

NORFOLK ISLAND'S REEF

Discover a fragile paradise – Norfolk Island's beaches, lagoons and coral reef

HOME EXPLORE OUT ON A SWIM - BLOG ABOUT CONTACT

OUT ON A SWIM

My [Out on A Swim](#) blog is rated in the [Top 20 Coral Reef Blogs](#) in the world.

It serves as a record of what has caught my eye when 'out on a swim' in the lagoons of Norfolk Island, as well as providing some short stories about the characters under the waves.



High tide and pounding waves on Norfolk Island's coral lagoon, southern shore, looking east towards Point Hunter



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catalogue of reports were delivered to the general public

NORFOLK ISLAND REEF'S AUTOPSY REPORTS

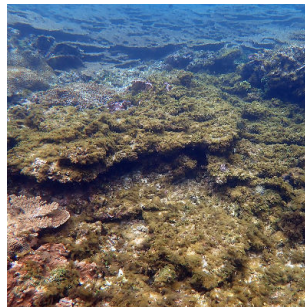
March 3, 2024

A couple of weeks ago, I read this comment on a LinkedIn post from David Tomasko, the Executive Director of the [Sarasota Bay Estuary Program](#), reproduced here with his permission:

'We are honing our skills, getting better and better at producing more detailed autopsies on collapsing ecosystems. So we end up where we are – management responses not sufficient for the scale of the problem, and [the] science mostly focused on monitoring and study, not science-based advocacy, and “solutions” from elected officials who either don't know what to do, or just want another photo op with a crowd of people smiling as the giant scissors cut through another ribbon cutting ceremony on another project way too small to matter. Not that I'm cynical.'



Healthy reef, Norfolk Island, 2020



Reef overgrown with algae, Norfolk Island, 2023

over the last few days on Norfolk Island's water quality and reef health. Reassuringly, they all say the same thing. Our poor water quality is affecting the health of our reef. So the science must be good! So when are we going to do something about it?

March 3, 2024



I ONLY HAVE FISH EYES FOR YOU!

Do fish have eyes that move independently? Well, no, not really, but, yes, sort of, in some species, sometimes!

Read on for a brief 'Fish eyes 101' summary of how they work.

Feb 22, 2024



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His words rang a loud bell for me. I looked them up again today, as I sat at my desk among a pile of recent reports on water quality and reef health for Norfolk Island, delivered to the general public over the last few days. In addition to these recent ones, on my hard drive I have a long catalogue of yet more reports. What is wonderful, though, is that they all say much the same thing. Moreover, they have been saying the same thing for many, many years. It is reassuring when the science is all in agreement, don't you think?

Back in August 2021, [in this blog](#), I said this (and my apologies for the repetition, but this is important):

Since at least 1966, so for 55 years, there have been warnings and disquiet about the state of the waters around Norfolk Island and, in particular, in Emily and Slaughter Bays, both from a health perspective and out of concern for the unique marine habitat. Many people have put their hands up to alert those in power about what needs to be done. I know your names, and I salute you for coming forward. I do understand why the issue was kicked like a can down the road. Money, or rather lack of it, being the major obstacle.

Over the last fifteen years or so there have been multiple reports on the water quality issue, commissioned by a variety of different government departments, administrations, or bodies, including these:

KNOW YOUR DAMSELS – MULTISPINE DAMSELFISH VERSUS BANDED SCALYFINS

The banded scalyfins and the multispine damselfish are arguably two of the most common species in Norfolk Island's lagoons. People often confuse them, particularly the juveniles, so here are some photos to clarify which are which. Once the differences have been pointed out, you'll never confuse them again.



