

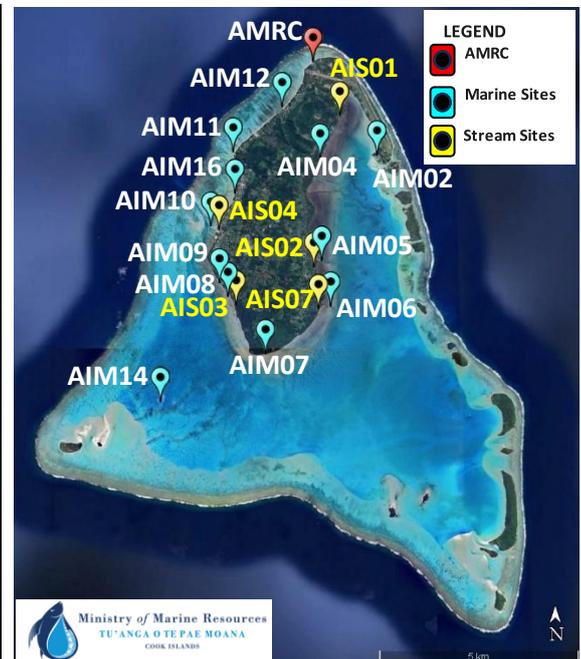


AITUTAKI WATER QUALITY REPORT JANUARY 2026

SUMMARY

Water samples were collected on Wednesday 28th January. Weather observed prior to the day of sampling was windy, overcast with some rain and rough, choppy lagoon conditions. Tides were changing from high to low during sample collection. Eleven lagoon sites were accessible and sampled. Maina Nursery was not sampled due to rough lagoon conditions. Salinity data was unavailable for all lagoon sites as the sensor is in the process of being replaced. Boodlea algae was observed at Vaipeka and Taravao lagoon sites. Stagnancy and lack of water were observed at four streams and therefore were not sampled. Tautu stream was flowing and sampled. Below is the summary table for Enterococci bacteria, total suspended solids and dissolved oxygen results and levels.

| Lagoon Site | Site ID | Enterococci (MPN/100ml) | Total Suspended Solids (mg/L) | Dissolved Oxygen (%) |
|----------------|---------|-------------------------|-------------------------------|----------------------|
| Ootu | AIM02 | <1 | 2.5 | 104 |
| Vaipeka | AIM04 | <1 | 2.2 | 105 |
| Vaipae Wharf | AIM05 | 146 | 8.8 | 110 |
| Tautu Wharf | AIM06 | 158 | 6.8 | 103 |
| Taravao | AIM07 | 20 | 10.9 | 94 |
| Vainamu | AIM08 | 10 | 44.8 | 88 |
| Vainamu Wharf | AIM09 | <1 | 1.8 | 71 |
| Arutanga Wharf | AIM10 | 30 | 2.4 | 102 |
| Rapae | AIM11 | 10 | 4.3 | 100 |
| Maunga Pu | AIM12 | 20 | 3.2 | 77 |
| Maina Nursery | AIM14 | ND | ND | ND |
| Amuri Wharf | AIM16 | 135 | 4.8 | 89 |
| Stream Site | Site ID | Enterococci (MPN/100ml) | Total Suspended Solids (mg/L) | Dissolved Oxygen (%) |
| Vaitiare | AIS01 | NW | NW | NW |
| Vaipae | AIS02 | NW | NW | NW |
| Pata | AIS03 | NW | NW | NW |
| Arutanga | AIS04 | NW | NW | NW |
| Tautu | AIS07 | 228 | 7.9 | 26 |



| GRADING SCALE | Excellent | Very Good | Good | Poor | Very Poor | Extremely Poor |
|---------------|-----------|-----------|------|------|-----------|----------------|
|---------------|-----------|-----------|------|------|-----------|----------------|

Lagoon:

- Enterococci bacteria showed good and excellent levels with low results at ten sites, ranging from <1 to 158 MPN/100mL that indicated safe areas for swimming. Yet Vainamu observed very poor levels with a high result of 408 MPN/100mL. Resampling was carried out and the result was 10 MPN/100mL at excellent levels.
- Seven out of eleven sites were below the total suspended solids recommended limit of 5.0 mg/L for healthy coral reefs that indicated clear waters and minimal threat to coral reefs. Vaipae and Tautu Wharves, Taravao and Vainamu observed poor to extremely poor levels exceeding the limit of 5.0 mg/L.
- Dissolved oxygen levels were above the recommended threshold of 80% showing good to excellent levels at nine sites. Poor levels below 80% were observed at Vainamu Wharf and Maunga Pu.
- Temperature ranged from 25.5 degrees at Vaipae Wharf to 27 degrees at Ootu and Vainamu Wharf. Mean temperature was 26.4 degrees.

