Distribution mapping and health assessment of honeycomb worm, *Sabellaria alveolata,* reefs on Heysham Flat, Lancashire

Report to the North Western Inshore Fisheries and Conservation Authority

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1 Acknowledgements

This report was conducted as part of Cumbria Wildlife Trust and the Wildlife Trust for Lancashire, Manchester and North Merseyside's Marine Graduate Training Programme in collaboration with the North Western Inshore Fisheries and Conservation Authority. This work was enabled, supervised and edited by Mandy Knott[1] and Dr Emily Baxter[2].

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2 Introduction

2.1 Background

Sabellaria alveolata is a sessile, tube-dwelling polychaete worm. Settling on hard substratum, after a planktonic larval stage, they form colonies that can develop into large biogenic reefs. Once settled, these worms begin to construct tubes around themselves from particles of sand and shell fragments held together with mucous. They construct their tubes in close proximity to one another, creating a honeycomb-like structure – hence their common name the honeycomb worm.

2.1.1 Distribution

The distribution of Sabellariidae appears to be geographically limited to between 72°N and 53°S (Kirtley & Tanner, 1968 cited in Allen *et al.,* 2002). Information is more limited when considering *S. alveolata* separately. However, found in the North Sea, eastern North Atlantic and south to Senegal, it is generally considered prevalent along much of the coast of north-west Europe (Allen *et al.,* 2002; Nieuwenhuijzen, *et al.,* unspecified date). In Great Britain the vast extent of *S. alveolata* has been recorded on the west coast between south Devon and the Solway Firth, with small isolated recordings also appearing in the south and north of eastern England (Gubbay, 1988) (Figure 1). This distribution pattern is related to the specific environmental conditions that *S. alveolata* requires to colonise an area successfully.

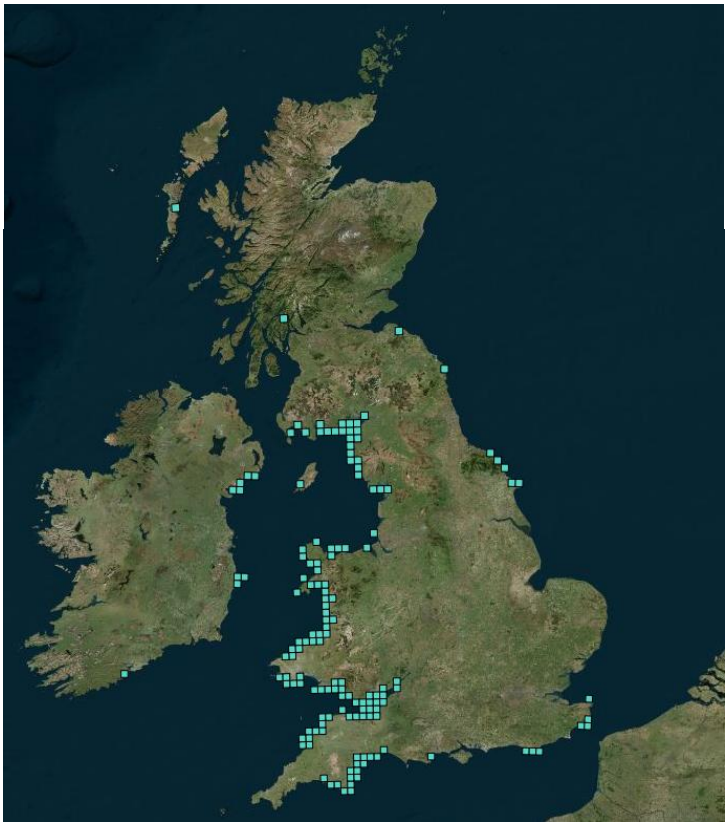


Figure 1. Distribution of *Sabellaria alveolata* in UK waters
Source: NBN Gateway, JNCC 2014[3]

2.1.2 Environmental requirements

Sabellaria alveolata needs a hard, exposed substratum for the pioneering settlement to develop. After this initial stage, new worms commonly settle on pre-existing formations. *Sabellaria alveolata* settling on areas bereft of these features have been reported, for example when sand is sufficiently populated by the sand mason *Lanice conchilega* to stabilise it (Larsonneur, 1994).

These marine species survive best on the low shore (Allen *et al.*, 2002). They occur most frequently on the lower third of the shore but are recorded higher on the shore and also frequently sub-tidally, at times as deep as 20 m (Allen *et al.*, 1991; Mettam *et al.*, 1989). Their metabolism and therefore growth increases with temperature until plateauing after 20^{o}C (Gruet, 1982). Below 5^{o}C the growth of *S. alveolata* is seriously constrained and these worms often do not survive extended periods of severely low temperatures, especially if located higher up the shore (Wilson, 1971; Gruet, 1982).

Honeycomb worms are filter feeders and build their protective tubing from suspended particles in the water column. It is for these reasons that they are located in areas with exposed coastal conditions with turbulent, high current velocity waters created by wave or tidal actions (Holt *et al.*, 1998). These factors, hard substratum existing next to an adequate supply of sand and sufficient water movement to mobilise large quantities of suspended food and coarse sand particles, provide the ideal environment for *S. alveolata* colonisation and growth.

2.1.3 Population dynamics

A great amount of historical work has been carried out on the biology and life history of honeycomb worms, and the abiotic and biotic factors that may influence them (Wilson, 1968, 1970, 1974; Gruet, 1982, 1986; Pawlik, 1988). Such studies have revealed that *S. alveolata* can live for up to 10 years but typically survive for between three and five years (Wilson, 1974; Gruet, 1982). Because new individuals prefer to settle on active colonies or the remains of old colonies, the age and morphology of reefs are not directly related to the age of individual worms. Gruet (1982) divided *S. alveolata* settlements into three different types of reef formation; sheets, hummocks and reefs. When found on more heterogeneous shores, *S. alveolata* tends to encrust the substratum. On homogeneous sandy shores, however, the colonies evolve first in globular formations and then, with time, extend into reef platforms (Gruet, 1986). These morphological changes are related to the development stages of the colony.

Sabellaria alveolata are dioecious. In previous research they are described as reproducing seasonally, generally in July in Britain, or in response to physical disturbances (Wilson, 1968 in Allen *et al.*, 2002; Pawlik, 1988). Settlement is delayed and may not occur until months after spawning, often observed throughout the winter months (Wilson, 1974). *Sabellaria alveolata*, as a population and geological structure, evolves in developmental cycles. Gruet (1986) describes such a cycle in four stages; primary settlement phase, growth phase, stagnation phase and destruction phase, occurring over ten years. One or all phases may be observed in an area of *S. alveolata* at any one time.

2.1.4 Associated biodiversity

The biogenic reefs that are created by *S. alveolata* are recognised as potential community enhancers. By creating variation in an otherwise largely homogeneous environment, and by stabilising loose substrate and restricting water flow to form pools, they may provide niches for a large array of species. Researchers have been investigating such hypotheses for decades. The

conclusions that have developed suggest that reefs that are actively growing will, commonly, completely dominate the eulittoral zone but, as they enter the destruction phase, tubes of older or damaged worms provide new niches and microenvironments that are colonised by exploitative species (Porras *et al.* 1996; Dias & Paula, 2001; Dubois *et al.* 2002).

Enrichment of the communities, by the presence of *S. alveolata*, has been studied in Morecambe Bay (Woombs, 1997; 1999). The species most commonly found associated with the reefs were *Arenicola marina, Asterias rubens, Balanus crenatus, Semibalanus balanoides, Elminius modestus, Electra pilosa, Pomotoceros triqueter, Sagartia elegans* and *Metridium senile* (Woombs, 1999). Large numbers of the blue mussel, *Mytilus edulis*, have also been recorded in close vicinity to *S. alveolata* reefs.

2.1.5 Competition with the blue mussel, *Mytilus edulis*

Although a small amount of adult mussels can always be found at Heysham Flat, it is seed mussel that is found in extensive, dense settlements. Similarly to *S. alveolata, M. edulis* discriminates between substrata for settlement and tends to opt for hard substratum and within the vicinity of conspecific adults (Seed & Suchanek, 1992). Competition or a cyclical succession has been suggested to occur when *M. edulis* and *S. alveolata* occur adjacent to one another (Cunningham *et al.*, 1984; Perkins, 1988). Ephemeral mussel beds are a feature in Morecambe Bay, with very large areas existing off Morecambe, Heysham, and Walney and Foulney Islands.

Although mussels are highly adaptable, their presence and density are affected strongly by predation, inter- and intraspecific competition, and adverse weather conditions. The starfish *A. rubens* is a veracious predator of mussels and occurs unpredictably in high densities around Britain. When *M. edulis* occur in high densities, as found at Heysham Flat, the population can die from over-crowding and suffocation as a result of excessive self-produced biodeposits (Dare, 1976 in Seed & Suchanek, 1992). Also frequently observed at Heysham is mass numbers being washed out of the area during stormy weather. Despite a regular array of disturbances, mussels are “supreme competitors” for space and complete recovery and re-colonisation of beds is a classic characteristic of Mytilids throughout the world (Seed & Suchanek, 1992).

2.1.6 Conservation status of *Sabellaria alveolata*

Honeycomb worms often thrive in areas with high wave action (Holt *et al*., 1998). Due to the visco-elastic behaviour of the cement their tubes are built with, they are able to absorb much of the energy of these impacts (Le Cam *et al*, 2011). Despite this idiosyncrasy *S. alveolata* reefs are susceptible to damage from a number of anthropogenic and environmental threats. Storm damage and extreme cold weather erode the reef formation (Crisp 1964 in Allen *et al.*, 2002). Other factors, especially affecting the smaller hummocks, include prolonged burial, mussel encroachment and variable recruitment, largely dependent on settlement location and exposure. Trampling and fishing activity damage are considered the principle anthropogenic threats, with aquaculture, chemical contamination, and damage from cooling water discharges also recognised as factors that may negatively affect *S. alveolata* settlement (UK Marine SACs Project, 2001; Desroy, 2011).

Sabellaria alveolata has been classified under reefs as an Annex I habitat in the EU Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive). Since 1999 it has been noted as a priority habitat for biodiversity in the UK’s Biodiversity Action Plan and noted as a feature for protection in Marine Protected Areas (MPAs) in the UK. As a

result of the comprehensive classification it has received, and the erratic distribution of this species, projects and plans have been developed to monitor the status of this habitat.

2.2 Project aims & objectives

Morecambe Bay is designated as a Special Protection Area (SPA) and Special Area of Conservation (SAC) under the Habitats and Wild Birds Directives. The intertidal and sub-tidal parts of these designations form the European Marine Site (EMS), of which *S. alveolata* biogenic reefs are a feature of interest. A three-year rolling Management Scheme Action Plan is implemented by the Morecambe Bay European Marine Site Management Group to direct best practice, under the Habitats Directive, by the 13 relevant authorities (UK MPA SACs Project, 2001b). Under the monitoring and evaluation actions outlined in the 2011 – 2014 Action Plan, Natural England and North Western Inshore Fisheries & Conservation Authority (NW-IFCA) have agreed to monitor honeycomb worm reefs in the Bay.

This project aims to fulfil the above agreement by surveying "*the extent and health of the Heysham Flat Sabellaria reefs, as part of mussel stock assessments*" with the objective of revealing "*changes in the distribution and quality of honeycomb worm reefs…..to inform management of shell fisheries and other activities*" in the area (Morecambe Bay Partnership, 2012).

2.3 Previous surveys

Sabellaria alveolata has been recorded and studied for many years in the UK. It is prevalent in the west of England and therefore research has been focussed in this region. Although interest in honeycomb worms stems much further back, in the last 30 years a number of comprehensive studies have described *S. alveolata* distribution on the Lancashire and Cumbria coastline.

Cunningham *et al.* (1984) compared the distribution of *S. alveolata* at Heysham between 1959 and 1984 as part of an island-wide investigation of geographical distribution. The presence of honeycomb worms dropped from occasional frequency in 1959 to rare in 1961, and had completely disappeared by 1984. The same area was surveyed by English Nature (Woombs, 1997) over 10 years later and at this time *S. alveolata* area cover was recorded as rare. In 1999, however, it had increased in area cover to a level described as abundant (WA Marine, 1999).

In 2002, Allen *et al.* completed a comprehensive distribution and condition assessment of *Sabellaria alveolata* in north-west England. During this study the *S. alveolata* at Heysham was again recorded. The "presence of large colonies" of *S. alveolata* were recorded, mapped and assessed for health status. Also noted was a nearby mussel bed and the *S. alveolata* reefs were described as being located "adjacent to and just west of the main area of mussel bed" (Allen *et al*., 2002). Since the completion of this report and the commencement of the present study no other surveys of *S. alveolata* in the Heysham area has been uncovered to the best of my knowledge.

3 Survey location

The survey area was located on the rocky skear at Heysham Flat, Heysham, Lancashire (Latitude: 54.0590, Longitude: -2.9031).

This biogenic reef, recorded in the area over the last 30 years, covers an area of 2 ha in Morecambe Bay (Figure 2). The reef lies within an expansive offshore sandy bay but is accessible by foot. In close vicinity there are areas of mussel bed that are actively fished during open seasons.

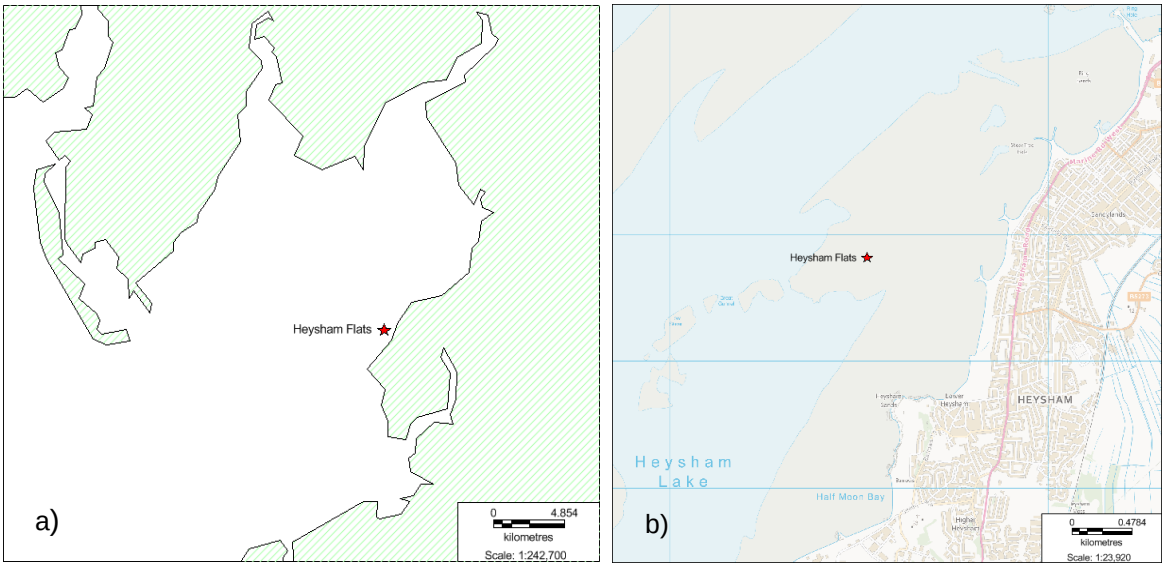


Figure 2. Location of Heysham Flat survey site
a) in relation to greater Morecambe Bay area; b) Heysham Flat and surrounding area

4 Field surveys

4.1 Survey organisation

4.1.1 Access permissions

This project was run under an agreement outlined in the Morecambe Bay Management Scheme Action Plan for the North Western Inshore Fisheries and Conservation Authority (NWIFCA) to monitor *S. alveolata* reefs on Heysham Flat. Notification of the coastguard was required before and after every survey.

4.1.2 Licenses

The surveys did not require the collection of specimens or samples and no license was required under the Wildlife and Countryside Act 1981.

4.1.3 Site of Special Scientific Interest (SSSI) consent

The surveys were non-destructive and no samples were taken. No operations likely to damage the special interest of the Morecambe Bay SSSI, planned or otherwise, were conducted as part of these surveys, therefore SSSI consent was not required.

4.1.4 Dates, tides & surveying hours

Aside from the initial reconnaissance survey, two full surveys were carried out in 2011 in early autumn (30 August and 27 September). In 2012, the project was expanded and surveys were completed in the summer (3 and 20 August) and autumn (15 October) seasons. The programme

continued to expand in 2013 with surveys conducted in spring (2 April), summer (27 June and 24 July) and autumn (10 October). Surveys were organised, whenever possible, on spring tides around extreme low water so that the furthest extent of the reef could be surveyed (Table 1). The surveys were conducted two hours before and up to one hour after the time of low tide.