COMBINE BACTERIA, FUNGI, AND MAYBE A SPONGE = ONE TOXIC MESS

This month, I have increasingly noticed a disease that is

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ASSOCIATE PROFESSOR ITALY

- *Norfolk Island Hydrology Study (Diatloff, 2007)*
- *Assessment of Groundwater Contamination in the Built-up Areas of Norfolk Island (Wilson 2010)*
- *Water Distribution System Integrity Investigation Study: Government House, Norfolk Island (Diatloff, 2011)*
- *Norfolk Island Water Quality Study: Emily Bay and Upper Cascade Creek Catchments (URS 2013)*
- *Norfolk Island Water Quality and Sewerage Infrastructure Management Strategy (2014)*
- *Emily Bay and Upper Cascade Creeks Catchments: Norfolk Island Water Quality Study (AECOM 2017).*

A report prepared for NIRC in 2017 titled 'Water quality in the KAVHA Catchment' summarised these, as follows:

The aforementioned studies have consistently identified elevated levels of microbial contamination and excessive nutrient loads in the lower waterways flowing through the Kingston Commons, Town Creek and the Recreation Reserves. E.coli levels reported in the waterways which discharge into Emily Bay have been shown in numerous studies to almost always exceed safe levels for primary contact, swimming and fishing. These waters were only considered suitable for restricted uses where human contact was avoided.

Ainsworth about what is going



SUSAN'S FLATWORM AND THE WISDOM OF SHARING KNOWLEDGE

Sharing knowledge is a fundamental aspect of human interaction that enriches both the giver and the receiver. Sharing and documenting knowledge ensures that valuable information and experiences are not lost but are instead preserved for future generations. So that is why I share.

Jan 22, 2024



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– AND THE FISHES

Since then, there have been further reports commissioned and delivered:

- *Upgrade of Norfolk Island's Sewerage Treatment Plant, Balmoral Group, for NIRC (2019)*
- *Improving the water quality of Emily Bay, Norfolk Island, Bligh Tanner, for Australian Marine Parks (2020).*

Which brings me to today, and those additional reports that are now sitting on my desk and hard drive, which are:

- [Norfolk Island Water Resource Assessment. Marine Water Quality – Year 1 of water quality monitoring and interim site-specific guideline values.](#) A report from the CSIRO Norfolk Island Water Resource Assessment Team to the Australian Government.
- [Norfolk Island Water Resource Assessment: Acid Sulphate Soils](#)

Then there are two further reports on the reef health itself:

- [Norfolk Island Lagoonal Reef Ecosystem Health 2022](#) (this came out last year but after the blog post that is quoted above was published, so I am popping it in here for reference)
- [Norfolk Island Lagoonal Reef Ecosystem Health 2023](#) (this landed on my hard drive yesterday)

Readers of this website may be familiar with my Facebook page, Norfolk Island Time, on which I cross post my blog posts about Norfolk Island's marine life. I can no longer gain access to that page. It's been taken over by a random person hell bent on getting a free lunch. But worse is that this particular scam has been doing the rounds for years while Facebook offers little assistance. We should be angry.

Jan 21, 2024



A YEAR IN REVIEW – 2023 ON NORFOLK ISLAND'S REEF

Sadly, the year didn't bring any obvious improvements to Norfolk Island's reef in terms of reductions in incidences of coral disease, or runaway algal

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Finally, there was a new paper that was brought to my attention at a CSIRO meeting held on island this week:

- [Microbial source tracking of fecal pollution to coral reef lagoons of Norfolk Island](#)

All these reports and papers agree. Our water quality is shit. Shit for corals, that is. Sometimes it is shit for humans, too. Any long-term local will tell you to avoid swimming in Emily Bay after heavy rain, which is incredible if you think about it, for a tiny, remote, island so far from other human habitation.

The paper 'Microbial source tracking of fecal pollution to coral reef lagoons of Norfolk Island', says our groundwater is polluted by human wastewater. It also confirms that 'surface water discharge [i]s a pathway for fecal and nutrient pollution into a marine environment where coral reef decline has been linked to elevated nutrient concentrations'.

We certainly know what we know. That is for sure. We have lots of reports all telling us the same thing.

