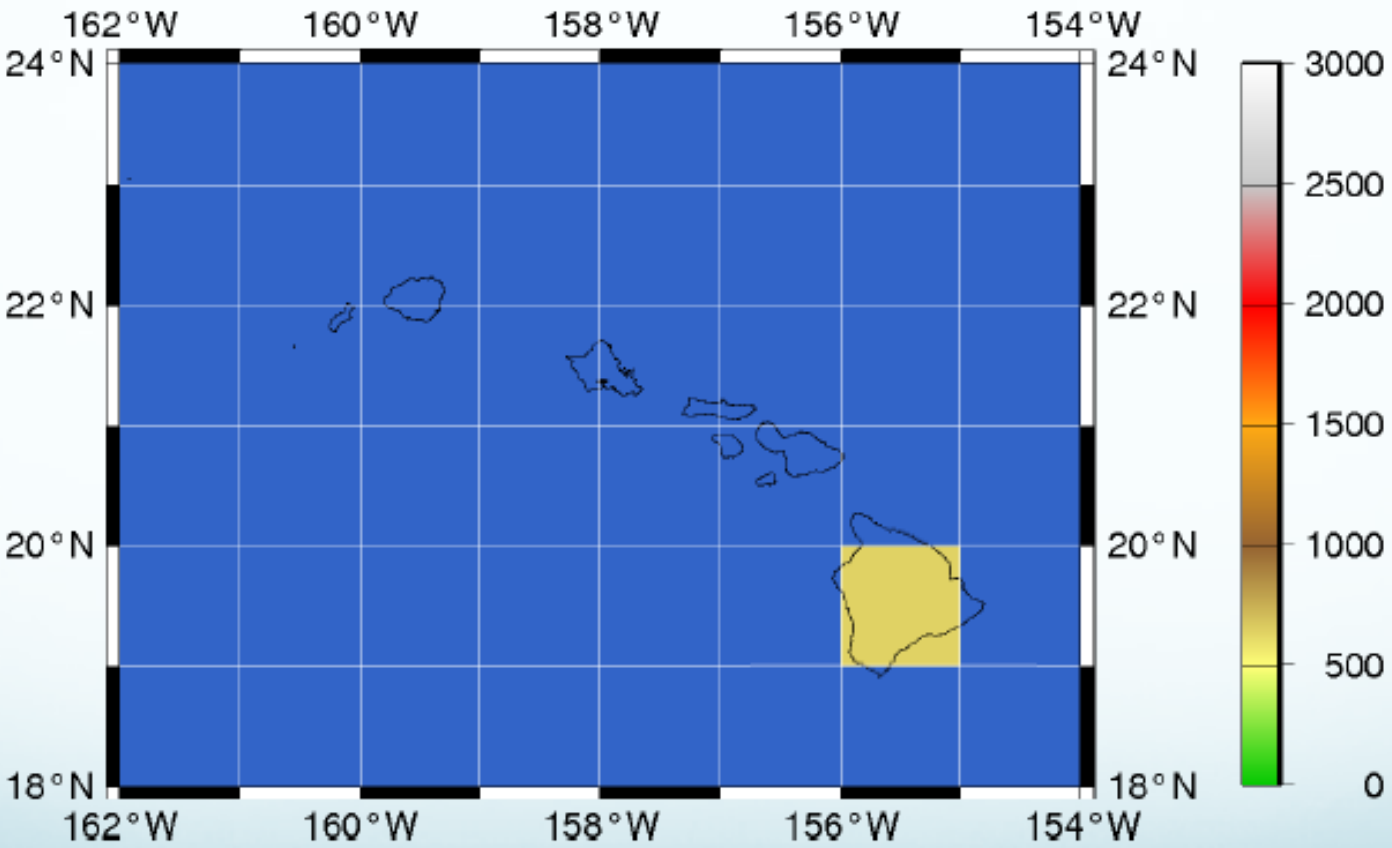
Hawaii in an IPCC AR-4 climate model

– Model topography (2 x2) –



