



Sep
2022

Meil Bay Visual Survey Report

1. Introduction

This baseline visual survey report has been prepared by Cooke Aquaculture Scotland (CAS) in support of a SEPA CAR Licence application for a modification of an existing marine fish farm: Meil Bay, Kirkwall, Orkney. The visual survey was completed on 31/08/2022 at the proposed location by Roving Eye Enterprises on behalf of CAS. The survey followed the procedure as per the methods outlined in SEPA's Aquaculture Manual (Baseline Survey, Visual – Standard).

This report used the video data collected at the location to describe and characterise the baseline benthic environment and in particular, highlight any species or habitats of conservation importance.

2. Survey Methodology

2.1 Survey Design

The visual transects for the proposed Meil Bay site were determined using outputs from a particle tracking model and guidance stated in the Baseline Survey & Seabed and Quality Monitoring Plan Design (SEPA, 2019).

The four transects were identified to ensure a catalogue of the benthic environment in the immediate area beneath the site, whilst also extending beyond any likely impacted area. The projected modelled footprint was plotted and transect 2 extended to ensure this area was covered by the baseline survey. Transect 4 could not be extended due to the presence of the existing site (Figure 2.1). Planned survey transects are detailed in Table 2.1 and Figure 2.1. Actual survey transects are shown in Figure 2.2 and Table 2.2.

Table 2.1. The planned visual benthic survey transects at the proposed Meil Bay site.

Transect	Start		End	
	Easting (OSGB)	Northing (OSGB)	Easting (OSGB)	Northing (OSGB)
1	348217.6	1012280	348756.4	1012977
2	348629.2	1012599	348911	1012599
3	348767.4	1012525	348357.6	1012820
4	348407.7	1012525	348161.6	1012698

Table 2.2. The actual visual benthic survey transects at the proposed Meil Bay site.

Transect	Start		End	
	Easting (OSGB)	Northing (OSGB)	Easting (OSGB)	Northing (OSGB)
1	348225	1012294	348752	1012987
2	348617	1012831	348915	1012617
3	348773	1012522	348351	1012822
4	348156	1012697	348398	1012534

