

WELLINGTON'S BLUE BELT

Snorkeller exploring kelp forests,
Taputeranga Marine Reserve.
© Nicole Miller

Marine conservationist and citizen scientist **Dr Nicole Miller** is on a quest to become the first person to document the capital's 70km coastline from beneath the waves.

The marine life of coastal Te Whanganui-a-Tara Wellington is surprisingly colourful and diverse. It's possible to encounter many species at the northern- or southernmost limit of their natural range. I often saw blue moki, blue cod, trevally, and even large conger eels on my scuba dives.

But the real surprise is the high diversity of species and habitats to be found within Wellington Harbour itself, including kelp forests, sponge beds, red seaweed meadows, and brachiopod beds. Each provides a different function, food source, or habitat for a wide range of species.

Another big secret was revealed once darkness came. What appears to be an empty sandy beach during the day comes to life at night. Squids, burrowing anemones, and thousands of crabs and flatfish are some of our sea life that is active at night.

Within a stone's throw of Wellington's shoreline, there are other treasures to be found. The "rainforests of the sea", where giant kelp (*macrocystis pyrifera*) forests tower over the harbour's rocky reefs build floating canopies that shape the underlying ecosystem, build biomass, and

provide food for a thriving ecosystem.

These dense kelp forests provide food, shelter, and nurseries for valuable kai moana species and for other marine life, from seahorses and pipefish to crabs and snails and smaller baitfish. These important seaweed forests also provide protection for softer sponges and other sessile invertebrates.

Kelp forests are highly valuable for our economy too. The economic contribution of one small area of kelp forest (about 0.5ha) is estimated to be around \$70,000 per year because it provides nutrients and supports other species all the way up the food chain to marine mammals like orca.

As in other parts of coastal Aotearoa, the kelp forests in Wellington Harbour are threatened by kina, our native sea urchins. Their numbers will increase in overfished areas because of the absence of kina predators.

In healthy and balanced marine ecosystems, crayfish, blue cod, moki, and snapper all prey on kina, keeping numbers under control. Without these predators, kina



Octopus are commonly sighted on the rocky reefs of Wellington's South Coast.
© Nicole Miller



Endemic *Jason mirabilis*, one of 50 nudibranch species recorded in Wellington. © Nicole Miller

numbers will explode and the kina overgraze on kelp, turning thriving kelp forests into areas of barren rock.

Wellingtonians have started to notice the increasing kina presence in their harbour. Ocean swimmers have reported injuries from stepping on the prickly creatures at Wellington's city beaches in recent years. Kina barrens are now visible from Oriental Parade, north of the fountain.

Last summer, iwi and volunteers removed more than 12,000 kina from Kau Point to restore a kelp forest at the northern end of Miramar Peninsula. A year on, the barren rocks that the kina had left behind are covered in seaweed again. It's such a great feeling to see life coming back to this part of the harbour.

Another success story has been Taputeranga Marine Reserve along Wellington's South Coast, where the Cook Strait brings a mix of warm and cold waters between the North and South Islands. Here the marine reserve has built an important refuge. Once heavily fished, our marine life has recovered, and divers can see thriving seaweed forests and abundance of marine life.

But there are many pressures on Wellington's marine environment, just as there are throughout our coastal nation.

I've been documenting declining seaweed forests, and with them the loss of marine life, for years. Within a few months, an entire seaweed forest can be lost without anyone noticing. Imagine the ancient forest giants of Ōtari Wilton Bush or Zealandia disappearing within two or three years. I bet Wellingtonians would be demonstrating for swift action. But when things are under the sea, it's a different matter. It's difficult to cherish what we cannot see.

Sedimentation is another threat to the health of the ocean. Run-off from shore and rivers creates fine sediments that blanket deeper parts of the harbour and smother all life.

When sediments don't settle on the ocean floor, they remain suspended in the water, blocking light from even the shallower parts of the harbour. This is a phenomenon known as "coastal darkening".

I experienced this while diving along the Petone foreshore. The sediment runoff from the Hutt River meant I felt obstacles before I could see them! It was certainly a challenging part of my dive this past summer.

This lack of light limits seaweed growth to narrow bands along the shore and acts like sandpaper making it difficult for seaweed spores to settle and grow. Add coastal developments and dredging activities into the mix, and the cumulative effects on our rainforests of the sea can be devastating.

Cumulative pressures build when you add in climate impacts, warming waters, and introduced species, which result in declining crucial habitats and productive marine space.

In January, I launched my *Explore Your Coast*



Kina devouring drift seaweed on a kina barren. © Nicole Miller

campaign to raise awareness of the rich diversity of Wellington's blue belt and provide different ways for locals to connect with their local underwater world (see overleaf). Wellington has plenty of conservation volunteers who go out every weekend to help regenerate bush reserves and coastal dunes. The media is full of good news around increases in native bird populations and reintroduction of kiwi to the hillsides overlooking the capital's harbour.

Marine taonga species and their habitats are equally at risk, but they aren't getting the same kind of love. We know that actions on land and in catchments will enhance ocean water quality, and we need to reduce fishing pressure to rebalance the marine food web and create more resilient marine ecosystems.

