



ANDERSON MARINE SURVEYS

Report To: Dawnfresh Farming Limited

Issued By: ■■■

Date: 17 December 2018

South Bute video survey

Summary

1. Habitats and species were as expected for a moderately tidal location in the Firth of Clyde. Physical disturbance of the seabed through trawling was considered to be of moderate severity, and anthropogenic debris was negligible.
2. Priority Marine Features observed were limited to a tentative identification of a single individual of the burrowing anemone *Arachnanthus sarsi*. Although not previously recorded from the Firth of Clyde, it is considered plausible that this species should occur in suitable habitat within the survey area.
3. Muddy sediments throughout the deeper parts of the survey area (>50m) were burrowed by *Nephrops norvegicus* and *Calocaris macandreae* (not observed but inferred from burrow characteristics). Very few seapens (all small *Virgularia mirabilis*) were observed; therefore this burrowed mud habitat does not constitute a specified PMF.
4. Density of *Nephrops* burrow systems varied along Transect 1, and increased with depth on Transects 2 and 3. Maximum densities were 0.45 /m² on Transect 1 and 0.50 /m² on Transect 3. Density was lower on Transect 3 (maximum 0.17 /m²).
5. The maximum estimated burrow system density (0.50 /m²) corresponds to a medium density 0.3 – 0.8 /m² using the classification adopted by ICES for *Nephrops* stock assessment (ICES, 2011). Most of the surveyed *Nephrops* ground from the present study would be classified as low-medium burrow density (<0.3 /m²).

Introduction

Dawnfresh are considering development of a new cage site south of Kilchattan Bay, South Bute, Firth of Clyde (Figure 1). This report describes findings of a video transect survey carried out in September 2018; with reference to general seabed habitat and condition, visible biota, and the presence of any Priority Marine Features¹.

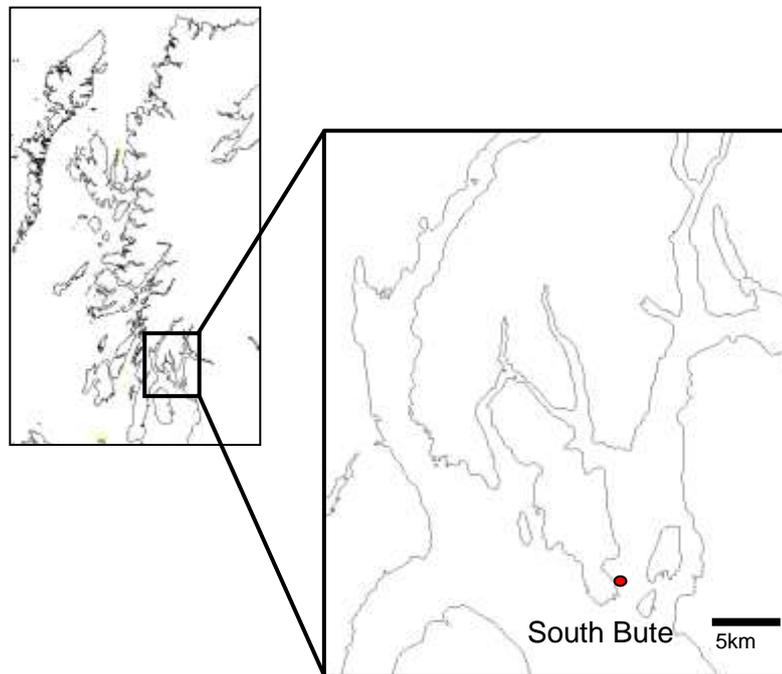


Figure 1
South Bute location

The survey was also carried out in accordance with SEPA guidance *BASELINE SURVEY, VISUAL – STANDARD* (15/09/2008).

¹ Listed in Priority Marine Features in Scotlands Seas, SNH 2014.
<https://www.nature.scot/sites/default/files/2018-05/Priority%20Marine%20Features%20in%20Scotlands%20seas.pdf> accessed 17/12/2018

Methods

The survey comprised three transects, and was originally carried out in January 2018. Video quality from that survey was considered inadequate and the survey was repeated on 01 September 2018. Weather conditions were fair, wind S2, overcast. Benthic sampling was carried out on the following day.

Survey operations were carried out from AMSL's 6.7m survey vessel *Mollie B*. Positioning and depth data were provided by a Simrad NSS7 evo.2 with fixes at 1s intervals logged directly to PC.

Transects were defined by start and end points (Figure 2). Cross-transects (T2 and T3) were run from west to east (shallow-deep), and were limited at the east end by water depth exceeding $\approx 80\text{m}$ (so planned end points were not reached).

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 four 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.

Site descriptor, position, elapsed time and depth were overlaid on 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 and individual species were captured from the video.

Nephrops burrow entrances were counted in 2-minute intervals of all transects and drops, and converted to density by estimating observed seabed area from cumulative track distance (between 1s GPS fix intervals) and estimated average field of view (0.6m). Burrow entrance density was converted to burrow system density, assuming a mean value of three entrances per burrow (see Discussion). Assessment of *Nephrops* abundance from burrow counts is dependent on four key assumptions: 1. Based on species-specific burrow entrance features, that burrows are accurately ascribed to *Nephrops*. 2. A cluster of openings judged to be related represents one burrow system. 3. Degraded, partially collapsed burrows are unoccupied and so are ignored. 4. Each burrow system contains one animal.

Results

Total surveyed lengths for each transect, calculated as cumulative distance between successive fixes were:

Transect 1 1508m
Transect 2 555m
Transect 3 621m

Positions of individual 2-minute transect segments are shown in Figures 3-5. Descriptive notes for each segment are tabulated in Appendix A. Still images are listed in Appendix B and are available on accompanying electronic media.

Substrate along the whole of Transect 1 consisted of fine sand or coarse silt, with varying quantities of shell and pebbles. Water depths along transect 1 varied from 35.3 – 55.3 m. Transects 2 and 3 covered a greater bathymetric range, 9.1 to 87.9 m, with sediments grading from gravel and sands at shallower depths to soft mud at depths >50 m. Detached / detrital algal fragments were widespread, including green (*Ulva* sp.), filamentous red and brown species (*Laminaria* sp., *Fucus* spp.).

Light linear scarring of the sediment surface was observed in some places; this was superficial (around 1-2 cm) and most likely resulted from trawling activities. Very little anthropogenic debris was observed (one bottle).

Muddy sediments throughout the deeper parts of the survey area (>50m) were burrowed by *Nephrops norvegicus* (Figures 3, 5, 14) and *Calocaris macandreae* (not observed but inferred from burrow characteristics). Very few seapens (all *Virgularia mirabilis*) were observed; therefore this habitat does not constitute a specified PMF.