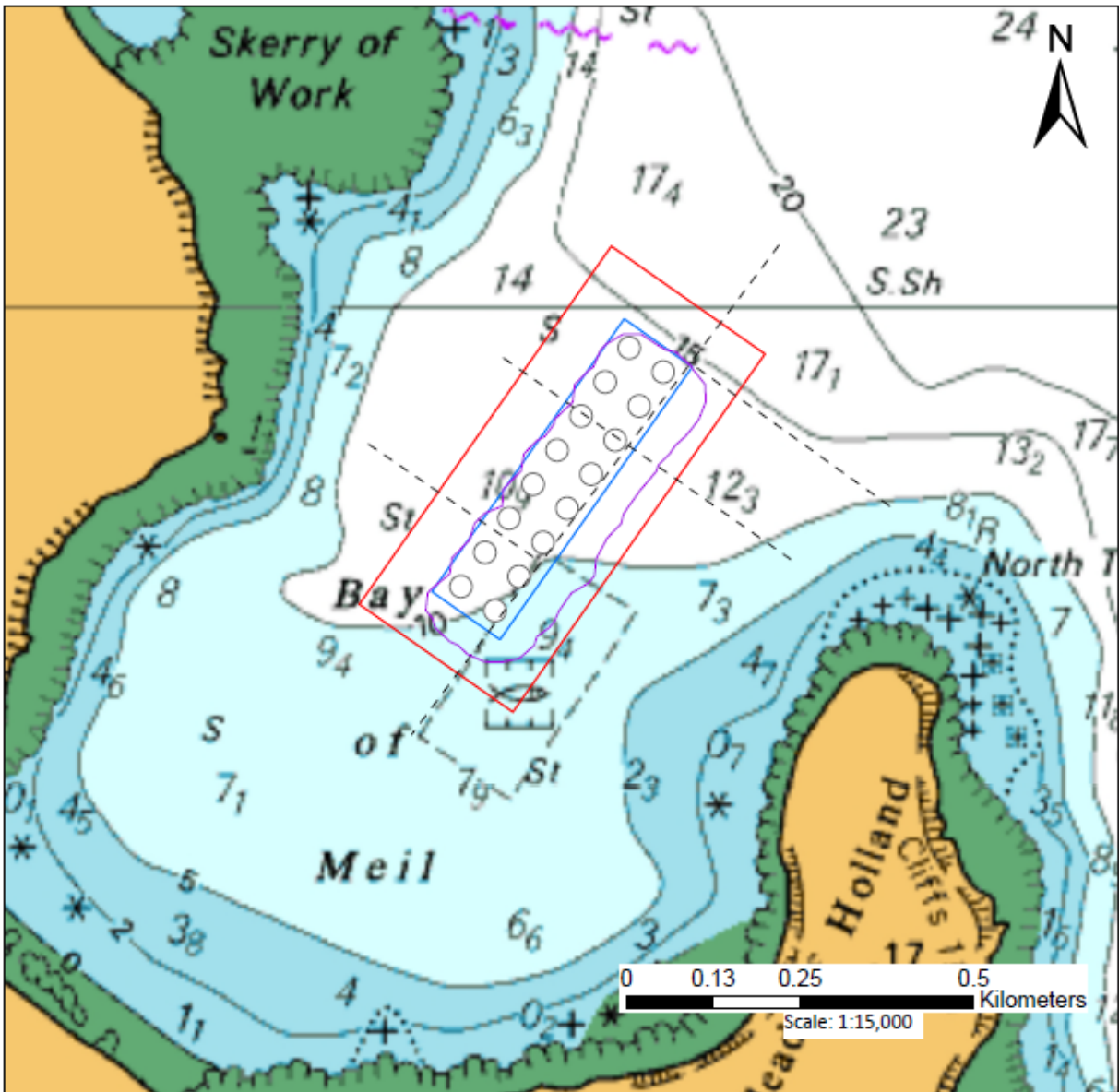
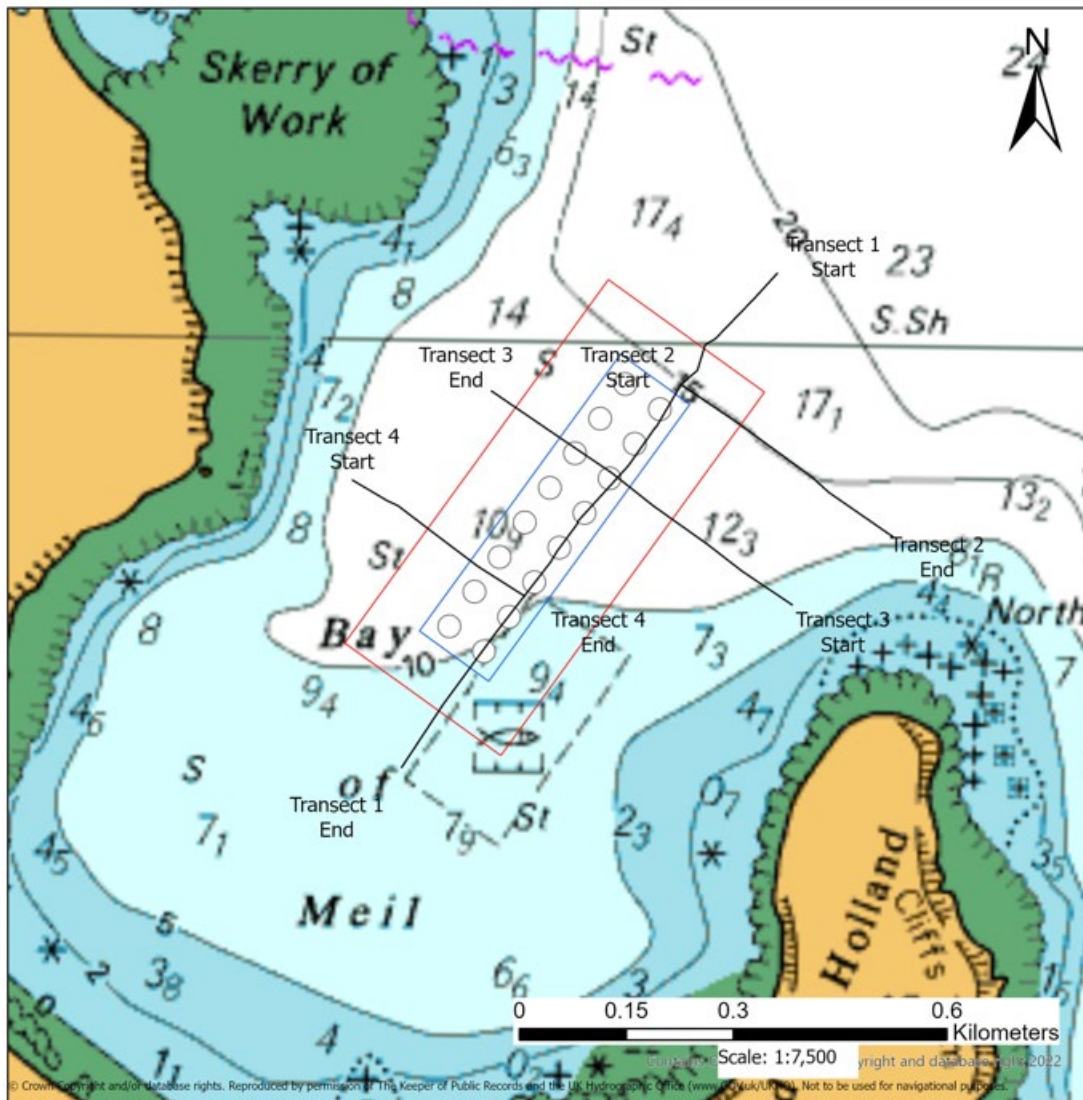


Figure 2.1. The locations of the planned visual benthic survey transects at the proposed Meil Bay site, including the location of the existing site and the projected modelled footprint.