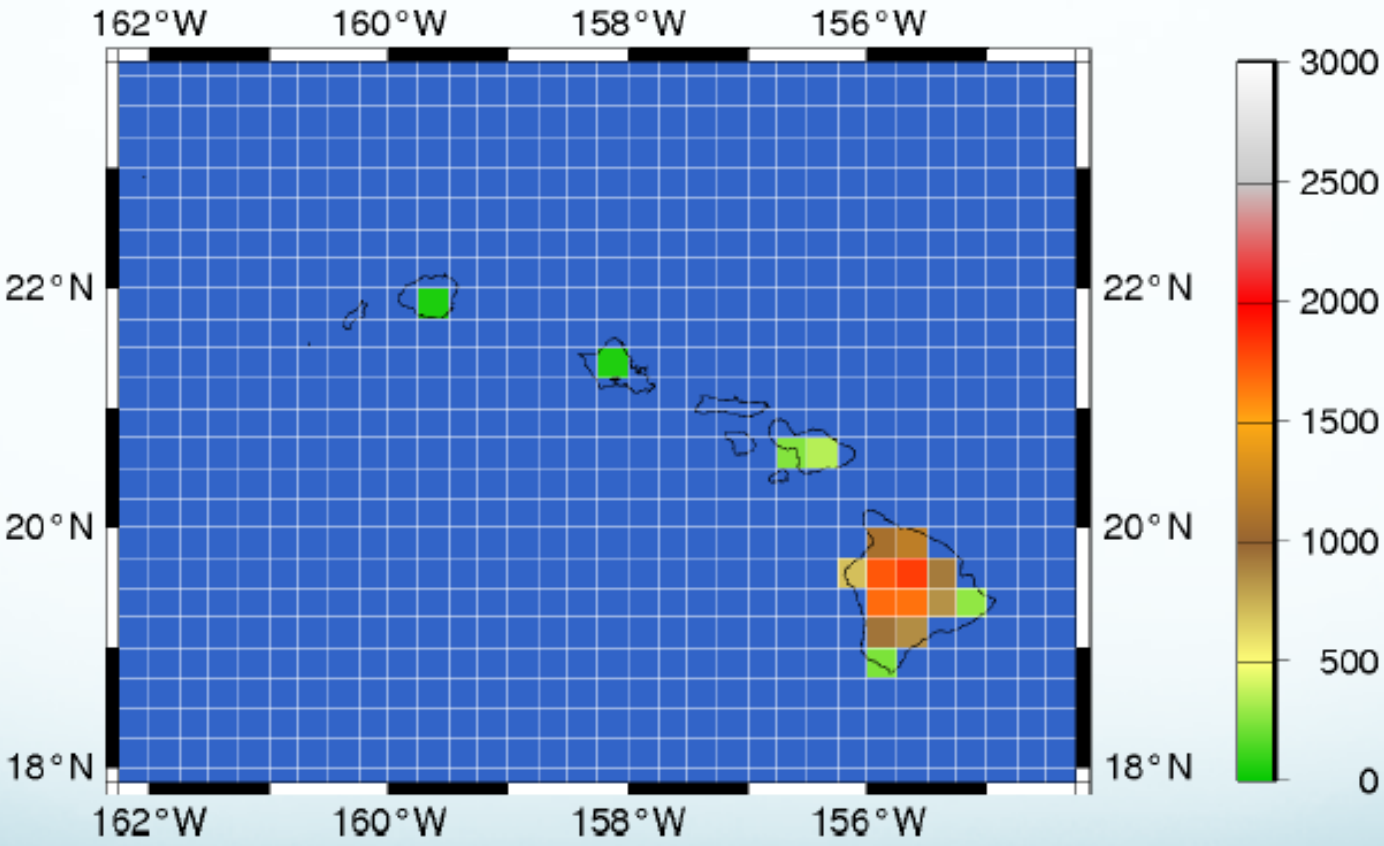
Hawaii in an IPCC AR-5 climate model

– Model topography (1 x1) –



