



**TR2024/8
Summary
October 2024**



Tāmaki Makaurau / Auckland Marine Sediment Contaminants

Summary of TR2024/8, 2023 monitoring for the Regional Sediment Contaminant Monitoring Programme. Environmental Evaluation and Monitoring Unit.

Key points:

- **Sediment contaminants (metals) were sampled at 19 sites across the Central Waitematā Harbour**
- **The spatial pattern of contamination remains consistent with previous monitoring**
- **Higher concentrations of several metals were found in the upper reaches of sub-estuaries and at the sheltered mouths of creeks along the southern shoreline**
- **Sites along the more exposed northern shoreline and in the body of the harbour show relatively low levels of metals**

This document summarises TR2024/8 which reports on the findings of Auckland Council’s Regional Sediment Contaminant Monitoring Programme (RSCMP) for sites sampled in 2023. Trends over time are analysed when we have multiple new samples since the last trend report. For a comprehensive assessment of marine sediment contaminant state and trends across Tāmaki Makaurau up until 2019, see *Marine sediment contaminant state and trends in Tāmaki Makaurau 2004 to 2019*, [TR2021/10](#).

Overview

Contaminants such as copper, lead, and zinc, can accumulate in the sediments of our harbours, estuaries, and beaches. These metals originate from a range of different activities and land uses, including vehicle tyre and brake wear, industrial activity, and some building materials. When it rains, these

pollutants are washed into our stormwater networks and waterways, ending up in our marine environment. The build-up of these contaminants can affect ecological health, by reducing the number or diversity of animals living in the sediment. This can have harmful effects on the natural functioning of these ecosystems and result in degraded communities that are dominated by few species that can tolerate higher contaminant levels. Understanding the distribution and level of contaminants in marine sediments provides a useful indicator of land use impacts on marine receiving environments and ecosystem health.

What we monitor

Monitoring focuses on the main metals associated with urban stormwater, copper, lead and zinc, along with mercury and the metalloid arsenic. In 2023,

cadmium, chromium, nickel, and silver were also tested at three sites in the Whau Estuary.

Concentrations are compared with Sediment Quality Guidelines (SQGs). SQGs are specific values used to assess the potential impact of sediment contamination on aquatic life. Conservative SQGs have been developed specifically for the Auckland region for copper, lead and zinc, known as the *Environmental Response Criteria* (ERC). A traffic light system indicates the contaminant level and associated impact, where **Green** indicates a low level of contaminants, **Amber** indicates moderately elevated levels where adverse effects on ecology may be beginning to appear, and **Red** indicates levels of contamination where ecological degradation is likely to be occurring. Other established SQGs are also used for comparison and for contaminants other than copper, lead, and zinc. Details of all SQGs used and comparisons with all chemicals analysed can be found in the full report, [TR2024/8](#)

Marine ecology and sediment mud content are measured at all sites in conjunction with sediment contaminant monitoring. Corresponding ecology data will be reported in 2025. See [TR2021/09](#) for the most recent analysis of RSCMP ecology data.

Where we monitor

The RSCMP includes regular monitoring in the intertidal sand/mud flats at around 80 sites across the region's harbours, estuaries, and beaches. As a key objective is to monitor the impacts of urban development, most sites are in areas receiving run-off from predominantly urban catchments. Other marine monitoring programmes have also collected sediment contaminant data in recent years expanding the spatial coverage of contaminant monitoring, particularly in more rural catchments.

Sites are sampled either every three or six years on a rotational basis, with specific areas the focus of each sampling round. In 2023, 19 sites were sampled all within the Central Waitematā Harbour.

