ANDERSON MARINE SURVEYS

Report To: Loch Duart Ltd

Issued By: *SJA*

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Reintraid seabed video survey

A seabed video survey was carried out in November 2023 in the vicinity of the Reintraid pen site, Loch A' Chairn Bhain west of Kylesku (Figure 1). Objectives of the survey were to identify the principal habitats and any Priority Marine Features[1] (PMFs) and to assess the ecological condition of the seabed in the vicinity of the site.

Seabed video was collected along two pre-determined transects southeast of the site (Figure 2). Transect T2 was interrupted by fouling on creel lines and was therefore recorded in four parts (T2A, T2B, T2C, T2D).

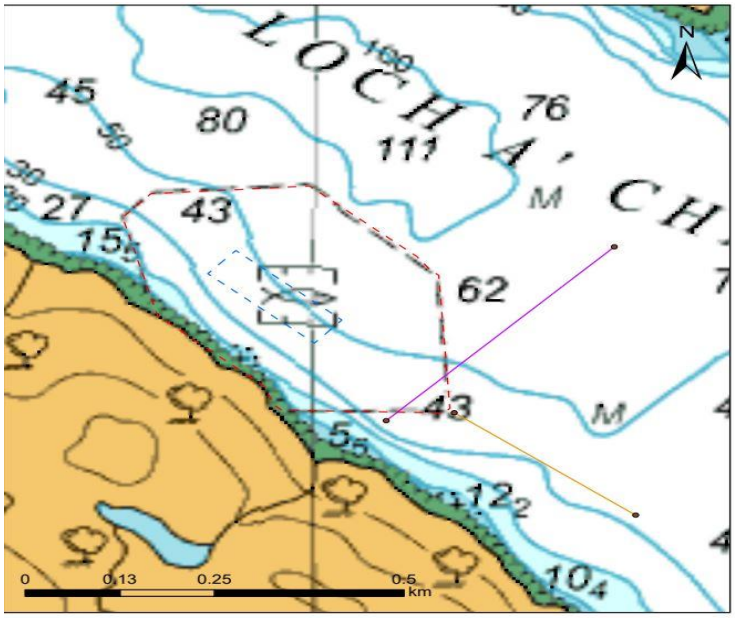
Video survey of defined transects was carried out using a camera frame fitted with a Bowtech DIVECAM-550C-AL-I4 camera, GoPro video camera and two high intensity LED lights. The system was also equipped with two parallel laser pointers at 20cm separation. The camera frame was towed along a pre-determined transect line at approximately 0.5 knots just above the seabed and allowed to settle briefly on the seabed at frequent intervals.

Positioning and depth data were provided by a Simrad NSS7 evo.2 with fixes at 1s intervals logged directly to PC. Site descriptor, position, time (UTC), elapsed time and depth overlays were added to the video post-survey, and deployment and recovery periods edited from the final video files in mp4 format.

Video footage has been examined and interpreted in 2-minute segments. Fauna was identified using standard sources (primarily Southward and Campbell 2006, Naylor 2011, Porter 2012, Wood 2013, Hayward and Ryland 2017, Bowen et al. 2018). Still images of representative views were captured from the video and are shown in Figure 3.

[1] As defined byTyler-Walters et al 2016.

Figure 1. Reintraid general location



Reintraid, Loch A' Chairn Bhain
Proposed Baseline Visual Survey 2023

- Existing Grid
- Existing MCA Area
- Proposed Visual Survey Transect Start/End

2023 Proposed Transects

- T1
- T2

Transect	OSGB		WGS 84	
	Eastng	Northing	Lattude	Longitude
T1 Start	219275	933810	58° 15.343' N	005° 04.904' W
T1 End	219596.39	933628.55	58° 15.253' N	005° 04.567' W
T2 Start	219365.35	933819.92	58° 15.350' N	005° 04.812' W
T2 End	219589.79	934102.48	58° 15.504' N	005° 04.596' W

Figure 2. Reintraid - proposed seabed video tracks

Habitats, observed epifaunal species and contamination assessment (primarily indicated by mat-forming filamentous bacteria *Beggiatoa*), are summarised below. Representative still images are shown in Figure 3.