This report includes data based on adopting recommended Good Lab Practices and the information and contents reflects the findings of the Ministry's Laboratory only and within the limits of customer instruction. The document cannot be reproduced in full/part without prior written approval of the Ministry. The tested samples of external customers are not retained.

- pH ranged from 7.56 at Tautu Wharf and Maunga Pu to 7.78 at Arutanga Wharf. Mean pH was 7.66.

Stream:

- Enterococci bacteria and total suspended solids noted poor levels with high results at 228 MPN/100mL and 7.9 mg/L, respectively.
- Dissolved oxygen level was extremely poor with a low result of 26%.
- Temperature and salinity were normal at 25.3 degrees and 0.2 ppt, respectively.
- pH was slightly below normal range at 5.83.

The monthly summary reports, rainfall data and lab study report can be found at the end of this report.

1. ENTEROCOCCI BACTERIAL COUNTS - AITUTAKI

Most Probable Number of Enterococci per 100 mL (MPN/100mL)

| Lagoon Site | Site ID | Aug-25 | Sep-25 | Oct-25 | Nov-25 | Dec-25 | Jan-26 |
|----------------|---------|--------|--------|--------|--------|--------|--------|
| Ootu | AIM02 | <1 | <1 | <1 | <1 | ND | <1 |
| Vaipeka | AIM04 | 10 | 10 | <1 | 20 | ND | <1 |
| Vaipae Wharf | AIM05 | <1 | 20 | <1 | 187 | ND | 146 |
| Tautu Wharf | AIM06 | <1 | 10 | <1 | <1 | ND | 158 |
| Taravao | AIM07 | <1 | 20 | <1 | 10 | ND | 20 |
| Vainamu | AIM08 | 31 | 31 | 107 | <1 | ND | 10 |
| Vainamu Wharf | AIM09 | 63 | <1 | 10 | 30 | ND | <1 |
| Arutanga Wharf | AIM10 | <1 | 10 | <1 | <1 | ND | 30 |
| Rapae | AIM11 | 41 | <1 | 41 | 10 | ND | 10 |
| Maunga Pu | AIM12 | 20 | <1 | <1 | <1 | ND | 20 |
| Maina Nursery | AIM14 | NW | NW | NW | NW | ND | ND |
| Amuri Wharf | AIM16 | <1 | 10 | 41 | 41 | ND | 135 |

| Stream Site | Site ID | Aug-25 | Sep-25 | Oct-25 | Nov-25 | Dec-25 | Jan-26 |
|-------------|---------|--------|--------|--------|--------|--------|--------|
| Vaitiare | AIS01 | NW | NW | NW | NW | NW | NW |
| Vaipae | AIS02 | NW | NW | NW | NW | NW | NW |
| Pata | AIS03 | NW | NW | NW | NW | NW | NW |
| Arutanga | AIS04 | NW | NW | NW | NW | NW | NW |
| Tautu | AIS07 | NW | NW | 56 | NW | NW | 228 |



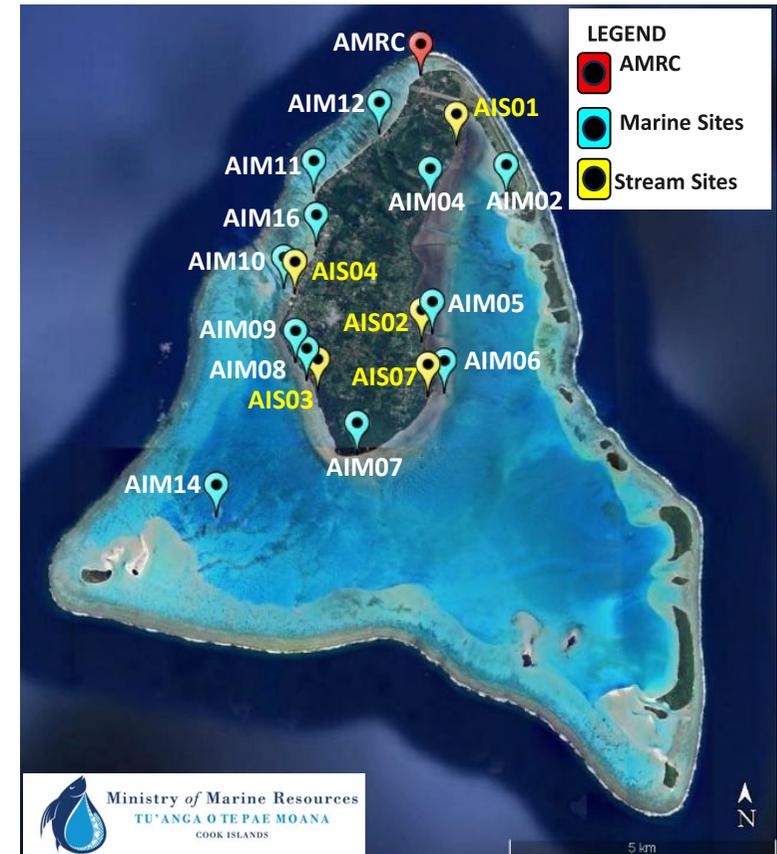
| ENTEROCOCCI BACTERIA STANDARDS | < 41 | 41 ≥ 100 | 101 ≥ 200 | 201 ≥ 350 | 351 ≥ 500 | > 500 |
|--------------------------------|-----------|-----------|-----------|-----------|-----------|----------------|
| | A | B | C | D | E | F |
| | Excellent | Very Good | Good | Poor | Very Poor | Extremely Poor |