Density of *Nephrops* burrow systems varied along Transect 1, and increased with depth on Transects 2 and 3 (Figure 6). Maximum densities were 0.45 /m² on Transect 1 and 0.50 /m² on Transect 2. Density was lower on Transect 3 (maximum 0.17 /m²)

Common species included the burrowing anemone *Cerianthus lloydii* (Figures 7, 11, 12), anemone *Urticina eques* (Figure 1), hydroids *Nemertesia antennina* (Figure 12) and *Halecium* sp., hermit crab *Pagurus* sp. (probably *bernhardus*), swimming crab *Liocarcinus* spp (probably both *L. depurator* and *L. holsatus* would be present), squat lobster *Munida rugosa* (abundant; Figure 2, 3, 15), starfish *Asterias rubens*, scallop *Pecten maximus*, queen scallop *Aequipecten opercularis*, tubeworm *Spirobranchus* sp., and gastropod *Turritella communis* (many of which may have been shells occupied by hermit crabs). These were all present at densities considered typical of natural habitat of this type.

Other epifaunal species recorded occasionally or singly from silty sand habitat were the soft coral *Alcyonium digitatum*, seapen *Virgularia mirabilis*, scaleworm *Aphrodita aculeata*, tubes thought to be those of the fanworm *Sabella pavonina*, eyelash worm *Myxicola infundibulum*, sea slug *Philine aperta*, whelk *Buccinum undatum*, starfish

Luidia ciliaris and *Porania pulvillus*, urchin *Echinus esculentus* and an unidentified shrimp (possibly *Philocherus sp.* or *Pontophilus sp.*). Shallower sand and gravel species included the anemone *Metridium dianthus*, tubeworm *Lanice conchilega*, and sea squirts *Asciidiella aspersa* and *Ciona intestinalis*. Egg masses, possibly of nudibranchs, were also observed.

A single individual anemone, tentatively identified as the PMF species *Arachnanthus sarsi*, was observed on Transect 3 (Figure 15). The observed individual appeared distinct, with fewer tentacles than the abundant *Cerianthus loydii* in the survey area; other possible confusions would be with the fireworks anemone *Pachycerianthus multiplicatus* or sabellid polychaete *Megalomma vesiculosum* although these are considered unlikely.

Fish observed included dragonet *Callionymus lyra*, gurnard *Eutrigla gurnardus*, gadiids *Trisopterus sp.*, haddock *Melanogrammus aeglefinus*, solenette *Buglossidium luteum*, dab *Limanda limanda*, butterflyfish *Pholis gunnellus* and gobies (probably Fries's goby *Lesueurigobius freisii* which is commensal with *Nephrops*; although possibly *Pomatoschistus spp.*).

Discussion

Habitats and species were as expected for a moderately tidal location in the Firth of Clyde. Physical disturbance of the seabed through trawling was considered to be of moderate severity, and anthropogenic debris was negligible.

Priority Marine Features observed were limited to a tentative identification of a single individual of the burrowing anemone *Arachnanthus sarsi*. The NBN atlas² lists 39 UK records for this species, all in west Scotland and Northern Ireland including Rathlin and Crinan; it is therefore plausible that the species should occur in suitable habitat in the Firth of Clyde.

The conclusive identification of burrows relies on resin-casting (e.g. Rice & Chapman 1971; Atkinson 1986; Marrs et al. 1996). In the present visual survey, burrows attributable to the thalassinid *Calocaris macandreae* were identified with high confidence in similar habitat to *Nephrops*.

Estimation of *Nephrops* population density (and by implication, stock size) on the basis of burrow counts is a standard method (e.g. Marrs et al. 1996; ICES 2007) but is subject to several assumptions. Significant factors include:

- **Identification of *Nephrops* burrows:** burrows of adult *Nephrops* are generally distinctive (including one or more shallow-angle “railway tunnel” openings) and distinguishable from burrows of other species present in the area (primarily the thalassinid crustacean *Calocaris macandreae*). Other potential confusing species include the crab *Goneplax rhomboides* and various fish species; however, no burrows were observed which could be conclusively attributed to these. The squat lobster *Munida rugosa* was

² <https://species.nbnatlas.org/species/NBNSYS0000173918>

observed in high densities around the edges of *Nephrops* ground, and in several cases was observed in burrow entrances. *Munida* is known to opportunistically use burrows of other species (mainly *Nephrops*), and in some cases to excavate shallow burrows, and it is possible that a proportion of burrows attributed to *Nephrops* may have belonged to *Munida*.

- **Number of entrances per burrow:** the small-scale distribution of observed *Nephrops* burrows was patchy, i.e. several burrows (2-10) tended to occur in close proximity and it was frequently not possible to distinguish individual burrow systems. Accordingly, all burrow entrances were counted. Marrs et al. (1996) examined an extensive collection of resin casts of *Nephrops* burrows (148 in total), most burrows had either two or three openings, but some had six or more (the average was three). Assuming an average of three entrances per burrow system, the maximum estimated burrow system density ($0.50 / m^2$) corresponds to a medium density ($0.3 - 0.8 / m^2$) using the classification adopted by ICES for *Nephrops* stock assessment (ICES, 2011). Most of the surveyed *Nephrops* ground from the present study would be classified as low-medium burrow density ($<0.3 / m^2$).

Nephrops densities in the Clyde Sea area are reported by Atkinson (1986) as varying from $0.07 / m^2$ (southeast of Arran) to $0.9-1.5 / m^2$ (Kilbrannan Sound) and densities recorded in this survey area would therefore be at the lower end of this range.

- **Abandoned burrows:** Marrs et al (1996) also considered the occupancy rate of *Nephrops* burrows, concluding that there were no reliable visual indications that a burrow was occupied, and that it may be necessary to derive estimates of the number of empty burrows from knowledge of the numbers of *Nephrops* removed by the fishery and by natural causes. This factor is therefore not taken into account by this study.
- **Field of view, visibility and edge effects** – these factors all influence the estimation of burrow density from camera systems, and have been considered in some detail in the context of stock assessment (e.g. ICES 2007). In this study, field of view was variable, due to changes in the height of the camera sledge above the seabed. However, the effects of increased field of view with height is offset by loss of visibility at heights more than 1m, and the overall estimate of an average field of view of 0.6m is considered reliable. Edge effect can lead to overestimates of between 20 and 35% (Addison & Bell 2000) in abundance when used to raise counts from a number of tows to larger areas, but is not considered to significantly influence the conclusions of this study.

