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ECOLOGICAL ASSESSMENT & REPORTING SERVICES



Proposed Aquaculture Management Areas (AMAs), Okuri Bay

Ecological Impact Assessment

For Clearwater Mussels Limited

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REPORT INFORMATION & QUALITY CONTROL

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Executive Summary

Clearwater Mussels Limited seeks for one or more marine farms due for relocation to be relocated to Aquaculture Management Areas (AMAs) not previously identified in Okuri Bay, outer western Marlborough Sounds. To understand and evaluate the ecological values present within the coastal receiving environment, Robertson Environmental Limited was engaged to undertake an ecological assessment of the values within three proposed AMAs (see Figure 1.1) and potential effects associated with the proposed activity (shellfish aquaculture). This assessment has been undertaken in accordance with the EIANZ Guidelines (2018).

Desktop, database, and field survey identified two subtidal habitat types associated to the proposed AMAs. The deeper subtidal habitat (Coastal Marine (Area) Zone; the Proposed Marlborough Environmental Plan, PMEP) to be covered by shellfish farming structures is predominantly soft substratum and of low or limited ecological value, but includes areas of reef and biogenic habitat identified with higher values. Key conclusions of the assessment were as follows:

- The subtidal area beyond mapped reef and biogenic features is soft sediment-dominated, common among the wider Okuri Bay and adjacent coastal area, and of relatively low value ecologically.
- With the exception of horse mussels, present in beds in several areas across the site, no other species or communities of scientific, conservation or ecological importance were observed within the proposed AMAs.
- Regarding native fauna, the proposal presents a low probability risk to marine mammals and seabirds.
- There is negligible risk of biosecurity (marine pests and disease) issues, and no risk of impacts from chemical additives (antibiotics, parasiticides, antifoulants and other therapeutics).
- Predominantly the overall magnitude of the potential effects, both direct and indirect, are low or very low, and the resultant significance of the potential adverse effect (in the absence of any mitigation measures) is generally low to very low.

Because associated impacts on the biogenic and reef habitats are inconsistent with the PMEP, we have identified areas within the proposed AMAs as shown in Figure 5.1, that would be considered inappropriate for consideration for marine aquaculture activities under the NES-MA and PMEP. It is suggested that further site design reflecting the presence of biogenic and reef features is undertaken and a process of iterative site design completed in order to focus on avoidance of effects on identified biogenic and reef habitats and optimise selection of suitable locations for shellfish farming in Okuri Bay.

It is recommended to minimise discharges (fine sediment and organic matter) to water in the receiving environment during marine farm operations. Although, the discharge effects of harvesting mussels are seen as transitory and, in most cases, quickly become indistinguishable from background sedimentation.

Where possible the proposed AMA site design has minimised impacts on Okuri Bay and its ecological values and, assuming implementation of the mitigation outlined above, no permanent loss of indigenous biodiversity values is expected to occur.

1 Introduction

Gathering information to inform the assessment of effects on the coastal environment is implicit in New Zealand's legislation for sustainable resource management. A key mechanism in this process is to undertake aquaculture ecological assessments, which are designed to consistently and transparently assess the magnitude of impacts of marine farming activities on local biological communities and habitats, to identify appropriate locations for development, and guide management.

With the Resource Management (National Environmental Standards for Aquaculture) Regulations 2020 (NES-MA) operative as of 1 December 2020, it is important to accurately assess and demarcate ecological values and potential effects to ensure the proposed aquaculture activity complies with the NES-MA.

The following report is an ecological impact assessment (EclA) of three proposed Aquaculture Management Areas (AMAs) located in Okuri Bay, outer western Marlborough Sounds ('the Site'). It was commissioned by Aquaculture Direct on behalf of Clearwater Mussels Limited (CML).

1.1 Ecological Assessment Scope

With detailed methodology outlined in Section 2, and survey limitations in Section 8, the purpose of this report is to:

- Identify and describe the significance and value of benthic habitat and biota associated with the Site (Section 3);
- Describe the potential effects on local ecology arising from the proposed activity (Section 4);
- Discuss and present an overall conclusion of the level of potential effects of the proposed activity on local ecology (Section 5); and,
- Recommend measures as appropriate to avoid, remedy or mitigate potential effects (including any proposed conditions/management plan required) (Section 6).

1.2 Description of Proposed Activity

The location of the Site and proposed AMAs ('Western AMA', 'Southeastern AMA' and '8009 AMA') within the surveyed area is shown in Figure 1.1.

The proposed AMAs would fall within CMU10 (Coastal Section - South of French Pass) under Variation 1 of the PMEP. It is understood that the results presented in this EclA will inform further refinement of AMAs included in CML's initial submission to the Marlborough Environment Plan aquaculture variation for one or more farms due for relocation to be relocated to AMAs not previously identified in Okuri Bay. We also understand that CML has signalled applying for these proposed AMAs to be included in the operative plan (the Marlborough Sounds Resource Management Plan) via private plan change (and accompanying resource consent application).

This report builds on existing information^{1,2} and accounts for Council feedback on that information³ where appropriate. We note the surveyed area as shown in Figure 1.1 covers the three proposed AMAs in their entirety⁴.

¹ Davidson, R.J., and Richards, L.A. 2017. Biological report for the reconsenting of marine farm 8009, Okuri Bay, Current Basin. Prepared by Davidson Environmental Ltd. for Clearwater Mussels. Survey and monitoring report no. 875.

² Davidson, R.J., Richards, L.A., and Scott-Simmonds. 2021. Biological report for two proposed AMA sites located in Okuri Bay, Tasman Bay. Prepared by Davidson Environmental Ltd. for Talley's Group Ltd. and Clearwater Mussels Ltd. Survey and monitoring report no. 1101.

³ Noting MDC Coastal Scientist Oliver Wade's comments regarding survey intensity and the need for more intensive investigation within the 'Western AMA' area (refer Figure 1.1) to determine the extent of any horse mussel beds.

⁴ and provides for an area of 20 m distance around the AMA boundaries in line with NES-MA requirements.

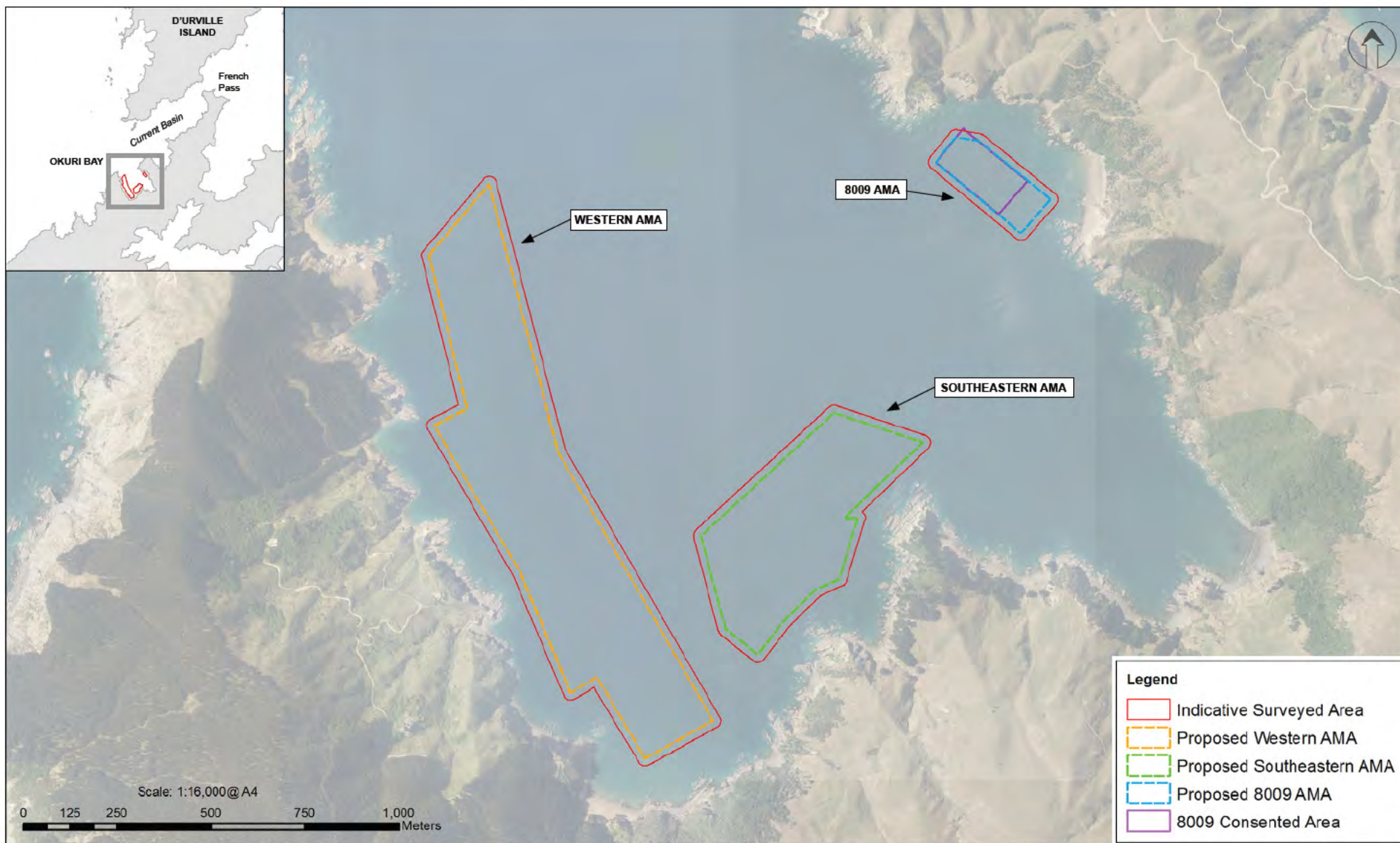


Figure 1.1. Overview of the location and extent of proposed AMAs and surveyed area assessed in the present study.

2 Assessment Methodology

The ecological assessment of the Site has been undertaken using a combined desktop, database and field survey approach outlined below.

2.1 Desktop Analysis

Existing biological databases and all published information on habitat types and biological values within the study area were researched. This phase also included preparation of site maps and plans to direct the field survey, including plotting of consent corners. Both the consent corners and extent of potential differences in habitat type within the site were delineated on geographic information systems (GIS) using topographical maps and high resolution aerial photography (LINZ rectified ~0.3 m per pixel resolution flown in 2017/18 - <https://data.linz.govt.nz/layer/98968-marlborough-03m-rural-aerial-photos-2017-2018/>) prior to site visit. Information was derived from known datasets on landforms, marine farms (MDC's Smart Maps database), climate, and topography of the site. Preliminary biological communities and habitat types were identified and described through a combination of past reports (MDC database), the use of aerial photographs, and to a lesser extent the New Zealand Land Cover Database version five (LCDB5).

The threat classification of important marine species was derived from the appropriate threat classification list for each taxa (Freeman et al. 2013; Nelson et al. 2019; Baker et al. 2019; Robertson et al. 2021; International Union for Conservation of Nature, IUNC) and their regional status was derived from Marlborough District Council reports (Davidson et al. 2011) and the Conservation Management Strategy for the Nelson/Marlborough Conservancy (Department of Conservation, 1996-2006).

2.1.1 Biogenic Habitats and Macroinvertebrates

Local biogenic habitat and epibenthic macroinvertebrate lists (Appendix E) obtained from various sources (Morton and Miller 1973; Davidson et al. 2010, 2011, 2018; and Anderson et al. 2019) were examined to identify any rare or uncommon biogenic habitat in which to focus field surveys. This list also included potential macroalgae and seagrass habitat.

2.1.2 Fish

A list of fish species in the area, as noted in Davidson et al. (2011), was collated (Appendix F).

2.1.3 Marine Mammals

A list of mammal species in the area, as noted in Davidson et al. (2011), was collated (Appendix C).

2.1.4 Seabirds

A list of bird species in the area, as noted in eBird (Grid BV58 June 2019-April 2022) and Davidson et al. (2011) and Schuckard et al. (2018), was collated (Appendix D). The species list obtained from the eBird atlas data served as a baseline of species previously recorded in the wider area and therefore potentially present at or near the site. More recent survey data on NZ King shag populations in the Marlborough Sounds, as presented in McClellan et al. (2020) and Bell et al. (2020), was also considered.

2.2 Field Survey

Habitat within and immediately adjacent to the proposed AMAs, was assessed by field survey. The survey targeted an approximately 65.11 hectare subtidal area based on the proposal (Figure 1.1). The survey was undertaken by boat (Vessel: Christina A, 12.1 m, MSA 129219) during relatively calm (<10 knot winds) sea conditions on the 11th August 2022. On this day, the tide was high at 0851 (3.39 m) and low at 1503 (0.55 m), and during the survey currents were negligible, with weather conditions mostly fine. Mean Low Water Mark (MLWM) was determined at various locations inshore of each of the AMA's inshore boundary.

The survey vessel was positioned over the low water mark and the position plotted using the on-board GPS unit, while visual assessment of the transition between intertidal and subtidal species was used to determine low tide.

2.2.1 Benthic Habitat Classification

Broad ecological or habitat zones in the benthic survey area were identified, and with the aid of a Garmin GPSMAP 8410scx chart plotter unit (accuracy approx. ± 5 -10 m) linked to two GT51MTHP through-hull high-definition (500 kW) transducers, which provide traditional CHIRP sonar data, right and left SideVu™ imaging as well as DownVu™ imaging, broadly delineated. Each habitat was subjectively classified into one of several different qualitative habitat type descriptors according to unique features identified and listed in Table 3.1 (refer to Appendix G for further details).

A stratified inspection of habitats was then undertaken using a combination of remotely operated vehicle (ROV - Custom Heavy BlueROV2 fitted with a Seatrac USBL X110 geopositioning system (accuracy approx. ± 5 m) and drop camera (Deep Blue HD (wide-angle 1080P) underwater splash camera fixed to a steel frame. ROV video tracks and drop camera stations were selected to obtain a representative range of habitats and depths within the Site, with additional imagery obtained when any features of interest (e.g. biogenic habitat, reef structures, cobbles) were observed on the remote monitor on-board the survey vessel. Detailed field data is presented in Appendix A.

Upon completion of field work the broad benthic habitat zones and benthic imagery were then imported into a georeferenced aerial photo of the area using Garmin HomePort (version 2.3.0) and ArcMap 10.5 GIS software. Using a combination of SideVu™ sonar imagery, ROV video footage and drop camera photos and colour aerial photos, delineated habitat zones were adjusted accordingly, to more accurately reflect the likely tonal gradations in sonar images of respective habitats, and an indicative map of different benthic habitats was produced.

2.2.2 Biogenic Habitat and Macroinvertebrates

The presence of biogenic habitat and epibenthic macroinvertebrates was evaluated at discrete points across a total of 73 stations within the 8009 AMA and along the representative ROV video tracks and drop camera stations located throughout the surveyed area of the Western and South-eastern AMAs (Figure 2.1). The presence/absence and approximate density of biogenic species (e.g. horse mussels) and the percentage cover of natural⁵ and farm-derived shell material were both estimated based on assessment of benthic imagery derived from the ROV video footage and drop camera. Benthic imagery is presented in Appendix B.

2.2.3 Fish

Beyond those documented via drop camera, field surveys for fish were not conducted. Rather, we rely on the vegetation community and habitat type descriptions obtained from the field investigations to identify areas of potential habitat for species likely to occur within the area, as well as published accounts of fish present within nearby habitats.

2.2.4 Marine Mammals

Field surveys for marine mammals were not conducted. Rather, we rely on the habitat type descriptions obtained from the field investigations to identify areas of potential habitat for species likely to occur within the area, as well as published accounts of marine mammals present within nearby habitats. All incidental mammal observations were recorded while on site and observations of mammals within or adjacent to the site.

⁵ Per NES-MA definition of '**dead shell**' — (a) includes dead shell, broken or whole, equal to or greater than 2 mm across; but (b) excludes shell from a marine farm.

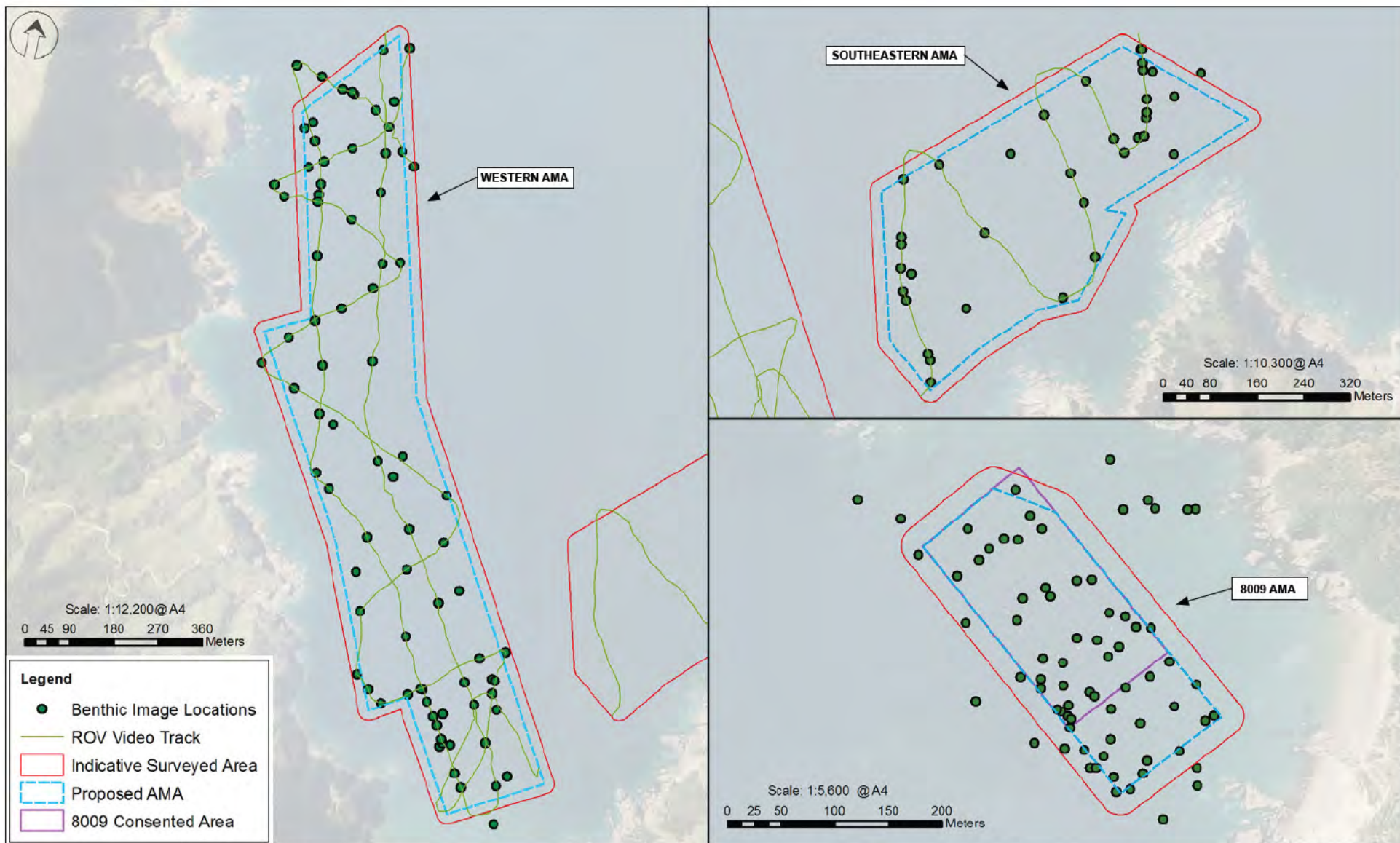


Figure 2.1. Surveyed areas, ROV video track and locations of benthic image locations within proposed AMAs, Okuri Bay. Note: corresponding side-scan sonar overlays are presented in Appendix A.

2.2.5 Seabirds

Again, field surveys for sea birds were not conducted. Rather, we rely on the habitat type descriptions obtained from the field investigations to identify areas of potential habitat for species likely to occur within the area, as well as published accounts of birds present within nearby habitats. All incidental bird observations were recorded while on site and observations of birds within or adjacent to the site.

2.3 Assessment of Effects Methodology

The location of the Site falls within the jurisdictional boundary of MDC and its operative Marlborough Sounds Resource Management Plan (MSRMP) and the Proposed Marlborough Environment Plan (PMEP). The Site lies within the boundary of the Coastal Marine Zone 1 (CMZ1) of the MSRMP, and Coastal Marine (Area) Zone under the PMEP. All statutory planning documents relevant to the consenting and ecological assessment of the proposed aquaculture activity, and the New Zealand Coastal Policy Statement 2010 (NZCPS) and the NES-MA, were considered in the assessment. The assessment of ecological effects follows the Environment Institute of Australia and NZ Inc. (EIANZ) Impact Assessment (EclA) guidelines (Roper-Lindsay et al., 2018)⁶. The EclA approach follows the steps outlined below:

Step 1: Assessment of ecological values

Ecological values within the defined Zone of Influence (i.e. study area) are assigned a level on a scale of Low, Moderate, High or Very High based on assessing the values of species, communities, and habitats identified against criteria set out in the EclA guidelines (see Table 2.1).

Table 2.1 Assignment of values to species, vegetation and habitats within the potentially affected marine area (adapted from EIANZ, 2018).

Value	Species Value requirements	Habitat Value requirements
Very High	Important for Nationally Threatened species	Meets most of the ecological significance criterion as set out in relevant statutory policies and plans (MSRMP and PMEP) including indigenous biological diversity criteria in Policy 11 of the NZCPS
High	Important for Nationally At Risk – species and may provide less suitable habitat for Nationally Threatened species	Meets some of the ecological significance criterion as set out in relevant statutory policies and plans (MSRMP and PMEP), including indigenous biological diversity criteria in Policy 11 of the NZCPS
Moderate	No Nationally Threatened or At Risk species, but habitat for locally uncommon or rare species	Habitat type does not meet ecological significance criteria as set out in the relevant statutory policies and plans (MSRMP and PMEP), or the NZCPS but does provide locally important ecosystem services (e.g. food resource, biogeochemical cycling, and seascape connectivity)
Low	No Nationally Threatened, At Risk or locally uncommon or rare species	Nationally or locally common habitat and supporting no Threatened or At Risk species, and does not provide locally important ecosystem services

⁶ Noting that, in New Zealand, while several regional plans, including the MSRMP/PMEP, have criteria for assigning ecological significance to biota and habitats, there is no published guidance on assessing marine ecological values for direct inclusion into ecological effects assessments for marine environments. We also note the EIANZ Guidelines primarily relate to terrestrial and freshwater ecosystems, as those ecosystems are well covered by ecological literature and have less complex legislative contexts than the coastal environment (Page 3 of the EIANZ Guidelines).

Step 2: Magnitude of effect assessments

Step 2 of the EcIA guidelines requires an evaluation of the magnitude of effects on ecological values based on the extent of any area which is likely to be affected, intensity and duration of effect. The magnitude of the effect that the consent is expected to have on ecological values is evaluated as being either No effect, Negligible, Low, Moderate, High or Very High, based on the proposed works (footprint size, intensity and duration; see Table 2.2).

Table 2.2 Summary of the criteria for describing the magnitude of effect as outlined in EIANZ, 2018.

Magnitude of effect	Description
Very High	Total loss or very major alteration to key elements/features of the baseline conditions such that character/composition/attributes will be fundamentally changed and may be lost from the site altogether; and/or Loss of a very high proportion of the known population or range of the element/feature
High	Major loss or major alteration to key elements/features of the baseline conditions such that post development character/composition/attributes will be fundamentally changed; and/or Loss of a high proportion of the known population or range of the element/feature
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that character/composition/attributes of baseline will be partially changed; and/or Loss of a moderate proportion of the known population or range of the element / feature
Low	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of baseline condition will be similar to current circumstances/patterns; and/or Having a minor effect on the known population or range of the element/feature
Negligible	Very slight change from baseline condition. Change barely distinguishable, approximating the “no change” situation; and/or Having negligible effect on the known population or range of the element/feature.

Step 3: Level of effects assessment in the absence of mitigation

Step 3 of the EcIA guidelines requires the overall level of effect to be determined using a matrix that is based on the ecological values and the magnitude of effects on these values in the absence of any efforts to avoid, remedy or mitigate for potential effects. Level of effect categories include No Effect, Very Low, Low, Moderate, Moderate/High, High and Very High. Table 2.3 shows the EcIA matrix outlining criteria to describe the overall level of ecological effects.

Table 2.3 - Summary of the criteria for describing the overall level of ecological effects as outlined in EIANZ, 2018.

Magnitude of effect	Ecological Value				
	Very High	High	Moderate	Low	Very Low
Positive	Net gain	Net gain	Net gain	Net gain	Net gain
Very High	Very high	Very high	High	Moderate	Low
High	Very high	Very high	Moderate	Low	Very low
Moderate	High	High	Moderate	Low	Very low
Low	Moderate	Low	Low	Very low	Very low
Negligible	Low	Very low	Very low	Very low	Very low

Assessment also considered the temporal scale at which potential impacts were likely to occur:

- Permanent (>25 years);
- Long-term (15-25 years);
- Medium-term (5-15 years);
- Short-term (0-5 years); or,
- Temporary (during marine farm construction).

Step 4: Establish if mitigation is required

Results from the matrix in Table 2.4 are used to determine the type of responses that may be required to mitigate potential direct and indirect impacts, considering the following EclA guidelines:

- A 'Low' or 'Very Low' level of impact is not normally of concern, though marine farm design should take measures to minimise potential effects.
- A 'Moderate' to 'High' level of impact indicates a level of impact that qualifies careful assessment on a case-by-case basis. Such activities could be managed through avoidance (revised marine farm design) or appropriate mitigation. Where avoidance is not possible, no net loss of biodiversity values would be appropriate.
- A 'Very High' level of impact is are unlikely to be acceptable on ecological grounds alone and should be avoided. Where avoidance is not possible, a net gain in biodiversity values would be appropriate.

As discussed later in this report, the proposed activity would largely have only low to very low ecology effects (in terms of Step 3 of the EclA guidelines), even without taking into account mitigation measures. However, mitigation measures are proposed for specific benthic features below to ensure a no-net-loss ecological outcome and consistency with the PMEP and NES-MA.

3 Ecological Description

3.1 Site Description

The proposed AMAs are located within Okuri Bay (Figure 3.1), a north-facing embayment within the wider Croisilles (Current Basin). Okuri Bay is situated on the southern shore of Current Basin, in the outer western Marlborough Sounds, approximately 7.5 km southwest of French Pass and some 56 km by sea from the entrance to Port Nelson. Okuri Bay has a coastline length of approximately 8 km, and covers an area of sea of approximately 315 ha. Okuri Bay is up to 2.1 km wide and appropriately 2.3 km long. The adjacent landscape is typical of the Marlborough Sounds and features a series of relatively low (<10 m in height), steep erodible hillslope-coastal cliffs which rise from a relatively narrow band of rocky bedrock, boulder and cobbled intertidal to ridges approximately 50-100 m in height. Predominantly its cover is one of plantation (pine) forest and producing pasture with some small pockets of mixed native-exotic scrubland vegetation (LCDB5).



Figure 3.1. Overview of the coastal receiving environment of Okuri Bay where the three proposed AMAs assessed in this report are located.

3.2 Ecological Context

Based on an initial desktop review of available information we have identified the following ecological habitats associated with the Site.

3.3 Marine Environment (Based on Historical Information)

The wider marine study area is delineated by two primary subtidal regions, the relatively shallow nearshore reef and deeper offshore zone where the proposed AMAs are situated.

3.3.1 Eastern side of Okuri Bay - Proposed 8009 AMA

Based on information in Davidson and Richards (2017), the eastern subtidal area associated with marine farm 8009 is dominated by silt substratum, with fine sand and natural shell in shallow parts of the consented area. Hard substratum is present along the nearshore subtidal, approximately >41 m from the consent. Bedrock reef outcrops are present near headlands, but do not extend into the consent area. No tubeworms, horse mussels, scallops or any species or communities likely to be considered biologically significant were observed in 2017.