T1 elapsed time		**Depth (mCD)**	
start	**end**		
00:00:00	00:02:00	40.9 - 40.4 m	mud, kelp fragments. Pennatula. Nephrops burrows, Calocaris burrows. Lesueurigobius. Liocarcinus
00:02:00	00:04:00	40.3 – 39.0 m	as above. Juv haddock? Asterias
00:04:00	00:06:00	38.95 - 36.4 m	as above. Pecten. Possibly Maera burrows. Lanice. Neptunea. Trisopterus. Bivalve siphon
00:06:00	00:08:00	36.4 - 31.5 m	As above, slightly shellier. Occasional cobble patches. Munida. Pagurus. More cobbles and boulders. Spirobranchus. Limanda.
00:08:00	00:10:00	31.5 - 31.8 m	Gravelly mud, occasional Nephrops burrows. Occasional then scattered boulders. Cariophyllia. Echinus. Protanthea. Antedon. Lots of square bottles, Ophiothrix. Muddy gravel, cobbles, boulders, Sabella tubes. Pottery jar fragments. Plates. Possible wreck site?
00:10:00	00:12:00	31.8 - 28.2 m	Gravelly mud. Balanus on scattered cobbles and boulders. Gobies.
00:12:00	00:14:00	28.2 - 32.0 m	Shelly, gravelly muddy sand. Occasional Nephrops burrows. Scattered boulders with Caryophyllia. Funiculina
00:14:00	00:16:00	32.0 - 33.6 m	Silted boulders / bedrock. Caryophyllia, Protanthea. Old cable? Back to sandy mud, occasional Nephrops burrows. Funiculina
00:16:00	00:18:00	33.6 - 34.2 m	Sandy mud, shell, Nephrops burrows. Funiculina, Pennatula.

T2 elapsed time		Depth (mCD)	
start	end		
00:00:00	00:02:00	16.4 - 22.7 m	boulders on silty gravel. Lithothamnion. Antedon. Echinus. Caryophyllia. Protanthea. Sabella tube. Spirobranchus.
00:05:44	00:07:44	36.3 - 40.4 m	silty sand. Pecten. Small Nephrops burrows. Asterias. Trisopterus.
00:07:44	00:09:44	40.4 - 42.3 m	as above. Leseurigobius. Nephrops. Possibly Maera burrows
00:09:44	00:10:35	42.3 - 42.2 m	as above, muddier
00:14:24	00:16:24	42.2 - 44.1 m	silty sand. Nephrops burrows. Pennatula.
00:16:24	00:18:24	44.1 - 48.8 m	as above. Probably Maera. Ammodytes? Creel.
00:18:24	00:20:24	48.8 - 47.7 m	as above. Funiculina. Fouled about 10:55:00
00:20:24	00:20:57	47.7 – 47.0 m	
00:28:48	00:30:48	51.0 - 54.7 m	Mud, large Nephrops burrows. Pennatula. Maera burrows.
00:30:48	00:32:48	54.7 - 56.1 m	As above. Funiculina. Nephrops.
00:32:48	00:34:48	56.1 - 57.4 m	As above.
00:34:48	00:36:48	57.4 - 60.5 m	As above. Common Nephrops outside burrows
00:36:48	00:38:48	60.5 - 66.2 m	As above. Boulder patch 11:14:10
00:38:48	00:40:48	66.2 - 81.1 m	As above, boulders on mud. Munida.
00:40:48	00:42:48	81.1 - 82.1 m	Soft mud, Nephrops, Maera burrows
00:42:48	00:44:48	82.1 – 82.0 m	As above. Kelp debris with Antedon, Macropodia
00:44:48	00:46:48	82.0 - 80.8 m	As above
00:46:48	00:48:13	80.8 - 81.3 m	As above

Table 1. Habitats, observed epifaunal species and contamination assessment from seabed video

A total of three habitats were distinguished (Table 2), although as usual, these grade into each other and determining boundaries is necessarily subjective.

	habitat	transect
1	burrowed mud with seapens	T1, T2
2	circalittoral silted boulders and bedrock with Caryophyllia	T1, T2
3	infralittoral mixed sediment	T2