References

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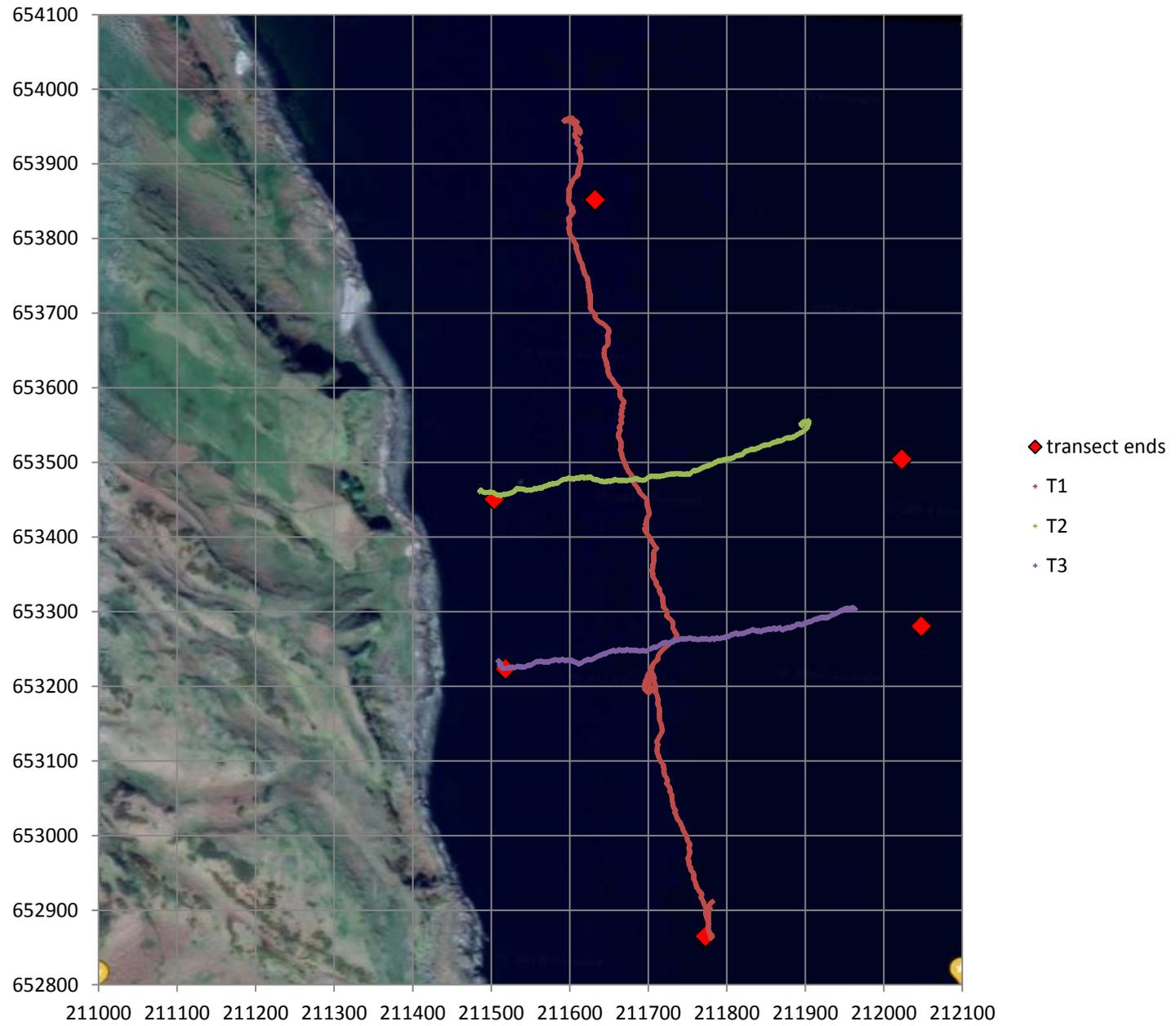


