



A TEENY-TINY
TRUTH 

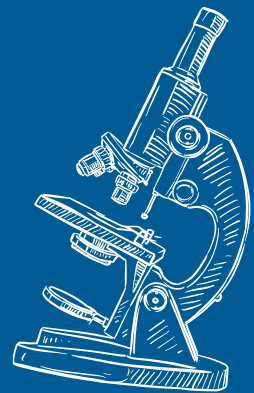
SAMPLING MICROPLASTICS IN WATER

A SIMPLIFIED COMMUNITY METHOD

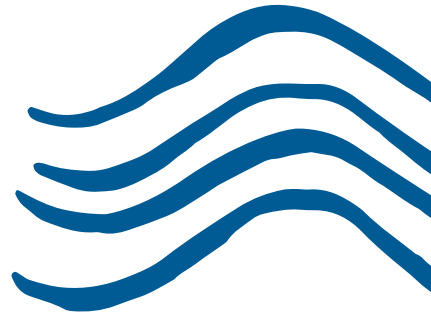
FOR SCHOOLS

PREPARED BASED ON METHODOLOGY
TRIALLED AND TESTED BY MARINE SCIENTIST:

VERONICA ROTMAN



What are microplastics and why are we monitoring their presence in fresh water?



Microplastics are any type of plastic less than 5mm long. Some have been made intentionally small, such as cosmetic microbeads, whereas others form through the break down of larger plastics over time.

In Aotearoa, microplastics could be degrading the health and mauri (lifeforce) of freshwater and marine ecosystems. Beyond their immense cultural and environmental value, the water from our lakes and river are a primary source of human drinking water, and rivers are a significant pathway for plastics to enter the ocean.

Therefore, it is important to understand the prevalence of microplastics in our aquatic environments, identify key sources and sinks of pollution, and mitigate these through innovation, education and policy change.

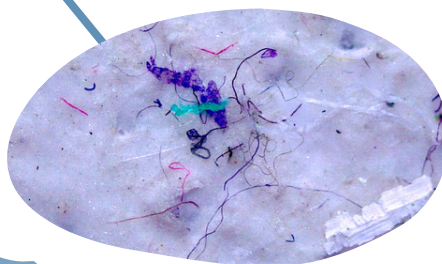


In June 2023, Marine Scientist and PhD Student Veronica Rotman began her study on microplastics in Lake Wānaka. Recognising the community's interest in this issue, WAI partnered with Veronica to amplify the project's impact and reach. Thus, 'A Teeny Tiny Truth' was born, bringing together over 30 volunteers to help with sampling at 10 different locations.

After trialing three different methods, Veronica found the 'sieve method' to be the best citizen science option for sampling microplastics in fresh water.

This document serves as a guide for sampling microplastics in Lake Wānaka and beyond, enabling school students to gather data and build on Veronica's research over time.

Microplastics in the form of fibres & fragments found in the Mātakitaki / Matukituki River.



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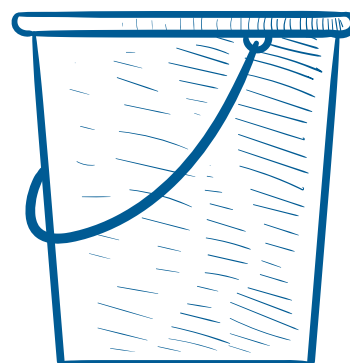
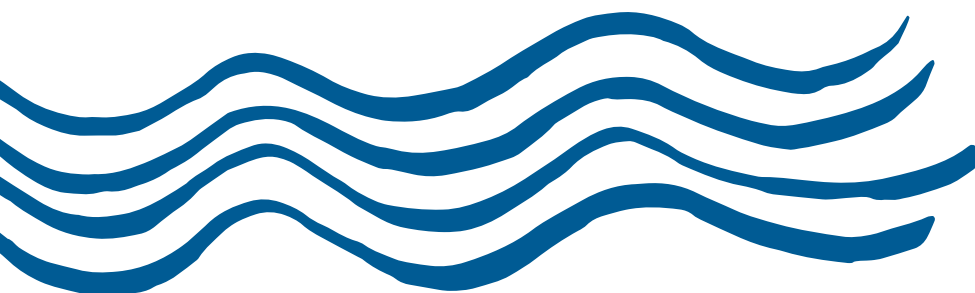
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EQUIPMENT:

