



AITUTAKI WATER QUALITY REPORT NOVEMBER 2025

SUMMARY

Water samples were collected on Wednesday 12th November. Weather observed on the day prior to sampling was sunny and very hot that continued the next day with overcast and breezy winds. Tides were low during sample collection. Maina Nursery was not sampled due to continued limited staff capacity and boat access. The remaining eleven lagoon sites were accessible and sampled. Algae such as Boodlea, Padina, Turbinaria, Codium, Caulerpa and Dictyota were observed at nine out of eleven sites except at Arutanga Wharf and Maunga Pu. Stagnancy and lack of water were observed at all five streams and therefore were omitted from sampling. Summary table for Enterococci bacteria, total suspended solids and dissolved oxygen results and levels below.

Lagoon Site	Site ID	Enterococci (MPN/100ml)	Total Suspended Solids (mg/L)	Dissolved Oxygen (%)
Ootu	AIM02	<1	3.0	87
Vaipeka	AIM04	20	3.0	112
Vaipae Wharf	AIM05	187	4.0	119
Tautu Wharf	AIM06	<1	2.0	107
Taravao	AIM07	10	5.0	97
Vainamu	AIM08	<1	6.7	79
Vainamu Wharf	AIM09	30	13.2	78
Arutanga Wharf	AIM10	<1	3.9	104
Rapae	AIM11	10	1.0	88
Maunga Pu	AIM12	<1	4.8	77
Maina Nursery	AIM14	NO WATER SAMPLED		
Amuri Wharf	AIM16	41	1.0	73

GRADING SCALE	Excellent	Very Good	Good	Poor	Very Poor	Extremely Poor

Lagoon:

- Most sites were safe for swimming due to low Enterococci bacteria results with very good and excellent levels. However, extremely poor and poor levels with high results were observed at Vaipae Wharf (5172) and Vainamu (327), respectively. Both sites were resampled and results were low at good and excellent levels, respectively. This indicated that the areas were safe for swimming.
- Nine 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. Vainamu and Vainamu Wharf observed poor and very poor levels, respectively, exceeding the limit of 5.0 mg/L.
- Dissolved oxygen levels were above the recommended threshold of 80% showing good and excellent levels at most sites. Poor levels below 80% were observed at Vainamu, Vainamu Wharf, Maunga Pu and Amuri Wharf.
- Mean temperature was 28 degrees, readings ranged from 26.7 degrees at Taravao to 29.2 degrees at Vaipae Wharf.
- Mean salinity was 35 ppt, readings ranged from 27 ppt at Vaipae Wharf to 38 ppt at Taravao.
- Mean pH was 7.88, readings ranged from 7.70 at Amuri Wharf to 8.00 at Vaipae Wharf.

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

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1. ENTEROCOCCI BACTERIAL COUNTS - AITUTAKI - Most Probable Number of Enterococci per 100 mL (MPN/100mL)

Lagoon Site	Site ID	Jun	Jul	Aug	Sep	Oct	Nov
Ootu	AIM02	<1	10	<1	<1	<1	<1
Vaipeka	AIM04	52	<1	10	10	<1	20
Vaipae Wharf	AIM05	<1	10	<1	20	<1	187
Tautu Wharf	AIM06	52	110	<1	10	<1	<1
Taravao	AIM07	63	<1	<1	20	<1	10
Vainamu	AIM08	52	30	31	31	107	<1
Vainamu Wharf	AIM09	146	<1	63	<1	10	30
Arutanga Wharf	AIM10	10	<1	<1	10	<1	<1
Rapae	AIM11	10	<1	41	<1	41	10
Maunga Pu	AIM12	10	20	20	<1	<1	<1
Maina Nursery	AIM14	<1	10	NW	NW	NW	NW
Amuri Wharf	AIM16	20	<1	<1	10	41	41

Stream Site	Site ID	Jun	Jul	Aug	Sep	Oct	Nov
Vaitiare	AIS01	88	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	39	NW	NW	56	NW



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.

