MOHIO - AUAHA - TAUTOKO
UNDERSTAND - INNOVATE - SUSTAIN

Bream Bay First Order Ecological Survey – Phase 2

Prepared for:

Prepared for: Bream Bay Guardians Society

.

PO Box 151, Raglan 3225, New Zealand
info@ecoast.co.nz | www.ecoast.co.nz | +64 7 825 0087

eCoast
eTakutai

Bream Bay First Order Ecological Survey – Phase 2

Report Status

Version	Date	Status	Approved by
0.0	18/05/2026	Internal Draft	EA
0.1	22/05/26	Draft for Client Review	STM
1.0	22/5/26	Minor Revisions	TH
1.1	25/5/26	Major Revision / Variation	STM

It is the responsibility of the reader to verify the version number of this report.

Authors

Shaw Mead, *BSc, MSc (Hons), PhD*

Tim Haggitt, *BSc, MSc (Hons), PhD*

Nakita Daniel, *BSc, MSc (Hons)*

Executive Summary

This report details a second first-order ecological survey of the proposed Te Ākau/ Bream Bay sand extraction area (15.4 km^2 in extent) as put forward by McCallum Brothers Limited (2026). At the time of writing, this application is currently under Fast Track Judicial Review (Fast -Track Approval Act, 2024). Main findings of the ecological survey include:

Physical characteristics of the seabed based on sled-tow video surveys revealed an array of surficial sediment types, which ranged from silty, fine, medium, and coarse sand, intermixed with patches of shell-hash and whole shell. The bedforms across the sampling site were dominated by sand ripples and mega-ripples and small sections of peat reef (identification pending) were observed and sampled further via scuba at one location. The occurrence of peat reef matched that of an earlier survey that found this habitat adjacent the northern boundary of the sand extraction area in January 2026.

The complexity afforded by the seabed structure provides important habitat for a range of fauna and flora (predominantly attached to shells) and the multitude of organisms that occupy the sediment surface in turn modify and engineer the sediment, thus providing important ecosystem functions and services.

These important ecosystem functions and services which support coastal fisheries, biodiversity and environmental health, include:

- Effects on the microphytobenthos.
- Habitat Provision: The formation of three-dimensional biogenic structures (such as reefs and shell banks) to provide shelter, breeding, and nursery areas for a wide variety of mobile fauna.
- Sediment Stabilisation and Modification: Benthic organisms modify sediment through bioturbation (burrowing and building), which reduces erosion, increases seabed complexity and alters the local habitat.
- Nutrient Cycling and Regeneration: Benthic organisms break down organic matter and recycle vital nutrients that support the overall productivity of the marine ecosystem.
- Contaminant Processing: Many of the fauna and microorganisms within the sediment can filter, detoxify, and process organic waste and pollutants from within the water column.
- Water Filtration: Shellfish and other benthic species filter-feed, which enhances water clarity and removes suspended particulate matter.

- Carbon Sequestration: The activity of benthic organisms buries organic carbon within the sediment, which helps to mitigate climate change.

Based on the known impacts of seabed mining undertaken in similar depths in the Mangawhai-Pakiri such as:

Biological: loss of biogenic habitat species (e.g., horse mussel beds), large reductions in epifauna (e.g., scallops), large scale changes in benthic species composition and abundances (shift in species from complex, long-lived often biogenic communities to simpler ones dominated by opportunistic, fast-reproducing species); and,

Physical: massive and widespread changes to the seabed structure e.g., Dr. Mike Hilton (University of Otago) suggests that the results of sand extraction provide "a very worrying picture of the extent and density of trenches and marks on the Pakiri seabed. Imagine a ploughed paddock ... one that is hundreds of ha in area". Collectively, both biological and physical impacts lead to a net loss of the important ecosystem functions and services of the benthos described above, which will be greatly modified and degraded resulting in significant ecological impacts.

The sampling areas within the proposed sand extraction area from a biological standpoint were found to be teeming with life. Many areas were dominated by crab, worm, and shrimp holes, tube worm guilds (that protruded from the sediment surface) and mobile epifauna bivalves (gastropods, hermit crabs and seastars). These organisms play important roles in terms of sediment reworking, nutrient cycling, larval settlement and are food for numerous fishes, e.g., eagle rays that were observed as part of the survey.

Of the mobile epifauna evaluated, tipa/scallops, which are culturally commercially and recreationally revered, occurred within 74 % of video transects. Of these, densities ranged from 0.2 to 15.4 per 100 m^2 with many substantially higher than estimates made for the ecological assessment of effects West and van Winkel (2025). That study suggested scallops occur in low numbers ranging from 0 to 2.5 scallops per 100 m^2, with an average density of 0.35 scallops per 100 m^2 from tows within the sand extraction area. Densities that are considered to be commercially acceptable for harvesting are >1 per 25m^3 or >4 per 100m^2; thresholds that were met within many sample transects for this study.

The peat-reef habitat that is akin to rocky reef habitat was an unexpected find within the proposed extraction area, however, adds to the biological diversity through provision of hard structure that supported sponge and red algal communities. In addition, numerous fishes (trevally, blue cod, snapper, snake eel, octopuses, and crustaceans (packhorse lobster and mysid shrimp) were associated with this habitat.

It cannot be overstated that the functioning of the Bream Bay seabed is exclusively biologically mediated and any activity that undermines this puts the long-term integrity, sustainability, and mauri of this entity in jeopardy. Irrespective of the proposed sand extraction the area must be considered under the current legislative framework, whereby there are complete bans on dredging activities to minimise disturbance to the seabed and help restore scallop densities and habitat complexity, the latter of which is required for both scallop settlement and on-growth, including predator avoidance.

Because the proposed sand extraction is non-selective, any or the marine biota described here has the potential to be impacted. There are also clear gaps in the understanding of the following:

- Impacts to existing habitat complexity that provides structure refuge and habitat for myriad organisms.
- Recovery rates of the seabed following sand extraction are not unknown, with Pakiri Beach sand extraction comparisons as a proxy irrelevant/not fit for purpose due to the monitoring methods applied during the dredging regime resulting in little understanding of the changes and damage done and any recovery; contrary to the applicants stance that the seabed recovers. Based on available evidence it is unlikely to recover throughout the duration of the consent and the longer-term effects on the ecosystem and its functions and services and unknown.
- Impacts have not been placed into the context that Bream Bay and surrounding areas are presently recovering ecosystems due to fisheries closures – primarily scallop dredging.
- No mention of impacts to the following within the extraction area:
    - Scallop swimming speeds have not been considered relative to the speed of the sand extraction equipment, or their limited swimming ability.
    - Impacts to the reefs communities not mentioned or considered.
    - Impacts to packhorse lobster not mentioned or considered.
    - Impacts to eagle rays and fishes (not mentioned or considered)
    - Impacts on microphytobenthos not considered.

The ecological surveys (albeit first-order) have demonstrated that the proposed sand extraction area is biologically diverse and ecologically important and impacts to the biota are not well understood.

Expertise and Experience

1. My name is Shaw Trevor Mead.
2. I am an Environmental Scientist and the Managing Director of eCoast based at Raglan, which is a marine and freshwater consulting and research organisation.
3. I hold a BSc in marine ecology (zoology and botany), a MSc (Hons) in Environmental Science, Marine Ecology and Aquaculture from the University of Auckland, and a PhD in Coastal Oceanography and Numerical Modelling from the University of Waikato. I have been working as an environmental consultant since 1994.
4. I have over 30 years' experience in marine research and consulting, have authored/co-authored 63 peer-reviewed scientific papers and two chapters in a practitioner's textbook on beach management[1] and surf science/coastal protection[2], and have solely or jointly produced over 700 technical reports pertaining to coastal oceanography, coastal engineering (design and impact assessments), marine ecology and aquaculture. I have also prepared over 80 expert witness statements and reports to support expert evidence for Resource Consent Hearings, Environment Court, High Court, and EPA Boards of Inquiry. I have undertaken over two thousand research and consulting SCUBA dives around the coast of New Zealand and overseas and have led many comprehensive field investigations that have addressed metocean, biological and chemical components of the coastal environment. I have previously been a lecturer (environmental change and coastal engineering) and research provider at UNITEC. I am a member of the New Zealand Coastal Society (ENZ), the New Zealand Association of Impact Assessment, and am on the editorial board of the Journal of Coastal Conservation, Planning and Management. In addition, I am a technical advisor for the Surfbreak Protection Society (NZ) and Save the Waves Coalition, which mostly entails consideration of marine structures and developments and the impacts they will have or have had on surfing breaks; I am co-author of the New Zealand Management Guidelines for Surfing Resources[3], which were first released in beta version in October 2018 and finalised in September 2019, and have been endorsed and adopted by the Department of Conservation (https://surfbreakresearch.org/downloads/
5. I have a background in coastal oceanography, numerical modelling, and marine ecology and aquaculture. I studied for my MSc degree at the University of Auckland's Leigh

---

[1] Mead S. T., 2017. *Chapter 6 - Beach Management*. In: Marine and Coastal Resource Management: Principles and Practices. Eds D. Green and J. Payne. Routledge, 328 pg.

[2] Mead S. T., and J. C. Borrero, 2017. *Chapter 16 -Surf Science and Multi-Purpose Reefs.* In: Marine and Coastal Resource Management: Principles and Practise. Eds D. Green and J. Payne. Routledge, 328 pg.

[3] Atkin, E., Bryan, K., Hume, T., Mead, S. T., and Waiti, J., 2019. Management Guidelines for Surfing Resources. Raglan, Aotearoa New Zealand: Aotearoa New Zealand Association for Surfing Research. ISBN: 978-0-473-49540-4. https://surfbreakresearch.org/wp-content/uploads/Management_Guidelines_for_Surfing_Resources.pdf

Marine Laboratory, undertaking subtidal research there from 1994 to 1996 directed at the fertilisation success of sea urchins as a basis for the sustainable management and development of the commercial market. My MSc in Environmental Science, Marine Ecology and Aquaculture included 4th year Environmental Law and a dissertation on the Quota Management System (QMS) legislative review. My PhD was primarily in coastal oceanography and surf science, with the marine ecological components of my Doctorate directed towards subtidal habitat enhancement of marine structures. The physical oceanography component was focused on understanding the effects of coastal bathymetry on surfing wave breaking characteristics using field measurements (bathymetry surveys, aerial photography, and GPS positioning of in situ data collection) and hydrodynamic numerical modelling. My PhD thesis is comprised of 6 peer-reviewed Journal Papers that describe the meso-scale components that combine to create high-quality surfing breaks and empirical methods of determining wave breaking intensity of high-quality surfing waves.

6. My professional career has included involvement in a wide range of coastal consulting and research projects that have included the design of coastal structures and developments (coastal engineering), and assessments and monitoring of physical and ecological effects of marine construction, MPR design and surf break impact assessment, design of inland surf pools and wave generators, coastal erosion control, marine reserves, dredging, outfalls, oil industry[4], aquaculture ventures and various other coastal and estuarine projects that have included ecological assessments, hydrodynamic (waves and currents), sediment transport and dispersion modelling (including contaminants, suspended sediments, freshwater, hypersaline water, nutrients and petro-chemicals) and methods to mitigate, avoid or remedy impacts of coastal developments.
7. Further to this, with direct relevance to the present case, I am familiar with the offshore benthic ecology, nearshore marine ecology and physical oceanography of the Southern Taranaki Bight, and have previously investigated the area in association with the Kupe development and Maui platform (Mead *et al*., 2004a[5],b[6]; Mead and McComb,

---

[4] In 2012 eCoast's Directors made a conscious decision not to work in a number of areas due to the associated impacts on the environment that cannot be avoided, remedied or mitigated, and/or are affecting $C0_2$ emissions, climate change, and sea level rise.

[5] Mead, S. T., P. McComb, E. Crofskey and T. Haggitt, 2004a. Assessment of the Existing Intertidal Marine Ecology and Usage in the Vicinity of the Kupe Development Project. Prepared for Origin Energy, July 2004.

[6] Mead, S. T., P. McComb, and E. Crofskey, 2004b. Assessment of Marine Mammals, Fisheries and Other Potential Usage in the Vicinity of the Kupe Development Project. Prepared for Origin Energy, July 2004.

2004[7]; McComb *et al*., 2004[8]; Mead *et al*., 2005a[9]), have undertaken an ecological survey of the North and South Traps (Mead *et al*., 2005b[10]), and provided expert evidence pertaining to the impacts of offshore seabed-mining on surf breaks in the region (Mead, 2014[11]). I also prepared expert evidence KASM based on a review of the benthic ecology component of Tran Tasman Resources Limited TTRL's (TTRLL) 2016 application for marine consents and marine discharge consents to extract and process iron sand in an area of seabed known as "Patea Shoals" within the South Taranaki Bight (STB)[12].

8. With respect to the impacts of dredging, collection of oceanographic and biological data, my following experience is of relevance:
9. In addition to South Taranaki Bight iron ore mining (TTRL), I have been involved with consideration of the impacts of dredging (physical and ecological) for the offshore, nearshore and inshore seabed mining in the Mangawhai-Pakiri embayment, the Northport channel deepening and disposal application, Lyttleton Port channel deepening and disposal application, Chatham Rise deep-sea phosphate mining, Centerport channel deepening, Port Otago channel deepening and disposal, Tauranga Harbour channel deepening, large scale dredging and disposal in Vietnam, large scale lagoon dredging for aggregates and land reclamation and heightening in the Republic of the Marshall Islands, and several other dredging related studies/applications in Australasia and the South Pacific Islands.
10. I have undertaken a large number of seabed surveys (>150) up to 200 m deep and incorporating intertidal areas (latterly with the application of RTK-GPS enabled drones), underwater mapping surveys over 10's to 100's of square kilometres using remote techniques (e.g. drop-cameras, grab-samplers video-sleds underwater drones, side-scan sonar, magnetometer, bathymetry, physical and chemical properties, etc.) to consider existing biological and physical environments for consideration of dredging

---

[7] Mead, S. T., and P. McComb, 2004. Overview of the Existing Marine and Coastal Processes, and the Marine and Benthic Flora and Fauna in the Vicinity of the Kupe Development Project. Prepared for Origin Energy, July 2004.