But it is the latest report from the coral reef health researchers, 'Norfolk Island Lagoonal Reef Ecosystem Health 2023', that truly brings me no joy. However, it does make me feel like I am not mad; that what I am seeing when I am out swimming is not right. And it makes me more determined than ever to keep pushing until we get something done to improve the water quality in the lagoons. Norfolk Island without a reef is unthinkable. We simply can't allow it to happen.

Here are a few quotes from that report:



FREE WEED!

I couldn't resist posting these beautiful images of floating seaweed. Enjoy!

Dec 22, 2023



THE JOURNEY FROM CORAL REEF TO RUBBLE

For two years, I have stopped by and photographed this beautiful

[A beautiful coral reef in Norfolk Island's lagoon](#)

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'Since reef health monitoring commenced the coral reefs of Emily and Slaughter Bay have been continually impacted by ongoing stressors ... resulting in significant changes [to the health] of these ecosystems.'

Back in February to April 2020, the reef experienced the first 'officially recorded' coral bleaching event. As the report says, coral bleaching can be attributed to 'increased sea surface temperatures above those normally experienced at a particular location'.

Bleached coral can recover if the heating event doesn't last too long. Which is what happened here; Norfolk Island's corals eventually recovered from the bleaching, but it can also make them less resilient when hit with other factors, like poor water quality, which can lead to disease, something we see plenty of on our reef.

From August 2020 until late in 2023, the report says, we had:

'extended periods of above average rainfall events and high nutrient inputs resulting in repeated sedimentation of Emily and Slaughter Bay, flushing of the land-based contaminants from adjacent catchment into the Bays, reduced water quality and nutrient enrichment of the marine ecosystem. Flooding events also resulted in official closures of the Bays due to high bacterial counts that pose both a human health risk and increased risk of zoonotic disease (↯disease spread between animals to humans and vice versa).



THE SPATIOTEMPORAL DYNAMICS OF A CORAL DISEASE

A pictorial study of the spread of white syndrome, over time, in a *Hynophora pilosa* colony on Norfolk Island. This beautiful coral colony is in the middle of the channel that runs between the contiguous Emily and Slaughter Bays, in Norfolk Island's inshore coral reef lagoon. It's one of my favourite places to pause and admire the scenery, when I'm out on my swim.

LATEST POSTS

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'Tracing of Fluorescent Whitening Compounds (FWC) (products found only within laundry detergents and cleaning agents for the purpose of brightening fabrics/surfaces) conducted throughout the catchments identified FWC contaminants within creek systems leading to and within the KAVHA catchment, within the wetland, and within the inshore lagoonal reef during flood events. Land-based nutrient inputs may include cattle grazing in the catchment, other animal inputs, fertilizer use, onsite wastewater disposal (septic systems and grey water used on gardens) within the catchment or surrounding areas and septic/sewage inputs into the waterways, including groundwater, leading to the lagoonal reef.'

Then, from March 2021 to the present:

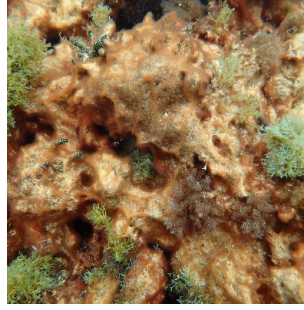
'Significant changes in the type and abundance of algae seen in Emily and Slaughter Bay, including declines in algal types associated with healthy coral reef ecosystems and subsequent increases in algal types that are associated with excessive nutrient inputs and declining water quality. This includes a red cyanobacteria found to cover up to 30% of the benthos in April 2022, with alga recorded overgrowing and covering live corals and other algal types. Red cyanobacterial overgrowth is associated with elevated nutrient inputs, indicative of a reef under stress from land-based runoff (Ford et al. 2018). Red cyanobacterial growth was subsequently removed by a large storm surge event in June 2022, but was then

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replaced by macroalgae also growing to
~30% benthic cover.