Figure 2. Proposed and actual transects, South Bute

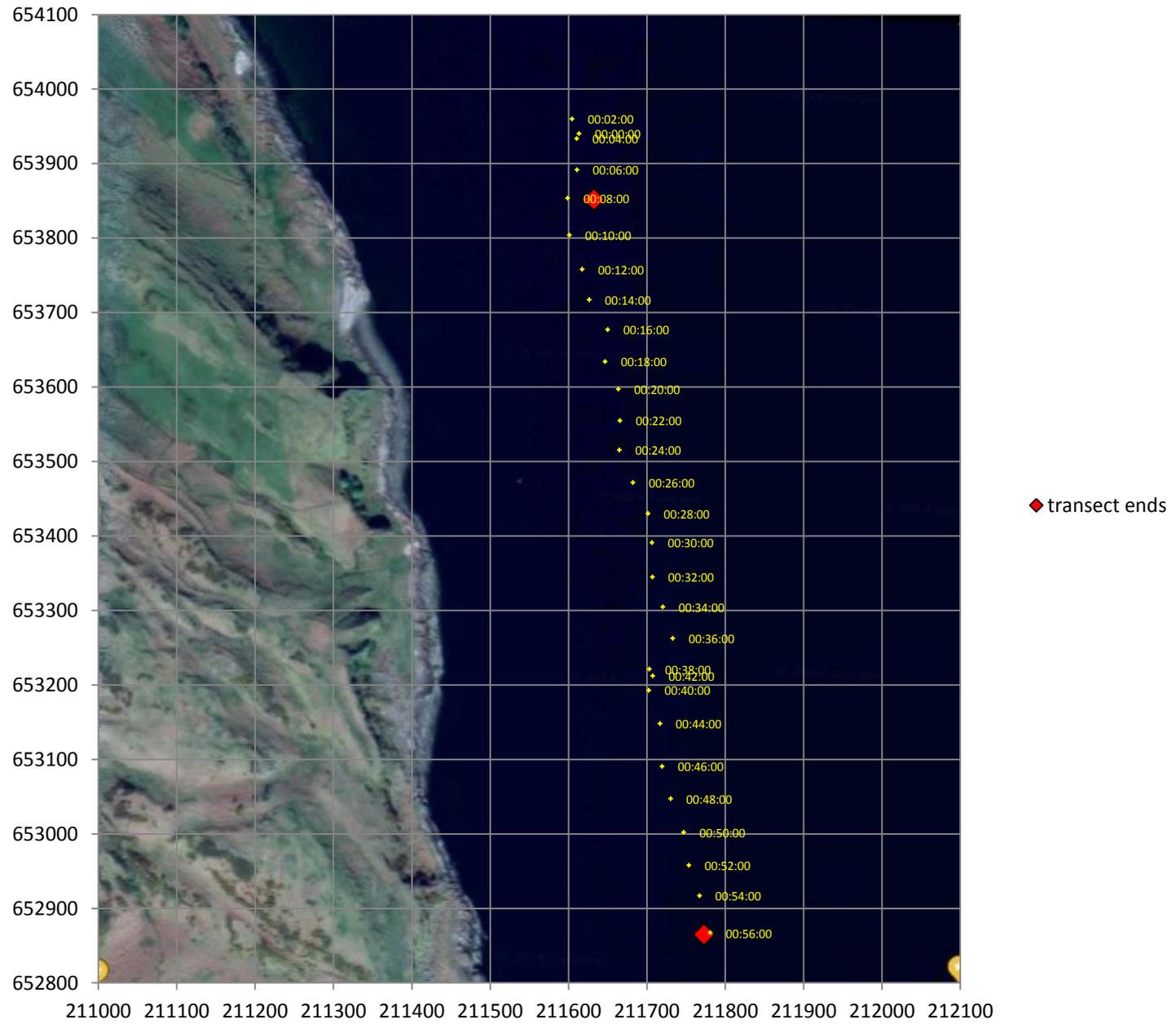


Figure 3. Transect 1, 2-minute interpretation segments

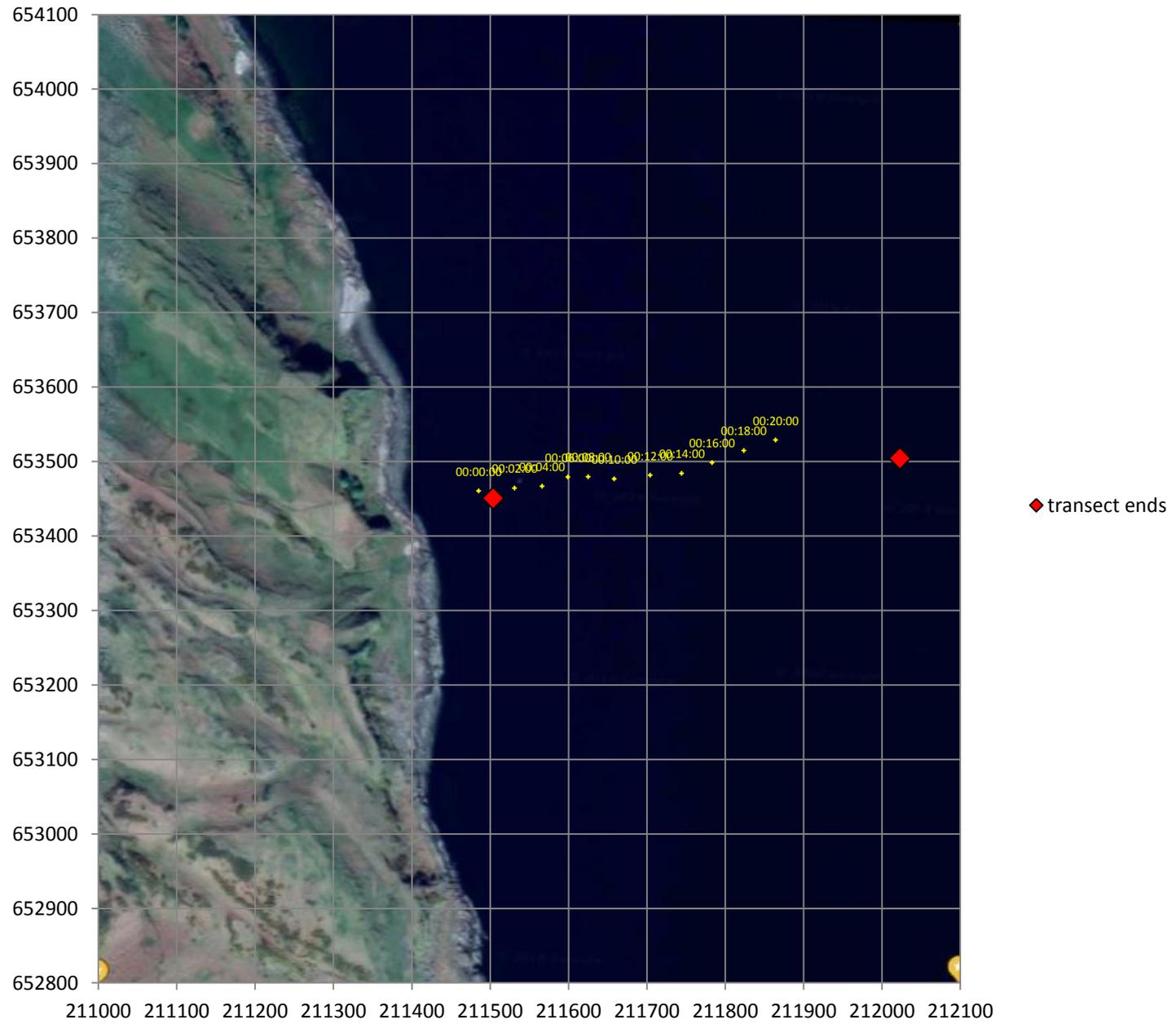


Figure 4. Transect 2, 2-minute interpretation segments

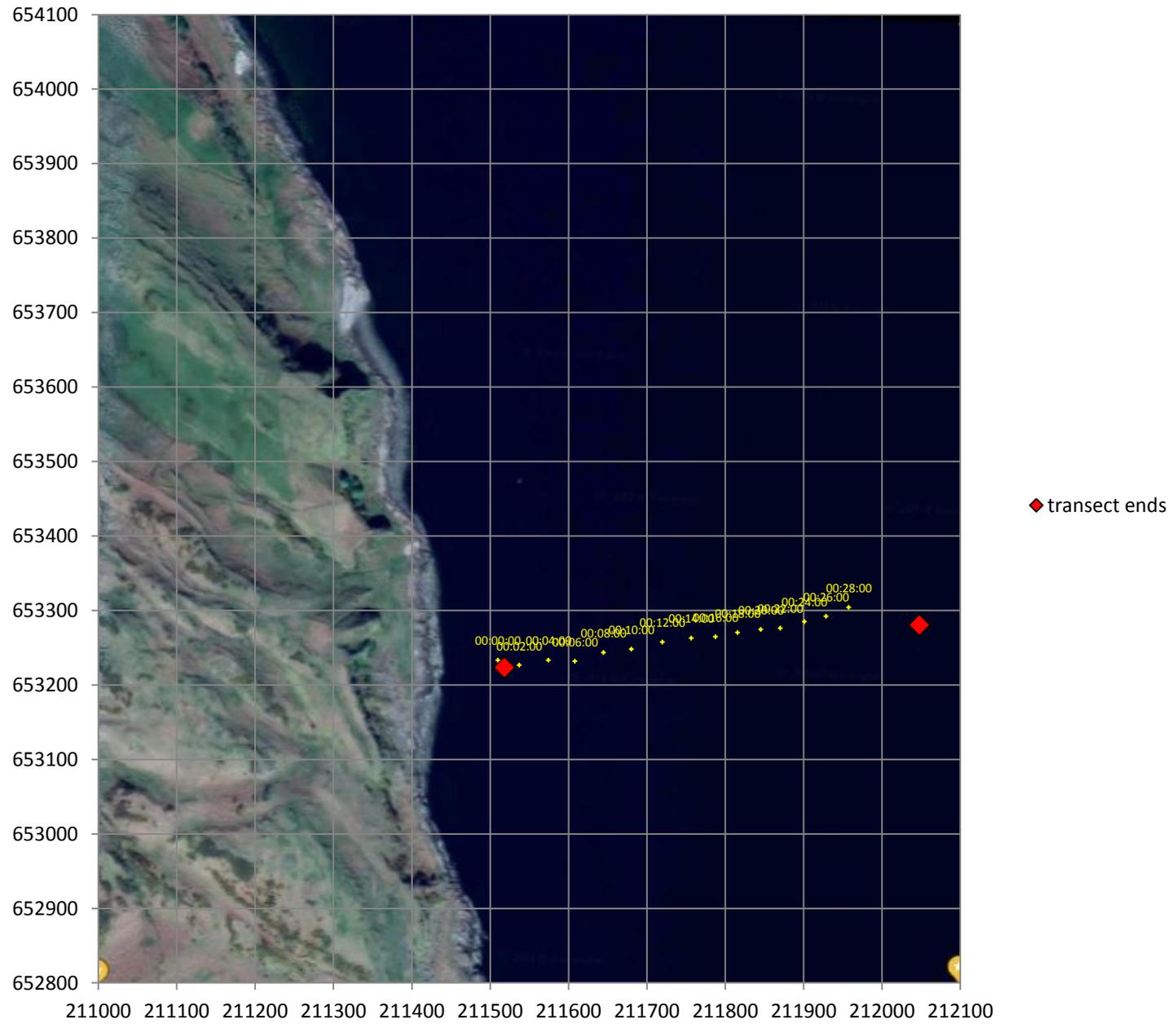


Figure 5. Transect 3, 2-minute interpretation segments

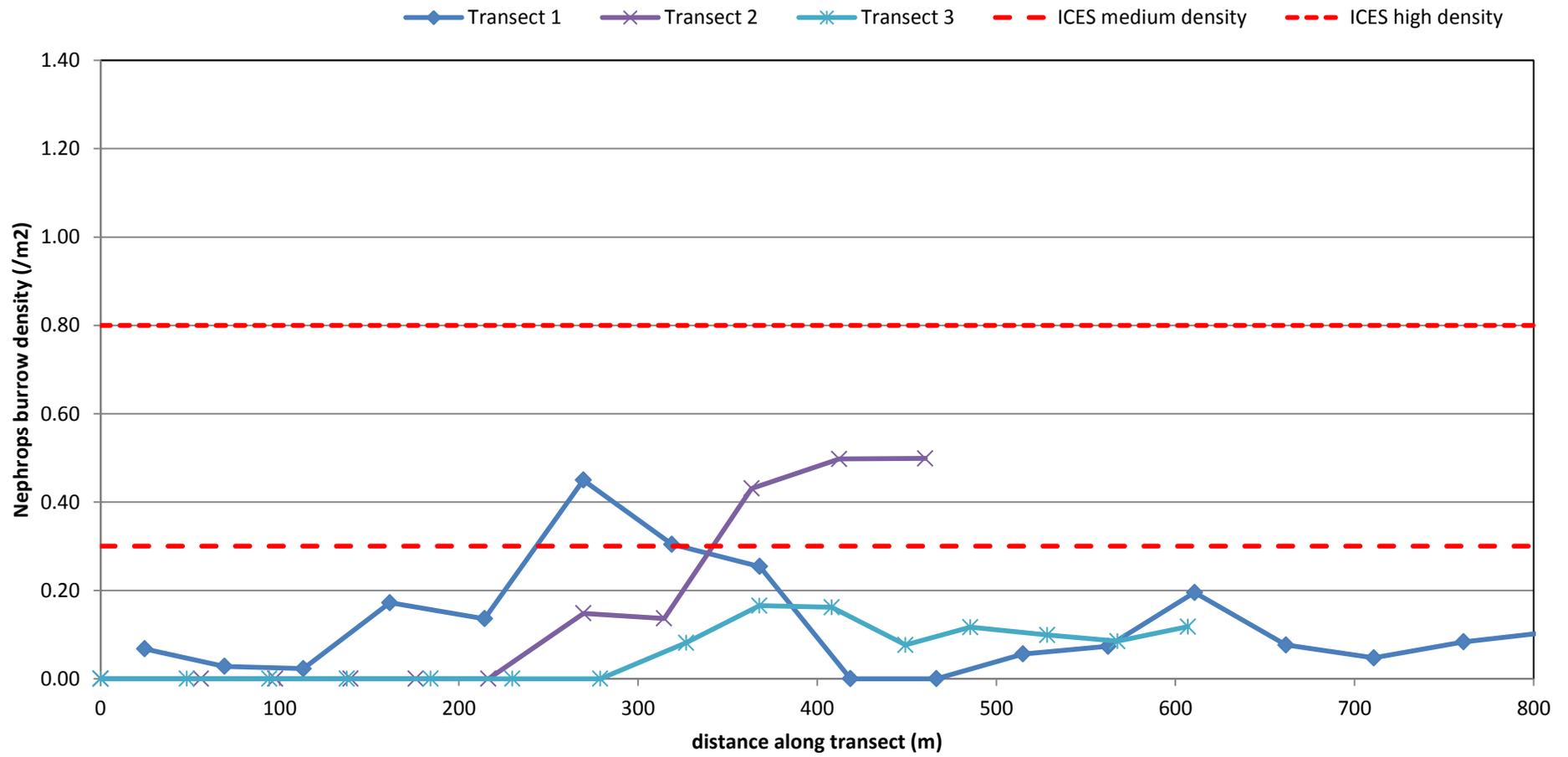


Figure 6. Nephrops burrow density along video transects, South Bute



Figure 7 (still 1). Coarse silt, *Urticina eques*, *Pagurus*, *Balanus*



Figure 8 (still 6). Trawl scars, *Nephrops* burrow entrances, *Munida rugosa*



Figure 9 (still 7). *Nephrops* burrow entrances, *Munida rugosa*

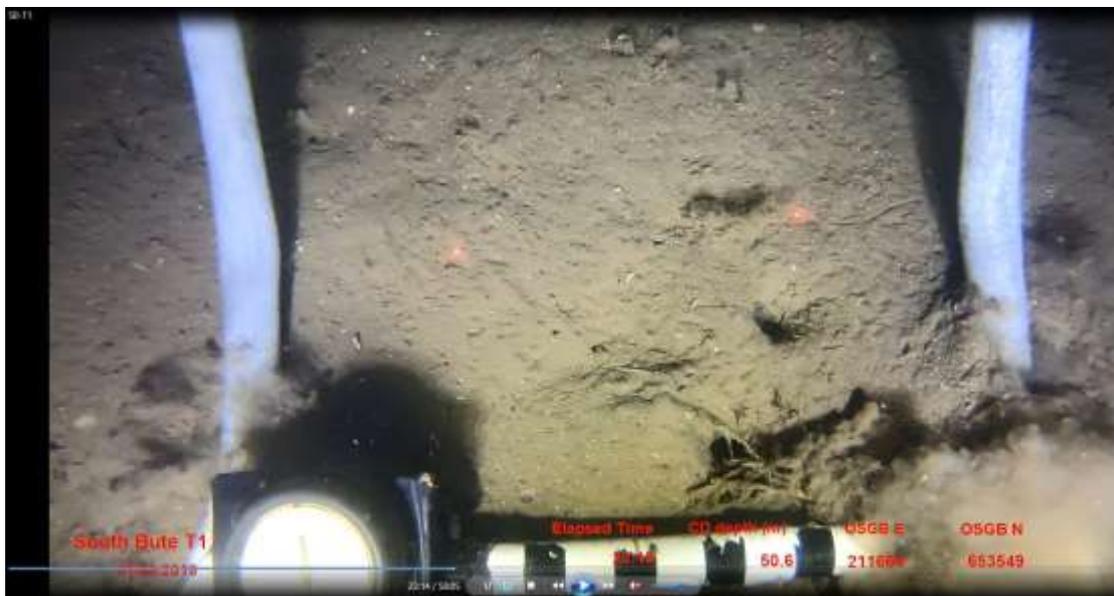


Figure 10 (still 10). Silty fine sand, unidentified burrow entrance



Figure 11 (still 11). *Nephrops norvegicus*



Figure 12 (still 16). Silty fine sand habitat

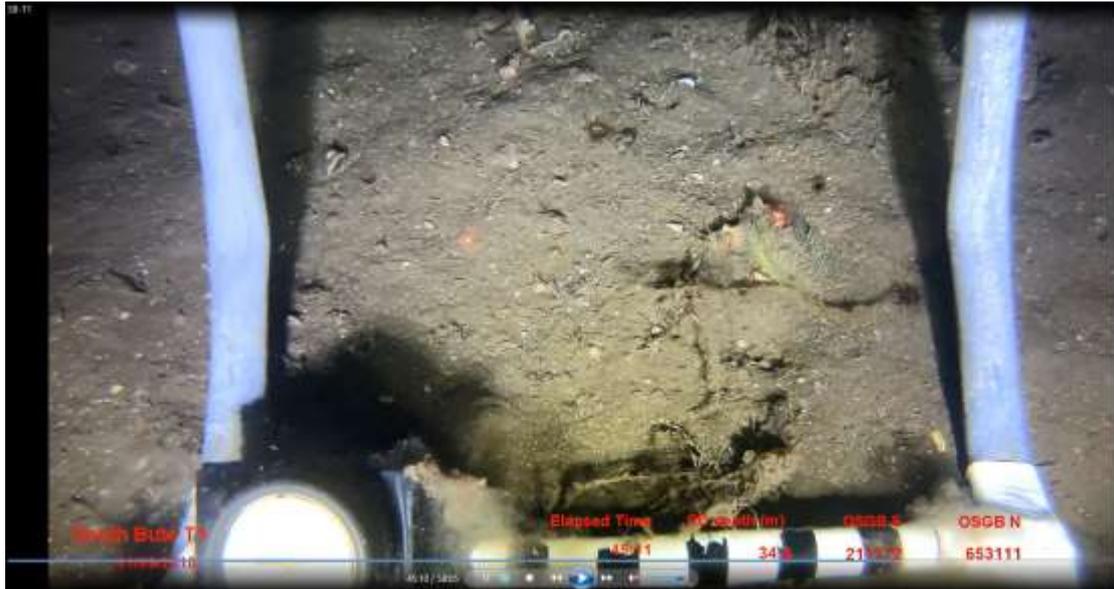


Figure 13 (still 17). *Aphrodita aculeata*, *Cerianthus lloydi*, *Spirobranchus* sp.



Figure 14 (still 18). Dab, hydroids