[8] McComb, P., S. T. Mead, and B. Beamsley, 2004. Summary of the Existing Oceanographic Environment in the Vicinity of the Kupe Development Project. Prepared for Origin Energy, July 2004

[9] Mead, S. T., J. Govier, and P. McComb, 2005a. Maui FPSO Decommissioning - A review of the options for creating an artificial reef with the Whakaaropai mooring components. Prepared for Shell Todd Oil Services Ltd, February 2005

[10] Mead, S. T., J. Govier, and J. Frazerhurst, 2005b. Patea Traps Marine Survey: Bathymetry and Remote-Video Surveys. Interactive DVD prepared for the Wanganui Conservancy, Department of Conservation, August 2005.

[11] Mead, S. T., 2014. Statement of Evidence in Chief of Dr Shaw Mead; Potential Impacts on Surfing Wave Quality Due to Seabed Mining. Prepared for of Trans-Tasman Resources Ltd, EPA Hearing, January 2014.

[12] STATEMENT OF EVIDENCE BY SHAW TREVOR MEAD ON BEHALF OF KIWIS AGAINST SEABED MINING INCORPORATED. Dated 23 January 2017. IN THE MATTER of the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 ("the Act") AND IN THE MATTER of the applications by Trans Tasman Resources Limited (TTRL) for marine and discharge consents to recover iron sand under sections 20 and 87B of the Act and BETWEEN Trans Tasman Resources Limited (Applicant) AND The Environmental Protection Authority EPA AND Kiwis Against Seabed Mining Incorporated (KASM) (Submitter).

(e.g. Tawara lagoon climate change resilience programme in Kiribati; Nasese Waters dredging in Suva Harbour, Majuro and Ebey lagoons in the Republic of the Marshall Islands), the selection of marine protected areas, for numerical modelling purposes, ports and marinas, and a range environmental impact assessments for a wide range of coastal developments.

11. I prepared expert evidence for the Mangawhai-Pākiri offshore extraction resource consent renewal Hearings in 2021 through 2023, which included surf break impact assessment, investigations into the offshore dredging activities in comparison to the resource consent conditions and the discovery of previously known and unreported deep shore-parallel trenches created by repeatedly dredging the same lines for multiple years. I am currently the benthic marine ecology representative on the Mātauranga Māori Expert Panel reviewing the temporary offshore consent. In early 2025, I prepared a statement of evidence on the impacts on benthic ecology due to the proposed seabed mining in the Southern Taranaki Bight for the Taranaki Offshore Partnership for the Fast Track Act.
12. I am also very experienced with respect to the monitoring and data analysis of benthic environments, with my first experience with benthic monitoring during a summer scholarship at the Leight Marine Laboratory at Goat Island Marine Reserve in 1992, where long-term monitoring has been underway since the early years of the establishment of the world's first marine reserve in the mid-1970's. I have been involved with, and designed the monitoring approach, for many biological, physical and chemical monitoring campaigns, including projects directly relevant to the TTRL application such as benthic communities (rocky and soft substrate), fish abundance and red lobster abundance at Leigh and Hahei Marine Reserves (since 2006), a BACI (Before/After, Control/Impact) monitoring campaign of Makara Estuary to detect any impacts of wind farm construction for the Mill Creek development (Meridian Energy), a BACI monitoring programme from 2017 to 2021 to determine the impacts of causeway and bridge construction on the intertidal communities (rocky and mud/sand) and seagrass beds in Whaingaroa (Raglan) Harbour , as well as the recently completed multi-harbour multi-year BACI monitoring campaign to determine the changes to the benthos (biological, physical and chemical) under oyster farms following the conversion from traditional rack farming to floating flip farms for NZ's largest oyster producer, Moana Pacific[13].

---

[13] From August 2021 to April 2024 at Whangaroa, Parengarenga and Coromandel Harbours. E.g., Mead, S. T., T. Haggitt, E. Atkin, L. Munson, and N. Daniel, 2024. Parengarenga Harbour Oyster Farm Conversion: Monitoring (February 2024). Prepared for Moana NZ, July 2024.

Code of conduct

13. Although these proceedings are not before the Environment Court, I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note (2023), and I agree to comply with it as if these proceedings were before the Court. My qualifications as an expert are set out above. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

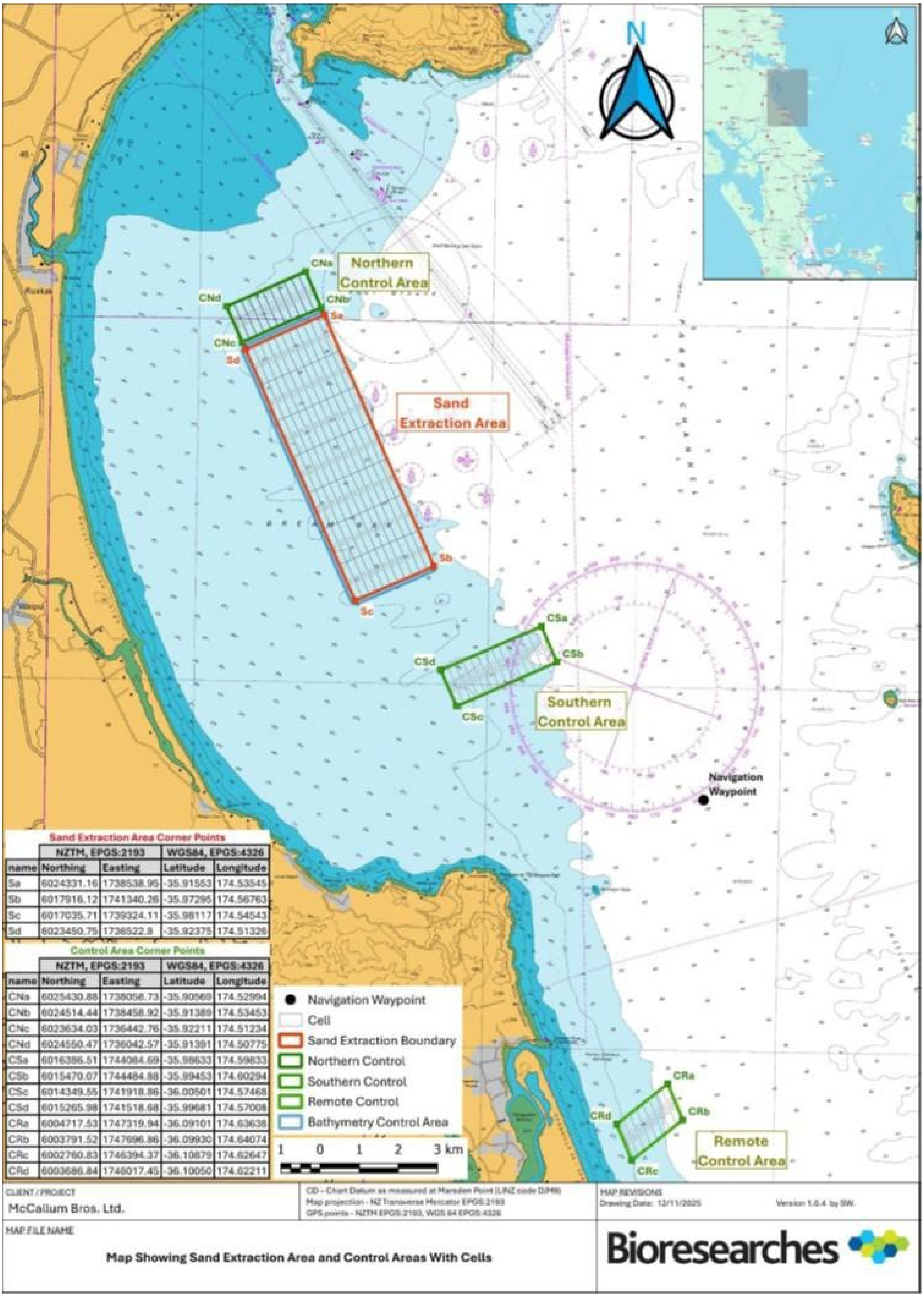
Contents

1 Introduction

This report marks a second "first order" ecological survey of the Te Ākau/Bream Bay marine ecosystem undertaken within a nearshore coastal area 15.4 km^2 that has been earmarked by McCallum Brothers Limited (MBL) for sand extraction. The take has been equated to 8.25 million m$^{3 \text{ over}}$ a 35-year period (see Figure 1-1 for area put forward by MBL). An earlier survey conducted between December 2025 and January 2026 based on grab sampling and diver surveys found that the area was biologically diverse and contained biogenic habitat of high ecological value Appendix 1).

The planned approach for this survey was to increase the spatial resolution through sampling surficial sediments via remote video survey (towed video sled) and examine videos for ecologically important species particularly: 1) tipa/scallops of which there is a complete ban on harvesting since 2022 under section 11 of the Fisheries Act (1996) Dr James Williams, NIWA personal communication in 2026; and, 2) other key biota that is present within the sampling area.

In addition, a review of the MBL Assessment of Ecological Effects proposal West, S., and van Winkel, D. (2025). Te Ākau Bream Bay Sand Extraction Project, Report for McCallum Bros Limited. pp 120, was undertaken.



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 DJM8)
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 1-1: Location map of proposed sand extraction area and control sites. Source MBL fast Track Application.

1.1 Review of McCallum Brothers fast track application

eCoast undertook a review of the MBL AEE pertaining to benthic marine ecology with several salient points being as follows:

- The benthic biota of the proposed sand extraction area was diverse with a total of 197 taxa with an average of 26.7, ranging from 8 to 41 taxa per sample. The number of individuals per sample in the proposed sand extraction area ranged from 12 to 520, averaging 103.2 per sample. No beds of large habitat forming biota such as horse mussels were present.
- Scallops were reported as representing the only taxa with commercial value but were found in low numbers, ranging from 0 to 2.5 scallops per 100 m^2, with an average density of 0.35 scallops per 100 m^2 from tows within the sand extraction area (Table E.1 West, *et al*., 2025).
- Of note, two species (*Kionotrochus sutrei*, *Sphenotrochus* sp.) of stony cup corals were recorded as present but in **very low numbers** with only 2 *Kionotrochus* and 7 *Sphenotrochus* recorded. The *Sphenotrochus* species is most likely *Sphenotrochus ralphae* not *Sphenotrochus squiresi* which is listed as "At risk - Naturally uncommon" in the NZTCS (Funnell *et al*. 2023). While neither *Kionotrochus* nor *Sphenotrochus* were listed as at risk, yet they are both protected under the Wildlife Act (1953). Under the Act, it is illegal to deliberately collect or damage these corals.
- Benthic Fish: No fish count assessments were conducted in the proposed sand extraction area in Te Ākau Bream Bay. Long-finned sand diver (*Limnichthys polyactis*), New Zealand sand diver (*Tewara cranwellae*), Sand snake-eel (*Ophisurus serpens*) and New Zealand lumpfish (*Trachelochismus pinnulatus*) are known to be present in the proposed sand extraction area as they were captured in either the benthic grab samples or in the epibenthic extraction tow samples in March 2024 (West, *et al*., 2025). Of the species recorded, none are listed as being Threatened or at risk by the NZTCS.
- Te Ākau Bream Bay will result in a patchwork of shallow (100 mm deep) disturbed strips where not all species are removed (e.g., deeper burrowing polychaete worms and stomatopods, have been observed to remain in the seabed).
- Based on the lack of biogenic habitats and sediment grain size composition recorded in the proposed sand extraction area (West, *and* van Winkel, (2025), and research in other locations, recovery is expected to be in the 2-3 year range, assuming no additional disturbance or change of habitat occurs as a result of sand extraction in that 2-3 year period.

- The shallow (100 mm) depth profile of extraction has been shown to result in faster recovery times from the disturbance. Dernie *et al.* (2003) working in dynamic sandy habitats in northern Wales reported that sediment disturbances to deeper depths (200 mm) took more than 107 days to recover, and areas of shallower (100 mm) sediment disturbance took 64 days to recover.
- To the authors knowledge, there were no studies of the recovery of the sandy habitat in 20 to 30 m of water following sand extraction in New Zealand and only a handful of international studies found targeting recovery of sand mining (see AEE application for references), none of which match the Te Ākau Bream Bay site conditions and extraction methods.

There are several aspects of these points put forward by West and van Winkel. (2025; Bioresearchers) that are questionable in association with the proposed activity:

- The surveys found 'The benthic biota of the proposed sand extraction area *was [biologically] diverse* with a total of 197 taxa', which similar to the surveys presented here, indications that the seabed is an ecologically important and biodiverse area that should be managed appropriately.
- It is suggested that deeper organisms will not be affected by the activity. However, since at least 2019 it has been shown (by multibeam survey and seabed imaging – Mead, 2023) that the dredging targets the same areas multiple times; this was repeated in the temporary permitted site offshore of Mangawhai-Pakiri despite the concerns with negative ecological impacts of repeat dredging being raised in multiple occasions.
- The authors state that there are no studies of the recovery of the sandy habitat in 20 to 30 m of water following sand extraction in New Zealand, yet the same method of dredging has been undertaken by the same company since the late 2000's and there has been ample opportunity to consider recovery of these areas, especially withing the '2-3 year range' since dredging ceased.
- It is assumed that "recovery is expected to be in the 2-3 year range, assuming no additional disturbance or change of habitat occurs as a result of sand extraction in that 2-3 year period" However, this is not based on any scientific investigations; as above, despite the close-by areas in Mangawhai-Pakiri where dredging as ceased several years that could be surveyed to determine this, as well as how these areas today compare to the pre-dredging assessments of the mid-2000's.
- Indeed, the evidence of Dr. Andrew Jeffs (2023) within the context of the Pakiri-Mangawhai sand extraction states that "there have been no detailed in-situ serial studies of areas of seabed directly disturbed by the sand extraction device to confirm

the path to recovery or otherwise of the disturbed benthic habitat. This could be a reasonable expectation for an activity of this extent and duration". Dr. Jeffs also states that "The potential adverse effects of this activity on the benthic ecology could conceivably consist of long-term (i.e., >10 years) or perhaps permanent loss of the natural biodiversity, productivity, community structure and ecological functioning of a relatively large area (i.e., at minimum 1.5 km^2) of benthic habitat in a coastal and marine area of recognised ecological and conservation significance". It is noted that Simon West agreed that recovery of some species would take longer than 10 years (JWS for Pakiri Sands – inshore, midshore and offshore, 2023).