Table 2. Identified habitats

Burrowed mud was the predominant habitat, being recorded from 24 of the 26 assessed video segments. Within the survey area, this varied continuously from burrowed silty sand with a high proportion of gravel and shell in 28mCD, to soft mud in >80mCD. On the basis of observed burrows and individuals of *Nephrops norvegicus*, and presence of seapens, all this habitat is classed[2] as SS.SMu.CFiMu.SpnMeg - Sea pens and burrowing megafauna in circalittoral fine mud. *Nephrops* burrows were observed at densities estimated as 0.5 – 2 /m2, typical of a healthy population, and numerous individuals were observed outside burrows (typical in early winter). Other burrowing crustacean species considered very likely to be present, from burrow entrance morphology, include the thalassinid *Calocaris macandreae* and the amphipod *Meara loveni* which has characteristic small "keyhole" shaped burrow entrances. Fries' goby, *Lesueurigobius freisii*, which is commensal with *Nephrops*, was relatively common.

The sea pens *Pennatula phosphorea* and *Funiculina quadrangularis* were widely distributed; with the latter increasing in abundance at depths >40mCD.

Taken together, these habitats can be considered to represent several sub-biotopes of the Priority Marine Feature 'Burrowed Mud'.

Circalittoral silted boulder and rock habitat, with relatively high abundance of the cup coral *Caryophyllia smithii*, was observed at 28-32mCD on T1 and 60-81m on T2, presumably representing glacial relicts. The northern sea fan *Swiftia pallida* was not observed and therefore the habitat is not considered to represent PMF but is classed as CR.MCR.EcCr - Echinoderms and crustose communities on circalittoral rock. The squat lobster *Munida rugosa* was very common in this habitat. The sea loch anemone *Protanthea simplex* was also abundant.

The inshore end of T2, in water depths 16-23mCD, had seabed consisting of boulders and cobbles on silty gravel, with rock surfaces encrusted by the red algae *Lithothamnion sp* and is therefore infralittoral.

No evidence of organic enrichment associated with aquaculture was observed. Kelp debris was present at all depths and may result in localised presence of opportunist macrofaunal species in grab samples.

Several square glass bottles and pottery fragments, including intact plates, were observed on T1 at OSGB 219470 933720, in 31mCD depth and might indicate a possible wreck site. What appeared to be an armoured telecoms cable was also observed at OSGB 219536 933662.

[2] According to the UK Marine habitat classification (22.04) list, https://www.marlin.ac.uk/habitats/biotopes

