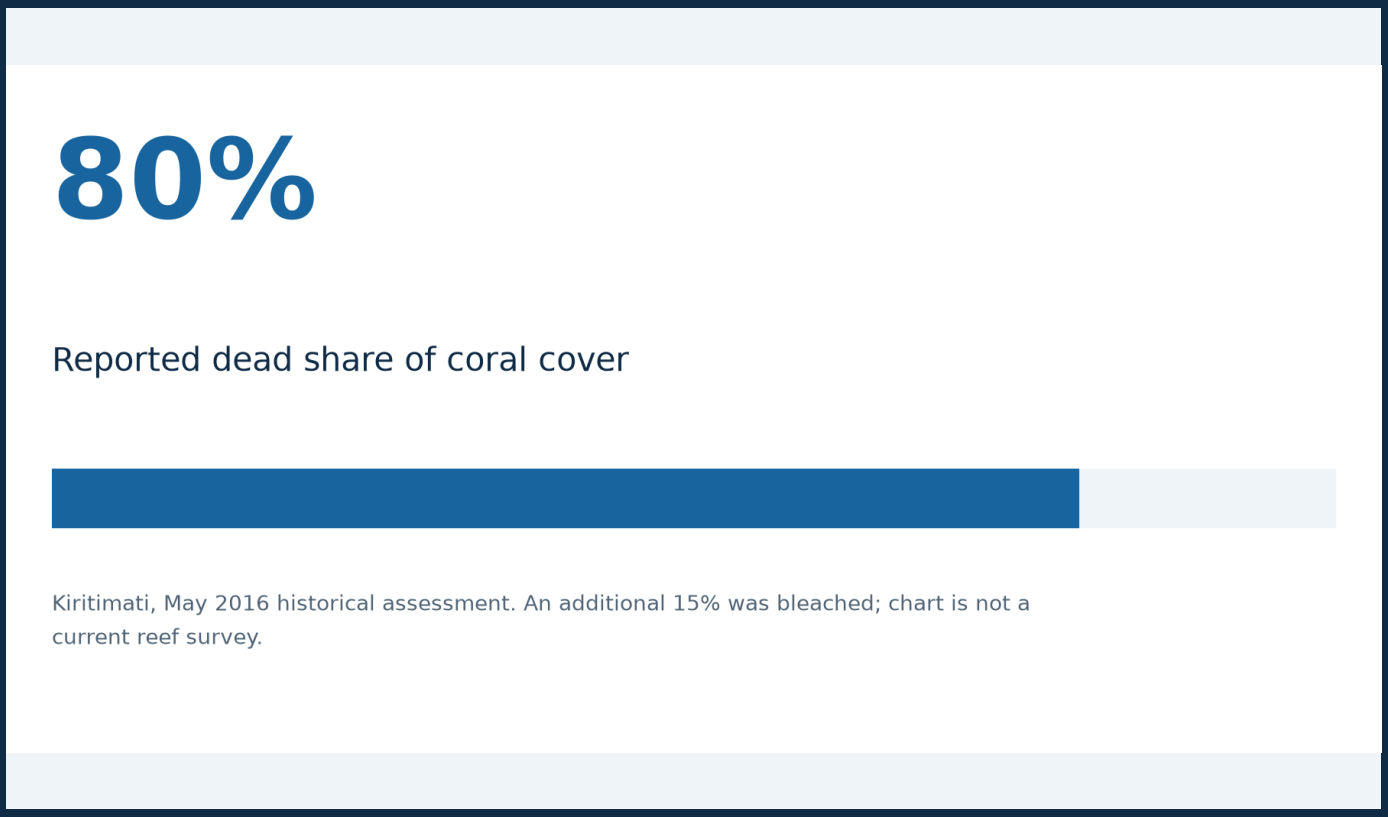
What Warming Water Leaves Behind

Six reef case studies connecting heat stress, bleaching and recovery | 2015-2023



Kiritimati, May 2016 historical assessment. An additional 15% was bleached; chart is not a current reef survey. Credit: Dattle graphic from the cited source data.

Historical evidence. Better questions. Useful records.

A pale reef is a warning sign, but it is not the same as a dead reef. These cases connect the water conditions with what observers actually found: bleaching, loss of coral cover, depth differences and the need for repeat surveys.

