ATTACHMENT THIRTY
Cup Coral Management Plan (“CCMP”)

McCALLUM BROS LTD
Established 1904

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Te Ākau Bream Bay Sand Extraction Project

Cup Coral Management Plan (CCMP)

October 2025

Revision history

Title: McCallum Bros Limited Bream Bay Sand Extraction Project Cup Coral Management Plan					
Date	**Version**	**Description**	**Prepared by**	**Reviewed by**	**Date certified**
14/07/2025	1	Issue for Wildlife Act Approval.	L.Davis	S.West J.Beaumont	
28/10/2025	2	Edits to Section 5	L.Davis	S.West J.Beaumont	

Glossary of Terms

MBL	McCallum Bros Limited
CCMP	Cup Coral Management Plan
TSHD	Trailing Suction Hopper Dredge

Limitations

This report has been prepared by McCallum Bros Limited (MBL) in collaboration with Bioresearches and reviewed by NIWA. The report has been prepared to a specific scope of work. The report cannot be relied upon by a third party for any use without written consent of MBL (the disclosing party).
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This document must always be displayed onboard the *William Fraser* at all times

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1.0 Introduction

McCallum Bros Limited (MBL) has been granted resource consent (*reference TBC*) for sand extraction at the Te Ākau Bream Bay Sand Extraction Site. This consent was given effect to on (*date TBC*) and expires on (*date TBC*). This consent allows for sand extraction of:

1. 150,000 m^3 of sand annually for the first three years.
2. After the first three years, the volume of extraction will increase up to 250,000m^3 annually over 32 years.

Sand extraction occurs using a trailing suction hopper dredge (TSHD) vessel, the "*William Fraser"*. During the extraction process, sand is fluidised into a slurry at the draghead via suction pulling sand and water through the draghead at the seabed. The sand slurry then moves up the draghead pipe, through a pump and onto the vessel where it is discharged onto a screen deck that utilises a dual screen layer system with a 20 mm screen above a 2.0 mm screen mesh to prevent larger material going into the load of the hopper. The larger 20 mm screen is likely to prevent larger, heavier, material from damaging smaller biota (including scleractinian cup corals) as they pass across the 2.0 mm screen. The oversized material (> 2.0 mm), including scleractinian cup corals, passes across the top of the screen and drops, via a pipe, into the forward port side moon pool where it drops through the vessel and exits, at keel height, under the vessel to return immediately to the seabed.

Monitoring has confirmed the presence of populations of solitary scleractinian cup corals (*Kionotrochus suteri* and *Sphenotrochus ralphae*) within the sand extraction and control areas at Te Ākau Bream Bay.

1.1 Purpose

The purpose of this draft Cup Coral Management Plan (CCMP) is to identify how the marine sand extraction process and monitoring will address, avoid, and manage the potential effects on populations of cup corals (Scleractinia) known to be present within the proposed extraction area (*Kionotrochus suteri* and *Sphenotrochus ralphae*). The report includes measures to reduce disturbance and the risk of incidental killing of these cup corals during the sand extraction at Te Ākau Bream Bay.