Lyngbya, Norfolk Island,
2023



Red cyanobacteria, Norfolk
Island, 2024

'Prior to the high rainfall events in August 2020 these algae contributed to less than 8% of the benthic cover. Increases in macroalgae cover are linked to phase shifts from coral dominated to algal dominated reefs attributed to the presence of increased nutrients from excessive stormwater runoff. These conditions resulted in algal competitive advantage over live coral and inhibition of juvenile coral recruitment. In addition, Lyngbya-like cyanobacteria has been identified in increased abundance on the reef for the first time since December 2022. Lyngbya is a genus of blue-green algae, some species of which produce a toxin that can cause skin, eye and respiratory issues in a range of species including humans. Growth of this algae is also linked to elevated nutrient inputs in other systems where it is found, in particular iron, phosphate and nitrogen (Ahern et al. 2007).'

And from April 2021 to the present:

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'Significant coral diseases outbreaks in all of the dominant coral taxa in Emily and Slaughter Bay, including Montipora and Acropora corals which contribute to over 60% of the coral assemblage in the bays. A healthy coral reef maintains less than 5% of individuals exhibiting signs of disease. Coral disease rates exceeding 5% are considered a disease outbreak and disease outbreaks greater than 20% of the population are substantial outbreak events which have been rare globally and are usually associated with reefs in decline (Burke et al. 2023; Walton et al. 2018). In Emily Bay Montipora White Syndrome rates have been consistently above 38% of the population since December 2020, with at times, up to 78% of colonies showing disease signs. Acropora White Syndrome disease rates have exceeded 22% since April 2021 while rates in Slaughter Bay have been greater than 28% since April 2022. Coral disease outbreaks are associated with degraded ecosystem health. In addition to leading to coral mortality, diseased corals have reduced capacity for competition with other organisms (such as algae) and have reduced reproductive output.

'Taken together these biological responses are indicative of a reef system under significant stress from anthropogenic stressors. Increased algal type and abundance are early signs of potential phase shift from a coral dominated to algal dominated system. Phase shifts are characterised by a rapid loss of coral that is

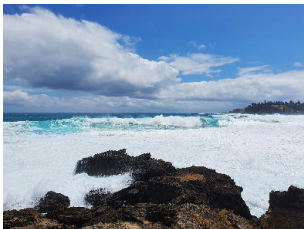
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replaced by alga, once a phase shift has occurred recovery back to a coral ecosystem is slow and reliant on coral recruitment and regrowth in addition to conditions returning to those that support coral growth. Loss of the coral ecosystems in Emily and Slaughter Bay may significantly impact many cultural aspects of the local community and directly impact on the island economy.'

My apologies for quoting so liberally, but, honestly, I couldn't say it better.

The report continues with some solid and urgent recommendations, the main priority being '**to rapidly reduc[e] the nutrient inputs into the Bays and minimise other activities that may place additional stressors on the corals**'. (My emphasis.)

In other words, we have to stop our dirty water entering the lagoonal areas otherwise the reef will continue to decline. And maybe die.



High surf, Norfolk Island

Perhaps now is a good time to reflect and give some thought to the implications of a dead reef – of a crumbling rubble wall of coral skeletons covered in

algae. Anyone who has lived on Norfolk Island will tell you, on some days the surf comes thumping in over that reef. It protects our low-lying World Heritage area – which is also our tourism ace-card – from inundation. You know you will see storm damage to the reef when you next enter the water, but that is OK if the losses are replaced by baby

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corals growing on a healthy substrate. If the recruitment of new corals doesn't match that being lost, well, you have a problem. And soon that problem could become a World Heritage-sized problem. There certainly won't be any arguments about whether cattle should or should not be allowed on the common grazing area – the one that was formerly a wetland before the British arrived in 1788 – because it will be inundated by seawater on those big surf days. The reef protects us from the southerlies that blow unimpeded all the way from Antarctica.