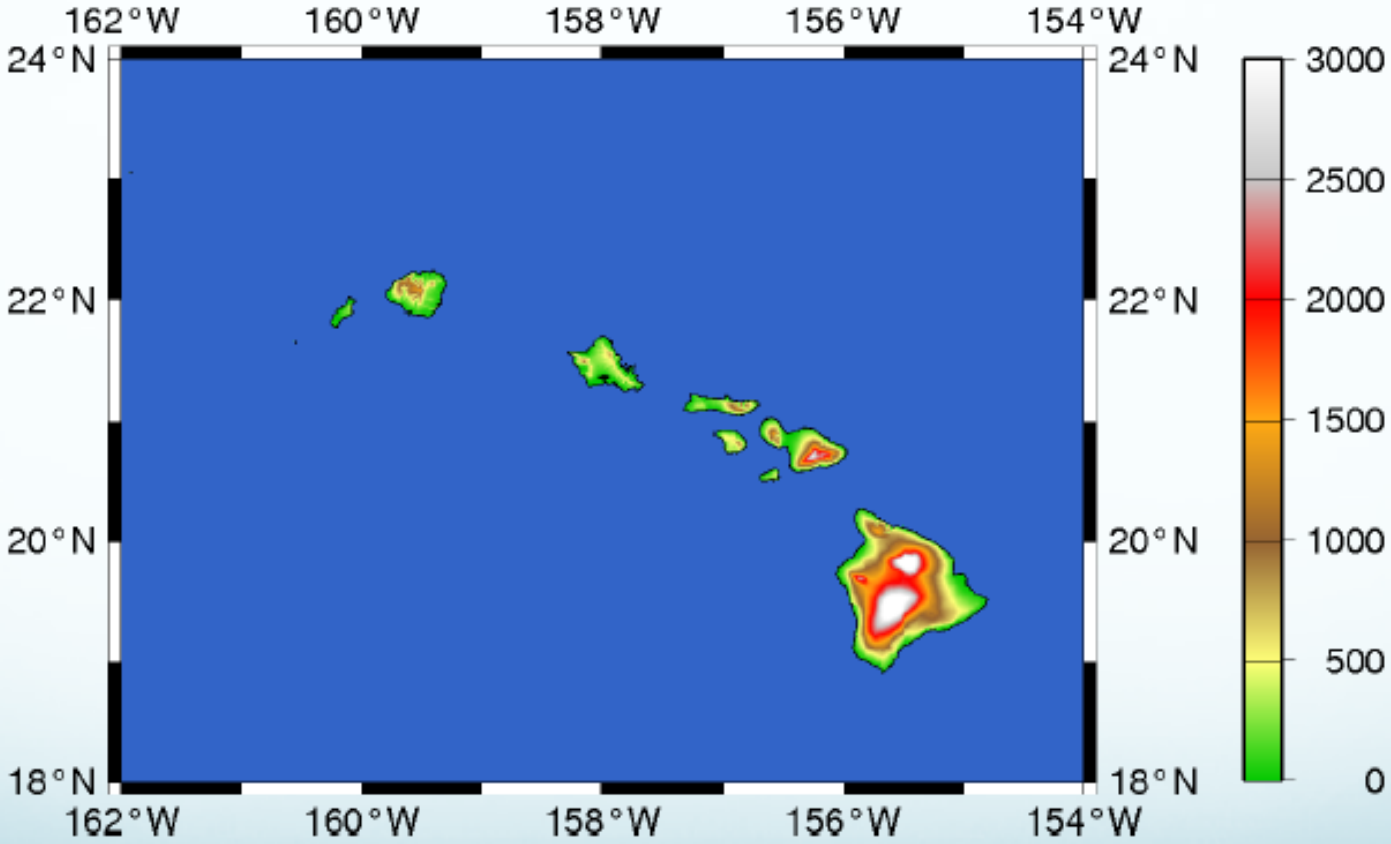
Hawaii in a regional climate model

– Model topography (0.25 x0.25) –