3.3.2 Western side of Okuri Bay - Proposed Western AMA

Davidson et al. (2021) assessed the benthic environment along the western side of Okuri Bay. In relation to dominant benthic features present within the area encompassing the proposed Western AMA, the authors stated:

- *“....The proposed AMA supported a relatively low abundance of surface-dwelling species apart from scallop and hermit crabs. Hermit crabs were widespread and at times common. Scallops were observed from most areas in the proposed AMA but did not appear to be present at high densities.*
- *The [proposed] AMA [was] characterised by a relatively flat bottom composed of silt and clay with a variable and low cover of natural shell.*
- *The inshore edges immediately adjacent to the proposed AMA supported a comparable substratum to the AMA [itself].*
- *Overall, the benthos under the proposed AMA is suitable for consideration for marine farming and avoids the western coarse soft sediment zone...”.*

3.3.2 Head of Okuri Bay - Proposed Southeastern AMA

Previous surveys of Okuri Bay have not included the area where the proposed Southeastern AMA is situated. The closest potential AMA site covered by Davidson et al. (2021) was an approximately 13 hectare area, the ‘Eastern AMA’, located to the immediate northeast of the proposed Southeastern AMA. In this area, silt substrata was dominant with variable but low cover of natural shell material and limited surface-dwelling flora and fauna. Scallops were observed in relatively low densities. Areas inshore of the Eastern AMA (toward the northern extent of the proposed Southeastern AMA) supported a bed of horse mussels. A variety of epibenthic species were recorded in association with horse mussels. The extent of the horse mussel bed was not established by Davidson et al. (2021) and horse mussel beds were not shown to be present during a previous survey of this area in 1996 (Davidson 1996).

The wider Okuri Bay and adjacent coastline is known to provide habitat and refuge for a variety of seabirds and marine mammals, which may include Threatened/At Risk species (further discussed in Section 4 below).

3.4 Proposed AMA Boundaries

The inshore depths of the proposed AMA boundaries ranged from 5.4-23.5 m, while offshore boundary depth was approximately 12.8-32.5 m (Appendix A). The distance between MLWM and the inshore boundary of each proposed AMA was measured at several positions along the adjacent

shoreline. The distance from MLWM positions to the inshore boundary ranged from 57-111 m.

3.5 Existing Benthic Habitat

Key areas of subtidal habitat within the Site are listed below and described in the following sections. An example, looking north across the proposed quarry expansion area, of how habitat margins were delineated is provided in Figure 3.2. A GIS-based broad scale benthic habitat map of the Site is provided in Figure 3.3a-c. Detailed data specific to each proposed AMA is presented in Appendix A.

Biogenic habitat

- Horse mussel (*Atrina zealandica*) bed; horse mussel density ≥ 1 per m^2 .
- Natural shell $\geq 40\%$ cover.

Non-biogenic habitat or other

- Reef; bedrock, boulder and cobble field (nearshore subtidal).
- Soft sediment; soft mud, firm muddy sand.

There was no obvious evidence of other biogenic species (e.g. rhodoliths, macroalgae, seagrass, tubeworms, brachiopods) being present at the Site.

3.5.1 Biogenic habitat

Horse mussel (Atrina zealandica) bed; horse mussel density ≥ 1 per m^2

Horse mussel beds, in which the density of mussels was estimated to be ≥ 1 per m^2 , are present within all three proposed AMAs. They are most prolific within the 8009 AMA site, accounting for approximately 1.46 ha (78.6%) of the total 1.85 ha area. The Western AMA supports approximately 6.92 ha of horse mussel bed within the proposed 43.27 ha area. The largest bed within the Western AMA is located towards the site's southernmost extent with two smaller areas observed along the northwestern boundary. Two beds were recorded along southwestern and northeastern boundaries of the Southeastern AMA, occupying approximately 1.18 ha (5.9%) of the ~20 ha AMA area.

Natural shell $\geq 40\%$ cover

Natural shell is present in most areas of the proposed AMAs; however, only the Southeastern AMA supports notable areas where cover was estimated to be $\geq 40\%$. Here, natural shell occurs as several isolated patches of variable size and comprised approximately 4.94 ha (24.7%) of the ~20 ha area.

The ecological value of biogenic habitat is Very High given recognised biodiversity attributes (including indigenous species). Horse mussel beds contain regionally significant species (*A. zealandica*) and together with areas of moderate-high natural shell are considered to act as a buffer and connect adjacent ecosystems. The areas mapped in this report are not recognised as Ecologically Significant Marine Sites (PMEP).

3.5.2 Non-biogenic or other

Reef; bedrock, boulder and cobble field (nearshore subtidal)

Inshore reef habitat occurs within the Western and Southeastern AMAs. It was recorded and extended seaward into the southwestern portion of the Western AMA and along the inshore boundary of the Southeastern AMA. These nearshore reef habitats are on a similar gradient to the relatively steeper intertidal zone, and collectively account for a relatively small proportion (2.0%) of the overall surveyed area. No reef habitat was recorded at the 8009 AMA.

The ecological value of the inshore reef is High given it may support Nationally Threatened, At Risk or locally uncommon or rare species.

Soft sediment; soft mud, firm muddy sand

The balance area across all three proposed AMAs and wider surveyed area is soft sediment lacking any notable biological or habitat features.

Table 3.1 Summary of current broad benthic habitat types within the surveyed area, Okuri Bay, August 2022.

Dominant Benthic Feature		Surveyed Area ¹		Proposed AMAs					
				Western AMA		Southeastern AMA		8009 AMA	
		Area (ha)	% of Area	Area (ha)	% of Area	Area (ha)	% of Area	Area (ha)	% of Area
1.	Biogenic habitat; horse mussel density ≥ 1 per m ²	9.56 ha	14.7%	6.92 ha	16.0%	1.18 ha	5.9%	1.46 ha	78.6%
2.	Biogenic habitat; natural shell $\geq 40\%$ cover	5.04 ha	7.7%	0.10 ha	0.2%	4.94 ha	24.7%	-	-
3.	Reef; bedrock/boulder/cobble	1.31 ha	2.0%	0.35 ha	0.8%	0.96 ha	4.8%	-	-
4.	Firm muddy sand	49.20 ha	75.6%	35.90 ha	83.0%	12.91 ha	64.6%	0.40 ha	21.4%
Total		65.11 ha	100%	43.27 ha	100.0%	19.99 ha	100.0%	1.85 ha	100%

¹ Based on the combined surveyed area as shown in Figure 1.1, encompassing the proposed Western, Southeastern and 8009 AMAs.

3.6 Epibenthic Macroinvertebrates

Biogenic habitat

Observed horse mussel beds appear to be in a healthy state, supporting various encrusting epifauna, often including sponges and red macroalgae. Scallop (*Pecten novaezelandiae*) and soft tubeworm (*Spiochaetopterus* sp.) were occasional in these areas. Other epifauna present included 11 armed starfish (*Coscinasterias muricata*) and cushion star (*Patiriella regularis*).

Reef; bedrock, boulder and cobble field (nearshore subtidal)

Epibenthic macrofauna, in this case unidentified sponges, were noted sparsely distributed among mapped rocky reef habitat. No notable biogenic habitat occurred, with only crustose macroalgae (*Lithothamnion* sp.) present at relatively high densities.

Soft sediment; soft mud, firm muddy sand

Species present at relatively low densities among soft sediments included scallop, sea cucumber, seven armed starfish, burrowing anemone, eleven armed starfish, and cushion star. Hermit crabs were recorded as abundant.



Figure 3.2. Example of the different habitats in the surveyed area and encountered via sonar during the field survey of the proposed 8009 AMA (as bounded in red). Note: representative drop camera imagery and live HD video feed were used to corroborate habitat types captured in side-scan sonar imagery.

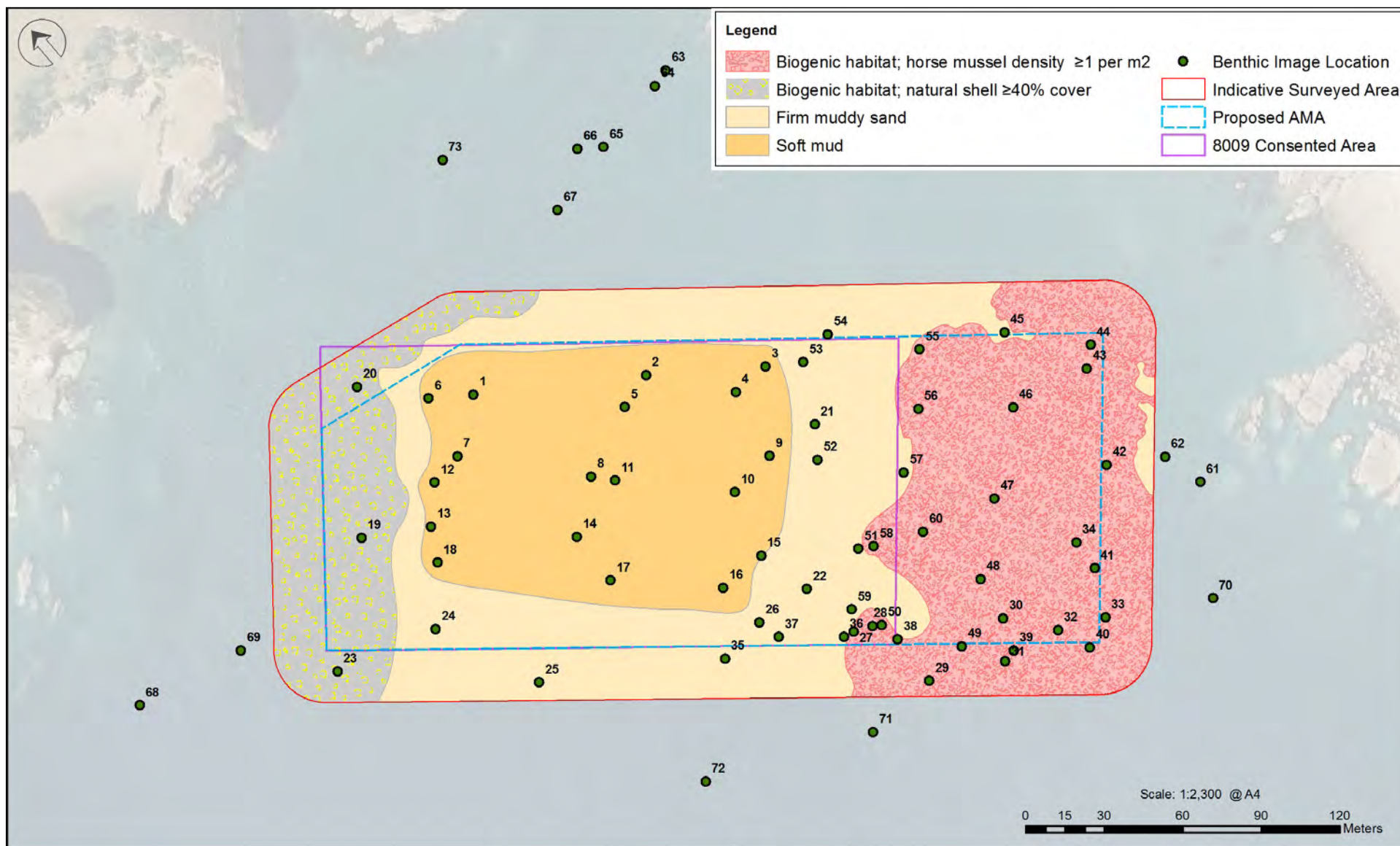


Figure 3.3a. Broad scale (indicative) map of dominant benthic habitat assessed below the proposed 8009 AMA. ROV video track and locations of benthic imagery locations used to corroborate the extent of mapped habitat types are overlaid. Detailed field data and benthic imagery is presented in Appendix A.

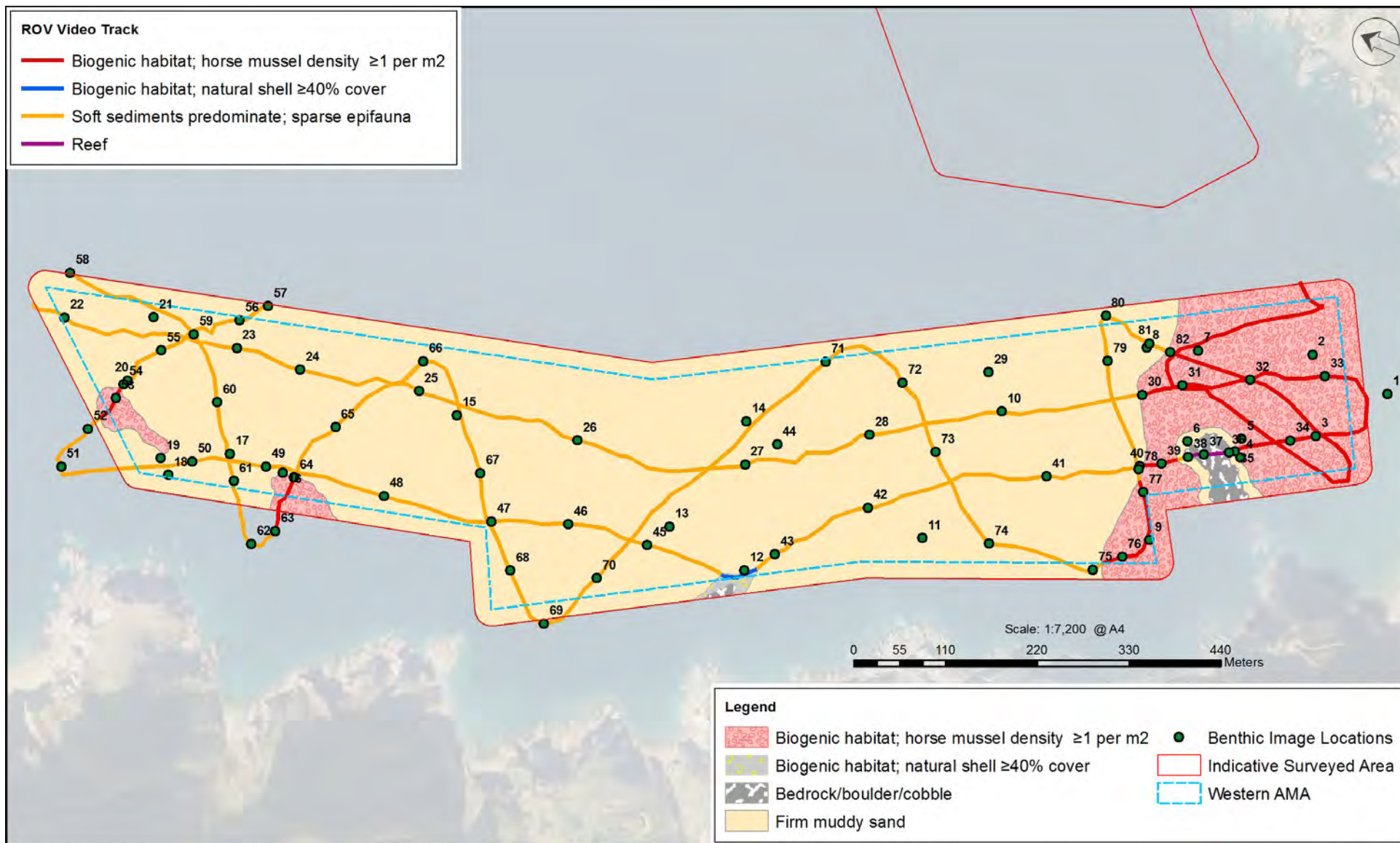


Figure 3.3b. Broad scale (indicative) map of dominant benthic habitat assessed below the proposed Western AMA. ROV video track and locations of benthic imagery locations used to corroborate the extent of mapped habitat types are overlaid. Detailed field data and benthic imagery is presented in Appendix A.

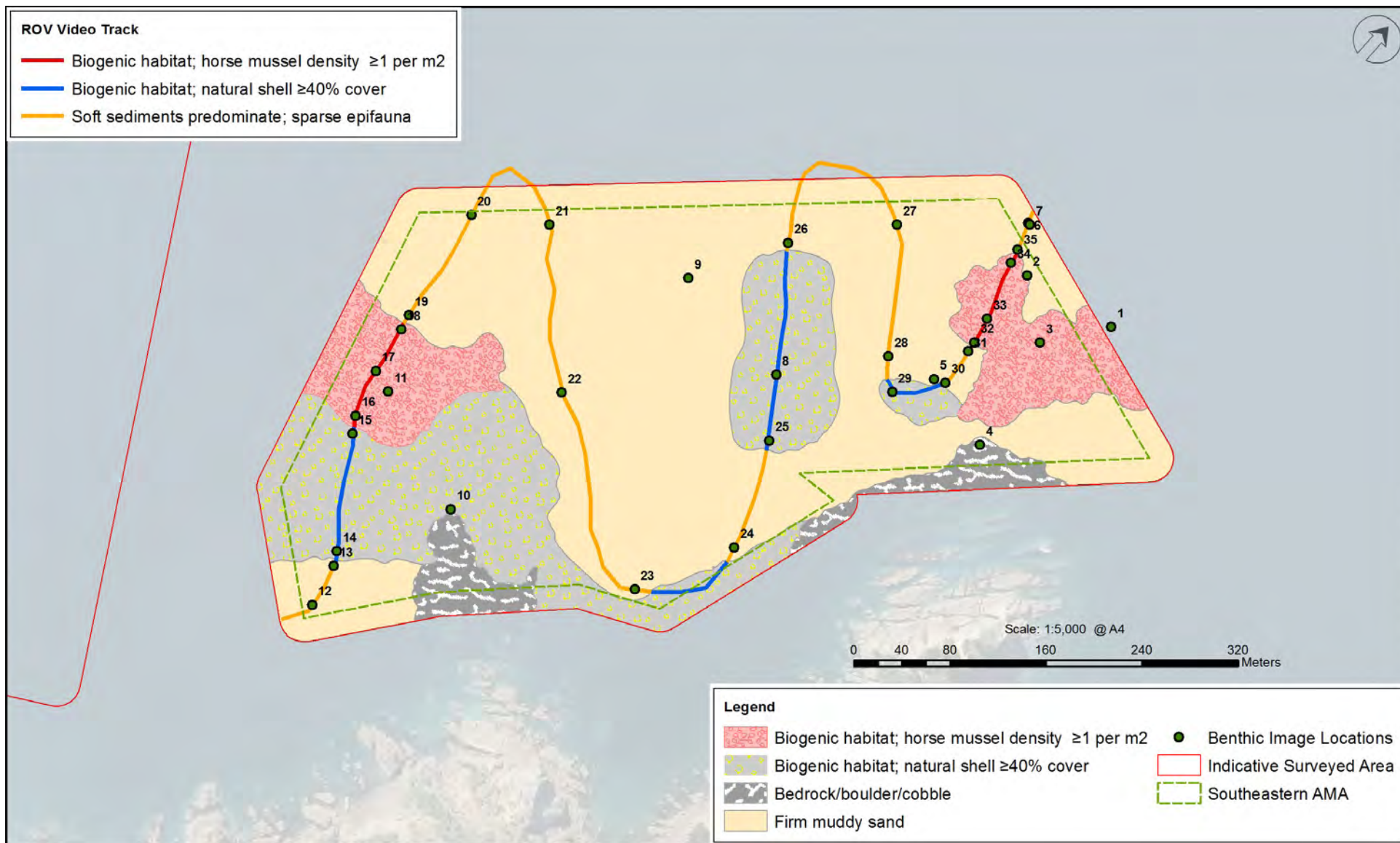


Figure 3.3c. Broad scale (indicative) map of dominant benthic habitat assessed below the proposed Southeastern AMA. ROV video track and locations of benthic imagery locations used to corroborate the extent of mapped habitat types are overlaid. Detailed field data and benthic imagery is presented in Appendix A.

3.7 Fish

Based on the habitat preference and recorded distributions of fish species (Appendix F), there are several species of fish with the potential to inhabit the Site (Davidson et al. 2011) including:

- Blue Cod (*Parapercis colias*) — Threatened - Least Concern (Decreasing);
- Elephant Fish (*Callorhynchus milii*) — Threatened - Least Concern (Stable);
- Rough Skate (*Zearaja natuta*) — Threatened - Least Concern (Stable);
- Snapper (*Pagrus auratus*) — Threatened - Least Concern (Decreasing); and,
- Spotty (*Notolabrus celidotus*) — Threatened - Least Concern.

Of these species, several blue cod were recorded during the present survey. The ecological value of fish populations in the coastal receiving environment of the Site is Moderate given the likelihood for species to utilise the wider area, which may include Threatened species; however, these species are not restricted to these habitats within the Site and likely utilise available habitat within Okuri Bay and adjacent coastal marine area.

3.8 Marine Mammals

Based on the habitat preference and recorded distributions of marine mammal species (refer to Appendix C for details), there are several species of mammal with the potential to inhabit the Site (Davidson et al. 2011) including:

- Bottlenose dolphin (*Tursiops truncatus*) — Nationally Endangered;
- Dusky dolphin (*Lagenorhynchus obscurus*) — Not Threatened;
- Hector's dolphin (*Cephalorhynchus hectori hectori*) — Nationally Vulnerable;
- Humpback whale (*Megaptera novaeangliae*) — Non-Resident Native (Migrant);
- Killer whale, orca (*Orcinus orca*) — Nationally Critical;
- Short-beaked common dolphin (*Delphinus delphis*) — Not Threatened; and,
- Southern right whale (*Eubalaena australis*) — At Risk - Recovering.

An individual New Zealand fur seal (*Arctocephalus forsteri* — Not Threatened) was observed within the proposed Western AMA during the present survey of Okuri Bay. The ecological value of marine mammal populations in the coastal receiving environment of the Site is Very High given the likelihood for mammal species to utilise the wider area and which may include Threatened/At Risk species; however, these species are not restricted to these habitats within the Site and likely utilise available habitat within Okuri Bay and adjacent coastal marine area. The Site does not feature within the 'Marine Mammal Distribution - Dolphins or Whales' PMEP overlays.

3.9 Seabirds

Recent shorebird and seabird sightings (refer to Appendix D for details) at Okuri Bay and adjacent area included (eBird July 2019-August 2022, and Davidson et al. 2011):

- Variable oystercatcher (*Haematopus unicolor*) — At Risk (Recovering);
- Fluttering shearwater (*Puffinus gavia*) — At Risk (Relict);
- New Zealand King shag (*Leucocarbo carunculatus*) — Nationally Endangered (Stable);
- White-fronted tern (*Sterna striata striata*) — At Risk (Declining);
- Caspian tern (*Hydroprogne caspia*) — Nationally Vulnerable;
- Black-fronted tern (*Chlidonias albobristatus*) — Nationally Endangered;

- White-capped albatross (*Thalassarche steadi*) — At Risk (Declining);
- Australasian gannet (*Morus serrator*) — Not Threatened; and,
- Spotted shag (*Stictocarbo punctatus*) — Not Threatened.

Again, the ecological value of shorebird and seabird populations in the coastal receiving environment of the Site is Very High given the recent sightings in the vicinity of Okuri Bay and known inhabitants of the open coast which include Threatened/At Risk bird species; however, these species are not restricted to these habitats within the Site and likely utilise available habitat within Okuri Bay and adjacent coastal marine area.

A roaming inventory of birds sighted or heard was taken during the field survey at the Site. Other than three individual Caspian tern noted roosting on surface floats associated with marine farm 8009, none were classified as Threatened or At Risk.

4 Assessment of Effects on Ecological Values

4.1 Positive Effects

Key potential positive effects from the development of shellfish farms within the proposed AMAs are (1) the creation of additional and stable habitat with increased biodiversity beneath farms and (2) regulating concentrations of nitrogen from nearshore waters via biodeposition and denitrification (conversion of bioavailable nitrogen to non-bioavailable gases) or sequestration in the sediment.

In this context, responsible development of the proposed AMAs will be crucial to ensure that ecological benefits are not eroded by suboptimal site selection or farming practices that diminish the same or other ecosystem services (Barrett et al. 2022).

4.2 Assessment of Operational Effects

In the absence of efforts to avoid, remedy or mitigate adverse ecological effects, the potential effects on coastal ecological values come primarily from localised effects at approximately the farm scale within the proposed AMAs.

In the aquaculture of shellfish, local effects can occur in both water column and benthic environments:

- Water column effects typically include phytoplankton depletion and changes in planktonic community composition, dissolved nutrient and particulate release, and impacts of farming structures on water movement and from biofouling communities.
- Benthic effects generally manifest as localised organic enrichment, smothering of organisms by biodeposits, biofouling drop-off and debris altering the composition of the benthos, and shading of benthos by structures thereby affecting localised productivity. The magnitude of effects ultimately depends on the magnitude and frequency of biodeposit and organic loading, and the assimilative capacity of the receiving environment (including the response, or sensitivity, of inhabitant biota).

Inshore reef and biogenic habitats are particularly susceptible to smothering impacts, hence they are considered inappropriate for aquaculture activities under the PMEP and NES-MA. The mapped reef and horse mussel beds and moderate-high coverage of natural shell meet the NES-MA definition of 'reef' or 'biogenic habitat'. Therefore, the constraints on complying activities apply to the inshore reef and biogenic habitat and surrounding area.

By contrast, the likelihood of adverse benthic impacts associated with shellfish farming on shallow nearshore habitat and soft-sediment habitat (beyond the reef and biogenic habitats) is generally low given the distance of the majority of the reef habitat from the proposed AMAs coupled with likely reasonable flushing potential at the Site. Effects from shading of seabed by structures is considered unlikely. Effects from drop-off of biofouling organisms from the structures can be managed or mitigated through good on-farm husbandry practices.

Biosecurity (marine pests and disease) impacts are not anticipated given the nature of the proposal (shellfish aquaculture) and that A+ members are required to recognise the Biosecurity Act 1993, as well as the Hazardous Substances and New Organisms Act 1996. CML is not seeking to discharge or use chemical additives such as antibiotics, parasiticides and other therapeutants, and so they pose no risk to local ecology.

Surrounding values include 'Coppermine Bay' (1.5) and 'French Pass' (2.16) located some 6-8 km northeast of the Site. There are no mapped Ecologically Significant Marine Sites (ESMS) within or near Okuri Bay under the PMEP (Figure 4.1). Generally speaking, given their distance from the Site, these significant sites are not likely to be impacted by the proposed activity. The Site is not listed as regionally or nationally significant under the MSRMP.

The likelihood (or risk) and magnitude of these effects occurring and the potential level of effects on coastal environments relevant to the proposal are discussed as follows.

4.2.1 Coastal Ecology

Table 4.1 integrates specific ecological values described in Section 3 above, and lists the potential effects (direct and indirect) on the marine habitats and fauna within the Site and their magnitude of effect. This is then used to calculate an overall level of effect to each ecological attribute, prior to impact management.

Requirements for the proposed activity to preclude effects on reef and biogenic habitats under the PMEP and NES-MA are considered separately to this assessment and are addressed as part of impact management (Section 5).