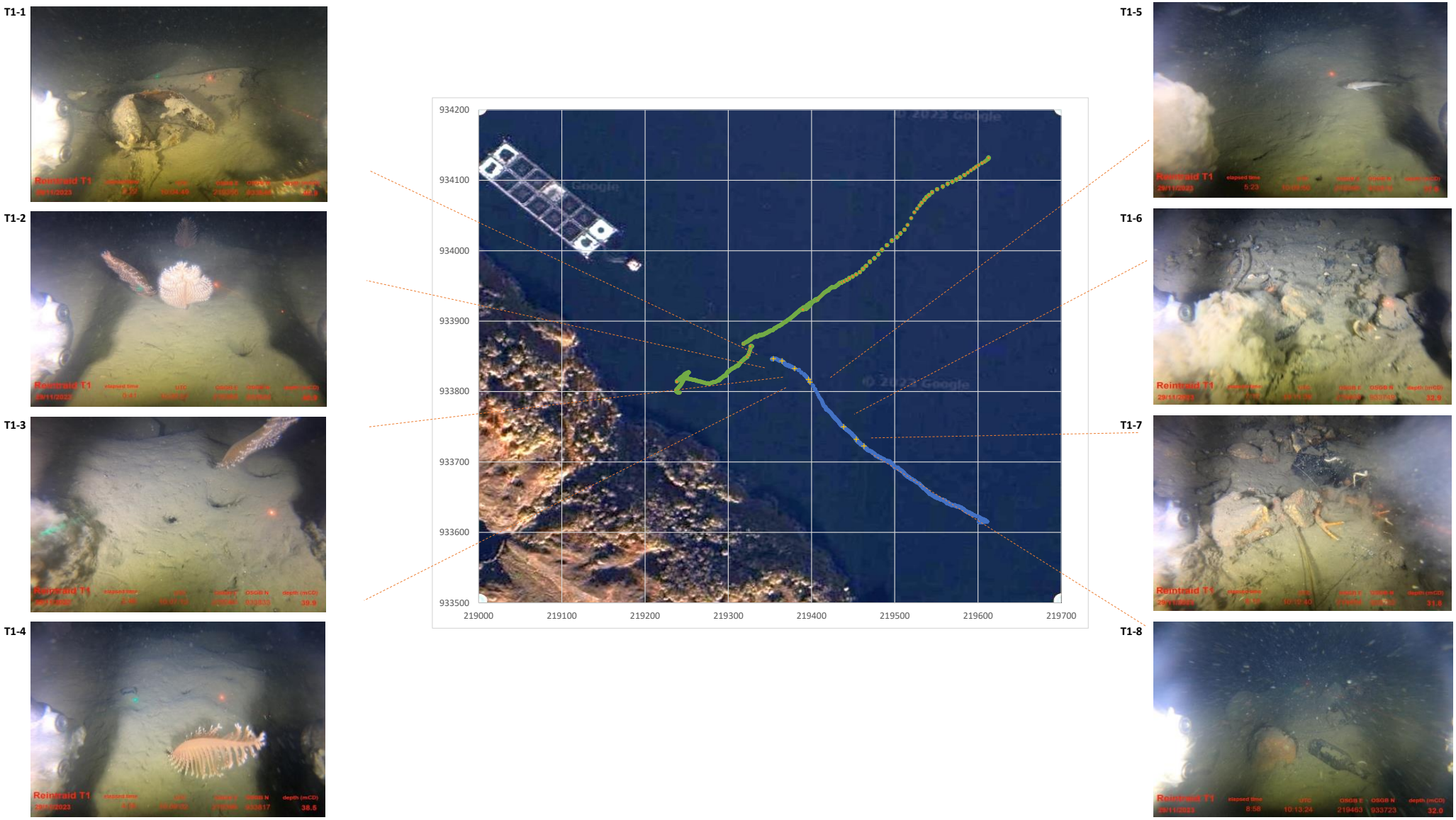


Figure 3. Representative habitat stills T1 1-8

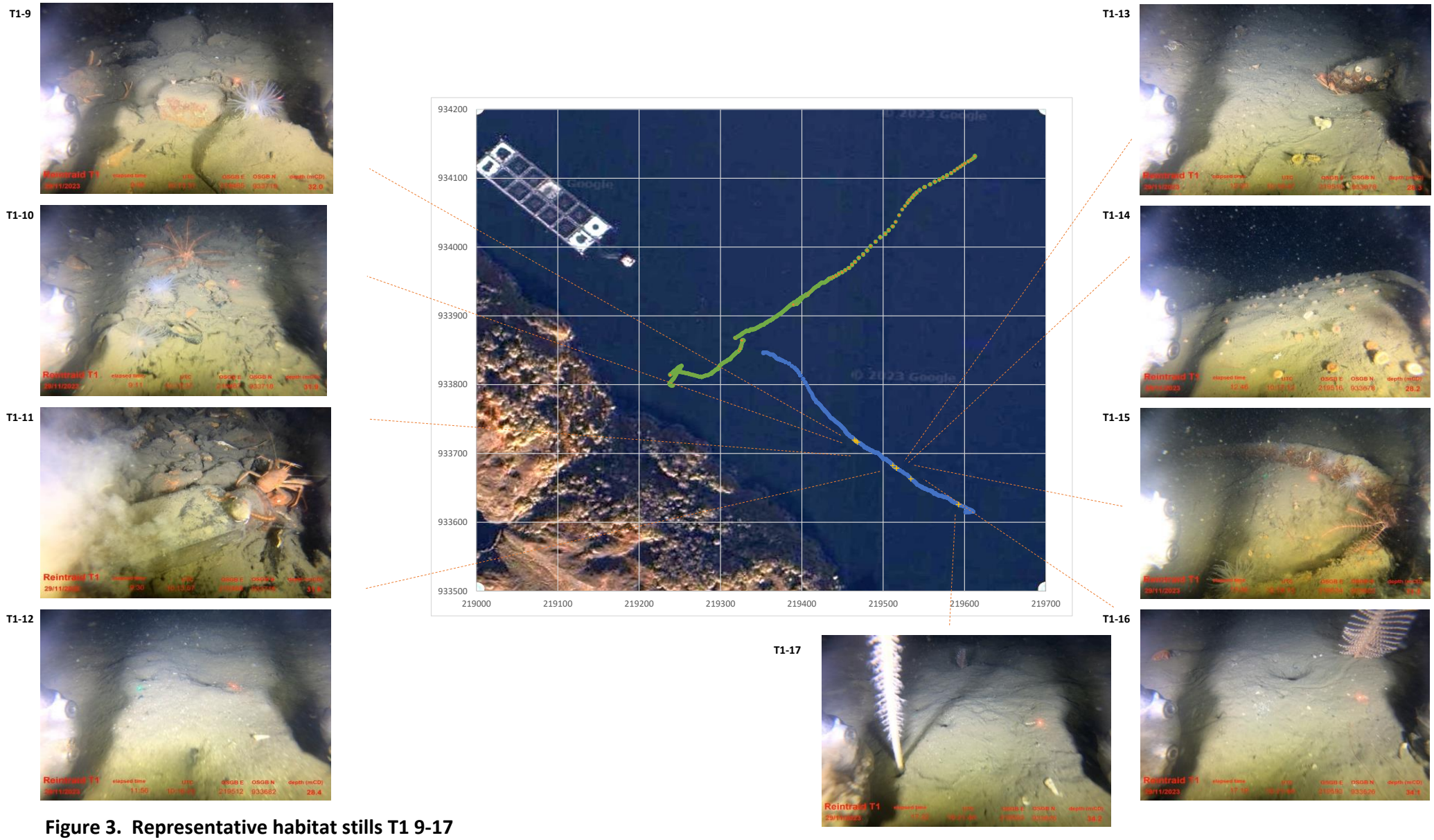