- Instead, international literature is used to show that "The shallow (100 mm) profile has been shown to result in faster recovery times from the disturbance. Dernie *et al.* (2003) working in dynamic sandy habitats in northern Wales reported that sediment disturbances to deeper depths (200 mm) took more than 107 days to recover, and areas of shallower (100 mm) sediment disturbance took 64 days to recover." However, these sites are in no way comparable to the proposed mining site.

It is also notable that many areas of reef and a significant number of species, as well as densities of species (e.g., scallops) that were found in the surveys presented herein were not found or reported by the MBL benthic ecology investigations.

2 Methods

This current survey was based on two days of sampling done entirely within the proposed sand extraction area (Figure 1-1). Specifically, sampling was undertaken on 19 March 2006 and 29 April 2026 respectively from a 7.3m Stabicraft (operated by Ocean Diversity Ltd).

2.1 Seabed survey

To provide a broad scale perspective on the spatial distribution of physical and biological features within the proposed extraction area, a towed video sled was used (see Figure 2-1). The video sled was constructed from square marine grade stainless steel with a GoPro Hero V12, mounted on the front to record seabed imagery. The GoPro was angled at 45° which allowed for a field of view of approximately 3 m forward facing and 0.5 m either side of the camera, thus equating to approximately 3 m^2 of visible area.

On 19 March 2026, a total of 18 transects covering approximately 4.6 km^2 were completed and on 29 April 13 transects covering 5.1 km^2 of seabed were completed (Figure 2-2). These two surveys equated to approximately 9.7 km^2 of seabed surveyed across the proposed extraction area.

The method of deployment for individual sample tows was as follows. The site location and transect #, corresponding GPS mark, and deployment time was written on a whiteboard and videoed immediately prior to the tow deployment. The camera was left recording, and the video sled was immediately lowered to the seabed. For each tow, approximately 50 m of rope was fed out to ensure that the sled would remain stable on the seabed during the tow. The vessel then towed the sled for a set time (minimum of 5 minutes), with vessel speed held at between 0.9 to 1.5 knots. At the end of the tow, a GPS mark was taken and the camera winched from the seabed to the vessel. Once back on the surface the camera recording was stopped and video played back to ensure the tow was successful in capturing the seabed content.

2.1.1 Video assessment

Video data was assessed for main physical and biological components by Dr. Tim Haggitt and Nakita Daniel. Individual tows were played through in their entirety on a laptop and then reviewed in more detail. This included sequentially making qualitative assessments of physical (Table 2.1) and biological (Table 2.2) attributes at roughly 45 to 60 second intervals based on the qualitative scales presented. For tipa/scallop enumeration, live individuals were also counted with the qualitative rank below applied and counts scaled to distance per 100m^2 of seabed.

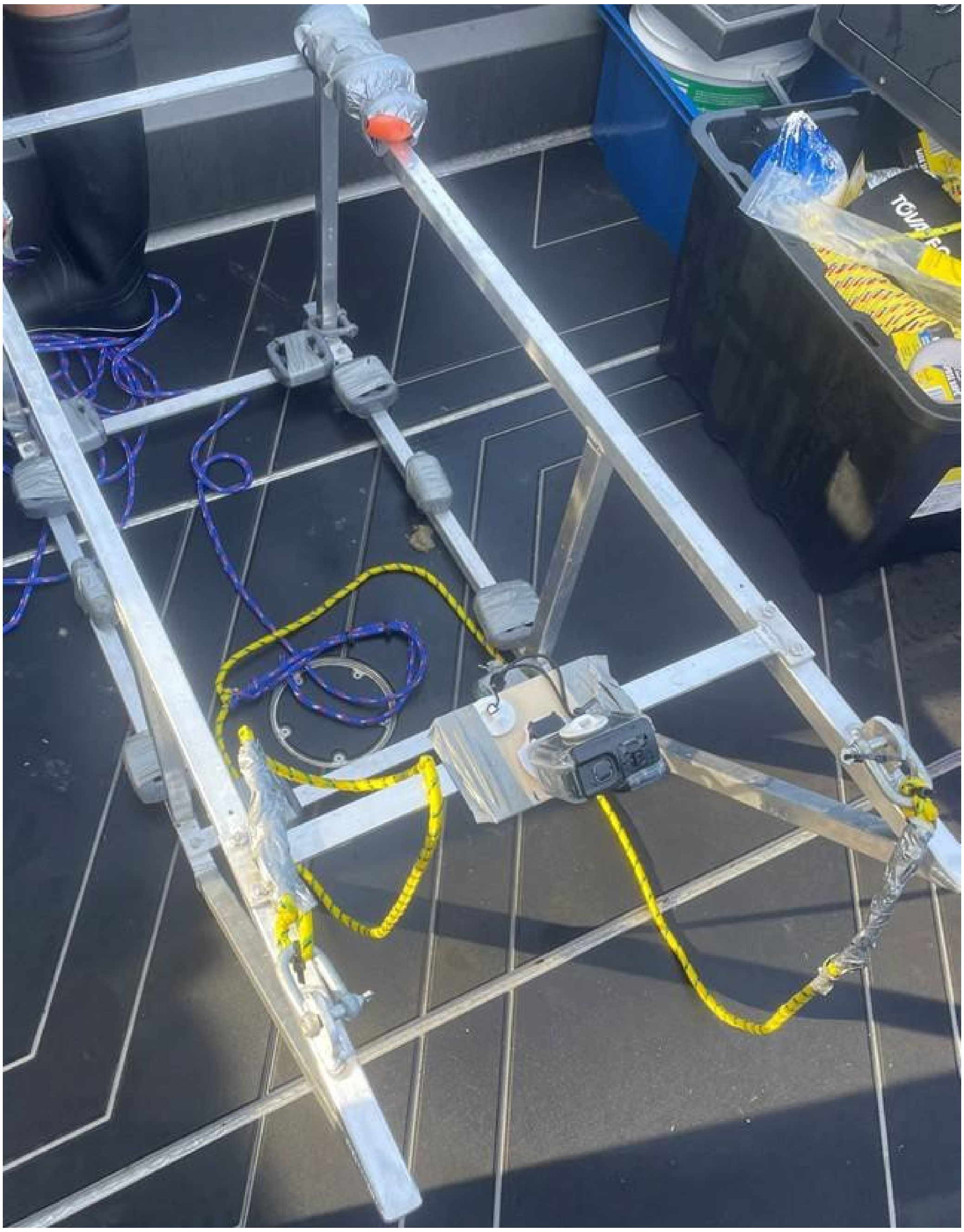


Figure 2-1: Sled tow used to sample the benthic environment.

Figure 2-2: Location of sample transects undertaken using remote video via sled tows – black markers. Green markers denote boundaries of the proposed sand extraction area.

Table 2-1: Qualitative scale used to grade physical attributes of the seabed.

Primary seafloor (grain) types	**Secondary seafloor type**	**Seafloor Features**
Silty Sand Fine Sand Medium Sand Coarse Sand Shell Hash Whole Shell	Silty Sand Fine Sand Medium Sand Coarse Sand Shell Hash Whole Shell Pebbles/small rocks	Flat seabed – relatively featureless Ripples – small undulating sand ripples can be irregular or uniform. Mega-ripple – larger sand ripples, often uniform Large swales – very large sand waves, uniform in nature and often comprised of coarse sand and shell hash.

Table 2-2: Qualitative scale used to grade biological attributes of the seabed.

Component	Scale	Definition
Crab, shrimp and worm holes	None Low Moderate High	No obvious holes in sediment surface Occasional holes in sediment surface, spaced far apart. Moderate number of holes in sediment surface often patchily distributed Very high cover of holes uniformly distributed
Tube worms	None Low Moderate High	No obvious tubes protruding from sediment surface. Occasional tubes protruding from sediment surface, spaced far apart. Moderate number of tubes protruding from surface often patchily distributed. Very high number of tubes protruding from surface uniformly distributed
Sponge	None Low Moderate High	No sponges on sediment surface One or two sponges on sediment surface (i.e., attached to shells) Three to five sponges on sediment surface (i.e., attached to shells) Greater than six sponges (often large) on sediment surface (i.e., attached to shells)
Hermit crabs	None Low Moderate High	No hermit crabs on sediment surface One or two hermit crabs on sediment surface (i.e., attached to shells) Three to five hermit crabs on sediment surface (i.e., attached to shells) Greater than six hermit crabs (often large clumps) on sediment surface. (i.e., attached to shells)
Scallops	None Low Moderate High	None = 0 scallops on sediment surface. Low = 1-2 scallops on sediment surface. Moderate = 3-5 scallops on sediment surface. High = > 6 scallops on sediment surface.
Surficial Biological activity	None Low Medium High	No obvious sign of animal tracks, feeding pits and/or sediment reworking. Occasional signs of animal tracks, feeding pits and/or sediment reworking. Moderate signs of animal tracks, feeding pits and/or sediment reworking. High signs of animal tracks, feeding pits and/or sediment reworking

2.1.2 Dive assessment

During the survey on the 29th of April 2026 an area of seabed was deemed to have potential reef habitat based on depth sounder readouts and was subsequently ground-truthed via SCUBA. Once on the seabed, a 50m transect was deployed down a pre-determined compass direction. A diver followed behind videoing the main soft sediment habitats approximately 1m above the seabed until reaching the end of the transect. Following this, both divers worked their way back slowly to the transect origin, videoing key areas of the reef that had biological merit.

3 Results

The 31 transects sampled using remote video sled within the proposed sand extraction area revealed a seabed comprised of a diverse array of physical and biological components, which are summarised below and in Tables 3.1 and 3.2, and Figures 3.1 and 3.2.

3.1 Physical environment

The physical nature of surficial sediments across sample transects ranged from silty sand with low to moderate complexity to larger mega ripples comprised of coarse sand and shell hash with higher complexity (Figure 3-1). Rock rubble and smaller stones were present on transect 22 and there were areas of peat reef evident towards the inshore boundary mid-way along the proposed extraction area and northern-most control area (see Section 3.2). The depth range sampled ranged from 22.1-30.1m (MLWS).

The most dominant bedform was medium-grained sand ripples that occurred across all sample transects, followed by coarse sand and fine sand, respectively. Several transects located in the northern part of the survey area were comprised of silty sand (T25, 26, 28) that is likely to reflect proximity to Whangarei Harbour. Secondary sediments were dominated by shell-hash and whole shell material, reflecting the biological contribution to the physical nature of the seabed. It was not uncommon for sample transects to be comprised of multiple sediment types and in several instances, there was rapid transition between them, i.e., fine sediment with low complexity to coarse sand and whole shell material.

As described in the first survey (Appendix 1), patches of peat reef were observed within and boarding the sand extraction area that are obvious permanent structures – as gauged by the amount of biological growth and species living on, in and around this habitat.

Other architectural elements of the substrate were those clearly biologically mediated including vast expanses of shrimp, crab, and worm burrows, animal tracks e.g., comb star, hermit crabs and whelks and extensive evidence of sting ray feeding pits.

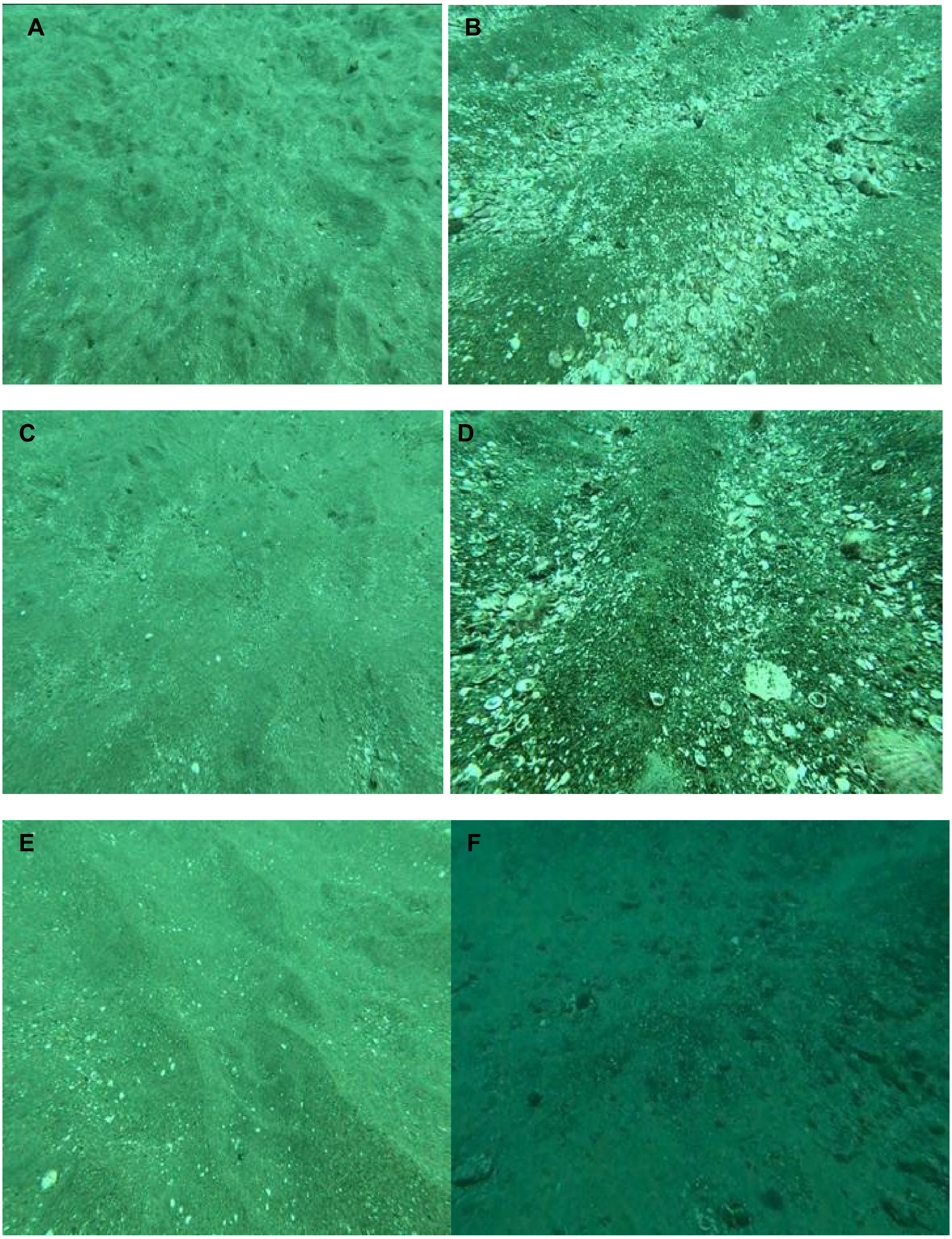


Figure 3-1: Examples of dominant seabed characteristic features A) flat topography (tube worm dominated); B) coarse sediment with whole shell tipa/scallops; C) fine sand with shell hash; D) mega rippled topography; E) sand ripples; F) rock rubbles and stones.

