Tonga - Vava'u

Regional summary of 21 dive sites (17 with their own page). Figures are averages across the sites that report them (n = sites with a value); each site's own page has its individual values. Part of the Tonga overview.

0 — 5

Coral Health Index: 2.96/5



Photo: Anderson Mayfield/Coral Reef Diagnostics — Tonga - Vava'u (TOVA44)

COUNTRY

Tonga

SITES

21

each linked below

HARD CORAL COVER (REGIONAL MEAN)

33% ± 12% (std. dev.)

n=21. range 9.6–53%

WATER TEMP. DURING SURVEYS (REGIONAL MEAN)

26.3°C

n = 20 of 21 sites; surveyed Sep 2013; all are station CTD-cast midpoints, not dive readings

CORAL HEALTH INDEX (REGIONAL MEAN)

2.96 / 5

n = 8 of 21 sites; scale of zero to five, higher is healthier

MOST RECENT WATER TEMPERATURE RECORD

24.3°C

26 Oct 2026 · Southern Tonga

MOST RECENT HEAT STRESS RECORD

0.0°C-weeks

26 Oct 2026 · No heat stress

MEAN ANNUAL MAX DEGREE HEATING WEEKS (DHW), LAST 5 YEARS

8.1°C-weeks

2021–2025 · Southern Tonga

HIGHEST ANNUAL HEAT STRESS

20.6°C-weeks 🔥

in 2026 (to date, 26 Oct) · Southern Tonga

SEVERE HEAT-STRESS YEARS

8

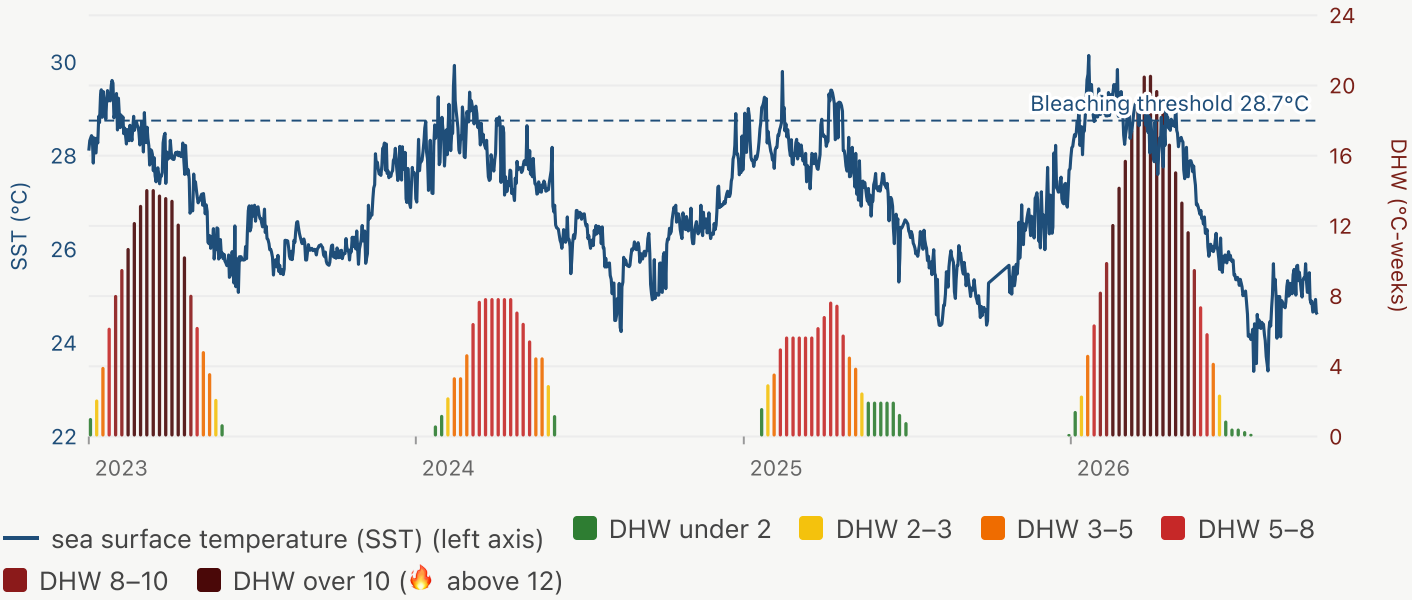
1985–2025 · 2 in the last 10 years

Heat-stress figures: NOAA Coral Reef Watch — Southern Tonga 5-km virtual station. Each pill links its source record and carries the values behind it.