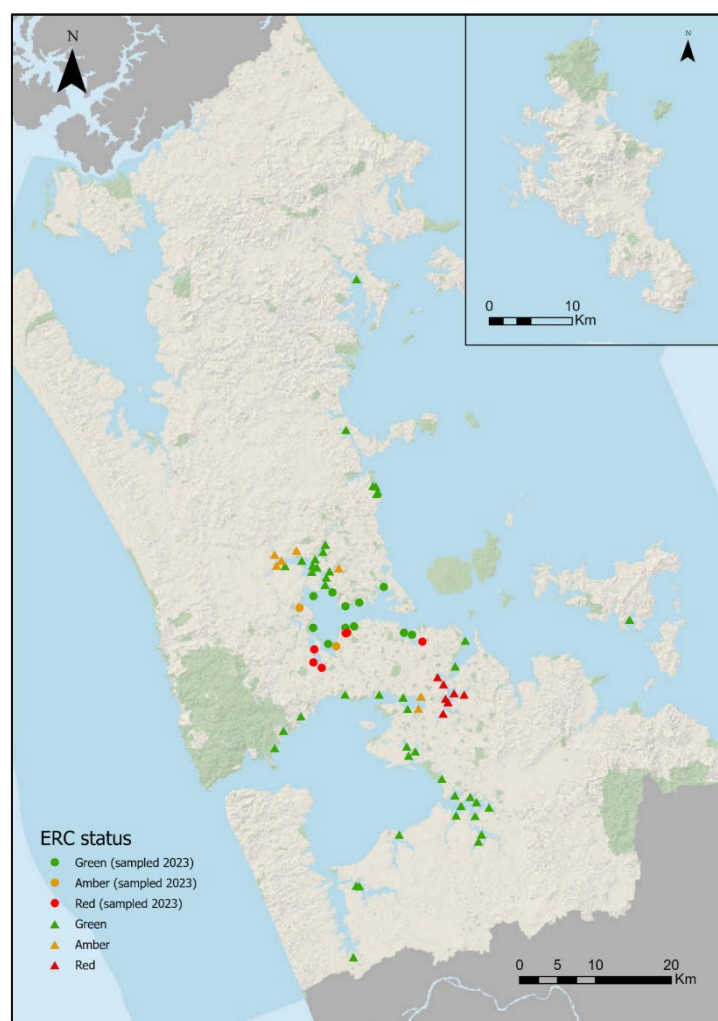
What have we found

The spatial distribution of contamination is largely in agreement with previous monitoring in the Harbour.

Sites along the mostly sandy northern shoreline and those in more exposed locations at the mouths of estuaries generally showed low levels of contamination.

Sites in the upper reaches of sub estuaries (such as the Whau Estuary and Hobson Bay) and at the lower reaches of creeks in fairly sheltered locations along the southern shoreline (such as sites Oakley Creek, Motions and Meola Inner) have higher concentrations.

At six sites at least one metal (most commonly zinc) is in the ERC – red category, while at four other sites at least one is in the SQG amber category.



Environmental Response Criteria (ERC) contaminant state of sites sampled in 2023 (●) and in previous years (▲).

What does it mean

The physical characteristics of a site, along with its surrounding catchment land use, play a crucial role in the volume of contaminants that enter marine environments and subsequently accumulate in marine sediments.

Levels of elevated metals are most prevalent at low energy, muddy sites in catchments with a long history of intensive urban land use. This is evident at sites in the Whau Estuary and the sheltered sites west of the city centre – including Motions, Meola Inner, and, to a lesser extent, Oakley Creek. Ongoing pressures associated with high density urban land use have cumulatively had a negative impact on sediment quality over time at these sites, with several metals triggering amber and/or red threshold levels since monitoring began. Much lower contaminant levels were observed at sites adjacent to heavily impacted areas, such as Whau Entrance and Meola Outer, as well as along the northern shoreline. This can be attributed to sites in these locations being more exposed, less muddy, and characterised by higher energy environments, where contaminants are more easily dispersed and less likely to settle and accumulate.

Zinc remains a contaminant of concern, and the metal most regularly exceeding ERC guidelines. Even in the absence of additional environmental pressures, sites with zinc levels in the ERC red category are likely causing significant stress to aquatic organisms.

Mercury, copper, and lead are moderately elevated at several sites and rarely elevated in isolation. The exception to this is sites Shoal Bay Hillcrest and Awatea, where mercury levels are the only contaminant occurring at slightly higher concentrations. In isolation, levels of these metals pose only a moderate level of risk to the animals

living there. However, when combined with other stressors in the environment such as other elevated metals and/or high mud content, even slightly elevated concentrations are likely to be contributing to cumulative effects and the overall picture of sediment quality and ecological health in the Central Waitematā.

Arsenic levels appear in line with what would be expected to occur naturally and are currently not of major concern at any sites.

All the metals included in the additional suite of analytes for sampling conducted in the Whau Estuary (cadmium, chromium, nickel, and silver) showed levels well below those where an impact on ecology might be expected. This is encouraging given the various potential sources in the surrounding catchment and the elevated concentrations observed in other metals.

In general, ERC contaminant status (for metals copper, lead, and zinc only) has remained relatively stable over time at most sites. Improving copper and lead levels were seen at site Whau Wairau and worsening copper and lead levels at site Whau Upper. These sites are located relatively close to one another in the same broad catchment. The varying differences observed highlight the site-specific nature of sediment and contaminant accumulation and the fine scale dynamics that can occur within an estuary.