Table 3-1 Summary of Transects. Physical Features percentages are based on precent occurrence per 30-60 second assessment.

Transect #; length; and, depth (meters)	Predominat seafloor type (grain)	Secondary seafloor type	Features
One Length 110m Depth 22.5m	Medium sand – 76 % Coarse sand – 24 %	Whole shell – 41 % Shell hash 59 %	Ripples 100 %
Two Length 122m Depth 23.9	Medium sand – 83 % Coarse sand – 16 %	Whole shell – 41 % Shell hash – 59 %	Ripples 91 % Mega Ripples 9 %
Three Length 272m Depth 24.3	Medium sand – 83 % Coarse sand – 16 %	Fine sand – 17 % Shell hash – 68 % Whole shell – %	Ripples 67 % Mega Ripples 33 %
Four Length 220m Depth 22.1	Medium sand -100 %	Fine sand – 61 % Coarse shell – 13 % Shell hash – 13% Whole shell – 13%	Ripples – 100 %
Five Length 138m Depth 22.4	Medium Sand -100%	Shell hash – 73% Whole shell – 23%	Ripples –100%
Six Length 268 m Depth 24.9	Fine sand – 83 % Medium sand -47%	Medium sand – 53% Fine sand – 27% Coarse sand – 13 % Whole shell – 7%	Flat seabed –100%
Seven Length 303 m Depth 24.7	Fine sand – 83 % Medium sand -47 %	Shell hash 64 % Coarse sand – 18 % Medium sand – 9 % Fine sand – 9 %	Ripples – 64% Flat seabed –36%
Eight Length 284 m Depth 25.5	Medium sand – 54 % Coarse sand – 46 %	Coarse sand – 46 % Whole shell – 46% Fine sand – 8%	Ripples – 92% Flat seabed –8%
Nine Length 347 m Depth 25.9	Medium sand – 100 %	Shell hash – 100 %	Mega ripples – 100%
Ten Length 291 m Depth 27.6 m	Fine sand – 36 % Medium sand – 36 % Coarse sand – 27 %	Fine sand – 36% Medium sand – 27 % Whole Shell– 27 % Coarse sand – 19	Ripples – 50% Mega Ripples – 25 % Flat seabed – 25 %

Eleven Length 291 m Depth 28.3 m	Medium sand – 67 % Fine sand – 33 %	Shell hash – 67% Medium sand – 33 %	Ripples – 89% Flat seabed – 11%
Twelve Length 291 m Depth 27.5 m	Coarse sand – 57 % Medium sand -29 % Coarse sand –14 %	Whole Shell– 57 % Shell hash – 29% Medium sand – 14 %	Ripples – 77 % Mega Ripples – 29 % Large swales – 14 %
Thirteen Length 291 m Depth 27.6	Medium sand – -67 % Silty sand – 33%	Whole Shell– 67 % Shell hash – 33%	Ripples – 50 % Flat seabed – 50 %
Fourteen Length 291 m Depth 22.5m	Medium sand – 100 %	Shell hash – 100%	Ripples – 80 % Flat seabed – 20 %
Fifteen Length 291 m Depth 23.4m	Coarse sand – 50 % Medium sand -20 %	Whole Shell– 80 % Shell hash – 20%	Ripples – 50 % Mega Ripples – 25 % Flat seabed – 25 %
Sixteen Length 291 m Depth 23.0m	Medium sand – 100 %	Shell hash – 100%	Ripples – 75 % Flat seabed – 25 %
Seventeen Length 291 m Depth 24.8m	Medium sand – 100 %	Shell hash – 100%	Ripples – 50 % Mega Ripples – 25 % Flat seabed – 25 %
Eighteen Length 317 m Depth 24.8m	Medium sand – 100 %	Whole Shell– 80 % Shell hash – 33%	Ripples – 75 % Flat seabed – 25 %
Nineteen Length 351 m Depth 27.5	Coarse sand – 50 % Fine sand – 38% Medium sand – 11 %	Medium sand – 38 % Whole Shell– 38 % Fine sand – 11% Shell hash – 11 %	Mega ripples – 50 % Flat seabed – 38 % Ripples – 11 %
Twenty Length 235 m Depth 26.0m	Fine sand – 100 %	Medium sand– 100%	Flat seabed – 100 %
Twenty-one Length 427.9 m Depth 26.0m	Coarse sand – 50 % Fine sand – 40% Medium sand – 10 %	Whole Shell– 50 % Medium sand – 40 % Fine sand – 10%	Ripples – 50 % Flat seabed – 50 %
Twenty-two Length 445.9 m			

Depth 26.0m			
Twenty-three Length 317.3 m Depth 30.3m			Rock rubble
Twenty-four Length 324.8 m Depth 28.1m	Fine sand – 50 % Medium sand – 50 %	Shell hash – 50% Coarse sand – 25% Whole shell – 25%	Large swales – 50% Ripples – 25 % Mega Ripples – 25 %
Twenty-five Length 167.3 m Depth 20.0m	Medium sand – 70 % Coarse sand – 20 Whole Shell – 10 %	Shell hash – 50% Whole shell – 30% Coarse sand – 10% Silty sand – 10%	Mega Ripples – 80 % Ripples – 20 %
Twenty-six Length 350.5 m Depth 23.0m	Fine sand – 88 % Coarse sand – 11%	Shell hash – 55% Silty sand – 33% Medium sand – 11% Coarse sand – 11%	Ripples – 67% Flat seabed – 33%
Twenty-seven Length 437.1 m Depth 22.0m	Silty sand – 100 %	Fine sand – 75% Shell hash – 25%	Flat seabed – 100%
Twenty-eight Length 998 m Depth 30.0m	Fine sand – 100 %	Silty sand– 100%	Ripples – 50 % Flat seabed – 50 %
Twenty-nine Length 240 m Depth 27.4m	Fine sand – 50 % Medium sand – 50 %	Fine sand – 50 % Shell hash – 25% Silty sand – 25%	Ripples – 75 % Flat seabed – 25 %
Thirty Length 565.4 m Depth 25.5	Silty sand – 100 %	Fine sand – 88% Silty sand – 12%	Ripples – 63% Flat seabed – 27%
Thirty-one Length 264. m Depth 26.0	Fine sand – 50% Medium sand – 37% Coarse sand – 13%	Shell hash – 50% Medium sand – 25% Whole shell – 25%	Flat seabed – 50 Ripples -25% Mega ripples – 25%

The whole area surveyed as part of this current survey including the initial survey undertaken in December 2025 and January 2026, (eCoast 2026; see Appendix One) has revealed a biologically diverse benthic community that based on the qualitative scoring presented here predominantly ranged from moderate to high across sample transects. This was evidenced by the numerous worm/crab/shrimp holes at the sediment surface, variety of epifauna observed from the remote video, and presence of biogenic habitat, with some of these species considered culturally and economically significant (Figure 3-2). Key points are considered further in the following sections:

Tipa/Scallop (*Pecten novaezelandiae*)

Live tipa were observed at 23 of the 31 sample transects (74 %), suggesting that they are a conspicuous component of the Bream Bay inshore ecology. Transects with the highest recorded density were located towards the central and southern region of the proposed extraction area - Transects 11, 12, and 14. There was some evidence to suggest higher densities were encountered in coarser sediment as opposed to those finer in nature; however, tipa were also encountered in high densities across the range of sediment-types evaluated in this assessment. Based on the sampling technique employed, it is likely that scallop densities presented here are underestimates of this cryptic species, as the preferred method to assess scallop abundance (dredge surveys) could not be conducted due to the current fisheries restriction on this species.

Tipa is considered to be important biogenic habitat due to the shells (living and dead) providing hard structure for sponges (observed in Bream Bay), algae (observed in Bream Bay) and other marine organisms. They are also considered to be important ecosystem engineers through their filter filtering capacity linking the benthos and water column. Based on the sled tow analysis undertaken tipa density ranged from 0 to 15.2 per 100 m^2 (Table 3.2).

Table 3-2. Assessment of Tipa/Scallop density based on count standardised to 100 m^2 and total count for individual transects. Note: yellow highlighted counts denote commercially viable densities (Willliams *et a*l., 2024).

Transect	**Count per 100m^2**	**Total Count per transect**
1	0	0
2	0	0
3	0	0
4	3.6	5
5	5.6	14
6	2.3	7
7	15.4	40
8	7.9	24
9	2.0	6
10	2.3	7
11	7.3	25
12	13.0	48
13	3.5	12
14	4.8	25
15	2.2	7
16	0	0
17	1.23	4
18	5.88	20
19	0	0
20	0	0
21	0.9	4
22	0	0
23	0	0
24	0.61	2
25	2.35	4
26	0.57	2
27	1.14	2
28	0.51	5
29	0.83	2
30	0.18	2
31	1.54	4
Average per 100m2 (SE)	2.76 (0.68)	
Total Count		271

Other biological features of note included tube worm complexes, areas dominated by numerous crab, shrimp and worm holes, sponges, and hermit crabs. Hermit crabs play important roles in increasing habitat complexity scavenging detritus and acting as a food source for predators.

In addition, several transects had high microphytobenthos (sediment dwelling, microscopic primary producers) cover (Figure 3-2). These communities are ecologically significant as they influence the flow and cycling of carbon and nutrients, such as nitrogen and help stabilise sediments (Hope et al. 2019).

Table 3.3. Summary of Transects. Biological features (percentages) are based on percent occurrence per 30-60 second assessment.

Transect	**Tipa/Scallop**	**Crab shrimp worm holes**	**Hermit crabs**	**Tube worms**	**Sponge**	**Surficial biological activity**	**Notes**
One	None – 100 % Low Moderate High Count =0	None Low – 71 % Moderate – 18 % High –12 %	None – 71% Low – 18% Moderate – 12% High		None 88% Low – 12 % Moderate High	None Low – 71 % Moderate – 71% High – 29 %	Multiple faunal tracks and evidence of sediment re-working. Astropecten observed on 3 occasions
Two	None – 80 % Low – 20 % Moderate High Count = 2	None Low Moderate High – 100%	None Low – 42% Moderate – 50% High – 8%	None Low Moderate – 50% High – 50%	None Low Moderate – 50% High – 50%	None Low Moderate High – 100%	Multiple faunal tracks and evidence of sediment re-working and feeding pits at the sediment surface
Three	None – 100 % Low Moderate High Count =0	None Low Moderate – 75% High – 25%	None Low – 50% Moderate – 30% High – 20%	None Low Moderate – 67% High – 33%	None – 33% Low Moderate – 33% High – 33%	None Low Moderate – 75% High – 25%	Tube worms and algae moderate to dominant features. Whelks *Cominella adspersa* abundant towards the end of the transect
Four	None – 50 % Low – 38 % Moderate –13 % High Count =4	None Low Moderate – 100% High	None Low Moderate High – 100%	None Low – 100% Moderate High	None – 63% Low Moderate – 38% High	None Low Moderate – 100% High	
Five	None – 55 % Low – 27 % Moderate – 9 % High – 9 % Count =14	None Low Moderate – 55% High – 45%	None Low Moderate – 45% High – 55%	None Low – 36% Moderate – 45% High – 18%	None Low – 27% Moderate – 55% High – 18%	None Low Moderate – 55% High – 45%	
Six	None – 60 % Low – 27 % Moderate – 13 % High	None Low Moderate – 6% High – 94%	None – 7% Low – 80% Moderate – 13% High	None Low Moderate – 6% High – 94%	None – 63% Low – 38% Moderate High	None Low Moderate – 6% High – 94%	

	Count =7						
Seven	None – 18% Low – 18 % Moderate –18% High – 45% Count =40	None Low – 67% Moderate – 8% High – 25%	None Low – 92% Moderate – 8% High	None Low – 67% Moderate – 8% High – 25%	None – 17% Low – 75% Moderate – 8% High	None Low Moderate – 64% High – 36%	
Eight	None – 38% Low – 38 % Moderate –15% High – 8% Count =24	None Low Moderate – 46% High – 54%	None – 15% Low – 62% Moderate – 23% High	None Low Moderate – 46% High – 54%	None – 54% Low – 46% Moderate High	None Low – 15% Moderate – 85% High	
Nine	None – 63% Low – 25 % Moderate –18% High Count =7	None Low Moderate – 88% High – 13%	None Low – 25% Moderate – 75% High	None Low Moderate – 88% High – 13%	None – 38% Low – 25% Moderate – 38% High	None Low Moderate – 88% High – 13%	
Ten	None – 73% Low – 27 % Moderate High Count =7	None Low Moderate – 55% High – 45%	None Low Moderate – 100% High	None Low Moderate – 64% High – 36%	None – 55% Low – 45% Moderate High	None Low Moderate – 55% High – 45%	Feeding pits conspicuous and microphytobenthos event across transect
Eleven	None – 33% Low – 22 % Moderate –11% High –22% Count =25	None Low Moderate – 100% High	None – 11% Low – 78% Moderate – 11% High	None Low – 67% Moderate – 33% High	None – 11% Low – 98% Moderate High	None Low Moderate – 100% High	
Twelve	None – Low – 14 % Moderate –29% High –57% Count =48	None Low Moderate – 43% High – 57%	None Low Moderate – 100% High	None Low – 43% Moderate – 57% High	None Low – 57% Moderate – 43% High	None Low Moderate – 43% High – 57%	
Thirteen	None – Low – 67% Moderate –33% High Count =12	None Low Moderate – 100% High	None Low – 33% Moderate – 67% High	None Low - 100% Moderate High	None Low - 100% Moderate High	None Low Moderate – 100% High	
Fourteen	None –40% Low – 10%	None Low	None - 100% Low	None Low - 100%	None Low - 100%	None Low	