REGIONAL SUMMARY

Vava'u's 21 stations, from sheltered lagoon reefs to cliff-backed fore reefs and a current-swept volcanic wall, feature dense shallow Acropora terraces, massive Porites stands, and a sea-fan-ringed cave. Coral-eating snails, cushion stars, and crown-of-thorns starfish were widespread pressures in September 2013.

Heat stress



Daily SST (line) and weekly maximum Degree Heating Weeks (bars), Jan 2023–Oct 2026, NOAA Coral Reef Watch 5-km Southern Tonga virtual station. Dashed line: bleaching threshold (maximum monthly mean 27.7°C + 1°C). DHW ≥ 4: bleaching likely; ≥ 8: severe bleaching and mortality likely. A bar is drawn only where DHW exceeds zero, so a stretch with no bar is accumulated heat stress of zero, not missing data — the SST line runs the full period.

Long-term record: 8 years from 1985 through 2025 reached 8 or more °C-weeks at NOAA's Southern Tonga station. Download the annual DHW data (CSV).



21 sites in this region — click a marker to open that site.

Read this summary in: English | lea faka-Tonga

Regional setting

Spalding et al. (2001) describe Tonga as a double chain of islands spread over more than 800 km along the western edge of the convergent margin between the Indo-Australian and Pacific

plates. The volcanic Tofua Arc forms the western chain, running from 'Ata to Niuafo'ou, and a trough some 1,800 m deep (the Tofua Trough) separates it from the eastern arc, where most islands are of reef origin, though blanketed in places by volcanic ash. The Vava'u group anchors the north of that eastern arc: it is dominated by the large island of Vava'u, with a broad spread of smaller islands and reefs off its southern side. Throughout the eastern islands, reefs are widespread and well developed, with fringing reefs around most shores and platform and barrier-type structures in most of the main groups. The atlas puts Tonga's national reef area at about 1,500 km². It also links eutrophication around Vava'u to untreated sewage and fertilizer runoff, mentions problems from causeway building, and notes that three proposed reserves in the group were surveyed in 1997. For Tonga as a whole, the same source records cyclone damage in 1995, 1997, 1999, and 2000, and a major bleaching event in 2000 after the reefs had largely escaped the 1998 bleaching.

No source in this set reports on Vava'u after 2001, so recent conditions come from regional overviews. Wilkinson (2006), drawing on the 2004 assessment of the Polynesia Mana network, which covers Tonga, described those reefs as largely healthy and among the least degraded anywhere because of their isolation, while warning that climate change, cyclones, and bleaching were the main worries and that sedimentation, overfishing, dredging, and nutrient pollution needed more attention near populous islands. For the Pacific region as a whole, Souter et al. (2021) report a fall in average hard coral cover from about 37% before 1998 to 31% in 2019, attribute most of the loss to bleaching, and note that most of the 15-year decline came between 2010–2014 and 2015–2019.

Overview

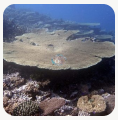
The 21 Vava'u stations, surveyed 22-28 September 2013 at maximum depths dived from 14 m (TOVA35) to 32.3 m (TOVA36), range from sheltered leeward lagoon reefs and channel entrances to fore reefs below uplifted coastal cliffs and a steep wall on a fore-reef pinnacle at TOVA49. Wide spurs separated by sand channels are the common framework, but the group also includes the massive *Porites* stand known as the Aquarium (TOVA35), a two-mouthed cave ringed by sea fans with black coral at a second cave entrance (TOVA37), and a north-shore terrace that drops near vertically onto spurs sloping past 35 m (TOVA38).

Dense branching and table *Acropora* dominate the shallow terraces, reaching 50-80% on the 3-8 m shallows of TOVA47 and 60-80% on the Treasure Island terrace at TOVA53; these are local patch values rather than site means. Deeper and on the spurs, massive *Porites* takes over, from colonies up to 5 m across at TOVA35 to mounding *Porites lobata* covering the spurs at Split Rock (TOVA36). Staghorn stands carrying damselfish algal lawns are a recurring feature, notably at Pete's Paradise (TOVA34), TOVA35, and TOVA46.