Prepared November 11, 2026 | A collection by Dattle

What the records reveal

SCOPE AND METHOD

Selected historical reef cases, not a global ranking. Heat exposure, bleaching, mortality, coral cover and the proportion of surveyed reefs affected describe different quantities. Each metric retains its denominator and observation period. Source maps show sea-surface conditions rather than temperatures at every coral. No historical status is presented as a current reef assessment.

A COMPARISON WORTH MAKING

Duration, location and observation method matter. The Flower Garden Banks study compares colony condition by depth; Jarvis compares live hard-coral cover between surveys; Great Barrier Reef maps describe heat patterns across a large region. These measures can support linked questions, but cannot be combined into one damage score.

IMAGES AND UNCERTAINTY

Photographs and satellite views are historical agency imagery. Charts are drawn from cited observations or estimates, with units and dates preserved. A picture shows a place and moment; it does not prove an entire event boundary, impact or cause. This is a historical reference, not a live warning service.

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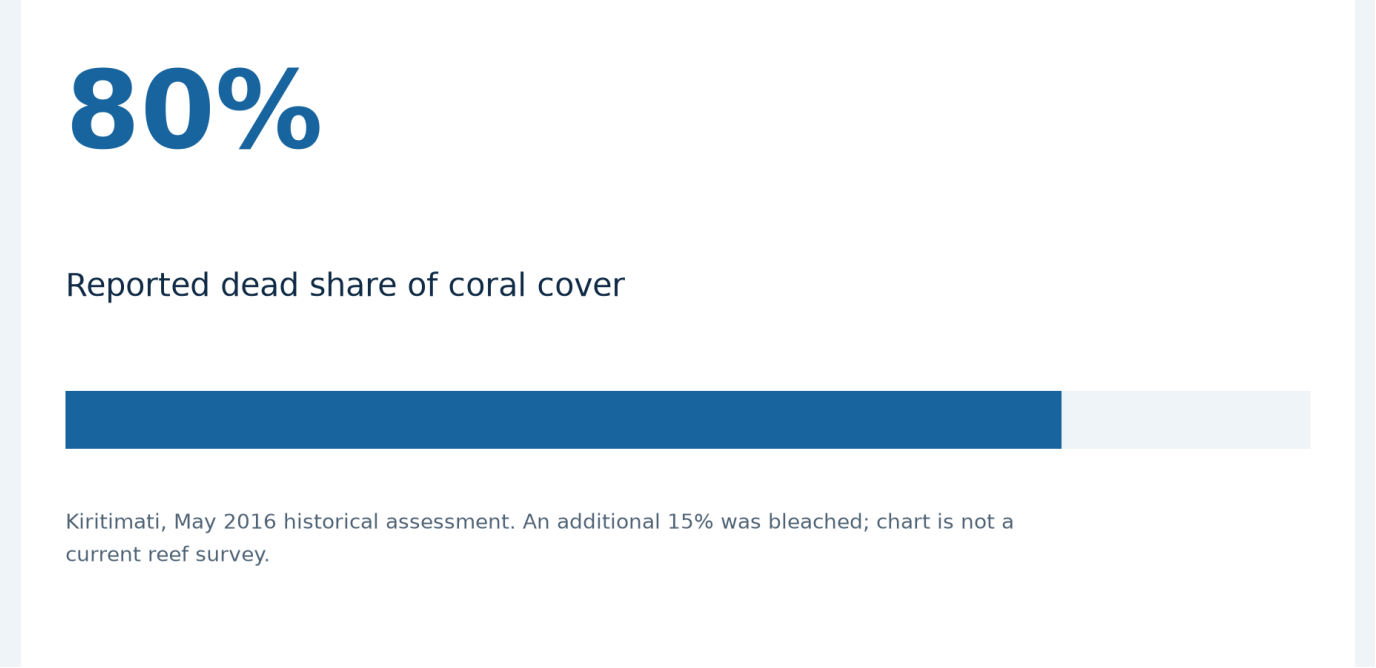
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Kiritimati: prolonged heat and extensive coral loss

2015-2016 heat event; May 2016 assessment | Kiritimati (Christmas Island), Kiribati, central Pacific



Kiritimati, May 2016 historical assessment. An additional 15% was bleached; chart is not a current reef survey. Credit: Dattle graphic from the cited source data.

Reported coral-cover condition

80% dead by May 2016

Additional coral cover bleached

15%

Evidence type

NOAA historical assessment

WHAT HAPPENED

NOAA's account of the 2014-2017 global bleaching event describes prolonged heat in the central equatorial Pacific. Its May 2016 snapshot reported 80 percent of total coral cover dead at Kiritimati, with another 15 percent bleached. The two conditions are distinct: bleaching records stress in still-living coral; mortality records loss.