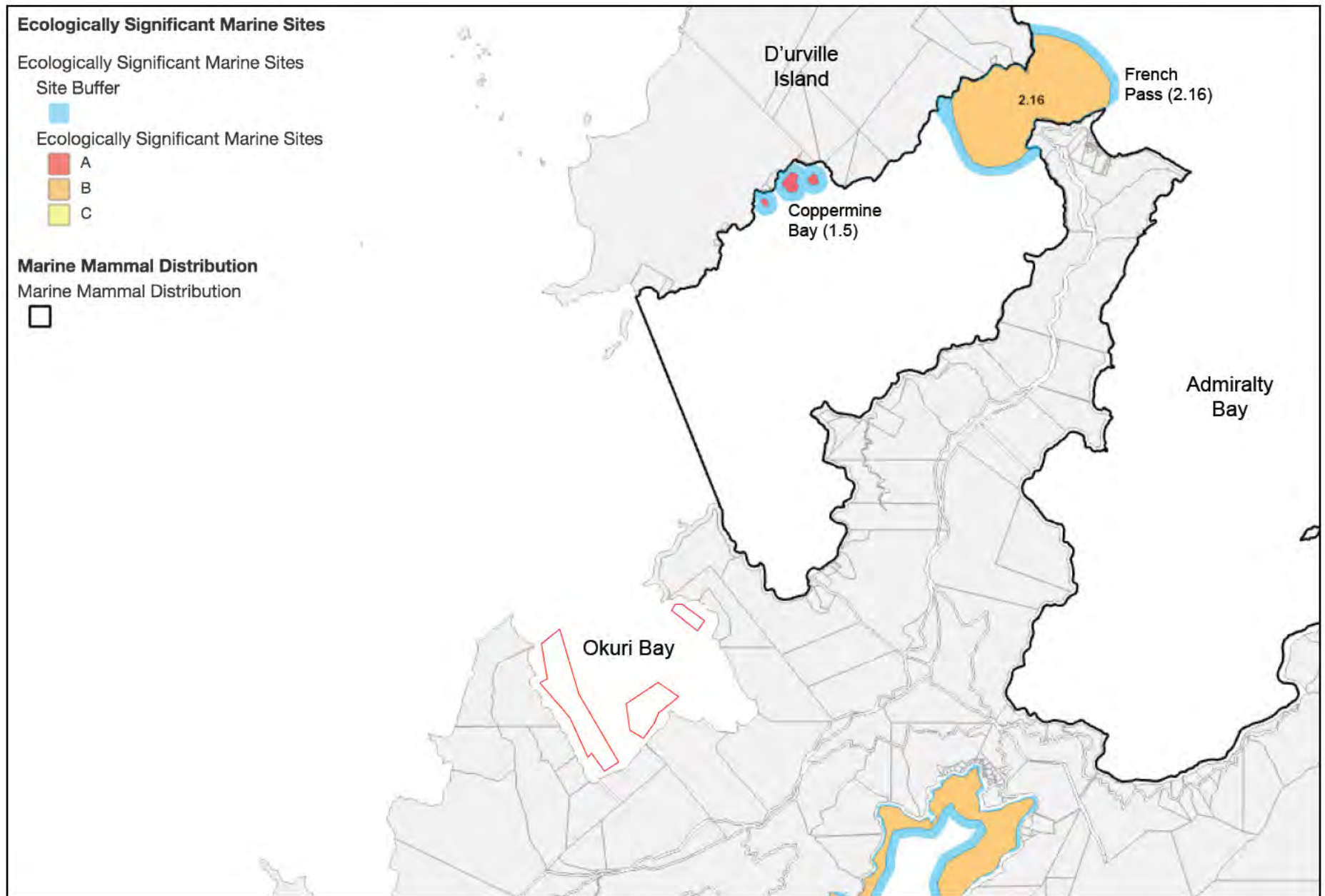


Figure 4.1. Marine ecological values associated with the proposed AMAs (indicative boundaries outlined in red), Okuri Bay. Source: MDC Smart Maps database - Environment Plan - Proposed overlays for the MEP - as amended by decisions on 21 Feb 2020.

Table 4.1 Magnitude of effects and subsequent level of effect (without mitigation) of the proposed activity on the coastal ecology features present within the Site during the marine farm operation phase.

Coastal Habitat/ Species	Ecological Value	Effects Description	Magnitude of Effect	Justification of Magnitude	Level of Effect, Without Mitigation
Reef (Bedrock, Boulder and Cobble Field) Habitat	High	Fragmentation of habitat/ecosystem and edge effects.	Moderate	Some biodeposition (mostly as shell debris) may occur on a proportion of the reef outcrop habitat situated below any future backbone structures within the proposed AMAs. No direct impacts on remaining inshore reef given the distance of this habitat from the proposed AMAs coupled with moderate flushing potential due to tides and periodic exposure to strong winds and wave action. No other direct impacts, but perhaps some indirect ones related to potential discharges and noise/activity disturbance of fauna. The overall extent of any disturbance is limited at both a site and bay scale and almost certainly reversible.	High
Soft Sediment (Firm Muddy Sand/Soft Mud) Habitat	Low to Moderate	Fragmentation of habitat/ecosystem and edge effects.	Low	Given the low value of this habitat with regard to inhabitant epibenthic macrofauna, any impacts associated to the proposed activity on this soft-sediment dominated habitat are expected to be within the low impact range known for shellfish farms in the Marlborough Sounds. It is unlikely that biogeochemical conditions within the benthic environment (e.g. biotic community structure, surface sediment grainsize distribution and oxygenation/redox conditions) would be significantly adversely effected by the proposed activity. The overall extent of any disturbance is limited at a bay scale and almost certainly reversible.	Low

Coastal Habitat/ Species	Ecological Value	Effects Description	Magnitude of Effect	Justification of Magnitude	Level of Effect, Without Mitigation
Biogenic Habitat	Very High ¹	Marine farm-related disturbances may impact on horse mussel beds and habitat formed by natural shell within the proposed AMAs and surrounding area. This activity may result in fragmentation of habitat/ ecosystem and edge effects.	High	Loss or disturbance of biogenic habitat is considered to be an unacceptable effect that is a relatively high probability outcome during marine farm operation. Implementing appropriate mitigation measures, as described in Section 6.3 below, will ensure avoidance of adverse marine farm-related effects on biogenic (horse mussel bed and natural shell-dominated) habitats identified within proposed AMAs.	Very High
Epibenthic Macro-fauna	Low	Loss or degradation of habitat primarily through depositional effects. Fragmentation of habitat.	Negligible	Given the relatively depauperate epibenthic macrofauna dominated by mobile species occupying soft sediments beyond the biogenic habitat, any impacts on them are expected to be negligible. The overall extent of any disturbance is limited at both a site and bay scale and almost certainly reversible.	Low
Fish	Moderate	Degradation of feeding habitat values or diminished food resources. Fragmentation of habitat.	Negligible	Because shellfish farms can enhance wild fish abundances by creating a habitat for fish to aggregate (providing food resources and refuge), effects on fish would potentially arise due to fish populations becoming displaced from other habitats or more vulnerable to recreational fishing pressure. However, in general, any effects of the proposed activity on wild fish populations are likely to be very minor, or perhaps ecologically neutral.	Very Low

¹ The Very High rating reflects the regional and national importance of the horse mussel beds and areas of moderate-high natural shell cover as habitat for indigenous fauna and for linking ecosystems.

Coastal Habitat/ Species	Ecological Value	Effects Description	Magnitude of Effect	Justification of Magnitude	Level of Effect, Without Mitigation
Marine Mammals	Very High	Disturbance or loss of foraging and breeding habitat. Fragmentation of habitat.	Negligible	Effects on mammals may arise through direct (e.g. vessel strike, increased underwater sound and light production and possibly the risk of entanglement) and indirect (e.g. degradation of feeding habitat values or diminished food resources and associated trophic flow-on) impacts. While the former has the greatest potential consequences (i.e., injury or death of a marine mammal), any such effects are expected to be either short-term, or avoidable through species utilising available feeding habitat throughout the wider Okuri Bay and adjacent coastal region.	Low
Seabirds	Very High	Disturbance or loss of foraging and breeding habitat. Fragmentation of habitat.	Negligible	Effects on seabirds would potentially arise due to degradation of feeding habitat values, diminished food resources, or through direct entanglement. However, farming structures may in fact provide alternative roost sites closer to foraging areas as well as promote aggregation of prey fish, and mobile bird species could avoid the latter effects by utilising available feeding habitat throughout the wider Okuri Bay and adjacent coastal region. Therefore, the magnitude of effect on birds would be negligible, or perhaps ecologically neutral.	Low

5 Impact Management Recommendations

5.1 Recommendations for avoiding or minimising potential adverse effects

In accordance with the EIANZ guidelines measures to avoid, remedy or mitigate effects is focused on biogenic and reef habitats where the level of effect was assessed to be High or Very High.

The proposed AMA plan overlaid with the habitat maps in Figures 3.3a-c suggests that the delineated reef and biogenic habitats occupy part of all three proposed AMAs.

Because associated impacts on the biogenic and reef habitats are inconsistent with the PMEP⁶, we have identified areas within the proposed AMAs as shown in Figure 5.1, that would be considered inappropriate for consideration for marine aquaculture activities under the NES-MA and PMEP. It is suggested that further site design reflecting the presence of biogenic and reef features is undertaken and a process of iterative site design completed in order to focus on avoidance of effects on identified biogenic and reef habitats and optimise selection of suitable locations for shellfish farming in Okuri Bay.

It is recommended to minimise discharges (fine sediment and organic matter) to water in the receiving environment during marine farm operations. Although, the discharge effects of harvesting mussels are seen as transitory and, in most cases, quickly become indistinguishable from background sedimentation.

5.2 Recommendations for addressing adverse residual effects that cannot be avoided or minimised

Assuming the proposed activity avoids adverse effects on mapped biogenic and reef habitats, monitoring of the coastal receiving environment is not warranted (on ecological grounds) given that the proposed activity is expected to have no more than minor effects on associated ecological values.

⁶ Policy 13.21.3 outlines that AMAs are established to provide for the area of existing marine farms within the Enclosed Water CMUs. AMAs within the Enclosed Waters CMUs are generally located, (b) Away from reefs and other areas of significant marine biodiversity value in order to protect the biodiversity values of those habitats. We note “reefs” are defined in V1 as per NES-MA, and that the Council Section 42A officer has accepted a submission that “away from” should be 20 m as per NES-MA.

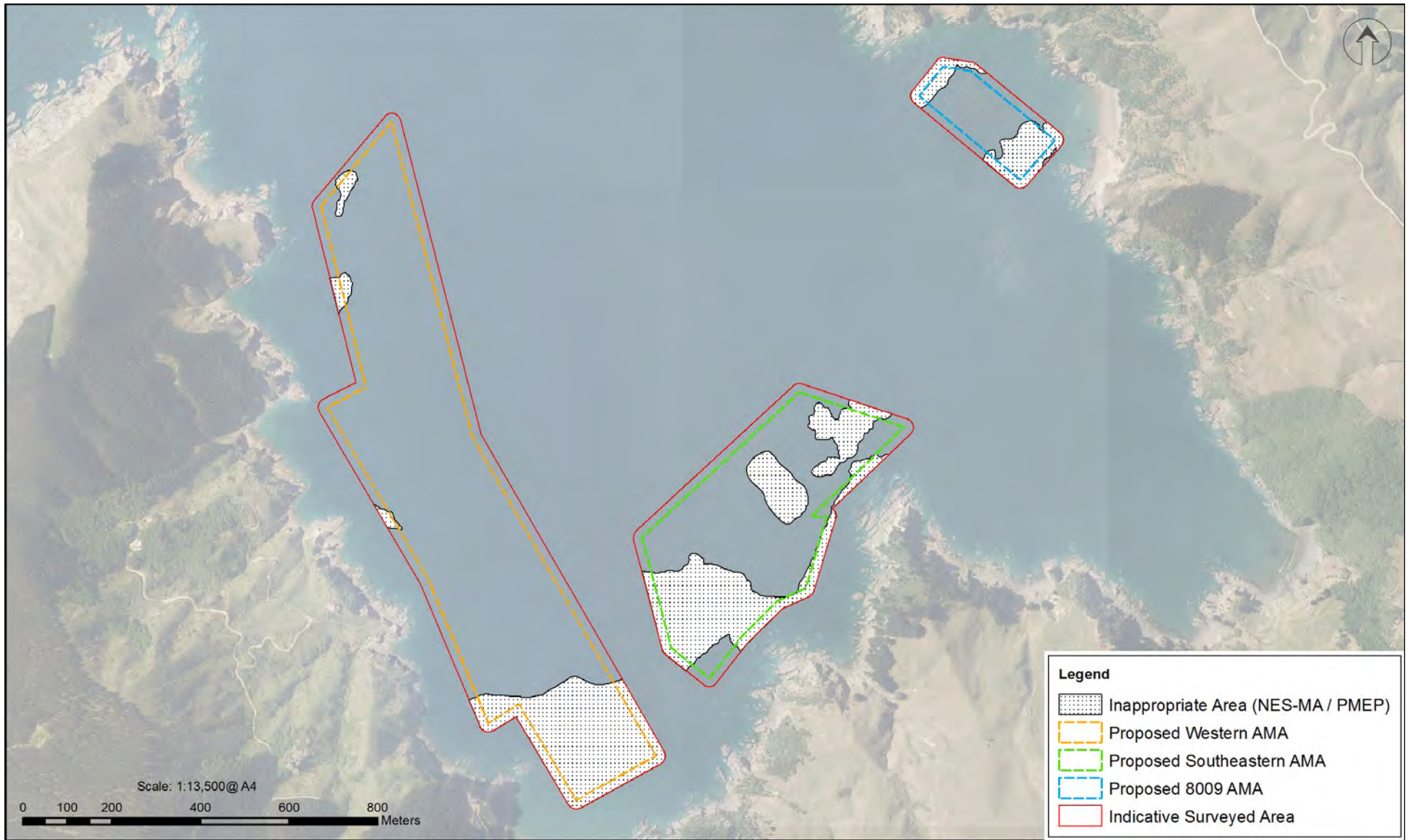


Figure 5.1. Areas within proposed AMAs where biogenic and reef habitat occur. These areas are considered inappropriate for consideration for marine aquaculture activities under the NES-MA and PMEP, whilst the balance areas are considered suitable.

6 Cumulative Effects

As per EIANZ guidelines, assessment of ecological effects of a proposed activity should consider cumulative impacts on the environment and not just the direct effects of the single proposal. For the purposes of this proposal it is considered that the proposed AMAs and the coastal receiving environment associated with Okuri Bay are an appropriate spatial scale for consideration of cumulative effects, given this area provides habitat for mobile fauna species such as native seabirds, marine mammals and fish.

The effects of phytoplankton depletion through shellfish consumption are generally only detectable at approximately the farm scale, and are of short duration (Morrissey et al. 2006). The significance of associated effects depends on a variety of factors, including the carrying capacity of the environment, prevailing water currents, weather patterns, and catchment-derived nutrient inputs, with effects more pronounced if farms are located in physically constrained shallow areas with slow currents, compared to deep sites with strong flow and good flushing (Zeldis et al. 2008, 2013; Plew 2011; Broekhuizen et al. 2015). The proposed AMA sites are situated within a relatively shallow (predominantly <30 m deep) area of Okuri Bay with close proximity to the main Current Basin Reach, so water residence times are expected to be relatively short, when compared to sheltered bays in inner Pelorus Sound and Croisilles Harbour. On this basis, it is considered unlikely that significant phytoplankton depletion would occur outside the boundaries of any future shellfish farms located within the proposed AMAs.

As the existing benthic environment is predominantly soft sediment habitat of limited ecological value, the specific shellfish farming impacts discussed within this report have been minimal and adverse effects have largely been avoided.

It is unlikely the proposal will contribute meaningfully to loss of ecological connectivity or decline in habitat quality at the bay-wide or regional scale. Cumulative adverse effects are therefore not anticipated.

7 Summary & Conclusions

An estimate of habitat change resulting from the proposed activity can be undertaken by importing the proposed AMA site design into a GIS environment. This allows a semi-quantitative estimate to be made of the habitat likely to be impacted. The areal footprint of the AMAs overlaid on a map of habitat types is shown above in Figure 3.3a-c with spatial proportions summarised in Table 3.1.

The main effect on local ecology is enhanced rates of sedimentation of organic-rich, fine-grained particles (biodeposits of faeces and pseudofaeces), and the deposition and accumulation of live shellfish, shell litter onto the seabed beneath the farms (Keeley et al. 2009; Stenton-Dozey and Broekhuizen 2019).

The proposed activity would not likely alter the soft sediment-dominated habitat. It is unlikely that those remaining habitats adjacent to the Site would be appreciably altered by the proposal. Given that the size of the survey area was selected based on the spatial extent of the proposed activity, these calculations suggest that approximately 13-76% of the firm muddy sand habitat in the study area will be situated within the proposed AMA footprint area. Existing inshore reef or biogenic habitat occupies the balance of the Site where marine aquaculture is considered an inappropriate activity (PMEP and NES-MA).

Although the proposed AMAs would be situated above a high proportion of the soft-sediment habitat in the surveyed area, the relatively depauperate biological nature of the habitat, in this case dominated by a limited number of highly mobile fauna, means that it is unlikely that significant changes to ecology will occur. Indirectly, ecology in more distant habitats from the Site (e.g. nearshore subtidal habitats) are also unlikely to be affected by the proposed activity given their distance from the vast majority of the Site, relatively large extent, and moderate flushing potential driven by tides and periodic wind and wave action.

Where possible the proposed AMA site design has minimised impacts on Okuri Bay and its ecological values, and no permanent loss of indigenous biodiversity values is expected to occur.

Overall, assuming integration of impact mitigation and management measures as outlined above in Section 5, it is considered that any effects resulting from the proposed activity will be relatively localised and therefore minor with regard to the wider marine receiving environment.

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9 Limitations & Applicability

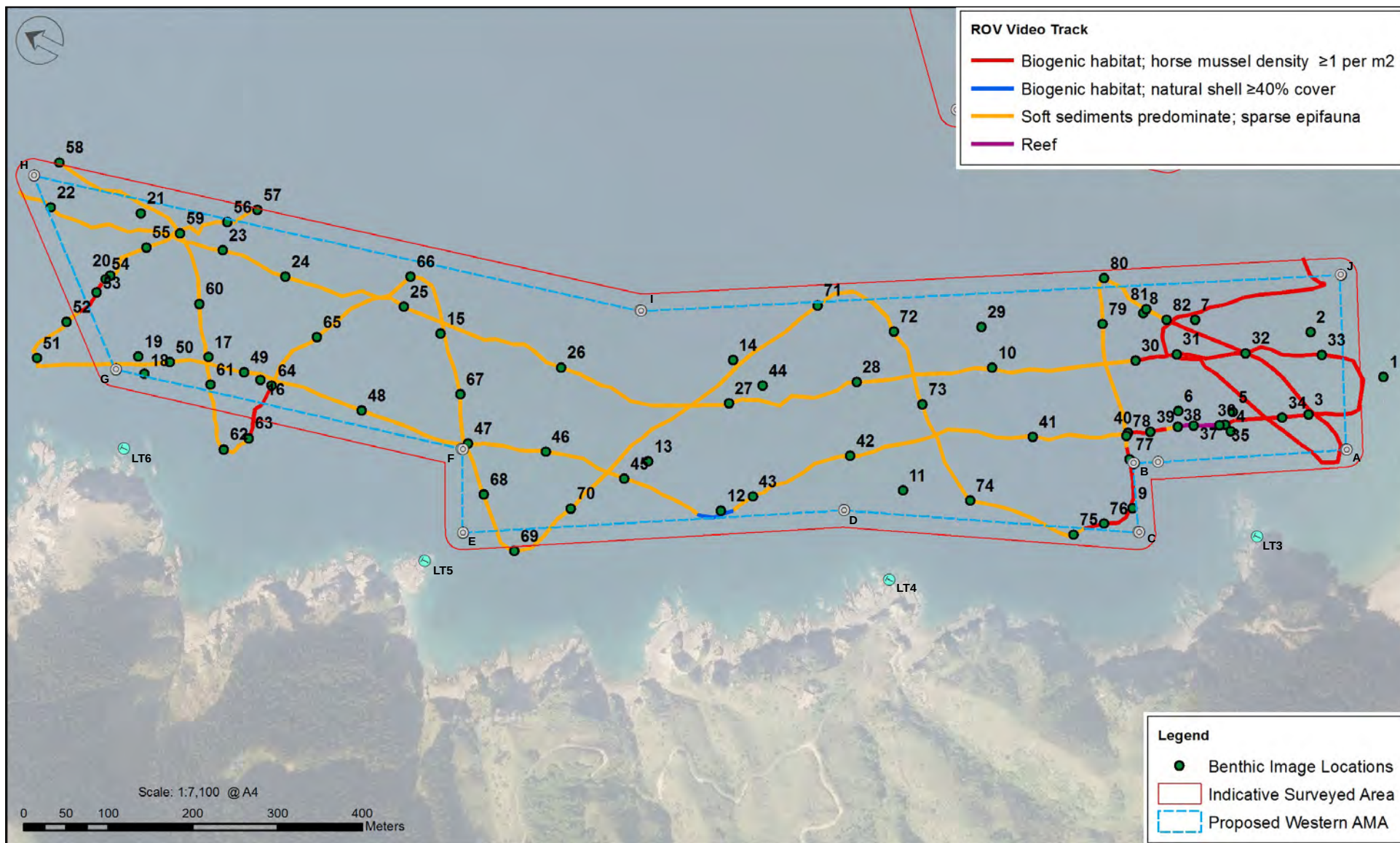
As with all one-off field ecological assessments, seasonal or temporal variation in the presence of mobile fauna means that the presence or absence of such fauna cannot be ascertained with great accuracy. Potential seasonal variability is not assessed through one site visit. The composition of the avifauna, fish and mammal communities utilising the area could not be established as the survey was only conducted once in the winter season. The condition of habitat becomes the surrogate for the presence or absence of fauna rather than observed condition on the day of the survey.

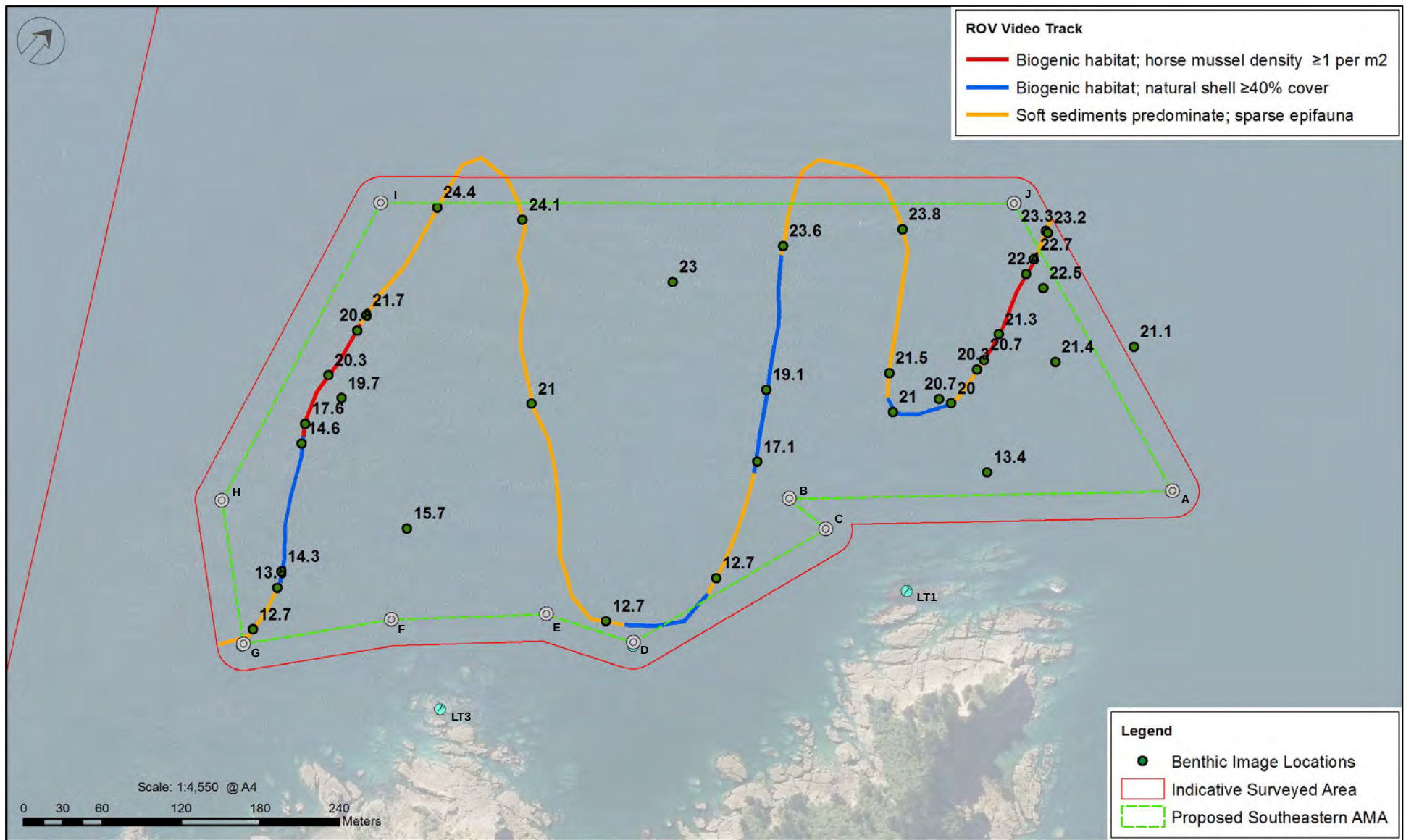
This assessment has been carried out in line with the project brief received by Robertson Environmental Limited on the 28th of July 2022. This is assumed in this assessment to be the activity being sought by Clearwater Mussels Limited. We note that this site design may not be final. Depending on the scope of any future development and site design changes, further ecological assessments, including further quantitative assessments may be required.

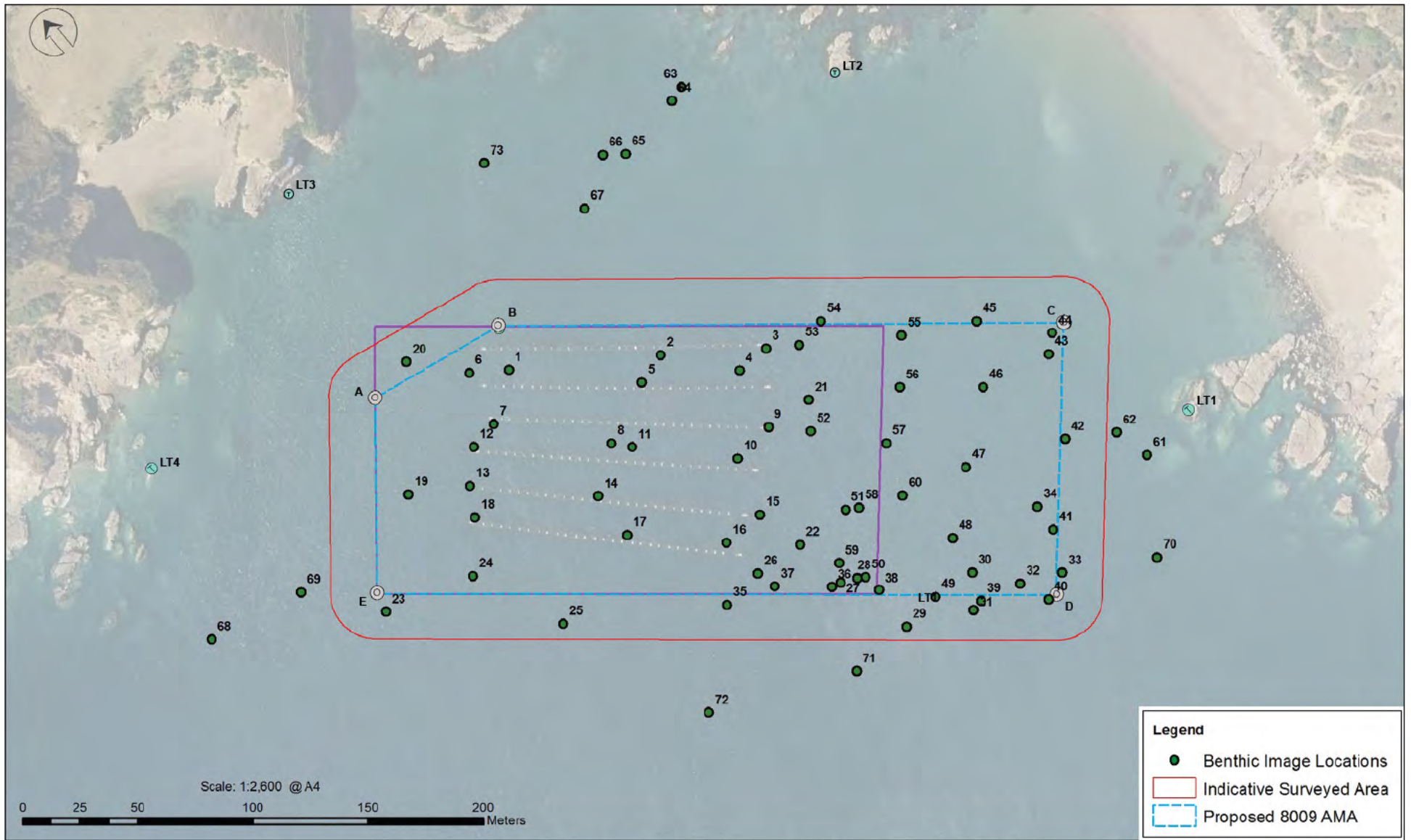
Robertson Environmental's professional opinions are based on its professional judgement, experience, and training. These opinions are also based upon data derived from the field survey and analysis described in this document, with the support of relevant guidelines (EIANZ, 2018). It is possible that additional surveying, testing and analyses might produce different results and/or different opinions. Should additional information become available, this report should be updated accordingly. Robertson Environmental Limited has relied upon information provided by the Client to inform parts of this document, some of which has not been fully verified by Robertson Environmental Limited. This document may be transmitted, reproduced or disseminated only in its entirety.