REFERENCE: WHO 2021 Guidelines on Recreational Water Quality for Coastal and Fresh Waters.

2. TOTAL SUSPENDED SOLIDS - AITUTAKI - Milligrams per Litre (mg/L)

| Lagoon Site | Site ID | Aug-25 | Sep-25 | Oct-25 | Nov-25 | Dec-25 | Jan-26 |
|----------------|---------|--------|--------|--------|--------|--------|--------|
| Ootu | AIM02 | 1.0 | 4.6 | 7.5 | 3.0 | 4.4 | 2.5 |
| Vaipeka | AIM04 | 9.1 | 3.5 | 7.7 | 3.0 | 0.3 | 2.2 |
| Vaipae Wharf | AIM05 | 6.0 | 2.0 | 13.6 | 4.0 | 5.2 | 8.8 |
| Tautu Wharf | AIM06 | 3.8 | 13.0 | 4.0 | 2.0 | 5.4 | 6.8 |
| Taravao | AIM07 | 11.9 | 2.9 | 5.4 | 5.0 | 2.4 | 10.9 |
| Vainamu | AIM08 | 9.5 | 20.5 | 17.9 | 6.7 | 13.6 | 44.8 |
| Vainamu Wharf | AIM09 | 6.8 | 4.6 | 9.5 | 13.2 | 2.2 | 1.8 |
| Arutanga Wharf | AIM10 | 5.4 | 7.1 | 8.9 | 3.9 | 3.1 | 2.4 |
| Rapae | AIM11 | 1.0 | 2.2 | 2.0 | 1.0 | 0.3 | 4.3 |
| Maunga Pu | AIM12 | 1.0 | 1.3 | 0.3 | 4.8 | 1.4 | 3.2 |
| Maina Nursery | AIM14 | NW | NW | NW | NW | 0.3 | ND |
| Amuri Wharf | AIM16 | 2.0 | 2.3 | 2.4 | 1.0 | 2.3 | 4.8 |

| Stream Site | Site ID | Aug-25 | Sep-25 | Oct-25 | Nov-25 | Dec-25 | Jan-26 |
|-------------|---------|--------|--------|--------|--------|--------|--------|
| Vaitiare | AIS01 | NW | NW | NW | NW | NW | NW |
| Vaipae | AIS02 | NW | NW | NW | NW | NW | NW |
| Pata | AIS03 | NW | NW | NW | NW | NW | NW |
| Arutanga | AIS04 | NW | NW | NW | NW | NW | NW |
| Tautu | AIS07 | NW | NW | 10.0 | NW | NW | 7.9 |



| TOTAL SUSPENDED SOLIDS STANDARDS | < 1.0 | 1.0 ≥ 2.5 | 2.5 ≥ 5.0 | 5.0 ≥ 10 | 10 ≥ 20 | > 20 |
|----------------------------------|-----------|-----------|-----------|----------|-----------|----------------|
| | A | B | C | D | E | F |
| | Excellent | Very Good | Good | Poor | Very Poor | Extremely Poor |

REFERENCE: Bell 1992, total suspended solids recommended limit is ≤5 mg/L for healthy coral reef.