WHAT THE DATA REVEALS

A useful reef record needs a follow-up date. Reporting only the initial bleaching can miss later deaths or recovery, and reporting only mortality loses the earlier warning stage.

READ WITH CARE

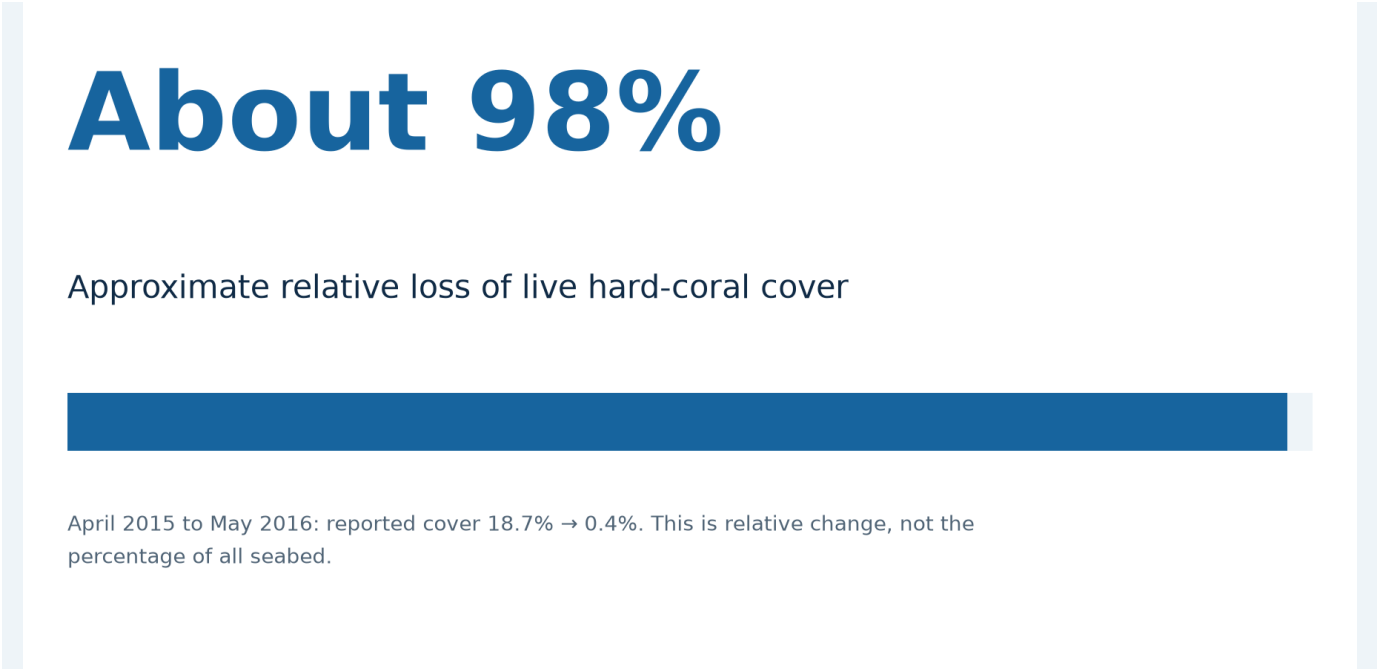
These are historical, reported proportions of coral cover, not a percentage of the island's land, all seafloor or a count of coral colonies. The summary combines regional evidence and cited observations; it is not a complete survey table or a statement of present conditions.

Source 1 >

Visual / data >

Jarvis Island: measure the cover, then return

April 2015-May 2016 survey comparison | Jarvis Island, central equatorial Pacific, USA



April 2015 to May 2016: reported cover 18.7% → 0.4%. This is relative change, not the percentage of all seabed. Credit: Dattle graphic from the cited source data.

Live hard-coral cover, April 2015

18.7%

Live hard-coral cover, May 2016

0.4%

Relative cover decline reported

More than 98% (rounded source values)

WHAT HAPPENED

NOAA-supported rapid ecological surveys documented a collapse in live hard-coral cover at Jarvis following the 2015-2016 El Niño. The published study reports cover falling from 18.7 percent to 0.4 percent between the April 2015 and May 2016 surveys. Later NOAA work looked for surviving colonies and new recruits rather than assuming the reef's trajectory from the first loss estimate.