Appendix A:

Detailed Field Data







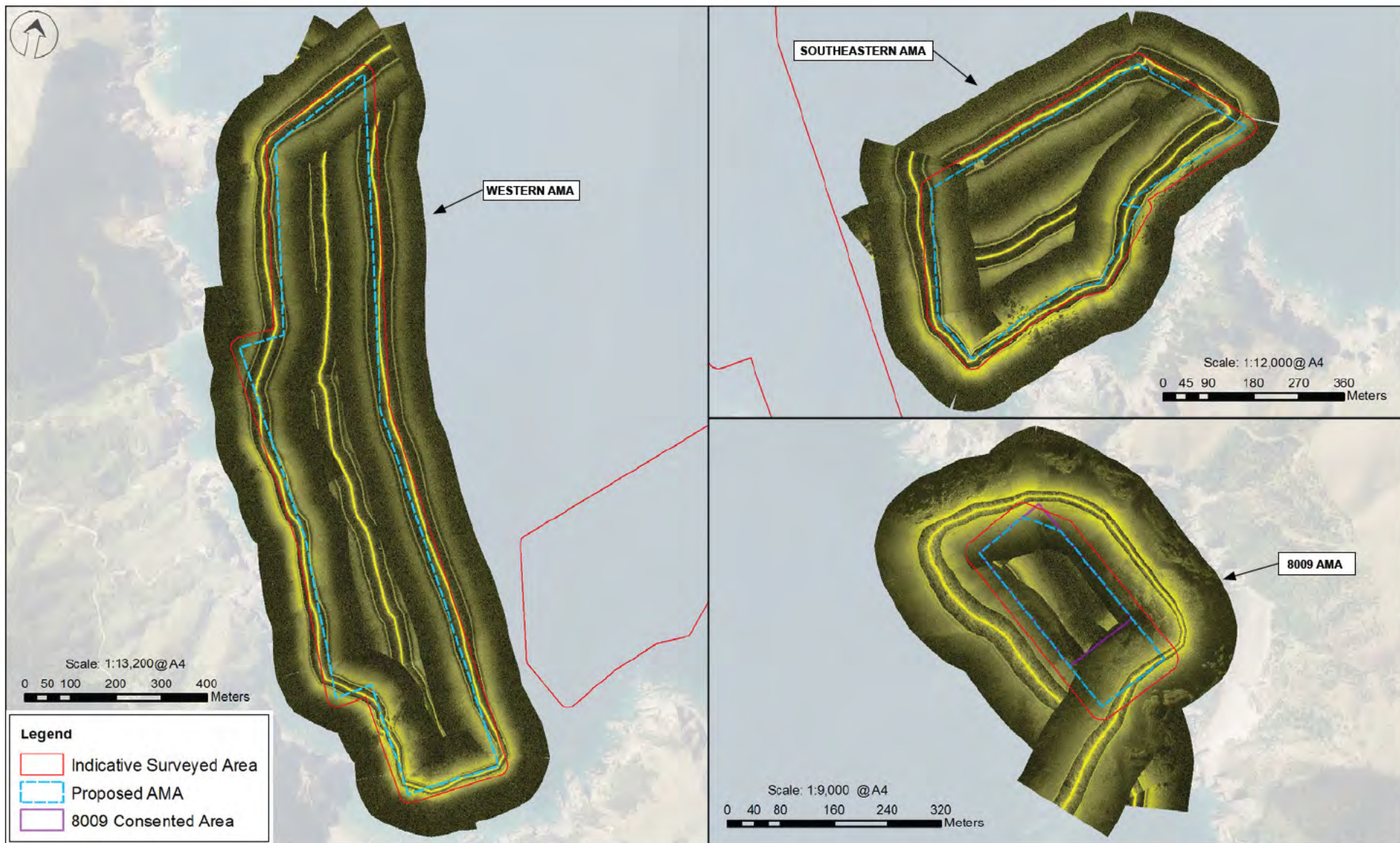
Overview of the proposed 8009 AMA, surveyed area, and locations of benthic sampling stations assessed in the present study. Corresponding data is presented below, with benthic imagery in Appendix B.

PROJECT: OKURI BAY AMA, CLEARWATER MUSSELS LTD

Proposed 8009 AMA Surveyed Area

| Date: 23 August 2022 | Revision: A | Aerial: LINZ 17/18
Plan map prepared for CML by Robertson Environmental Limited

Project Manager: [REDACTED]



expert
ecological
services.

Overview of the proposed AMAs, surveyed area, and high-resolution side-scan sonar imagery used to corroborate benthic habitat types in the present study.

PROJECT: OKURI BAY AMA, CLEARWATER MUSSELS LTD

Proposed AMAs Sonar Imagery

| Date: 23 August 2022 | Revision: A | Aerial: LINZ 17/18
Plan map prepared for CML by Robertson Environmental Limited

Project Manager: [REDACTED]

Summary information for the proposed AMAs, including Mean Low Water Mark and survey corner locations, Okuri Bay, August 2022.

Western AMA				
Station Type	Station Code	Depth (m)	Location	
			NZTM E	NZTM N
AMA Inshore	A	5.4	1665520	5462220
AMA Inshore	B	14.5	1665392	5462436
AMA Inshore	C	12.6	1665322	5462394
AMA Inshore	D	19.5	1665187	5462716
AMA Inshore	E	20.1	1664959	5463105
AMA Inshore	F	23.5	1665047	5463151
AMA Offshore	G	20.1	1664945	5463558
AMA Offshore	H	32.5	1665105	5463748
AMA Offshore	I	23.9	1665288	5463037
AMA Inshore	J	9.6	1665701	5462319
MLWM	LT 1	NA	1665668	5462171
MLWM	LT 2	NA	1665537	5462108
MLWM	LT 3	NA	1665381	5462267
MLWM	LT 4	NA	1665138	5462631
MLWM	LT 5	NA	1664909	5463130
MLWM	LT 6	NA	1664866	5463507
Southeastern AMA				
AMA Inshore	A	13.4	1666259	5463060
AMA Inshore	B	17.1	1666050	5462858
AMA Inshore	C	15.1	1666086	5462860
AMA Inshore	D	12.7	1666038	5462696
AMA Inshore	E	13.0	1669754	5462668
AMA Inshore	F	13.1	1665890	5462585
AMA Inshore	G	12.7	1665820	5462494
AMA Offshore	H	15.7	1665733	5462565
AMA Offshore	I	24.4	1665669	5462813
AMA Offshore	J	23.2	1666023	5463139
MLWM	LT 1	NA	1666163	5462868
MLWM	LT 2	NA	1661367	5462519
MLWM	LT 3	NA	1665963	5462561
8009 AMA				
AMA Inshore	A	9.1	1666347	5463874
AMA Inshore	B	9.0	1666408	5463863
AMA Inshore	C	5.5	1666599	5463708
AMA Offshore	D	12.8	1666521	5463619
AMA Offshore	E	15.2	1666294	5463808
MLWM	LT 1	NA	1666253	5463912
MLWM	LT 2	NA	1666375	5463967
MLWM	LT 3	NA	1666594	5463857
MLWM	LT 4	NA	1666616	5463645

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed Western AMA, August 2022.

Station ID	Video dive time ¹	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
1		5.4	1665617	5462219	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), red macroalgae	-
2		8.6	1665625	5462320	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), red macroalgae	-
3		7.7	1665537	5462278	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), red macroalgae	-
4		10.6	1665478	5462351	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), red macroalgae	-
5		11.2	1665499	5462359	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), red macroalgae	-
6		14	1665471	5462417	Silt, fine sand, broken natural shell	Firm muddy sand		-
7		13.9	1665576	5462448	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), red macroalgae	-
8		17.3	1665555	5462506	Silt/clay, fine sand, broken natural shell	Firm muddy sand		-
9		12.8	1665344	5462413	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), red macroalgae, burrowing anemone	-
10		21.7	1665417	5462636	Silt, fine sand, broken natural shell	Firm muddy sand		-
11		19	1665240	5462664	Silt, fine sand, broken natural shell	Firm muddy sand		-
12		16.9	1665121	5462845	Silt, fine sand, broken natural shell	Firm muddy sand	Red macroalgae	-
13		21.9	1665134	5462948	Silt, fine sand, broken natural shell	Firm muddy sand		-
14		23.3	1665286	5462913	Silt, fine sand, broken natural shell	Firm muddy sand		-
15		25	1665157	5463235	Silt, fine sand, broken natural shell	Firm muddy sand	Hermit crab	-

¹ Refers to ROV video time stamp for imagery collected by ROV.

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed Western AMA, August 2022.

Station ID	Video dive time ¹	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
16		23.7	1665012	5463400	Silt, fine sand, broken natural shell	Firm muddy sand		-
17		23.5	1665008	5463467	Silt, fine sand, broken natural shell	Firm muddy sand		-
18		20.1	1664956	5463525	Silt, fine sand, broken natural shell	Firm muddy sand	Hermit crab	-
19		22.5	1664971	5463541	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
20		28.5	1665041	5463614	Silt, fine sand, broken natural shell	Firm muddy sand		-
21		29.2	1665123	5463615	Silt, fine sand, broken natural shell	Firm muddy sand	Scallop (<i>Pecten novaezelandiae</i>)	-
22		32.5	1665081	5463713	Silt, fine sand, broken natural shell	Firm muddy sand		-
23	0:00:11	30.5	1665128	5463509	Silt, fine sand, broken natural shell	Firm muddy sand		-
24	0:03:31	28.8	1665134	5463429	Silt, fine sand, broken natural shell	Firm muddy sand		-
25	0:06:27	27.9	1665166	5463288	Silt, fine sand, broken natural shell	Firm muddy sand		-
26	0:10:08	26.5	1665186	5463090	Silt, fine sand, broken natural shell	Firm muddy sand		-
27	0:15:50	24.8	1665238	5462894	Silt, fine sand, broken natural shell	Firm muddy sand		-
28	0:19:55	24.8	1665329	5462771	Silt, fine sand, broken natural shell	Firm muddy sand		-
29	0:24:54	22.9	1665454	5462669	Silt, fine sand, broken natural shell	Firm muddy sand		-
30	0:26:10	21.1	1665501	5462489	Silt, fine sand, broken natural shell	Firm muddy sand		-

¹ Refers to ROV video time stamp for imagery collected by ROV.

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed Western AMA, August 2022.

Station ID	Video dive time ¹	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
31	0:26:59	18.8	1665530	5462449	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
32	0:28:15	15.2	1665568	5462377	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), 11 armed starfish (<i>Coscinasterias muricata</i>)	-
33	0:30:25	10.1	1665607	5462296	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
34	0:48:07	10.5	1665520	5462304	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
35	0:00:50	11.2	1665482	5462360	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
36	0:01:12	12.4	1665478	5462366	Silt, fine sand, broken natural shell	Firm muddy sand		-
37	0:01:19	12.0	1665464	5462393	Bedrock, boulder, cobble	Bedrock reef	Lithothamnion sp., unid. sponge, blue cod	-
38	0:02:17	14.4	1665454	5462409	Silt, fine sand, broken natural shell	Firm muddy sand		-
39	0:02:44	15.4	1665434	5462435	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
40	0:03:34	18.0	1665421	5462458	Silt, fine sand, broken natural shell	Firm muddy sand		-
41	0:06:07	21.7	1665366	5462556	Silt, fine sand, broken natural shell	Firm muddy sand	11 armed starfish (<i>Coscinasterias muricata</i>)	-
42	0:11:16	23.6	1665248	5462738	Silt, fine sand, broken natural shell	Firm muddy sand		-
43	0:13:58	20.2	1665153	5462819	Silt, fine sand, broken natural shell	Firm muddy sand		-
44	0:14:36	18.2	1665275	5462868	Silt, fine sand, broken natural shell	Firm muddy sand	Red macroalgae	-
45	0:17:16	22.9	1665103	5462964	Silt, fine sand, broken natural shell	Firm muddy sand		-

¹ Refers to ROV video time stamp for imagery collected by ROV.

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed Western AMA, August 2022.

Station ID	Video dive time ¹	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
46	0:19:34	23.4	1665089	5463061	Silt, fine sand, broken natural shell	Firm muddy sand		-
47	0:21:50	23.5	1665056	5463147	Silt, fine sand, broken natural shell	Firm muddy sand		-
48	0:24:50	24.3	1665034	5463277	Silt, fine sand, broken natural shell	Firm muddy sand		-
49	0:27:40	25.2	1665011	5463421	Silt, fine sand, broken natural shell	Firm muddy sand		-
50	0:29:54	23.2	1664982	5463505	Silt, fine sand, broken natural shell	Firm muddy sand		-
51	0:32:12	20.4	1664915	5463647	Silt, fine sand, broken natural shell	Firm muddy sand		-
52	0:35:26	25	1664969	5463635	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
53	0:36:43	28.5	1665016	5463619	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
54	0:37:19	29.6	1665035	5463617	Silt, fine sand, broken natural shell	Firm muddy sand		-
55	0:39:05	29.9	1665090	5463591	Silt, fine sand, broken natural shell	Firm muddy sand		-
56	0:43:14	29.5	1665160	5463519	Silt, fine sand, broken natural shell	Firm muddy sand		-
57	0:43:58	29.4	1665189	5463494	Silt, fine sand, broken natural shell	Firm muddy sand		-
58	0:00:36	30.5	1665133	5463728	Silt, fine sand, broken natural shell	Firm muddy sand		-
59	0:04:58	28.1	1665123	5463563	Silt, fine sand, broken natural shell	Firm muddy sand	Cushion star (<i>Patiriella regularis</i>), unid. sponge	-
60	0:06:10	26.8	1665059	5463505	Silt, fine sand, broken natural shell	Firm muddy sand		-

¹ Refers to ROV video time stamp for imagery collected by ROV.

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed Western AMA, August 2022.

Station ID	Video dive time ¹	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
61	0:07:54	21.5	1664980	5463450	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
62	0:09:49	14	1664919	5463401	Silt, fine sand, broken natural shell	Firm muddy sand		-
63	0:11:36	21.5	1664944	5463381	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
64	0:12:05	22.8	1665012	5463385	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
65	0:14:13	25.5	1665087	5463363	Silt, fine sand, broken natural shell	Firm muddy sand		-
66	0:20:42	26.1	1665201	5463297	Silt, fine sand, broken natural shell	Firm muddy sand		-
67	0:20:01	23.8	1665104	5463182	Silt, fine sand	Firm muddy sand		-
68	0:22:07	21.6	1665011	5463103	Silt, fine sand, broken natural shell	Firm muddy sand		-
69	0:24:04	19.8	1664968	5463041	Silt, fine sand, broken natural shell	Firm muddy sand		-
70	0:26:27	21.1	1665043	5463004	Silt, fine sand, broken natural shell	Firm muddy sand	Sea cucumber (<i>Stichopus mollis</i>)	-
71	0:34:39	23.9	1665389	5462853	Silt, fine sand, broken natural shell	Firm muddy sand		-
72	0:36:39	23.1	1665402	5462759	Silt, fine sand, broken natural shell	Firm muddy sand		-
73	0:38:03	22.1	1665341	5462690	Silt, fine sand, broken natural shell	Firm muddy sand	Sea cucumber (<i>Stichopus mollis</i>)	-
74	0:40:53	19.5	1665265	5462588	Silt, fine sand, broken natural shell	Firm muddy sand	MPB film	-
75	0:43:28	15.4	1665285	5462461	Silt, fine sand, broken natural shell	Firm muddy sand	MPB film	-

¹ Refers to ROV video time stamp for imagery collected by ROV.

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed Western AMA, August 2022.

Station ID	Video dive time ¹	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
76	0:44:04	12.6	1665313	5462435	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
77	0:45:39	14.5	1665394	5462442	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
78	0:45:56	15.3	1665417	5462458	Silt, fine sand, broken natural shell	Firm muddy sand		-
79	0:49:53	20.1	1665522	5462543	Silt, fine sand, broken natural shell	Firm muddy sand		-
80	0:51:04	19.7	1665571	5462566	Silt, fine sand, broken natural shell	Firm muddy sand		-
81	0:52:06	17.5	1665561	5462505	Silt, fine sand, broken natural shell	Firm muddy sand		-
82	0:52:40	15.8	1665561	5462478	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-

¹ Refers to ROV video time stamp for imagery collected by ROV.

Summary of benthic observations in relation to the NES-MA, proposed Western AMA, August 2022.

Station ID	Section 7 Bio-genic habitat	Section 8 Reef	Section 9 (a, b, c) Status or significant species	Section 9 Council significant site	S4 4 (b) % Natural Shell - (>40% cover)	S4 1 Rhodolith - (1 seen)	S4 2 Council recognised important dead shell	S4 3 (a, b) Biogenic prominent or raised (0.5 m) - (present/absent)	S4 4 (a) (i) Biogenic (colony forming) - (≥10%)	S4 4 (a) (ii) Biogenic macroalgae or seagrass - (≥10%)	S4 4 (a) (iii) Biogenic tube-worms, brachiopods, natural shellfish - (≥10%)	S4 4 (c) Biogenic large habitat-forming species (e.g. horse mussel, hydroid tree) - mean ≥1 per m ²	Suitability in terms of NES-MA (one or more threshold exceeded)
1	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
2	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
3	Yes	-	Yes	-	55	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
4	Yes	-	Yes	-	10	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
5	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
6	-	-	-	-	35	-	-	-	-	-	-	-	Suitable
7	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
8	-	-	-	-	5	-	-	-	-	-	-	-	Suitable ¹
9	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
10	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
11	-	-	-	-	4	-	-	-	-	-	-	-	Suitable ¹
12	-	-	Yes	-	8	-	-	-	-	-	-	-	Suitable ²
13	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
14	-	-	-	-	2	-	-	-	-	-	-	-	Suitable

¹ Horse mussels observed via live video feed but appear to be present at low densities.

² Red macroalgae present but appears to be <10% cover.

Summary of benthic observations in relation to the NES-MA, proposed Western AMA, August 2022.

Station ID	Section 7 Bio-genic habitat	Section 8 Reef	Section 9 (a, b, c) Status or significant species	Section 9 Council significant site	S4 4 (b) % Natural Shell - (>40% cover)	S4 1 Rhodolith - (1 seen)	S4 2 Council recognised important dead shell	S4 3 (a, b) Biogenic prominent or raised (0.5 m) - (present/absent)	S4 4 (a) (i) Biogenic (colony forming) - (≥10%)	S4 4 (a) (ii) Biogenic macroalgae or seagrass - (≥10%)	S4 4 (a) (iii) Biogenic tube-worms, brachiopods, natural shellfish - (≥10%)	S4 4 (c) Biogenic large habitat-forming species (e.g. horse mussel, hydroid tree) - mean ≥1 per m ²	Suitability in terms of NES-MA (one or more threshold exceeded)
15	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
16	-	-	-	-	3	-	-	-	-	-	-	-	Suitable
17	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
18	-	-	-	-	7	-	-	-	-	-	-	-	Suitable
19	Yes	-	Yes	-	4	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
20	-	-	-	-	8	-	-	-	-	-	-	-	Suitable
21	-	-	Yes	-	4	-	-	-	-	-	-	-	Suitable ¹
22	-	-	-	-	30	-	-	-	-	-	-	-	Suitable
23	-	-	-	-	30	-	-	-	-	-	-	-	Suitable
24	-	-	-	-	10	-	-	-	-	-	-	-	Suitable
25	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
26	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
27	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
28	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
29	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
30	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
31	Yes	-	Yes	-	3	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
32	Yes	-	Yes	-	5	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable

¹ Scallops observed via live video feed but appear to be present at low densities.

Summary of benthic observations in relation to the NES-MA, proposed Western AMA, August 2022.

Station ID	Section 7 Bio-genic habitat	Section 8 Reef	Section 9 (a, b, c) Status or significant species	Section 9 Council significant site	S4 4 (b) % Natural Shell - (>40% cover)	S4 1 Rhodolith - (1 seen)	S4 2 Council recognised important dead shell	S4 3 (a, b) Biogenic prominent or raised (0.5 m) - (present/absent)	S4 4 (a) (i) Biogenic (colony forming) - (≥10%)	S4 4 (a) (ii) Biogenic macroalgae or seagrass - (≥10%)	S4 4 (a) (iii) Biogenic tube-worms, brachiopods, natural shellfish - (≥10%)	S4 4 (c) Biogenic large habitat-forming species (e.g. horse mussel, hydroid tree) - mean ≥1 per m ²	Suitability in terms of NES-MA (one or more threshold exceeded)
33	Yes	-	Yes	-	5	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
34	Yes	-	Yes	-	5	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
35	Yes	-	Yes	-	5	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
36	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
37	-	Present	-	-	-	-	-	-	-	-	-	-	Not suitable
38	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
39	Yes	-	Yes	-	3	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
40	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
41	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
42	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
43	-	-	-	-	10	-	-	-	-	-	-	-	Suitable
44	-	-	-	-	80	-	-	-	-	-	-	-	Not suitable
45	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
46	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
47	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
48	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
49	-	-	-	-	5	-	-	-	-	-	-	-	Suitable

¹ Scallops observed via live video feed but appear to be present at low densities.

Summary of benthic observations in relation to the NES-MA, proposed Western AMA, August 2022.

Station ID	Section 7 Bio-genic habitat	Section 8 Reef	Section 9 (a, b, c) Status or significant species	Section 9 Council significant site	S4 4 (b) % Natural Shell - (>40% cover)	S4 1 Rhodolith - (1 seen)	S4 2 Council recognised important dead shell	S4 3 (a, b) Biogenic prominent or raised (0.5 m) - (present/absent)	S4 4 (a) (i) Biogenic (colony forming) - (≥10%)	S4 4 (a) (ii) Biogenic macroalgae or seagrass - (≥10%)	S4 4 (a) (iii) Biogenic tube-worms, brachiopods, natural shellfish - (≥10%)	S4 4 (c) Biogenic large habitat-forming species (e.g. horse mussel, hydroid tree) - mean ≥1 per m ²	Suitability in terms of NES-MA (one or more threshold exceeded)
50	-	-	-	-	3	-	-	-	-	-	-	-	Suitable
51	-	-	-	-	3	-	-	-	-	-	-	-	Suitable
52	-	-	-	-	5	-	-	-	-	-	-	-	Suitable ¹
53	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
54	-	-	-	-	8	-	-	-	-	-	-	-	Suitable
55	-	-	-	-	25	-	-	-	-	-	-	-	Suitable
56	-	-	-	-	8	-	-	-	-	-	-	-	Suitable
57	-	-	-	-	8	-	-	-	-	-	-	-	Suitable
58	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
59	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
60	-	-	-	-	8	-	-	-	-	-	-	-	Suitable
61	-	-	-	-	5	-	-	-	-	-	-	-	Suitable ¹
62	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
63	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
64	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
65	-	-	-	-	4	-	-	-	-	-	-	-	Suitable
66	-	-	-	-	2	-	-	-	-	-	-	-	Suitable

¹ Horse mussels observed via live video feed but appear to be present at low densities.

Summary of benthic observations in relation to the NES-MA, proposed Western AMA, August 2022.

Station ID	Section 7 Bio-genic habitat	Section 8 Reef	Section 9 (a, b, c) Status or significant species	Section 9 Council significant site	S4 4 (b) % Natural Shell - (>40% cover)	S4 1 Rhodolith - (1 seen)	S4 2 Council recognised important dead shell	S4 3 (a, b) Biogenic prominent or raised (0.5 m) - (present/absent)	S4 4 (a) (i) Biogenic (colony forming) - (≥10%)	S4 4 (a) (ii) Biogenic macroalgae or seagrass - (≥10%)	S4 4 (a) (iii) Biogenic tube-worms, brachiopods, natural shellfish - (≥10%)	S4 4 (c) Biogenic large habitat-forming species (e.g. horse mussel, hydroid tree) - mean ≥1 per m ²	Suitability in terms of NES-MA (one or more threshold exceeded)
67	-	-	-	-	-	-	-	-	-	-	-	-	Suitable
68	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
69	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
70	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
71	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
72	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
73	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
74	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
75	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
76	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
77	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
78	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
79	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
80	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
81	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
82	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable

¹ Horse mussels observed via live video feed but appear to be present at low densities.

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed Southeastern AMA, August 2022.

Station ID	Video dive time ¹	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
1		21.1	1666164	5463122	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), 11 armed starfish (<i>Coscinasterias muricata</i>)	-
2		22.5	1666083	5463108	Silt, fine sand, broken natural shell	Firm muddy sand	Hermit crab	-
3		21.4	1666128	5463073	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
4		13.4	1666147	5462976	Bedrock	Bedrock reef	Lithothamnion sp., unid. sponge	-
5		20.7	1666082	5462992	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
6		23.3	1666055	5463141	Silt, fine sand, broken natural shell	Firm muddy sand		-
7		23.2	1666057	5463141	Silt, fine sand, broken natural shell	Firm muddy sand	Scallop (<i>Pecten novaezelandiae</i>)	-
8		19.1	1665981	5462908	Silt, fine sand, coarse sand, gravel, occasional cobble, broken natural shell	Firm muddy sand	Red macroalgae	-
9		23	1665873	5462920	Silt, fine sand, broken natural shell	Firm muddy sand		-
10		15.7	1665852	5462645	Silt, fine sand, broken natural shell	Firm muddy sand	Hermit crab	-
11		19.7	1665748	5462684	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
12	0:00:18	12.7	1665818	5462509	Silt, fine sand, broken natural shell	Firm muddy sand		-
13	0:01:06	13.5	1665810	5462545	Silt, fine sand, broken natural shell	Firm muddy sand		-
14	0:01:22	14.3	1665804	5462556	Silt, fine sand, coarse sand, gravel, occasional cobble, broken natural shell	Firm muddy sand	Cushion star (<i>Patiriella regularis</i>)	-
15	0:01:29	14.6	1665749	5462638	Silt, fine sand, broken natural shell	Firm muddy sand		-

¹ Refers to ROV video time stamp for imagery collected by ROV.

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed Southeastern AMA, August 2022.

Station ID	Video dive time ¹	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
16	0:02:50	17.6	1665741	5462651	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
17	0:03:59	20.3	1665729	5462690	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
18	0:04:10	20.8	1665722	5462730	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
19	0:04:28	21.7	1665719	5462743	Silt, fine sand, broken natural shell	Firm muddy sand		-
20	0:07:06	24.4	1665703	5462840	Silt, fine sand, broken natural shell	Firm muddy sand	11 armed starfish (<i>Coscinasterias muricata</i>)	-
21	0:09:48	24.1	1665757	5462877	Silt, fine sand, broken natural shell	Firm muddy sand		-
22	0:11:47	21	1665857	5462779	Silt, fine sand, broken natural shell	Firm muddy sand	Hermit crab	-
23	0:16:28	12.7	1666011	5462696	Silt, fine sand coarse sand, broken natural shell	Firm muddy sand	Hermit crab	-
24	0:17:27	12.7	1666050	5462777	Silt, fine sand coarse sand, broken natural shell	Firm muddy sand	Hermit crab	-
25	0:19:40	17.1	1666013	5462863	Silt, fine sand coarse sand, broken natural shell	Firm muddy sand	Hermit crab	-
26	0:22:01	23.6	1665916	5462997	Silt, fine sand coarse sand, broken natural shell	Firm muddy sand	Hermit crab	-
27	0:27:26	23.8	1665974	5463068	Silt, fine sand coarse sand, broken natural shell	Firm muddy sand		-
28	0:29:33	21.5	1666041	5462981	Silt, fine sand coarse sand, broken natural shell	Firm muddy sand	Hermit crab	-
29	0:29:56	21	1666063	5462961	Silt, fine sand coarse sand, broken natural shell	Firm muddy sand		-
30	0:30:45	20	1666091	5462996	Silt, fine sand coarse sand, broken natural shell	Firm muddy sand		-

¹ Refers to ROV video time stamp for imagery collected by ROV.

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed Southeastern AMA, August 2022.