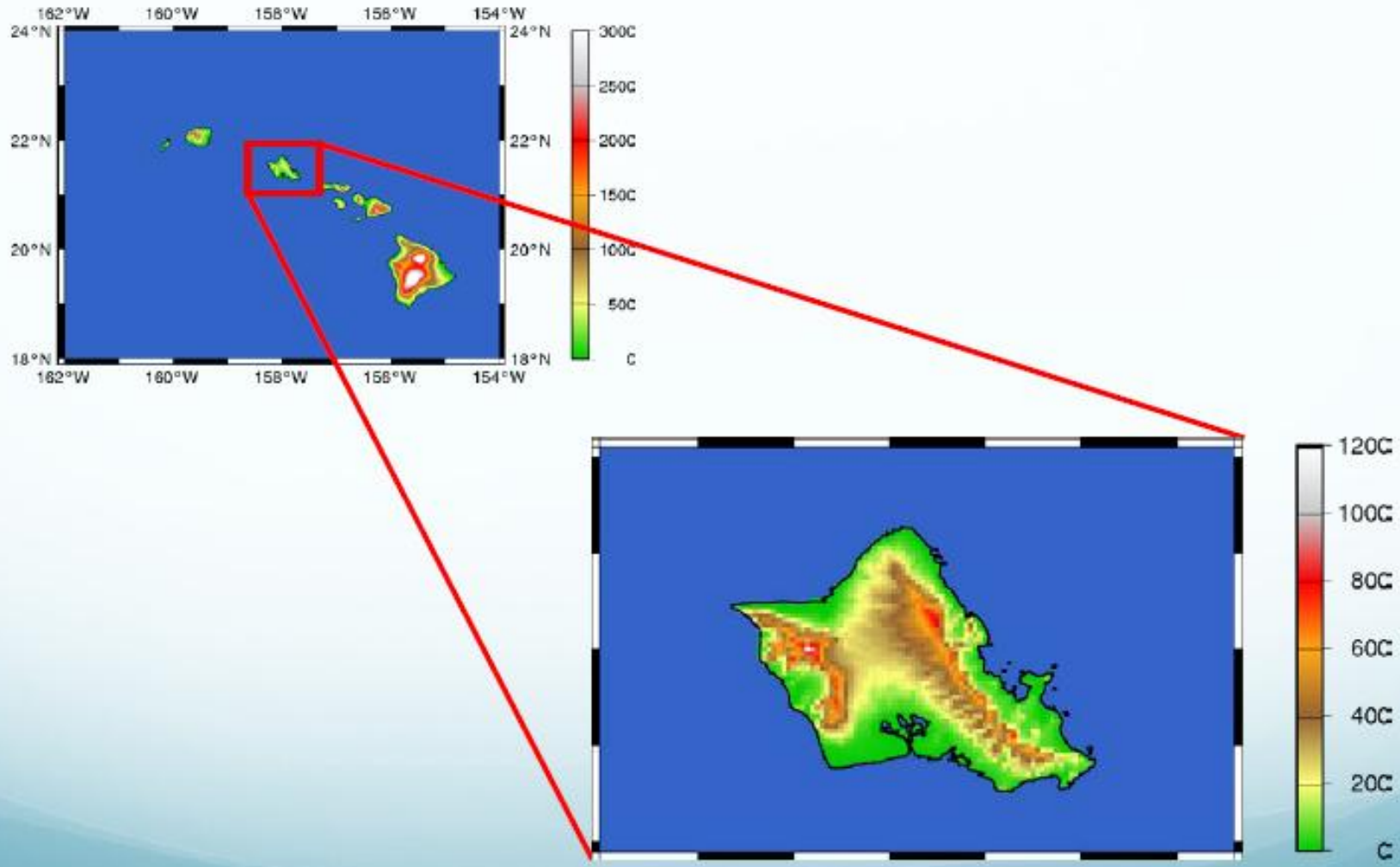
Hawaii in a high-resolution regional climate model