We can all help restore our oceans, and there are plenty of land-based conservation activities anyone can help with. You don't need to be a certified scuba diver or even get your feet wet! For example, you could help with a beach clean-up, help with dune restoration work, or collect data for scientists studying local marine ecosystems.

We shouldn't take marine decline for granted, and creating ocean-connected communities can help make a difference in the marine space, just as it does in bird sanctuaries. The time to act is now.



Sedimentation threatens blue cod habitat, Wellington Harbour. © Nicole Miller

Dr Nicole Miller is a citizen science leader with a special interest in marine ecosystems. She also Chair of the Friends of Taputeranga Marine Reserve, established in 2008 through the work of the South Coast Marine Reserve Coalition and Forest & Bird.



MARINE

CHERISH OUR OCEANS

Diver hovers over a dense canopy of the seaweed *Lessonia variegata*, Wellington Harbour.

There's lots we can do to help restore our precious marine environment, as **Miett Fear** explains. **by Nicole Miller**

Wellington ocean advocate Dr Nicole Miller knows you don't need to be a marine scientist to make a difference, and this was the thinking behind the launch of her inaugural *Explore Your Coast Wellington* campaign in January.

She wanted to celebrate the marine environment of Te Whanganui-a-Tara Wellington Harbour while showing some of the different ways everyone can help protect it.

This includes becoming a citizen scientist and gathering valuable data for local marine studies, donating money to groups involved in underwater harbour clean-ups, or helping with a beach clean-up.

"If we take decisive action today, we can save our huge diversity of the underwater habitats for tomorrow," she says. "Conversely, the more kelp forests and other valuable marine habitat we lose, the more difficult natural marine restoration becomes in the future." Over three weekends in January and on Waitangi Day, Wellington's divers, snorkellers, swimmers, kayakers, conservation, and restoration groups came together to enjoy and share the diverse marine life of Wellington's blue belt.

Events included free public snorkel and educational activities, dune and coastal restoration events, beach and underwater clean-ups, kina tasting, and scuba divers filming beneath the waves of Wellington, all to encourage people to engage with their coast.

Nicole also set herself the ambitious goal to becoming the first person to scuba dive and film 70km of Wellington's coastline, from the Taputeranga Marine Reserve on the south coast to Pencarrow Lighthouse on the Wainuiomata coast.

The diving was scheduled for seven days of summer, usually the most suitable conditions. However, unusual strong winds scuppered several potential diving opportunities. At the time of writing, Nicole had surveyed 30km of Wellington's coastline and taken 25 hours of video footage.

Nicole will return to diving and documenting next summer and still hopes to become the first person to video the whole of Wellington's coastline. This will provide baseline data to help scientists monitor changes, including the health of seaweed forests and the extent of kina barrens.

Meanwhile, she will use the winter months to find out about marine restoration projects around the world, supported by a prestigious Winston Churchill Memorial Trust Fellowship.

Nicole has developed a fully immersive video tour of Taputeranga Marine Reserve for virtual reality headsets. This 360° virtual tour has allowed thousands of kids and adults to experience a dive and explore the reserve.

"I particularly enjoyed seeing their reactions when they came face-to-face with a nosy wrasse or entered the F69 Frigate shipwreck for the first time," she said.

Nicole has also created



Manaia large-bellied seahorse during a night dive, Wellington Harbour.

videos from different dive sites, providing land-based marine reserve visitors an opportunity to explore under the waves.

Next time you gaze out over the ocean, have a think about the world below the surface that is relying on you to protect and care for it.

Check out Wellington's underwater world at <https://exploreyourcoast.co.nz>. Nicole gives free talks to local community groups about looking after their coastlines – contact Miett Fear at exploreyourcoast@gmail.com to find out more.

NATURE-BASED SOLUTIONS

It's the UN Decade of Ecosystem Restoration, and countries around the world are looking at ways to protect marine biodiversity and bring back ocean abundance.

New Zealand has led the world in terrestrial conservation efforts, such as removing predators from offshore islands to provide safe sanctuaries for endangered birds. Now it's time for Kiwis to become ocean champions too.

There are many opportunities to establish a marine economy that is based on low impact and positive environmental outcomes, said Nicole Miller.

One such idea is no-input aquaculture, where there is no artificial feeding of the farmed marine species.

This can be done by integrating shellfish and seaweed aquaculture, where multiple species such as mussels, oysters, and seaweed are grown in proximity and for mutual benefit.

Imagine raising oysters that don't need feeding. You can read more about this at www.nature.org/en-us/what-we-do/our-insights/perspectives/the-aquaculture-opportunity/. Innovative ideas such as these can mitigate nitrogen loads from aquaculture and help rebuild biodiversity in marine ecosystems in our blue backyards.

We can also use local seaweed species to support local jobs, for example by using them in artisan food products, marine cosmetics, dietary supplements, or other applications.

Nature's solutions lie in front of our eyes, and with some smarts Aotearoa New Zealand can benefit and create high value and bespoke products, local jobs, and a knowledge-based support industry, including digital blue solutions that we can export too.

Miett Fear is *Explore Your Coast's* media and events manager.



Schools of jack mackerel are common in Wellington Harbour.



Juvenile blue cod hiding in scallop shell, Wellington Harbour. Pink coralline algae covers surrounding gravel.

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