Figure 3. Representative habitat stills T1 9-17

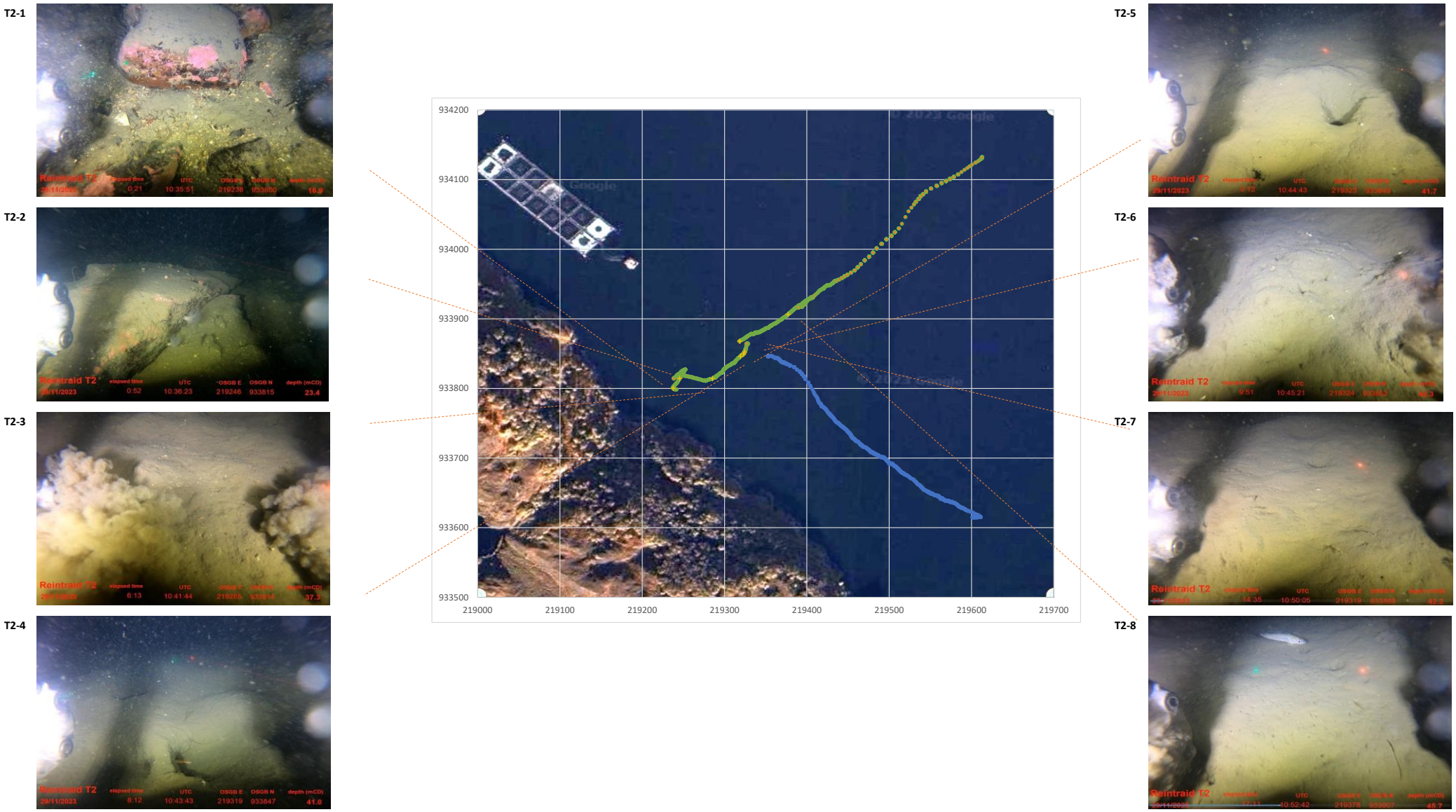