Figure 15 (still 20). Fine sand habitat



Figure 16 (still 22). Silty fine sand habitat



Figure 17 (still 2). medium sand and shell, *Cerianthus lloydi*, nudibranch egg mass?



Figure 18 (still 5). *Nemertesia antennina*, *Cerianthus lloydi*



Figure 19 (still 6). Boulder with hydroid turf



Figure 20 (still 9). *Nephrops norvegicus*

Table 1. South Bute 01 September 2018 transect start and end positions

transect	start						end					
	deg-N	min-N	deg-W	min-W	OSGB E	OSGB N	deg-N	min-N	deg-W	min-W	OSGB E	OSGB N
1	55	44.475	5	0.137	211632	653852	55	43.947	4	59.962	211773	652865
2	55	44.256	5	0.243	211504	653451	55	44.297	4	59.750	212023	653504
3	55	44.134	5	0.220	211518	653223	55	44.177	4	59.717	212048	653280

Table 2. South Bute Nephrops burrow counts

transect	interpretation segment	area	entrance count	density	depth
		m2		burrows/m2	m
T1	00:00:00	29.6	6	0.07	54.4
T1	00:02:00	23.8	2	0.03	54.3
T1	00:04:00	29.0	2	0.02	55.1
T1	00:06:00	29.0	15	0.17	55.3
T1	00:08:00	34.4	14	0.14	53.6
T1	00:10:00	31.9	43	0.45	52.0
T1	00:12:00	27.4	25	0.30	52.2