PREPARATION AND FIELD WORK



125 μ m STAINLESS
STEEL SIEVE



SQUEEZE BOTTLE



CARDBOARD BOX TO
STORE SIEVE



STAINLESS STEEL
FUNNEL TO FIT SIEVE



12L STAINLESS STEEL
BUCKET WITH MARKED
10L LINE



500ML GLASS JARS
WITH LIDS

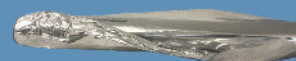
DEPENDANT
ON SAMPLE
SIZE,
INCLUDING
BLANKS



ULTRA-PURE
DEIONISED (DI) WATER



PYRONEG SOLUTION



ALUMINIUM FOIL



CLOTHING MADE FROM
NATURAL FIBERS

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EQUIPMENT: LAB WORK



ULTRA-PURE
DEIONISED (DI) WATER



SQUEEZE BOTTLE



ALUMINIUM FOIL



1.6 μm PORE SIZE GLASS
FIBRE FILTER PAPERS



DISSECTION
MICROSCOPE



FINE TIP STAINLESS
STEEL FORCEPS



NITRILE POWDER FREE
GLOVES



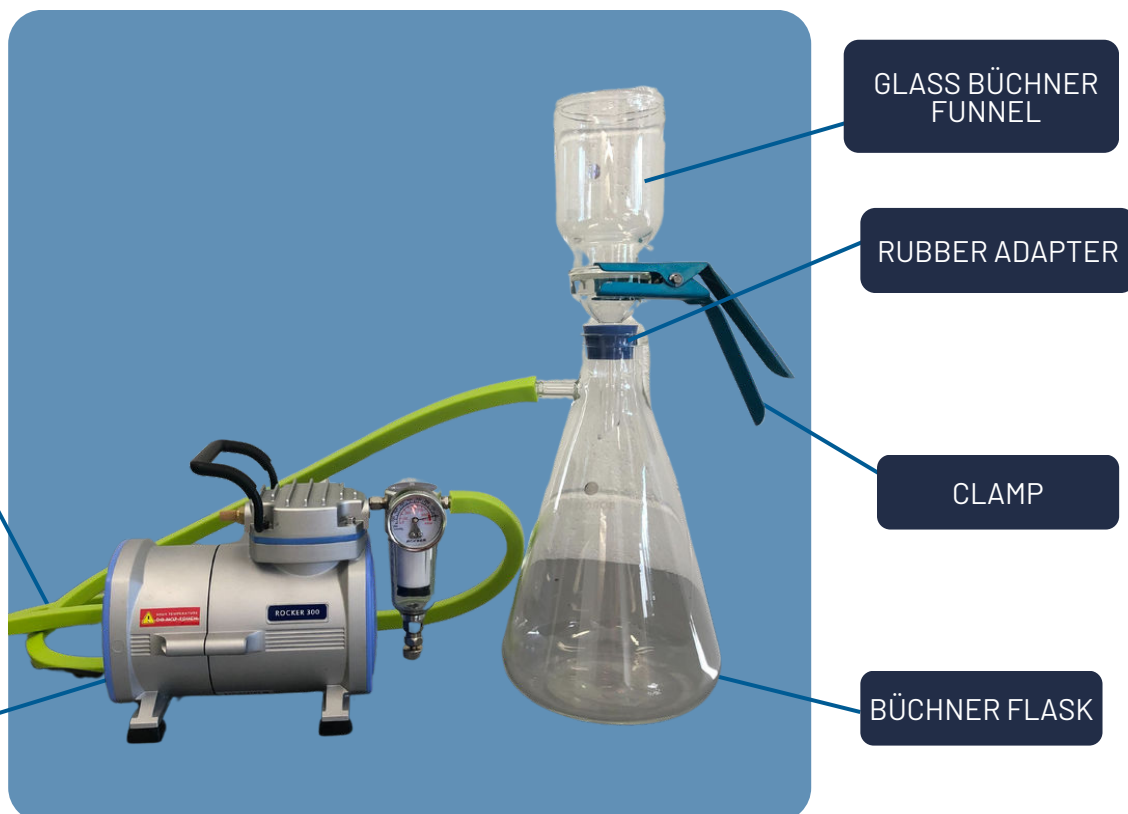
LAB COAT

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EQUIPMENT:

LAB WORK CONTINUED



GLASS BÜCHNER FUNNEL

RUBBER ADAPTER

CLAMP

BÜCHNER FLASK

RUBBER VACUUM TUBING

VACUUM PUMP

VACUUM FILTER SET UP INCLUDING:
VACUUM PUMP, CLAMP, BÜCHNER
FLASK, BÜCHNER FUNNEL WITH
RUBBER ADAPTER, AND RUBBER
VACUUM TUBING