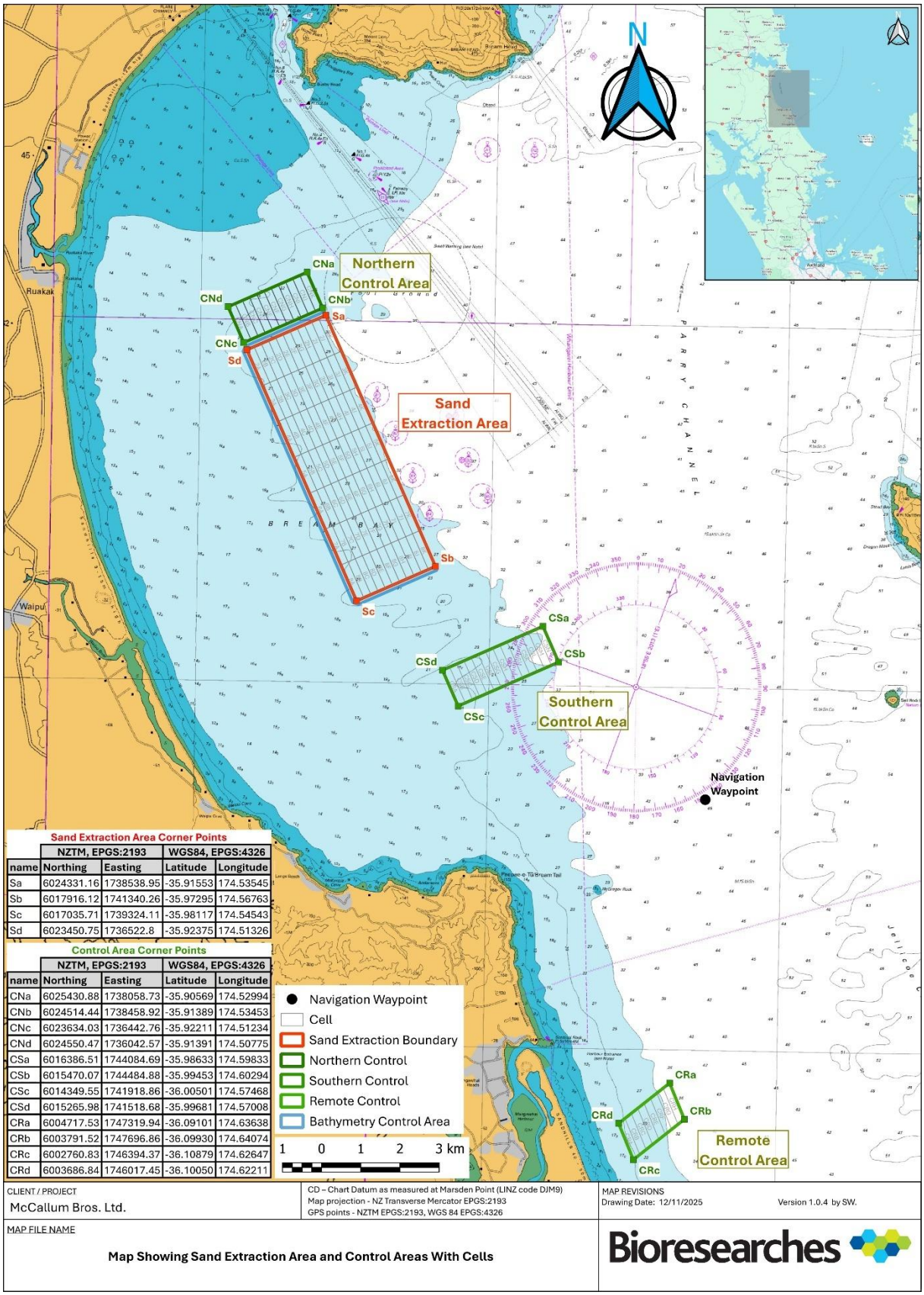
1.2 Scope

This CCMP applies to all MBL employees, including sub-contractors.

1.3 Objective

The objective of the certified CCMP is to avoid or minimise the risk of disturbance, possession and incidental killing of Cup Coral during both monitoring and sand extraction. The CCMP must include as a minimum:

a) The methodology and processes to minimise the disturbance, possession and incidental killing of cup corals during sand extraction,
b) The methodology and processes to minimise the disturbance, possession and incidental killing of cup corals during monitoring.



Sand Extraction Area Corner Points

	NZTM, EPGS:2193		WGS84, EPGS:4326	
name	Northing	Easting	Latitude	Longitude
Sa	6024331.16	1738538.95	-35.91553	174.53545
Sb	6017916.12	1741340.26	-35.97295	174.56763
Sc	6017035.71	1739324.11	-35.98117	174.54543
Sd	6023450.75	1736522.8	-35.92375	174.51326

Control Area Corner Points

	NZTM, EPGS:2193		WGS84, EPGS:4326	
name	Northing	Easting	Latitude	Longitude
CNa	6025430.88	1738058.73	-35.90569	174.52994
CNb	6024514.44	1738458.92	-35.91389	174.53453
CNc	6023634.03	1736442.76	-35.92211	174.51234
CNd	6024550.47	1736042.57	-35.91391	174.50775
CSa	6016386.51	1744084.69	-35.98633	174.59833
CSb	6015470.07	1744484.88	-35.99453	174.60294
CSc	6014349.55	1741918.86	-36.00501	174.57468
CSd	6015265.98	1741518.68	-35.99681	174.57008
CRa	6004717.53	1747319.94	-36.09101	174.63638
CRb	6003791.52	1747696.86	-36.09930	174.64074
CRc	6002760.83	1746394.37	-36.10879	174.62647
CRd	6003686.84	1746017.45	-36.10050	174.62211

CLIENT / PROJECT
McCallum Bros. Ltd.