Transect cover ranged from 9.6% at TOVA50, where algae outweighed coral more than six to one, to 53% at TOVA44. Algae ranged from 25% at TOVA33 to 76% at TOVA49. The Coral Health Index (scale of zero to five; higher is healthier), scored at eight stations, was 4.24 at TOVA34, 3.71 at TOVA47, 3.46 at TOVA44, 3.10 at TOVA51, 2.20 at TOVA40, 3.00 at TOVA53, 2.49 at TOVA52, and 1.50 at TOVA35, a high-cover reef with large dead patches under damselfish lawns. Coral-eating snails were widespread (the TOVA39 survey notes record snails behind most of the mortality on about 20% of the *Isopora*, digitate *Acropora*, and *Pocillopora*), and *Culcita* were recorded at many stations. The expedition's field report describes localized crown-of-thorns outbreaks in the central lagoon, among stands of *Pocillopora damicornis* and around Treasure Island, where 25 starfish were collected (Bruckner 2014). Crown-of-thorns starfish appeared at TOVA40, TOVA44, and TOVA51, where five or six were massed together, and 15 were counted on a single bommie at the Japanese Coral Gardens (TOVA42). Anderson's sampling sheets record bleaching among the *Pocillopora* sampled at eight Vava'u stations (TOVA33, TOVA34, TOVA35, TOVA40, TOVA44, TOVA47, TOVA51, and TOVA52), among them all seven colonies 20-80% bleached at TOVA34 and four of eight 60-95% bleached at TOVA47.

Sightings include banded sea kraits at TOVA36 and TOVA37, giant clams at TOVA39, TOVA47, and TOVA49, and schooling fish along the TOVA49 wall.

Highlights

- Pete's Paradise scored a Coral Health Index of 4.24 (scale of zero to five; higher is healthier), on wide *Acropora* spurs and mounds up to 5 m tall (TOVA34). 
- A multi-layered platform of table and staghorn *Acropora*, with 53% transect cover (TOVA44). 
- A two-mouthed cave ringed by sea fans, with black coral at a second cave entrance (TOVA37). 
- A 4 m *Diploastrea* on a near-vertical terrace wall above spurs sloping past 35 m (TOVA38). 
- *Acropora* tables spreading like awnings among staghorn clumps (TOVA52). 
- Five or six crown-of-thorns starfish massed together at TOVA51, where a vast staghorn thicket was bleached pale gray-white; 15 crown-of-thorns were counted on one bommie at the Japanese Coral Gardens (TOVA42). 

▼ Notable observations (12)

- Tonga - Vava'u (TOVA36): Throughout the reef 2-5% of acroporids and pocilloporids had partial mortality and white areas recently eaten by Drupella snails; recent Turbinaria die-off at depth; damselfish bite lesions on Porites 
- Tonga - Vava'u (TOVA37): Numerous Drupella lesions on branching corals, high numbers of damselfish algal lawns, and several Culcita; piles of large broken plating corals, mostly dead, on the shallow slope 
- Tonga - Vava'u (TOVA38): About 10-20% of branching corals showed snail damage; numerous small (5-10 cm) colonies eaten by Culcita 
- Tonga - Vava'u (TOVA39): Highest density of snails observed to date on the expedition; about 20% of the Isopora, digitate Acropora, and Pocillopora with old and recent mortality, mostly due to snails; 3 Culcita 
- Tonga - Vava'u (TOVA40): Found 1 crown-of-thorns starfish (COTS) that had eaten a large table acroporid and one other COTS under a massive coral; gray encrusting sponge overgrowing corals 
- Tonga - Vava'u (TOVA42): One bommie with much more mortality and 15 COTS; more than 40 Culcita among the bommies and surrounding rubble; many acroporids with dead spots
- Tonga - Vava'u (TOVA44): From 20-30% of the table acroporids were dead in growth position and 5% had large white lesions; 1 Culcita and 1 COTS 
- Tonga - Vava'u (TOVA46): Most staghorn patches partially dead with dense turf and damselfish; 3 Culcita 
- Tonga - Vava'u (TOVA47): 3 Culcita; a lot of overturned and broken corals on the steep slope; about 10% dead table acroporids below 15 m 
- Tonga - Vava'u (TOVA51): Five or six crown-of-thorns starfish massed together on the reef; the staghorn thicket bleached pale gray-white, still alive 

- Tonga - Vava'u (TOVA53): 4 Culcita and 2 trumpet tritons found 
- Tonga - Vava'u (TOVA35): Low Coral Health Index (1.50) despite 41% cover: large dead patches of the massive Porites stand taken over by damselfish algal lawns. 