	Moderate – 30% High – 20% Count =25	Moderate – 100% High	Moderate High	Moderate High	Moderate High	Moderate – 100% High	
Fifteen	None –50% Low – 50% Moderate High Count =7	None Low Moderate – 100% High	None Low – 50% Moderate – 50% High	None Low – 50% Moderate – 50% High	None Low - 100% Moderate High	None Low Moderate – 100% High	Lots of whelks towards the end of transect
Sixteen	None – 100 % Low Moderate High Count =0	None Low – 57 % Moderate – 29 % High –14 %	None – 100% Low Moderate High	None – 100% Low Moderate High	None – 100% Low Moderate High	None Low – 57 % Moderate – 29 % High –14 %	Numerous feeding pits and sediment reworking
Seventeen	None – 50 % Low – 50% Moderate High Count = 4	None Low – 100 % Moderate High	None Low – 25 % Moderate– 75 % High	None – 75 % Low – 25 % Moderate High	None Low – 100 % Moderate High	None Low Moderate – 100% High	
Eighteen	None –22% Low – 56% Moderate – 11% High – 11% Count =20	None Low – 100 % Moderate High	None – 75 % Low – 25 % Moderate High	None Low - 100% Moderate High	None - 100% Low Moderate High	None Low – 56% Moderate - 44% High	Eagle ray visible on sediment surface
Nineteen	None – 100 % Low Moderate High Count =0	None Low – 57 % Moderate – 29 % High –14 %	None – 100% Low Moderate High	None – 100% Low Moderate High	None – 100% Low Moderate High	None Low – 57 % Moderate – 29 % High –14 %	Area dominated by feeding pits; 1 Astropecten
Twenty	None – 100 % Low Moderate High Count =0	None Low Moderate High – 100%	None Low – 60 % Moderate – 40% High	None Low Moderate –100 % High	None – 100 % Low Moderate High	None Low Moderate High – 100%	Feeding pits conspicuous and microphytobenthos event across transect
Twenty-one	None – 60 % Low – 30% Moderate –10 % High Count =4	None Low – 40 % Moderate – 20 % High –40 %	None – 100% Low Moderate High	None – 40% Low – 30% Moderate – 40% High	None – 60% Low – 10% Moderate – 30% High	None Low Moderate – 60% High – 40%	Feeding pits numerous

Twenty-two	None – 100 % Low Moderate High Count =0	None Low – 71 % Moderate – 18 % High –12 %	None – 71% Low – 18% Moderate – 12% High	None – 75 % Low – 25 % Moderate High	None 88% Low – 12 % Moderate High	None Low – 71 % Moderate – 71% High – 29 %	Multiple faunal tracks and evidence of sediment re-working. ions
Twenty-three	None – 100 % Low Moderate High Count =0	None Low – 100 % Moderate High	None – 75 % Low – 25 % Moderate High	None Low - 100% Moderate High	None - 100% Low Moderate High	None Low – 56% Moderate - 44% High	
Twenty-four	None – 75 % Low – 25% Moderate –10 % High Count = 2	None Low – 25 % Moderate – 50 % High –25 %	None – 75% Low – 25% Moderate High	None – 50% Low – 25% Moderate – 25% High	None – 100 % Low Moderate High	None Low – 75 % Moderate – 25% High	
Twenty-five	None – 60% Low – 40% Moderate High Count =4	None Low – 40 % Moderate – 40 % High –20 %	None – 40% Low – 60% Moderate High	None – 10% Low – 50% Moderate – 20% High – 20%	None – 20% Low – 10% Moderate – 70% High	None Low – 20 % Moderate – 60 % High –20 %	
Twenty-six	None – 89% Low – 11% Moderate High Count =2	None Low – 44 % Moderate – 44% High – 11 %	None – 100% Low Moderate High	None – 22% Low – 22% Moderate – 44% High – 11%	None – 60% Low – 40% Moderate High	None Low –44 % Moderate –33 % High –22 %	Feeding pits conspicuous and microphytobenthos event across transect
Twenty-seven	None – 25% Low – 75% Moderate High Count = 5	None Low Moderate – 75% High – 25%	None – 25% Low – 50% Moderate – 25% High	None – 50% Low – 25% Moderate – 25% High	None – 75% Low – 25% Moderate High	None Low Moderate – 75% High – 25%	Kingfish observed above sled
Twenty-eight	None – 88% Low – 0% Moderate –13% High Count = 5	None Low – 12 % Moderate – 88 % High	None – 88% Low – 12% Moderate High	None Low – 63 % Moderate – 37 % High	None – 50% Low – 50 % Moderate High	None Low – 38% Moderate –50 % High – 12 %	Lots of feeding pits
Twenty-nine	None – 78% Low – 22% Moderate	None Low Moderate – 75%	None – 13% Low – 88% Moderate	None – 13% Low – 38% Moderate – 50%	None – 63% Low – 38 % Moderate	None Low – 33% Moderate –66 %	

	High Count = 2	High – 25%	High	High	High	High	
Thirty	None – 88% Low – 13% Moderate High Count = 1	None Low – 57 % Moderate – 43 % High	None – 43 % Low – 57 % Moderate High	None Low – 71 % Moderate – 29 % High	None – 86% Low – 14 % Moderate High	None – 13% Low – 75% Moderate – 13% High	
Thirty-one	None – 50% Low – 50% Moderate High Count = 4	None –40% Low – 10% Moderate – 30% High – 20%	None – 50 % Low – 50 % Moderate High	None Low – 25 % Moderate – 75 % High	None – 75% Low – 13% Moderate – 13% High	None Low – 25% Moderate –38 % High – 38 %	

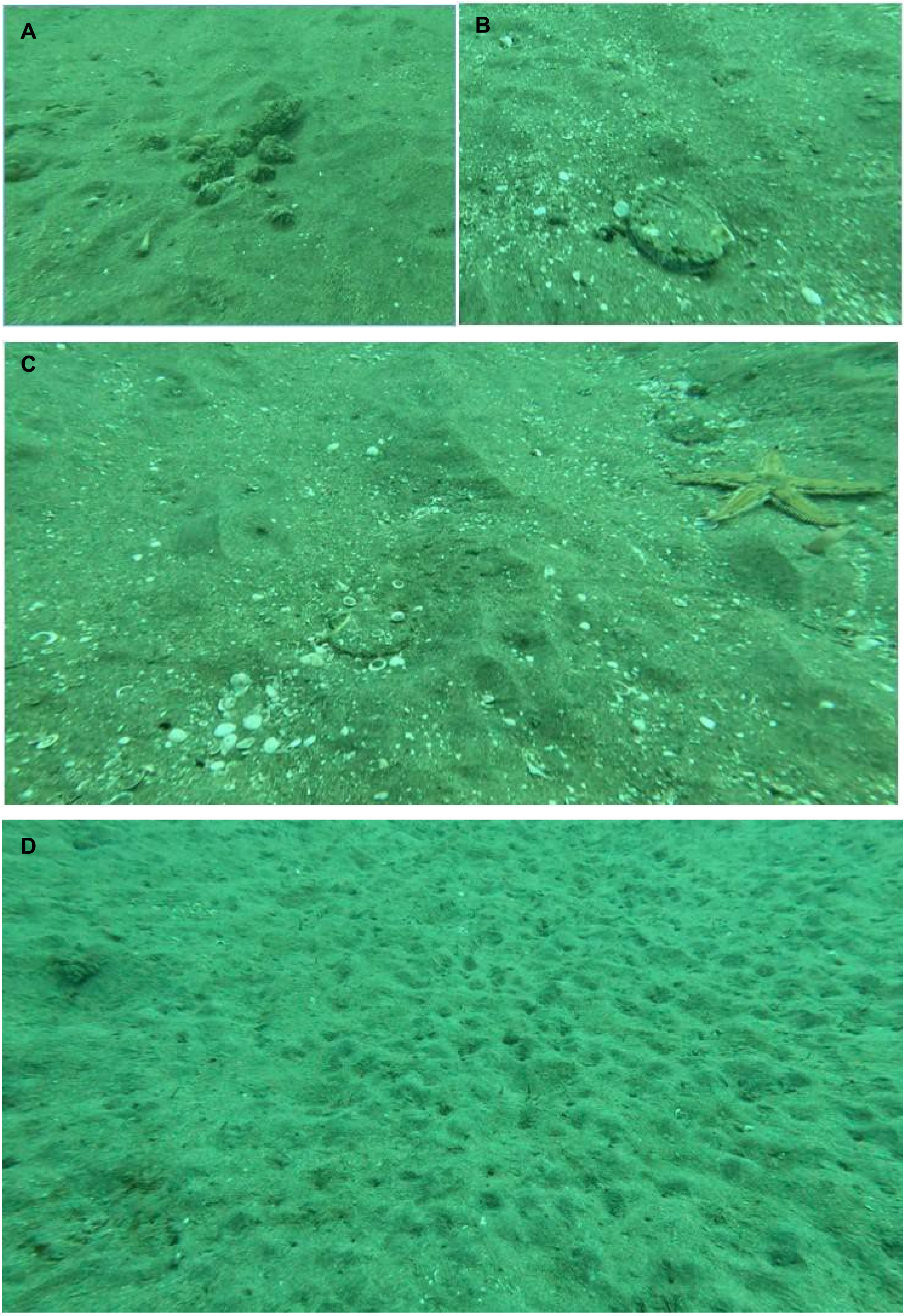


Figure 3-2: Examples of dominant ecology and ecological features A) hermit crabs; B) tipa/scallops; C) tipa and comb star; and D) example of expansive crab and worm holes.

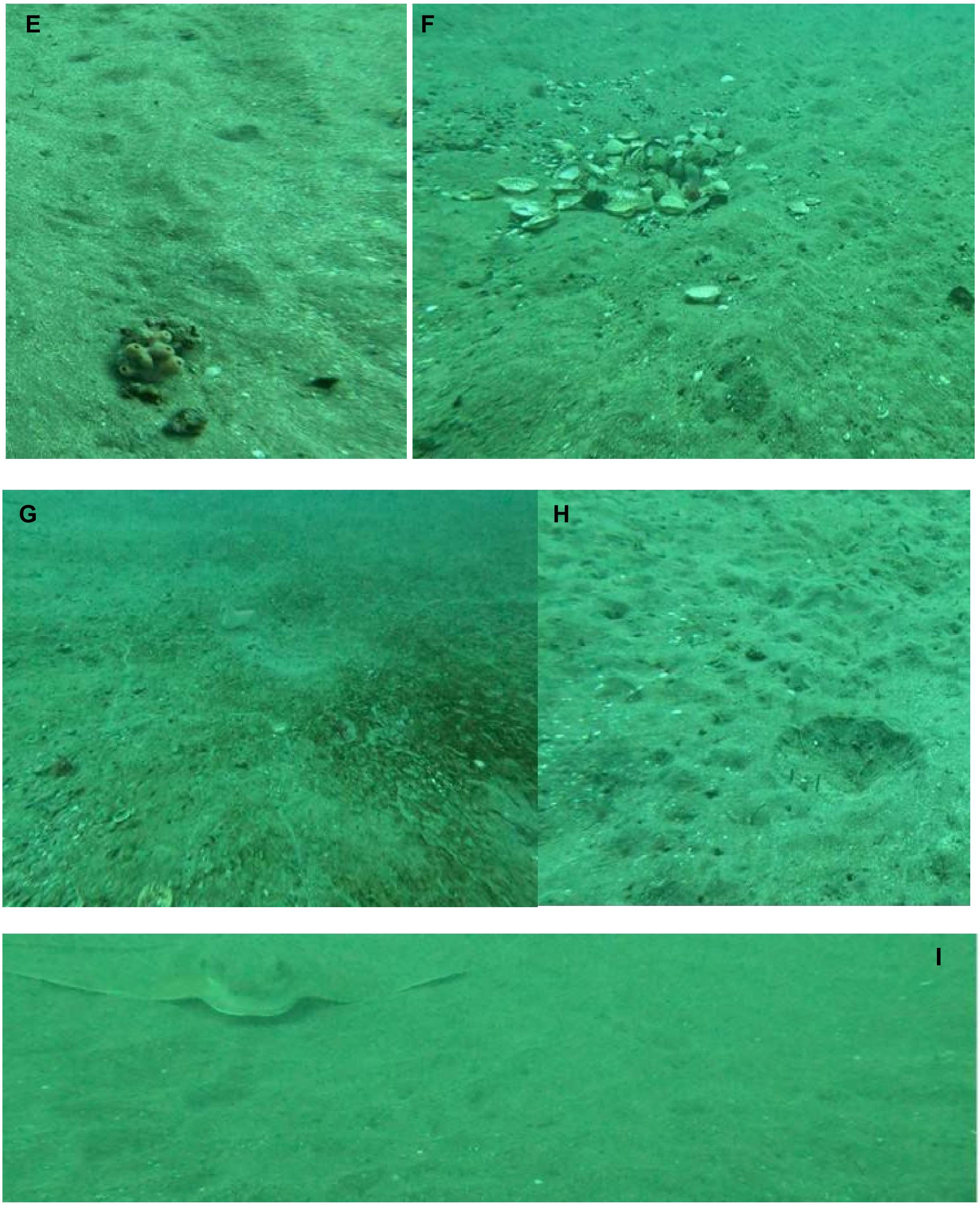


Figure 3-2 continued: Examples of dominant ecology and ecological features continued E) sponge; F) octopus den; G) microphytobenthos community; H) eagle ray feeding pit; and I) Eagle ray.

Dive assessment

The assessment of potential reef habitat, as documented in the initial survey (see Appendix One) revealed a similar reef structure and composition that appeared to be peat/wood composition -pending identification (Figure 3-3). This reef structure was again notable for both the encrusting sponges and red algae suggesting that is a permanent feature and also the reef-fish fauna associated with it that included blue cod (*Parapercis colias*); tarakihi (*Nemadactylus macropterus*) juvenile trevally (*Pseudocaranx georgianus*), conger eel (*Conger verreauxi*) and octopus (*Octopus tetricus*). Mysid shrimp (were also extremely abundant around the reef margins.