Figure 3. Representative habitat stills T2 1-8

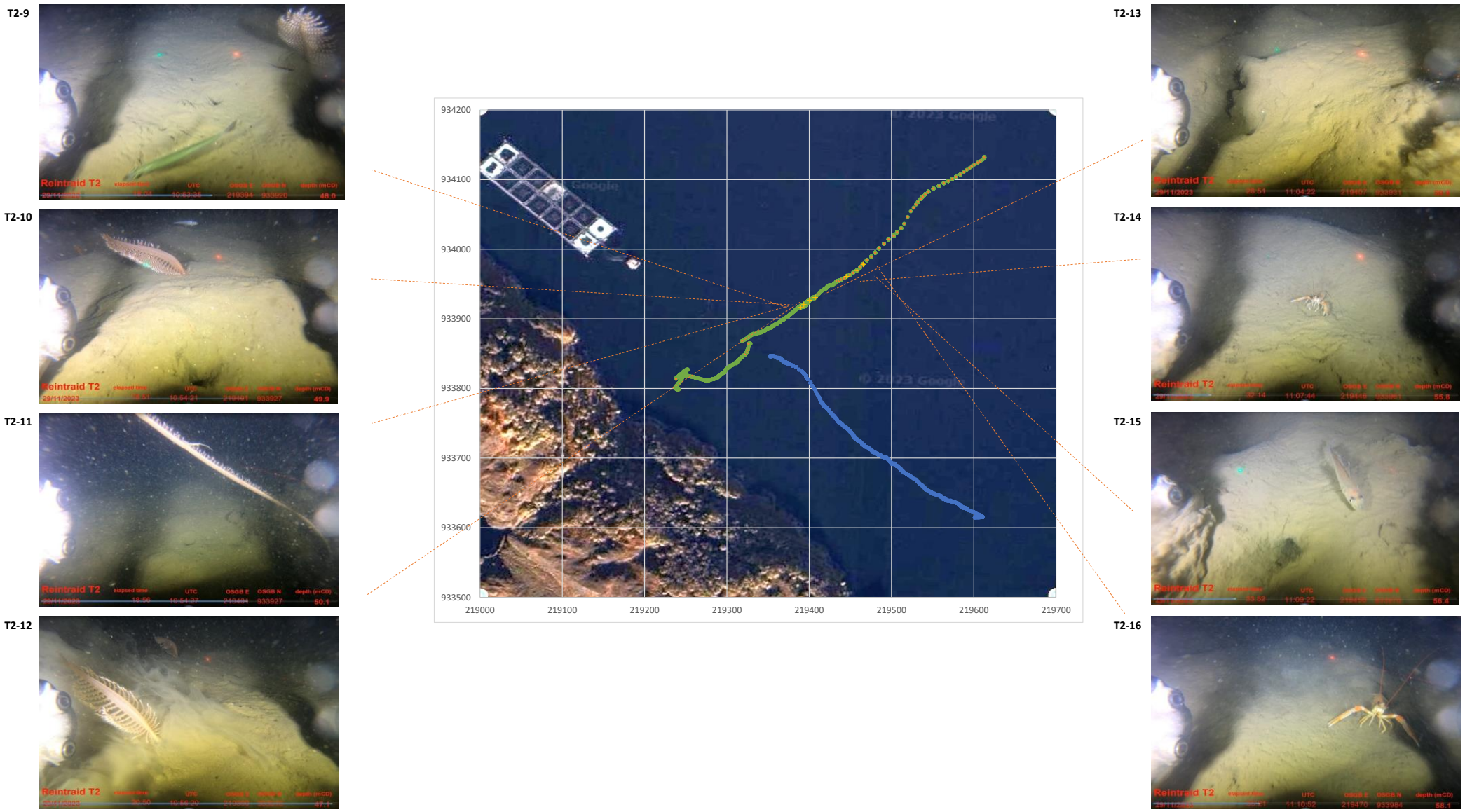


Figure 3. Representative