Table 1. Survey dates and corresponding daylight hours and tide times.

Date	Time of sunrise (BST)	Time of sunset (BST)	Time of low tide (BST)	Height of low tide (m)	Time of high tide (BST)	Height of high tide (m)
30/08/11	06:17	20:08	07:05/19:15	0.6/0.8	12:50	10.1
27/09/11	07:07	18:58	06:00/18:10	0.8/0.9	11:40	10.0
03/08/12	05:30	21:05	07:15/19:30	0.8/1.1	12:50	9.5
20/08/12	06:00	20:29	08:05	0.9	13:50	9.7
15/10/12	07:41	18.13	05:55/18:05	1.1/1.2	11:40	9.9
02/04/13	06:40	19:15	10:40	1.8	16:30	8.6
27/06/13	04:41	21:48	09:25	0.7	15:00	9.4
24/07/13	05:13	21:23	19:50	0.8	00:40	10.2
10/10/13	07:31	18:25	09:40	2.0	15:30	9.1

4.1.5 Surveyors

The surveys have been conducted as part of the Marine Graduate Training Programme (MGTP), led by Cumbria Wildlife Trust (CWT) and the Wildlife Trust for Lancashire, Manchester and North Merseyside (WTLMNM), in collaboration with the NWIFCA. The marine graduates who have led the surveys and compiled annual reports on the surveys were Jonathan Haines, Emily Miles, and Sian Egerton in 2011, 2012 and 2013 respectively. Other surveyors from the MGTP have included: Nicola Taylor, Rebecca Oliver and Laurence Browning in 2011; Rebecca Hunter, Rebecca Wilcox and Joe Moulton in 2012; and Anna Bunney, Rachael Wright and Jonathon Holt in 2013. Initial summer surveys have been led, and the methods introduced, by the science officers at the NWIFCA, namely Senior Scientist Mandy Knott, Helen Ake (2011 and 2012), and Abigail Leadbeater (2013). Other surveyors that have aided on one or more occasion have included Emily Baxter of the North West Wildlife Trusts, and Helen Ake, Holly Latham and Tarn Drylie of Natural England.

4.2 Methodology

On commencement of the project in 2011, the location and distribution of *S. alveolata* were recorded. The perimeter of the honeycomb worm settlements were tracked on foot and logged using a Garmin 67 GPS. Areas of live worm tubes were recorded and, where appropriate, the area was mapped. The time at which the lowest point on the seaward side of the bed could be reached was recorded. To support observations, a digital camera was used, at waypoints logged with the GPS, to capture visual data of the state of the *S. alveolata* reefs.

The honeycomb worm settlement was surveyed following methods developed by NWIFCA (Haines, 2011) to record distribution and health of the worms. The survey site was segmented into a 50 m x 50 m grid of waypoints. At each waypoint, a 0.5 m^2 quadrat was placed randomly in the vicinity of the point and the percentage cover of *S. alveolata* was recorded. *Mytilus edulis* was divided into two categories; adult mussels, ≥45 mm, the minimum landing size in north-west England, and under-size mussels, <45 mm. The percentage cover of these categories were also recorded as well as

other possible substrates present, categorised as; cobble-stone, mussel mud, sand, shell, bare rock, algae, water pools and other. If *S. alveolata* was present the type of colony formation (sheet, hummock, patchy, reef; for descriptions see Table 2) was identified and recorded as a percentage of the total *S. alveolata* cover (100%). The percentage proportion of the health of the colony (newly settled worms, those with crisp apertures, those with worn apertures and dead worms) was similarly estimated. A photographic guide to the classification of *S. alveolata* formation type and health was used to increase accuracy and standardise recordings (Appendix 1). Each quadrat surveyed was photographed and the photo logged for post-assessment of the data collected, if required.

Table 2. Descriptions of different formation types used to categorise *Sabellaria alveolata* colonies
From Gruet, 1984

Formation	Description
Patchy	Small crusts or mounds which are less than 30cm^2
Hummock	Raised mound which are greater than 30cm^2
Sheet	Flat crust which are greater than 30cm^2
Reef	Large mounds which are greater than 1m^2

In summer 2012, a large number of new waypoints were added, increasing the survey area, to take into account the increased distribution of *S. alveolata.* The October survey in 2012 and the April survey in 2013 focussed on another new area to the south-east of previous waypoints. In 2013, all previous survey areas were covered and a small number of new waypoints were added to provide a clearer assessment of the change in distribution of the honeycomb worm colonies (see Appendix 1l). In 2012 and 2013 the survey methodology was further developed through a rudimentary assessment of biodiversity made by recording the number of species present within each quadrat, aside from *S. alveolata* and *M. edulis*. Species were recorded to the lowest possible taxonomic level without aid of keys or guides.

4.3 Data analysis

Data from all surveys were digitised, integrated and measuring units standardised. Records with discrepancies that could not be resolved were removed from the dataset.

Analysis focussed on investigating changes in:

- Distribution (i.e. percentage area cover) of *S. alveolata*
- Health status and formation type of *S. alveolata*
- Distribution of *M. edulis*
- Biodiversity associated with *S. alveolata* reefs

4.3.1 Statistical analysis

Initial analysis included the calculation of the average percentage cover of *S. alveolata* in the three years and the associated variance. A Kruskal Wallis rank sum test was run in R 2.15.2 statistical software package to investigate a difference in percentage cover of *S. alveolata* in a sub-sample of waypoints that were surveyed in all three years.

Associations between formation type and health status of the honeycomb worm colonies were investigated by calculating the mean abundance of honeycomb worms recorded in different health states on colonies found in each of the formation types and the results were displayed in a bar-chart to facilitate comparisons.

The data on percentage area cover of *M. edulis* were processed and the differences between seasons and years were analysed.

Finally a Spearman's rank-order correlation was used in R 2.15.2 statistical software package to investigate any possible association between the percentage cover of *S. alveolata* and species richness (the number of species recorded in each quadrat recorded in 2012 and 2013).

4.3.2 Mapping data

Maps were created using MapInfo 11.5 GIS software, with data overlaid on Ordinance Survey maps. Thematic maps were created to display the distribution of *S. alveolata* in 2011, 2012 and 2013, the distribution of the principle formation type of *S. alveolata* in 2011, 2012 and 2013; the distribution of the principle health status of *S. alveolata* in 2011, 2012 and 2013 and the distribution of *M. edulis*, in adult and under-size categories, in 2011, 2012 and 2013. Maps displaying density estimate polygons of ≥30% and ≥70% *S. alveolata* area cover were created for the 2011, 2012 and 2013 survey years to outline areas of high importance and highlight the variability across the years. Every waypoint recorded in any of the three years was marked on each of the maps to allow for a clearer analysis of the changes observed across the three years.

5 Results

Nine surveys were completed between 30 August 2011 and 10 October 2013. From the data ascertained, geographical differences between the three survey years, in the distribution, reef formations and health stages are evident (Figures 3 – 6). In 2011, honeycomb worms were found solely in the south-west of the final survey area. In 2012, the reefs grew out eastwards and to the north-east. In 2013, a portion of reef in the south-east of the survey area had disappeared but more *S. alveolata* was recorded on the northern periphery of the survey area.

Table 3. Number of waypoints surveyed in 2011, 2012 and 2013 at Heysham Flat, Lancashire

Survey Year	2011		2012			2013			
Survey Date	30/08	27/09	03/08	20/08	15/10	02/04	27/06	24/07	10/10
No. waypoints (points) surveyed	22	27	37	49	62	63	59	45	51
Notes			Survey area increased			Repeat of autumn 2012 points	Repeat of summer 2012 points		Partial repeat of summer 2013 points
				New survey area covered					

5.1 *Sabellaria alveolata* distribution

Recording the distribution of *S. alveolata* was a primary objective of this project. In 2011, the first year of surveying, the survey area contained 49 survey points situated between latitudes 54.0547°N – 54.0572°N and longitudes -2.9185°W – -2.9117°W. The average *S. alveolata* percentage cover was 18.39 ± 3.82% (±1 s.e., *n* = 49). Twelve (24.5%) of the quadrats surveyed contained no *S. alveolata*, while 13 (26.5%) quadrats had a *S. alveolata* percentage cover of ≥30% (Figure 3a). In year two of the study, 2012, the distribution of *S. alveolata* increased greatly and therefore so did the survey area. The 2012 survey area extended to between latitudes 54.0545°N – 54.0620°N and longitudes -2.9178°W – -2.9065°W. The average *S. alveolata* percentage cover recorded was 19.48 ± 2.1% (±1 s.e., *n* = 148). Although the area was extended, 60 (40.5%) of the quadrats surveyed contained no *S. alveolata*, while five (30.4%) quadrats had a *S. alveolata* percentage cover of ≥30% (Figure 3b). The 2012 survey area was surveyed again in year three of the study, 2013. The average *S. alveolata* percentage cover in year three was 12.56 ± 1.57% (±1 s.e., *n* = 218). One hundred and twenty-eight (58.72%) of the quadrats surveyed contained no *S. alveolata*, while 36 (16.5%) quadrats had a *S. alveolata* percentage area cover of ≥30% (Figure 3c). If autumn duplicates are removed from the 2013 dataset, the average *S. alveolata* percentage cover decreases to 10.02 ± 1.63% (±1 s.e., *n* = 172), with 128 (74.42%) of the quadrats surveyed still containing no *S. alveolata*, while the number of quadrats with a *S. alveolata* percentage cover of ≥30% is nearly halved to 22 quadrats (12.79%; Table 4).

Figure 4 outlines where these areas of denser *S. alveolata* existed in each of the survey years and highlight the densest zones of ≥70% *S. alveolata* area cover.

Table 4. Percentage cover of *Sabellaria alveolata* on Heysham Flat in 2011, 2012 and 2013

	2011 (n = 49)	2012 (n = 148)	2013 (n = 218)
Mean *Sabellaria* cover (%) (± 1 s.e.)	18.39 ± 3.82	19.48 ± 2.1	12.56 ± 1.57
Samples with 0% *Sabellaria* (% of quadrat surveyed)	24.5	40.5	58.72
Samples with ≥25% *Sabellaria* (% of quadrat surveyed)	30.6	36.5	19.27

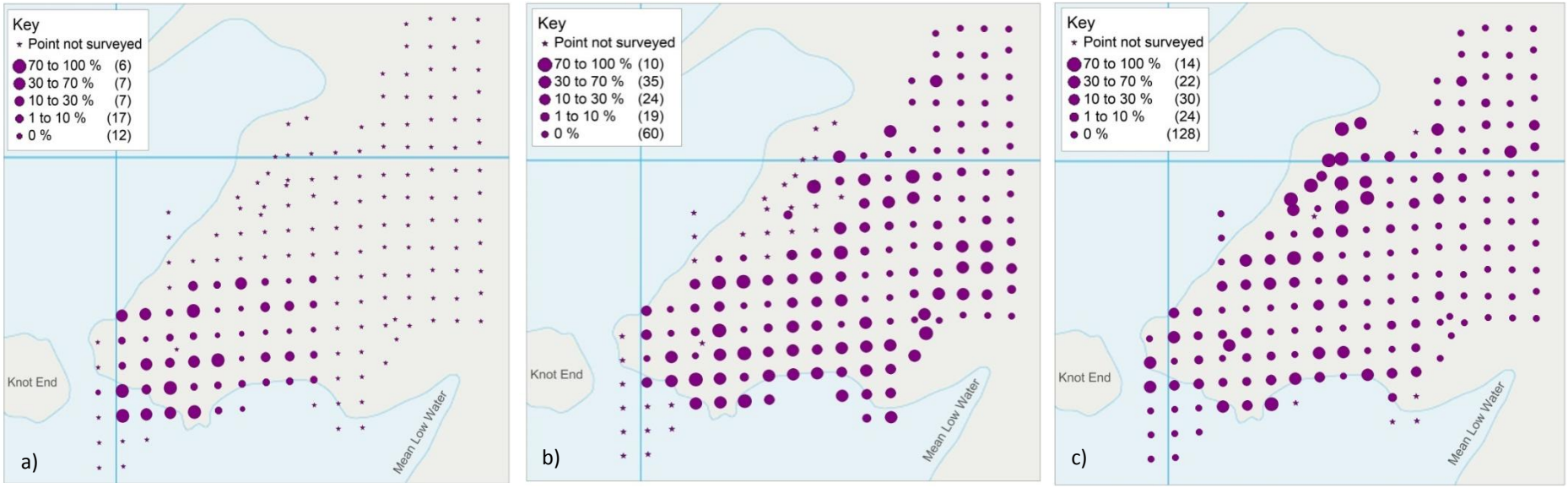


Figure 3. Percentage cover of *Sabellaria alveolata* on Heysham Flat

a) 2011 (surveys conducted on 30/08/11, low tide of 0.8 m at 19:15, and 27/09/11, low tide of 0.9 m at 18.10); b) 2012 (surveys conducted on 03/08/12, low tide of 1.1 m at 09.30, 20/08/12, low tide of 0.9 m at 08.05 and 15/10/12, low tide of 1.2 m at 18.05); and c) 2013 (surveys conducted on 02/04/13, low tide of 1.8 m at 10.40, 27/06/13, low tide of 0.7 m at 09.25, 24/07/13, low tide of 0.8 m at 19.50 and 10/10/13, low tide of 2.0 m at 09.40)

Taking only the quadrats that were surveyed in all three years (the survey area of 2011), a significant difference in *S. alveolata* percentage cover was found between 2012 and 2013 (Kruskal-Wallis rank sum test, H = 7.3669, df = 2, $p < 0.05$). No statistical analysis was carried out between the three years that took into account the increased survey area in year two and three. This is due to the fact that analysis had to be restricted to the survey stations that were surveyed in all years. The necessary expansion of the survey area in year two and three, to cover areas of new settlement by *S. alveolata*, suggests that significant differences between year one and later years may exist (Figure 3).

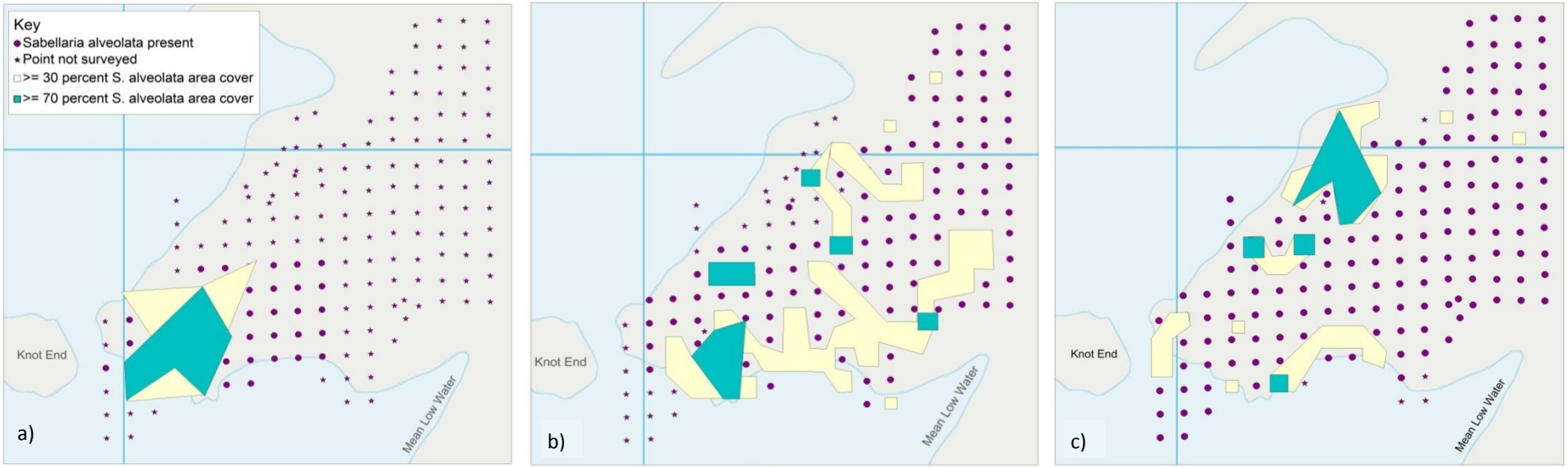


Figure 4. Presence of *Sabellaria alveolata* on Heysham Flat

a) 2011 (surveys conducted on 30/08/11, low tide of 0.8 m at 19:15, and 27/09/11, low tide of 0. 9m at 18.10); b) 2012 (surveys conducted on 03/08/12, low tide of 1.1 m at 09.30, 20/08/12, low tide of 0.9 m at 08.05 and 15/10/12, low tide of 1. 2m at 18.05); and c) 2013 (surveys conducted on 02/04/13, low tide of 1.8 m at 10.40, 27/06/13, low tide of 0.7 m at 09.25, 24/07/13, low tide of 0.8 m at 19.50 and 10/10/13, low tide of 2.0 m at 09.40)

5.2 Health and formation of *Sabellaria alveolata*

Focussing on the quadrats in which *S. alveolata* was recorded in; in 2011, in 26 (70%) quadrats surveyed, ≥50% of *S. alveolata* present was considered to have a patchy formation (Figure 8). This figure increased in 2012 (55 quadrats, 65%) and again in 2013 (61 quadrats, 69%), but the proportion of surveyed quadrats containing *S. alveolata* remained similar. A relatively steady increase in the number of quadrats with ≥50% reef formation was also seen over the three years. The number of quadrats surveyed with at least 50% of *S. alveolata* found in a hummock formation rose considerably (from seven to 19) between 2011 and 2012 before decreasing (to seven) again in 2013 (Figure 9). However, it is worth noting, with the increased survey area, that the amount of *S. alveolata* in hummock formation was a significantly smaller proportion (8% compared to 19%) in year three than in year one. *Sabellaria alveolata* found in sheet formation was overall low but has increased slightly in each subsequent year (Figure 5).