[CLICK HERE
for how-to](#)



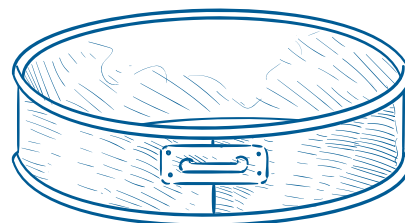
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METHOD:

PREPARATION

- 1 THOROUGHLY WASH 500 ML GLASS JARS IN DETERGENT OR PYRONEG SOLUTION. RINSE FOUR TIMES WITH ULTRAPURE WATER AND LEAVE UPSIDE DOWN TO DRY ON A CLEAN WORKSPACE. COVER DRYING JARS WITH ALUMINIUM FOIL TO PREVENT AIRBORNE FIBRES FROM SETTLING ON THEM.
- 2 ONCE DRY, CUT OUT SMALL SQUARES OF ALUMINIUM FOIL AND COVER JARS BEFORE SCREWING THE LID ON TOP.
- 3 LABEL JARS BY SAMPLE SITE AND REPLICATE NUMBER. AIM FOR 5 REPLICATES PER SITE.
- 4 PREPARE ENVIRONMENTAL BLANKS TO PLACE OUT AT THE TIME OF SAMPLING BY FILLING TWO GLASS JARS HALF FULL OF ULTRAPURE DI WATER PER SAMPLE SITE.



Method:

FIELD WORK

- 1 OPEN TWO GLASS JARS HALF FULL OF ULTRAPURE DI WATER AND LEAVE OUT FOR THE ENTIRETY OF THE SAMPLING AT EACH SITE.
- 2 RINSE STAINLESS STEEL BUCKET AND BACKWASH SIEVES THOROUGHLY IN SAMPLING SITE WATER

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3 USING A STAINLESS STEEL BUCKET, POUR 60L OF WATER OVER THE SIEVE IN 10L INCREMENTS. SAMPLES SHOULD BE TAKEN FROM THE SIDE OF A BOAT OUTSIDE OF WAKE ZONE, OR UPSTREAM OF YOUR POSITION TO AVOID CONTAMINATION OR AGITATION.

4 USING THE SQUEEZE BOTTLE FILLED WITH SITE WATER, FLIP SIEVE ONTO STAINLESS STEEL FUNNEL AND BACKWASH CONTENTS INTO LABELLED GLASS JAR. REPLACE LID WHEN FULL.

5 MOVE RANDOMLY 10M IN ANY DIRECTION AND REPEAT FOR EACH OF THE FIVE REPLICATES AT THE SITE.

6 STORE JARS IN A DARK FRIDGE OR DARK ROOM TO REDUCE ANY GROWTH OF PHOTOSYNTHETIC ORGANISMS UNTIL LABORATORY PROCESSING OCCURS.



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METHOD:

LAB WORK

- 1 PLACE TWO LABORATORY BLANK GLASS FIBRE FILTER PAPERS OUT IN THE WORKING AREA TO PICK UP AIRBORNE CONTAMINATION WHEN SAMPLES ARE EXPOSED (SEE VIDEO ON NEXT PAGE).



[CLICK HERE for setting up control samples/blanks how-to](#)



- 2 VACUUM FILTER EACH SAMPLE THROUGH A 1.6 μ M GLASS FILTER PAPER. RINSE THE BUCHNER FUNNEL FOUR TIMES USING A SQUEEZE BOTTLE FILLED WITH ULTRA-PURE DI WATER, AND LEAVE VACUUM ON TO RINSE BOTTOM OF BUCHNER FUNNEL ONTO FILTER PAPER (SEE VIDEO ON NEXT PAGE)

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[CLICK HERE for vacuum filter and rinsing Buchner funnel how-to](#)