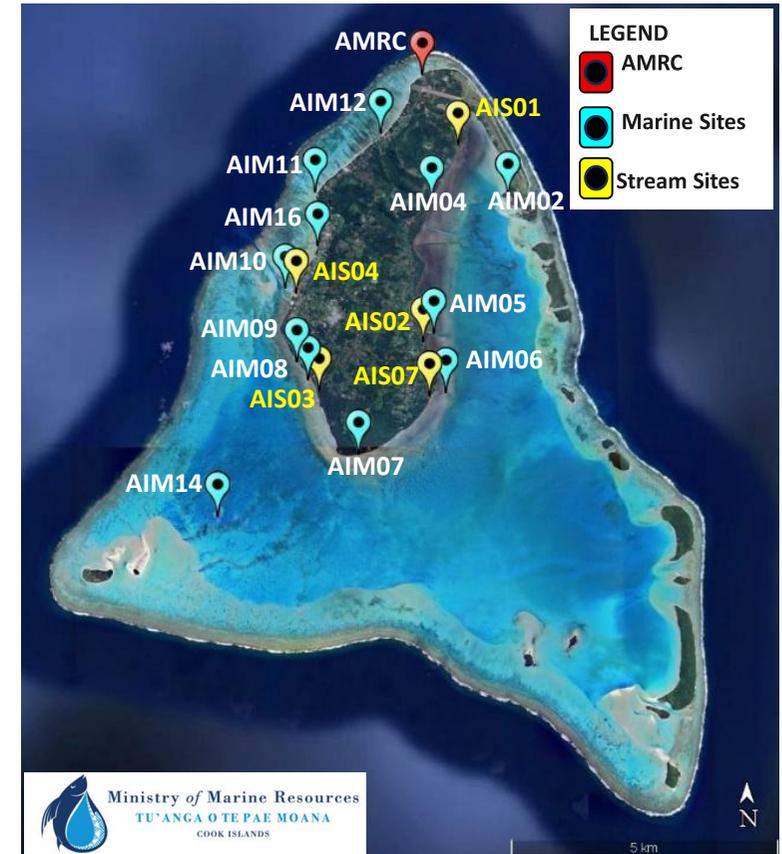
3. DISSOLVED OXYGEN - AITUTAKI - Percent (%)

| Lagoon Site | Site ID | Aug-25 | Sep-25 | Oct-25 | Nov-25 | Dec-25 | Jan-26 |
|----------------|---------|--------|--------|--------|--------|--------|--------|
| Ootu | AIM02 | 102 | 77 | 110 | 87 | 99 | 104 |
| Vaipeka | AIM04 | 119 | 111 | 117 | 112 | 114 | 105 |
| Vaipae Wharf | AIM05 | 123 | 116 | 122 | 119 | 112 | 110 |
| Tautu Wharf | AIM06 | 114 | 111 | 117 | 107 | 110 | 103 |
| Taravao | AIM07 | 115 | 99 | 117 | 97 | 113 | 94 |
| Vainamu | AIM08 | 91 | 86 | 87 | 79 | 100 | 88 |
| Vainamu Wharf | AIM09 | 90 | 100 | 94 | 78 | 82 | 71 |
| Arutanga Wharf | AIM10 | 104 | 109 | 106 | 104 | 81 | 102 |
| Rapae | AIM11 | 89 | 80 | 84 | 88 | 95 | 100 |
| Maunga Pu | AIM12 | 88 | 86 | 83 | 77 | 80 | 77 |
| Maina Nursery | AIM14 | NW | NW | NW | NW | 78 | ND |
| Amuri Wharf | AIM16 | 86 | 92 | 87 | 73 | 73 | 89 |

| Stream Site | Site ID | Aug-25 | Sep-25 | Oct-25 | Nov-25 | Dec-25 | Jan-26 |
|-------------|---------|--------|--------|--------|--------|--------|--------|
| Vaitiare | AIS01 | NW | NW | NW | NW | NW | NW |
| Vaipae | AIS02 | NW | NW | NW | NW | NW | NW |
| Pata | AIS03 | NW | NW | NW | NW | NW | NW |
| Arutanga | AIS04 | NW | NW | NW | NW | NW | NW |
| Tautu | AIS07 | NW | NW | 15 | NW | NW | 26 |