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

Lagoon Site	Site ID	Jun	Jul	Aug	Sep	Oct	Nov
Ootu	AIM02	4.9	3.6	1.0	4.6	7.5	3.0
Vaipeka	AIM04	13.1	3.0	9.1	3.5	7.7	3.0
Vaipae Wharf	AIM05	4.4	2.6	6.0	2.0	13.6	4.0
Tautu Wharf	AIM06	2.3	3.3	3.8	13.0	4.0	2.0
Taravao	AIM07	41.7	3.3	11.9	2.9	5.4	5.0
Vainamu	AIM08	44.4	11.8	9.5	20.5	17.9	6.7
Vainamu Wharf	AIM09	16.7	6.3	6.8	4.6	9.5	13.2
Arutanga Wharf	AIM10	3.1	4.6	5.4	7.1	8.9	3.9
Rapae	AIM11	1.3	1.0	1.0	2.2	2.0	1.0
Maunga Pu	AIM12	1.3	1.0	1.0	1.3	0.3	4.8
Maina Nursery	AIM14	1.3	0.3	NW	NW	NW	NW
Amuri Wharf	AIM16	3.3	1.0	2.0	2.3	2.4	1.0

Stream Site	Site ID	Jun	Jul	Aug	Sep	Oct	Nov
Vaitiare	AIS01	26.7	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	8.3	NW	NW	10.0	NW



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	Jun	Jul	Aug	Sep	Oct	Nov
Ootu	AIM02	102	93	102	77	110	87
Vaipeka	AIM04	110	89	119	111	117	112
Vaipae Wharf	AIM05	110	102	123	116	122	119
Tautu Wharf	AIM06	108	104	114	111	117	107
Taravao	AIM07	114	94	115	99	117	97
Vainamu	AIM08	81	89	91	86	87	79
Vainamu Wharf	AIM09	95	103	90	100	94	78
Arutanga Wharf	AIM10	68	95	104	109	106	104
Rapae	AIM11	93	105	89	80	84	88
Maunga Pu	AIM12	101	83	88	86	83	77
Maina Nursery	AIM14	92	92	NW	NW	NW	NW
Amuri Wharf	AIM16	95	93	86	92	87	73

Stream Site	Site ID	Jun	Jul	Aug	Sep	Oct	Nov
Vaitiare	AIS01	24	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	62	NW	NW	15	NW

