Supplementary Materials: The impact of the 2024 coral bleaching event on coral at a remote atoll in the Tuamotu Archipelago, French Polynesia

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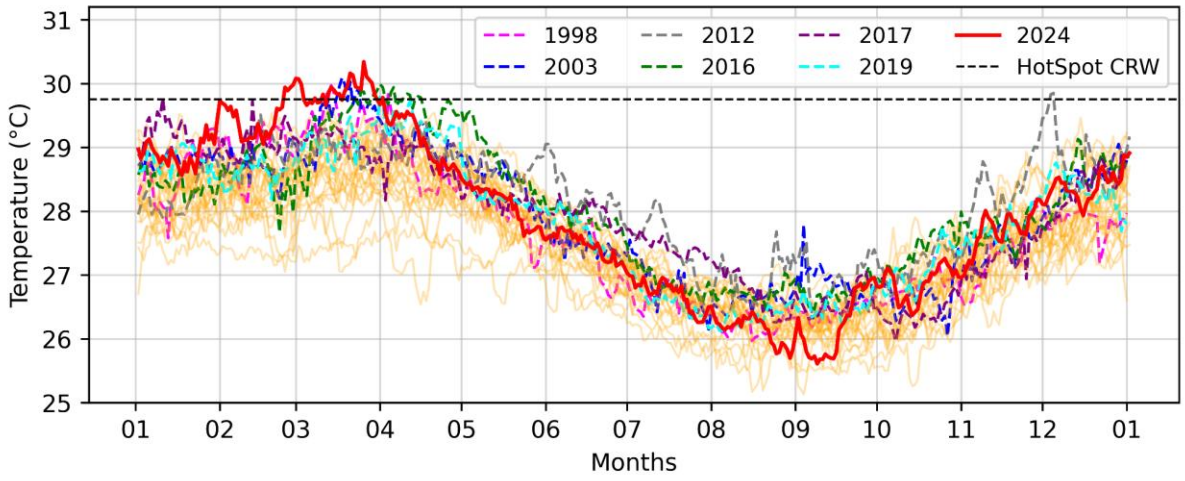

Fig. SP1 Daily time series of satellite sea surface temperature (SST) from NOAA Coral Reef Watch (CRW) overlaid from January 01 to December 31 for each year of the 1995-2024 period. Years for which Daily degree-Heating Weeks (DHW) was positive are highlighted on the graph with a dashed and colored line, while other years are not specified and are shown as orange lines on the graph.

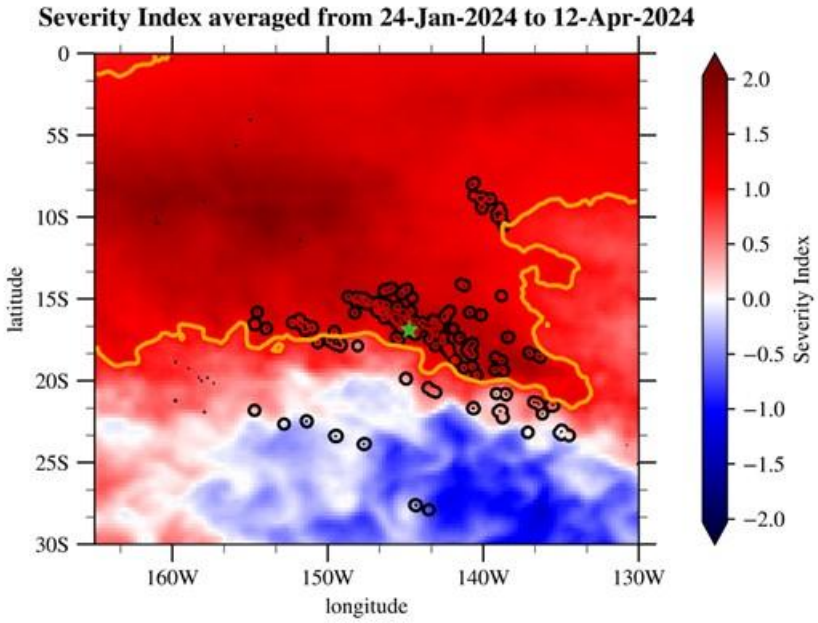

Fig. SP2 To further analyze temperature patterns over the broader Pacific basin and the French Polynesia region, the 0.05° x 0.05° CRW dataset was regridded to a coarser 0.25° x 0.25°grid. MHW detection on this regridded dataset applied the same methodology and climatological baseline (1995–2024). This figure shows Severity Index (SI) averaged over the marine heatwave (MHW) duration (January 24, 2024 to April 12, 2024) across the French Polynesia region [165°W,130°W,30°S,0°S] based on NOAA Coral Reef Watch (CRW) satellite data at 0.25° resolution. The orange contour

indicates the SI = 1 threshold (SI > 1 means SST exceeds the MHW detection threshold). The location of Tahanea atoll is marked with a green star. The SI is calculated as in Sen Gupta et al., (2020):