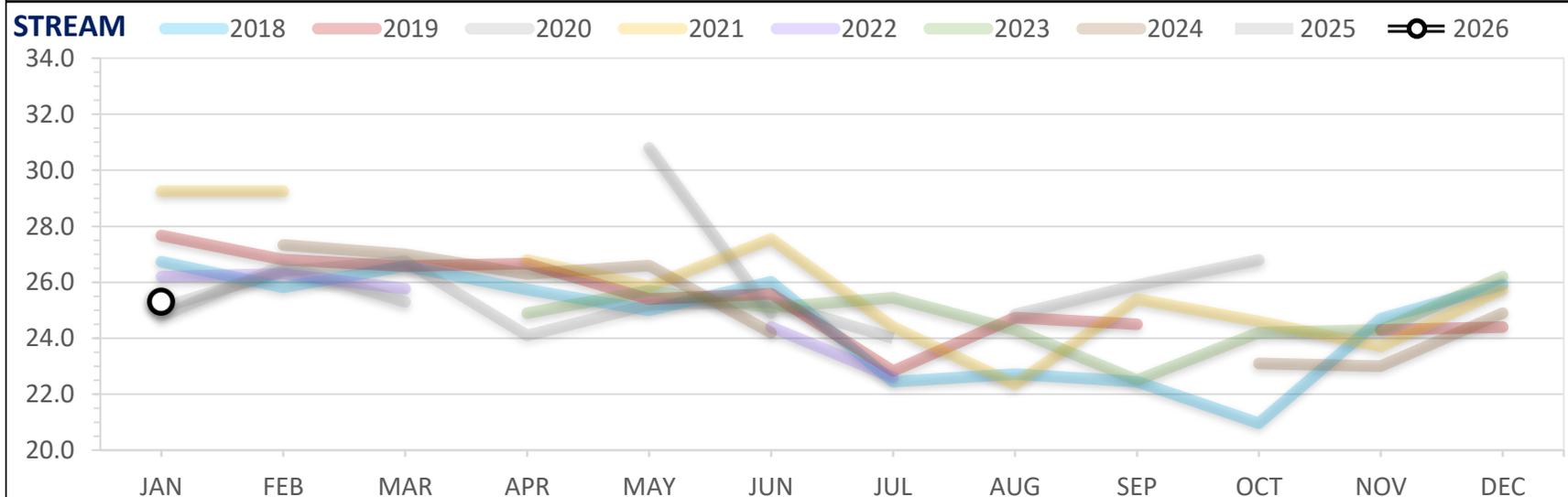
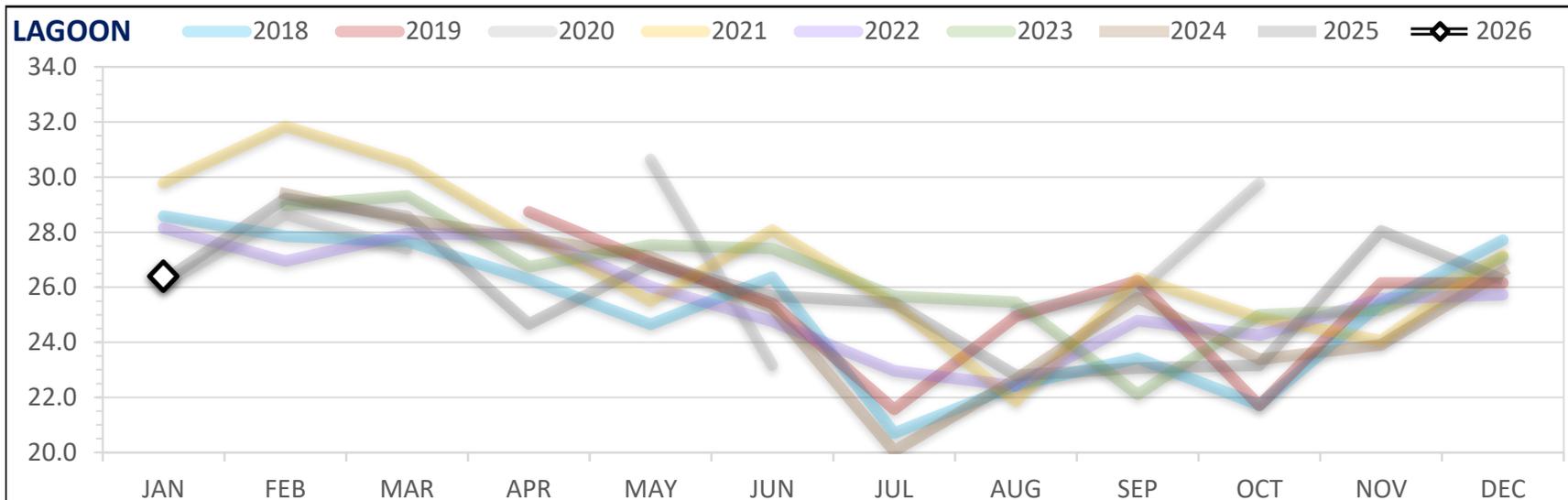
| DISSOLVED OXYGEN STANDARDS | > 95 | 90 ≥ 95 | 80 ≥ 90 | 60 ≥ 80 | 40 ≥ 60 | < 40 |
|----------------------------|-----------|-----------|---------|---------|-----------|----------------|
| | A | B | C | D | E | F |
| | Excellent | Very Good | Good | Poor | Very Poor | Extremely Poor |

REFERENCE: Department of Health, Clean Water Branch Hawaii 1994: Dissolved oxygen recommended limit is ≥75% saturation for oceanic waters, embayments, open coastal waters & estuaries; ≥80% saturation for streams.