WHAT THE DATA REVEALS

Store the baseline and follow-up values, not just a dramatic percentage change. Repeat surveys can reveal recovery in one measure while other aspects of reef structure remain impaired.

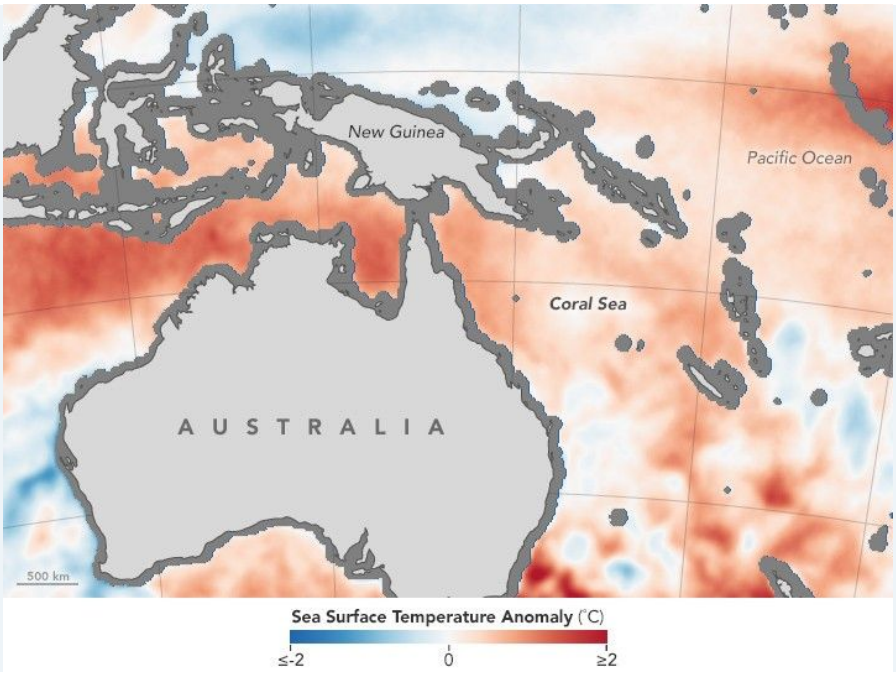
READ WITH CARE

The approximately 98 percent decline is relative to earlier live coral cover; it does not mean 98 percent of the entire seabed died. Displayed cover values are rounded, so a calculation from them will differ slightly from the study's reported decline.

Source 1 > Source 2 > Visual / data >

Great Barrier Reef: a strong north-to-south contrast

February-March 2016 heat peak; May 2016 report | Great Barrier Reef, Queensland, Australia



Southwestern Pacific sea-surface temperature anomaly map accompanying NASA's account of the February-March 2016 warm period; reference average: 2003-2012. Credit: NASA Earth Observatory / Jesse Allen; multi-satellite microwave SST data: Remote Sensing Systems.

Northern survey area, severely bleached reefs

81%

Central survey area, severely bleached reefs

33%

Southern survey area, severely bleached reefs

1%

WHAT HAPPENED

The 2016 bleaching event affected a vast reef system unevenly. NASA's contemporary summary of aerial and in-water surveys reported much more severe bleaching in the northern survey area than in the south. Sea-surface anomaly maps placed those observations in a regional heat context. The associated warm-water episode was prolonged, rather than a single hot day.

WHAT THE DATA REVEALS

Preserve the spatial breakdown. One whole-reef headline can hide both heavily affected areas and less-affected locations that deserve follow-up comparisons.