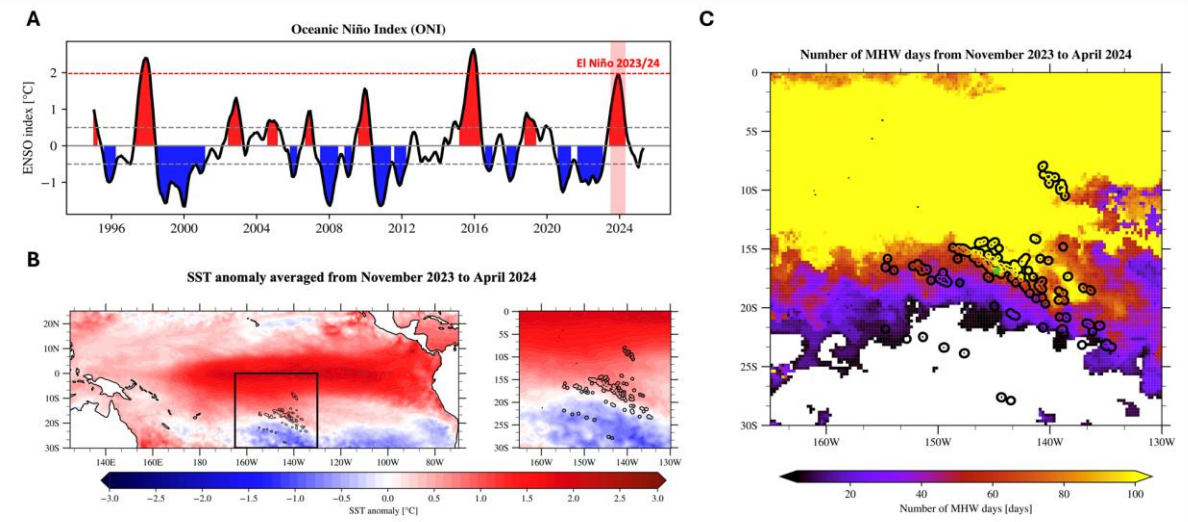

Fig. SP3 (A) Oceanic Niño Index (ONI) time series from 1995 to 2024. Red and blue shaded periods indicate El Niño and La Niña events, respectively, as officially defined by NOAA (i.e., ONI ≥ +0.5 °C or ≤ –0.5 °C for at least five consecutive overlapping 3-month periods). The gray dashed lines represent the +/- 0.5°C thresholds. ONI is taken from the NOAA National Weather Service Climate Prediction Center (cold and warm episodes by season,). The 2023/24 El Niño is highlighted in light red, with the peak ONI value during this event marked by a red horizontal dashed line. (B) Sea surface temperature (SST) anomalies relative to the 1995–2024 climatology, based on CRW satellite data at 0.25° resolution (see Methods), shown at the Pacific basin scale and over French Polynesia (black box). (C) Number of MHW days detected from November 2023 to April 2024 over French Polynesia region [165°W,130°W,30°S,0°S]. The location of Tahanea atoll is marked with a green star.