Station ID	Video dive time ¹	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
31	0:30:54	20.3	1666088	5463028	Silt, fine sand coarse sand, broken natural shell	Firm muddy sand		-
32	0:31:21	20.7	1666087	5463037	Silt, fine sand coarse sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
33	0:32:02	21.3	1666082	5463059	Silt, fine sand coarse sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
34	0:33:17	22.4	1666066	5463107	Silt, fine sand coarse sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
35	0:33:34	22.7	1666063	5463119	Silt, fine sand coarse sand, broken natural shell	Firm muddy sand		-

¹ Refers to ROV video time stamp for imagery collected by ROV.

Summary of benthic observations in relation to the NES-MA, proposed Western AMA, August 2022.

Station ID	Section 7 Bio-genic habitat	Section 8 Reef	Section 9 (a, b, c) Status or significant species	Section 9 Council significant site	S4 4 (b) % Natural Shell - (>40% cover)	S4 1 Rhodo-lith - (1 seen)	S4 2 Council recognised important dead shell	S4 3 (a, b) Biogenic prominent or raised (0.5 m) - (present/absent)	S4 4 (a) (i) Biogenic (colony forming) - ($\geq 10\%$)	S4 4 (a) (ii) Biogenic macroal-gae or seagrass - ($\geq 10\%$)	S4 4 (a) (iii) Biogenic tube-worms, bra-chiopods, natural shellfish - ($\geq 10\%$)	S4 4 (c) Biogenic large habi-tat-forming species (e.g. horse mussel, hydroid tree) - mean ≥ 1 per m ²	Suitability in terms of NES-MA (one or more threshold exceeded)
1	Yes	-	Yes	-	7	-	-	-	$\geq 10\%$	-	-	≥ 1 per m ²	Not suitable
2	-	-	-	-	-	-	-	-	-	-	-	-	Suitable
3	Yes	-	Yes	-	40	-	-	-	$\geq 10\%$	-	-	≥ 1 per m ²	Not suitable
4	-	Present	-	-	-	-	-	-	-	-	-	-	Not suitable
5	-	-	-	-	5	-	-	-	-	-	-	-	Suitable ¹
6	-	-	-	-	-	-	-	-	-	-	-	-	Suitable
7	-	-	Yes	-	2	-	-	-	-	-	-	-	Suitable ¹
8	Yes	-	Yes	-	>40	>1	-	-	-	-	-	-	Not suitable
9	-	-	-	-	20	-	-	-	-	-	-	-	Suitable
10	Yes	-	-	-	40	-	-	-	-	-	-	-	Not suitable
11	Yes	-	Yes	-	1	-	-	-	$\geq 10\%$	-	-	≥ 1 per m ²	Not suitable
12	-	-	-	-	10	-	-	-	-	-	-	-	Suitable
13	-	-	-	-	20	-	-	-	-	-	-	-	Suitable
14	Yes	-	-	-	70	-	-	-	-	-	-	-	Not suitable
15	Yes	-	-	-	70	-	-	-	-	-	-	-	Not suitable

¹ Horse mussels or scallop observed via live video feed but appear to be present at low densities.

Summary of benthic observations in relation to the NES-MA, proposed Western AMA, August 2022.

Station ID	Section 7 Bio-genic habitat	Section 8 Reef	Section 9 (a, b, c) Status or significant species	Section 9 Council significant site	S4 4 (b) % Natural Shell - (>40% cover)	S4 1 Rhodolith - (1 seen)	S4 2 Council recognised important dead shell	S4 3 (a, b) Biogenic prominent or raised (0.5 m) - (present/absent)	S4 4 (a) (i) Biogenic (colony forming) - (≥10%)	S4 4 (a) (ii) Biogenic macroalgae or seagrass - (≥10%)	S4 4 (a) (iii) Biogenic tube-worms, brachiopods, natural shellfish - (≥10%)	S4 4 (c) Biogenic large habitat-forming species (e.g. horse mussel, hydroid tree) - mean ≥1 per m ²	Suitability in terms of NES-MA (one or more threshold exceeded)
16	Yes	-	Yes	-	5	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
17	Yes	-	Yes	-	5	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
18	Yes	-	Yes	-	5	-	-	-	≥ 10%	-	-	≥1 per m ²	Not suitable
19	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
20	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
21	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
22	-	-	-	-	7	-	-	-	-	-	-	-	Suitable
23	-	-	-	-	40	-	-	-	-	-	-	-	Not suitable ¹
24	-	-	-	-	10	-	-	-	-	-	-	-	Suitable
25	-	-	-	-	40	-	-	-	-	-	-	-	Not suitable ¹
26	-	-	-	-	8	-	-	-	-	-	-	-	Suitable
27	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
28	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
29	-	-	-	-	50	-	-	-	-	-	-	-	Not suitable
30	-	-	-	-	5	-	-	-	-	-	-	-	Suitable

¹ Sediment waves observed indicating strong currents/mobile sands.

Summary of benthic observations in relation to the NES-MA, proposed Western AMA, August 2022.

Station ID	Section 7 Bio-genic habitat	Section 8 Reef	Section 9 (a, b, c) Status or significant species	Section 9 Council significant site	S4 4 (b) % Natural Shell - (>40% cover)	S4 1 Rhodolith - (1 seen)	S4 2 Council recognised important dead shell	S4 3 (a, b) Biogenic prominent or raised (0.5 m) - (present/absent)	S4 4 (a) (i) Biogenic (colony forming) - (≥10%)	S4 4 (a) (ii) Biogenic macroalgae or seagrass - (≥10%)	S4 4 (a) (iii) Biogenic tube-worms, brachiopods, natural shellfish - (≥10%)	S4 4 (c) Biogenic large habitat-forming species (e.g. horse mussel, hydroid tree) - mean ≥1 per m ²	Suitability in terms of NES-MA (one or more threshold exceeded)
31	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
32	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
33	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
34	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
35	-	-	-	-	2	-	-	-	-	-	-	-	Suitable

¹ Sediment waves observed indicating strong currents/mobile sands.

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed 8009 AMA, August 2022.

Station ID	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
1	9.7	1666400	5463846	Silt, fine sand, coarse sand, mussel shell, broken natural shell	Firm muddy sand	11 armed starfish (<i>Coscinasterias muricata</i>)	2
2	10.1	1666455	5463809	Silt/clay, mussel shell, broken natural shell	Soft mud		20
3	10	1666492	5463782	Silt/clay, mussel shell, broken natural shell	Soft mud	Sea cucumber (<i>Stichopus mollis</i>)	98
4	10.9	1666477	5463782	Silt/clay, mussel shell, broken natural shell	Soft mud	Macroalgae (drift)	80
5	11	1666441	5463805	Silt/clay, mussel shell, broken natural shell	Soft mud		65
6	10.1	1666386	5463856	Silt, fine sand, coarse sand, mussel shell, broken natural shell	Firm muddy sand	11 armed starfish (<i>Coscinasterias muricata</i>)	1
7	11.6	1666380	5463832	Silt/clay, mussel shell, broken natural shell	Soft mud	11 armed starfish (<i>Coscinasterias muricata</i>)	50
8	13.3	1666414	5463793	Silt/clay, mussel shell, broken natural shell	Soft mud		35
9	13.3	1666471	5463755	Silt/clay, mussel shell, broken natural shell	Soft mud	Red macroalgae (attached to mussel shell)	85
10	14.3	1666452	5463753	Silt/clay, mussel shell	Soft mud		95
11	14	1666420	5463786	Silt/clay, mussel shell	Soft mud	Snake brittle star (<i>Ophiopsammus maculata</i>)	98
12	11.8	1666367	5463830	Silt/clay, mussel shell	Soft mud	7 armed starfish (<i>Astrostele scabra</i>), 11 armed starfish (<i>Coscinasterias muricata</i>)	100
13	13.4	1666355	5463818	Silt/clay, mussel shell	Soft mud		95
14	15.5	1666395	5463779	Silt/clay, mussel shell	Soft mud	11 armed starfish (<i>Coscinasterias muricata</i>)	98
15	16	1666444	5463728	Silt/clay, mussel shell, broken natural shell	Soft mud		85
16	17	1666425	5463728	Silt/clay, mussel shell, broken natural shell	Soft mud	Sea cucumber (<i>Stichopus mollis</i>)	95

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed 8009 AMA, August 2022.

Station ID	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
17	17.2	1666394	5463758	Silt/clay, mussel shell, broken natural shell	Soft mud	Sea cucumber (<i>Stichopus mollis</i>), 11 armed starfish (<i>Coscinasterias muricata</i>), <i>Perna canaliculus</i>	98
18	14.1	1666348	5463806	Silt/clay, mussel shell, broken natural shell	Soft mud		98
19	11.7	1666332	5463832	Silt, fine sand, coarse sand, gravel, broken natural shell	Firm muddy sand		-
20	9.1	1666368	5463877	Silt, fine sand, coarse sand, gravel, broken natural shell	Firm muddy sand	Cushion star (<i>Patiriella regularis</i>)	-
21	11	1666492	5463753	Silt, fine sand, natural shell	Firm muddy sand		-
22	16.1	1666449	5463707	Silt, fine sand, natural shell	Firm muddy sand		-
23	15.2	1666292	5463799	Silt, fine sand, coarse sand, gravel, occasional cobble, broken natural shell	Firm muddy sand	Rhodolith (bed)	-
24	16.3	1666331	5463787	Silt, fine sand, coarse sand, mussel shell, broken natural shell	Firm muddy sand		1
25	19.4	1666348	5463746	Silt/clay, mussel shell, broken natural shell	Soft mud	Macroalgae (drift)	10
26	17.9	1666427	5463709	Silt/clay, broken natural shell	Soft mud		-
27	16.3	1666452	5463683	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
28	15.8	1666459	5463680	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
29	15	1666462	5463650	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), macroalgae (drift)	-
30	13.4	1666499	5463650	Silt, fine sand	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), soft tubeworm (<i>Spiochaetopterus</i> sp.), red macroalgae	-
31	13.9	1666489	5463637	Silt, fine sand	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), soft tubeworm (<i>Spiochaetopterus</i> sp.), red macroalgae	-

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed 8009 AMA, August 2022.

Station ID	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
32	12.7	1666512	5463633	Silt, fine sand, broken natural shell	Firm muddy sand	Red macroalgae	-
33	11.8	1666529	5463625	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), soft tubeworm (<i>Spiochaetopterus</i> sp.), red macroalgae	-
34	10.5	1666539	5463654	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), red macroalgae	-
35	18.7	1666408	5463707	Silt, fine sand	Firm muddy sand	MPB film	-
36	16.5	1666448	5463684	Silt, fine sand	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
37	17.4	1666429	5463700	Silt, fine sand	Firm muddy sand	MPB film	-
38	15.3	1666463	5463670	Silt, fine sand	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
39	13.9	1666494	5463638	Silt, fine sand	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), red macroalgae, macroalgae (drift), 11 armed starfish (<i>Coscinasterias muricata</i>)	-
40	12.8	1666517	5463620	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), soft tubeworm (<i>Spiochaetopterus</i> sp.), red macroalgae	-
41	10.5	1666538	5463642	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), red macroalgae	-
42	8.1	1666567	5463669	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), red macroalgae	-
43	5.8	1666585	5463702	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
44	5.5	1666592	5463708	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), cushion star (<i>Patiriella regularis</i>)	-
45	6.4	1666570	5463733	Silt, fine sand	Firm muddy sand	Cushion star (<i>Patiriella regularis</i>)	-
46	7.7	1666554	5463709	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), MPB film	-
47	10.1	1666526	5463687	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), MPB film	-

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed 8009 AMA, August 2022.

Station ID	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
48	12.8	1666502	5463667	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
49	13.9	1666480	5463652	Silt, fine sand	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), soft tubeworm (<i>Spiochaetopterus</i> sp.), red macroalgae, 11 armed starfish (<i>Coscina asterias muricata</i>)	-
50	15.8	1666462	5463678	Silt, fine sand	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
51	14.1	1666474	5463706	Silt, fine sand, broken natural shell	Firm muddy sand	MPB film	-
52	12.2	1666484	5463742	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), red macroalgae	-
53	10.1	1666504	5463774	Silt, fine sand	Firm muddy sand	Unid. gastropod snail, MPB film	-
54	8.9	1666518	5463776	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), MPB film	-
55	7.8	1666541	5463749	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
56	9.2	1666526	5463732	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
57	11.3	1666506	5463717	Silt, fine sand	Firm muddy sand		-
58	13.3	1666479	5463703	Silt, fine sand	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
59	15.9	1666457	5463690	Silt, fine sand	Firm muddy sand		-
60	12.3	1666497	5463695	Silt, fine sand	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>), soft tubeworm (<i>Spiochaetopterus</i> sp.), red macroalgae	-
61	6.6	1666590	5463641	Bedrock	Bedrock reef	Lithothamnion sp., unid. sponge	-
62	7.5	1666586	5463657	Silt, fine sand	Firm muddy sand		-
63	5.7	1666536	5463893	Bedrock	Bedrock reef	Lithothamnion sp., juvenile barnacle (<i>Chamaesipho columna</i>), <i>Notoplax latalamina</i>	-

Summary of benthic imagery locations, substratum type, mussel shell debris and species present, proposed 8009 AMA, August 2022.

Station ID	Depth (m)	NZTM E	NZTM N	Substratum	Dominant substratum*	Notable epibenthic macrofaunal species	% Mussel Shell Debris
64	6.3	1666529	5463891	Silt, fine sand, coarse sand, gravel, broken natural shell	Firm muddy sand		-
65	7.1	1666499	5463886	Silt, fine sand, broken natural shell	Firm muddy sand	Cushion star (<i>Patiriella regularis</i>)	-
66	7.1	1666491	5463892	Silt, fine sand, broken natural shell	Firm muddy sand	Solitary ascidian	-
67	7.8	1666470	5463879	Silt, fine sand, broken natural shell	Firm muddy sand	Red macroalgae	-
68	10.9	1666226	5463838	Bedrock, silt, fine sand	Bedrock reef	Finger sponge (<i>Callyspongia</i> sp.), lithothamnion sp., unid. sponge	-
69	13	1666269	5463829	Silt, fine sand, gravel, occasional cobble, broken natural shell	Firm muddy sand	Cushion star (<i>Patiriella regularis</i>)	-
70	10.6	1666565	5463604	Silt, fine sand, broken natural shell	Firm muddy sand		-
71	18	1666433	5463649	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-
72	20.5	1666372	5463676	Silt, fine sand, broken natural shell	Firm muddy sand	11 armed starfish (<i>Coscinasterias muricata</i>)	-
73	7.2	1666449	5463922	Silt, fine sand, broken natural shell	Firm muddy sand	Horse mussel (<i>Atrina zealandica</i>)	-

Summary of benthic observations in relation to the NES-MA, proposed 8009 AMA, August 2022.

Station ID	Section 7 Bio-genic habitat	Section 8 Reef	Section 9 (a, b, c) Status or significant species	Section 9 Council significant site	S4 4 (b) % Natural Shell - (>40% cover)	S4 1 Rhodolith - (1 seen)	S4 2 Council recognised important dead shell	S4 3 (a, b) Biogenic prominent or raised (0.5 m) - (present/absent)	S4 4 (a) (i) Biogenic (colony forming) - (≥10%)	S4 4 (a) (ii) Biogenic macroalgae or seagrass - (≥10%)	S4 4 (a) (iii) Biogenic tube-worms, brachiopods, natural shellfish - (≥10%)	S4 4 (c) Biogenic large habitat-forming species (e.g. horse mussel, hydroid tree) - mean ≥1 per m ²	Suitability in terms of NES-MA (one or more threshold exceeded)
1	-	-	-	-	3	-	-	-	-	-	-	-	Suitable
2	-	-	-	-	3	-	-	-	-	-	-	-	Suitable
3	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
4	-	-	-	-	3	-	-	-	-	-	-	-	Suitable
5	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
6	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
7	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
8	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
9	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
10	-	-	-	-	-	-	-	-	-	-	-	-	Suitable
11	-	-	-	-	-	-	-	-	-	-	-	-	Suitable
12	-	-	-	-	-	-	-	-	-	-	-	-	Suitable
13	-	-	-	-	-	-	-	-	-	-	-	-	Suitable
14	-	-	-	-	-	-	-	-	-	-	-	-	Suitable
15	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
16	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
17	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
18	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
19	Yes	-	-	-	80	-	-	-	-	-	-	-	Not suitable
20	Yes	-	-	-	65	-	-	-	-	-	-	-	Not suitable

Summary of benthic observations in relation to the NES-MA, proposed 8009 AMA, August 2022.

Station ID	Section 7 Bio-genic habitat	Section 8 Reef	Section 9 (a, b, c) Status or significant species	Section 9 Council significant site	S4 4 (b) % Natural Shell - (>40% cover)	S4 1 Rhodolith - (1 seen)	S4 2 Council recognised important dead shell	S4 3 (a, b) Biogenic prominent or raised (0.5 m) - (present/absent)	S4 4 (a) (i) Biogenic (colony forming) - (≥10%)	S4 4 (a) (ii) Biogenic macroalgae or seagrass - (≥10%)	S4 4 (a) (iii) Biogenic tube-worms, brachiopods, natural shellfish - (≥10%)	S4 4 (c) Biogenic large habitat-forming species (e.g. horse mussel, hydroid tree) - mean ≥1 per m ²	Suitability in terms of NES-MA (one or more threshold exceeded)
21	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
22	-	-	-	-	2	-	-	-	-	-	-	-	Suitable
23	Yes	-	Yes	-	>40	>1	-	-	-	-	-	-	Not suitable
24	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
25	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
26	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
27	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
28	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
29	Yes	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
30	Yes	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
31	Yes	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
32	-	-	-	-	2	-	-	-	-	-	-	-	Not suitable ¹
33	Yes	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
34	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable

¹ Likely represents a bare patch among wider horse mussel bed.

Summary of benthic observations in relation to the NES-MA, proposed 8009 AMA, August 2022.

Station ID	Section 7 Bio-genic habitat	Section 8 Reef	Section 9 (a, b, c) Status or significant species	Section 9 Council significant site	S4 4 (b) % Natural Shell - (>40% cover)	S4 1 Rhodolith - (1 seen)	S4 2 Council recognised important dead shell	S4 3 (a, b) Biogenic prominent or raised (0.5 m) - (present/absent)	S4 4 (a) (i) Biogenic (colony forming) - (≥10%)	S4 4 (a) (ii) Biogenic macroalgae or seagrass - (≥10%)	S4 4 (a) (iii) Biogenic tube-worms, brachiopods, natural shellfish - (≥10%)	S4 4 (c) Biogenic large habitat-forming species (e.g. horse mussel, hydroid tree) - mean ≥1 per m ²	Suitability in terms of NES-MA (one or more threshold exceeded)
35	-	-	-	-	-	-	-	-	-	-	-	-	Not suitable ¹
36	Yes		Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
37	-	-	-	-	1	-	-	-	-	-	-	-	Not suitable ¹
38	Yes	-	Yes	-	-	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
39	Yes	-	Yes	-	-	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
40	Yes	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
41	Yes	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
42	Yes	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
43	Yes	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
44	Yes	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
45	-	-	-	-	-	-	-	-	-	-	-	-	Suitable
46	Yes	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable

¹ Likely represents a bare patch among wider horse mussel bed.

Summary of benthic observations in relation to the NES-MA, proposed 8009 AMA, August 2022.

Station ID	Section 7 Bio-genic habitat	Section 8 Reef	Section 9 (a, b, c) Status or significant species	Section 9 Council significant site	S4 4 (b) % Natural Shell - (>40% cover)	S4 1 Rhodo-lith - (1 seen)	S4 2 Council recognised important dead shell	S4 3 (a, b) Biogenic prominent or raised (0.5 m) - (present/absent)	S4 4 (a) (i) Biogenic (colony forming) - (≥10%)	S4 4 (a) (ii) Biogenic macroal-gae or seagrass - (≥10%)	S4 4 (a) (iii) Biogenic tube-worms, bra-chiopods, natural shellfish - (≥10%)	S4 4 (c) Biogenic large habi-tat-forming species (e.g. horse mussel, hydroid tree) - mean ≥1 per m ²	Suitability in terms of NES-MA (one or more threshold exceeded)
49	Yes	-	Yes	-	-	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
50	Yes	-	Yes	-	-	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
51	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
52	Yes	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
53	-	-	-	-	-	-	-	-	-	-	-	-	Suitable
54	Yes	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
55	-	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
56	Yes	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
57	-	-	-	-	-	-	-	-	-	-	-	-	Suitable
58	Yes	-	Yes	-	-	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
59	-	-	-	-	-	-	-	-	-	-	-	-	Suitable
60	Yes	-	Yes	-	-	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
61	-	Present	-	-	-	-	-	-	-	-	-	-	Not suitable
62	-	-	-	-	-	-	-	-	-	-	-	-	Suitable

Summary of benthic observations in relation to the NES-MA, proposed 8009 AMA, August 2022.

Station ID	Section 7 Bio-genic habitat	Section 8 Reef	Section 9 (a, b, c) Status or significant species	Section 9 Council significant site	S4 4 (b) % Natural Shell - (>40% cover)	S4 1 Rhodolith - (1 seen)	S4 2 Council recognised important dead shell	S4 3 (a, b) Biogenic prominent or raised (0.5 m) - (present/absent)	S4 4 (a) (i) Biogenic (colony forming) - (≥10%)	S4 4 (a) (ii) Biogenic macroalgae or seagrass - (≥10%)	S4 4 (a) (iii) Biogenic tube-worms, brachiopods, natural shellfish - (≥10%)	S4 4 (c) Biogenic large habitat-forming species (e.g. horse mussel, hydroid tree) - mean ≥1 per m ²	Suitability in terms of NES-MA (one or more threshold exceeded)
63	-	Present	Notoplax latalamina	-	-	-	-	-	-	-	-	-	Not suitable
64	Yes	-	-	-	45	-	-	-	-	-	-	-	Not suitable
65	-	-	-	-	5	-	-	-	-	-	-	-	Suitable
66	-	-	-	-	3	-	-	-	-	-	-	-	Suitable
67	Yes	-	-	-	45	-	-	-	-	-	-	-	Not suitable
68	-	Present	-	-	-	-	-	-	-	-	-	-	Not suitable
69	Yes	-	-	-	45	-	-	-	-	-	-	-	Not suitable
70	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
71	Yes	-	Yes	-	2	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable
72	-	-	-	-	1	-	-	-	-	-	-	-	Suitable
73	-	-	Yes	-	1	-	-	-	≥ 10%	-	-	≥1 per m2	Not suitable

Appendix B:

Benthic Imagery

Proposed Western AMA - Okuri Bay

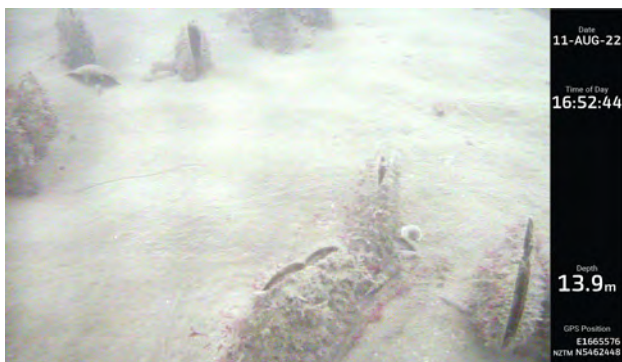
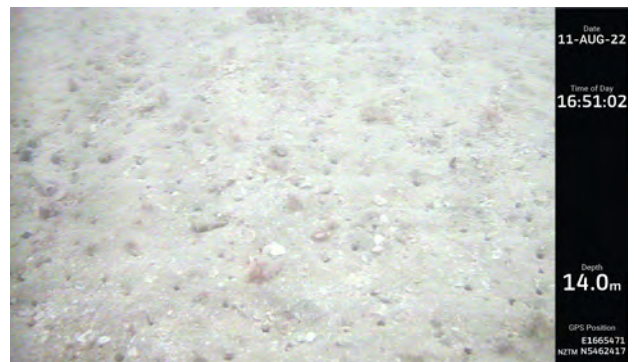
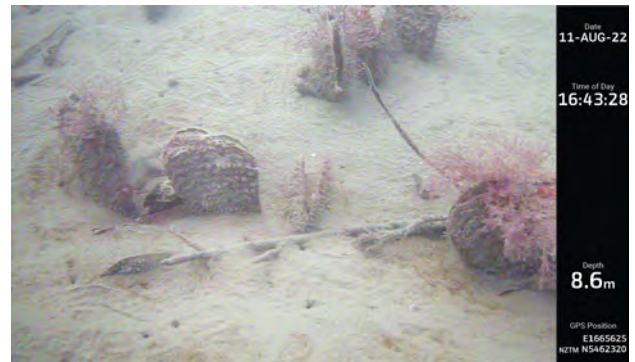


Image 1-8 (Left to right, top to bottom): Station ID 1-8 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Western AMA - Okuri Bay

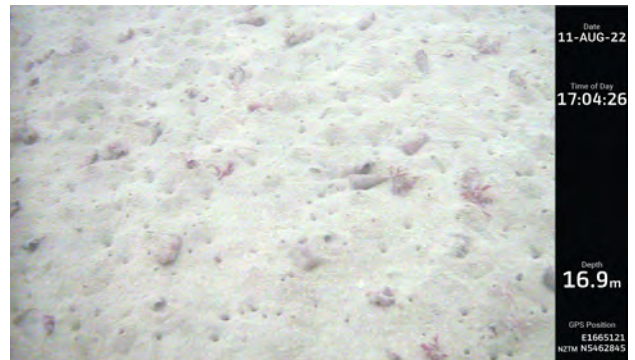
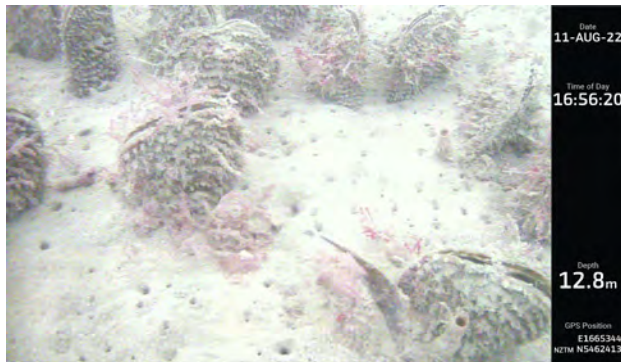


Image 9-16 (Left to right, top to bottom): Station ID 9-16 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Western AMA - Okuri Bay

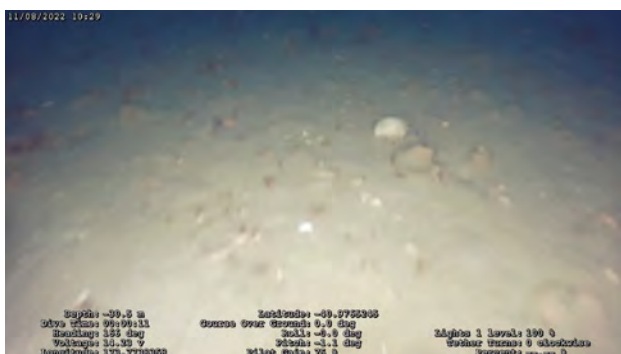
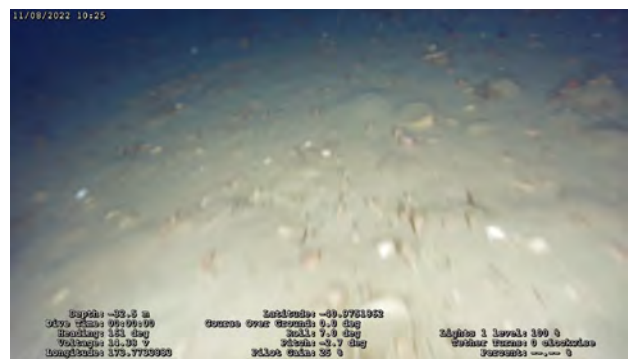
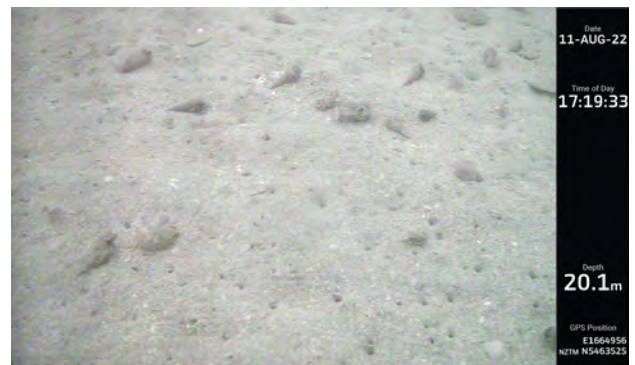