There were some noticeable changes in the prevalence of honeycomb worms recorded in the different health categories across the three years. It was most common to find worm tubes with a crisp aperture. The health in 2012 differed significantly from the other years, in terms of the amount of newly settled and, to a lesser extent, dead honeycomb worms. Only eight quadrats recorded, less than 10% of those surveyed, had ≥50% dead *S. alveolata* in 2012, while colonies consisting of ≥50% of newly settled *S. alveolata* were recorded in 43 quadrats (50% of those surveyed). This level of new settlement was only recorded in two quadrats in 2011 and 2013. Quadrats containing ≥50% dead honeycomb worms increased from 10 and eight quadrats, in 2011 and 2012 respectively, to 31 in 2013 (Figure 6).

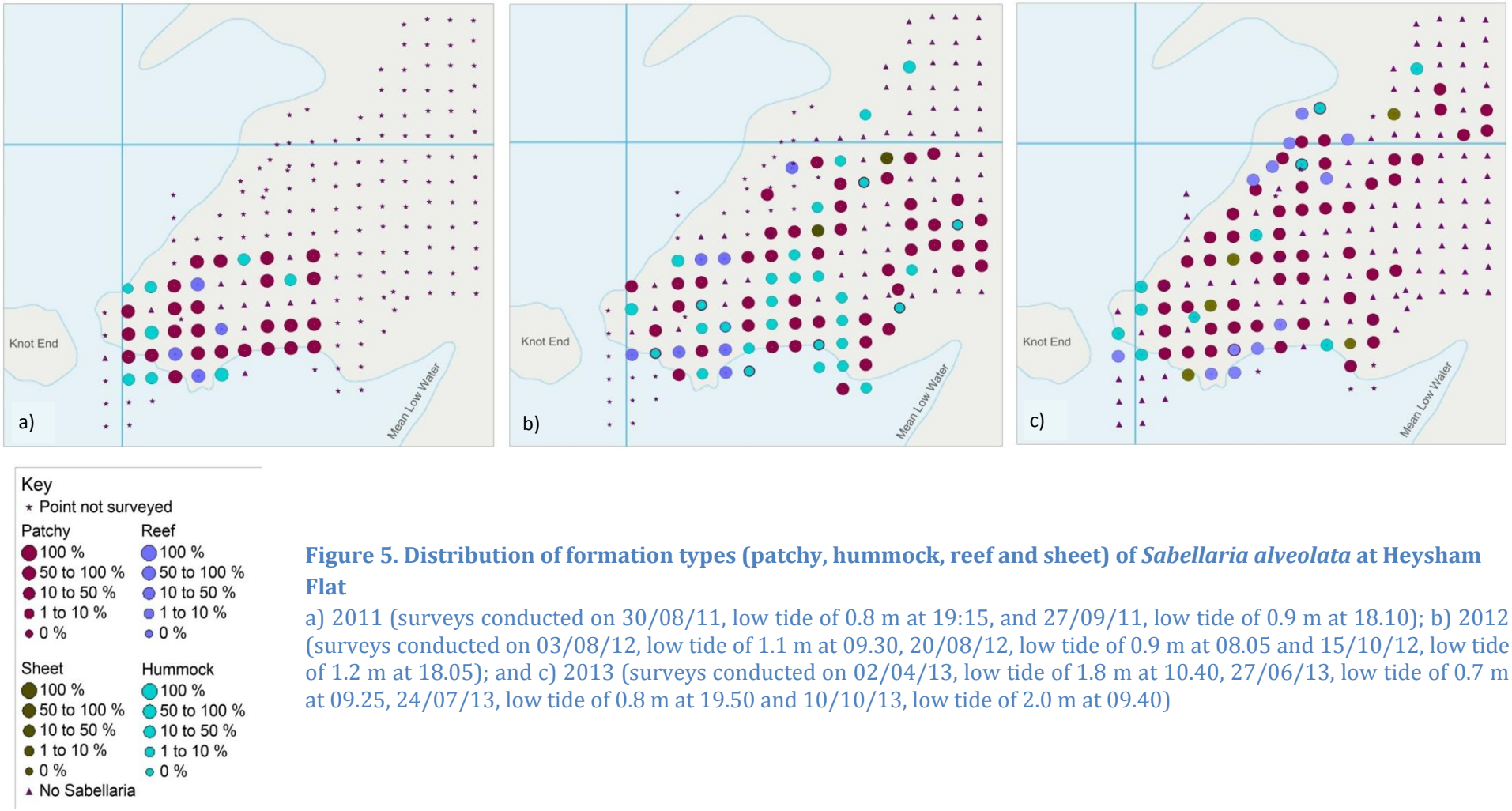


Figure 5. Distribution of formation types (patchy, hummock, reef and sheet) of *Sabellaria alveolata* at Heysham Flat

a) 2011 (surveys conducted on 30/08/11, low tide of 0.8 m at 19:15, and 27/09/11, low tide of 0.9 m at 18.10); b) 2012 (surveys conducted on 03/08/12, low tide of 1.1 m at 09.30, 20/08/12, low tide of 0.9 m at 08.05 and 15/10/12, low tide of 1.2 m at 18.05); and c) 2013 (surveys conducted on 02/04/13, low tide of 1.8 m at 10.40, 27/06/13, low tide of 0.7 m at 09.25, 24/07/13, low tide of 0.8 m at 19.50 and 10/10/13, low tide of 2.0 m at 09.40)

Figure 6. Distribution of health types (crisp aperture, worn aperture, newly settled and dead) of *Sabellaria alveolata* at Heysham Flat

a) 2011 (surveys conducted on 30/08/11, low tide of 0.8 m at 19:15, and 27/09/11, low tide of 0.9 m at 18.10); b) 2012 (surveys conducted on 03/08/12, low tide of 1.1 m at 09.30, 20/08/12, low tide of 0.9 m at 08.05 and 15/10/12, low tide of 1.2 m at 18.05); and c) 2013 (surveys conducted on 02/04/13, low tide of 1.8 m at 10.40, 27/06/13, low tide of 0.7 m at 09.25, 24/07/13, low tide of 0.8 m at 19.50 and 10/10/13, low tide of 2.0 m at 09.40)

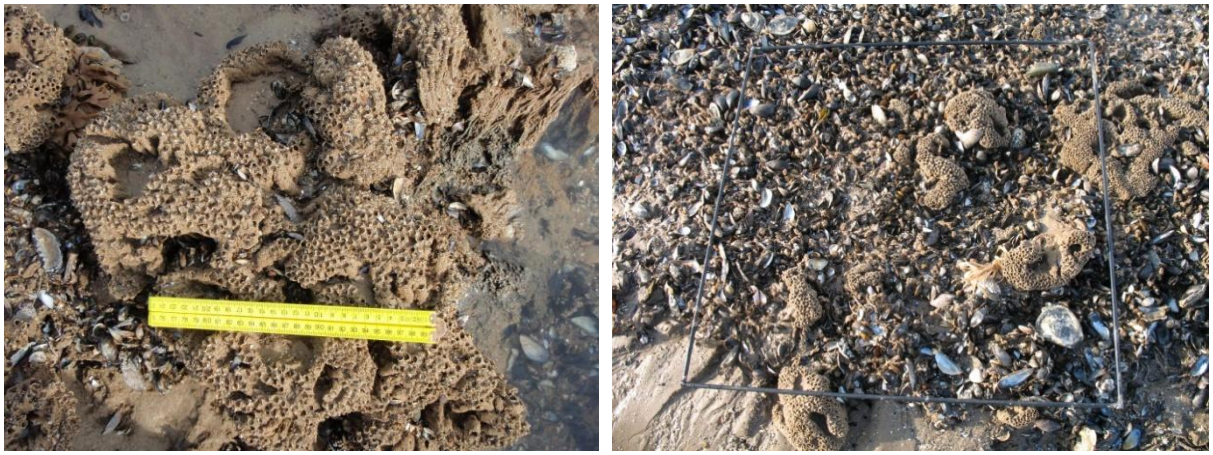


Figure 7. Patchy formation of *Sabellaria alveolata* colonies
Recorded in 2011 (27/09/2011)

Across the years patchy formations of *S. alveolata* were located around the survey site in a relatively sporadic distribution. The majority of the *S. alveolata* in the expanded survey area of 2012 and 2013 was recorded as patchy in distribution. Aside from smaller hummock formations that occurred towards the centre of the survey area (in 2012), hummock and reef formations were typically recorded towards the outer edges of the survey area, which corresponded with the outer limits of the skear. It is these formation types that were found to be most closely associated with those with crisp apertures (Figure 9 and 10) and have newly settled worms associated with them. Hummocks were associated only with newly settled worms and those with crisp apertures. A mean of 40% ± 2.8% (±1 s.e., *n* = 13) of *S. alveolata* in hummock formation were newly settled and 42% ± 4.2% (±1 s.e., *n* = 21) had crisp apertures (Figure 8).

Figure 8. Typical hummock formations of *Sabellaria alveolata*
Recorded in 2012 surveys (03/08/2012)

Dead worms were most commonly recorded in sheet formations of *S. alveolata* (mean percent of worms dead in sheet formation = 41± 12.6% (±1 s.e., *n* = 7)) (Figure 9). A considerable amount of *S. alveolata* that spread to new areas in 2012 and 2013 were, unsurprisingly, newly settled or with

a crisp aperture (Figure 6). There were some noticeable areas of dead *S. alveolata* in the 2011 survey that were re-settled in 2012, only to be recorded as dead again in the 2013 surveys (Figure 6). A large proportion of dead *S. alveolata* recorded in the 2013 surveys was centrally located on the skear (Figure 6).

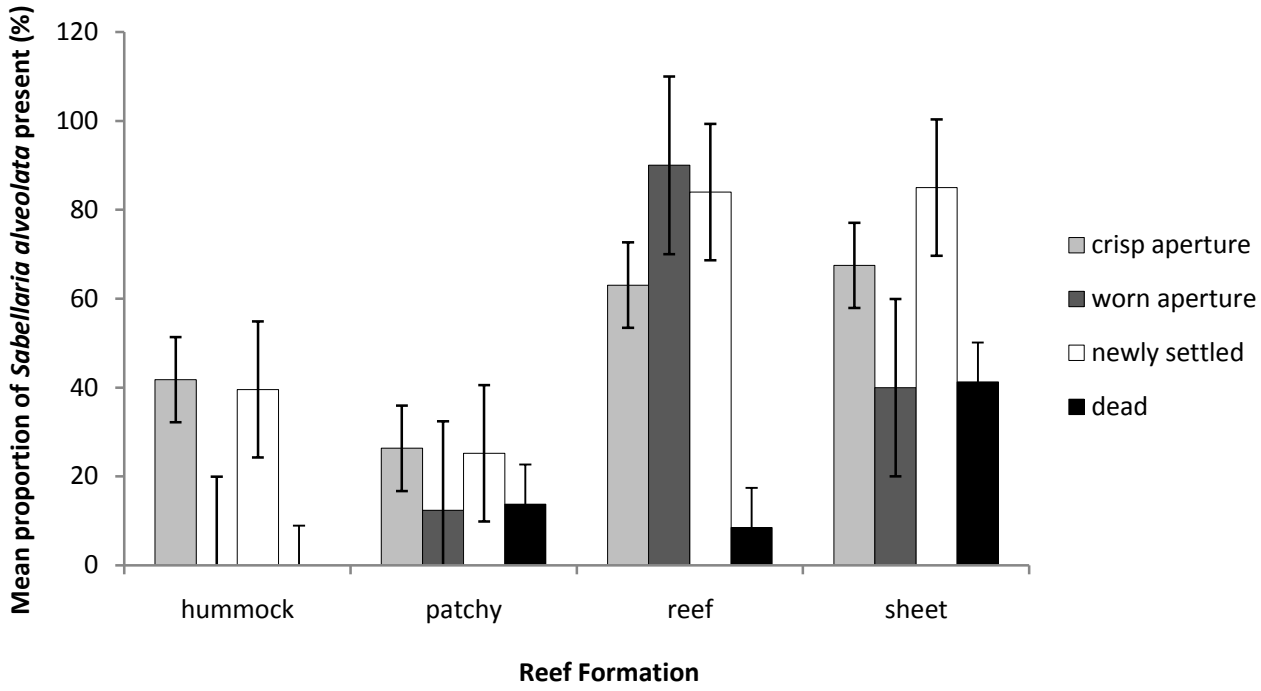


Figure 9. The health of Sabellaria alveolata worms associated with different reef formations
Mean proportion of each health category across all samples (± 1 s.e.)

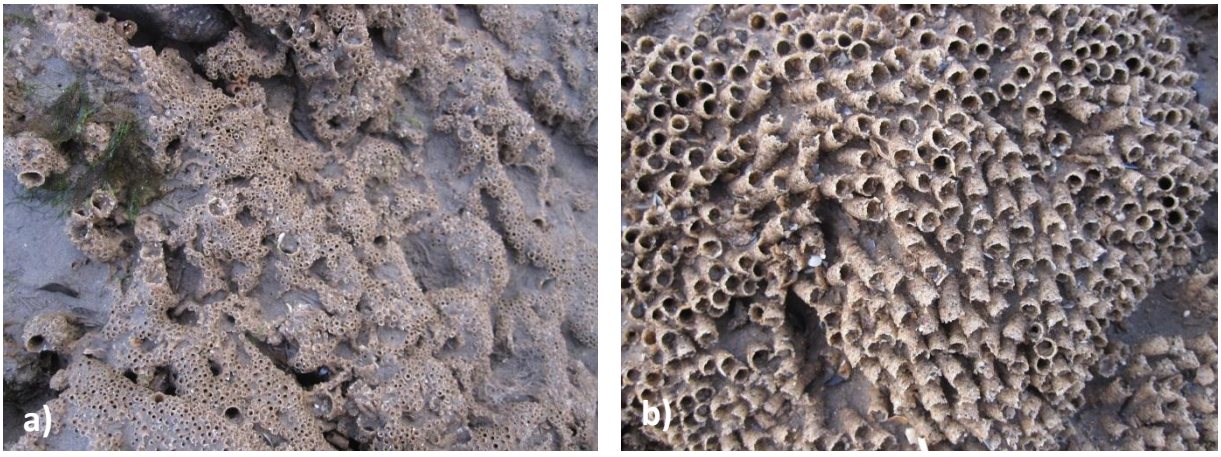


Figure 10. *Sabellaria alveolata* colonies in reef formation
a) Newly settled worms and b) those with crisp apertures. Recorded in 2013 (24/07/2013)

5.3 *Mytilus edulis* distribution

The distribution and abundance of blue mussels, *M. edulis*, were recorded each year in conjunction with *S. alveolata*. In every survey, except autumn 2011 and summer 2012, over 75% of area cover recorded had no adult mussels present. In autumn 2011, nearly 80% of the area surveyed was covered by 1 – 20% adult mussel while in summer 2012, 70% of the area surveyed was covered by 1 – 20% adult mussel and in the autumn survey of 2012 over 90% of area cover recorded had no adult mussels present (Figure 11). Adult mussels were never recorded covering more than 36% of surveyed area in any year. In contrast, under-size mussels were recorded in densities of up to 100% cover. The greatest densities of under-size mussel were recorded in the 2013 summer surveys. In summer 2012 and spring 2013, no under-size mussels were recorded from 74 and 95% of area cover recorded respectively (Figure 12).