T1	00:14:00	31.5	24	0.25	49.0
T1	00:16:00	29.3	0	0.00	53.2
T1	00:18:00	28.3	0	0.00	49.1
T1	00:20:00	29.7	5	0.06	53.0
T1	00:22:00	27.2	6	0.07	52.7
T1	00:24:00	30.7	18	0.20	47.7
T1	00:26:00	30.5	7	0.08	47.5
T1	00:28:00	28.3	4	0.05	49.0
T1	00:30:00	31.9	8	0.08	49.2
T1	00:32:00	28.2	9	0.11	45.9
T1	00:34:00	32.4	2	0.02	47.2
T1	00:36:00	33.9	1	0.01	48.0
T1	00:38:00	25.6	0	0.00	37.4
T1	00:40:00	27.0	0	0.00	36.0
T1	00:42:00	41.5	0	0.00	37.8
T1	00:44:00	38.7	0	0.00	36.4
T1	00:46:00	31.1	0	0.00	35.3
T1	00:48:00	32.9	0	0.00	36.8
T1	00:50:00	32.0	0	0.00	40.5
T1	00:52:00	32.8	2	0.02	41.3
T1	00:54:00	34.9	0	0.00	42.1
T1	00:56:00	39.7	0	0.00	41.4
T2	00:00:00	33.6	0	0.00	9.1
T2	00:02:00	24.9	0	0.00	17.6
T2	00:04:00	25.2	0	0.00	23.6
T2	00:06:00	21.9	0	0.00	28.2
T2	00:08:00	24.3	0	0.00	32.6
T2	00:10:00	31.9	0	0.00	40.6
T2	00:12:00	27.0	12	0.15	55.6
T2	00:14:00	29.3	12	0.14	62.6
T2	00:16:00	29.4	38	0.43	66.6
T2	00:18:00	28.8	43	0.50	70.4
T2	00:20:00	29.4	44	0.50	74.2
T3	00:00:00	28.9	0	0.00	12.6
T3	00:02:00	27.6	0	0.00	18.9
T3	00:04:00	25.9	0	0.00	25.6