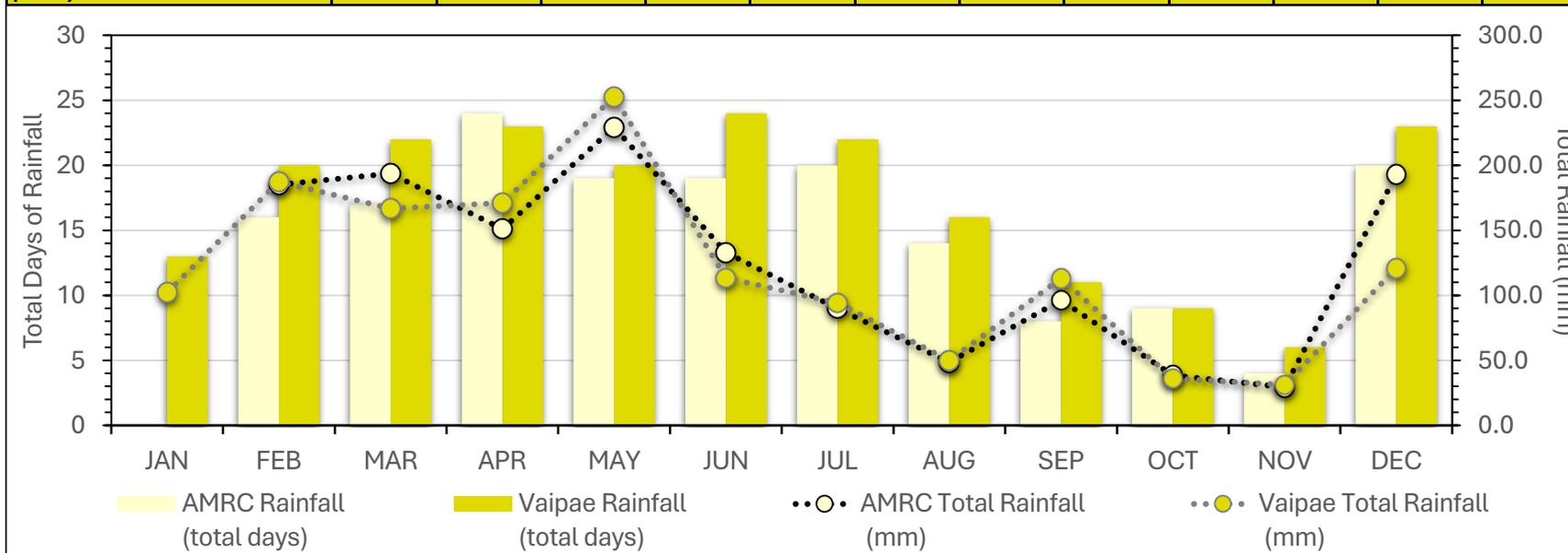
4. AVERAGE TEMPERATURE - AITUTAKI - Degrees Celcius (° C)

| 2026 | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|--------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Lagoon | 26.4 | | | | | | | | | | | |
| Stream | 25.3 | | | | | | | | | | | |



5. AITUTAKI RAINFALL - AMRC & VAIPAE - Total Rainfall (mm) & Total Days of Rainfall

| 2025 | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|-------------------------------------|-------|-------|-------|-------|-------|-------|------|------|-------|------|------|-------|
| AMRC Total Rainfall (mm) | ND | 185.2 | 193.8 | 151.0 | 229.4 | 132.9 | 89.9 | 48.6 | 96.2 | 38.4 | 29.4 | 192.8 |
| AMRC Rainfall (total days) | ND | 16 | 17 | 24 | 19 | 19 | 20 | 14 | 8 | 9 | 4 | 20 |
| AMRC Highest 1-Day (mm) | ND | 43.8 | 39.6 | 75.8 | 95.0 | 72.4 | 20.4 | 19.2 | 74.8 | 14.0 | 14.0 | 62.6 |
| AMRC Highest 1-Day (date) | ND | 19th | 3rd | 6th | 24th | 26th | 11th | 7th | 18th | 5th | 30th | 17th |
| Vaipae Total Rainfall (mm) | 102.2 | 187.4 | 166.8 | 171.0 | 252.6 | 113.6 | 94.2 | 50.0 | 113.0 | 36.2 | 31.2 | 121.0 |
| Vaipae Rainfall (total days) | 13 | 20 | 22 | 23 | 20 | 24 | 22 | 16 | 11 | 9 | 6 | 23 |
| Vaipae Highest 1-Day (mm) | 26.2 | 44.4 | 33.0 | 68.4 | 100.2 | 52.0 | 20.0 | 19.0 | 89.0 | 14.4 | 14.4 | 34.2 |
| Vaipae Highest 1-Day (date) | 10th | 19th | 3rd | 6th | 24th | 26th | 11th | 7th | 18th | 5th | 30th | 17th |