Meil Bay

Visual Survey

- Proposed Pens
- Proposed Pen Grid
- Proposed Mooring Containment Area
- Baseline Visual Survey Transects

Figure 2.2. Meil Bay Baseline visual survey locations

2.2 Hydrographic and NewDepomod Modelling

Hydrographic survey results indicate an average small tidal dispersion pattern, with limited export of waste material outside the immediate vicinity of the site. Modelling has been undertaken using NewDepomod to determine the area of benthic impact. The modelling indicates that at maximum site biomass of 1410 tonnes, the 100m mixing zone area for this site will be 177,418 m². The total benthic impacted area (the area of seabed impacted within the mixing zone) is projected to be 81,875 m² or 46.2% of the mixing zone. The modelled footprint is shown in figure 2.1.

2.3 Survey Analysis and Interpretation

Survey video footage was inspected by CAS and used to describe the biota and seabed characteristics in the area. The Marine Nature Conservation Review SACFOR abundance scale was used to quantify

any species found on the footage (Hiscock, 1996). Biotope types were identified and classified according to the JNCC Marine Habitat Classification for Britain and Ireland (JNCC, 2015).

3. Survey observations

3.1 Seabed characteristics

The sediment type across the survey area was fairly uniform across transects 1 to 4 with fine sand being the predominant sediment, although there were some presence of shells. The shallower areas of the survey area were predominantly bedrock with large boulders present. Depth was variable across the survey area ranging from 10m to 22m across transect 1 and ranging from 6m to 17m across transects 2 to 4.

3.2 Biota

Species presence had limited diversity but was moderate to high in frequency across all transects. The benthos was dominated by tube worms including peacock worms (*Sabella pavonina*) and sand masons (*Lanice conchilega*). Mixed seaweeds were prominent throughout the area including sugar kelp (*Saccharina latissimi*) and toothed wrack (*Fucus serratus*) was also noted. The north end of the transects had razor shell (*Ensis arcuatus*) present and Lug worm casts and burrows (*Arenicola marina*) were frequently seen. The shallow areas with a biota of bedrock and large boulders were dominated by oarweed (*Laminaria digitata*) and a topshell (possibly *Calliostoma zizyphinum*).

Footage photos can be found in Appendix 2 and the locations of these captures are shown in Figure 3.1. Appendix 1 has details of the biota descriptions for each photo.