T3	00:06:00	28.0	0	0.00	28.3
T3	00:08:00	27.4	0	0.00	30.8
T3	00:10:00	29.4	0	0.00	35.0
T3	00:12:00	28.8	0	0.00	45.2
T3	00:14:00	24.5	6	0.08	53.2
T3	00:16:00	24.2	12	0.17	57.0
T3	00:18:00	24.7	12	0.16	60.1
T3	00:20:00	21.8	5	0.08	63.8
T3	00:22:00	25.7	9	0.12	68.8
T3	00:24:00	23.6	7	0.10	73.9
T3	00:26:00	23.6	6	0.08	80.5
T3	00:28:00	8.5	3	0.12	87.9

SOUTH BUTE APPENDIX A. VIDEO INTERPRETATION

	depth	elapsed time	description
T1	54.4	00:00:00	coarse silt, shell, Nephrops, Calocaris burrows. Turritella. Amphiuira tips? (or Myriochele) Bivalve siphon? Munida. Urticina, prob eques. Balanus. Pagurus. Still 1. Trisopterus sp.? (luscus and minutus). Stopped.
	54.3	00:02:00	coarse silt. Cerianthus. Crangonid? (Philocheirus,Pontophilus?) still 2. Calocaris, Nephrops burrows. Munida in burrow. Hooked? (re-tracing track)
	55.1	00:04:00	coarse silt. Asterias. Calocaris burrows still 3. Off-bed
	55.3	00:06:00	Off bed, coarse silt. Calocaris, Nephrops burrows. Still 4. Trisopterus. Munida. Trawl scars.
	53.6	00:08:00	coarse silt, Nephrops, Calocaris burrows. Trisopterus. Munida. Bivalve siphon. Urticina eques still 5.
	52.0	00:10:00	coarse silt, Nephrops Calocaris burrows. Trawl scars. Melanogrammus. Munida. Still 6.
	52.2	00:12:00	coarse silt, Nephrops, Calocaris burrows. Munida. Asterias. Pecten. Crangonid 13:10. Trawl scars. Fucoid detritus. Grey gurnard. Trisopterus. Cerianthus.
	49.0	00:14:00	coarse silt. Nephrops burrows. Cerianthus. Munida. Still 7. Kelp, fucoid detritus.
	53.2	00:16:00	silty fine sand. Occasional pebbles and cobbles. Cerianthus. Munida. Bivalve siphons. Small Aequipecten. Kelp detritus. Boulder, with abraded hydroid turf and Nemertesia. Gurnard, Pholis still 8. Another Pholis.
	49.1	00:18:00	silty fine sand with scattered pebbles. Siphon, Cerianthus. Still 9. Munida. Cobbles and boulders.
	53.0	00:20:00	silty fine sand. Cerianthus. Nephrops burrows. Munida.
	52.7	00:22:00	silty fine sand. Still 10. Munida. Trisopterus. Solenette. Nephrops burrows, Siphons. Aequipecten. Philine. Asterias. Cerianthus. Virgularia.
	47.7	00:24:00	silty fine sand. Nephrops burrows. Siphons. Cerianthus. Still 11. Kelp debris.
	47.5	00:26:00	coarse silt. Nephrops, Calocaris burrows. Siphons. Cerianthus.
	49.0	00:28:00	coarse silt. Occ Nephrops burrows. Cerianthus. Pholis still 12. Munida. Pecten. Kelp detritus.
	49.2	00:30:00	coarse silt. Cerianthus. Calocaris and Nephrops burrows. Alcyonium.
	45.9	00:32:00	coarse silt, algal detritus. Munida. Pecten. Cerianthus. Urticina (retracted). Alcyonium. Calocaris burrows. Nephrops burrows.
	47.2	00:34:00	coarse silt. Munida. Cerianthus. Alcyonium on pebbles. Moribund Virgularia (stalk)? Nephrops burrow.
	48.0	00:36:00	coarse silt. Buccinum. Still 13. Nephrops burrow. Munida. Aequipecten still 14. Trisopterus. Cerianthus.
	37.4	00:38:00	silty fine sand. Bottle. Cerianthus. Hydroid turf. Nemertesia antennina. Munida. Siphons.
	36.0	00:40:00	silty fine sand. Overturned. Munida. Alcyonium still 15. Cerianthus. Nemertesia. Liocarcinus. Halecium.
	37.8	00:42:00	silty fine sand still 16. Cerianthus. Boulders with hydroid turf. Alcyonium. Munida. Dab.
	36.4	00:44:00	silty fine sand. Nemertesia. Munida. Aequipecten. Cerianthus. Asterias. Ciona? Aphrodita still 17. Alcyonium. Small Virgularia? Dab. Asterias.
	35.3	00:46:00	fine sand, shell and pebbles. Virgularia. Munida. Aequipecten. Asterias. Pecten. Cerianthus. Goby (Pomatoschistus?). Alcyonium. Ciona. Nemertesia. Spirobranchus.
	36.8	00:48:00	fine sand, pebbles. Munida. Virgularia. Alcyonium. Spirobranchus. Cerianthus. Aequipecten. Ciona? Ascidia. Pecten. Asterias. Nemertesia. Dab still 18.
	40.5	00:50:00	fine sand. Cerianthus. Munida. Virgularia. Nemertesia. Alcyonium. Halecium still 19. Aequipecten.gurnard. Siphons.
	41.3	00:52:00	fine sand. Munida. Pecten. Still 20. Cerianthus. Spirobranchus. Alcyonium. Halecium. Virgularia. Ciona. Aequipecten. Nephrops 53:19. Asterias.
	42.1	00:54:00	fine sand, scattered shell and pebbles. Cerianthus. Munida. Alcyonium. Urticina. Siphons. Pecten. Halecium. Aequipecten. Philine. Nemertesia. Still 21. Virgularia. Gurnard? Pagurus.
	41.4	00:56:00	silty fine sand. Virgularia. Munida. Cerianthus. Stopped. Still 22. Sabellid tubes?
	T2	9.1	00:00:00
17.6		00:02:00	fine sand and shell. Detached algae. Cerianthus. Ciona. Spirobranchus. Still 3. Liocarcinus. Nemertesia antennina. Alcyonium.
23.6		00:04:00	silty sand and shell. Spirobranchus. Ciona. Cerianthus. Nemertesia. Munida. Luidia. Myxicola still 4. Asciidiella aspersa. Serpula tube? 05:08. Alcyonium. Hydroid Sertularia sp?. Necora puber.
28.2		00:06:00	silty sand and shell. Munida. Asciidiella. Nemertesia antennina. Pecten. Boulders with hydroid turf still 6. Cerianthus. Porania. Luidia.
32.6		00:08:00	silty fine sand and gravel. Sparse hydroid turf on pebbles and scattered boulders. Siphons. Asciidiella. Munida. Barnacles. Aequipecten still 7. Cerianthus. Serpula?.
40.6		00:10:00	silty fine sand. Sparse hydroids. Scattered boulders. Nemertesia. Munida. Echinus. Still 8. Cerianthus. Asterias. Pecten. Porania. Alcyonium.
55.6		00:12:00	silty fine sand and pebbles with hydroids. Munida. Cerianthus. Buccinum. Occasional Nephrops and other burrows. Dragonet 13:43.
62.6		00:14:00	coarse silt. Munida. Metridium. Trisopterus. Nephrops burrows. Haddock. Gurnard.
66.6		00:16:00	medium silt. Nephrops 16:05 still 9 Abundant Nephrops and Calocaris burrows
70.4		00:18:00	soft mud. Nephrops and Calocaris burrows. Haddock. Pagurus. Trisopterus. Several Nephrops
74.2		00:20:00	soft mud. Nephrops and Calocaris burrows. Numerous Nephrops
T3 io stills		12.6	00:00:00
	18.9	00:02:00	Gravel, coarse sand and shell. Spirobranchus. Egg mass? Asterias. Ciona. Cerianthus. Nemertesia. Serpula? Echinus. Asciidiella.
	25.6	00:04:00	Silty gravel and shell. Ciona. Echinus. Nemertesia. Alcyonium. Nudibranch egg mass. Munida. Asciidiella. Spirobranchus. Liocarcinus. Asterias.
	28.3	00:06:00	Gravelly fine sand. Nemertesia. Alcyonium. Munida. Spirobranchus. Liocarcinus. Asterias. Luidia. Kelp detritus. Boulders with hydroids.
	30.8	00:08:00	Gravelly fine sand. Sabella tube? Munida. Cerianthus. Spirobranchus on pebbles. Nemertesia. Alcyonium. Liocarcinus. Asciidiella
	35.0	00:10:00	Gravelly fine sand. Nemertesia. Munida. Spirobranchus. Cerianthus. Alcyonium. Asterias.
	45.2	00:12:00	Silty sand with shell and gravel, scattered cobbles. Munida. Alcyonium. Nemertesia. Pagurus. Cerianthus.
	53.2	00:14:00	Coarse silt, scattered pebbles with hydroids. Munida. Pagurus. Siphons. Small burrow entrances. Virgularia. Nephrops burrows.
	57.0	00:16:00	soft mud. Few Nephrops burrows. Trawl scars. Munida
	60.1	00:18:00	soft mud. Few Nephrops and Calocaris burrows. Haddock. Munida. Urticina eques. Gurnard.
	63.8	00:20:00	soft mud. Few Nephrops burrows. Haddock. Trawl scars. Munida.
	68.8	00:22:00	soft mud. Single Sabella tube. Trawl scars, barren; then a few Nephrops and Calocaris burrows.
	73.9	00:24:00	soft mud. Nephrops 24:31. Scraped, barren
	80.5	00:26:00	soft mud. Arachnanthus? (PMF) 26:00. Still SB T3 1. Nephrops. Juv Virgularia. Munida.
	87.9	00:28:00	soft mud