| Report Date: 09.02.2026 | | AITUTAKI LAB STUDY REPORT – JANUARY 2026 | | | | | Lab Report No.: 01M5435 – 01M5447 | | | | |
|------------------------------------|---------|--|------------------|----------------|----------------------|-------------------------|-----------------------------------|--|--|--|--|
| SAMPLE DESCRIPTION | | | | | | | | | | | |
| Date Samples Collected: | | Name of Sample: | Collected By: | Submitted By: | Time of Receipt: | | Physical Description: | | Quantity Per Site Received: | | |
| Wednesday 28 th January | | Marine | MMR | | 10:20am | | Clear | | 2.5L | | |
| | | Stream | | | | | Slightly turbid | | | | |
| Study No. | | 1 | 2 | 3 | 4 | 5 | 6 | | 7 | | |
| SITE ID | LAB ID | Enterococci (MPN/100ml) | Temperature (°C) | Salinity (ppt) | Dissolved Oxygen (%) | Dissolved Oxygen (mg/L) | pH | | Total Suspended Solids (mg/L) | | |
| MARINE | | | | | | | | | | | |
| AIM02 | 01M5435 | <1 | 0.45 | ND | 103.9 | 7.79 | 7.61 | | 2.5 | | |
| AIM04 | 01M5436 | <1 | 25.7 | ND | 104.5 | 7.88 | 7.66 | | 2.2 | | |
| AIM05 | 01M5437 | 146 | 25.5 | ND | 109.7 | 8.21 | 7.73 | | 8.8 | | |
| AIM06 | 01M5438 | 158 | 25.8 | ND | 103.0 | 7.67 | 7.56 | | 6.8 | | |
| AIM07 | 01M5439 | 20 | 25.9 | ND | 93.6 | 6.94 | 7.64 | | 10.9 | | |
| AIM08 | 01M5440 | 408 | 26.2 | ND | 87.8 | 6.53 | 7.60 | | 44.8 | | |
| AIM09 | 01M5441 | <1 | 27.0 | ND | 71.2 | 5.19 | 7.70 | | 1.8 | | |
| AIM10 | 01M5442 | 30 | 26.8 | ND | 101.6 | 7.43 | 7.78 | | 2.4 | | |
| AIM11 | 01M5443 | 10 | 26.8 | ND | 100.4 | 7.36 | 7.65 | | 4.3 | | |
| AIM12 | 01M5444 | 20 | 26.7 | ND | 76.8 | 5.68 | 7.56 | | 3.2 | | |
| AIM14 | - | ND | ND | ND | ND | ND | ND | | ND | | |
| AIM16 | 01M5445 | 135 | 26.9 | ND | 88.8 | 6.51 | 7.77 | | 4.8 | | |
| STREAM | | | | | | | | | | | |
| AIS07 | 01M5446 | 228 | 25.3 | 0.2 | 25.7 | 2.11 | 5.83 | | 7.9 | | |
| Study Method | | IDEXX Enterolert* | YSI Manual | YSI Manual | YSI Manual | YSI Manual | YSI Manual | | MMR Lab Manual Water Quality Monitoring V5 | | |
| Recommended Limit | | Ref. Comments | Ref. Comments | Ref. Comments | Ref. Comments | Ref. Comments | Ref. Comments | | Ref. Comments | | |

| Resample # | Date Sample Collected | Time of Receipt | Physical Description | Quantity Per Site Received | Marine Study Parameter | Unit | Site ID | Lab ID | Result | Study Method | Recommended Limit |
|------------|-----------------------|-----------------|----------------------|----------------------------|------------------------|-----------|---------|---------|--------|-------------------|-------------------|
| 1 | 30.01.2026 | 10:10am | Clear | 500mL | Enterococci | MPN/100mL | AIM08 | 01M5447 | 10 | IDEXX Enterolert* | Ref. Comments |

Abbreviation

NL: Not Listed, MPN: Most Probable Number, cfu: Colony Forming Unit, mL: milli Litre, FAU: Formazin Attenuation Unit, NTU: Nephelometric Turbidity Unit, ppt: Parts Per Thousand, DB: Designated Bathing Beach, MB: Moderate Use of Bathing, LB: Light Use of Bathing, IB: Infrequent Use of Bathing

NA: Not Available, however data will be available at a later date; ND: No Data due to equipment failure or logistics problems or time delay or methodology problem or combination of all; NW: No Water, stream dry or water stagnant or water level too low for sample collection or water dirty/murky.