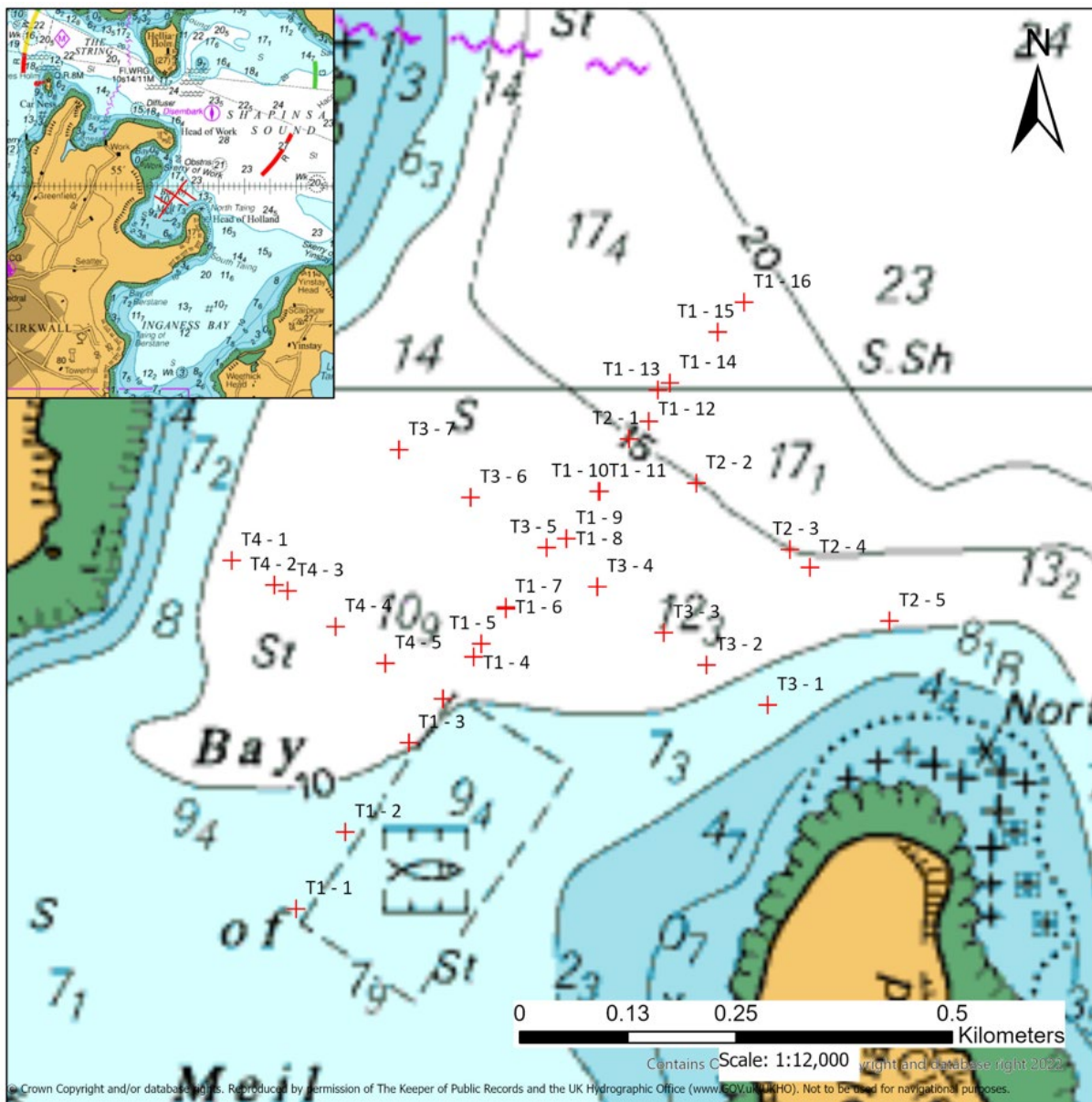


Figure 3.1. Locations of the photos taken from the footage of the visual survey at Meil Bay.

4. Description of Biotope

The seabed sediments across the survey area were predominantly composed of fine sand with the shallow areas comprised of bedrock and large boulders. All seafloor habitats known in UK waters are classified into biotopes (JNCC, 2015). The survey area displayed characteristics of the following biotope types described below:

Infralittoral fine sand (SS.SSa.IFiSa)

The survey area of transects 1 - 4 consisted of mostly fine sand with the presence of shells consistent with the biotope SS.SSa.IFiSa. This is evident by an abundance of tube-forming polychaetes such as *Sabella pavonine*. There are also *Lanice conchilega* present throughout this survey area. The area also has a possible sub-category of biota of Semi-permanent tube-building amphipods and polychaetes in sublittoral sand (SS.SSa.IFiSa.TbAmPo).

Semi-permanent tube-building amphipods and polychaetes in sublittoral sand (SS.SSa.IFiSa.TbAmPo)

The survey area of all transects are dominated by tube-forming polychaetes. At the sediment surface, *Arenicola marina* worm casts are visible and the seaweed *Saccharina latissima* is present. *Ensis magnus* is also present consistent with the biotope SS.SSa.IFiSa.TbAmPo. Many of the areas this biotope can be found are situated near fish farms and there is an existing fish farm, Meil Bay, nearby.

Kelp and red seaweeds (moderate energy infralittoral rock) (IR.MIR.KR)

The shallow areas of the transects are situated in a moderately exposed rocky shore area. There was evidence of a *Laminaria digitata* habitat attached to the bedrock and boulders with communities of red seaweeds consistent with the biotope IR.MIR.KR.

5. References

Hiscock, K. (1996) Marine Nature Conservation Review: Rationale and methods. Coasts and seas of the United Kingdom. MNCR series. JNCC [online].

JNCC (2015) The Marine Habitat Classification for Britain and Ireland Version 15.03. Available from: <https://mhc.jncc.gov.uk/>

Appendix 1

Table 3 describes the location, substrate and biota for each image shown in Appendix 2. The SACFOR scale of abundance (S = Superabundant, A = Abundant, C = Common, F = Frequent, O = Occasional, R = Rare) has been used to estimate abundance of individuals observed in each image (JNCC, 2015) and their corresponding percentage cover.

Table 3. Descriptions of images taken from the visual survey at the proposed Meil Bay site.

Image	Easting	Northing	Depth (m)	Substrate	Biota	SACFOR	% cover
T1 – 1	348225	1012294	10.1	Fine sand	Peacock worm (<i>Sabella pavonina</i>) Sugar kelp (<i>Saccharina latissimi</i>) Lug worm (<i>Arenicola marina</i>) casts and burrows Mixed red seaweeds	O C F A	1-5% 1-5% 5-9% 40-79%
T1 – 2	348283	1012382	11.4	Fine sand	Peacock worm (<i>Sabella pavonina</i>) Sand mason (<i>Lanice conchilega</i>) Unidentified tubeworm Lug worm (<i>Arenicola marina</i>) casts and burrows Mixed red seaweeds	O A P C A	1-5% 20-39% - 10-19% 25%
T1 – 3	348358	1012484	11.9	Fine sand	Peacock worm (<i>Sabella pavonina</i>) Sand mason (<i>Lanice conchilega</i>) Lug worm (<i>Arenicola marina</i>) casts/burrows Crab (possibly <i>Carcinus maenas</i>) Unidentified tubeworms Mixed seaweeds	O F P P P A	1-5% 10% - - - 33%
T1 – 4	348434	1012582	12.6	Fine sand	Sand mason (<i>Lanice conchilega</i>) Lug worm (<i>Arenicola marina</i>) casts/burrows Unidentified tubeworm (possibly <i>Chone fauveli</i>) Mixed seaweeds	O P O A	1-5% - 1-5% 25%
T1 – 5	348443	1012597	12.6	Fine sand	Sand mason (<i>Lanice conchilega</i>) Lug worm (<i>Arenicola marina</i>) casts/burrows Mixed seaweeds Toothed wrack (<i>Fucus serratus</i>)	O P S F	1-5% - 40-79% 1-5%
T1 – 6	348472	1012637	13.1	Fine sand	Peacock worm (<i>Sabella pavonina</i>)	A	10-19%