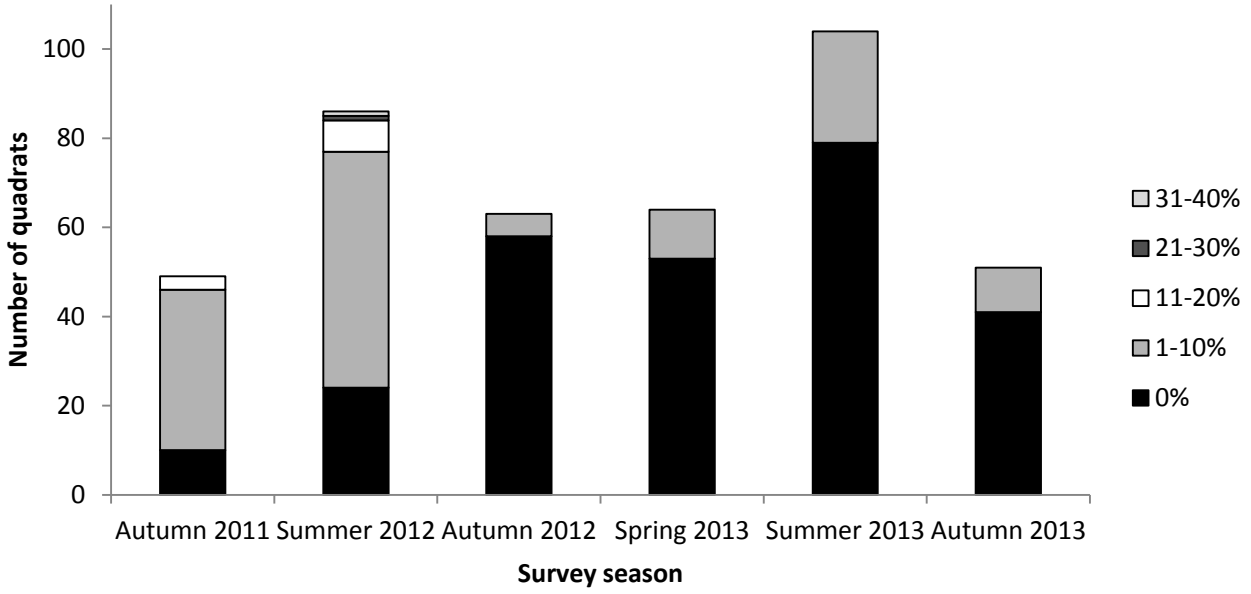


Figure 11. Percentage area of adult blue mussels, *Mytilus edulis*, in quadrats surveyed on Heysham Flat between 2011 and 2013

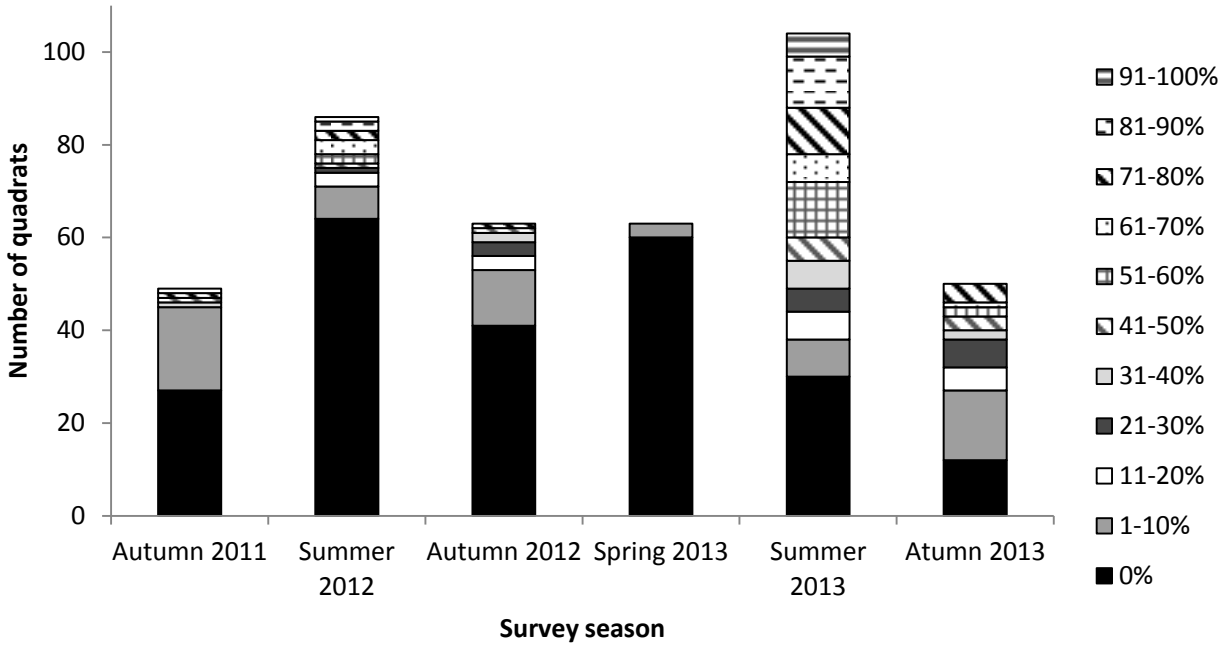
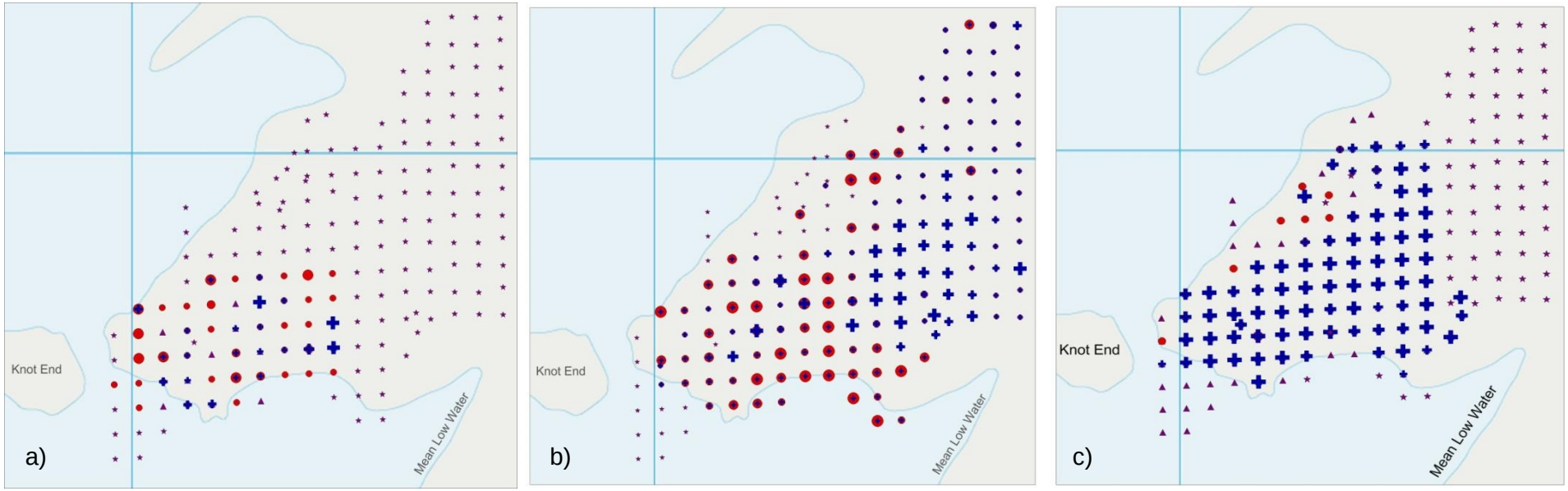


Figure 12. Percentage area of under-size blue mussels, *Mytilus edulis*, in quadrats surveyed on Heysham Flat between 2011 and 2013

Figure 13 shows there is a marked difference between the years in the prevalence of adult and under-size mussels, as well as their location. Adult mussels were recorded at 80% of the survey waypoints in 2011 however they never covered more than 20% of the survey quadrats. On the contrary, under-size mussels were recorded covering up to 90% of a survey area but were absent from 27 of the survey waypoints (Figure 13a). In 2012 more adult mussels were recorded, commonly in the central region of the survey area, clustering in the south. The greatest abundance of under-size mussels was recorded to the east of the dense adult mussel clusters (Figure 13b). In 2013, there was a marked increase in under-size mussel abundance, while the density of adult mussels reduced. The under-size mussels dominated the percentage cover in quadrats over a large central region of the survey area but were rare or absent in the south-western tip, throughout the far eastern strip and also to an extent along the edge of the skear running from south-west to north-east (Figure 13c).



Key
- Point not surveyed

Under-size mussel
- 50 to 100 % (3)
- 20 to 50 % (1)
- 5 to 20 % (4)
- 1 to 5 % (14)
- No under-size mussels (27)

Adult mussel
- 10 to 36 % (7)
- 5 to 10 % (4)
- 1 to 5 % (28)
- No adult mussels (10)

Figure 13. Percentage area covered by under-size and adult blue mussels, *Mytilus edulis*, on Heysham Flat
a) 2011 (surveys conducted on 30/08/11, low tide of 0.8 m at 19:15, and 27/09/11, low tide of 0.9 m at 18.10); b) 2012 (survey conducted on 03/08/12, low tide of 1.1 m at 09.30, 20/08/12, low tide of 0.9 m at 08.05 and 15/10/12, low tide of 1.2 m at 18.05); and b) 2013 (surveys conducted on 02/04/13, low tide of 1.8 m at 10.40, 27/06/13, low tide of 0.7 m at 09.25, 24/07/13, low tide of 0.8 m at 19.50 and 10/10/13, low tide of 2.0 m at 09.40)

5.4 Biodiversity

The presence of species, aside from *S. alveolata* and *M. edulis,* were recorded in each quadrat. This detail of data recorded during this section of the survey was limited. Fifty-five per cent of quadrats surveyed with *S. alveolata* present had no other species present (not including *M. edulis*) while 6% of the quadrats contained between three to five other species. The following species were recorded during the surveys: *Ulva lactuca, Fucus spiralis, Flustra foliocea, Fucus vesiculosus, Lanice conchilega, Chlamys varia, Crassostrea gigas, Pagurus bernhardus, Carcinus maenas, Littorinidae* spp.*, Cerastoderma edule, Elminius modestus*, barnacle spp., anemone spp., gutweed, bryozoan, hydroid, lugworm cast and shrimp (Figure 14). There is a weak, but statistically significant, positive correlation between the honeycomb worm percentage cover and the species richness during 2012 and 2013 (Spearman rank-order correlation, r_s (367) = 0.3878, p < 0.001) (Figure 15).

Figure 14. Examples of the species recorded in close proximity to *Sabellaria alveolata* colonies
a) Shore crab (surveyed on 24/07/2013), b) sand mason worms (surveyed on 24/07/2013), c) gutweed (surveyed on 20/08/2012)

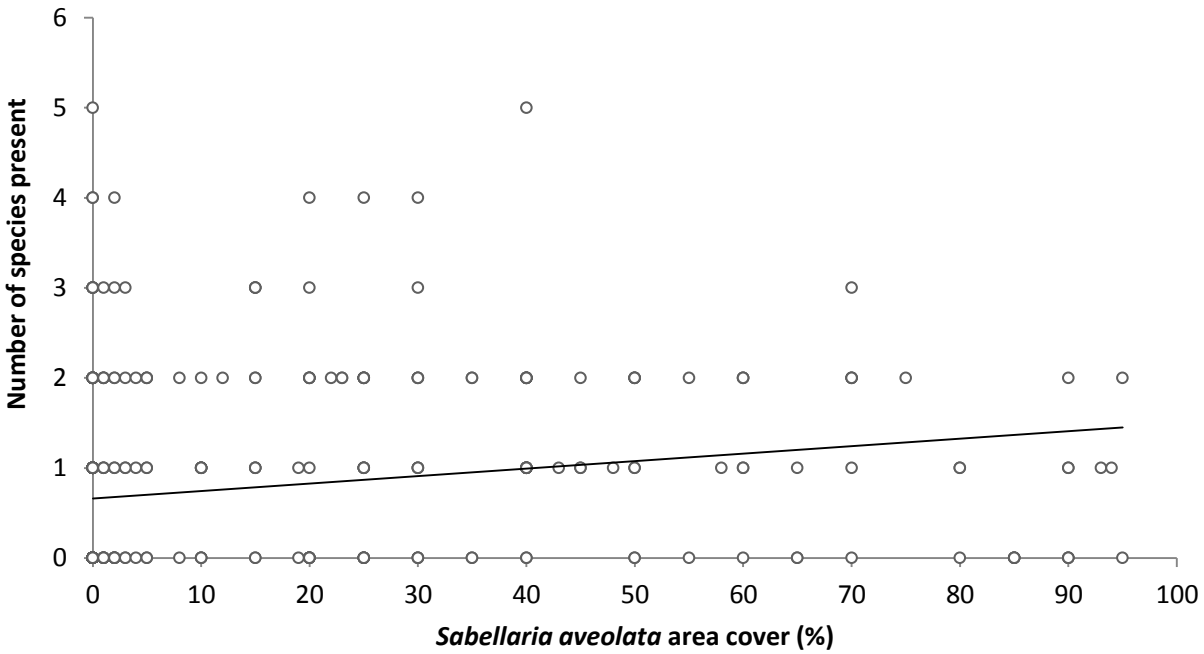


Figure 15. Correlation between species richness and *Sabellaria alveolata* percentage cover
Excludes *Mytilus edulis*. For 2012 to 2013 only

5.5 Summary of results

To summarise the results found in this study; *S. alveolata* occurred in a small area to the south-west of the rocky skear at Heysham Flat in 2011. In 2012 it spread significantly throughout the skear and in 2013 the percentage cover of *S. alveolata* reduced again, although not to the levels of 2011. It appears that *S. alveolata* tends to be prevalent and in a healthier condition towards the water's edge (at low water) while blue mussels dominated in the central region of the skear. Adult mussels were recorded in their greatest density in summer 2012, and in 2011 when considered proportionally, while under-size mussels were most dense in summer 2013. A weak positive correlation between species richness and *S. alveolata* area cover was uncovered from data collected in 2012 and 2013.

6 Discussion

Heysham Flat and skear support a large area of the honeycomb worm, *S. alveolata*, including reef features which are an Annex I habitat, protected under the Habitats Directive. An ephemeral seed-mussel bed, open to a hand-gathered fishery is also present in the area. As such, regular monitoring and evaluation of the health and distribution of the honeycomb worm in the area is necessary to inform the management of the mussel fishery. The results of this three-year assessment of the health and distribution of *Sabellaria alveolata* have revealed the variable nature of these colonies and those of the neighbouring *M. edulis* beds. Their continued persistence in the area, despite their variable distribution highlights how their dynamic life history is able to withstand the changes regularly occurring in Morecambe Bay, as well as the suitability of the location for colonisation.

6.1 *Sabellaria alveolata* distribution

Significant reef expansion was noted between summer 2011 and summer 2012. Since no survey was carried out between September 2011 and August 2012, it is not possible to determine when this growth and new settlement occurred. However, in the U.K., settlement often occurs throughout the winter months (Wilson, 1974). The winter of 2011/2012 was milder on average, and significantly warmer than the previous three winters (Met Office, 2012). Since honeycomb worms grow faster in warmer conditions it is reasonable to suggest that these climatic conditions supported increased successful settlement and growth (Gruet, 1982). A relatively low spatfall of *M. edulis* was also recorded in 2011 (Knott, 2012) and a reduced number of mussels would have resulted in a reduction in mussel mud present. In turn, this may have influenced the distribution of the honeycomb worms through a lack of competition with the mussels, which may have allowed for increased reproductive investment. The remaining *S. alveolata*, which would have been exposed over the winter, may have supported the colonisation of large areas by *S. alveolata* larvae. The surveys in 2013 revealed a reduction of overall percentage cover of *S. alveolata* but also a strengthening and expansion of the colonies on the north-western edge of the skear. Severe freezing weather at the beginning of 2013 (the third coldest March, average of -1.1^{o}C, and the fourth coldest spring, average of 2.3^{o}C, since 1910; Met Office, 2013) is likely to have had a detrimental effect on the reef. The majority of deterioration occurred in areas, higher up on the shore, that were exposed for longer periods by the tides. The highest density of *S. alveolata* in 2013 bordered a channel near the mean low water mark. Currents in Morecambe Bay trend in an anti-clockwise direction (Annan, 2001). These currents may provide larvae for settlement from the southern communities on the skear or further afield.