CD – Chart Datum as measured at Marsden Point (LINZ code DJM9)
Map projection - NZ Transverse Mercator EPGS:2193
GPS points - NZTM EPGS:2193, WGS 84 EPGS:4326

MAP REVISIONS
Drawing Date: 12/11/2025 Version 1.0.4 by SW.

MAP FILE NAME

Map Showing Sand Extraction Area and Control Areas With Cells

Bioresearches

Figure 1: Map showing the proposed sand extraction area and control areas in Te Ākau Bream Bay. Source: Simon West, Bioresearches, personal communication.

2.0 This Plan

The key elements of this plan include:

- Section 1.0 – Introduces the purpose, scope and objectives of the plan.
- Section 3.0 – Provides an overview of the Scleractinia cup corals present within MBL's proposed extraction area.
- Section 4.0 – Sets out MBL's management processes to reduce disturbance and the risk of incidental killing of cup corals.
- Section 5.0 – Sets out the benthic biota monitoring plan.
- Section 6.0 – Provides information about communication.
- Section 7.0 – Sets out the management plan review frequency.

3.0 Scleractinia cup corals

Sphenotrochus ralphae and *Kionotrochus suteri* are both members of the family Turbinoliidae (Cnidaria, Scleractinia). Turbinoliidae are small (usually less than 10 mm) cup corals that occur mostly in moderately deep water in temperate and tropical seas (Beaumont et al. 2024 and references within). These corals have a hard calcium carbonate skeleton forming a cup-like structure that houses the polyp. Their small size and apparent interstitial habit within sandy substrates at lower shelf to upper slope depths (110-150m) have resulted in the collection of relatively few turbinoliidae specimens, and little is known about their modes of life and life history traits (Cairns 1997).

3.1 Sphenotrochus ralphae

Sphenotrochus ralphae (Squires 1964) is endemic to Aotearoa New Zealand. This species has a small triangular corallum with flat faces and rounded edges. The corallum is white or sometimes porcellanous and measures up to 9 mm in height (Figure 2).

Figure 2: Images of Sphenotrochus ralphae. photographed alongside a ruler for scale with each black line 1 mm apart. Left: top view; Right: side view. Source: Simon West, Bioresearches, personal communication.

3.2 Kionotrochus suteri

Kionotrochus suteri is also endemic to Aotearoa New Zealand. This species is up to 6.8 mm in CD and 6.5 mm in height (Figure 3). The corallum is white and often attached to a bivalve shell. Mature specimens have a conical corallum with a rounded base.

Figure 3: Images of Kionotrochus suteri. Source: Simon West, Bioresearches, personal communication.

3.3 Resilience of Scleractinia cup corals

While there is little available information on the behaviour or life histories of *Sphenotrochus ralphae* or *Kionotrochus suteri*, evidence in the literature suggests that members of the Turbinoliidae family of cup corals are well adapted to infaunal life and the challenges faced with living in mobile sediments. For example, corals can move vertically through sediments to escape burial (at least up to 1 cm), can burrow into sediments (perhaps as a predator avoidance strategy) and can return to an upright position after being overturned. In addition, many species of solitary cup coral, including those within the Turbinoliidae family, can regenerate both soft and skeletal tissues following fragmentation. This is true even of relatively small fragments (approximately 10% of original coral). See Beaumont et al. (2024) for further details.

MBL's sand extraction process has the potential to cause mortality and/or damage to benthic faunal species as they pass through the draghead and screening deck. However, previous survivorship studies showed that many benthic faunal species, particularly those smaller than approximately 20 mm, did survive this process at MBL's extraction site in the Mangawhai-Pākiri embayment, at least as far as being returned to the seafloor. Cup corals were not included in survivability studies as no live corals were observed within the samples. However, the presence of live *Sphenotrochus* corals within the sand extraction area at MBL's Pākiri site suggests that cup corals may have some ability to survive the proposed disturbance at Te Ākau Bream Bay. This is perhaps not surprising given the ability of corals to move within sediments and regenerate tissues if damaged.