					Fauveli's peacock worm (<i>Chone fauveli</i>) Mixed red seaweeds including <i>Ceramium spp</i>	F S	<1% 40-79%
T1 – 7	348472	1012639	13.1	Fine sand	Peacock worm (<i>Sabella pavonina</i>) Sand mason (<i>Lanice conchilega</i>) Lug worm (<i>Arenicola sp.</i>) casts/burrows Fauveli's peacock worm (<i>Chone fauveli</i>) Unidentified tubeworm Mixed seaweeds	O O P R P C	1-5% 1-5% - <1% - 10-19%
T1 – 8	348543	1012717	14.6	Fine sand with shells	Velvet swimming crab (<i>Necora puber</i>) Peacock worm (<i>Sabella pavonina</i>) Mixed seaweeds Razor shell (<i>Ensis arcuatus</i>)	P O F O	- 1-5% 5-9% <1%
T1 – 9	348543	1012717	14.6	Fine sand	Peacock worm (<i>Sabella pavonina</i>) Mixed red seaweeds	A A	10-19% 20-39%
T1 – 10	348581	1012771	15.7	Fine sand	Fauveli's peacock worm (<i>Chone fauveli</i>) Edible crab (<i>Cancer pagurus</i>) Peacock worm (<i>Sabella pavonina</i>) Razor shell (<i>Ensis arcuatus</i>) Fish (possibly dragonet <i>Callionymus lyra</i>)	C O O R O	5-9% <1% <1% <1% <1%
T1 – 11	348582	1012771	15.8	Fine sand with shells	Fauveli's peacock worm (<i>Chone fauveli</i>) Sand mason (<i>Lanice conchilega</i>) Lug worm (<i>Arenicola marina</i>) casts	O O P	5-9% 5-9% -
T1 – 12	348640	1012851	17.8	Fine sand with shells	Slender spider crab (<i>Macropodia tenuirostris</i>) Unidentified tube worm Mixed seaweed Razor shell (<i>Ensis arcuatus</i>)	P O C F	- 5-9% 10-19% 1-5%
T1 – 13	348651	1012887	18.5	Fine sand with shells	Unidentified tubeworm (possibly <i>Chone fauveli</i>) Unidentified seaweed Fanworm (<i>Acromegalomma vesiculosum</i>)	C O R	10-19% <1% <1%
T1 – 14	348665	1012895	18.8	Fine sand with shells	Peacock worm (<i>Sabella pavonina</i>) Lug worm (<i>Arenicola marina</i>) casts/burrows Sugar kelp (<i>Saccharina latissimi</i>) Mixed seaweeds	F P O F	5-9% - 1-5% 5-9%
T1 – 15	348721	1012953	20.5	Fine sand with shells	Razor shell (<i>Ensis arcuatus</i>)	A	10-19%

					Fish (possibly dragonet <i>Callionymus lyra</i>) Unidentified tubeworm	P F	- 5-9%
T1 – 16	348752	1012987	21.4	Fine sand with shells	Razor shell (<i>Ensis arcuatus</i>) Unidentified tubeworm (possibly <i>Chone fauveli</i>)	F A	1-5% 10-19%
T2 – 1	348617	1012831	17.3	Fine sand with shells	Fish (possibly dragonet <i>Callionymus lyra</i>) Lug worm (<i>Arenicola marina</i>) casts/burrows Sand mason (<i>Lanice conchilega</i>) Unidentified tubeworm (possibly <i>Chone fauveli</i>) Peacock worm (<i>Sabella pavonina</i>)	P P O O R	- - 5-9% 5-9% <1%
T2 – 2	348694	1012779	17.4	Fine sand with shells	Lug worm (<i>Arenicola marina</i>) casts/burrows Sand mason (<i>Lanice conchilega</i>) Unidentified tubeworm (possibly <i>Chone fauveli</i>)	P O O	- 5-9% 5-9%
T2 – 3	348801	1012701	17.5	Fine sand	Peacock worm (<i>Sabella pavonina</i>) Unidentified tubeworm (possibly <i>Chone fauveli</i>) Mixed seaweeds	O O F	1-5% 1-5% 5-9%
T2 – 4	348824	1012680	17.6	Coarse sand/ shells	European sea squirt (<i>Ascidrella aspersa</i>) Mixed red and green seaweeds	O A	5-9% 20-39%
T2 – 5	348915	1012617	12.5	Bedrock, large boulders	Encrusting algae Oarweed (<i>Laminaria digitata</i>) Sugar kelp (<i>Saccharina latissima</i>) Edible sea urchin (<i>Echinus esculentus</i>) Topshell (possibly <i>Calliostoma zizyphinum</i>)	C A A O R	20-39% 5-9% 5-9% 1-5% <1%
T3 – 1	348773	1012522	6.8	Bedrock, large boulders	Oarweed (<i>Laminaria digitata</i>) Topshell (possibly <i>Calliostoma zizyphinum</i>)	S R	40-79% <1%
T3 – 2	348703	1012569	14.1	Coarse sand/ shells	Common starfish (<i>Asterias rubens</i>) Topshell (possibly <i>Calliostoma zizyphinum</i>) Mixed seaweeds	S R A	10-19% <1% 20-39%
T3 – 3	348654	1012607	14.4	Fine sand	Lug worm (<i>Arenicola marina</i>) casts/burrows Peacock worm (<i>Sabella pavonina</i>)	P F	- 1-5%
T3 – 4	348578	1012661	14.5	Fine sand	Lug worm (<i>Arenicola marina</i>) casts and burrows Peacock worm (<i>Sabella pavonina</i>) Razor shell (<i>Ensis arcuatus</i>) Mixed seaweed	P F F F	- 1-5% 1-5% 5-9%
T3 – 5	348520	1012707	14.6	Fine sand	Peacock worm (<i>Sabella pavonina</i>)	F	1-5%