▼ Sites in this region (21)

- Tonga - Vava'u (TOVA33) — 33% coral cover
- Tonga - Vava'u (TOVA34) — 50% coral cover
- Tonga - Vava'u (TOVA35) — 41% coral cover
- Tonga - Vava'u (TOVA36) — 30% coral cover
- Tonga - Vava'u (TOVA37) — 28% coral cover
- Tonga - Vava'u (TOVA38) — 41% coral cover
- Tonga - Vava'u (TOVA39) — 15% coral cover
- Tonga - Vava'u (TOVA40) — 21% coral cover
- Tonga - Vava'u (TOVA41) — 31% coral cover
- Tonga - Vava'u (TOVA42) — 32% coral cover
- Tonga - Vava'u (TOVA43) — 33% coral cover
- Tonga - Vava'u (TOVA44) — 53% coral cover
- Tonga - Vava'u (TOVA45) — 38% coral cover
- Tonga - Vava'u (TOVA46) — 19% coral cover
- Tonga - Vava'u (TOVA47) — 44% coral cover
- Tonga - Vava'u (TOVA48) — 22% coral cover
- Tonga - Vava'u (TOVA49) — 22% coral cover
- Tonga - Vava'u (TOVA50) — 9.6% coral cover
- Tonga - Vava'u (TOVA51) — 35% coral cover
- Tonga - Vava'u (TOVA52) — 47% coral cover
- Tonga - Vava'u (TOVA53) — 38% coral cover

% coral cover by method

Pooled across 6 dive sites

Method	Mean % coral cover	Std. dev. between dive sites	n dive sites	Note
CoralSCOP (SAM-based mask-sum), unedited photos	36%	±6.8	6	—

Claude (Anthropic), blind point count	32%	±11	6	—
In-water diver transect (line/point intercept)	40%	±9.1	6	—

The mean is an UNWEIGHTED mean of the dive site values — each dive site counts once, whatever its photo count — which is the convention of the published tables and of every other figure on this page. Each value is the one printed on that dive site's own page; a page that prints no value for a method (fewer than 10 photographs) is left out of that method's mean.

This table pools only the 6 dive sites in this unit that have a method comparison; the table for all 22 dive sites is on the Tonga page.

Deviation from the reference

Over the dive sites where an independent reference exists, Claude (Anthropic), blind point count has a mean absolute deviation of 9.0 pp from it across 6 dive sites. Not in this ranking: CoralSCOP (unedited), which is not comparable with this reference. A mean absolute deviation is not an accuracy score: a model with a consistent offset is correctable, while one with the same deviation scattered in both directions is not.

By dive site

Dive site	CoralSCOP (unedited)	Claude	Diver transect
TOVA33	36% n=21	33% n=21	33%
TOVA37	25% n=18	12% n=18	28%
TOVA38	31% n=41	30% n=41	41%
TOVA44	40% n=15	32% n=15	53%
TOVA52	43% n=17	43% n=17	47%
TOVA53	39% n=34	40% n=34	38%

n under each value is the number of photographs that method scored at that dive site. ⚠ marks a cell that is not an independent check.

Reference: Living Oceans Foundation (LOF) Global Reef Expedition in-water transects (mean of all the station's transects, Living Oceans Foundation per-transect benthic data). Denominator: line/point intercept along the transect; not a photo-point denominator. Source: LOF Global Reef Expedition 2013, per-transect benthic data ('GRE data-full benthic'): the mean of all of each station's transects For all 22 dive sites in the comparison: The transect is THE coral-cover value at every site; the Claude photo estimate is a methods comparison only, never averaged with the transect and never a headline. Site-level only: the photos come from the survey dives, not from the transect points.

Accuracy, Claude vs transect, the 22 sites with 10 or more reef-habitat photos (sampled-colony close-ups left out; sites with fewer than 10 have no Claude row): mean difference -4.2 pp (95% CI -8.8 to +0.5), mean absolute difference 8.4 pp, r 0.43. Claude tracks the transect only weakly from site to site in Tonga. This is a methods comparison, not a ranking.

Nearby external survey stations

1 independent survey record within 5 km of a site in this region (each record counted once).

- Reef Check — The Coral Gardens (2013): 59% hard coral cover, 1.34 km from Tonga - Vava'u (TOVA34)

All images from Coral Reef Diagnostics. Data are from the Khaled bin Sultan Living Oceans Foundation Global Reef Expedition, Coral Reef Diagnostics, and Reef Check Foundation.

 © Coral Reef Diagnostics.

References

- Souter D, et al. (eds) (2021) *Status of Coral Reefs of the World: 2020*. International Coral Reef Initiative / Global Coral Reef Monitoring Network. [PDF]
- Spalding MD, et al. (2001) *World Atlas of Coral Reefs*. University of California Press, Berkeley. [PDF]
- Wilkinson C (2006) Status of coral reefs of the world: summary of threats and remedial action. In: Côté IM, Reynolds JD (eds) *Coral Reef Conservation*. Cambridge University Press, Cambridge. [PDF]
- Bruckner AW (2014). Global Reef Expedition: Kingdom of Tonga. Field Report. Khaled bin Sultan Living Oceans Foundation, Landover, MD. 28 pp. PDF