– Model topography (30″x30″) –

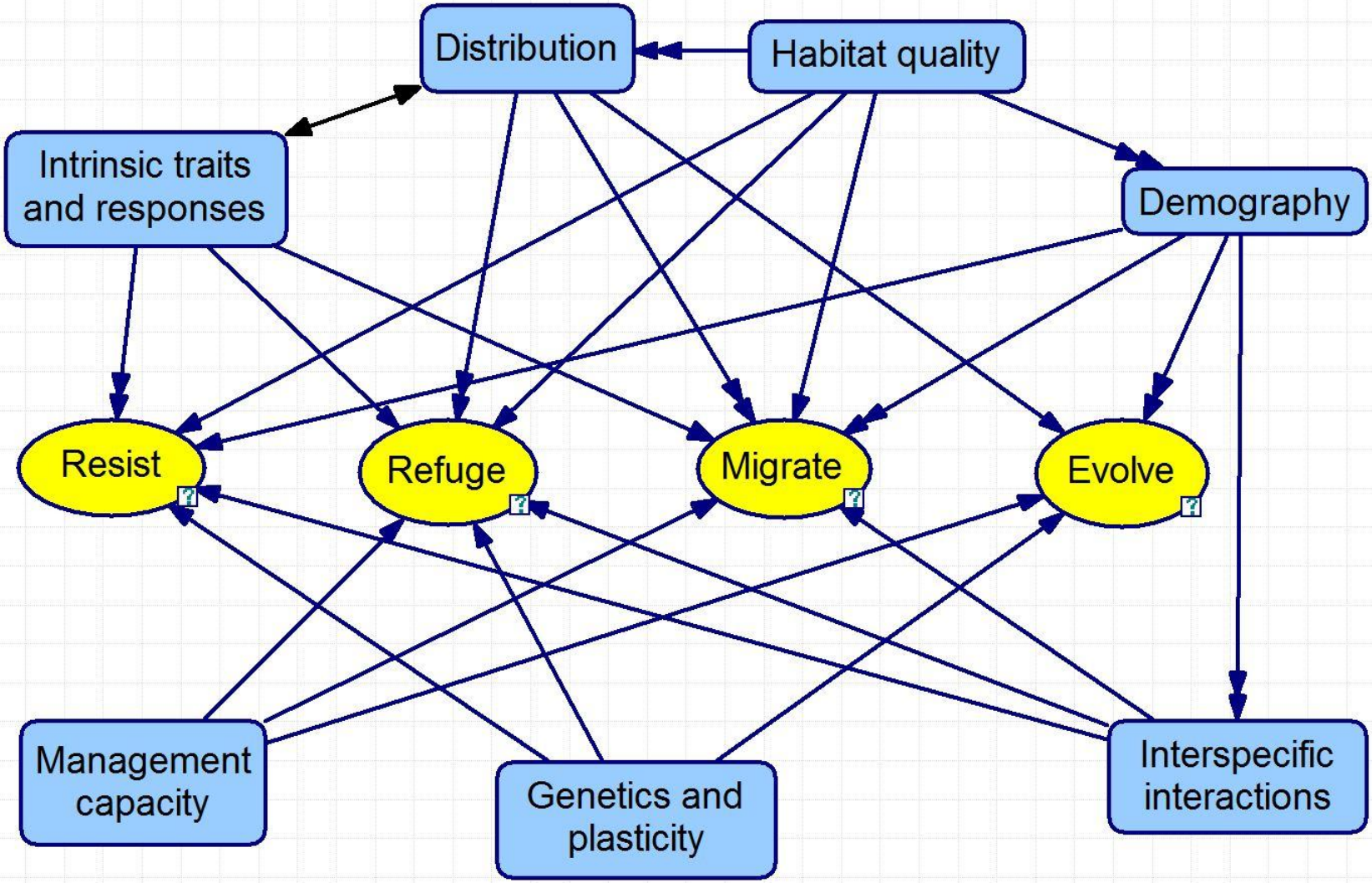


Hawaii in a high-resolution regional climate model

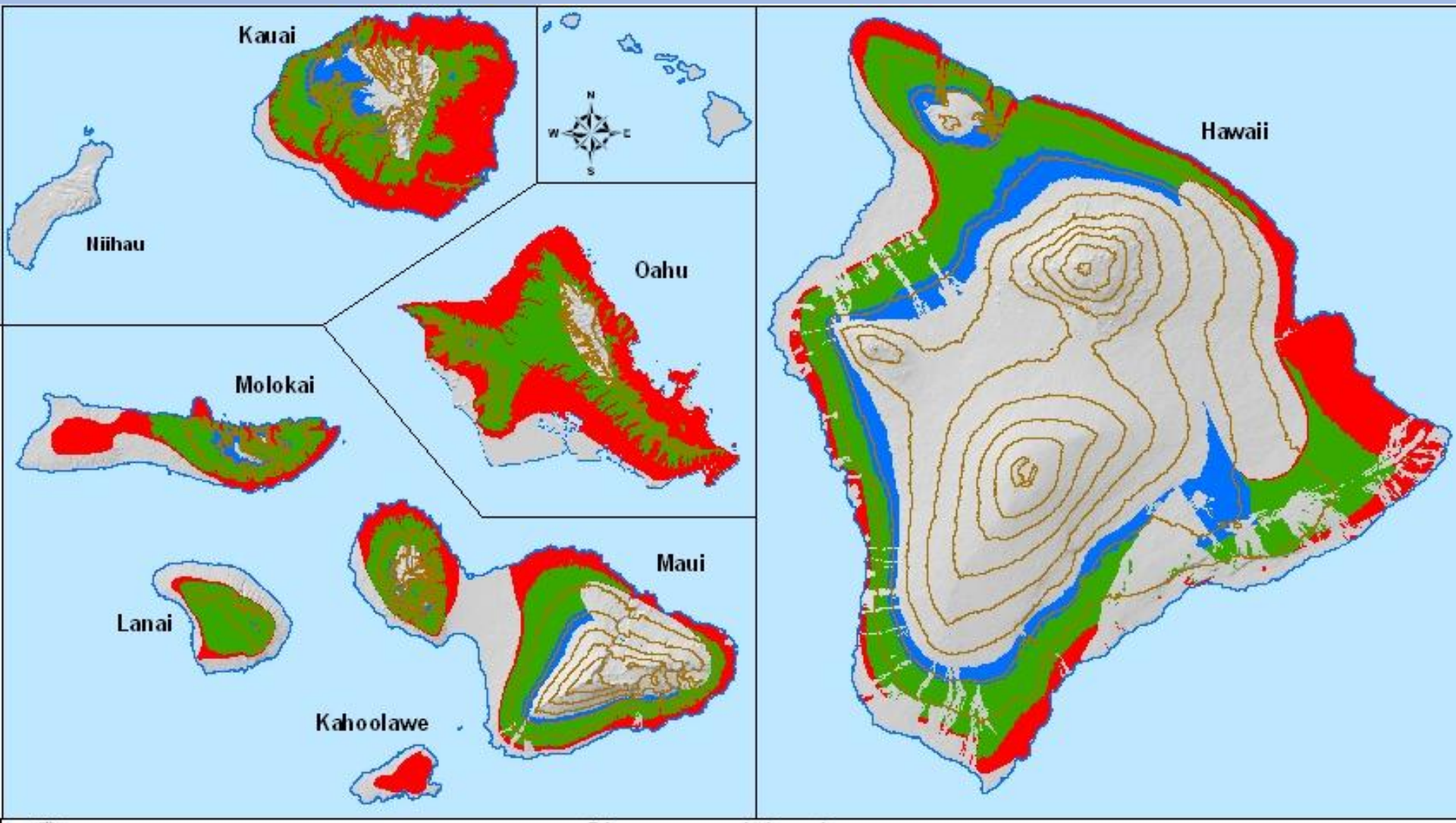
– Model topography (30″x30″) –



Our Vulnerability Assessment



Building and sustaining models



Diospyros sandwicensis

Estimated Potential Range at Present and in the Year 2100

Present Distribution Unchanged

Present Distribution Lost in 2100

Distribution Expanded in 2100

0 25 50 Km

0 15 30 Miles

Projected range for the year 2100 is based on 1-3 degrees C increase in temperature, and up to 6% less annual precipitation.

500 m contours

USGS science for a changing world

Smithsonian National Museum of Natural History