Image 17-24 (Left to right, top to bottom): Station ID Image 17-24 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Western AMA - Okuri Bay

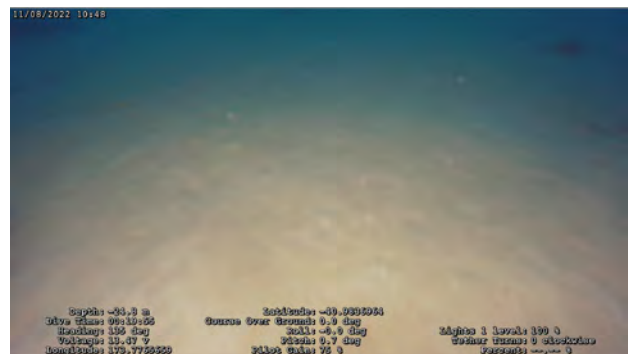
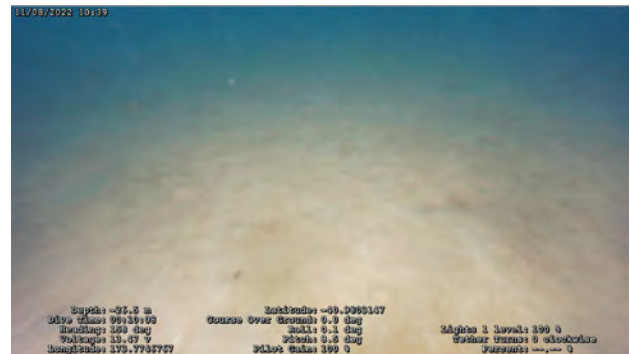
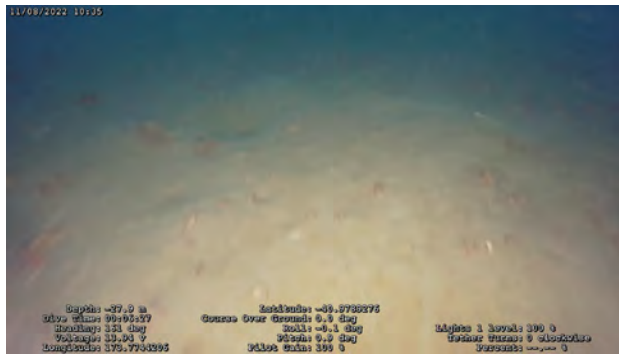


Image 25-32 (Left to right, top to bottom): Station ID Image 25-32 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Western AMA - Okuri Bay

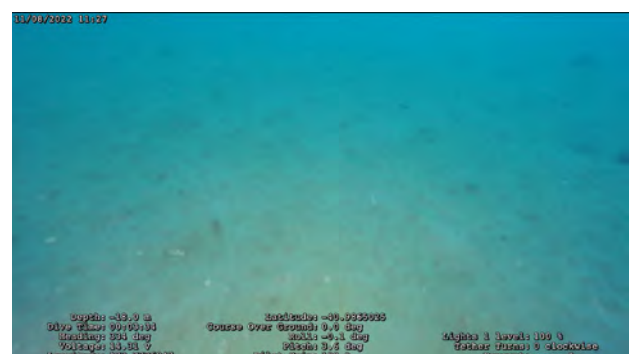
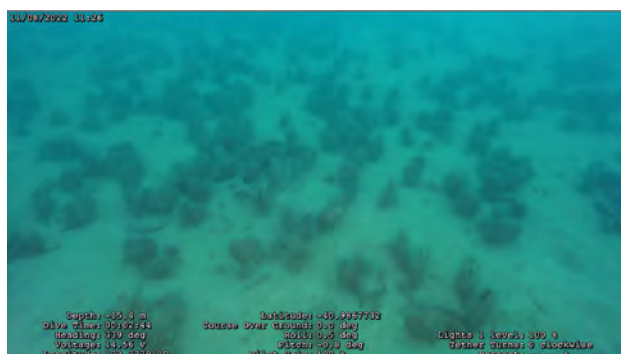
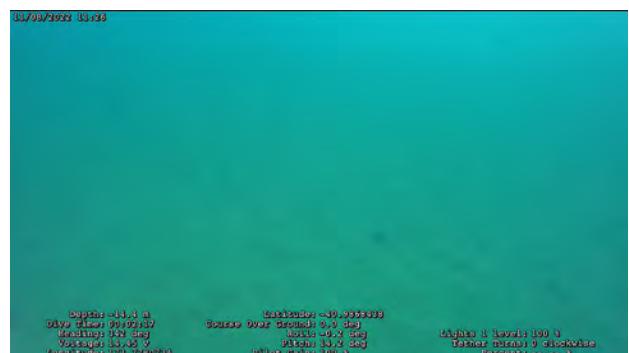
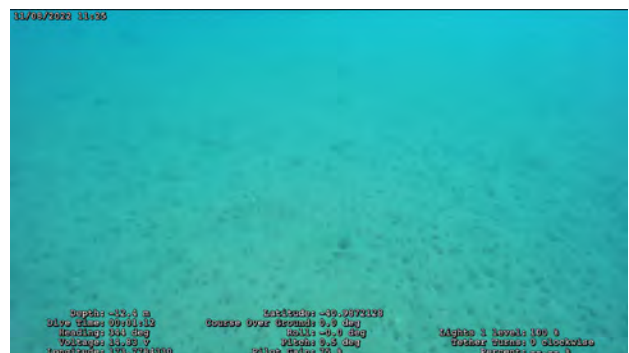
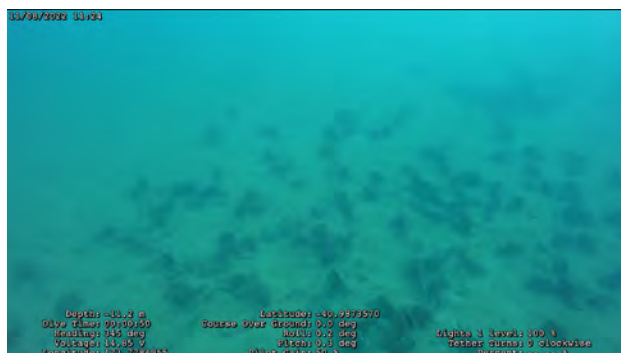


Image 33-40 (Left to right, top to bottom): Station ID Image 33-40 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Western AMA - Okuri Bay

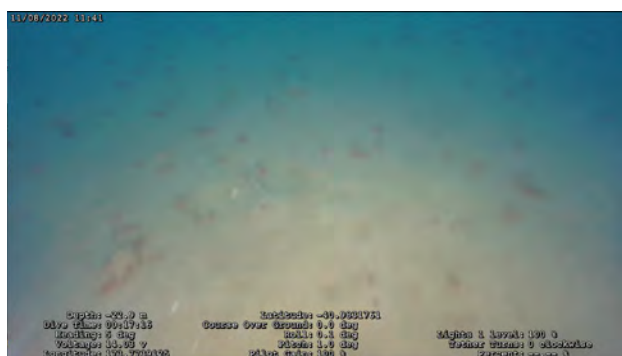
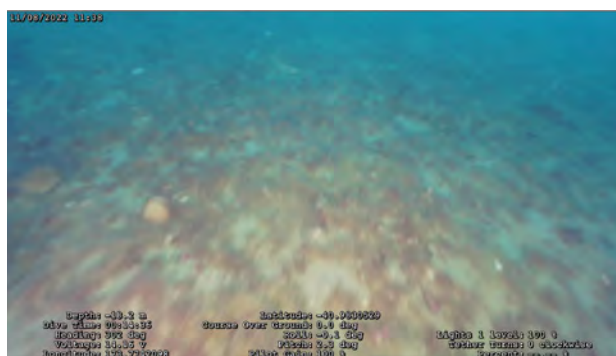
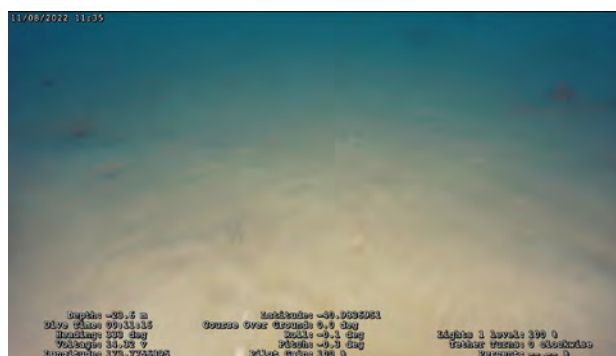
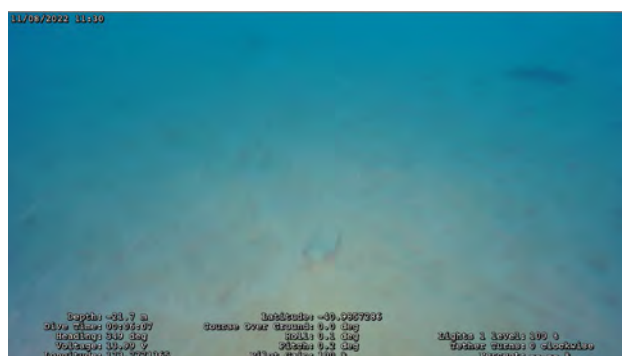


Image 41-48 (Left to right, top to bottom): Station ID Image 41-48 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Western AMA - Okuri Bay

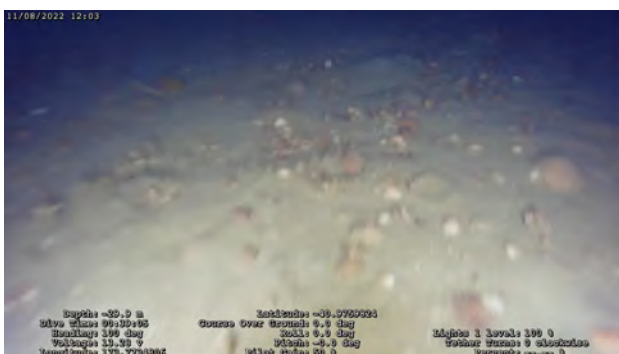
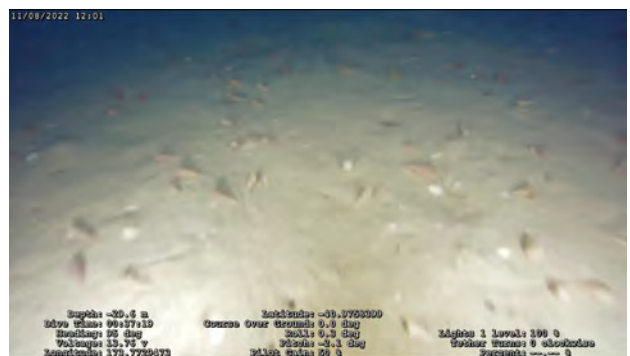
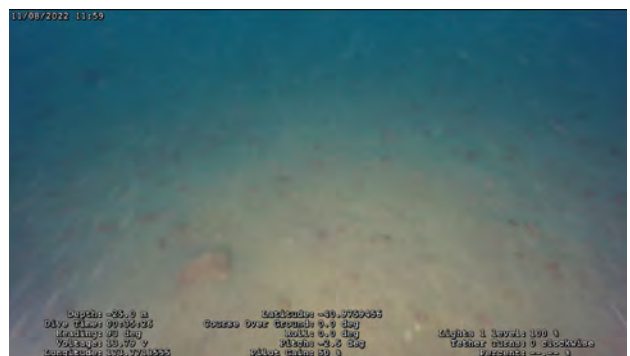
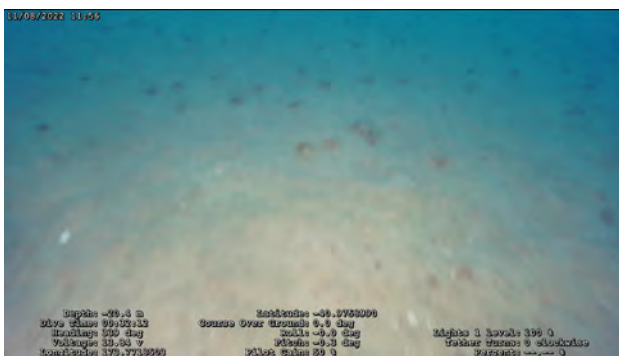
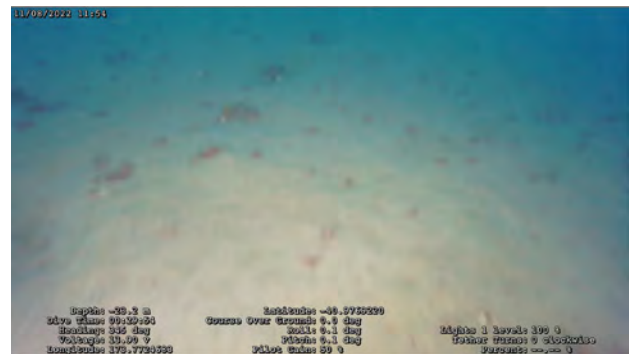
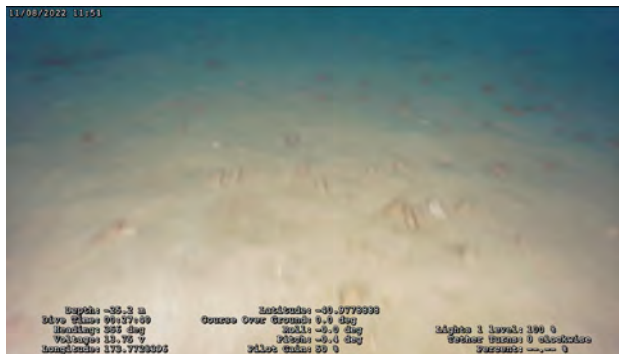


Image 49-56 (Left to right, top to bottom): Station ID Image 49-56 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Western AMA - Okuri Bay

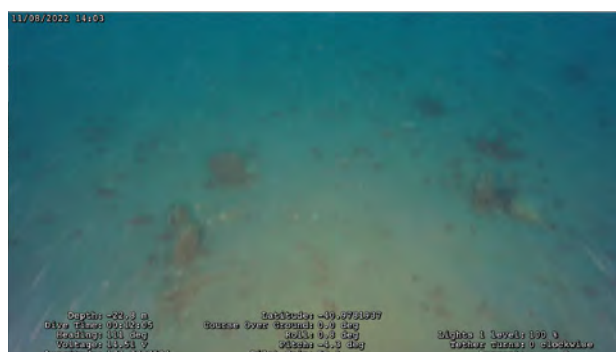
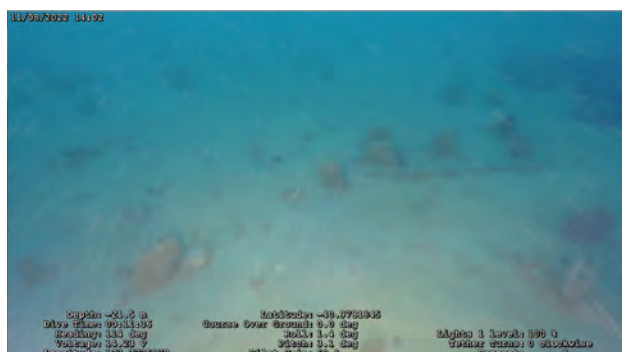
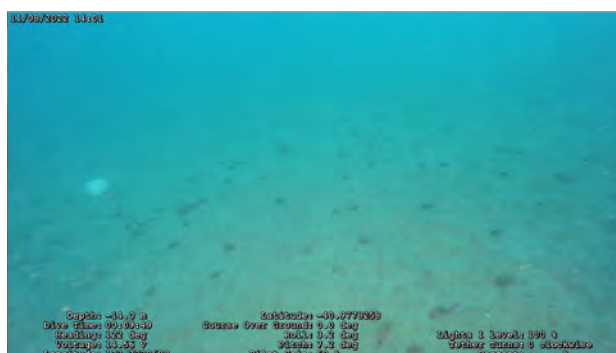
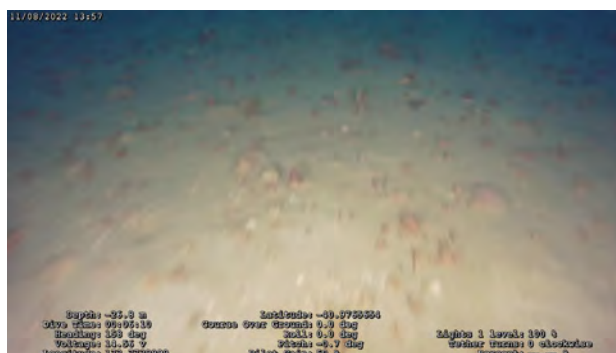
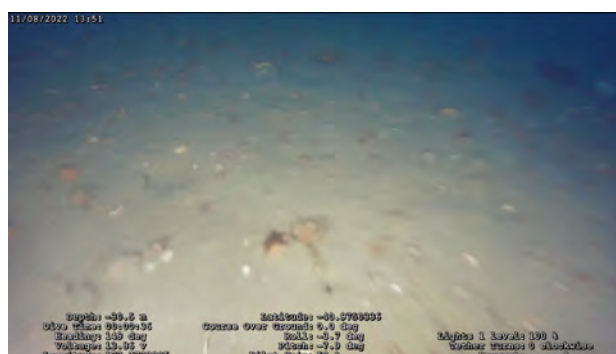


Image 57-64 (Left to right, top to bottom): Station ID Image 57-64 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Western AMA - Okuri Bay

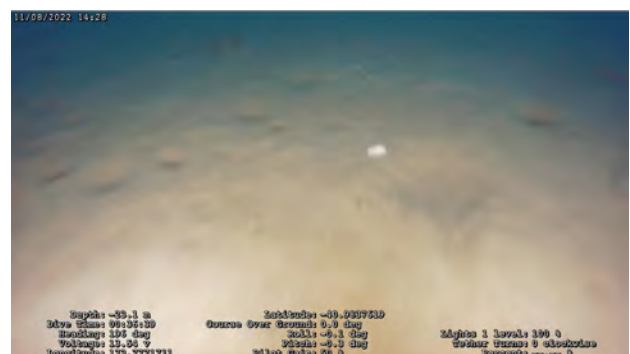
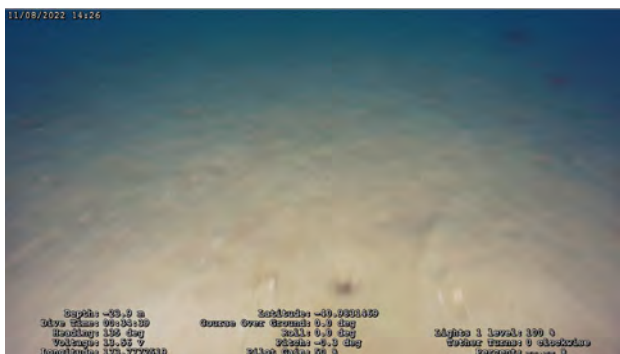
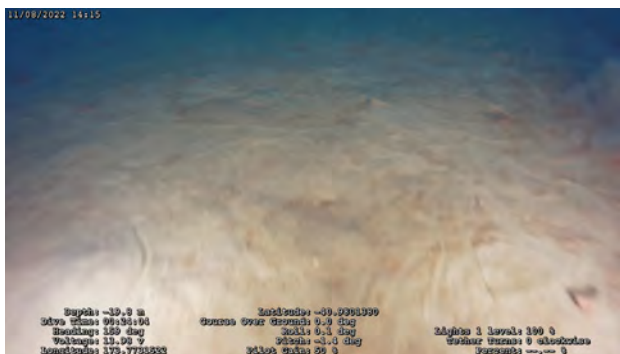
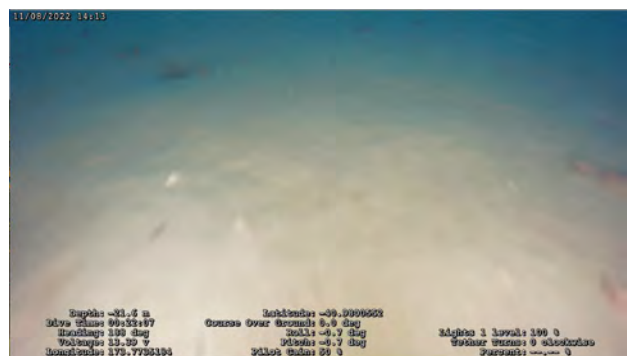
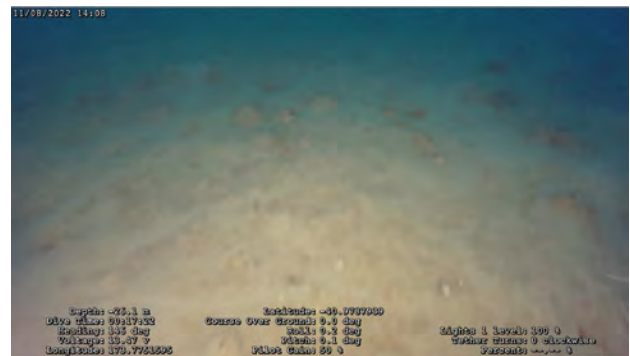
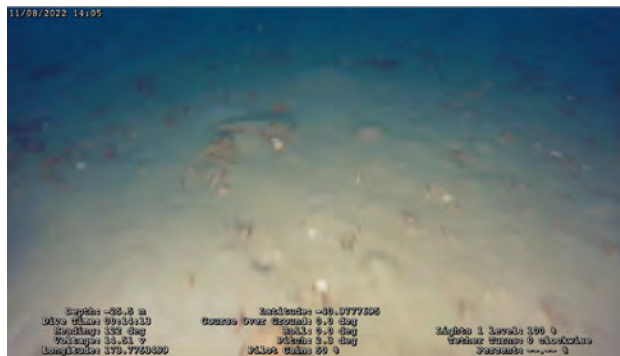


Image 65-72 (Left to right, top to bottom): Station ID Image 65-72 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Western AMA - Okuri Bay

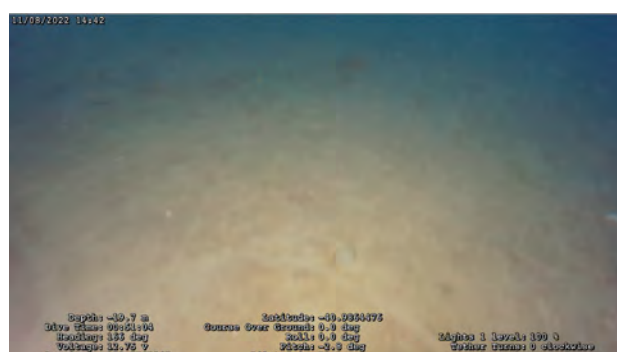
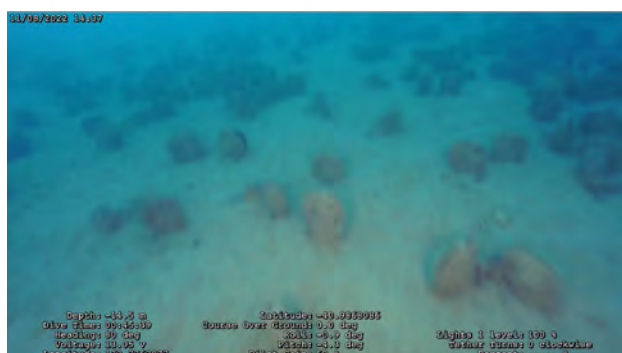
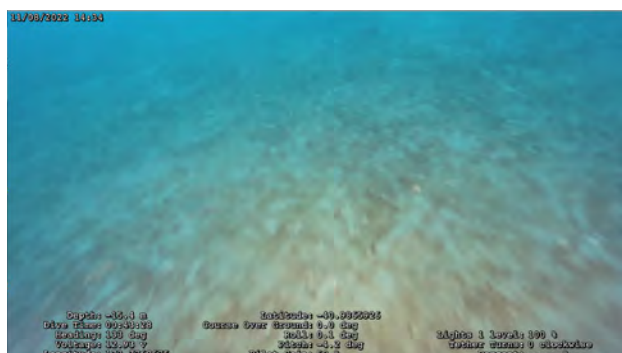
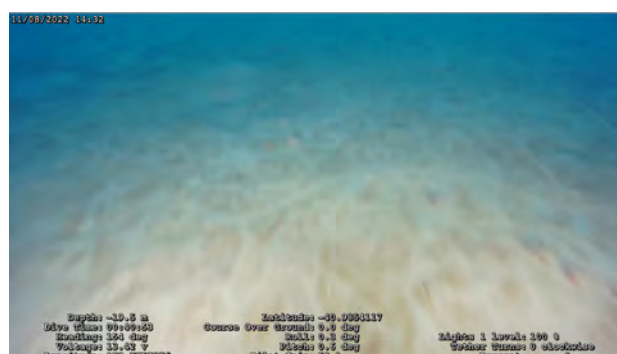


Image 73-80 (Left to right, top to bottom): Station ID Image 73-80 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Western AMA - Okuri Bay



Image 81-82 (Left to right, top to bottom): Station ID Image 81-82 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Southeastern AMA - Okuri Bay

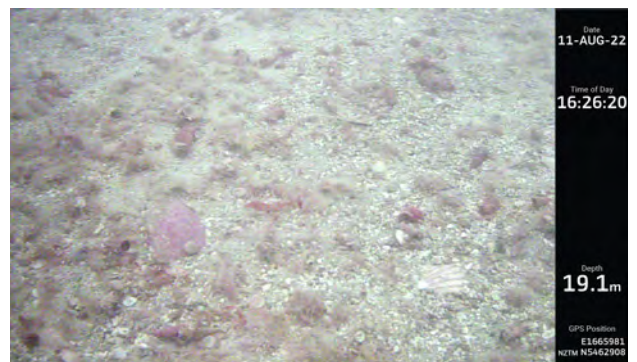
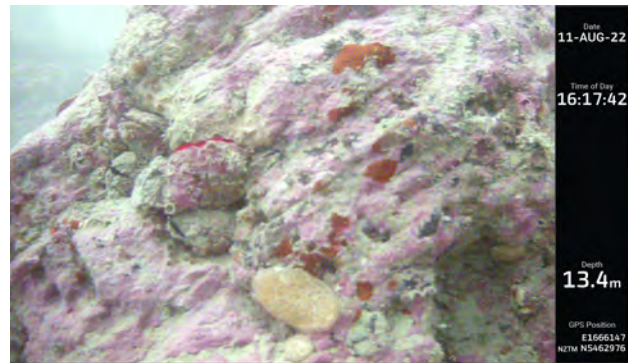


Image 1-8 (Left to right, top to bottom): Station ID 1-8 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Southeastern AMA - Okuri Bay