SOUTH BUTE APPENDIX B. CAPTURED STILL IMAGES

Figure	transect	still	video file time
1	T1	1 coarse silt, <i>Urticina eques</i> , <i>Pagurus</i> , <i>Balanus</i>	00:00:11
	T1	2 coarse silt habitat	00:02:00
	T1	3 <i>Calocaris</i> burrow	00:05:27
	T1	4 coarse silt habitat	00:06:31
	T1	5 <i>Urticina eques</i> , <i>Pagurus</i> , <i>Balanus</i>	00:09:54
2	T1	6 Trawl scars, <i>Nephrops</i> burrow entrances, <i>Munida rugosa</i>	00:10:55
3	T1	7 <i>Nephrops</i> burrow entrances, <i>Munida rugosa</i>	00:14:51
	T1	8 Boulder with hydroids, dragonet, butterflyfish	00:17:38
	T1	9 silty fine sand, <i>Cerianthus lloydi</i> , bivalve siphon	00:18:03
4	T1	10 silty fine sand, unidentified burrow entrance	00:22:15
5	T1	11 <i>Nephrops norvegicus</i>	00:25:35
	T1	12 Butterflyfish, <i>Cerianthus lloydi</i> , <i>Suberites carnosus</i> , burrow entrances	00:28:34
	T1	13 coarse silt habitat, <i>Buccinum undatum</i>	00:36:00
	T1	14 <i>Aequipecten opercularis</i> , <i>Munida rugosa</i>	00:37:18
	T1	15 <i>Alcyonium digitatum</i> on cobble	00:41:44
6	T1	16 silty fine sand habitat	00:42:05
7	T1	17 <i>Aphrodita aculeata</i> , <i>Cerianthus lloydi</i> , <i>Spirobranchus</i> sp.	00:45:11
8	T1	18 Dab, hydroids	00:49:47
	T1	19 <i>Halecium</i> sp.	00:50:42
9	T1	20 fine sand habitat	00:52:03
	T1	21 <i>Munida rugosa</i> , unidentified burrow entrance	00:55:18
10	T1	22 silty fine sand habitat	00:57:01
11	T2	1 medium sand and shell, <i>Cerianthus lloydi</i> , <i>Lanice conchilega</i>	00:00:55
	T2	2 medium sand and shell, <i>Cerianthus lloydi</i> , nudibranch egg mass?	00:01:47
	T2	3 fine sand and shell. <i>Spirobranchus</i>	00:02:21
	T2	4 <i>Myxicola infandibulum</i> , <i>Cerianthus lloydi</i>	00:04:42
12	T2	5 <i>Nemertesia antennina</i> , <i>Cerianthus lloydi</i>	00:05:42
13	T2	6 Boulder with hydroid turf	00:06:14
	T2	7 silty fine sand, <i>Aequipecten opercularis</i> , <i>Munida rugosa</i>	00:09:18
	T2	8 <i>Echinus esculentus</i> , hydroids	00:10:21
14	T2	9 <i>Nephrops norvegicus</i>	00:19:05
15	T3	1 <i>Arachnanthus sarsi</i> ?, <i>Munida rugosa</i>	00:26:00