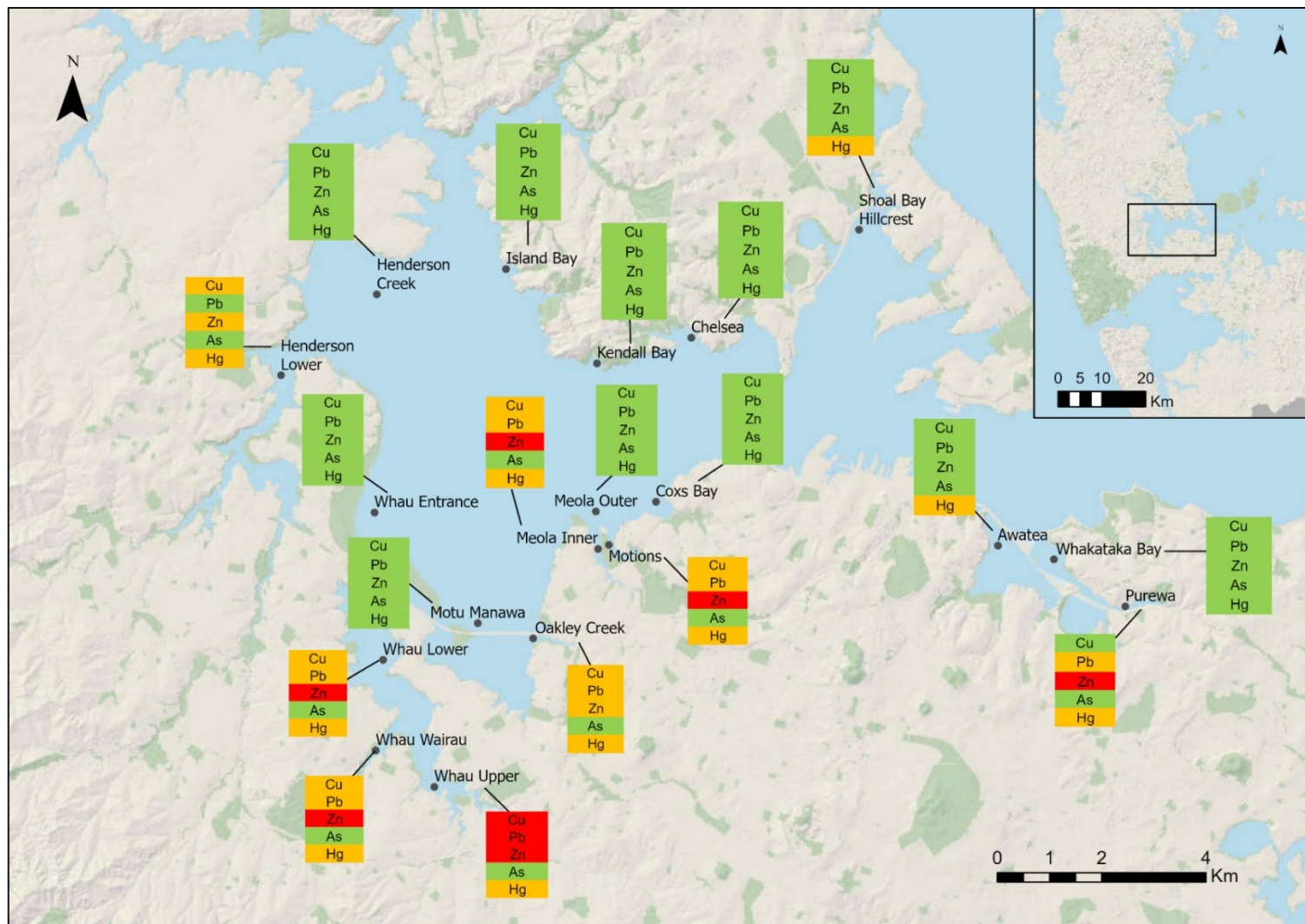
Extreme weather events in early 2023 caused widespread flooding across much of the region, including in urban suburbs surrounding the central Waitematā Harbour. Consequently, a myriad of urban



RSCMP sites Whau Upper (left) and Island Bay in the Central Waitematā.

pollutants and chemicals would have been expected to make their way via flood waters into the marine environment. These events also led to an increase in land erosion, which can transport pollutants stored in soil. While it is difficult to directly link any impact from these weather events to observations made in

the RSCMP, the relatively stable results from 2023 – compared with three to four years previously – provides some assurance that widespread and significant increases (at least for the metals measured) did not occur.



Sites and state of metals (based on suitable sediment quality guidelines) sampled in the RSCMP in 2023. Metals are copper (Cu), lead (Pb), zinc (Zn), arsenic (As), and mercury (Hg). Inset map shows regional location.

Find out more:

Allen, H. (2024). [Tāmaki Makaurau / Auckland marine sediment contaminant monitoring: State report for 2023](#). Auckland Council technical report, TR2024/8

Mills, G N and Allen, H. (2021). [Marine sediment contaminant state and trends in Tāmaki Makaurau / Auckland 2004-2019. State of the environment reporting](#). Auckland Council technical report, TR2021/10 For more information or to request data, email environmentaldata@aklc.govt.nz

Technical reports are available on [Knowledge Auckland](#)