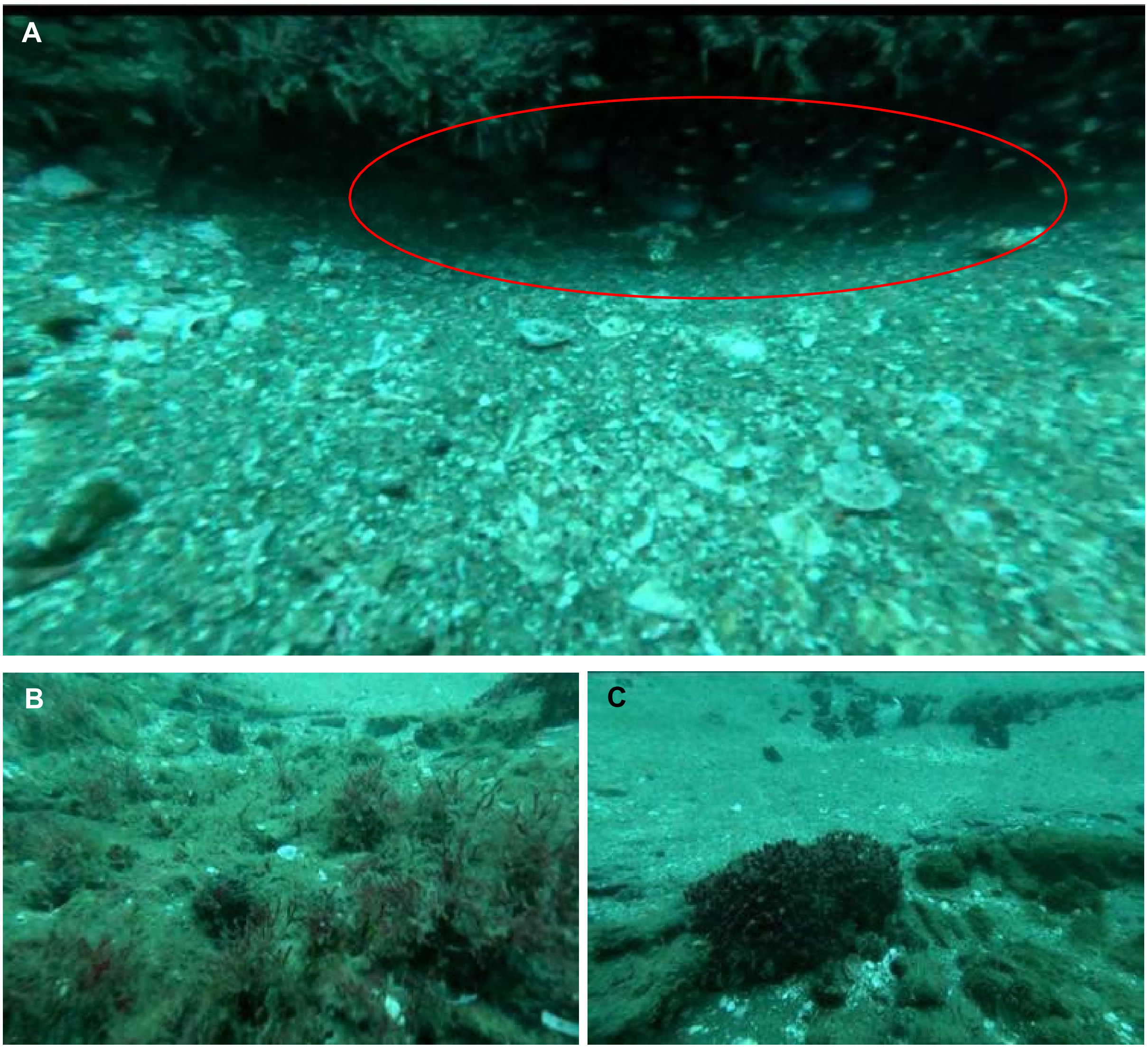


Figure 3-3: Examples of dominant ecology and ecological features associated with the reef habitats A) conger eels (red circle); red turfing algae; and, C) sponge.

4 Conclusions and Recommendations

The first order ecological surveys undertaken by eCoast between December 2025 and April 2026 have revealed that the proposed sample area is ecologically diverse and contains species and habitats that are considered biogenic and thus ecologically significant.

4.1 Tipa/scallops

Given the current restrictions on tipa harvesting since April 2022, and the obvious correlation between the occurrence of tipa within the proposed extraction area, it must be considered that the area is regenerating, which is the point of the closure in the first place i.e., part of a long-term recovery effort. Moreover, given that scallops were found at 74% of sample transects using a method that would underestimate scallop density and occurrence and adopting the precautionary principle of the RMA (1991), it would be safe to infer that the entire extraction area contains suitable scallop habitat. As such, how would the proposed sand extraction "avoid disturbance to a species and its ecosystem that is currently under a zero-disturbance regime?

This survey has proved that the area supports habitat to augment this recovery so long as it is given the chance. Sand extraction as put forward by the MBL will directly impact both the current and future scallop populations by way of:

- Removing sand – which scallops live in;
- Removing, damaging, and disturbing adult spawning populations that are crucial for recovery;
- Removal of habitat such as tube worm complexes that are crucial for larval settlement;
- Impact on ecosystem health, i.e., the swimming speeds of scallops are likely to be ***significantly less*** than the speed of the dredge head, While this has not be quantified by the applicant, the study of Guderley, and Tremblay (2016) proved that all scallops species can carry out short bursts of swimming, as a measure to avoid predation/disturbance. However, as for any species undertaking such an energetic activity, recovery time following disturbance is considerable in temperate species. Laboratory studies have demonstrated that recovery is typically > 24h following disturbance. How has this been addressed?
- During public meetings and discussions with representatives from MBL, it was repeatedly stated by the applicant that 'scallops will just swim away'. This is incorrect and misleading in the sense that scallops can indeed 'swim', however, it is very restricted in direction, speed and duration, and they are not able to navigate away from

the head of a cutter suction dredge. Since the dredge moves at 2-3 knots while dredging, which is 3.7 to 5.6 kph (Ministry of Primary Industries), the dredge is moving at least 3-4 times faster than adult scallops can swim. Scallops can only swim a very short distance for a short time, and also in the direction that they are orientated on the seabed, the direction of their hinge (i.e., they cannot quickly move sideways to avoid a dredge head). Therefore, in all likelihood, only a very small number of scallops would evade the dredge head, which will then likely 'mow' them down the next time the dredge comes through, or the time after that or after that; a cumulative effect.

4.2 Habitats

In addition to seafloor heterogeneity and scallop habitat, the presence of the reef habitat (thought to be peat and currently awaiting identification) within and adjacent to the proposed sampling area that supports a diversity of marine invertebrates, algae and reef fishes, highlights the uniqueness of the Bream Bay area. These would undoubtable be destroyed by the planned sand extraction. There are also key areas of concern in relation to the ecological AEE used to support the Fast Track Act application.

4.3 Key gaps/ weaknesses / assumptions in the AEE Report (West and van Winkle (2025)

1. **Recovery time is largely assumed, not proven.**

The report predicts that benthic communities will recover in about 2–3 years, but it explicitly states that:

- There are no studies of sand-mining recovery in similar NZ environments.
- Only a small number of overseas studies exist, and none match the site conditions. Therefore, the use of the Dernie *et al.* (2003) study from Wales to infer/estimate recovery times is completely erroneous, as it it's a completely different system to that of Bream Bay.

2. **Heavy reliance on a different site (Pakiri) as an "analogue"**

The report uses monitoring results from Pakiri sand extraction to predict impacts at Te Ākau.

- However: Pakiri has different sediment transport, ocean conditions, and ecology. Even the report acknowledges that no studies match the exact site conditions and has never recovered following sand extraction activities.

3. **Baseline ecological data is limited.**

The ecological baseline survey was conducted once (2024).

- But benthic communities:
- vary seasonally.
- vary with recruitment events.
- vary after storms.
- Would vary under current fishing restrictions on scallop dredging,
- Ignore that the Bream Bay area is essentially a regenerating area due to the ban on scallop harvesting.
- Has failed to recognise the importance of the area to marine species that have been recorded across the ecological surveys here – crayfish, eagle rays, reef fishes (snapper, blue cod, terakihi, trevally etc.).
- It is unclear what the x means in Appendix A against the fish species listed. It means this is not present then it is completely inaccurate.

The report notes that ideally there should be multiple baseline surveys across seasons before extraction.

4. “Recovery” is defined loosely.

The report defines recovery as:

- 80% of species diversity and biomass returning.

This means:

- the original community does not need to return.
- a different community could replace it.

The report even notes extraction could lead to semi-permanent changes in community composition if sediment and seabed changes (see Figure 4.1); these findings do not support the statement by the applicant that there is an expectation that the drag head channels will level out ‘over a period of days’.

We note that from evidence put forward by Dr Anderw Jeffs, Dr Mike Hillman and Dr Shaw Mead the following in terms of impacts and recovery:

- The northern part of Area 1 of the Pakiri-Mangawhai sand mining area, to which Dr Hilton says post-mining, “provide a very worrying picture of the extent and density of trenches and marks on the Pakiri seabed. Imagine a ploughed paddock ... one that is hundreds of ha in area.”

This method of dredging is based on unfounded assumptions prove incorrect by the 'ploughed field' impacts. If it was necessary to dredge sand from the seabed, then you would minimise the impacts by dredging a small area as a deep hole, you would not increase the impacts over as wide an area as possible.

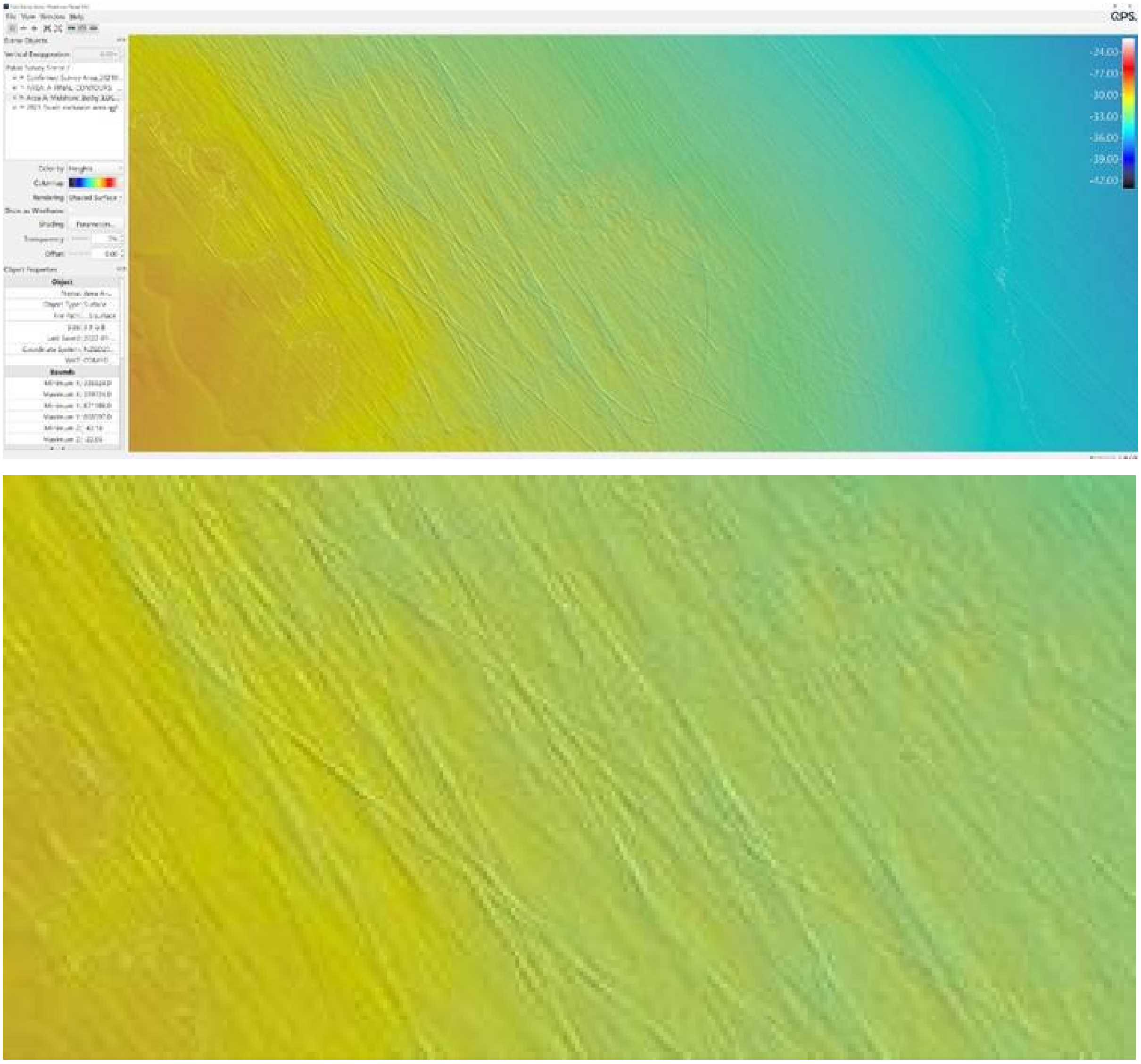


Figure 4-1 Over 100 dredged trenches are evident, which are the multiple dark lines running NNW to SSE, crossing over each other and the curving features at the mid-bottom of the image where dredging is continued while turning. The plough paddock seabed is evident in the seabed imagery from just north of the 'Swale exclusion Zone in Area 1 to just south of the Northland-Auckland boundary in Area 2 and cover an across shore distance of between 300 m and almost 1 km wide (widest in the south, this image). Source: DML.

5. Sediment changes could alter habitat.

The report acknowledges that dredging could:

- change grain size.
- change organic content.

- expose different subsurface sediments.

These changes could lead to different species dominating the area.

6. Some evidence of ecological effects already exists.

Monitoring at Pakiri detected:

- statistically significant changes in benthic community composition
- declines in some species (e.g., Cumaceans −40%) compared with controls.

The report says these likely recover, but they still indicate measurable ecological impacts.

7. Assumes the ecosystem is already disturbed.

The report argues impacts will be small because:

- the seabed has already been affected by scallop dredging and trawling. However, this is contradictory given that there has been a ban on this activity since 1 April 2022.