It should be noted, however, that fragmented parts of corals would be unlikely to have the ability to escape sediment burial and may also be prone to predation on the seabed. As such, some mortality of fragments would be expected but the extent of such mortality is unknown. Sentoku et al. (2017) noted

that fragmented corals were able to burrow into sediments 188 days (a little over 6 months) following fragmentation. Survival of coral fragments following sand extraction would, therefore, be increased by returning damaged corals and/or fragments to an area that will remain undisturbed by active sand extraction for at least 7 months. It is, however, considered likely that repeated disturbance could reduce the resilience or survivability of cup corals following damage or fragmentation.

4.0 Management

4.1 MBL's sand extraction methodology

The following technology is used on the *William Fraser* which assist to reduce disturbance and incidental killing of cup corals:

- A draghead designed to minimise seabed disturbance and take a wider and shallower extraction furrow. Where the extraction track is an average of 100 mm deep and 1600 mm wide.
- A Dutch-designed screening deck, rather than flume pipes, which reduces damage to live animals passing through the draghead and increases the screening efficiency.
- Moon pools to immediately deliver the over-size material and sediment discharge below the water line to minimise turbidity.
- The moon pool system also reduces the aeration of the sediment and/or biota, which decreases their settling time, and therefore the time they may be vulnerable to predation, compared to the flume pipe and discharge over the side of the boat method.

During extraction, the sand slurry is discharged onto a double deck screening tower that utilises a 20mm screen and a 2.0mm screen mesh (Figure 4) to prevent larger material (which would include Scleractinia) going into the load of the hopper. The 20mm screen (not pictured) is likely to prevent larger heavier material from damaging smaller biota such as the cup corals.

Oversized material (<2.0mm) passes across the top of the screens and drops via a pipe into the forward port side moon pool and exits at keel height under the vessel. Having the oversize material pass through the moonpool and enter the sea at keel height reduces the aeration of the sediment (compared to pumping over the side of the vessel) which accelerates the descent of the suspended sediment in the water column, therefore reducing the effects on water quality.

Figure 4: Scleractinia cup corals retained on a 2 mm screen as per the William Frasers'. Source: Simon West, Bioresearches, personal communication.

The screened sand passes through the screen deck and into two pipes that run along the sides of the hopper. As the sand slurry drops into the hopper, the water velocity slows, and the sand settles out. The water and any finer suspended micro-sediments (<2.0mm, including any remaining cup corals) will pass out of the hopper and into one of the six moon pools (three on each side of the hopper) which discharges any oversized or suspended sediments under the vessel's keel. It is expected all cup corals will be retained on the sieve and returned to the seafloor via the moonpool.

4.2 Spatial management of sand extraction

The sand extraction rotation methodology, as outlined in the Sand Extraction Operation Plan, will result in the same extraction tracks not being reused for up to 1 year. This would maximise the time available for damaged/fragmented corals to regenerate between disturbance events, giving them the ability to move through sediments to escape burial (Beaumont et al, 2024).

5.0 Monitoring

5.1 Benthic biota monitoring methodology

Due to the small size and difficulty in locating and collecting cup corals within the sand extraction area, salvaging and relocating these corals is not considered feasible. Therefore, alternative management measures are required to monitor and understand their presence and condition.

A benthic monitoring program will be implemented to assess the presence of benthic biota including cup corals within and around the sand extraction area. Monitoring will be conducted annually for the first seven years following the commencement of extraction activities, and then at a reduced frequency of no greater than 3 years for the duration of the consent, to provide data on ecological changes and coral presence.

The sand extraction area and three control areas as shown in Figure 5 have been divided into monitoring cells 1000m long and 200m wide.