					Lug worm (<i>Arenicola marina</i>) casts and burrows Mixed seaweed Unidentified tubeworm (possibly <i>Chone fauveli</i>) Sand mason (<i>Lanice conchilega</i>)	P A O R	- 20-39% 5-9% <1%
T3 – 6	348433	1012766	15.0	Fine sand	Unidentified tubeworm (possibly <i>Chone fauveli</i>) Peacock worm (<i>Sabella pavonina</i>) Fish (possibly dragonet <i>Callionymus lyra</i>) Mixed seaweed	S O P A	20-39% 5-9% - 20-39%
T3 – 7	348351	1012822	15.3	Fine sand	Unidentified tubeworm (possibly <i>Chone fauveli</i>) Mixed seaweed	S A	20-39% 20-39%
T4 – 1	348156	1012697	15.0	Course sand with shells	Edible sea urchin (<i>Echinus esculentus</i>) Mixed seaweed (turf)	P S	- 40-79%
T4 – 2	348205	1012668	15.2	Coarse sand	Sand mason (<i>Lanice conchilega</i>) Unidentified tubeworm (possibly <i>Chone fauveli</i>) Lug worm (<i>Arenicola marina</i>) casts Mixed seaweed	O O P F	5-9% 1-5% - 5-9%
T4 – 3	348220	1012661	15.0	Coarse sand	Sand mason (<i>Lanice conchilega</i>) Unidentified tubeworm (possibly <i>Chone fauveli</i>) Sugar kelp (<i>Saccharina latissimi</i>) Mixed seaweed	O O F C	5-9% 1-5% <1% 10-19%
T4 – 4	348275	1012619	13.9	Fine sand	Peacock worms (<i>Sabella pavonina</i>) Sand mason (<i>Lanice conchilega</i>) Lug worm (<i>Arenicola marina</i>) casts Mixed seaweeds (turf)	F O P S	1-5% 1-5% - 40-79%
T4 – 5	348332	1012576	13.3	Fine sand	Peacock worms (<i>Sabella pavonina</i>) Unidentified tubeworm Lug worm (<i>Arenicola marina</i>) casts Sand mason (<i>Lanice conchilega</i>) Mixed seaweeds	F F P O C	1-5% 1-5% - 1-5% 20-39%
T4 – 6	348398	1012534	12.9	Sand	Peacock worms (<i>Sabella pavonina</i>) Sugar kelp (<i>Saccharina latissimi</i>) Other mixed seaweed (turf)	A F S	10-19% 5-9% 40-79%