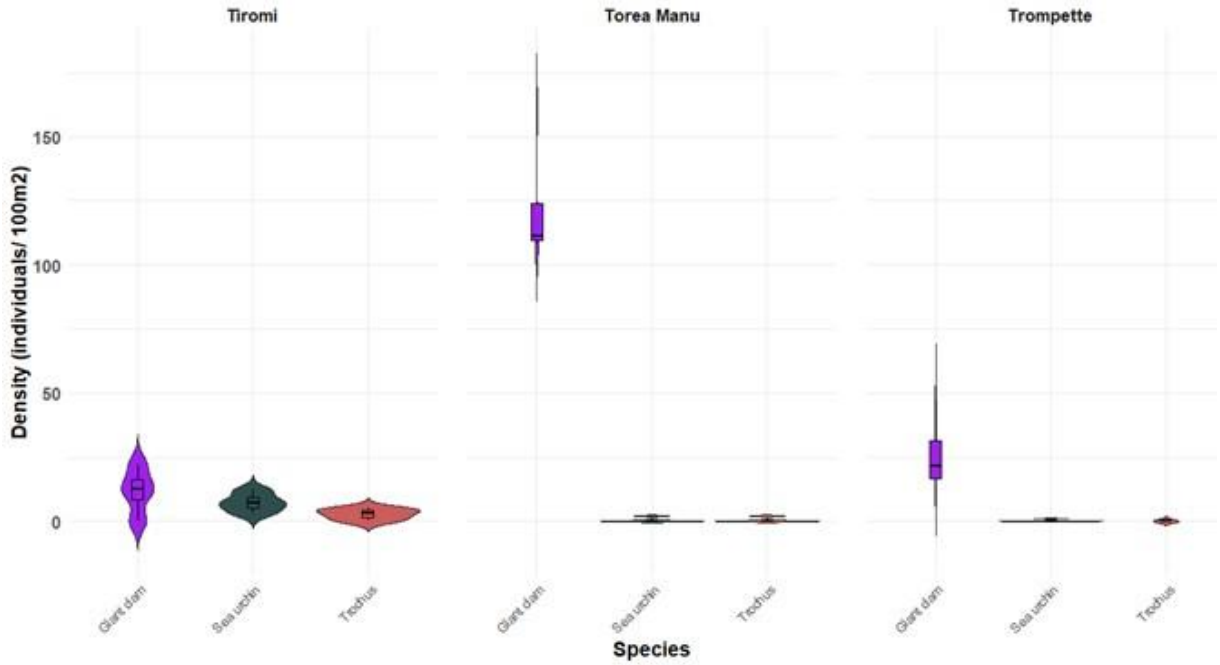

Fig. SP4. Density of giant clams, sea urchins, and *Trochus* mollusks at each site (Tiromi, Torea Manu, and Trompette reefs). Values represent the number of individuals per 100 m². Macro-invertebrates were counted using a 5 m wide belt transect to estimate the abundance of key taxa: giant clams (*Tridacna maxima*), sea-urchins (all species), and trochus sea-snails (*Rochia nilotica*). The reefs hosted low densities of sea urchins (2.67 ± 3.96, 0–12 individuals per 100 m^2) and trochus (1.08 ± 1.78, 0-5 individuals per 100 m^2, Fig. SP4). In contrast, giant clams were found in higher numbers (53.58 ± 53.67, 0-160 individuals per 100 m^2). Their abundance was significantly higher at Torea Manu reef (122.5 ± 25.05, 108-160 individuals per 100 m^2) than at Tiromi reef (11.75 ± 9.11, 0–22 individuals per 100 m^2; $\chi^2 = 8.77$, df = 2, p = 0.01; Z = −2.94, p = 0.01).

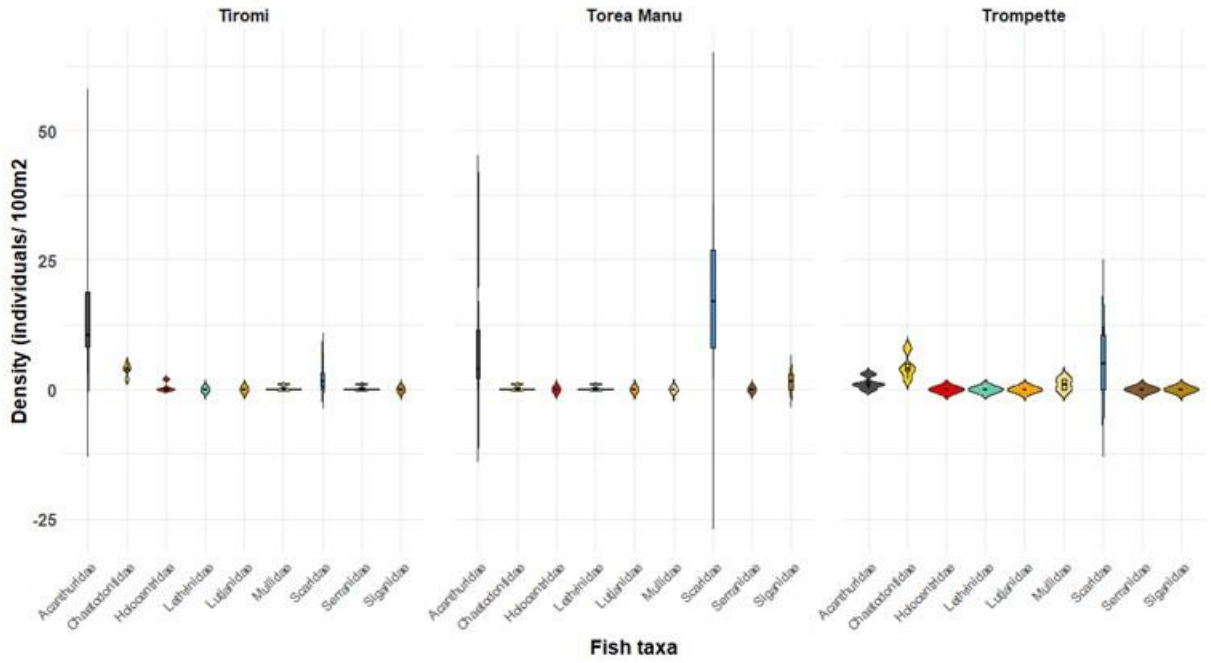

Figure SP5 Density of fish, per family at each site (Tiromi, Torea Manu, and Trompette reefs). Values represent the number of individuals per 100 m². Fish were surveyed using a 5 m-wide belt transect to record the abundance of key families: Acanthuridae, Chaetodontidae, Holocentridae, Lethrinidae, Lutjanidae, Mullidae, Scaridae, Ser-ranidae, and Siganidae. Acanthuridae (mean: 9.17 ± 13.46, range: 0–42 individuals per 100 m^2) and Scaridae (8.67 ± 11.17, 0–36 individuals per 100 m^2, Fig. SP5) were the most abundant fish families. Chaetodontidae was the third most abundant family (2.83 ± 2.44, 0–8 individuals per 100 m^2), with marked variation between sites, mean values ranged from 0.25 ± 0.5 individuals per 100 m^2 at Torea Manu to 4.5 ± 2.52 individuals per 100 m^2 at Trompette reef. Other families had the mean abundances below 0.42 individuals per 100 m^2.