READ WITH CARE

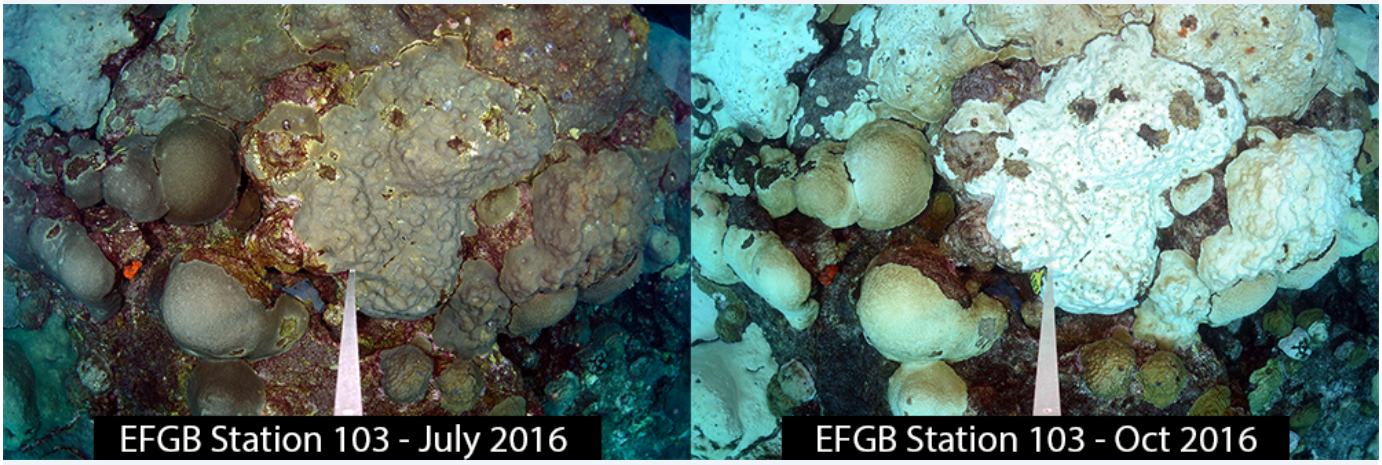
The percentages describe surveyed reefs classified as severely bleached, not percentages of dead coral or live coral cover. The image is a temperature anomaly relative to 2003-2012, not an absolute temperature or a photograph of bleaching. Findings reflect the contemporary survey report.

Source 1 >

Visual / data >

Flower Garden Banks: compare the same corals by depth

October 5, 2016 survey | East Flower Garden Bank, Gulf of Mexico, USA



Permanent Photo Station 103 at East Flower Garden Bank in July and October 2016; pale colonies are visible in the later image. Credit: NOAA Flower Garden Banks National Marine Sanctuary (FGBNMS).

Shallow stations: colonies pale or bleached

46% (60-80 ft depth)

Deep stations: colonies pale or bleached

15% (100-130 ft depth)

Sea-surface heat exposure reported

Above 30°C on 85 of preceding ~120 days

WHAT HAPPENED

Permanent photo stations allowed sanctuary researchers to revisit individual corals after a prolonged warm period. Preliminary analysis found 46 percent of colonies pale or bleached at shallow stations, compared with 15 percent at deeper stations. These observations came from a 100-by-100-meter study site at East Flower Garden Bank, not every reef in the sanctuary.

WHAT THE DATA REVEALS

Repeat photography and depth information make a visual comparison measurable. The July-to-October view shows why a stable camera station is more useful than unrelated attractive reef photographs.

READ WITH CARE

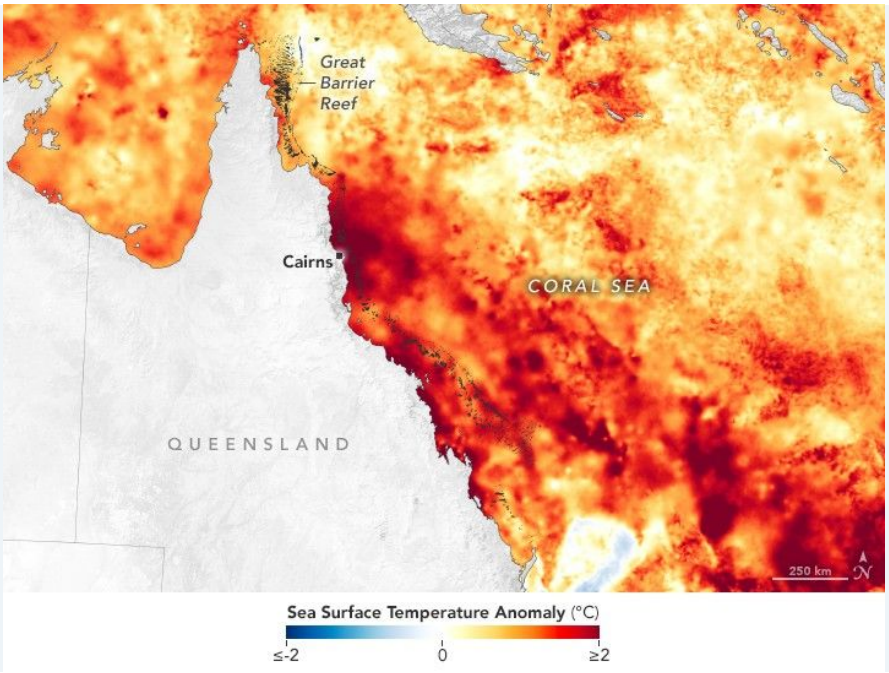
Paling and bleaching are combined condition categories, not mortality. The estimates were preliminary and site-specific. NOAA distinguished this thermal bleaching episode from a separate July 2016 mass-mortality event; the two should not be merged.