6.2 Health & formation of honeycomb worm reef

The differences in health and formation types of the reef magnify the changes illustrated by the changes in the percentage cover. The association revealed between health or life stage and formation type will also be beneficial for future management plans. Results revealed an apparent trend towards healthier worms – those that are newly settled or with crisp apertures, contributing to reef formations on the outer limits of the skear, adjacent to the mean low water line (Figure 6). On the contrary, dead and worn colonies tended to be found in a patchy formation closer to the centre of the skear (Figure 5, 6). Hummock formations are linked to the growth stage of *S. alveolata* reefs, and their presence in particular areas suggests where reef expansion may occur in the future. Despite cyclical changes, *S. alveolata* appeared to be maintaining and increasing a strong-hold on the outer edge of Heysham Flat skear. A similar trend was observed by Allen *et al.* in 2002. Access to food and sand during longer periods of inundation in these areas are likely to improve the health and perseverance of these worm colonies; a result that has also been observed with other Sabellariids, and likely to occur because tube building only takes place while sub-merged (Badve, 1996; Bamber & Irving, 1997). Communities of *M. edulis* are *S. alveolata's* prime competitor. In Morecambe Bay, however, large invasions of *Asterias rubens*, a voracious predator of *M. edulis*, have been recorded (Sloan & Aldridge, 1981; Dare, 1982). The presence of this sub-littoral predator is likely to prevent *M. edulis* from establishing colonies at lower levels of the shore, removing *S. alveolata's* trophic and spatial competitor.

6.3 *Mytilus edulis* distribution

Blue mussels have co-existed with honeycomb worms on Heysham Flat skear for many years. As suspension feeders that require a hard substratum for settlement, it is inevitable that they will compete with *S. alveolata* for food and space. Actively growing *S. alveolata* has been found to repeatedly out-compete other littoral species for space (Cunningham *et al.,* 1984). However, when mussels settle at high densities, as on Heysham Flat skear, the honeycomb worm tubes become swamped by the settlement and their pseudo-faeces or mussel mud. These honeycomb worms die after prolonged smothering and the reefs they formed break under the weight of the inundation (Allen *et al.,* 1999; Hammond, 2000).

With only three years of mussel data recorded, it is difficult to extract with certainty what parameters may be influencing the changes observed. There is no well documented data for the overall distribution of blue mussels in 2011 because they were only recorded in the reduced region of where *S. alveolata* was present. It is known, however, that the spatfall was light and no mussel fishery was opened in the area that year (pers. comms with M. Knott). The severe freezing weather conditions experienced over the 2010/2011 winter may have had an effect on this as could the revived recruitment of *S. alveolata* in the area (Figure 16). In 2012, spat fall became established most densely in the central eastern area of the skear where there was no, or only minimal patches, of dead and worn *S. alveolata*. Since *S. alveolata* larvae are recruited over the winter months, but the majority of mussel larvae do not settle until the later spring and summer months, the honeycomb worms have an opportunity to establish themselves and grow to a competitive size before the risk of mussel competition arises (Figure 16). The spatfall in 2013 covered a significantly larger area, which corresponds to the reduced area covered by *S. alveolata* in this year.

At this early stage of a long-term monitoring project, the data clearly suggests that seed mussel can thrive easily in areas where *S. alveolata* is present in patchy, worn or dead colonies but struggles to dominate in areas where healthy actively growing worms have formed larger reef formations. The data provide evidence of a self-sustaining dynamic system in which a cyclical successive relationship exists between the ephemeral colony of blue mussels and the extensive colonies of honeycomb worms. It is the characteristics of this particular mussel bed that facilitates the successive relationship. The density at which these seed mussel communities settle create excessive biodeposits that result in widespread mortality in the community from intra-competition, suffocation and eventually destruction of the beds from wave action (Seed & Suchanek, 1992). Each year the majority of the bed is scoured from the shore by the end of the autumn, re-exposing hard substratum that can be colonised by passing larvae (pers. comms with M. Knott; Dare, 1976). Removal of seed mussel through a hand-gathered fishery may help speed up the scouring process of mud from wave action; reducing the length of time the honeycomb worms are covered and therefore increasing chances of survival. In this study, however, no attempt was made to investigate such a hypothesis.

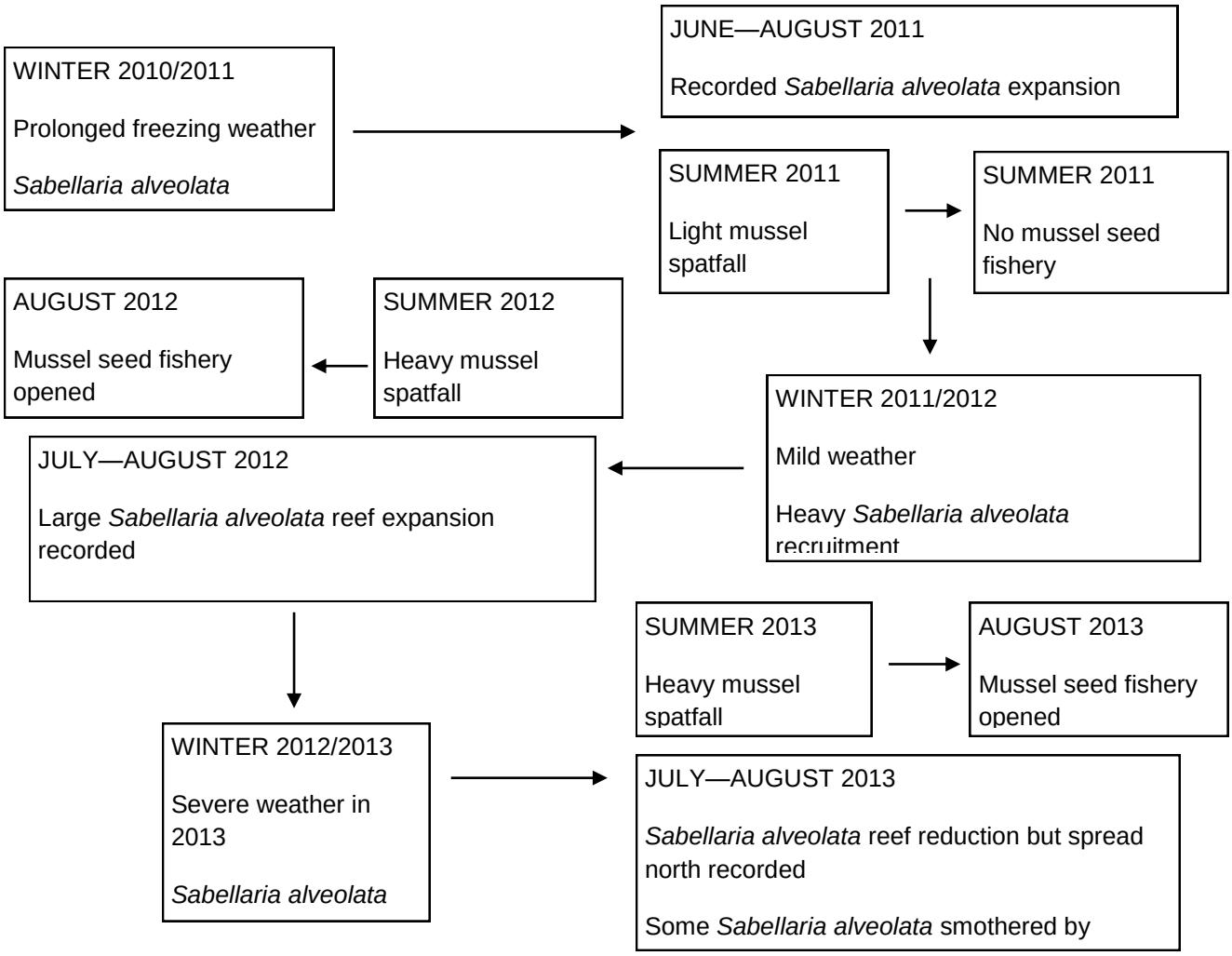


Figure 16. Cyclical recruitment of *Sabellaria alveolata* and *Mytilus edulis* to Heysham Flat skear between 2011 and 2013

6.4 Biodiversity

Sabellaria alveolata is considered the most important reef-building organism in temperate coastal environments (Naylor & Viles, 2000). It has been widely shown that the presence of *S. alveolata* reefs can enhance biodiversity in an area; especially when otherwise surrounded by homogenous sandy habitats (Thorin *et al.* 2001; Dubois *et al.* 2002). This study reveals a weak positive correlation between percentage cover of *S. alveolata* and the species richness. However, the data collected included a large proportion of zero values which has the potential to skew results. The data does not allow the complexity of factors that influence biodiversity levels to be revealed. Dubois *et al.* (2002) investigated the relationship of area biodiversity and the presence of *S. alveolata* in more detail at Mont Saint-Michel, France. In this study an inverse relationship between density of *S. alveolata* and the density of other species was recorded. Significant differences were also found between formation types, with hummock or "ball" and platform formations harbouring fewer species than degraded structures but also different types of species. Differences observed may also have been related to a number of other local environmental factors including the habitats

with which the structures were surrounded. These, however, were not investigated in the current study so limited conclusions can be drawn from the data. As such, the results presented here should be considered with caution as they are likely to be scale dependant, and it is unlikely that a highly degraded reef will continue to maintain an elevated level of species richness.

7 Conclusion

Sabellaria alveolata colonies have been recorded at Heysham Flat, Lancashire since 1959 (Cunningham, 1984). Reports have been sporadic and have included times when it has disappeared completely (Cunningham, 1984; Allen *et al.*, 2002). It is well recognised that *S. alveolata* is a species that moves through successive cycles of five to 10 years, with significant reproductive efforts on only every three or more years (Wilson, 1974; 1976; Gruet, 1986).

Although studies have shown the detrimental effects of trophic competition from shellfish on *S. alveolata* colonies; in Morecambe Bay, because the majority of the mussel beds are those of ephemeral juveniles, a dynamic cyclical system of succession can exist between the two communities with each maintaining strong-holds in micro-niches on the skear (Dubois *et al.,* 2006; Desroy *et al.,* 2011).

This study did not investigate any possible effects that an open fishery may have on the *S. alveolata* reefs. Negative effects on honeycomb worm reefs, primarily damage from trampling during fishing, are well documented (Dubois *et al.,* 2002; Desroy *et al.,* 2011). Possible positive effects from removal of seed mussel and reduction of the length of time that the *S. alveolata* colonies are covered have not been considered. To date, NWIFCA have been able to manage the mussel fishery with due consideration of the negative effects towards the *S. alveolata* reefs by restricting access (Knott, 2012). The results of the present study suggest that as long as the current location of the *S. alveolata* reefs continue to be considered before the seasonal hand gathering fishery is opened, there is no reason that successful habitat conservation and fisheries should not co-exist.

8 Future research & recommendations

With such a complex and dynamic system there are endless questions to be answered and hypotheses to be investigated. In particular, investigations into the source of *S. alveolata* and *M. edulis* larvae may add significantly to the understanding of population variances. A controlled experiment, investigating the effects of fishing activity on the honeycomb worm reefs would also help ensure that the system is being optimally managed.

It is hoped that the current project will be able to continue in the future, reinforcing the collaborative partnership between the North West Wildlife Trusts and NWIFCA, and maintaining the monitoring responsibilities as outlined in the Morecambe Bay Management Scheme Action Plans. The addition of further, long-term data will, in itself, enhance the results that can be determined. To provide the opportunity for a wider range of analysis to be used in the future, it is recommended that some sites within the survey area should be picked out and prioritised for repeated surveying at each seasonal period. It would also be of great interest to develop the data collected on presence and density of other species present to allow for a more comprehensive study to be carried out.

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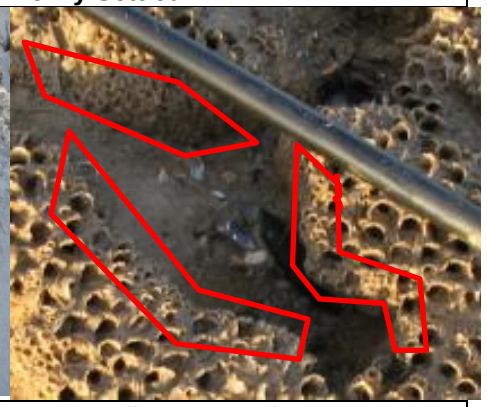
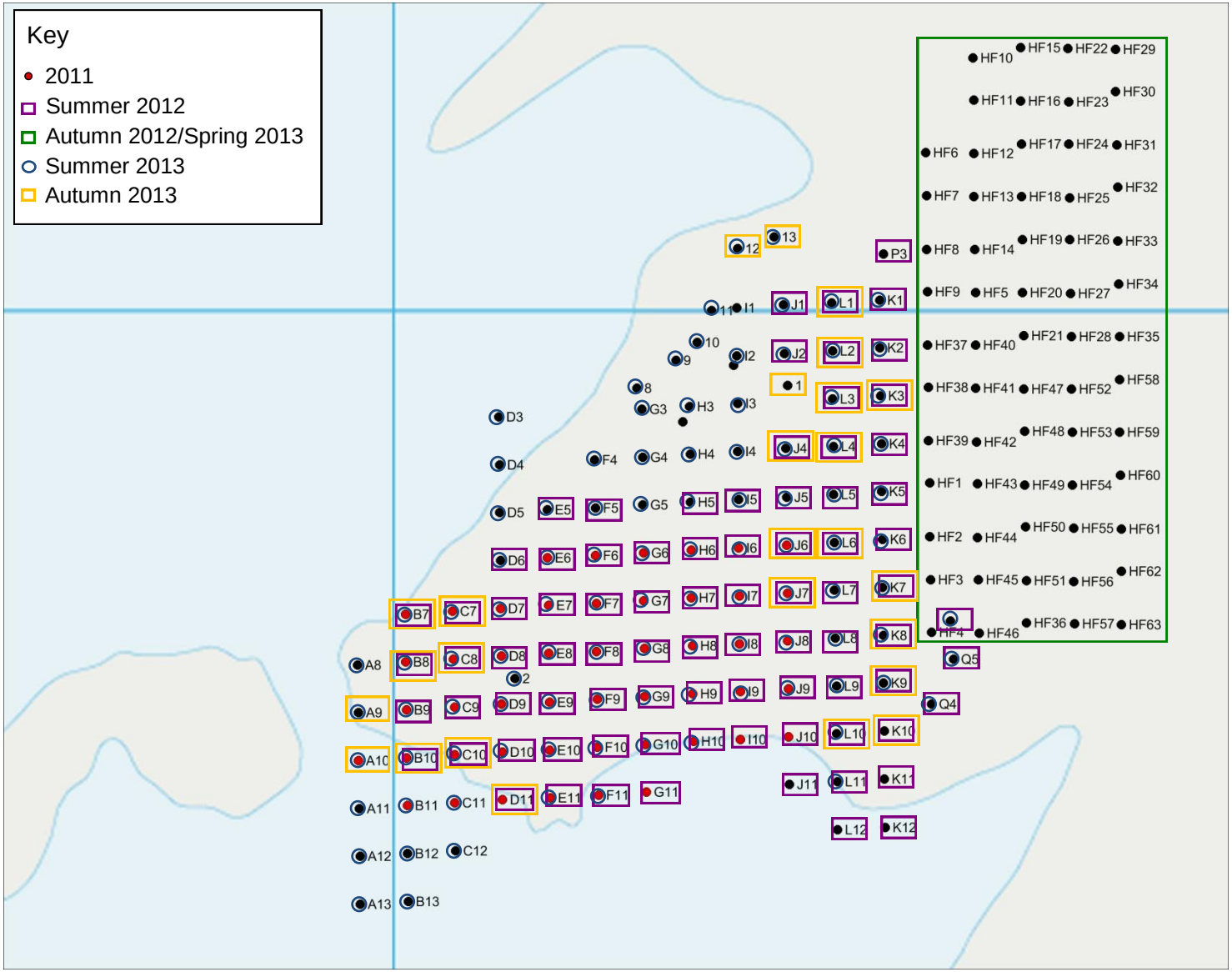
10 Appendices

10.1 Appendix I – A guide to the classification of *Sabellaria alveolata*

Formation Type			
Patchy	**Sheet**	**Hummock**	**Reef**
			
Small crusts or mounds which are less than 30 cm^2	Flat crust which are greater than 30 cm^2	Raised mound which are greater than 30 cm^2	Large mounds which are greater than 1 m^2
Health Categories			
Dead	**Worn Apertures**	**Crisp Apertures**	**Newly Settled**
			
Tubes have merged into a block of sediment. If a piece of reef is detached from the substratum.	There has been no clear new growth/ tube building. The apertures can still be seen. The tubes are still attached to the substratum.	New growth of tubes can be seen, the apertures are crisp and will have a fine wall. Tend to be a lighter sandy colour compared with worn reef.	Very small apertures between 1 mm and 4 mm. Usually found around the larger, older apertures as shown above.