The reef is much more than a protective barrier, though. However, I don't have room here to discuss the cultural significance of the reef, its ecological importance, let alone its amenity as the island's main recreational area.

While I welcome all the reports, and the excellent science therein, I have to ponder the CSIRO report 'Norfolk Island Water Resource Assessment. Marine Water Quality – Year 1', which states in its Recommendations: 'There should be an ongoing long-term monitoring program of the KAVHA bays and reference sites ... to improve the robustness of the dataset and determine if water quality is changing over time.'

Absolutely, let's do more science and get more data. I have no issue with that. I'm definitely an evidence-based kind of girl! Science is important and can give us an essential and firm base on which to base our remediation of the reef. But not at the expense of doing something concrete about improving our water quality in the meantime. If we just keep doing the science but not attend to the

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rehabilitation, we can watch in slo-mo as our reef dies, but at least we will know if the water quality has changed.

Also giving me pause, was this: 'Additional research on the cause-effect relationships between nutrients and coral health could be considered to provide further evidence of the causes for the decline in coral health observed in the KAVHA bays ...'

Again, a commendable notion, but we already have reports. Lots of them. From scientists around the globe, all confirming that corals don't like nutrient-rich water. But at least we would have our own bespoke report to tell us that **our** excess nutrients are detrimentally affecting **our** corals' health.

Don't get me wrong here, because I am not knocking the science at all. What I am having a go at is practice that feeds one more report after another into a system of governance, with little apparent action coming out the other side. In another year or two, we should have a few **more** reports to tell us what we know we already know.

Which is reassuring.

I think.

I firmly believe that coral reefs are resilient and Norfolk Island's can recover, if we just do something to reduce those nutrient levels.

I am not privy to the machinations of our government when it comes to fixing our water quality problems. I know they are aware of the issues, after all, they've invested a great deal in the science and the reports. However, there is little in the way of community and stakeholder

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communication unless another report is being handed down, and then we get to come along to a meeting to here the same news, which is that we have a problem with our water quality . I understand that they (Norfolk Island Regional Council) are attempting 'to secure funds'. Exactly what for, how much and from whom, I can't tell you. Meanwhile our environment on Norfolk Island is held ransom to a wonky governance situation (yes, it is being addressed, slowly), and grant funds that are allocated in a competitive application process, where we vie for the cash against every council in Australia. This is, of course, the topic of another article for another day; it is definitely too convoluted to delve into here.

Recall at the beginning of this post I quoted David Tomasko: 'We are honing our skills, getting better and better at producing more detailed autopsies on collapsing ecosystems.'

How true are his words. Will all these reports that we now have on Norfolk Island's water quality and coral reef amount to a chunky-sized autopsy report? Will my website and this blog become the eulogy?

I sincerely hope not. And I also sincerely hope that those grant funds needed by our governing bodies to actually fix the mess are forthcoming. But then again, I'll lay bets that they (the grant givers) will be waiting on the next report. Just so they can be sure that we have a problem.

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Waves breaking over Norfolk Island's inshore reef, looking west towards Kingston Pier

In Environmental degradation

Tags water quality, reports, Norfolk Island, coral health, coral disease, World Heritage Area

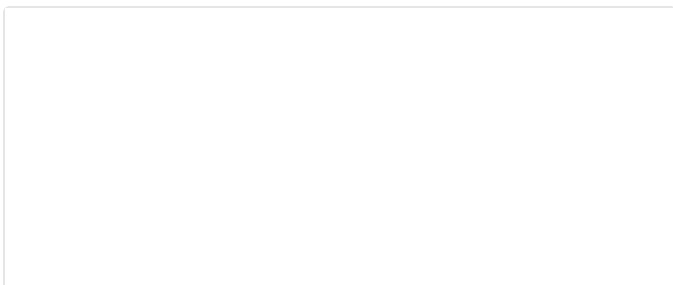
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