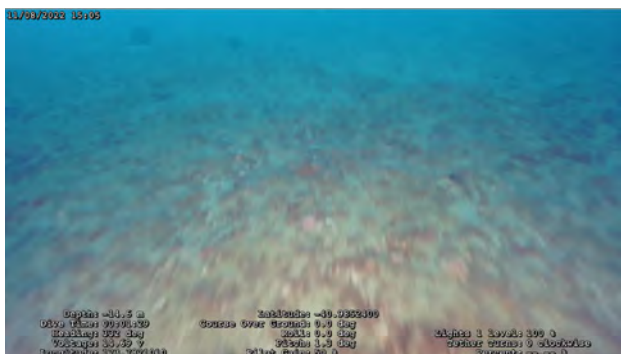
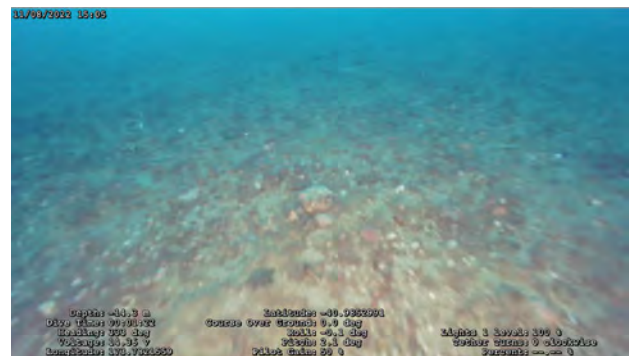
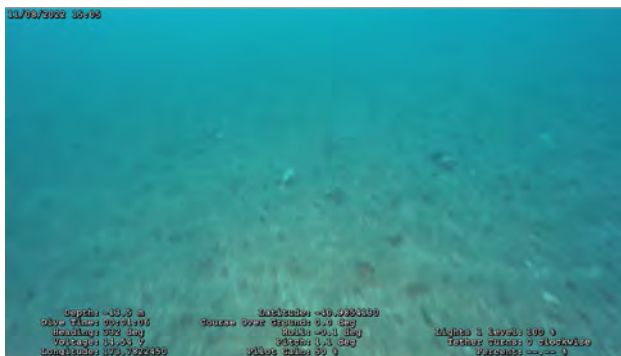
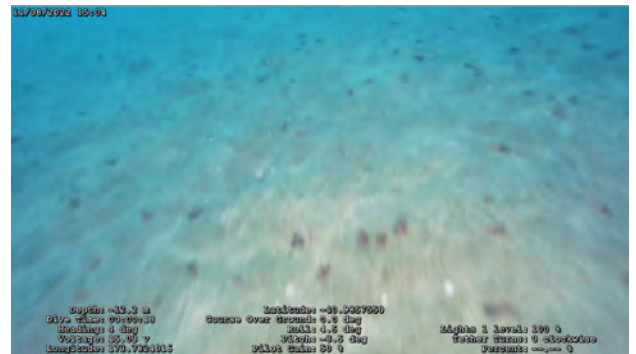
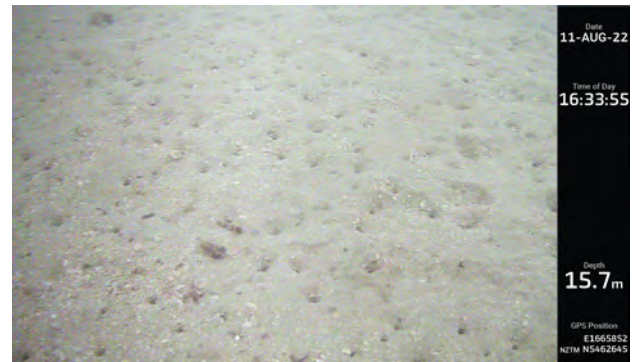


Image 9-16 (Left to right, top to bottom): Station ID 9-16 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Southeastern AMA - Okuri Bay

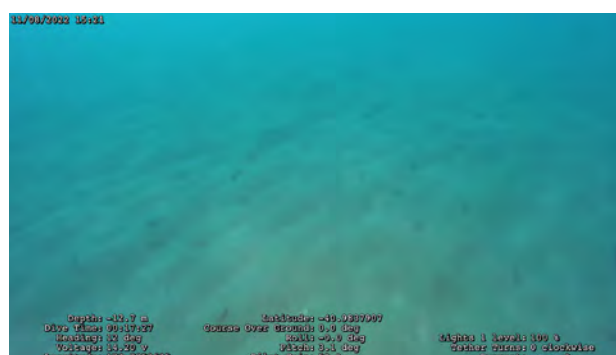
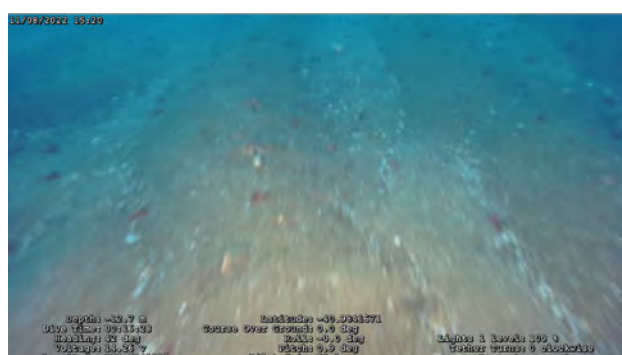
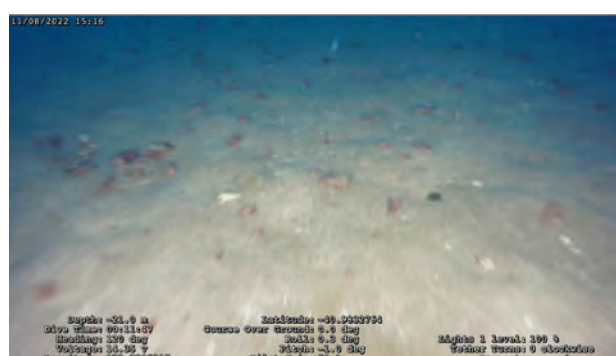
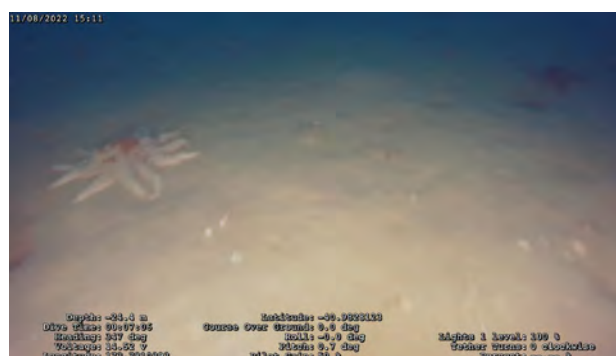
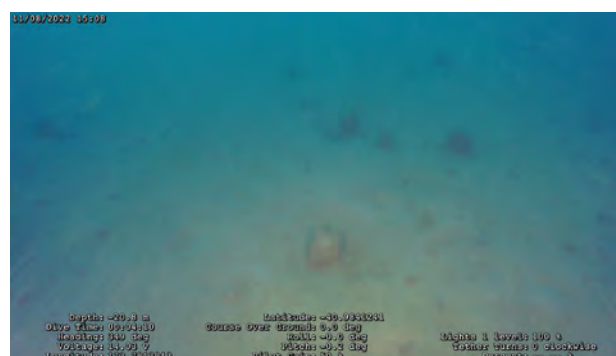


Image 17-24 (Left to right, top to bottom): Station ID 17-24 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed Southeastern AMA - Okuri Bay

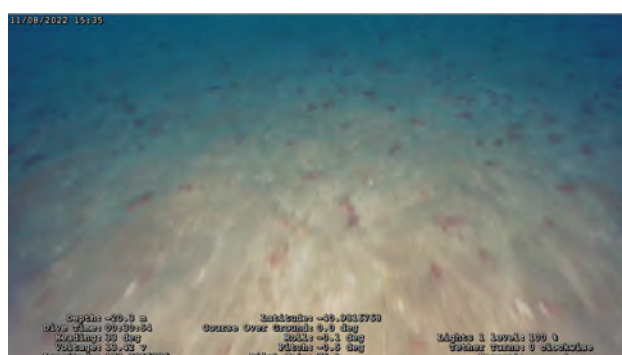
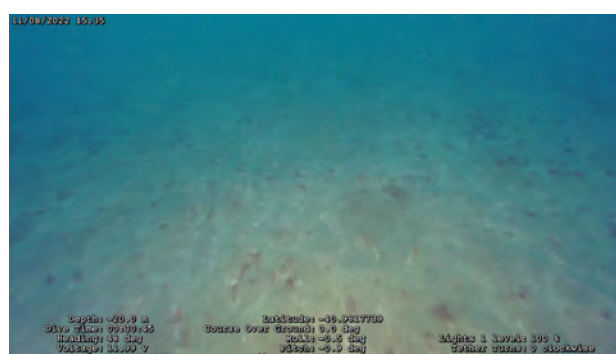
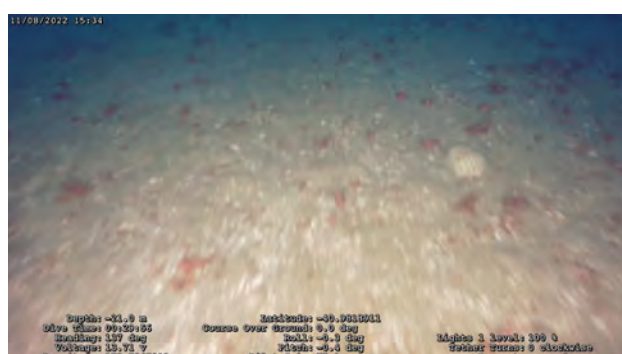
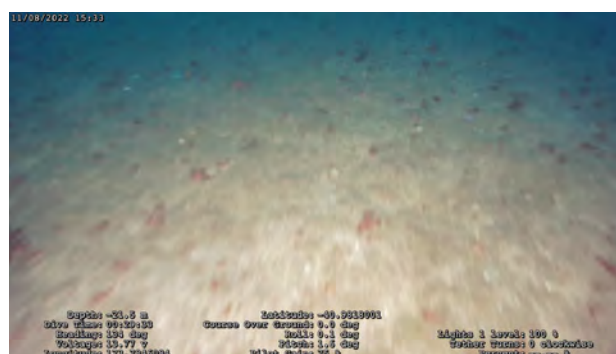
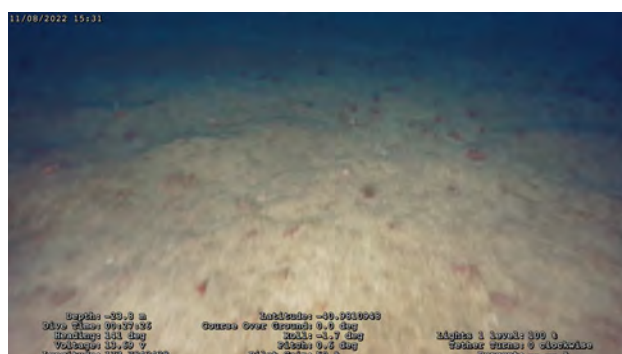
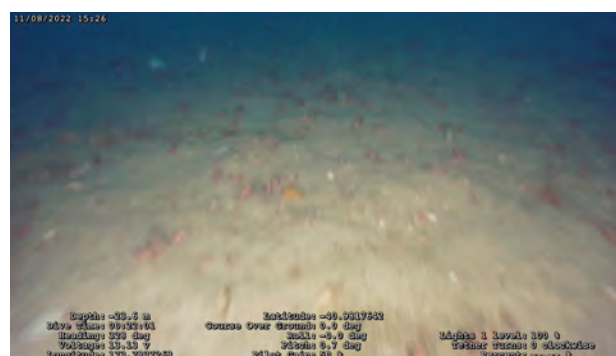
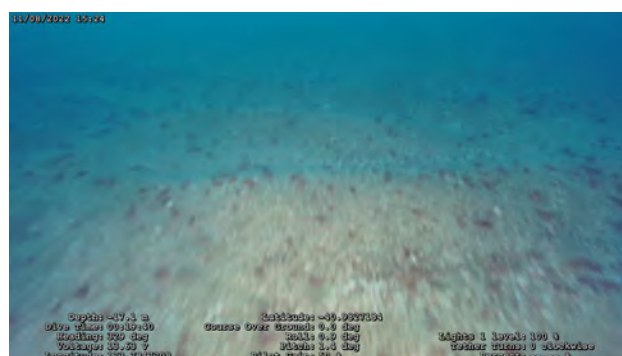


Image 25-32 (Left to right, top to bottom): Station ID 25-32 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.



Image 33-35 (Left to right, top to bottom): Station ID 33-35 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed 8009 AMA - Okuri Bay



Image 1-8 (Left to right, top to bottom): Station ID 1-8 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed 8009 AMA - Okuri Bay



Image 9-16 (Left to right, top to bottom): Station ID 9-16 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed 8009 AMA - Okuri Bay

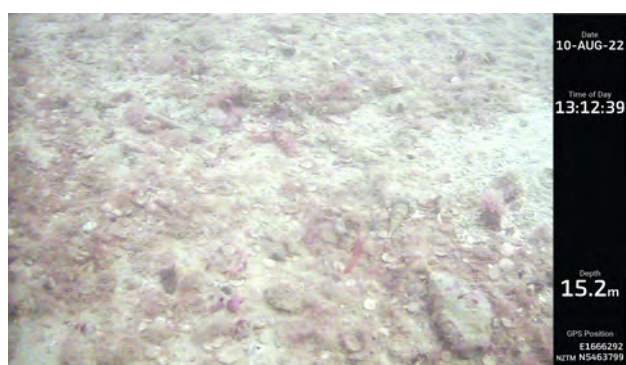
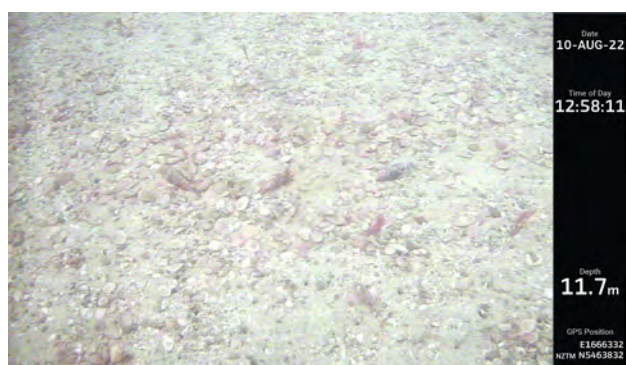


Image 17-24 (Left to right, top to bottom): Station ID 17-24 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed 8009 AMA - Okuri Bay

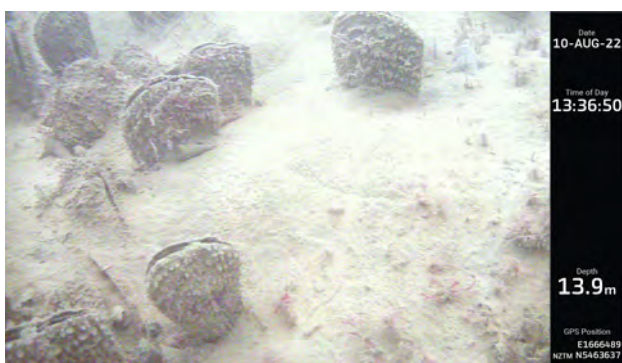
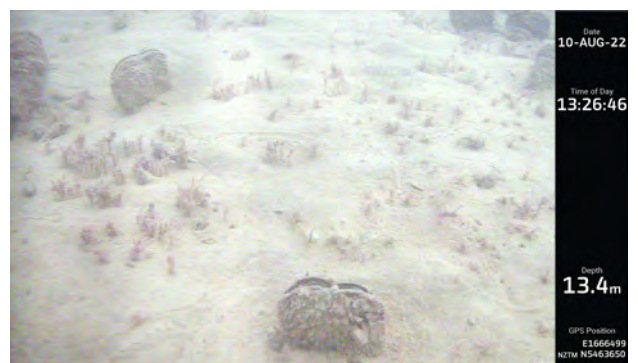


Image 25-32 (Left to right, top to bottom): Station ID 25-32 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed 8009 AMA - Okuri Bay

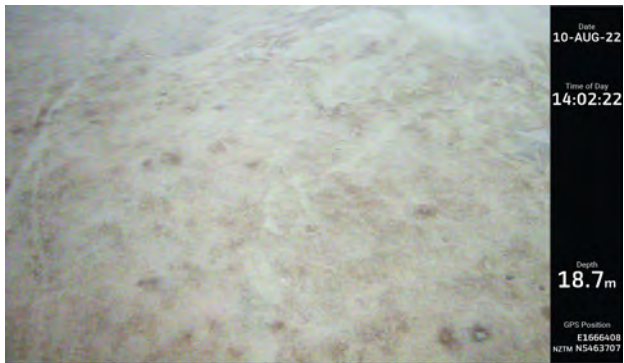


Image 33-40 (Left to right, top to bottom): Station ID 33-40 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed 8009 AMA - Okuri Bay



Image 41-48 (Left to right, top to bottom): Station ID 41-48 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed 8009 AMA - Okuri Bay

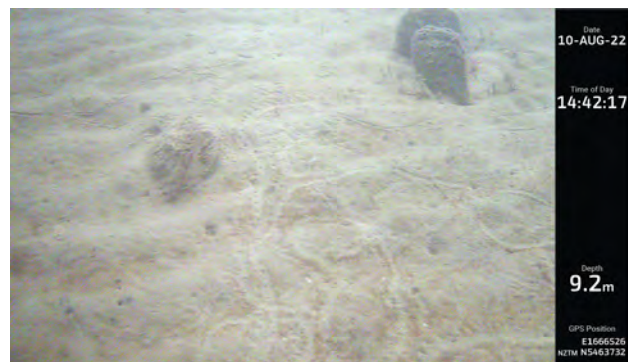
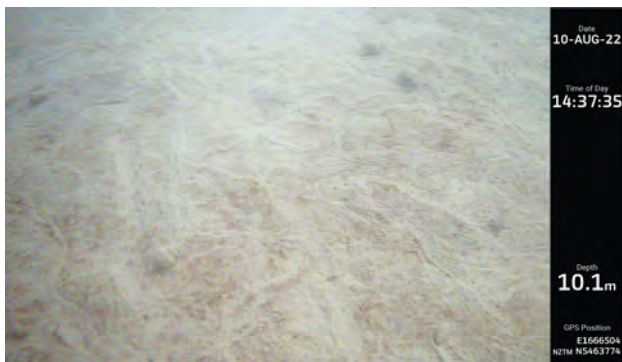
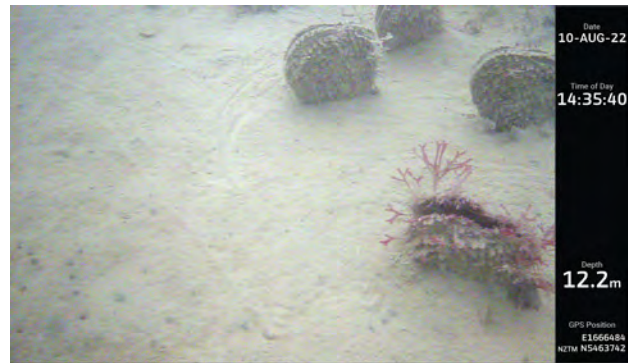
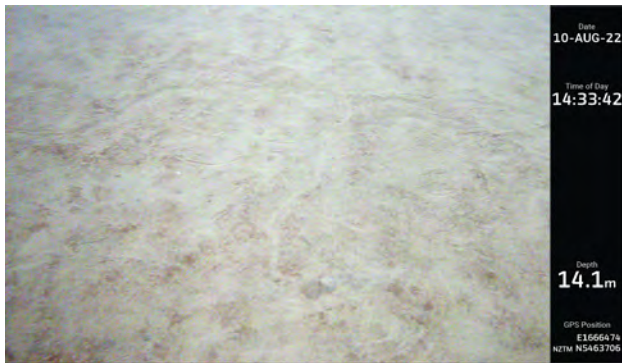


Image 49-56 (Left to right, top to bottom): Station ID 49-56 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed 8009 AMA - Okuri Bay

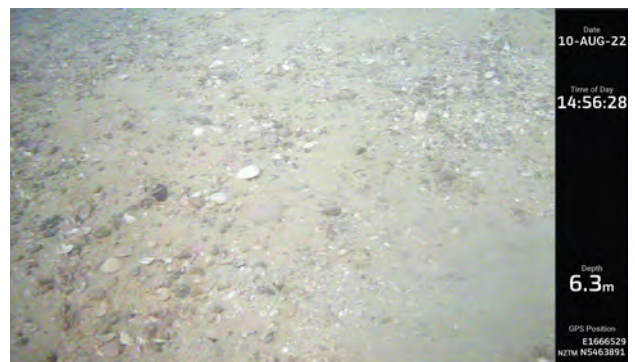
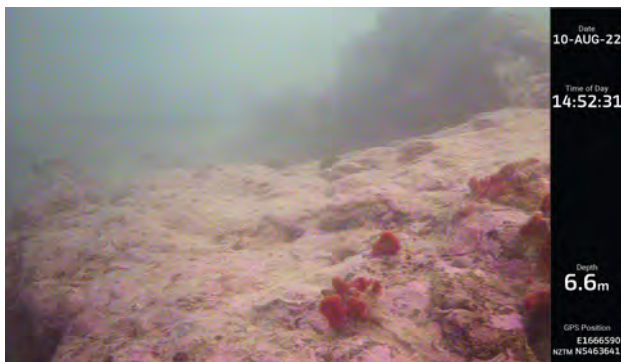
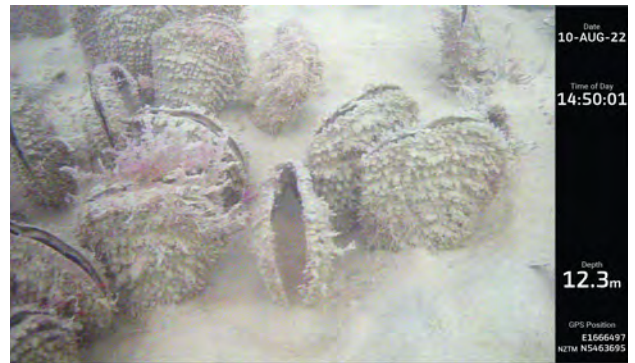
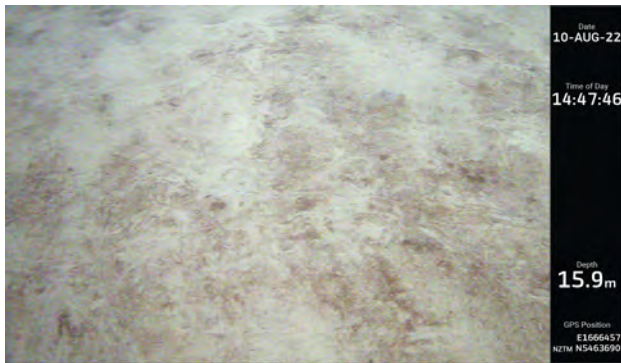
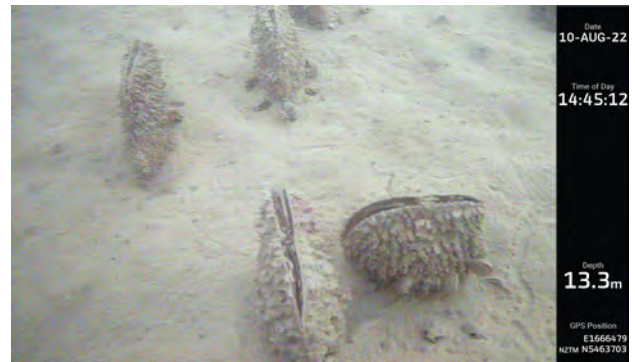


Image 57-64 (Left to right, top to bottom): Station ID 57-64 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed 8009 AMA - Okuri Bay

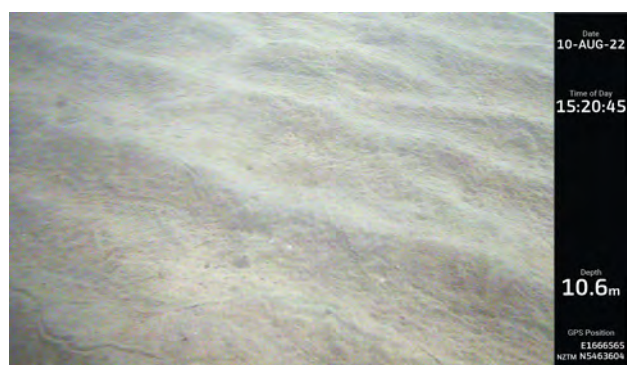
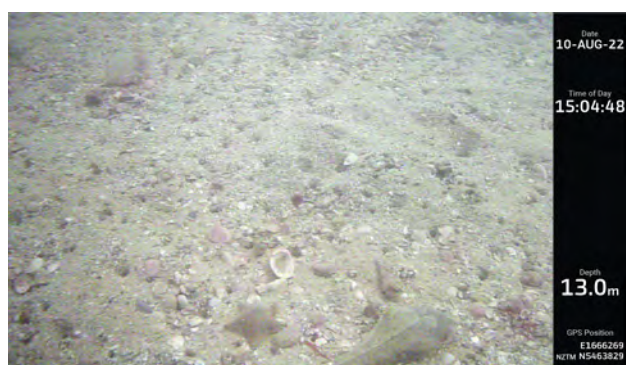


Image 65-72 (Left to right, top to bottom): Station ID 65-72 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Proposed 8009 AMA - Okuri Bay

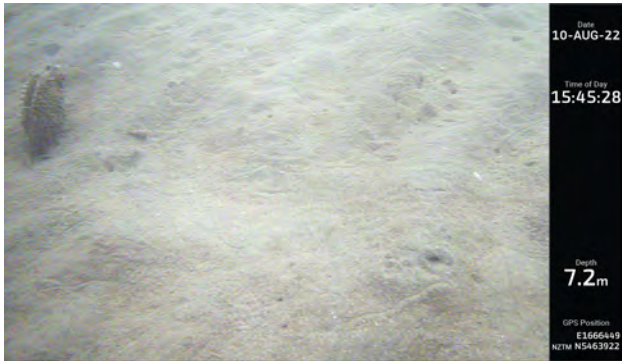


Image 73 - Station ID 73 (as listed in Appendix A). Direct HD video output often provided a clearer image and was therefore used to confirm habitat and biota captured in ROV and drop camera screen grabs whilst in the field.

Appendix C:

Potential Marine Mammal Species

Summary the threat classification, habitat preferences and distribution of mammal species known to occur within the Marlborough Sounds area.						
Species	Common name	Threat classification (DOC) (2019) ¹	Threat classification (IUCN) ²	Date last assessed (IUCN)	Significant Species Marlborough (MDC) ³	Distribution ³
<i>Tursiops truncatus</i>	Bottlenose Dolphin	Threatened - Nationally endangered	Threatened - Least Concern	2018	Significant Species - Conservation grounds	New Zealand is at the southern most point of their range. Limits to the range of this species appear to be temperature related. Around 450 individuals live in the North Island area, ranging from Doubtless Bay in Northland to Tauranga. There are currently 31 individual dolphins visiting the Bay of Islands area (from 2017-2019 data). Around 63 live in Doubtful Sound, Fiordland (as at 1998). Another group range from the Marlborough Sounds to Westport. The only known population estimate for the Marlborough Sounds is 211 semi-resident animals.
<i>Lagenorhynchus obscurus</i>	Dusky Dolphin	Not Threatened	Threatened - Least Concern	2018	Significant Species	They are widely distributed around the South Island and southern North Island but are rarely seen north of Hawke's Bay. They have been observed throughout much of the Marlborough Sounds, including Admiralty Bay, Queen Charlotte Sound and Tory Channel, Marlborough Sounds and Croisilles Harbour. Admiralty Bay is now recognised as an important feeding area for some over-wintering dolphins that are found off Kaikoura during the summer. Feeding in Admiralty Bay occurs during daylight hours, with primary targets being small schooling fishes e.g. pilchards. The Admiralty Bay winter population represents a significant portion of the New Zealand dusky dolphin population. This population has been the focus of continued scientific interest regarding the relationship between aquaculture activities and dolphins.
<i>Cephalorhynchus hectori hectori</i>	Hector's Dolphin	Threatened - Nationally Vulnerable	Threatened - Endangered (Decreasing)	2008	Significant Species - Conservation grounds	Two sub-species of Hector's dolphins exist: Maui's dolphin is only found off the west coast of the north island; Hector's dolphin is found around the South Island of New Zealand except Fiordland. In Marlborough the Hector's Dolphin is known to inhabit an area in the central Queen Charlotte Sound and a second area in Cloudy and Clifford Bays.

1. Baker et al. (2019).

2. Listed as 'Threatened' by the International Union for Conservation of Nature (IUCN). <https://www.iucnredlist.org/species>.