habitat stills T2 9-16

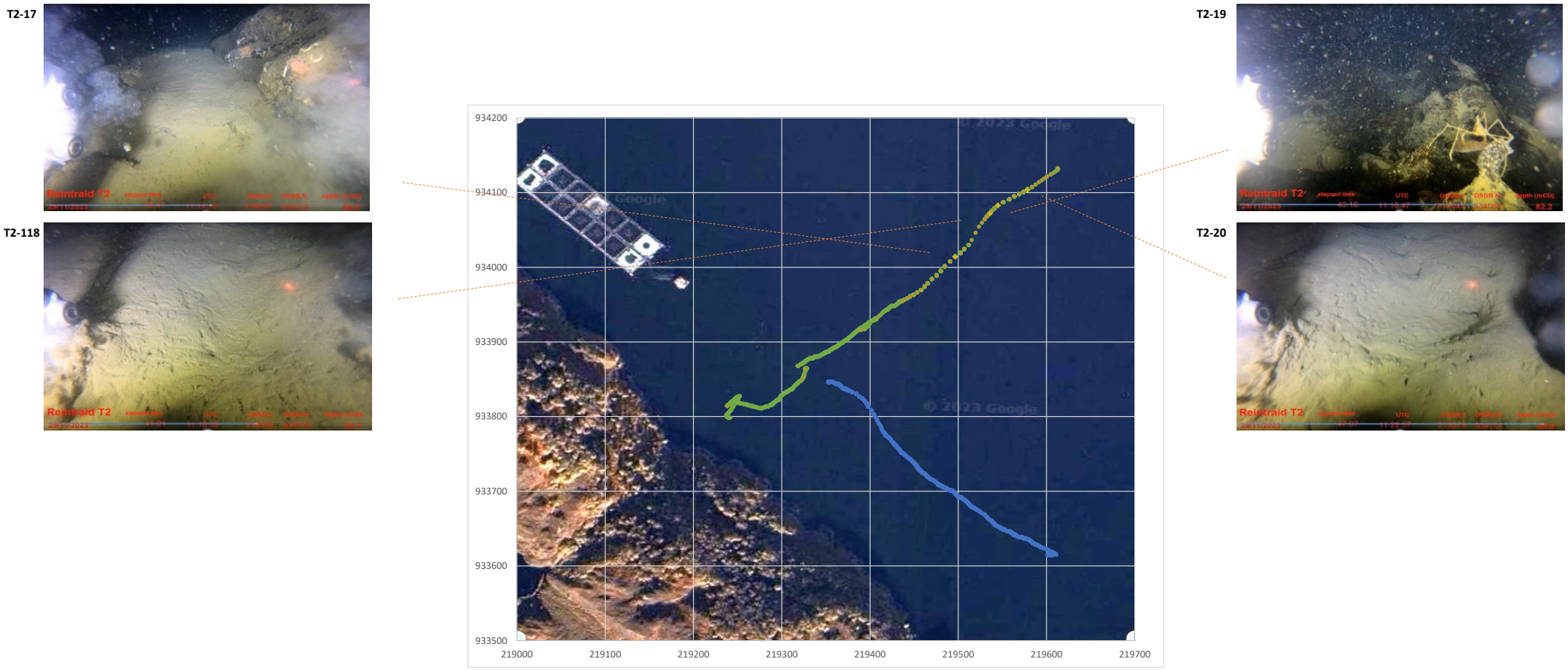


Figure 3. Representative habitat stills T2 17-20