RADseq bleaching response data from Montipora capitata (Tracking 2014 Hawaiian Coral Bleaching Event project)

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Project
» Tracking Recovery from the 2014 Coral Bleaching Event in Hawaiian Waters: Water Quality Gradients, Ecological Factors, and Reef Resilience to Climate Change (Tracking 2014 Hawaiian Coral Bleaching Event)

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Dataset Description

RADseq bleaching response data from Montipora capitata.

Samples for DNA extraction were collected by hand. DNA extractions were done with Qiagen DNeasy blood and tissue kit. RADseq was accomplished using protocols outlined in Toonen et al. (2013), ezRAD: a simplified method for genomic genotyping in non-model organisms. PeerJ 1:e203; DOI 10.7717/peerj.203.

Data have not been submitted.

Data Processing Description

Data are raw and unprocessed.

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Parameters

Parameters for this dataset have not yet been identified

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Project Information

Tracking Recovery from the 2014 Coral Bleaching Event in Hawaiian Waters: Water Quality Gradients, Ecological Factors, and Reef Resilience to Climate Change (Tracking 2014 Hawaiian

Coral Bleaching Event)

Coverage: Coastline of the main Hawaiian Islands

Coral reefs provide habitat for millions of coral-associated species and support the basic livelihoods of hundreds of millions of people globally. Unfortunately, coral reefs are very sensitive to elevated ocean temperatures and are already showing major impacts from thermal stress events. Warm weather can cause coral bleaching, a stress response that involves the loss of the microscopic algae that live inside coral cells and that corals depend on for food. Without these algae, many corals cannot survive such that, as bleaching events become more common on a warming Earth, coral reefs may decline worldwide. This project will further the understanding of how different corals respond to and recover from bleaching (by re-gaining their symbiotic algae) along the coastline of the main Hawaiian Islands. These coral reefs experienced a severe bleaching event that started in late summer 2014. This project will document the extent of bleaching and mortality among different species of corals as well as track the recovery of individual corals using a variety of measurements of coral health. By studying reefs that differ in water quality, the research will examine the idea that coral reefs exposed to greater land-based pollution suffer more extensive bleaching and are also less likely to recover from bleaching. The project will also use molecular methods to identify and compare coral genes that confer greater resistance to bleaching. The research will address basic scientific questions about coral bleaching but will also generate data necessary to gauge how and if managers and decision makers can increase coral reef resilience through improvements in coastal water quality. This multi-disciplinary project will provide financial support and training for one graduate student and one postdoctoral researcher. The scientific results will be translated to material for K-12 students, higher education trainees, and the public through the researchers' ongoing relationships with local community education programs.

Coral reefs of the Hawaiian Islands are currently experiencing a severe bleaching event that poses a substantial threat to the integrity of the largest area of coral reef habitat in US waters, exceeding levels recorded in 1996 during the only major bleaching event previously documented for Hawaii. This study will document the heterogeneity of this event, follow both reef and colony-scale recovery from bleaching, identify the factors driving fitness differences between colonies, and evaluate the correlates of reef sensitivity and resilience against the backdrop of nearshore water quality as a means to understand the impacts of land-based stressors on the abilities of corals to resist and recover from bleaching. The study will focus on the goals of: (1) documenting the spatial and taxonomic patterns of coral responses to the 2014 temperature anomaly in Hawaii; (2) testing the links between water quality and reef resilience; and (3) identifying genetic and environmental factors responsible for heterogeneity in bleaching response and recovery. The researchers will deploy data loggers and take scheduled water samples to record temperature, light (PAR), sediment and nutrient concentrations, pH and alkalinity, conduct periodic video transects at each site to capture species- and genotype-specific differences in response and recovery to the high temperature anomaly, repeatedly assay the physiological state of individually tagged coral colonies during the bleaching event and recovery, and characterize coral holobiont genomes and microbial community composition.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1505158

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