10.2 Appendix II – Outline of waypoints covered during each survey



10.3 Appendix III – *Sabellaria alveolata* raw data

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
A10	54.05523	-2.91857	339964	462532	2011	autumn	30/08/2011	0	0	0	0	0	0	0	0	0
B10	54.05526	-2.91781	340014	462535	2011	autumn	30/08/2011	70	100	0	0	0	5	0	0	95
B11	54.05481	-2.91779	340015	462485	2011	autumn	30/08/2011	70	30	0	70	0	75	0	20	5
B7	54.05661	-2.91787	340013	462685	2011	autumn	30/08/2011	30	70	0	30	0	90	0	10	0
B8	54.05616	-2.91785	340013	462635	2011	autumn	30/08/2011	3	100	0	0	0	0	0	0	100
B9	54.05571	-2.91783	340014	462585	2011	autumn	30/08/2011	1	100	0	0	0	0	0	0	100
C10	54.05529	-2.91705	340064	462538	2011	autumn	30/08/2011	20	100	0	0	0	95	0	5	0
C11	54.05484	-2.91704	340064	462488	2011	autumn	30/08/2011	55	30	0	70	0	60	0	20	20
C7	54.05664	-2.91711	340062	462688	2011	autumn	30/08/2011	40	40	0	60	0	80	0	20	0
C8	54.05619	-2.91709	340063	462638	2011	autumn	30/08/2011	0	0	0	0	0	0	0	0	0
C9	54.05574	-2.91707	340064	462588	2011	autumn	30/08/2011	35	0	0	100	0	100	0	0	0
D10	54.05533	-2.91629	340114	462541	2011	autumn	30/08/2011	90	0	0	0	100	25	55	0	20
D11	54.05488	-2.91628	340114	462491	2011	autumn	30/08/2011	30	100	0	0	0	50	0	50	0
D7	54.05667	-2.91635	340112	462691	2011	autumn	30/08/2011	1	100	0	0	0	100	0	0	0
D8	54.05622	-2.91633	340113	462641	2011	autumn	30/08/2011	3	100	0	0	0	0	0	0	100
D9	54.05577	-2.91631	340113	462591	2011	autumn	30/08/2011	20	100	0	0	0	75	0	0	25
E10	54.05536	-2.91553	340163	462543	2011	autumn	30/08/2011	2	100	0	0	0	0	0	0	100
E11	54.05491	-2.91552	340164	462493	2011	autumn	30/08/2011	85	0	0	0	100	10	0	90	0
E6	54.05715	-2.91561	340161	462744	2011	autumn	30/08/2011	25	100	0	0	0	80	10	10	0
E7	54.05670	-2.91559	340162	462694	2011	autumn	30/08/2011	85	0	0	0	100	10	8	82	0
E8	54.05626	-2.91557	340162	462644	2011	autumn	30/08/2011	1	100	0	0	0	0	0	0	100
E9	54.05580	-2.91555	340163	462593	2011	autumn	30/08/2011	30	100	0	0	0	0	2	0	98
F10	54.05539	-2.91477	340213	462546	2011	autumn	27/09/2011	2	100	0	0	0	0	0	0	100
F11	54.05494	-2.91476	340214	462496	2011	autumn	27/09/2011	4	0	0	100	0	90	0	10	0
F6	54.05718	-2.91485	340211	462746	2011	autumn	27/09/2011	1	100	0	0	0	0	0	0	100

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
F7	54.05673	-2.91483	340212	462696	2011	autumn	27/09/2011	0	0	0	0	0	0	0	0	0
F8	54.05629	-2.91481	340212	462646	2011	autumn	27/09/2011	0	0	0	0	0	0	0	0	0
F9	54.05584	-2.91479	340213	462596	2011	autumn	27/09/2011	75	20	0	0	80	80	0	20	0
G10	54.05542	-2.91402	340263	462549	2011	autumn	27/09/2011	5	100	0	0	0	70	0	0	30
G11	54.05497	-2.91400	340264	462499	2011	autumn	27/09/2011	0	0	0	0	0	0	0	0	0
G6	54.05721	-2.91409	340261	462749	2011	autumn	27/09/2011	45	10	0	90	0	60	0	40	0
G7	54.05676	-2.91407	340261	462699	2011	autumn	27/09/2011	0	0	0	0	0	0	0	0	0
G8	54.05632	-2.91405	340262	462649	2011	autumn	27/09/2011	0	0	0	0	0	0	0	0	0
G9	54.05587	-2.91403	340262	462599	2011	autumn	27/09/2011	0	0	0	0	0	0	0	0	0
H10	54.05545	-2.91326	340313	462552	2011	autumn	27/09/2011	1	100	0	0	0	0	100	0	0
H6	54.05725	-2.91333	340311	462752	2011	autumn	27/09/2011	1	100	0	0	0	0	0	0	100
H7	54.05680	-2.91331	340311	462702	2011	autumn	27/09/2011	12	100	0	0	0	80	0	20	0
H8	54.05635	-2.91329	340312	462652	2011	autumn	27/09/2011	0	0	0	0	0	0	0	0	0
H9	54.05590	-2.91327	340312	462602	2011	autumn	27/09/2011	20	100	0	0	0	70	0	30	0
I10	54.05548	-2.91250	340362	462554	2011	autumn	27/09/2011	1	100	0	0	0	100	0	0	0
I6	54.05727	-2.91257	340360	462754	2011	autumn	27/09/2011	0	0	0	0	0	0	0	0	0
I7	54.05683	-2.91255	340361	462704	2011	autumn	27/09/2011	10	20	0	80	0	70	0	30	0
I8	54.05638	-2.91253	340361	462654	2011	autumn	27/09/2011	0	0	0	0	0	0	0	0	0
I9	54.05593	-2.91251	340362	462604	2011	autumn	27/09/2011	15	100	0	0	0	60	0	40	0
J10	54.05551	-2.91174	340412	462557	2011	autumn	27/09/2011	3	100	0	0	0	100	0	0	0
J6	54.05731	-2.91181	340410	462757	2011	autumn	27/09/2011	5	100	0	0	0	80	0	0	20
J7	54.05686	-2.91179	340411	462707	2011	autumn	27/09/2011	4	100	0	0	0	100	0	0	0
J8	54.05641	-2.91177	340411	462657	2011	autumn	27/09/2011	0	0	0	0	0	0	0	0	0
J9	54.05596	-2.91176	340412	462607	2011	autumn	27/09/2011	1	100	0	0	0	100	0	0	0
B10	54.05526	-2.91781	340014	462535	2012	summer	03/08/2012	15	0	0	0	100	0	20	0	80
B7	54.05661	-2.91787	340013	462685	2012	summer	03/08/2012	15	100	0	0	0	0	0	0	100
B8	54.05616	-2.91785	340013	462635	2012	summer	03/08/2012	25	0	0	100	0	50	50	0	0
B9	54.05571	-2.91783	340014	462585	2012	summer	03/08/2012	0	0	0	0	0	0	0	0	0
C10	54.05529	-2.91705	340064	462538	2012	summer	03/08/2012	50	60	0	40	0	0	20	70	10

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
C7	54.05664	-2.91711	340062	462688	2012	summer	03/08/2012	0	0	0	0	0	0	0	0	0
C8	54.05619	-2.91709	340063	462638	2012	summer	03/08/2012	0	0	0	0	0	0	0	0	0
C9	54.05574	-2.91707	340064	462588	2012	summer	03/08/2012	30	100	0	0	0	0	0	100	0
D10	54.05532	-2.91629	340114	462541	2012	summer	03/08/2012	93	0	0	0	100	0	0	100	0
D11	54.05487	-2.91627	340114	462491	2012	summer	03/08/2012	30	100	0	0	0	2	0	98	0
D6	54.05712	-2.91637	340112	462741	2012	summer	03/08/2012	25	0	0	100	0	15	5	80	0
D7	54.05667	-2.91635	340112	462691	2012	summer	03/08/2012	5	100	0	0	0	100	0	0	0
D8	54.05622	-2.91633	340113	462641	2012	summer	03/08/2012	8	100	0	0	0	0	50	50	0
D9	54.05577	-2.91631	340113	462591	2012	summer	03/08/2012	0	0	0	0	0	0	0	0	0
E10	54.05535	-2.91553	340163	462543	2012	summer	03/08/2012	30	100	0	0	0	10	70	0	20
E11	54.05490	-2.91551	340164	462493	2012	summer	03/08/2012	50	30	0	70	0	40	0	60	0
E5	54.05760	-2.91562	340161	462794	2012	summer	03/08/2012	0	0	0	0	0	0	0	0	0
E6	54.05715	-2.91561	340161	462744	2012	summer	03/08/2012	90	0	0	0	100	70	5	25	0
E7	54.05670	-2.91559	340162	462694	2012	summer	03/08/2012	10	100	0	0	0	40	0	60	0
E8	54.05625	-2.91557	340162	462644	2012	summer	03/08/2012	80	60	0	40	0	0	0	100	0
E9	54.05580	-2.91555	340163	462593	2012	summer	03/08/2012	60	45	0	55	0	70	0	30	0
F10	54.05539	-2.91477	340213	462546	2012	summer	03/08/2012	2	0	0	0	100	0	0	0	100
F11	54.05493	-2.91476	340214	462496	2012	summer	03/08/2012	70	0	0	0	100	5	10	75	10
F5	54.05763	-2.91486	340211	462796	2012	summer	03/08/2012	0	0	0	0	0	0	0	0	0
F6	54.05718	-2.91485	340211	462746	2012	summer	03/08/2012	94	0	0	0	100	60	5	35	0
F7	54.05673	-2.91483	340212	462696	2012	summer	03/08/2012	0	0	0	0	0	0	0	0	0
F8	54.05628	-2.91481	340212	462646	2012	summer	03/08/2012	0	0	0	0	0	0	0	0	0
F9	54.05584	-2.91479	340213	462596	2012	summer	03/08/2012	80	0	0	20	80	48	0	50	2
G10	54.05542	-2.91401	340263	462549	2012	summer	20/08/2012	40	10	0	90	0	0	0	100	0
G11	54.05497	-2.91400	340264	462499	2012	summer	20/08/2012	25	70	0	30	0	20	10	70	0
G6	54.05721	-2.91409	340261	462749	2012	summer	03/08/2012	10	100	0	0	0	20	0	80	0
G7	54.05676	-2.91407	340261	462699	2012	summer	03/08/2012	0	0	0	0	0	0	0	0	0
G8	54.05631	-2.91405	340262	462649	2012	summer	03/08/2012	1	100	0	0	0	0	0	100	0
G9	54.05586	-2.91403	340262	462599	2012	summer	03/08/2012	10	100	0	0	0	0	0	100	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
H10	54.05545	-2.91325	340313	462552	2012	summer	20/08/2012	40	100	0	0	0	5	0	85	10
H5	54.05769	-2.91335	340310	462802	2012	summer	03/08/2012	25	100	0	0	0	40	40	20	0
H6	54.05724	-2.91333	340311	462752	2012	summer	03/08/2012	15	100	0	0	0	0	0	100	0
H7	54.05680	-2.91331	340311	462702	2012	summer	03/08/2012	25	50	0	50	0	30	0	70	0
H8	54.05634	-2.91329	340312	462652	2012	summer	03/08/2012	40	20	0	80	0	60	0	40	0
H9	54.05590	-2.91327	340312	462602	2012	summer	03/08/2012	40	10	0	85	5	10	5	85	0
HF1	54.05790	-2.90955	340559	462822	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF10	54.06190	-2.90895	340604	463266	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF11	54.06150	-2.90892	340605	463222	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF12	54.06100	-2.90891	340605	463166	2012	autumn	15/10/2012	45	0	0	100	0	60	40	0	0
HF13	54.06060	-2.90890	340605	463121	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF14	54.06010	-2.90888	340606	463066	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF15	54.06200	-2.90819	340654	463277	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF16	54.06150	-2.90818	340654	463221	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF17	54.06110	-2.90815	340655	463176	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF18	54.06060	-2.90814	340655	463121	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF19	54.06020	-2.90812	340656	463076	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF2	54.05740	-2.90954	340559	462766	2012	autumn	15/10/2012	2	0	0	0	0	0	0	0	100
HF20	54.05970	-2.90811	340656	463021	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF21	54.05930	-2.90808	340657	462976	2012	autumn	15/10/2012	5	100	0	0	0	0	100	0	0
HF22	54.06200	-2.90744	340703	463276	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF23	54.06150	-2.90741	340704	463220	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF24	54.06110	-2.90740	340704	463176	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF25	54.06060	-2.90738	340705	463120	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF26	54.06020	-2.90737	340705	463076	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF27	54.05970	-2.90734	340706	463020	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF28	54.05930	-2.90732	340707	462975	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF29	54.06200	-2.90667	340753	463275	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF3	54.05700	-2.90951	340560	462721	2012	autumn	15/10/2012	5	100	0	0	0	2	98	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
HF30	54.06160	-2.90666	340753	463231	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF31	54.06110	-2.90664	340754	463175	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF32	54.06070	-2.90661	340755	463131	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF33	54.06020	-2.90660	340755	463075	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF34	54.05980	-2.90658	340756	463030	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF35	54.05930	-2.90655	340757	462975	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF36	54.05660	-2.90798	340660	462676	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF37	54.05920	-2.90961	340557	462966	2012	autumn	15/10/2012	95	0	100	0	0	50	50	0	0
HF38	54.05880	-2.90958	340558	462922	2012	autumn	15/10/2012	30	100	0	0	0	70	30	0	0
HF39	54.05830	-2.90957	340558	462866	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF4	54.05650	-2.90949	340561	462666	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF40	54.05920	-2.90884	340607	462966	2012	autumn	15/10/2012	2	100	0	0	0	80	20	0	0
HF41	54.05880	-2.90883	340607	462921	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF42	54.05830	-2.90881	340608	462865	2012	autumn	15/10/2012	1	100	0	0	0	0	0	0	100
HF43	54.05790	-2.90878	340609	462821	2012	autumn	15/10/2012	1	100	0	0	0	0	0	0	100
HF44	54.05740	-2.90877	340609	462765	2012	autumn	15/10/2012	1	100	0	0	0	0	0	0	100
HF45	54.05700	-2.90875	340610	462721	2012	autumn	15/10/2012	60	40	0	60	0	50	50	0	0
HF46	54.05650	-2.90872	340611	462665	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF47	54.05880	-2.90807	340657	462920	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF48	54.05840	-2.90805	340658	462876	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF49	54.05790	-2.90804	340658	462820	2012	autumn	15/10/2012	40	100	0	0	0	70	30	0	0
HF5	54.05970	-2.90885	340607	463021	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF50	54.05750	-2.90801	340659	462776	2012	autumn	15/10/2012	30	100	0	0	0	90	10	0	0
HF51	54.05700	-2.90799	340660	462720	2012	autumn	15/10/2012	65	0	0	0	0	0	0	0	0
HF52	54.05880	-2.90731	340707	462920	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF53	54.05840	-2.90728	340708	462875	2012	autumn	15/10/2012	1	100	0	0	0	0	0	0	100
HF54	54.05790	-2.90727	340708	462820	2012	autumn	15/10/2012	60	75	0	25	0	50	50	0	0
HF55	54.05750	-2.90725	340709	462775	2012	autumn	15/10/2012	50	100	0	0	0	60	20	20	0
HF56	54.05700	-2.90724	340709	462719	2012	autumn	15/10/2012	25	100	0	0	0	45	50	5	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
HF57	54.05660	-2.90721	340710	462675	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF58	54.05890	-2.90654	340757	462930	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF59	54.05840	-2.90653	340757	462875	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF6	54.06100	-2.90968	340555	463167	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF60	54.05800	-2.90651	340758	462830	2012	autumn	15/10/2012	3	100	0	0	0	0	100	0	0
HF61	54.05750	-2.90648	340759	462774	2012	autumn	15/10/2012	15	100	0	0	0	0	10	0	90
HF62	54.05710	-2.90648	340759	462730	2012	autumn	15/10/2012	2	100	0	0	0	100	0	0	0
HF63	54.05660	-2.90646	340759	462674	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF7	54.06060	-2.90965	340556	463122	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
HF9	54.05970	-2.90962	340557	463022	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0
I10	54.05548	-2.91250	340362	462554	2012	summer	20/08/2012	35	100	0	0	0	0	0	100	0
I5	54.05773	-2.91259	340360	462805	2012	summer	20/08/2012	10	100	0	0	0	30	0	70	0
I6	54.05727	-2.91257	340360	462754	2012	summer	20/08/2012	50	0	30	70	0	40	0	60	0
I7	54.05683	-2.91255	340361	462704	2012	summer	20/08/2012	25	40	0	60	0	80	0	20	0
I8	54.05638	-2.91253	340361	462654	2012	summer	20/08/2012	20	100	0	0	0	30	0	70	0
I9	54.05593	-2.91251	340362	462604	2012	summer	20/08/2012	15	100	0	0	0	50	0	50	0
J1	54.05955	-2.91190	340407	463008	2012	summer	20/08/2012	60	0	0	0	100	45	0	40	15
J10	54.05551	-2.91174	340412	462557	2012	summer	20/08/2012	25	90	0	10	0	80	0	20	0
J11	54.05506	-2.91172	340413	462507	2012	summer	20/08/2012	40	50	0	50	0	5	0	95	0
J2	54.05910	-2.91188	340408	462957	2012	summer	20/08/2012	2	100	0	0	0	0	0	100	0
J4	54.05821	-2.91185	340409	462858	2012	summer	20/08/2012	45	20	0	80	0	20	0	80	0
J5	54.05775	-2.91183	340410	462807	2012	summer	20/08/2012	85	0	100	0	0	0	50	50	0
J6	54.05731	-2.91181	340410	462757	2012	summer	20/08/2012	20	100	0	0	0	70	0	30	0
J7	54.05686	-2.91179	340411	462707	2012	summer	20/08/2012	50	30	0	70	0	80	0	20	0
J8	54.05641	-2.91177	340411	462657	2012	summer	20/08/2012	0	0	0	0	0	0	0	0	0
J9	54.05596	-2.91176	340412	462607	2012	summer	20/08/2012	40	100	0	0	0	15	0	85	0
K1	54.05962	-2.91038	340507	463013	2012	summer	20/08/2012	0	0	0	0	0	0	0	0	0
K10	54.05557	-2.91022	340512	462563	2012	summer	20/08/2012	20	100	0	0	0	0	0	70	30
K11	54.05512	-2.91020	340512	462513	2012	summer	20/08/2012	15	100	0	0	0	0	0	100	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
K12	54.05467	-2.91018	340513	462462	2012	summer	20/08/2012	45	40	0	60	0	15	0	85	0
K2	54.05916	-2.91036	340507	462963	2012	summer	20/08/2012	0	0	0	0	0	0	0	0	0
K3	54.05872	-2.91034	340508	462913	2012	summer	20/08/2012	60	80	0	20	0	0	0	100	0
K4	54.05827	-2.91033	340509	462863	2012	summer	20/08/2012	2	0	0	0	0	0	0	0	0
K5	54.05782	-2.91031	340509	462813	2012	summer	20/08/2012	0	0	0	0	0	0	0	0	0
K6	54.05737	-2.91029	340510	462763	2012	summer	20/08/2012	0	0	0	0	0	0	0	0	0
K7	54.05692	-2.91027	340510	462713	2012	summer	20/08/2012	0	0	0	0	0	0	0	0	0
K8	54.05647	-2.91025	340511	462663	2012	summer	20/08/2012	0	0	0	0	0	0	0	0	0
K9	54.05602	-2.91024	340511	462613	2012	summer	20/08/2012	50	100	0	0	0	35	0	65	0
L1	54.05958	-2.91114	340457	463010	2012	summer	20/08/2012	0	0	0	0	0	0	0	0	0
L10	54.05554	-2.91098	340462	462560	2012	summer	20/08/2012	30	30	0	70	0	20	0	80	0
L11	54.05509	-2.91096	340463	462510	2012	summer	20/08/2012	25	20	0	80	0	0	0	100	0
L12	54.05464	-2.91094	340463	462460	2012	summer	20/08/2012	8	100	0	0	0	0	0	100	0
L2	54.05914	-2.91112	340458	462960	2012	summer	20/08/2012	40	20	0	80	0	35	0	60	5
L3	54.05869	-2.91110	340458	462910	2012	summer	20/08/2012	10	100	0	0	0	0	0	100	0
L4	54.05824	-2.91109	340459	462860	2012	summer	20/08/2012	20	100	0	0	0	20	0	80	0
L5	54.05779	-2.91107	340459	462810	2012	summer	20/08/2012	5	100	0	0	0	0	0	100	0
L6	54.05734	-2.91105	340460	462760	2012	summer	20/08/2012	0	0	0	0	0	0	0	0	0
L7	54.05689	-2.91103	340460	462710	2012	summer	20/08/2012	0	0	0	0	0	0	0	0	0
L8	54.05644	-2.91101	340461	462660	2012	summer	20/08/2012	35	50	0	50	0	40	30	30	0
L9	54.05599	-2.91099	340462	462610	2012	summer	20/08/2012	30	30	0	70	0	20	0	80	0
P1	54.05898	-2.91268	340355	462945	2012	summer	20/08/2012	90	0	0	0	100	40	0	60	0
P2	54.05845	-2.91349	340302	462886	2012	summer	20/08/2012	5	100	0	0	0	50	0	50	0
P3	54.06005	-2.91032	340511	463061	2012	summer	20/08/2012	55	10	0	90	0	40	0	60	0
Q4	54.05583	-2.90947	340561	462591	2012	summer	20/08/2012	40	100	0	0	0	80	0	20	0
Q5	54.05626	-2.90912	340584	462638	2012	summer	20/08/2012	70	70	0	30	0	75	0	25	0
Q6	54.05661	-2.90919	340581	462678	2012	summer	20/08/2012	35	100	0	0	0	95	0	5	0
001	54.05880	-2.91183	340411	462924	2013	autumn	10/10/2013	90	0	0	0	100	99	0	1	0
002	54.05602	-2.91611	340127	462618	2013	summer	27/06/2013	48	50	0	50	0	40	10	10	40