3. Davidson et al. (2011).

Species	Common name	Threat classification (DOC) (2019) ¹	Threat classification (IUCN) ²	Date last assessed (IUCN)	Significant Species Marlborough (MDC) ³	Distribution ³
<i>Megaptera novaeangliae</i>	Humpback Whale	Non-Resident Native - Migrant	Threatened - Least Concern (Increasing)	2018	Significant Species - Scientific and conservation and grounds	In Marlborough humpback whales migrate northward from late May to early August, travelling up the east coast of the South Island before dividing into two groups: one moving through Cook Strait and up the west coast of the north island; the other continuing up the east coast of the north island. South bound humpbacks mostly pass along the west coasts of both islands, between mid November and early December.
<i>Orcinus orca</i>	Killer Whale, Orca	Threatened - Nationally Critical	Threatened - Data Deficient	2017	Significant Species - Conservation grounds	They are the most cosmopolitan of all marine mammals, being found in all waters from tropics to polar regions. Within new Zealand there appear to be three main populations: (1) north island, (2) South island and (3) a population that appears to move between the both islands. Killer whales have been recorded from throughout much of Marlborough and may be encountered at any time of the year.
<i>Delphinus delphis</i>	Short-beaked Common Dolphin	Not Threatened	Threatened - Least Concern	2008	Significant Species	The New Zealand distribution is not well documented, however common dolphins are known from as far south as Fiordland, through to Kaikoura, the eastern coast of the north island and the Hauraki Gulf. Common dolphin are also present off the west coast of the North Island, from Northland through to the South Taranaki Bight and Cook Strait. In Marlborough common dolphin are known from Queen Charlotte Sound and Cook Strait; French Pass and Admiralty Bay area and also Cloudy and Clifford Bays.
<i>Eubalaena australis</i>	Southern Right Whale	At Risk - Recovering	Threatened - Least Concern	2017	Significant Species - Conservation grounds	They have a circumpolar distribution between 20 and 55 degrees south. Southern right whales are occasionally seen in the Marlborough region during winter and spring. Sightings are primarily in Cloudy and Clifford Bay, Tory Channel and Queen Charlotte Sound, however sightings have occurred in other areas and seasons. Historically, New Zealand was considered to have two of the seven recognised southern right whale breeding grounds in the South Pacific to Indian Ocean Basin: (1) mainland New Zealand; and (2) Auckland Islands.

1. Baker et al. (2019).

2. Listed as 'Threatened' by the International Union for Conservation of Nature (IUCN). <https://www.iucnredlist.org/species>.

3. Davidson et al. (2011).

Species	Common name	Threat classification (DOC) (2019) ¹	Threat classification (IUCN) ²	Date last assessed (IUCN)	Significant Species Marlborough (MDC) ³	Distribution ³
<i>Arctocephalus forsteri</i>	New Zealand Fur Seal	Not Threatened	Threatened - Least Concern (Increasing)	2014	Significant Species - Scientific and conservation and grounds	They are widely distributed around mainland New Zealand as well as offshore islands and sub-Antarctic islands and can be found as far north as Three Kings islands. They are widely distributed in the Marlborough Sounds and east coast region. In Marlborough breeding colonies exist at Stephens Island and Trio islands. There are numerous haul outs throughout the Marlborough Sounds region. In at least some parts of the region (e.g. Admiralty Bay, French Pass, Current Basin), the haulout sites can vary through-out the year. Fur seals are regularly seen near salmon farms. Fur seals frequently feed on pelagic schooling fishes such as hoki, jack mackerel, and barracouta, as well as arrow squid. They also occasionally feed on penguins and shearwaters. Adult females tend to forage at night, in depths ranging from 15 m to 163 m.

1. Baker et al. (2019).

2. Listed as 'Threatened' by the International Union for Conservation of Nature (IUCN). <https://www.iucnredlist.org/species>.

3. Davidson et al. (2011).

Appendix D:

Potential Seabird Species

Species	Common name	Threat classification (DOC) (2016) ¹	Significant Species Marlborough (MDC) ²	Location	Date	Distribution ^{2,3}	Habitat ²
<i>Haematopus unicolor</i>	Variable Oystercatcher	At Risk (Recovering)	N/A	Taipari Bay	18-Oct-20		
<i>Larus dominicanus dominicanus</i>	Kelp Gull (Southern black-backed gull)	Not Threatened	N/A	Taipare Bay coastal	29-Apr-22		
<i>Morus serrator</i>	Australasian Gannet	Not Threatened	Significant Species - Relatively few breeding areas	Marlborough, NZ (-40.972, 173.763)	31-May-21	Australasian gannets nest in dense breeding colonies on the New Zealand mainland and coastal rocks and islands. The largest mainland gannetry is at Cape Kidnappers, other mainland breeding sites include Muriwai, Farewell Spit Croisilles Harbour, Waimaru Bay, Waimaru, nuggets in Otago Peninsula and on Solander Island, Foveaux Strait. Anatohia Bay on the western shores of Arapawa Island.	Australasian gannets mostly feed on waters over the continental shelf. They prefer flat ground for nesting, rather than cliff ledges. Breeding colonies are mostly situated at sites that are completely or largely surrounded by the sea, i.e. on islands or headlands.
<i>Hydroprogne caspia</i>	Caspian Tern	Threatened - Nationally Vulnerable	N/A	Taipari Bay	4-Jul-21		
<i>Anthus novaeseelandiae</i>	NZ Pipit	At Risk (Declining)	N/A	French Pass -40.986, 173.809	19-Dec-20		

1. Robertson et al. (2016). 2. Davidson et al. (2011). 3. <http://nzbirdsonline.org.nz/species>. 4. Species not observed directly at surveyed site but considered regionally significant (Davidson et al. (2011)).

Species	Common name	Threat classification (DOC) (2016) ¹	Significant Species Marlborough (MDC) ²	Location	Date	Distribution[2] (2011), [3]	Habitat[2]
<i>Stictocorbo punctatus punctatus</i>	Spotted Shag	Not Threatened	Significant Species - Often encountered, being widespread and common	Taipari Bay	14-Apr-22	Spotted shags occur mainly around the South Island in coastal waters out to 16 km. They are more localised on the west coast of the South Island, around Stewart Island, and parts of the North Island, including the Hauraki Gulf, West Auckland, Hawke's Bay and Wellington Harbour. The strongholds for spotted shags are the Marlborough Sounds, Banks Peninsula and Otago coast. In Marlborough colonies range from the Croisilles Harbour in the west throughout the Sounds to Port underwood in the east.	Breeding colonies restricted to eroded rocky outcrops on the coast, entering inlets and estuaries to feed and roost.
<i>Leucocorbo carunculatus</i>	New Zealand King Shag	Nationally Endangered (Stable)	Significant Species - Restricted to the region with breeding occurring at few sites making them vulnerable to catastrophic events.	Marlborough, NZ (-40.972, 173.763)	31-May-21	The New Zealand King Shag is endemic to New Zealand, only occurring in the Marlborough Sounds. King shags are restricted to the outer Marlborough Sounds, from the west coast of D'Urville Island east to where Queen Charlotte Sound and Cook Strait meet. About 85% of all existing birds are located at five colonies: Rahuinui Island, Duffers Reef, Trio Islands, Sentinel Rock and White Rocks.	King shags breed on low rock plateaus (Duffers Reef and Stewart Island/Tekuru Kuru), steep rock faces (Trio Islands and White Rock) or rock ridges (Sentinel Rock and Rahuinui Island). King shags breed between 2 and 33 m above sea level, with 80% of the population breeding lower than 14 m above sea-level. While relative little quantitative evidence exists as to their movement and foraging patterns in this area, recent preliminary data from the 2018 King Shag Banding Study suggests that marine farms may act as feeding grounds and/or intermediate roosting habitat for King shag (Jonathan Large, pers. comm. AQNZ 2019). Other studies have shown that in Croisilles Harbour the diet was almost exclusively witch flounder and a left-eyed flatfish.

1. Robertson et al. (2016). 2. Davidson et al. (2011). 3. <http://nzbirdsonline.org.nz/species>. 4. Species not observed directly at surveyed site but considered regionally significant (Davidson et al. (2011)).

Species	Common name	Threat classification (DOC) (2016) ¹	Significant Species Marlborough (MDC) ²	Location	Date	Distribution[2] (2011), [3]	Habitat[2]
<i>Sterna striata striata</i>	White-fronted Tern	At Risk (Declining)	Significant Species	Taipare Bay coastal	29-Apr-22	Common all around New Zealand coasts. Breeding occurs mainly on the coast of New Zealand and its outlying islands, Stewart, Chatham, and Auckland Islands, and off northeast Tasmania at Flinders and Cape Barren Islands.	Occasionally forage up larger Canterbury rivers, but are seldom found far from the coast. Breeding usually occurs in large dense colonies on shingle river beds, sand dunes, stacks and cliffs.
<i>Eudyptula minor</i>	Little Penguin (Southern Blue Penguin)	At Risk (Declining)	Significant Species - Easily seen and have huge public appeal.	Taipari Bay	14-Apr-22	Little penguins are widely distributed along the coastlines of the North, South, Stewart and Chatham Islands and their offshore islands. Major breeding areas in New Zealand include Hauraki Gulf islands, Wellington Harbour, Cook Strait islands and Marlborough Sounds, West Coast, Fiordland, Motunui Island, Banks Peninsula, Oamaru, Otago Peninsula, islands in Foveaux Strait and around Stewart Island, and the Chatham Islands.	Birds tend to nest in dense vegetation, rock piles, coastal caves and under built structures close to the shore. Where there is no disturbance some birds will climb a long way to nest sites such as the summit of Maud island. Mainly found within 25 km of the shore during the breeding season, but can travel further out to sea when not breeding.
<i>Puffinus gavia</i>	Fluttering Shearwater	At Risk (Relict)	Significant Species - Abundance and contribution to the fertility of the island ecosystems where they breed.	Taipare Bay coastal	29-Apr-22	Fluttering shearwaters breed on many offshore islands throughout northern New Zealand, with large colonies on Three Kings, Moturoa, Motuharakeke (Cavalli), Bream, north-west Chickens, Mercury and Alderman Islands. In the Marlborough Sounds they are found on most rodent-free islands with the largest colonies on Trios and long island. In restoration projects, chicks have successfully been translocated to Maud Island (Marlborough Sounds) and Mana Island (Wellington).	Feeding range is restricted to coastal waters and the continental shelf. Found on most Rodent-free islands and nest in short burrows, under scrub or in forest.

1. Robertson et al. (2016). 2. Davidson et al. (2011). 3. <http://nzbirdsonline.org.nz/species>. 4. Species not observed directly at surveyed site but considered regionally significant (Davidson et al. (2011)).

Species	Common name	Threat classification (DOC) (2016) ¹	Significant Species Marlborough (MDC) ²	Location	Date	Distribution[2] (2011), [3]	Habitat[2]
<i>Larus novaehollandiae scopulinus</i>	Silver Gull (Red-Billed Gull)	At Risk (Declining)	Significant Species - Due to a recent decline in numbers	Taipare Bay coastal	29-Apr-22	This subspecies is endemic to New Zealand and is commonly seen in all coastal areas including the sub-Antarctic islands and the Chatham islands. It is only occasionally seen inland. There are two main breeding colonies in the Marlborough Sounds, one on Stephens island and the other on Bird island, Forsyth Bay.	On mainland New Zealand, breeding occurs in dense colonies, mainly restricted to the eastern coasts of the North and South Islands on stacks, cliffs, river mouths and sandy and rocky shores. Often seen scavenging in towns. Upwellings at places like McManaway Reef are popular with birds as the tidal rips and turbulent current bring food to the surface.
<i>Thalasarche steadi</i>	White-capped albatross	At Risk (Declining)	N/A	Taipare Bay Off-shore (-41.003, 173.723)	27-Sept-22		
<i>Phalacrocorax varius</i>	Pied cormorant	At Risk (Recovering)	N/A	Taipare Bay coastal	29-Apr-22		
<i>Puffinus griseus</i>	Sooty Shearwater	At Risk (Declining)	N/A	Taipare Bay Off-shore (-41.003, 173.723)	7-May-20		
<i>Egretta sacra</i>	Pacific Reef-Heron	Threatened - Nationally endangered (Stable)	Significant Species - Approximately 22% of new Zealand's population live in Marlborough.	Current Basin	27-Jun-19	The species, which comprises two subspecies, is found through eastern Asia and the Pacific. In Marlborough they are found throughout the Sounds, but is relatively uncommon.	The reef heron is a bird of the rocky shore, where it stalks around rock pools and small rivulets of water that may carry fish. It can also be seen on estuary mudflats feeding at low tide and may occasionally be seen wading in the shallow waves on sandy beaches. It is rarely seen inland. They are solitary nesters; in caves, crevices, under overhangs on rock shelves, and amongst cliff-side vegetation.

1. Robertson et al. (2016). 2. Davidson et al. (2011). 3. <http://nzbirdsonline.org.nz/species>. 4. Species not observed directly at surveyed site but considered regionally significant (Davidson et al. (2011)).

Appendix E:

Potential Biogenic Habitat & Macroinvertebrates

Species	Common name	Threat classification (DOC) (2016) ¹	Significant Species Marlborough (MDC) ²	Distribution ^{2,3}	Habitat ²
<i>Haliotis iris</i>	Black Foot Paua	N/A	Significant Species - Iconic species in Marlborough as they highly regarded as a recreational and commercial catch.	Black-foot paua are endemic to New Zealand. In Marlborough they have been recorded throughout much of the Marlborough Sounds apart from inner Marlborough Sounds. They are most common from exposed outer Sounds locations and areas with macroalgal forest.	Lives in shallow coastal waters, usually in large groups on rocky reefs.
<i>Galeopsis porcellanicus</i>	Bryozoan Coral	N/A	Significant Species - In Marlborough as they provide biogenic habitat for a variety of species.	Endemic, throughout NZ from Three Kings Islands to Foveaux Strait and the Antipodes Islands.	Found on rock or shelly gravel in sublittoral fringe to 235 m. In Marlborough it is known from areas with relatively strong tidal currents.
<i>Notoplax latalamina</i>	Chiton	N/A	Significant Species - Endemic to the outer Marlborough Sounds being recorded nowhere else.	Endemic to the outer Marlborough Sounds being recorded nowhere else. The type locality of the species is 200 m depth off Stephen's island (Takaporewa). It has also been observed by divers from Croisilles Harbour to Sentinel Rock in the outer Marlborough Sounds. This species appears to be naturally rare, and is sparsely distributed in the outer north-west Marlborough Sounds and Cook Strait.	Found on rocky reefs between 6 to 200 m depth, associated with large sponges growing in areas of moderate to high current flow.
<i>Neothyris lenticularis</i>	Giant Lamp-shell	N/A	Significant Species - Scientific and conservation values.	This species and genus is endemic to New Zealand and sub Antarctic waters. They are known from 200 m depth at Stephens island and form large beds in Cook and Foveaux Straits. In Marlborough it is widespread in deep waters of Cook Strait, but has also been recorded from a variety of shallow locations in East Bay, Arapawa island and several locations in inner Queen Charlotte Sound.	Found on a variety of substrates from solid rock platforms and walls to coarse sandy rubble.
<i>Atrina zelandica</i>	Horse Mussel	N/A	Significant Species - Can form a biogenic habitat in high densities.	They are found in muddy to sandy soft-sediment habitats around the coast of New Zealand from extreme low water to 70 m depth. In the Marlborough Sounds they are often found in the soft sediments. Dense beds of greater than 10 per square metre have been recorded from particular areas such as Grove Arm, Wet inlet and Port Gore.	Inhabit soft sediments with most of the shell embedded in the sea floor and anchored to sediment by byssus threads. The exposed shells provide attachment for an array of algae and invertebrates such as sponges and sea squirts.

1. Freeman et al. (2013). 2. Nelson et al. (2019). 3. Davidson et al. (2011). 4. Page (2017).

Species	Common name	Threat classification (DOC) (2016) ¹	Significant Species (MDC) ²	Distribution ^{2,3}	Habitat ²
<i>Jasus edwardsii</i>	Rock Lobster	N/A	Significant Species - Highly regarded as a recreational and commercial catch. Dominant or key-stone predator.	They are found from Three Kings, north, South, Stewart and Chatham islands, south to Auckland islands. In Marlborough they have been recorded throughout the Sounds where suitable rock habitat exists, except central and inner Marlborough Sounds. Port underwood where large numbers of juveniles can be observed in the shallows.	Most common from outer Sounds locations and areas swept by moderate to strong tidal currents in rocky reef and on occasion, soft sediment habitats.
<i>Pecten novaezelandiae</i>	Scallop	N/A	Significant Species - Iconic species in Marlborough as they highly regarded as a recreational and commercial catch.	They are found throughout the Marlborough Sounds except inner Marlborough Sounds (including inner Kenepuru Sound) and Port underwood. They are particularly abundant in Croisilles Harbour entrance, the many bays in Queen Charlotte Sound and some outer Sound locations.	Found on a variety of soft substrata from mud to fine gravels, however adults appear to prefer coarse sediments (e.g. shell gravel and grit). They are usually most abundant in areas with some tidal flow.
<i>Celleporaria agglutinans</i>	Separation point coral	Not Threatened	Significant Species - Form dense beds that provide habitat for a variety of other species.	In New Zealand it is commonly known as Separation Point coral, Tasman Bay coral or 'hard coral' and occurs from the Three Kings islands to Foveaux Strait at about 3 to 220 m depth. In Marlborough particularly large concentrations of colonies are known from Current Basin, Chetwode and Titi islands.	Grows on rocky and soft sediment substrata, but only tends to form large, conspicuous colonies on soft sediments in high current areas.
<i>Galeolaria hystrix</i>	Tubeworm	N/A	Significant Species - Tubeworm mounds represent a significant biogenic habitat in Marlborough as they are utilised by a variety of species enhancing local biodiversity and potentially providing habitat for a variety of juvenile fishes.	Found on the rocky shores throughout Marlborough, however mounds are restricted only known to occur in the sheltered waters of the Marlborough Sounds and Port underwood. Particularly dense growths of these mounds are restricted to locations such as The Knobbies and Perano Shoal. There are three major reefs in the region. One is in Queen Charlotte Sound and two are in Port Underwood at the Knobbies and Whataroa Bay.	Most abundant on rocky sheltered shores devoid of macroalgae but swept by tidal currents. Mounds are absent from areas exposed to ocean storms.

1. Freeman et al. (2013). 2. Nelson et al. (2019). 3. Davidson et al. (2011). 4. Page (2017).

Species	Common name	Threat classification (DOC) (2016) ¹	Significant Species Marlborough (MDC) ²	Distribution ^{2,3}	Habitat ²
<i>Macrocystis pyrifera</i>	Giant Kelp	At Risk (Declining)	Significant species - In Marlborough because in areas where it is dominant it can alter abiotic and biotic conditions by dampening water motion, altering sedimentation, shading the sea floor, scrubbing nutrients from the water column, stabilising substrata, and they can provide physical habitat for organisms both above and below the benthic boundary.	The giant kelp is found throughout New Zealand's marine environment. The range and extent of beds in the Marlborough Sounds has declined, with beds now absent from the eastern coast of D'urville island. Beds in the Marlborough Sounds are largely confined to sheltered eastern outer sound locations. Giant kelp beds are also located north and south of Cape Campbell.	Generally attaches to rock substrata, occasionally horse mussels, from low water to at least 18 m depth. The lower depth limit is determined by light and habitat availability. Note this species may also be a useful indicator of global warming as its distributional limit has been moving southward.
<i>Adamsiella chauliophylla</i>	Red Alga	Not Threatened	Significant species - In Marlborough because where it forms dense beds it appears to provide habitat for a variety of species including bivalves, holothurians and fishes.	Endemic to New Zealand. In Marlborough it often forms dense beds in particular areas of Port Underwood, East Bay, and inner Queen Charlotte Sound (Houhou Point, Hauatehoro Point, Wedge Point, Ngakutu Point).	Found growing on a variety of substrata from rock to sand and mud.
<i>Rhodomyenia</i> sp.	Red Algae	Data Deficient	Significant Species - In Marlborough because they provide an important food source for a variety of species, including urchins and some herbivorous fishes	New Zealand waters.	Occur on a variety of substrata including rock, tube worm colonies and horse mussel shells. They may also be intertidal but most beds are subtidal in harbours and inlets.
<i>Lithothamnion</i> sp.	Rhodoliths	Data Deficient	Significant Species - Play an important role in the global calcium carbonate budget.	In the Marlborough Sounds rhodoliths are known from a small number of distinct locations including Picnic Bay in Marlborough Sounds, and Pongau Bay and Catherine Cove, D'urville island.	Many species that form rhodoliths may also be found encrusting reefs and other hard substrata. Rhodoliths may form around small particles of rock, shell or coral, or may develop from fragments of coralline algae eroded from reefs.

1. Freeman et al. (2013). 2. Nelson et al. (2019). 3. Davidson et al. (2011). 4. Page (2017).

Appendix F:

Potential Fish Species

Species	Common name	Threat classification (IUNC) ¹	Date last assessed (IUCN)	Significant Species Marlborough (MDC) ²	Distribution ²	Habitat ²
<i>Paraper- cis colias</i>	Blue Cod	Threatened - Least Concern (Decreasing)	2009	Significant Species - Iconic species, dominant or key- stone predator.	Blue cod are endemic to New Zealand and are found from the Three Kings islands in the north to the Snares islands in the south. They are a common reef fish in Marlborough, Kaitiaki, Fiordland, Stewart island and the Chatham Islands.	Found throughout Marlborough on rocky habitats and offshore biogenic soft bottom habitats. Small juveniles appear at about 5 cm length on sandy or shelly bottoms that provide some cover (e.g. dead whole shells or cobbles).
<i>Cal- lorhynchus milii</i>	Elephant Fish	Threatened - Least Concern (Stable)	2015	Significant Species - Accessibility of the spawning areas makes them of importance to scientists	This chimaera resides on continental shelves of cool temperate areas to depths to at least 656 feet (200 m). It has also been reported to migrate into estuaries and inshore bays during the spring months to mate. They occur throughout New Zealand coastal waters but are most common around the South Island. Spawning grounds have been identified at several locations in the Marlborough Sounds. Observations suggest that highest densities of egg cases occur in Garne Bay, Marlborough Sounds, but other important areas include Saville Bay, Kumutoto Bay and Grove Arm.	Adults are most often found on soft bottom habitats, from the surf zone to 227 m depth. Adults migrate into inshore waters, including harbours and estuaries to breed.
<i>Zearaja natuta</i>	Rough Skate	Threatened - Least Concern (Stable)	2017	"Significant Species - breeds in the sheltered bays of the Marlborough Sounds and its	Endemic to the outer Marlborough Sounds being recorded nowhere else. The type locality of the species is 200 m depth off Stephen's island (Takaporewa). It has also been observed by divers from Croisilles Harbour to Sentinel Rock in the outer Marlborough Sounds. This species appears to be naturally rare, and is sparsely distributed in the outer north-west Marlborough Sounds and Cook Strait.	Found on rocky reefs between 6 to 200 m depth, associated with large sponges growing in areas of moderate to high current flow.
<i>Pagrus auratus</i>	Snapper	Threatened - Least Concern (Decreasing)	2009	Significant Species - Significant Species - Iconic species, dominant or keystone predator.	In New Zealand they are found mainly in warmer coastal waters from Three Kings islands south to Cook Strait on the east coast; and to Tasman Bay and Westport on the west. Occasional individuals have been recorded from Foveaux Strait and Chatham Islands. Snapper are present throughout Marlborough but are more common in the west.	Young fish school in shallow water and sheltered areas and move out to deeper water in winter.
<i>Noto- labrus celidotus</i>	Spotty	Threatened - Least Concern	2008	N/A	Endemic to the waters around New Zealand, including Stewart Island.	Found on reefs at depths from 22 to 145 m, though most common in shallower parts of that range.

1. International Union for Conservation of Nature (IUCN) - <https://www.iucnredlist.org/species>.

2. Davidson et al. (2011).

Appendix G:

Broad Scale Habitat Classifications

Coastal vegetation was classified using an interpretation of the Atkinson (1985) system, whereby dominant plant species were coded by using the two first letters of their Latin genus and species names e.g. marram grass, *Ammophila arenaria*, was coded as Amar. An indication of dominance is provided by the use of () to distinguish subdominant species e.g. Amar(Caed) indicates that marram grass was dominant over ice plant (*Carpobrotus edulis*). The use of () is not always based on percentage cover, but the subjective observation of which vegetation is the dominant or subdominant species within the patch. A measure of vegetation height can be derived from its structural class (e.g. rushland, scrub, forest).

Vegetation (mapped separately to the substrata they overlie):

Seagrass meadows: Seagrasses are the sole marine representatives of the Angiospermae.

They all belong to the order Helobiae, in two families: Potamogetonaceae and Hydrocharitaceae. Although they may occasionally be exposed to the air, they are predominantly submerged, and their flowers are usually pollinated underwater. A notable feature of all seagrass plants is the extensive underground root/rhizome system which anchors them to their substrata. Seagrasses are commonly found in shallow coastal marine locations, salt-marshes and estuaries and are mapped separately to the substrata they overlie.

Macroalgal bed: Algae are relatively simple plants that live in freshwater or saltwater environments. In the marine environment, they are often called seaweeds. Although they contain chlorophyll, they differ from many other plants by their lack of vascular tissues (roots, stems, and leaves). Many familiar algae fall into three major divisions: Chlorophyta (green algae), Rhodophyta (red algae), and Phaeophyta (brown algae). Macroalgae are algae observable without using a microscope. Macroalgal density, biomass and entrainment are classified and mapped separately to the substrata they overlie.

Substrata (physical and biogenic habitat):

Artificial structures: Introduced natural or man-made materials that modify the environment. Includes rip-rap, rock walls, wharf piles, bridge supports, walkways, boat ramps, sand replenishment, groynes, flood control banks, stop gates.

Cliff: A steep face of land which exceeds the area covered by any one class of plant growth-form. Cliffs are named from the dominant substrata type when unvegetated or the leading plant species when plant cover is $\geq 1\%$.

Rock field: Land in which the area of residual rock exceeds the area covered by any one class of plant growth-form. They are named from the leading plant species when plant cover is $\geq 1\%$.

Boulder field: Land in which the area of unconsolidated boulders (>200 mm diam.) exceeds the area covered by any one class of plant growth-form. Boulder fields are named from the leading plant species when plant cover is $\geq 1\%$.

Cobble field: Land in which the area of unconsolidated cobbles (20-200 mm diam.) exceeds the area covered by any one class of plant growth-form. Cobble fields are named from the leading plant species when plant cover is $\geq 1\%$.

Gravel field: Land in which the area of unconsolidated gravel (2-20 mm diameter) exceeds the area covered by any one class of plant growth-form. Gravel fields are named from the leading plant species when plant cover is $\geq 1\%$.

Mobile sand: Granular beach sand characterised by a rippled surface layer from strong tidal or wind-generated currents. Often forms bars and beaches.

Firm or soft sand: Sand flats may be mud-like in appearance but are granular when rubbed between the fingers and no conspicuous fines are evident when sediment is disturbed e.g. a mud content <1%. Classified as firm sand if an adult sinks <2 cm or soft sand if an adult sinks >2 cm.

Firm muddy sand: A sand/mud mixture dominated by sand with a moderate mud fraction (e.g. 1-10%), the mud fraction conspicuous only when sediment is mixed in water. The sediment appears brown, and may have a black anaerobic layer below. From a distance appears visually similar to firm sandy mud, firm or soft mud, and very soft mud. When walking you'll sink 0-2 cm. Granular when rubbed between the fingers.

Firm sandy mud: A sand/mud mixture dominated by sand with an elevated mud fraction (e.g. 10-25%), the mud fraction visually conspicuous when walking on it. The surface appears brown, and may have a black anaerobic layer below. From a distance appears visually similar to firm muddy sand, firm or soft mud, and very soft mud. When walking you'll sink 0-2 cm. Granular when rubbed between the fingers, but with a smoother consistency than firm muddy sand.

Firm or soft mud: A mixture of mud and sand where mud is a major component (e.g. >25% mud). Sediment rubbed between the fingers retains a granular component but is primarily smooth/silken. The surface appears grey or brown, and may have a black anaerobic layer below. From a distance appears visually similar to firm muddy sand, firm sandy mud, and very soft mud. Classified as firm mud if an adult sinks <5 cm (usually if sediments are dried out or another component e.g. gravel prevents sinking) or soft mud if an adult sinks >5 cm.

Very soft mud: A mixture of mud and sand where mud is the major component (e.g. >50% mud), the surface appears brown, and may have a black anaerobic layer below. When walking you'll sink >5 cm unless another component e.g. gravel prevents sinking. From a distance appears visually similar to firm muddy sand, firm sandy mud, and firm or soft mud. Sediment rubbed between the fingers may retain a slight granular component but is primarily smooth/silken.

Cockle bed/Mussel reef/Oyster reef: Area that is dominated by both live and dead cockle shells, or one or more mussel or oyster species respectively.

Tube worm (e.g. Sabellid) field: Area that is dominated by raised beds of sabellid polychaete tubes.

Shell bank: Area that is dominated by dead shells.

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