In the absence of commercial dredging and seabed mining, the likely future benthic environment would likely include adult scallop beds and potentially horse mussel beds, these biogenic structures were relatively abundant in the late 1999's offshore of Mangawhai-Pakiri, although they were "identified as a nuisance by blocking the dredge head during dredging operations by the Kaipara Excavators Ltd dredge MV Coastal Carrier" (Healy *et al*., 1996), and have been completely removed from the areas dredged offshore of Mangawhai-Pakiri by repeated dredging/ploughing of the seabed; whether the current low abundance of biogenic horse mussel beds along the NE coast is due to the loss of these areas that 'seeded' the local benthos, or whether a settlement is episode is required, is unknown,

8. Sensitive species could be missed.

The approach relies on:

pre-extraction surveys to detect sensitive habitats and avoid them.

But benthic habitats like:

- shellfish beds
- coral patches
- peat reefs

can be patchy and easily missed in surveys.

9. Ecosystem functions and services.

There is no mention of how the proposed activity of sand extraction will impact on ecosystem functions and services including but not necessarily limited to:

- Effects on the microphytobenthos (Evident in Figure 3-2 G).
- Habitat Provision: The formation of three-dimensional biogenic structures (such as reefs and shell banks) to provide shelter, breeding, and nursery areas for a wide variety of mobile fauna.
- Sediment Stabilisation and Modification: Benthic organisms modify sediment through bioturbation (burrowing and building), which reduces erosion, increases seabed complexity and alters the local habitat.
- Nutrient Cycling and Regeneration: Benthic organisms break down organic matter and recycle vital nutrients that support the overall productivity of the marine ecosystem.
- Contaminant Processing: Many of the fauna and microorganisms within the sediment can filter, detoxify, and process organic waste and pollutants from within the water column.
- Water Filtration: Shellfish and other benthic species filter-feed, which enhances water clarity and removes suspended particulate matter.
- Carbon Sequestration: The activity of benthic organisms buries organic carbon within the sediment, which helps to mitigate climate change. Activities such as bottom trawling and seabed mining release this stored carbon.

See Thrush and Dayton (2002); Hope *et al*. (2019); and Bartl and Thrush (2026) for background material.

References.

Dernie K.M., Kaiser M.J., Richardson E.A., & Warwick R.M. (2003) Recovery of soft sediment communities and habitats following physical disturbance. *Journal of Experimental Marine Biology and Ecology*, *285*, 415-434.

Bartl, I. and Thrush, S. (2026) Sediment heterogeneity shapes spatial variability of resuspension-induced CO_2 production, Biogeosciences, 22: 7441–7454,

https://doi.org/10.5194/bg-22-7441-2025, 2025.

Guderley, H.E.; Tremblay, I. (2016). Swimming in Scallops. *In*: Shumway, S.E.; Parsons, G.J. (eds.) *Scallops: Biology, Ecology and Aquaculture*, pp. 535–566. Elsevier, Amsterdam, Holland.

Hope, J.A., Paterson, D.A., Thrush, S.F. (2019) The role of microphytobenthos in soft-sediment ecological networks and their contribution to the delivery of multiple ecosystem services Journal of Ecology. 2020; 108:815–830.

Mead, S. T., 2023. *Statement of Evidence on behalf of Damon Clapshaw. Coastal Processes, Surfbreaks and Marine Ecology*. Environment Court, April 2023.

Thrush, S.F., Dayton, P.K. (2002) Disturbance to marine benthic habitats by trawling and dredging: implications for marine biodiversity. Annual Review of Ecology and Systematics 33: 449-473.

West, S. and van Winkel, D. (2025). Te Ākau Bream Bay Sand Extraction Project, Assessment of Ecological Effects. Report for McCallum Bros Limited. pp 120

Williams, J.R.; Underwood, M.J.; Rensen, T.; Hughes, R.; Bian, R.; Middleton, C.; Evans, O.; Middleton, I. (2025). Camera, dive, and dredge surveys of scallops in SCA 1 and SCA CS, 2024. New Zealand Fisheries Assessment Report 2025/16. 72 p

Appendix A: Memorandum Bream Bay Ecological Investigation

Prepared for: Bream Bay Guardians Society

By:

Tim Haggitt (PhD)

Shaw Mead (PhD)

eCoast
eTakutai

MOHIO - AUAHA - TAUTOKO
UNDERSTAND - INNOVATE - SUSTAIN

PO Box 151, Raglan 3225, New Zealand
Ph: +64 7 825 0087 I info@ecoast.co.nz I www.ecoast.co.nz

1.0 Preamble

This memorandum is prepared for the Bream Bay Guardians with respect to a first order ecological survey undertaken within a nearshore coastal area within Bream Bay that has been earmarked for sand extraction – 8.25 million m^3 over 35 years (see Appendix 1 for area). The planned approach for this survey was to sample surficial sediments and examine these for ecologically important species particularly: 1) tipa/scallops of which there is a complete ban on harvesting since 1 April 2022 under section 11 of the Fisheries Act (1996) Dr James Williams, NIWA personal communication in 2026; and, 2) stoney corals that are protected under the Wildlife Act (1953).

2.0 Methodology

Sampling was undertaken on two occasions: 13 December 2025 (benthic sampling) and 7 January 2026 (benthic sampling and dive surveys). Surficial sediment samples were obtained from select sites encompassing the proposed survey area using either a bucket dredge (n=6), or ponar grab (n=38). These sampling devices were deployed from a 7.3m Stabicraft (operated by Ocean Diversity). Once obtained, sediment samples were inspected on the surface for dominant fauna - identified to species level where possible - with notes on sediment type also made.

For the dive component, two dive sites were historically identified as potentially supporting ecologically important species and were investigated accordingly. At each site, a 50m transect was deployed down a pre-determined compass direction. A diver followed behind videoing the main soft sediment habitats approximately 1m above the seabed until reaching the end of the transect. Following this, both divers worked their way back slowly to the transect origin sampling 1m either side of the transect counting and sizing (± 1 mm using vernier callipers) all tipa/scallops encountered.

The seabed was also videoed using an underwater drone (Hollie Kereopa) and drop camera (Shaun Lee).

3.0 Results

3.1 Surficial sediments

Surficial sediments obtained by grab and bucket dredge sampling ranged from fine silty muddy sand, fine sand, to coarser whole shell and shell hash material. Silty muddy sand was typical of sites closer to the northwestern boundary of the proposed sand mining area, whereas coarser shell material was characteristic of sites closer to the southern boundary of the proposed dredge area and along the offshore boundary. Fine sand was the predominant surficial sediment type obtained across the sampling area.

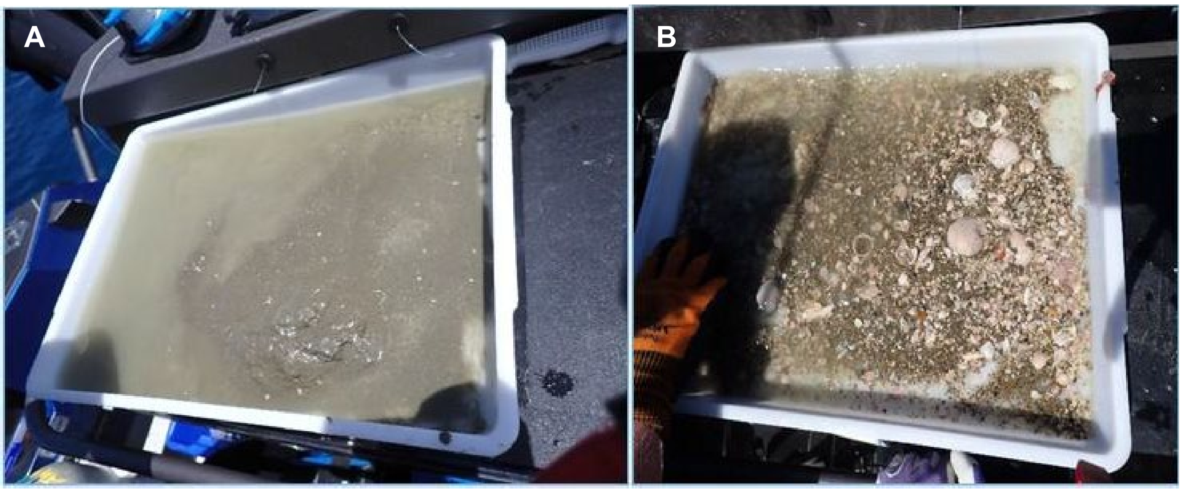


Figure 1. Examples of sediment sample obtained by grab sampling, close to the north-western Boundary of the proposed sand extraction area. A) Fine sand with silty mud, B) Coarser sand and shell hash.

3.2 Surficial sediment sampling - Faunal descriptions

A range of fauna were detected from grab and bucket dredge sampling. Common to many were polychaete tube worm complexes (unidentified), gastropods, bivalves, echinoderms and crustacea. Species that were commonly encountered are presented in Table 1.

Table 1. Common faunal species derived from grab and bucket dredge sampling.

Taxa	Common name	Taxonomic group
Cominella adspersa	Whelk	Gastropod
Struthiolaria papulosa	Ostrich foot	Gastropod
Maoricolpus roseus	Turret shell	Gastropod
Pecten novaezelandiae	Scallop	Bivalve
Talochlamys zelandiae	Scallop	Bivalve
Nucula nitidula	Nut shell	Bivalve
Gari spp	Sunset Shell	Bivalve
Tawera spissa	Morning star	Bivalve
Myadora striata	Battleaxe clam	Bivalve
Ovalipes catharus	Paddle crab	Crustacea
Pagurus novaezelandiae	Hermit crab	Crustacea
Neommatocarcinus huttoni	Policeman crab	Crustacea
Astropecten polyacanthus	Comb star	Echinodermata
Amphiura spp	Brittle star	Echinodermata

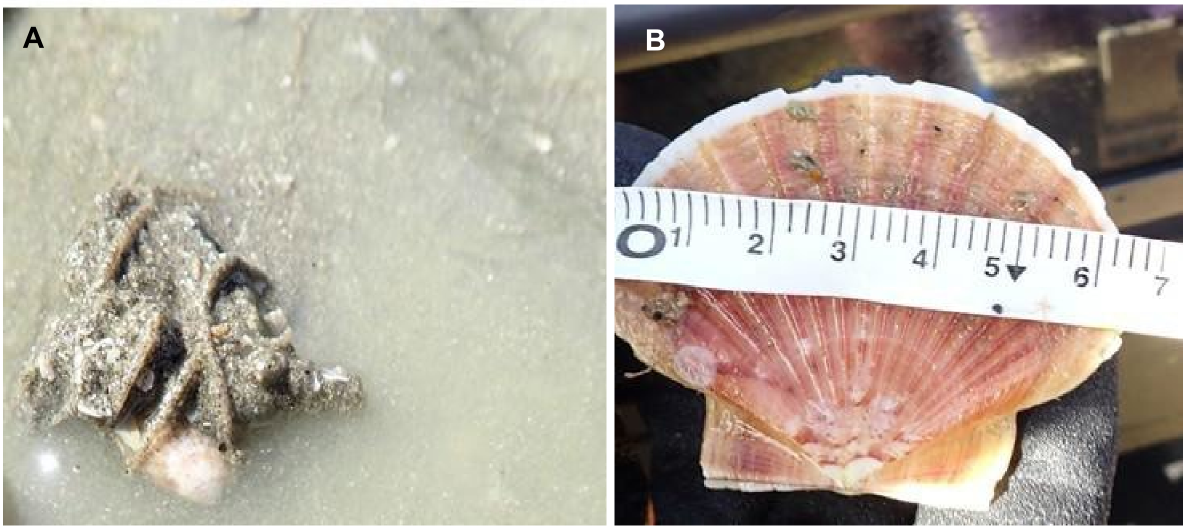


Figure 2. Examples of A) tube worm complexes and b) tipa/scallop derived from benthic sampling.

3.3 Dive survey - Faunal descriptions

Surficial sediments at Dive site 1 were coarse in nature and included whole shells that accumulated at the base of distinct sediment ripples. Main ecological features included the presence of dense patches of scallops (*Pecten novaezelandiae*), erect sponges (*Callyspongia* spp, *lophon minor*a) red algae and hydroids attached to whole shells (Figure 4). Feather duster worms (*Euchone* spp) were also present. The transect sampled (100 m^2) contained 53 scallops that ranged in size from 22mm to 101mm. Tipa ranging between 80-100mm were the most prevalent (Figure 3).

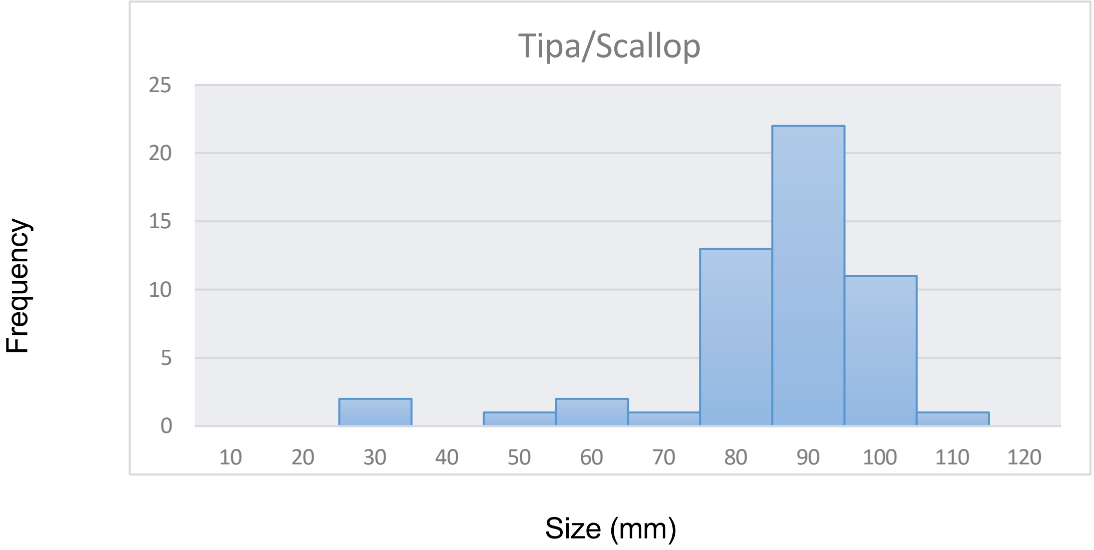


Figure 3. Size frequency distribution of Tipa/scallops (n=53) obtained from benthic sampling of one 100 m^2 area – Bream Bay 7/01/26.