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
8	54.05875	-2.91422	340254	462921	2013	summer	24/07/2013	85	0	0	0	100	100	0	0	0
9	54.05903	-2.91361	340295	462950	2013	summer	24/07/2013	80	0	0	0	100	85	10	5	0
10	54.05919	-2.91327	340317	462969	2013	summer	24/07/2013	25	100	0	0	0	90	0	10	0
11	54.05949	-2.91305	340332	463002	2013	summer	24/07/2013	70	0	0	0	100	70	6	20	4
12	54.06008	-2.91265	340359	463067	2013	summer	24/07/2013	90	100	0	0	0	90	3	5	2
12	54.06008	-2.91265	340359	463067	2013	autumn	10/10/2013	95	0	0	0	100	97	0	3	0
13	54.06019	-2.91207	340397	463079	2013	summer	24/07/2013	20	25	0	75	0	40	5	0	25
13	54.06019	-2.91207	340397	463079	2013	autumn	10/10/2013	40	100	0	0	0	97	0	1	2
A10	54.05523	-2.91857	339964	462532	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
A10	54.05523	-2.91857	339964	462532	2013	autumn	10/10/2013	90	0	0	0	100	100	0	0	0
A11	54.05478	-2.91855	339965	462482	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
A12	54.05433	-2.91853	339966	462432	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
A13	54.05388	-2.91852	339966	462382	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
A8	54.05613	-2.91861	339963	462632	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
A9	54.05568	-2.91859	339964	462582	2013	summer	27/06/2013	22	100	0	0	0	0	50	0	50
A9	54.05568	-2.91859	339964	462582	2013	autumn	10/10/2013	40	0	0	100	0	100	0	0	0
B10	54.05526	-2.91781	340014	462535	2013	summer	27/06/2013	25	100	0	0	0	0	70	0	30
B10	54.05526	-2.91781	340014	462535	2013	autumn	10/10/2013	65	0	0	100	0	100	0	0	0
B11	54.05481	-2.91779	340015	462485	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
B12	54.05436	-2.91778	340015	462435	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
B13	54.05391	-2.91776	340016	462385	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
B7	54.05661	-2.91787	340013	462685	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
B7	54.05661	-2.91787	340013	462685	2013	autumn	10/10/2013	23	0	0	100	0	90	0	0	10
B8	54.05616	-2.91785	340013	462635	2013	summer	27/06/2013	20	100	0	0	0	0	0	0	100
B8	54.05616	-2.91785	340013	462635	2013	autumn	10/10/2013	58	0	0	100	0	90	0	0	10
B9	54.05571	-2.91783	340014	462585	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
C10	54.05529	-2.91705	340064	462538	2013	autumn	10/10/2013	2	100	0	0	0	0	0	0	100
C10	54.05529	-2.91705	340064	462538	2013	summer	27/06/2013	25	100	0	0	0	20	80	0	0
C11	54.05484	-2.91703	340064	462488	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
C12	54.05439	-2.91702	340065	462438	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
C7	54.05664	-2.91711	340062	462688	2013	autumn	10/10/2013	0	0	0	0	0	0	0	0	0
C7	54.05664	-2.91711	340062	462688	2013	summer	27/06/2013	10	100	0	0	0	0	100	0	0
C8	54.05619	-2.91709	340063	462638	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
C8	54.05619	-2.91709	340063	462638	2013	autumn	10/10/2013	2	100	0	0	0	0	0	0	100
C9	54.05574	-2.91707	340064	462588	2013	summer	27/06/2013	3	100	0	0	0	100	0	0	0
D10	54.05532	-2.91629	340114	462541	2013	summer	27/06/2013	1	100	0	0	0	0	0	0	0
D11	54.05487	-2.91627	340114	462491	2013	autumn	10/10/2013	40	0	100	0	0	0	90	0	10
D3	54.05847	-2.91642	340110	462891	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
D4	54.05802	-2.91640	340111	462841	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
D5	54.05757	-2.91638	340111	462791	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
D6	54.05712	-2.91637	340112	462741	2013	summer	27/06/2013	23	100	0	0	0	0	0	0	100
D7	54.05667	-2.91635	340112	462691	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
D8	54.05622	-2.91633	340113	462641	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
D8	54.05622	-2.91633	340113	462641	2013	autumn	10/10/2013	15	100	0	0	0	0	0	0	100
D9	54.05577	-2.91631	340113	462591	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
E10	54.05535	-2.91553	340163	462543	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
E10	54.05535	-2.91553	340163	462543	2013	autumn	10/10/2013	2	100	0	0	0	0	0	0	100
E11	54.05490	-2.91551	340164	462493	2013	summer	27/06/2013	20	0	0	0	100	100	0	0	0
E11	54.05490	-2.91551	340164	462493	2013	autumn	10/10/2013	20	100	0	0	0	0	70	0	30
E5	54.05760	-2.91562	340161	462794	2013	summer	27/06/2013	40	100	0	0	0	35	10	0	55
E6	54.05715	-2.91561	340161	462744	2013	summer	27/06/2013	19	100	0	0	0	100	0	0	0
E7	54.05670	-2.91559	340162	462694	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
E8	54.05625	-2.91557	340162	462644	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
E8	54.05625	-2.91557	340162	462644	2013	autumn	10/10/2013	20	0	100	0	0	0	0	0	100
E9	54.05580	-2.91555	340163	462593	2013	summer	27/06/2013	1	100	0	0	0	0	100	0	0
F10	54.05539	-2.91477	340213	462546	2013	autumn	10/10/2013	1	100	0	0	0	0	0	0	100
F10	54.05539	-2.91477	340213	462546	2013	summer	27/06/2013	35	0	50	0	50	100	0	0	0
F11	54.05493	-2.91476	340214	462496	2013	summer	27/06/2013	90	0	0	0	100	95	5	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
F4	54.05808	-2.91488	340210	462846	2013	summer	27/06/2013	1	100	0	0	0	0	0	0	100
F5	54.05763	-2.91486	340211	462796	2013	summer	27/06/2013	15	100	0	0	0	0	0	0	100
F6	54.05718	-2.91485	340211	462746	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
F6	54.05718	-2.91485	340211	462746	2013	autumn	10/10/2013	70	0	100	0	0	10	40	0	50
F7	54.05673	-2.91483	340212	462696	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
F8	54.05628	-2.91481	340212	462646	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
F8	54.05628	-2.91481	340212	462646	2013	autumn	10/10/2013	1	100	0	0	0	0	0	0	100
F9	54.05584	-2.91479	340213	462596	2013	summer	27/06/2013	1	100	0	0	0	100	0	0	0
G10	54.05542	-2.91401	340263	462549	2013	summer	27/06/2013	50	0	0	0	100	100	0	0	0
G3	54.05856	-2.91414	340259	462899	2013	summer	24/07/2013	30	100	0	0	0	100	0	0	0
G4	54.05811	-2.91412	340260	462849	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
G5	54.05766	-2.91411	340260	462799	2013	summer	27/06/2013	70	0	0	100	0	80	7	10	3
G6	54.05721	-2.91409	340261	462749	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
G6	54.05721	-2.91409	340261	462749	2013	autumn	10/10/2013	30	100	0	0	0	10	0	0	90
G7	54.05676	-2.91407	340261	462699	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
G7	54.05676	-2.91407	340261	462699	2013	autumn	10/10/2013	0	0	0	0	0	0	0	0	0
G8	54.05631	-2.91405	340262	462649	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
G8	54.05631	-2.91405	340262	462649	2013	autumn	10/10/2013	0	0	0	0	0	0	0	0	0
G9	54.05586	-2.91403	340262	462599	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
G9	54.05586	-2.91403	340262	462599	2013	autumn	10/10/2013	1	100	0	0	0	0	0	0	100
H10	54.05545	-2.91325	340313	462552	2013	summer	27/06/2013	20	100	0	0	0	0	100	0	0
H3	54.05859	-2.91338	340309	462902	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
H4	54.05814	-2.91336	340310	462852	2013	summer	27/06/2013	19	100	0	0	0	5	0	0	95
H5	54.05769	-2.91335	340310	462802	2013	summer	27/06/2013	10	100	0	0	0	90	10	0	0
H5	54.05769	-2.91335	340310	462802	2013	autumn	10/10/2013	40	100	0	0	0	1	10	0	89
H6	54.05724	-2.91333	340311	462752	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
H6	54.05724	-2.91333	340311	462752	2013	autumn	10/10/2013	0	0	0	0	0	0	0	0	0
H7	54.05680	-2.91331	340311	462702	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
H7	54.05680	-2.91331	340311	462702	2013	autumn	10/10/2013	20	100	0	0	0	0	0	0	100