Appendix 2

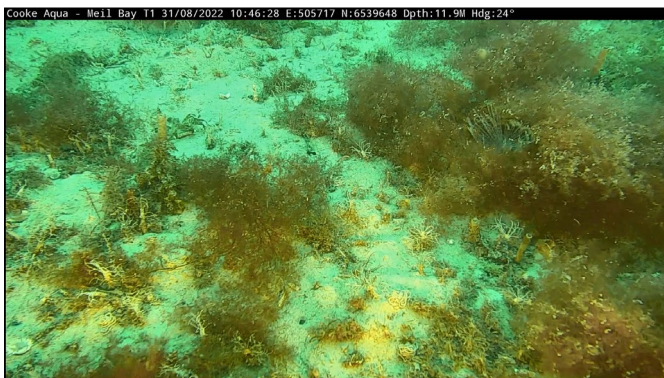
TRANSECT 1



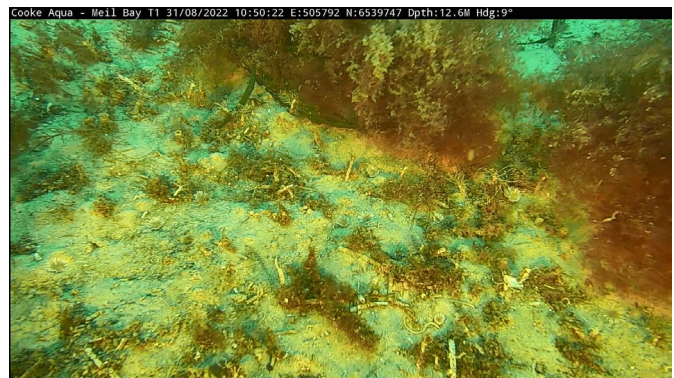
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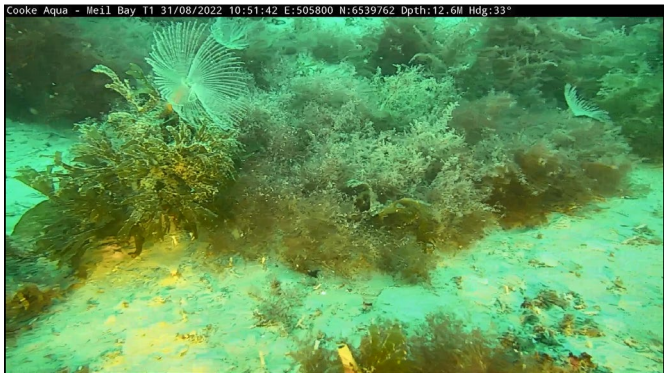
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T1 - 3



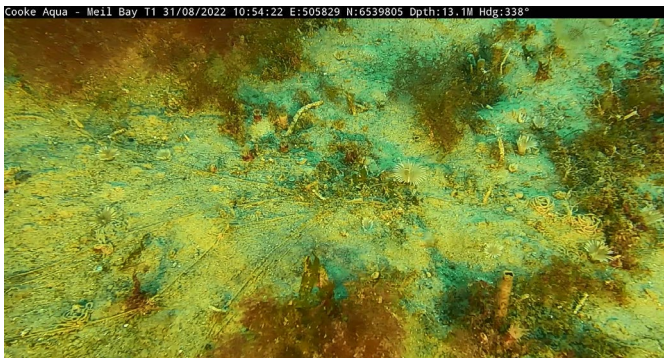
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T1 - 5



T1 - 6



T1 - 7



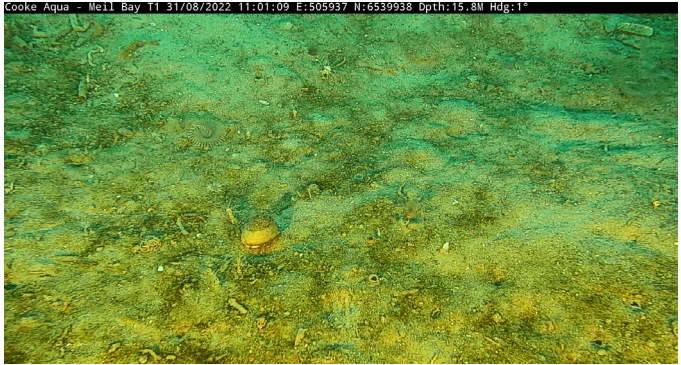
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T1 - 9



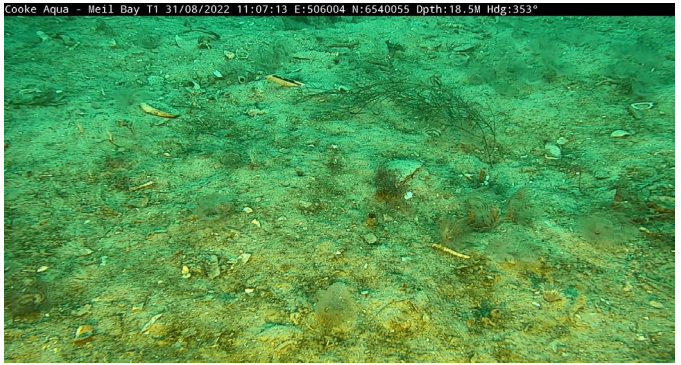
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T1 - 11



T1 - 12



T1 - 13



T1 - 14



T1 - 15

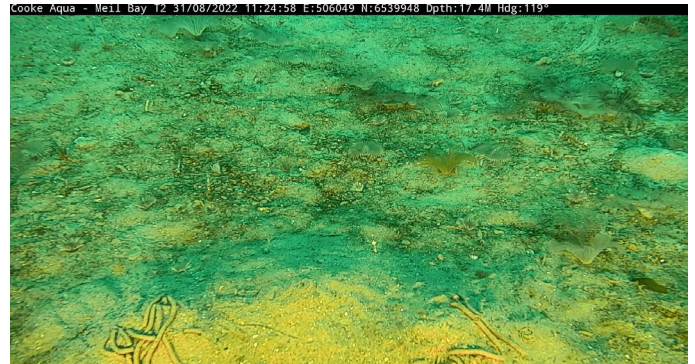


T1 - 16

TRANSECT 2



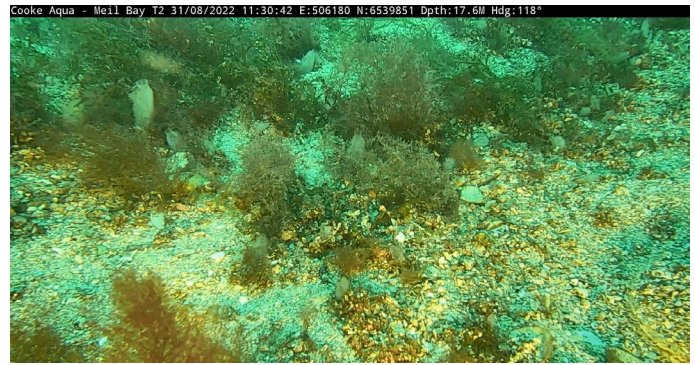
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T2 - 2