Source 1 >

Visual / data >

Great Barrier Reef: bleaching during La Niña

March 2022; map acquired March 14, 2022 | Great Barrier Reef, Queensland, Australia



Sea-surface temperature anomaly on March 14, 2022, relative to the 2003-2014 reference average. Credit: NASA Earth Observatory / Lauren Dauphin; Multiscale Ultrahigh Resolution (MUR) SST data and GBRMPA reef information.

Aerial survey scope

More than 750 reefs

Management areas with bleaching

All four

Anomaly in many mapped areas

More than +2°C on March 14

WHAT HAPPENED

Aerial surveys confirmed mass bleaching across the Great Barrier Reef in March 2022 even though the season was influenced by La Niña. The survey covered more than 750 reefs and found bleaching in all four management areas, with stronger effects in northern and central sections. The source map shows a broad warm anomaly along the reef.

WHAT THE DATA REVEALS

A climate-pattern label does not replace local observations. Pair the larger climate context with actual temperatures and reef surveys so an expected cooler season does not conceal local heat stress.

READ WITH CARE

The mapped anomaly compares daily sea-surface temperature with a 2003-2014 reference average; it is not a measurement at every coral's depth. Bleaching does not establish eventual mortality. This is the 2022 episode, not a description of the reef today.

Source 1 >

Visual / data >

Florida Keys: heat, bleaching and the follow-up record

Summer 2023; photograph July 25, 2023 | Horseshoe Reef near Key Largo, Florida, USA



Bleached and likely dead elkhorn coral at Horseshoe Reef, photographed July 25, 2023. Credit: Katey Lesneski / NOAA; reproduced by NASA Earth Observatory.

Regional warm-water timing

At least 31°C as early as mid-June 2023

Regional duration

Many areas remained that warm into October

Photo evidence

July 25, 2023; Horseshoe Reef

WHAT HAPPENED

The 2023 heat event reached Florida's reef tract early and persisted for months in many areas. At Horseshoe Reef, observers documented bleaching and coral death using underwater photographs and repeated aerial imagery. The July 25 photograph provides a dated view of affected elkhorn coral, while broader water-temperature records supply the exposure context.

WHAT THE DATA REVEALS

Track heat exposure, coral appearance and later survival in separate fields. The same reef can look very different after bleaching, tissue loss or algal growth, making photo dates and repeat observations essential.

READ WITH CARE

The regional temperature description is not a temperature reading at the exact photograph location. Pale appearance alone cannot confirm death in every colony. This record uses a documented July photograph and does not generalize its condition to every Florida reef.

Source 1 >

Visual / data >

From examples to observations

A USEFUL RECORD KEEPS ITS EVIDENCE

Keep the time, place, measurement method, unit, source and uncertainty with every observation. Separate what you saw from an estimate or interpretation. Repeat observations consistently, and retain the original evidence when updating a record.

SUGGESTED DATTLE FIELDS

- Reef or permanent station, location and depth
- Observation date and survey method
- Water temperature, units and sensor depth
- Temperature anomaly and reference baseline
- Heat-stress duration or Degree Heating Weeks, with product version
- Coral condition: normal, pale, bleached, recently dead or recovering
- Denominator: colonies, cover, area or surveyed reefs
- Species or growth form when reliably identified
- Repeat photograph with date, credit and view direction
- Source, uncertainty and follow-up observation date

AI AS AN ACCELERATOR

Use this prompt to draft a collection structure, then review it. AI can organize the questions and fields; it cannot supply missing observations or replace source verification.

> Create a Dattle to document coral heat stress and reef condition. Include reef name, location, date, depth, survey method, measured water temperature, temperature anomaly and baseline, heat-stress duration, coral condition, species when known, repeat photos, source links and follow-up. Keep bleaching separate from mortality. Specify whether every percentage refers to colonies, live coral cover or surveyed reefs. Mark unmeasured values as unknown and avoid drawing a reef-wide conclusion from one photograph.

Explore Dattle at dattle.com. Availability, features and plan limits are described on the website.

Sources and image credits

Primary references checked November 11, 2026. Records and estimates can be revised. Every case page links to its evidence; full addresses are retained here for reuse.

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