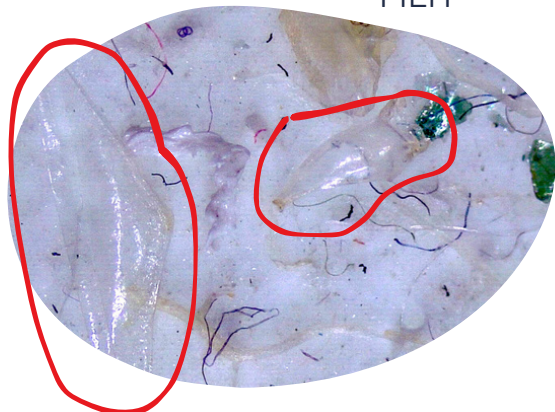
- 3 USING A DISSECTION MICROSCOPE AT 20× TO 60× MAGNIFICATION, PERFORM A VISUAL IDENTIFICATION OF MICROPLASTICS. MICROPLASTIC **FRAGMENTS** ARE IDENTIFIED AS PARTICLES OF OFTEN IRREGULAR SHAPE WITH NO EVIDENCE OF CELLULAR STRUCTURE (UNLIKE ORGANIC); **FIBRES** WITH AN EQUAL THICKNESS ALONG THE LENGTH; **NURDLES** CAN BE IDENTIFIED AS SMALL ROUND BEADS; **FILMS** AS THIN AND FLAT PIECES; AND **FOAMS** AS LIGHT, POROUS PARTICLES. MICROPLASTICS ARE CATEGORISED AS PARTICLES UNDER 5MM IN SIZE. ONCE IDENTIFIED, THE COLOUR, SHAPE AND NUMBER OF MICROPLASTICS ARE TO BE RECORDED. (SEE VISUAL OF DIFFERENT TYPES ON NEXT PAGE).
- 4 CARRY OUT THE SAME VISUAL IDENTIFICATION FOR ENVIRONMENTAL AND LABORATORY BLANKS.

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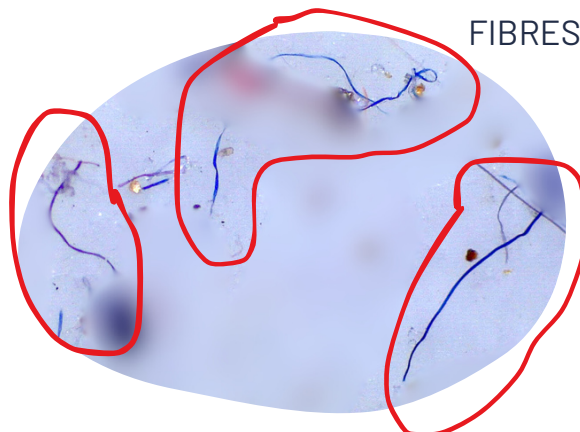


TYPES OF MICROPLASTICS

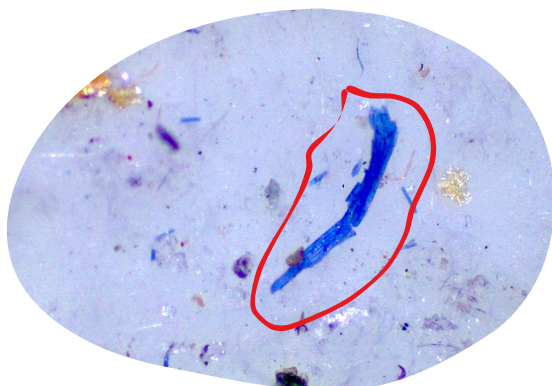
FILM



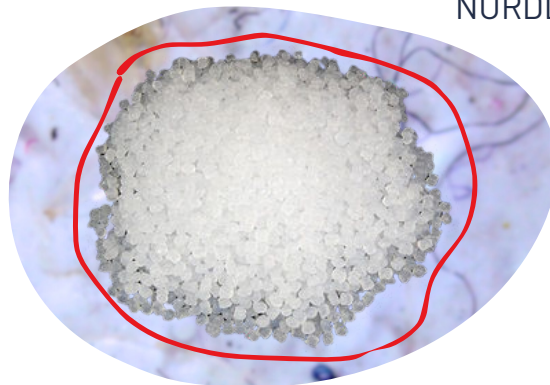
FIBRES



FRAGMENTS



NURDLES



'Spotters Guide to Plastic Pollution'



DATA ANALYSIS

- 1 CORRECT COUNT DATA BY SUBTRACTING NUMBER OF PARTICLES IN ENVIRONMENTAL AND LABORATORY BLANKS FROM RELEVANT SITE COUNT DATA.
- 2 THE MICROPLASTICS ABUNDANCE IN WATER SHOULD BE EXPRESSED AS MICROPLASTICS (MP) PER L⁻¹.

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KĀ MIHI NUI

THANK YOU VERY MUCH

A huge thank-you goes out to:

Marine Scientist Veronica Rotman, the University of Auckland and the University of Otago

As well as the Otago Participatory Science Platform for supporting this initiative.



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