Comments

1. Temperature[#]
Subtropical regions (south of Cape Canaveral and Tampa Bay, Florida, and Hawaii).
Short-term Max. 32.2°C, Max. True daily mean 29.4°C (average of 24-hourly temperature reading).
Temperature is the measure of warmth and coldness, reported as an average and measured in degrees celcius (°C).
2. pH
Changes to pH can be caused by a range of potential water quality problems (e.g., low values due to acid sulphate runoff). pH values are also related to soil geology and may be naturally low or high (in limestone areas). High pH values can also be caused temporarily when high rates of photosynthesis by aquatic plants (including algae) lead to a decrease in carbon dioxide, and therefore a decrease in carbonic acid in the water.
3. Salinity
A measure of the amount of dissolved salts in the water, and therefore an indicator of salinity. Excess salinity in freshwater streams occurs as a result of excess soil salinity, which may be caused by excess land clearing and changes to the groundwater table. Salinity is reported as parts per thousand (ppt).
4. Dissolved Oxygen[^]
DO levels indicate how much oxygen is in the water. Low DO levels indicate an abnormal disturbance in the ecosystem such as an algal bloom. DO is measured in percentage (%).
Low DO: 3.5 mg/L at 26C leads to 100% mortality of *Acipenser oxyrinchus*
2.7 mg/L at 19C leads to 22% mortality of *Acipenser oxyrinchus*
<3.7 mg/L Demersal finfish biomass diminishes
<3.5 mg/L Species richness diminishes
Below 2 mg/L infaunal species migrate to sediment surface and epifaunal species move to better aerated water.
Oxygen is essential for life processes of most aquatic organisms. Many aquatic organisms will suffocate if there is insufficient oxygen in the water.
5. Suspended Solids[@]
Settleable and suspended solids should not reduce the depth of the compensation point for photosynthetic activity by more than 10% from the seasonably established norm for aquatic life. Total suspended solids (TSS) are non-living (inorganic) such as silt and mud; and organic matter such as animal and plant material found in the water. The presence of large amounts of particles are responsible for creating the murky appearance of dirty water and can quickly kill coral reefs. TSS is measured in milligrams per litre (mg/L).
6. Turbidity
Water clarity (the degree of light penetration) is important as aquatic plants depend on light to photosynthesize and produce oxygen. Large amounts of sediment in a water body can also smother benthic organisms. Suspended solid results are interactive and interdependent with turbidity. Expert interpretation needed. Turbidity is measured as FAU.
7. Enterococci[‡]
The presence of bacteria Enterococci *sp* is monitored as an indicator of human and animal waste pollution. The higher the numbers of Enterococci bacteria present in a sample, the greater the amount of faecal pollution in the water. Bacteria count is measured in Most Probable Number of Enterococci cells per 100mL of sample (MPN/100mL).
8. Nutrients (Nitrate, Nitrite, Ammonia, Phosphate)
High nutrient concentrations in a water body (eutrophication) may lead to excessive weed and algal growth. Excess nutrients enter a water body through several means, including discharge of treated sewage, storm water, and in run-off from land, for example as fertiliser, animal waste, or decaying plant matter.
9. Chlorophyll-a
Chlorophyll-a is a pigment found in green plants, including aquatic plants. Measuring the amount of chlorophyll-a in the water therefore indicates the amount of green algae present in the water. High concentrations of algae (algal blooms) may harm other aquatic organisms, either through the production of toxins, reduction of available light through covering the water surface, or by using all available oxygen during respiration at night. Chlorophyll-a is measured in micrograms per litre (µg/L).
10. Rainfall
Rarotonga: daily rainfall data is provided by the Cook Islands Meteorological Service.
Aitutaki: daily rainfall data is recorded by MMR Staff at Amuri (Aitutaki Marine Research Centre – AMRC) and at Vaipae (Rowan Strickland's residence).
Rainfall is measured in millimetres (mm) and reported as total rainfall per month, total number of days that had rainfall and the highest amount of rainfall in 1-day and date(s).

[#]EPA Quality Criteria for Water Gold Book 1986

[^]EPA Ambient Aquatic Life Water Quality Criteria for DO (Saltwater): Cape Cod to Cape Hatteras Nov 2000

[@]EPA Quality Criteria for Water Red Book 1976

[‡]WHO Guidelines on Recreational Water Quality for Coastal and Fresh Waters 2021