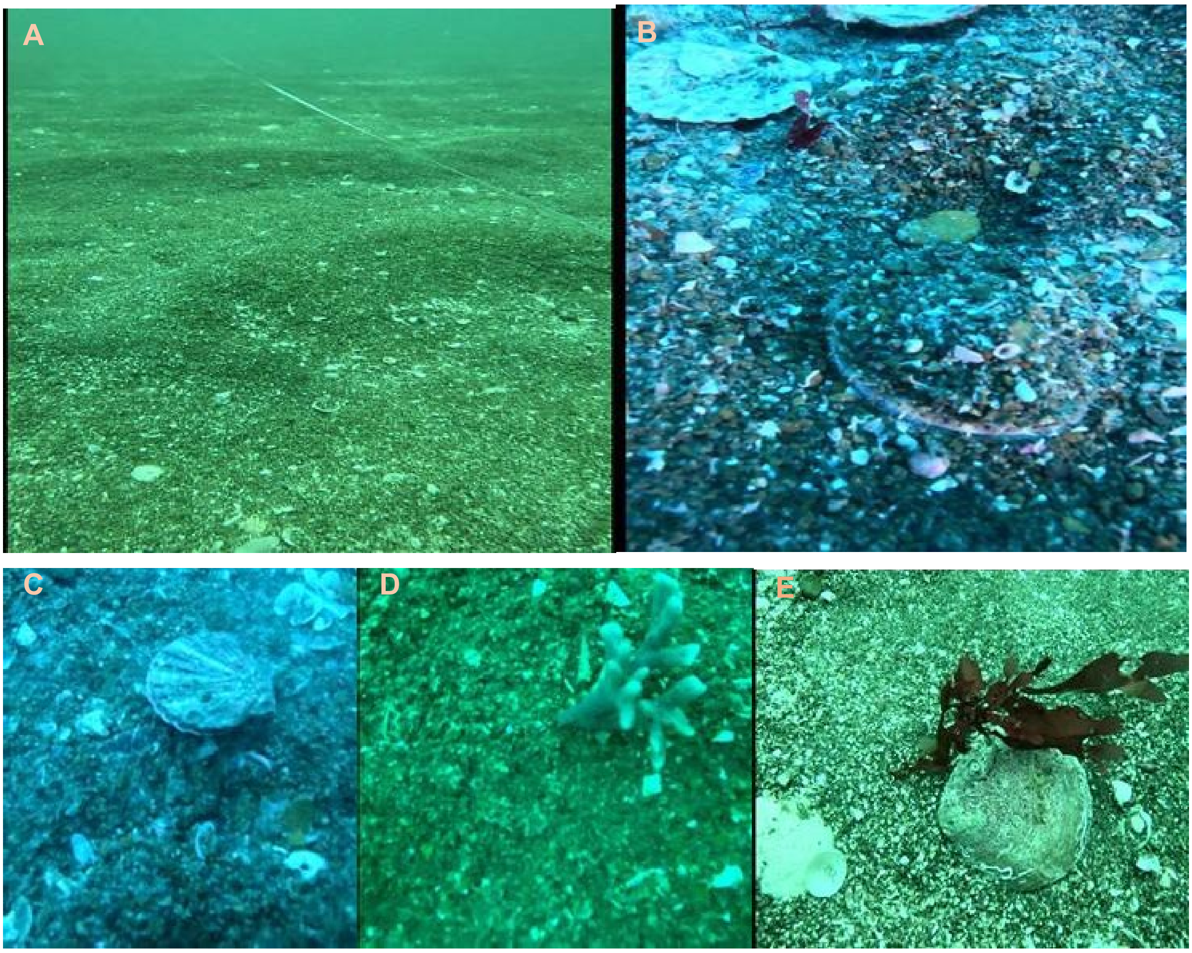


Figure 4. A) Nature of surficial sediments at Dive site 1 and accompanying ecology B) and C) tipa/scallops; D) sponge (*Callyspongia* sp); and, E) red algae (*Callophyllis* spp).

Dive site 2 was predominantly soft sediment in nature, again dominated by soft sediment features. However, a predominant feature of this site was a low-lying reefal habitat that supported sessile invertebrates (sponges) and red algae. Fish were also present and included blue cod (*Parapercis colias*), snapper (*Chrysophrys auratus)*, goat fish (*Upeneichthys lineatus)*, and big eye (*Pempheris adspersa).* In addition, the majority of the reef was occupied by large packhorse crayfish (*Sagmariasus verreauxi*) in high density (n=45). While not formally surveyed there was a mix of female and male lobster (Figure 5).

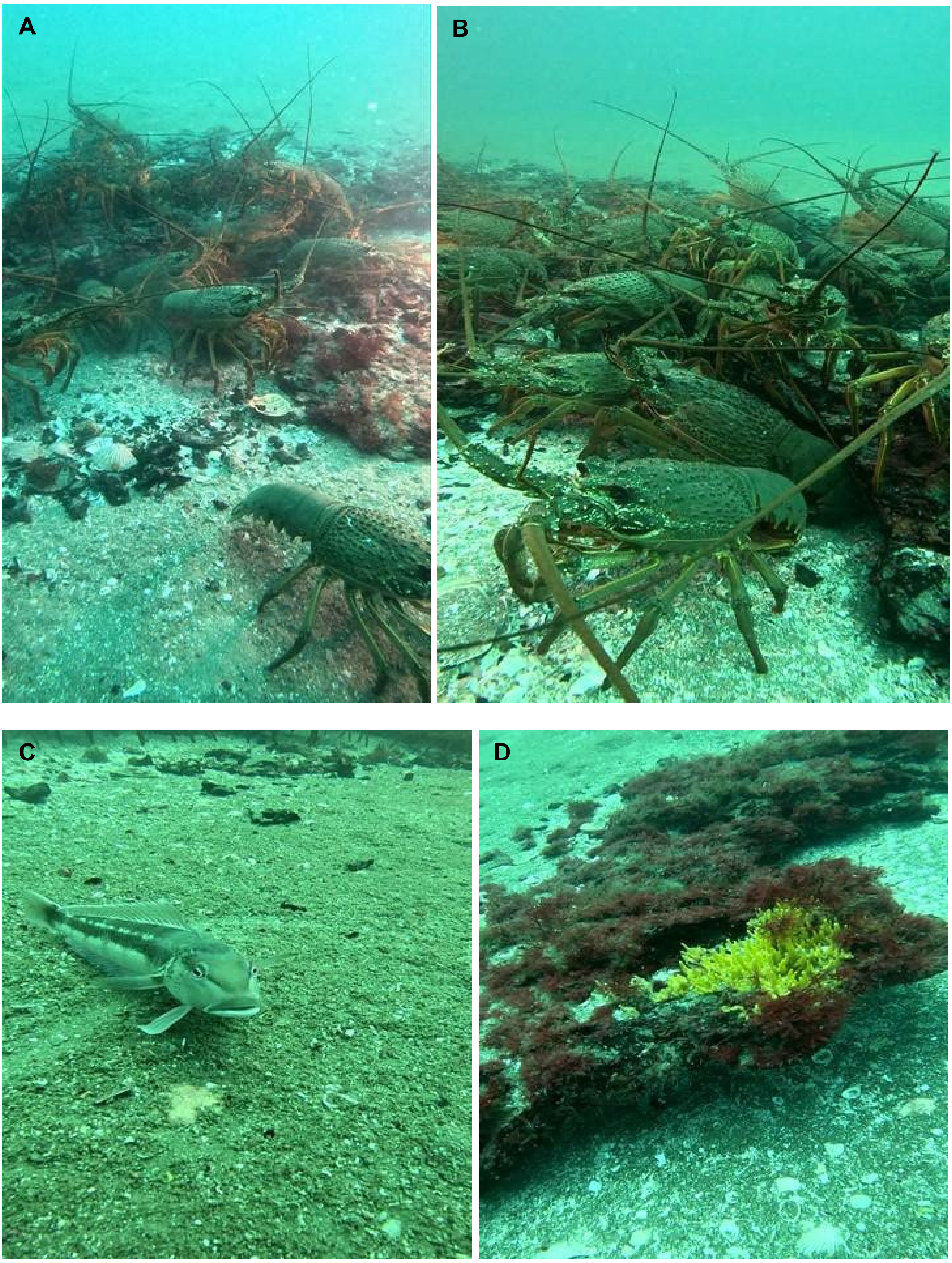


Figure 5. Dive site 2: A) and B) packhorse lobster (*Sagmariasus verreauxi*); blue cod (*Parapercis colias*); and, D) sponge (*Polymastia spp*).

4.0 Conclusion

Based on this first order survey the proposed sand mining area is biologically diverse and ecologically significant. All surficial samples comprised species of ecological merit and function. Main findings were:

- Polychaete worms were numerically dominant across the whole survey area and these play important roles in terms of sediment reworking, nutrient cycling, food for numerous fishes and larval settlement.
- This is also true of other infaunal and epifaunal species such as the numerous crabs and bivalves encountered. Tube worm complexes are also considered to be important habitat for bivalve settlement with scallop larval settlement requiring the presence of fine filamentous emergent epifauna on the seabed, such as tubeworms, hydroids, and filamentous algae (MPI, 2024; Dr James Williams, NIWA personal communication in 2026.)
- Tipa/scallops were observed via drop camera (Shaun Lee) and drone (Holly Kereopa) at various sites across the proposed sand mining area. Of these, the scallop bed occurring toward the southern end is of particular significance given the high bed integrity, scallop abundance and considering the current fisheries restrictions on scallop harvesting that is currently in place across the region (MPI 2022).
- The occurrence of packhorse lobster, blue cod, snapper, big-eye, goatfish, and larval fish (unid) within a small spatial area is also significant of the importance of his area to Bream Bay biodiversity and ecological function.

Given the scale of proposed sand mining in relation to the existing ecology (tis report), effects will be significantly deleterious to the ecological functioning of the Bream Bay coastal environment. These effects would include but are not necessarily limited to: direct damage and smothering of highly sensitive and ecologically and culturally important species, disruption to sediment geochemical processes, loss of sediment complexity, loss of and, destruction to, foraging grounds, migration pathways, and habitat for larval settlement.

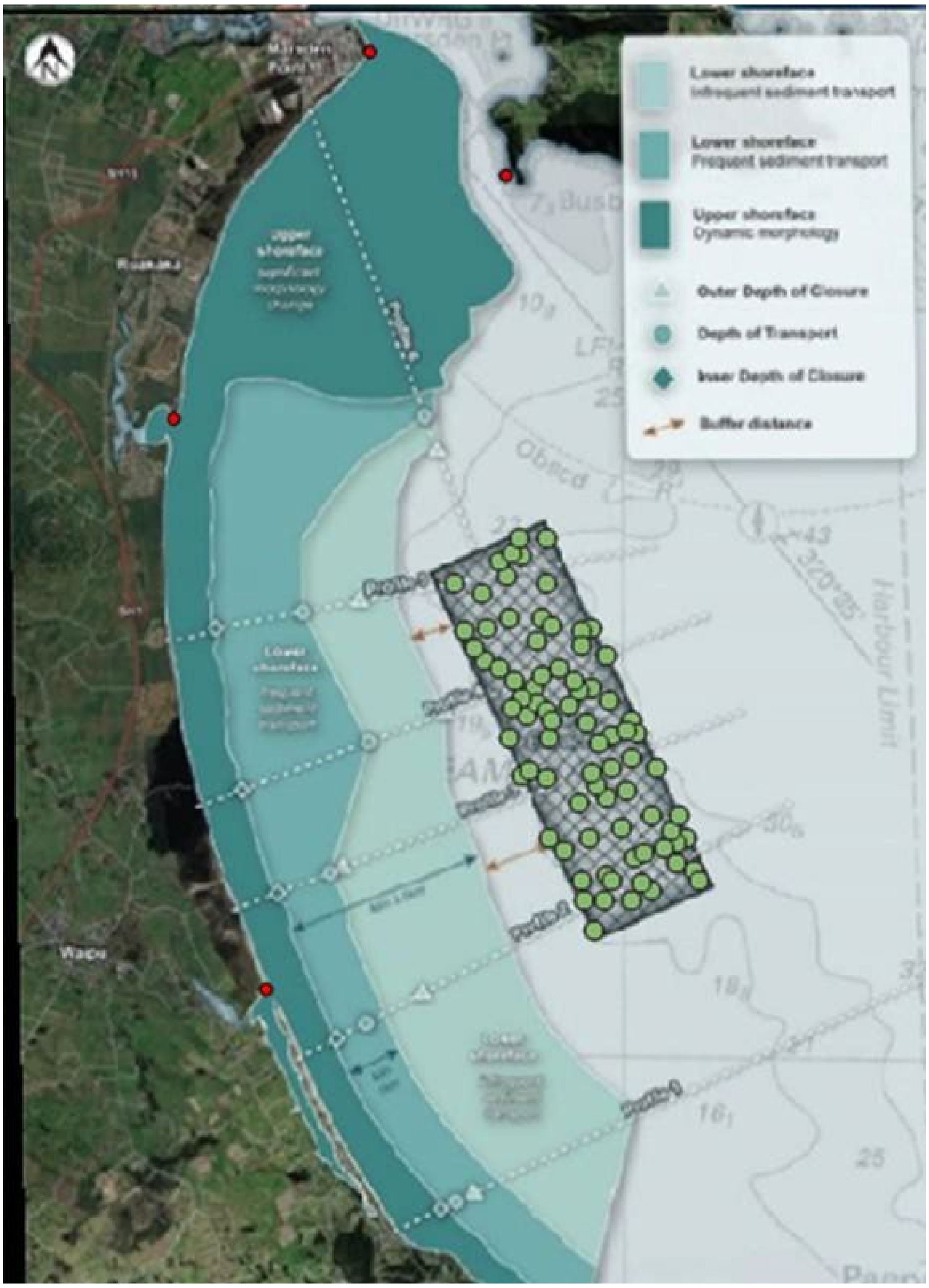


Figure A1. Planned extraction area denoted by rectangle.