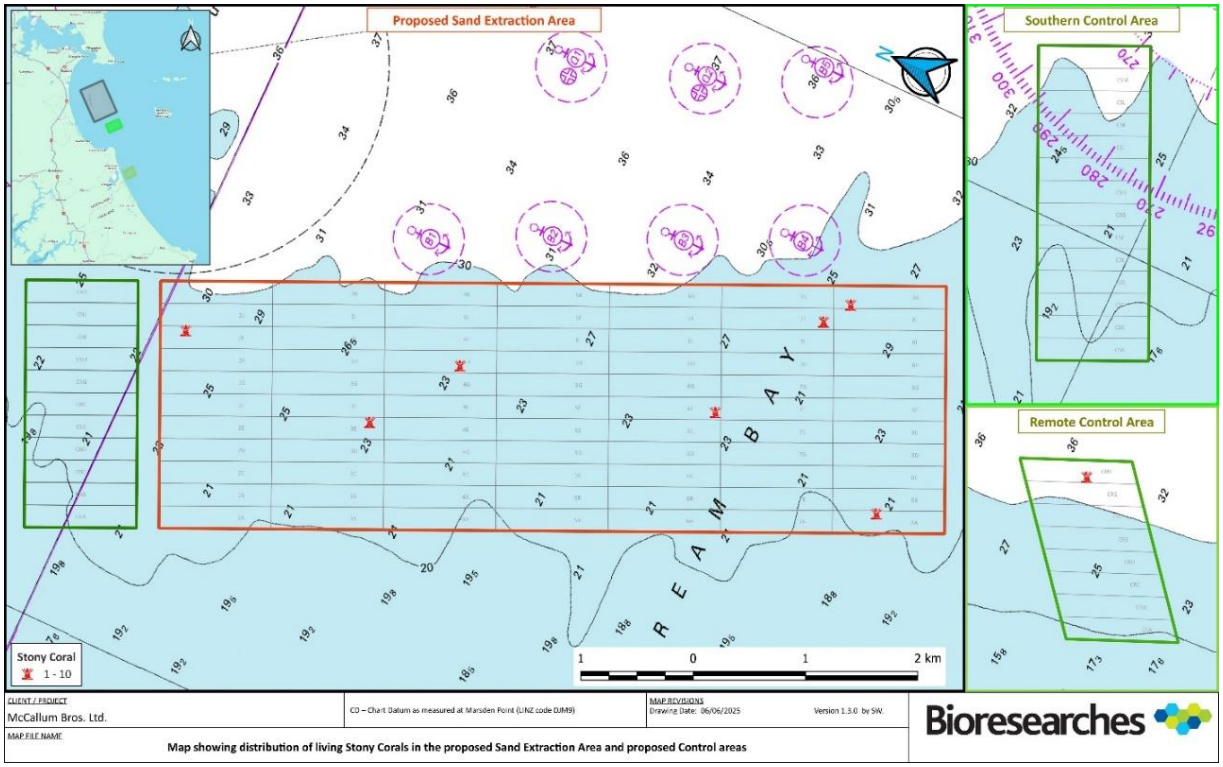


Figure 5: Map Showing the cells within the proposed Sand Extraction Area and proposed Control Areas. The red symbols indicate the location of live cup corals observed during previous monitoring. Source: Simon West, Bioresearches, personal communication.

5.1.1 Drop Camera

A drop camera will be used to quantify benthic species and communities within the proposed sand extraction and control areas within Te Ākau Bream Bay. At each sampling period, at least three camera drops will be made within each of 77 extraction cells and five drops per cell in the 33 cells within the control area (a total of at least 396 deployments). The frame of the drop camera rests on the seafloor during the camera survey. The camera frame is 1 m2 with a large void in the centre to image the

sediments (Figure 6). An area of approximately 0.05 m2 makes contact with the seabed at each deployment, or approximately 19.8 m2 in total for each sampling period.

Figure 6: MBL's drop camera frame. Source: Shayne Elstob, MBL, personal communication.

5.1.2 Grab Sampling

At three stratified random locations within each cell of the sand extraction area, and at five locations in each control area cell, benthic grab samples will be collected using a modified standard ponar grab sampler (sample area 0.071 m², bite depth ~100 mm). At each sampling period, at least three grab samples will be collected from each of 77 extraction cells within the sand extraction area together with at least five grab samples from each of 33 cells within the control areas.