T2 - 3



T2 - 4



T2 - 5

TRANSECT 3



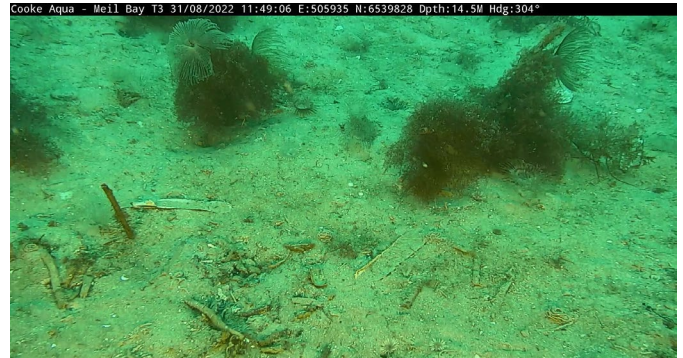
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T3-2



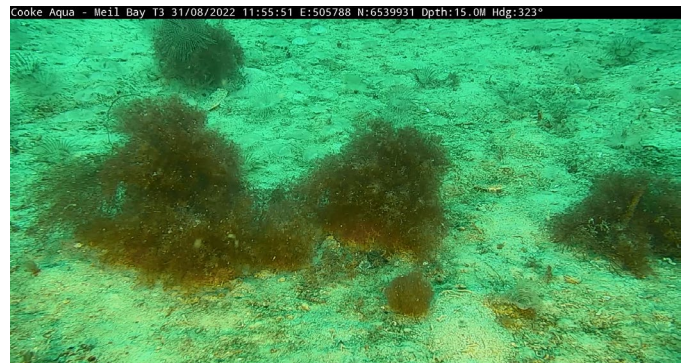
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T3-4



T3-5



T3-6

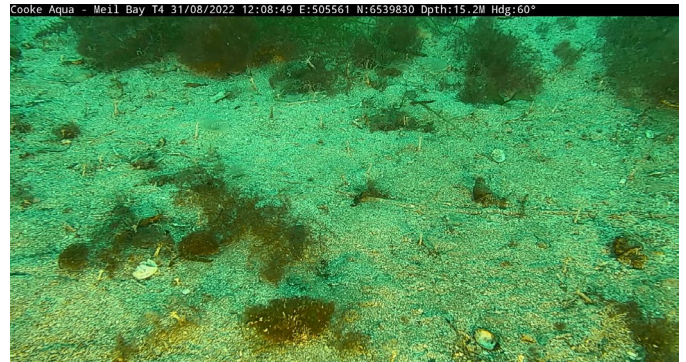


T3-7

TRANSECT 4



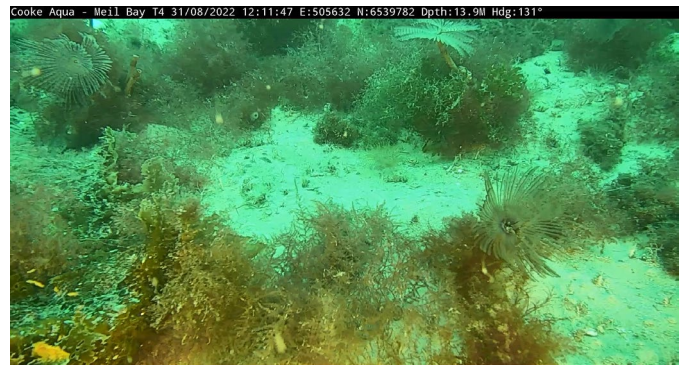
T4 - 1



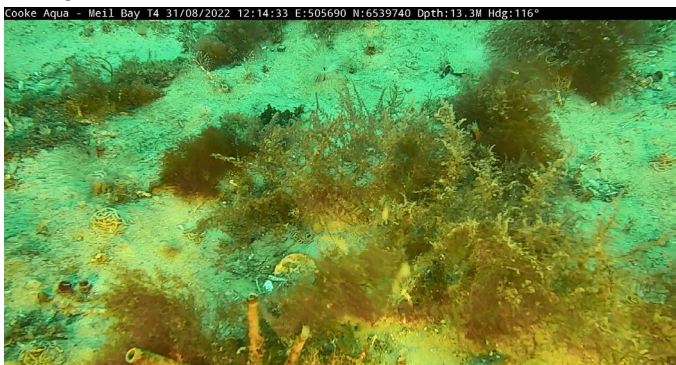
T4 - 2



T4 - 3



T4 - 4



T4 - 5



T4 - 6