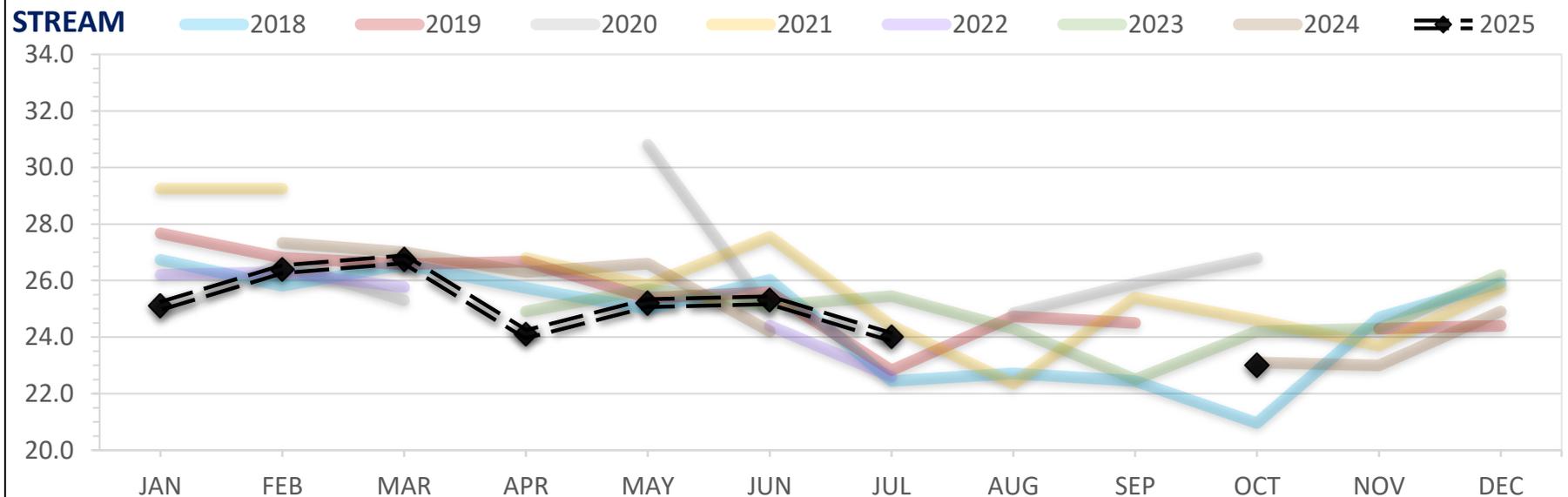
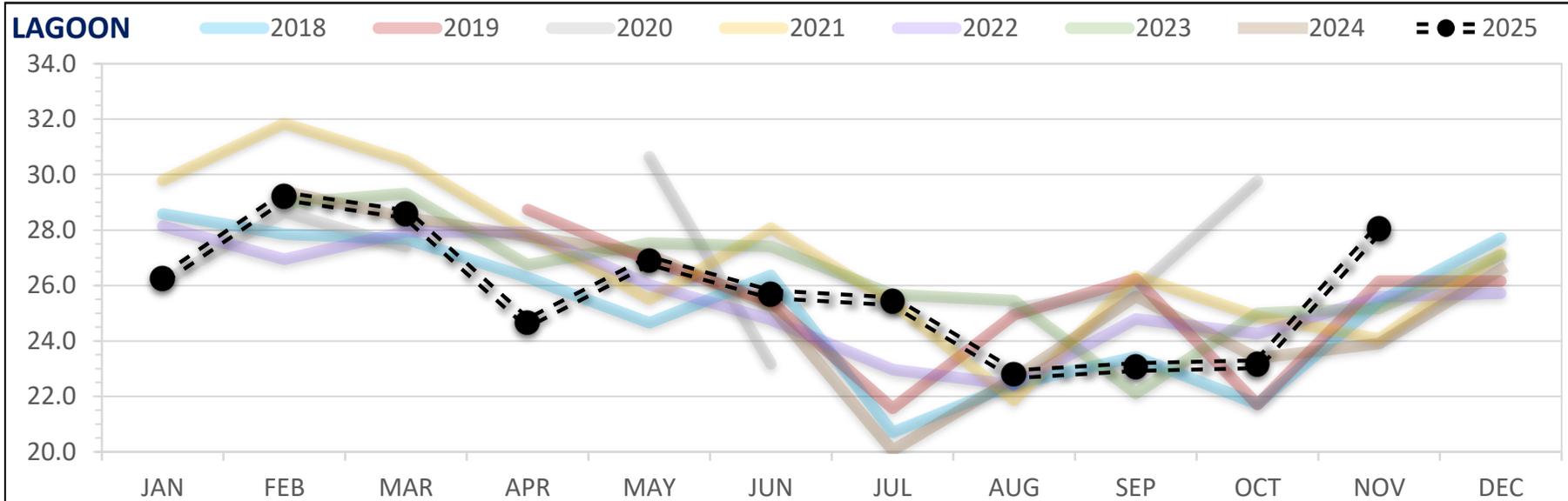


DISSOLVED OXYGEN STANDARDS	> 95	90 ≥ 95	80 ≥ 90	60 ≥ 80	40 ≥ 60	< 40
	A	B	C	D	E	F
	Excellent	Very Good	Good	Poor	Very Poor	Extremely Poor

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

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

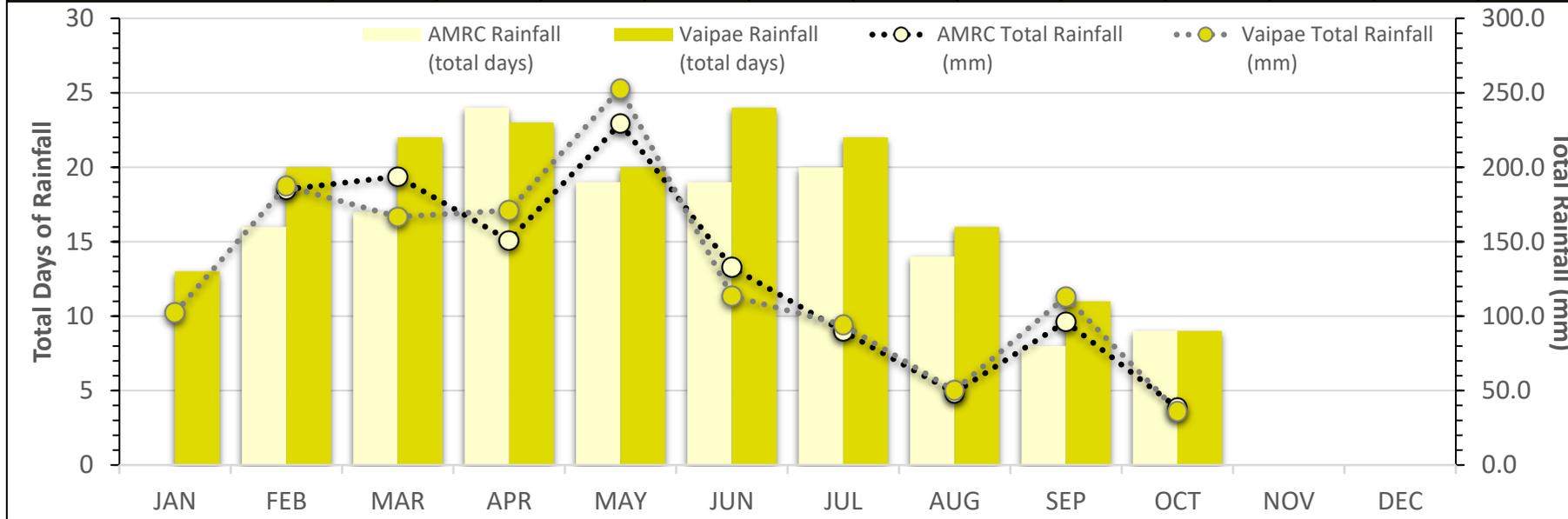
2025	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Lagoon	26.2	29.2	28.6	24.7	26.9	25.7	25.4	22.8	23.1	23.2	28.0	
Stream	25.1	26.4	26.8	24.1	25.2	25.3	24.0	ND	ND	23.0	ND	