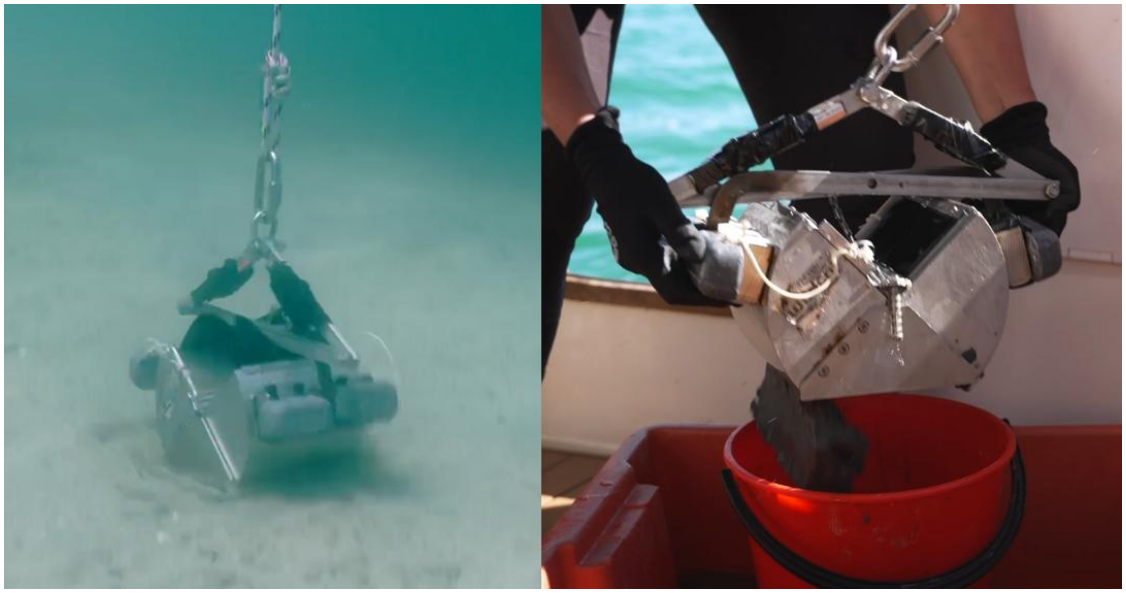


Figure 7: Modified standard ponar grab. Left: collecting a sediment sample on the seabed. Right: Sediment sample being emptied into a bucket. Source: Simon West, Bioresearches, personal communication.

Upon arriving at the surface, collected sediment samples are deposited into a clean fish bin. The sample is then homogenised by mixing and two 100 ml subsamples taken for analysis of sediment properties. Samples with volumes less than 2L will be discarded and recollected to ensure sufficient sample size. Each of the 396 samples will be puddle sieved, washing each whole sample through 3 mm and 1 mm mesh sieves in buckets of seawater, immediately after collection to separate biota from sediment.

Biota retained on the 3 mm sieve (Figure 6) will be visually inspected by a SEQP for the presence of cup corals or notable macrofauna. If detected, they will be photographed, enumerated, and returned to the seafloor. Exposure of fauna (e.g., live corals) to air will be minimised where possible.

Figure 8: Scleractinia cup corals retained on a 3 mm sieve as part of Bioresearches monitoring methodology. Source: Simon West, Bioresearches, personal communication.

The remaining material retained on the 3 and 1 mm sieves will then be transferred to a polyethylene 'zip lock'-type bag with a pre-printed waterproof label (identifying site, sample date and testing required), and preserved in a solution of 5% glyoxal, 70% ethanol sea water solution, sealed and placed in a second polyethylene 'zip lock'-type bag and packed into a labelled plastic container, for transportation to the laboratory.

Prior to sorting, the samples will be rinsed on a 1 mm sieve with freshwater and placed in a white sorting tray. All organisms will be picked out of the samples and placed in labelled vials of 70% ethanol solution prior to taxonomic identification (to the lowest taxonomic group possible) and counting.

Only animals with intact heads and/or coral will be identified and counted, by an SQEP benthic taxonomist. Both living and dead corals will be identified and counted, with the living and dead specimens counted separately.

All samples will be store in a secure restricted access room and any specimens of cup corals will be disposed of following reporting. Numbers, locations, identification, life status of all cup corals will be

reported to DOC as required by the Wildlife Act (1953) and sent to NIWA who are authorised to hold them.

5.1.3 Epibenthic dredge

At each sampling period, a single dredge tow will be conducted to sample for the presence of macrofauna spread across every two cells (adjoining along the seaward side) of the proposed extraction area and three control areas, resulting in 55 tows in the sand extraction area and 16 in the control areas combined. The dredge (Figure 8) is 600 mm wide and will be towed at low speed (~<1kt) for approximately 200 m (approximately 120 m^2 per tow, or 6,600 m^2 in the sand extraction area and 1,920 m^2 in the control areas).

