Pocillopora Coral Spawning Polynesia 2022 - 2024

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Project
» Coral reproduction following mass corallivore outbreak and offspring tolerance during El Nino modulates reef recovery (Corallivore and warming impacts on coral reproduction)

Contributors	Affiliation	Role
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Coverage

Spatial Extent: **Lat**:0 **Lon**:0

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Parameters

Parameters for this dataset have not yet been identified

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Project Information

Coral reproduction following mass corallivore outbreak and offspring tolerance during El Nino modulates reef recovery (Corallivore and warming impacts on coral reproduction)

Coverage: South Pacific, French Polynesia, Moorea

NSF Award Abstract:
Natural and anthropogenic impacts are increasingly co-occurring with negative consequences for marine systems, specifically coral reefs. Natural predator outbreaks, such as the corallivorous Crown of Thorns Sea stars, can rapidly kill corals. Further, the stress generated by climate and ocean warming is driving coral bleaching, or the breakdown of the coral-dinoflagellate nutritional symbiosis, which can cause coral starvation and mass mortality. The reefs of Mo'orea, French Polynesia, are currently experiencing an outbreak of Crown of Thorns sea stars, with high coral mortality. In conjunction, the current El Niño warming is driving up ocean temperatures, with the potential to exacerbate peak seasonal thermal stress on corals. In particular, *Pocillopora spp*, which are dominant reef builders in Mo'orea, are being preferentially eaten by Crown of Thorns Sea stars and have historically displayed coral bleaching during the warmest months. In light of the rapid and extensive coral predation on the ecologically dominant *Pocillopora spp* on the forereef in Mo'orea and compounding El Niño thermal stress, this project examines the role of lagoon reef *Pocillopora spp* reproduction, recruitment, and temperature tolerance in reef recovery. This work provides the capacity to quantify species-specific reproduction and thermal tolerance to better understand and forecast legacy effects on reef recovery and resilience. Broader impacts of this project include research support for early career scientist training, as well as data and materials for undergraduate and high school student curriculum modules

and research projects for schools in French Polynesia and Rhode Island.

This project represents an urgently needed assessment of the impact of multiple co-occurring disturbance events of corallivore outbreaks and thermal stress on coral reefs. Along with quantifying the Crown of Thorns Sea star abundance and distribution, researchers are completing a genetic and ecological characterization of the diversity and abundance of adult and juvenile *Pocillopora spp* in the lagoon to determine the population prior to spawning and thermal peak, quantifying reproduction of *Pocillopora spp* and larval thermal tolerance, and determining the density and thermal tolerance of *Pocillopora spp* recruits in the lagoon and forereef during the peak of seasonal thermal stress and several months after, in an El Niño year. The results advance understanding of the consequences of coral spawning and recruitment immediately following a natural disturbance. Importantly, the project provides information on how the dominant Pocillopora spp are contending with the chronic and acute stress of ocean warming and marine heat waves at sensitive early life stages. The results of this project provide a deeper understanding of the legacy of stress on the ecologically, economically, and culturally significant coral reef ecosystem.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-2348674

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