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

Month	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		
AMRC Rainfall (total days)	ND	16	17	24	19	19	20	14	8	9		
AMRC Highest 1-Day (mm)	ND	43.8	39.6	75.8	95.0	72.4	20.4	19.2	74.8	14.0		
AMRC Highest 1-Day (date)	ND	19th	3rd	6th	24th	26th	11th	7th	18th	5th		
Vaipae Total Rainfall (mm)	102.2	187.4	166.8	171.0	252.6	113.6	94.2	50.0	113.0	36.2		
Vaipae Rainfall (total days)	13	20	22	23	20	24	22	16	11	9		
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		
Vaipae Highest 1-Day (date)	10th	19th	3rd	6th	24th	26th	11th	7th	18th	5th		



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Report Date: 14.11.2025		AITUTAKI LAB STUDY REPORT – NOVEMBER				Lab Report No.: 11L5376 – 11L5388			
SAMPLE DESCRIPTION									
Date Samples Collected:		Name of Sample:	Collected By:	Submitted By:	Time of Receipt:	Physical Description:		Quantity Per Site Received:	
Wednesday 12 th November		Marine	MMR		10:38am	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	11L5376	<1	28.3	36.9	87.1	5.53	7.97	3.0	
AIM04	11L5377	20	26.8	33.0	112.1	7.45	7.91	3.0	
AIM05	11L5378	5172	29.2	27.0	118.5	7.83	8.00	4.0	
AIM06	11L5379	<1	28.6	37.3	106.6	6.71	7.99	2.0	
AIM07	11L5380	10	26.7	38.0	96.9	6.27	7.84	5.0	
AIM08	11L5381	327	28.4	31.5	78.9	5.14	7.77	6.7	
AIM09	11L5382	30	28.5	37.0	77.7	4.91	7.81	13.2	
AIM10	11L5383	<1	28.5	36.5	103.8	6.58	7.99	3.9	
AIM11	11L5384	10	27.3	35.9	87.7	5.68	7.87	1.0	
AIM12	11L5385	<1	28.4	36.0	77.1	4.91	7.83	4.8	
AIM16	11L5386	41	27.8	36.3	73.3	4.71	7.70	1.0	
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	AIM05 (11L5387)	AIM08 (11L5388)	Study Method	Recommended Limit
1	13.11.2025	6PM	Clear	500mL	Enterococci	MPN/100mL	187	<1	IDEXX Enterolert*	Ref. Comments

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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 oxyrhincus*
2.7 mg/L at 19C leads to 22% mortality of *Acipenser oxyrhincus*
<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^β
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 plant. 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 (Aitutaki Marine Research Centre – AMRC) at Amuri and by Rowan Strickland at Vaipae.
Rainfall is measured in millimetres (mm) and reported as an average per month, total number of days that had no rainfall and the highest amount of rainfall in 1-day.

[#]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

^βWHO Guidelines on Recreational Water Quality for Coastal and Fresh Waters 2021