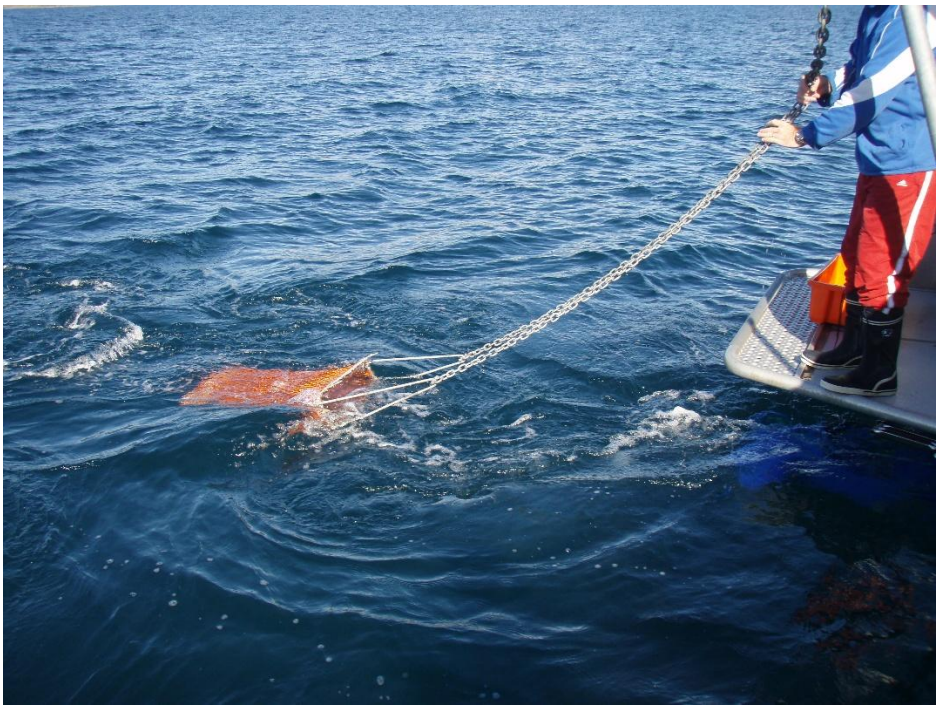


Figure 9: Epibenthic dredge being deployed. Source: Simon West, Bioresearches, personal communication.

The dredge is fitted with a 35 mm mesh bag which should allow any cup corals that enter the dredge to return to the seabed. All material retained on the dredge is sorted onboard, identified and returned to the seabed. Exposure to air is minimised where possible.

6.0 Communications

6.1 MBL's Roles and responsibilities

Role	Responsibilities
Managing Director	Oversees the overall operations and strategy of the company.
Chief Operating Officer	Oversees and manages the day-to-day operations of the company, implementing the managing director's vision and strategies to ensure efficient and effective business processes.
Operations Manager	Responsible for the coordination and management of vessel operations, including managing crew and planning transit routes.
Compliance Manager	Manager for vessel and crew health and safety, including destination port and maritime compliance obligations.
Environmental Manager	Environmental compliance and management, including consent and environmental monitoring and reporting.
Compliance Officer	Responsible for recording and reporting obligations related to vessel analytics, extraction amounts, and extraction tracks.
Master William Fraser	Responsible for the navigation and operation of the *William Fraser* at berth, transit, and while extracting.

Table 1: Roles, responsibilities, and contact details relevant to the Extraction Management Plan. Source: McCallum Bros Limited

6.2 Key Contacts

The key contacts for matters set out in this CCMP are set out in Table 2.

Party	Person	Phone	Email
NIWA	Jennifer Beaumont	[redacted]	[redacted]
Bioresearches	Simon West	[redacted]	[redacted]
MBL's Environmental Manager	Luke Davis	[redacted]	[redacted]
DOC approved cup coral expert	TBC		[redacted]
Northland Regional Council	TBC		

Table 2: Key contacts.

7.0 Management plan review

A review of this CCMP will be undertaken annually by a SQEP(s). This review will assess if any changes in the sand extraction or monitoring methodology can be practically implemented to reduce the risk of disturbance and incidental killing of cup corals.

References

Beaumont, J., Anderson, O., Mills, S. (2024). Scleractinian cup corals at Te Ākau Bream Bay Literature review and distribution of cup corals identified within the proposed sand extraction area. National Institute of Water & Atmospheric Research Ltd.

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Sentoku, A., Tokuda, Y., Ezaki, Y., Webb, G.E. (2017). Modes of regeneration and adaptaion to soft-botom subsrates of the free-living solitary scleractinian Deltocyathoides orientalis. Lethaia, 51: 102-111. 10.1111/let.12228

Squires, D.F. (1964). Flabellum rubrum (Quoy and Gaimard). New Zealand Oceanographic Institude Memoir No. 20: 40.

Appendix A: Wildlife Act Authorisation

To be appended once granted by Department of Conservation.

McCALLUM BROS. LTD

Established 1904