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
H8	54.05634	-2.91329	340312	462652	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
H9	54.05590	-2.91327	340312	462602	2013	summer	27/06/2013	10	0	0	0	100	50	50	0	0
H9	54.05590	-2.91327	340312	462602	2013	autumn	10/10/2013	55	0	100	0	0	0	2	0	98
HF1	54.05790	-2.90955	340559	462822	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF10	54.06190	-2.90895	340604	463266	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF11	54.06150	-2.90892	340605	463222	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF12	54.06100	-2.90891	340605	463166	2013	spring	02/04/2013	20	0	0	100	0	90	10	0	0
HF13	54.06060	-2.90890	340605	463121	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF14	54.06010	-2.90888	340606	463066	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF15	54.06200	-2.90819	340654	463277	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF16	54.06150	-2.90818	340654	463221	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF17	54.06110	-2.90815	340655	463176	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF18	54.06060	-2.90814	340655	463121	2013	spring	02/04/2013	3	100	0	0	0	0	100	0	0
HF19	54.06020	-2.90812	340656	463076	2013	spring	02/04/2013	4	100	0	0	0	0	100	0	0
HF2	54.05740	-2.90954	340559	462766	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF20	54.05970	-2.90811	340656	463021	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF21	54.05930	-2.90808	340657	462976	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF22	54.06200	-2.90744	340703	463276	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF23	54.06150	-2.90741	340704	463220	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF24	54.06110	-2.90740	340704	463176	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF25	54.06060	-2.90738	340705	463120	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF26	54.06020	-2.90737	340705	463076	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF27	54.05970	-2.90734	340706	463020	2013	spring	02/04/2013	30	100	0	0	0	90	10	0	0
HF28	54.05930	-2.90732	340707	462975	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF29	54.06200	-2.90667	340753	463275	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF3	54.05700	-2.90951	340560	462721	2013	spring	02/04/2013	5	100	0	0	0	0	0	0	100
HF30	54.06160	-2.90666	340753	463231	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF31	54.06110	-2.90664	340754	463175	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF32	54.06070	-2.90661	340755	463131	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
HF33	54.06020	-2.90660	340755	463075	2013	spring	02/04/2013	12	100	0	0	0	90	10	0	0
HF34	54.05980	-2.90658	340756	463030	2013	spring	02/04/2013	3	100	0	0	0	0	100	0	0
HF35	54.05930	-2.90655	340757	462975	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF36	54.05660	-2.90798	340660	462676	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF37	54.05920	-2.90961	340557	462966	2013	spring	02/04/2013	25	100	0	0	0	65	35	0	0
HF38	54.05880	-2.90958	340558	462922	2013	spring	02/04/2013	15	100	0	0	0	70	30	0	0
HF39	54.05830	-2.90957	340558	462866	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF4	54.05650	-2.90949	340561	462666	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF40	54.05920	-2.90884	340607	462966	2013	spring	02/04/2013	4	100	0	0	0	100	0	0	0
HF41	54.05880	-2.90883	340607	462921	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF42	54.05830	-2.90881	340608	462865	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF43	54.05790	-2.90878	340609	462821	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF44	54.05740	-2.90877	340609	462765	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF45	54.05700	-2.90875	340610	462721	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF46	54.05650	-2.90872	340611	462665	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF47	54.05880	-2.90807	340657	462920	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF48	54.05840	-2.90805	340658	462876	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF49	54.05790	-2.90804	340658	462820	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF5	54.05970	-2.90885	340607	463021	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF50	54.05750	-2.90801	340659	462776	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF51	54.05700	-2.90799	340660	462720	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF52	54.05880	-2.90731	340707	462920	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF53	54.05840	-2.90728	340708	462875	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF54	54.05790	-2.90727	340708	462820	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF55	54.05750	-2.90725	340709	462775	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF56	54.05700	-2.90724	340709	462719	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF57	54.05660	-2.90721	340710	462675	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF58	54.05890	-2.90654	340757	462930	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF59	54.05840	-2.90653	340757	462875	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
HF6	54.06100	-2.90968	340555	463167	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF60	54.05800	-2.90651	340758	462830	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF61	54.05750	-2.90648	340759	462774	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF62	54.05710	-2.90648	340759	462730	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF63	54.05660	-2.90646	340759	462674	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF7	54.06060	-2.90965	340556	463122	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
HF8	54.06010	-2.90964	340556	463066	2013	spring	02/04/2013	40	0	100	0	0	100	0	0	0
HF9	54.05970	-2.90962	340557	463022	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0
I1	54.05952	-2.91266	340358	463005	2013	autumn	10/10/2013	75	100	0	0	0	100	0	0	0
I10	54.05548	-2.91250	340362	462554	2013	autumn	10/10/2013	0	0	0	0	0	0	0	0	0
I2	54.05907	-2.91264	340358	462955	2013	summer	24/07/2013	85	20	0	80	0	20	15	60	5
I2	54.05907	-2.91264	340358	462955	2013	autumn	10/10/2013	85	100	0	0	0	86	0	10	4
I3	54.05862	-2.91262	340359	462905	2013	summer	24/07/2013	70	100	0	0	0	60	0	40	0
I4	54.05817	-2.91260	340359	462855	2013	autumn	10/10/2013	50	100	0	0	0	0	30	10	60
I4	54.05817	-2.91260	340359	462855	2013	summer	24/07/2013	60	100	0	0	0	70	5	25	0
I5	54.05773	-2.91259	340360	462805	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
I5	54.05773	-2.91259	340360	462805	2013	autumn	10/10/2013	0	0	0	0	0	0	0	0	0
I6	54.05727	-2.91257	340360	462754	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
I6	54.05727	-2.91257	340360	462754	2013	autumn	10/10/2013	40	100	0	0	0	0	0	0	100
I7	54.05683	-2.91255	340361	462704	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
I7	54.05683	-2.91255	340361	462704	2013	autumn	10/10/2013	10	100	0	0	0	0	0	0	100
I8	54.05638	-2.91253	340361	462654	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
I9	54.05593	-2.91251	340362	462604	2013	summer	24/07/2013	30	100	0	0	0	80	0	20	0
J1	54.05955	-2.91190	340407	463008	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
J1	54.05955	-2.91190	340407	463008	2013	autumn	10/10/2013	5	100	0	0	0	50	50	0	0
J10	54.05551	-2.91174	340412	462557	2013	autumn	10/10/2013	40	0	0	100	0	100	0	0	0
J2	54.05910	-2.91188	340408	462957	2013	summer	24/07/2013	20	100	0	0	0	40	0	60	0
J2	54.05910	-2.91188	340408	462957	2013	autumn	10/10/2013	65	100	0	0	0	99	0	1	0
J4	54.05821	-2.91185	340409	462858	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
J4	54.05821	-2.91185	340409	462858	2013	autumn	10/10/2013	1	100	0	0	0	0	0	0	100
J5	54.05775	-2.91183	340410	462807	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
J6	54.05731	-2.91181	340410	462757	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
J6	54.05731	-2.91181	340410	462757	2013	autumn	10/10/2013	0	0	0	0	0	0	0	0	0
J7	54.05686	-2.91179	340411	462707	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
J7	54.05686	-2.91179	340411	462707	2013	autumn	10/10/2013	0	0	0	0	0	0	0	0	0
J8	54.05641	-2.91177	340411	462657	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
J9	54.05596	-2.91176	340412	462607	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
K1	54.05962	-2.91038	340507	463013	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
K10	54.05557	-2.91022	340512	462563	2013	autumn	10/10/2013	25	100	0	0	0	0	0	0	100
K2	54.05916	-2.91036	340507	462963	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
K3	54.05872	-2.91034	340508	462913	2013	summer	24/07/2013	1	100	0	0	0	0	100	0	0
K3	54.05872	-2.91034	340508	462913	2013	autumn	10/10/2013	25	100	0	0	0	0	5	0	95
K4	54.05827	-2.91033	340509	462863	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
K5	54.05782	-2.91031	340509	462813	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
K6	54.05737	-2.91029	340510	462763	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
K7	54.05692	-2.91027	340510	462713	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
K7	54.05692	-2.91027	340510	462713	2013	autumn	10/10/2013	0	100	0	0	0	0	0	0	100
K8	54.05647	-2.91025	340511	462663	2013	summer	27/06/2013	0	0	0	0	0	0	0	0	0
K8	54.05647	-2.91025	340511	462663	2013	autumn	10/10/2013	4	0	0	0	0	0	0	0	0
K9	54.05602	-2.91024	340511	462613	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
K9	54.05602	-2.91024	340511	462613	2013	autumn	10/10/2013	2	100	0	0	0	0	0	0	100
L1	54.05958	-2.91114	340457	463010	2013	autumn	10/10/2013	15	0	0	0	100	85	0	15	0
L1	54.05958	-2.91114	340457	463010	2013	summer	24/07/2013	43	100	0	0	0	70	10	20	0
L10	54.05554	-2.91098	340462	462560	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
L10	54.05554	-2.91098	340462	462560	2013	autumn	10/10/2013	20	20	80	0	0	0	0	0	100
L11	54.05509	-2.91096	340463	462510	2013	summer	24/07/2013	3	100	0	0	0	90	0	10	0
L2	54.05914	-2.91112	340458	462960	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
L2	54.05914	-2.91112	340458	462960	2013	autumn	10/10/2013	0	0	0	0	0	0	0	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	*Sabellaria*	Patchy	Sheet	Hummock	Reef	Crisp	Worn	New	Dead
L3	54.05869	-2.91110	340458	462910	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
L3	54.05869	-2.91110	340458	462910	2013	autumn	10/10/2013	0	0	0	0	0	0	0	0	0
L4	54.05824	-2.91109	340459	462860	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
L4	54.05824	-2.91109	340459	462860	2013	autumn	10/10/2013	3	100	0	0	0	0	0	0	100
L5	54.05779	-2.91107	340459	462810	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
L6	54.05734	-2.91105	340460	462760	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
L6	54.05734	-2.91105	340460	462760	2013	autumn	10/10/2013	0	100	0	0	0	0	0	0	100
L7	54.05689	-2.91103	340460	462710	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
L8	54.05644	-2.91101	340461	462660	2013	summer	24/07/2013	2	100	0	0	0	0	0	0	100
L9	54.05599	-2.91099	340462	462610	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
Q4	54.05583	-2.90947	340561	462591	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
Q5	54.05626	-2.90912	340584	462638	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0
Q6	54.05661	-2.90919	340581	462678	2013	summer	24/07/2013	0	0	0	0	0	0	0	0	0

10.4 Appendix IV –*Mytilus edulis* and substrate raw data

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
A10	54.05523	-2.91857	339964	462532	2011	autumn	30/08/2011	1	0	0	7	8	0	80	4	0	0
B10	54.05526	-2.91781	340014	462535	2011	autumn	30/08/2011	3	0	0	20	6	0	1	0	0	0
B11	54.05481	-2.91779	340015	462485	2011	autumn	30/08/2011	1	0	0	14	14	0	0	1	0	0
B7	54.05661	-2.91787	340013	462685	2011	autumn	30/08/2011	20	10	0	35	5	0	0	0	0	0
B8	54.05616	-2.91785	340013	462635	2011	autumn	30/08/2011	10	0	0	30	23	0	30	3	0	1
B9	54.05571	-2.91783	340014	462585	2011	autumn	30/08/2011	10	0	0	60	24	0	0	0	0	5
C10	54.05529	-2.91705	340064	462538	2011	autumn	30/08/2011	1	6	0	15	51	0	0	4	0	3
C11	54.05484	-2.91704	340064	462488	2011	autumn	30/08/2011	0	0	0	15	30	0	0	0	0	0
C7	54.05664	-2.91711	340062	462688	2011	autumn	30/08/2011	2	0	0	30	25	0	0	1	0	2
C8	54.05619	-2.91709	340063	462638	2011	autumn	30/08/2011	0	0	0	0	0	0	0	0	100	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
C9	54.05574	-2.91707	340064	462588	2011	autumn	30/08/2011	15	1	0	30	18	0	0	0	0	1
D10	54.05533	-2.91629	340114	462541	2011	autumn	30/08/2011	0	1	0	8	1	0	0	0	0	0
D11	54.05488	-2.91628	340114	462491	2011	autumn	30/08/2011	2	6	0	32	27	0	0	3	0	0
D7	54.05667	-2.91635	340112	462691	2011	autumn	30/08/2011	2	0	0	25	60	0	0	2	0	10
D8	54.05622	-2.91633	340113	462641	2011	autumn	30/08/2011	3	1	0	48	20	0	25	0	0	0
D9	54.05577	-2.91631	340113	462591	2011	autumn	30/08/2011	3	1	0	36	37	0	0	3	0	0
E10	54.05536	-2.91553	340163	462543	2011	autumn	30/08/2011	2	0	0	50	30	0	0	5	0	11
E11	54.05491	-2.91552	340164	462493	2011	autumn	30/08/2011	0	8	0	3	4	0	0	0	0	0
E6	54.05715	-2.91561	340161	462744	2011	autumn	30/08/2011	20	1	4	46	3	0	0	0	0	1
E7	54.05670	-2.91559	340162	462694	2011	autumn	30/08/2011	5	0	0	10	0	0	0	0	0	0
E8	54.05626	-2.91557	340162	462644	2011	autumn	30/08/2011	4	0	0	35	49	0	1	8	0	2
E9	54.05580	-2.91555	340163	462593	2011	autumn	30/08/2011	0	0	0	15	28	0	4	3	20	0
F10	54.05539	-2.91477	340213	462546	2011	autumn	27/09/2011	10	1	0	87	0	0	0	0	0	0
F11	54.05494	-2.91476	340214	462496	2011	autumn	27/09/2011	2	0	0	25	69	0	0	0	0	0
F6	54.05718	-2.91485	340211	462746	2011	autumn	27/09/2011	1	0	0	49	49	0	0	0	0	0
F7	54.05673	-2.91483	340212	462696	2011	autumn	27/09/2011	0	0	0	0	0	0	0	0	100	0
F8	54.05629	-2.91481	340212	462646	2011	autumn	27/09/2011	0	2	0	15	3	0	80	0	0	0
F9	54.05584	-2.91479	340213	462596	2011	autumn	27/09/2011	5	1	0	19	0	0	0	0	0	0
G10	54.05542	-2.91402	340263	462549	2011	autumn	27/09/2011	5	2	0	40	48	0	0	0	0	0
G11	54.05497	-2.91400	340264	462499	2011	autumn	27/09/2011	0	0	0	0	100	0	0	0	0	0
G6	54.05721	-2.91409	340261	462749	2011	autumn	27/09/2011	1	1	0	18	15	0	0	0	0	20
G7	54.05676	-2.91407	340261	462699	2011	autumn	27/09/2011	1	80	0	15	1	0	0	0	0	3
G8	54.05632	-2.91405	340262	462649	2011	autumn	27/09/2011	1	1	0	31	7	0	60	0	0	0
G9	54.05587	-2.91403	340262	462599	2011	autumn	27/09/2011	0	1	0	14	85	0	0	0	0	0
H10	54.05545	-2.91326	340313	462552	2011	autumn	27/09/2011	1	0	0	49	49	0	0	0	0	0
H6	54.05725	-2.91333	340311	462752	2011	autumn	27/09/2011	2	0	0	92	5	0	0	0	0	0
H7	54.05680	-2.91331	340311	462702	2011	autumn	27/09/2011	3	1	0	53	30	0	0	0	0	1
H8	54.05635	-2.91329	340312	462652	2011	autumn	27/09/2011	1	0	0	29	20	0	50	0	0	0
H9	54.05590	-2.91327	340312	462602	2011	autumn	27/09/2011	1	1	0	65	11	0	0	0	0	2

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
I10	54.05548	-2.91250	340362	462554	2011	autumn	27/09/2011	1	0	0	46	52	0	0	0	0	0
I6	54.05727	-2.91257	340360	462754	2011	autumn	27/09/2011	10	0	0	79	10	0	1	0	0	0
I7	54.05683	-2.91255	340361	462704	2011	autumn	27/09/2011	1	0	0	40	49	0	0	0	0	0
I8	54.05638	-2.91253	340361	462654	2011	autumn	27/09/2011	1	0	0	40	9	0	50	0	0	0
I9	54.05593	-2.91251	340362	462604	2011	autumn	27/09/2011	5	32	0	26	2	0	0	1	0	19
J10	54.05551	-2.91174	340412	462557	2011	autumn	27/09/2011	2	0	0	45	50	0	0	0	0	0
J6	54.05731	-2.91181	340410	462757	2011	autumn	27/09/2011	1	0	0	52	40	0	2	0	0	0
J7	54.05686	-2.91179	340411	462707	2011	autumn	27/09/2011	1	0	0	12	50	0	30	0	0	3
J8	54.05641	-2.91177	340411	462657	2011	autumn	27/09/2011	1	90	0	4	5	0	0	0	0	0
J9	54.05596	-2.91176	340412	462607	2011	autumn	27/09/2011	0	50	0	10	35	0	0	0	0	4
B10	54.05526	-2.91781	340014	462535	2012	summer	03/08/2012	0	0	0	10	0	0	72	0	0	3
B7	54.05661	-2.91787	340013	462685	2012	summer	03/08/2012	15	0	0	50	20	0	0	0	0	0
B8	54.05616	-2.91785	340013	462635	2012	summer	03/08/2012	0	0	0	15	10	20	30	0	0	0
B9	54.05571	-2.91783	340014	462585	2012	summer	03/08/2012	5	0	0	35	5	0	50	0	0	5
C10	54.05529	-2.91705	340064	462538	2012	summer	03/08/2012	1	0	0	28	20	0	0	0	0	1
C7	54.05664	-2.91711	340062	462688	2012	summer	03/08/2012	2	0	0	30	66	0	0	0	0	2
C8	54.05619	-2.91709	340063	462638	2012	summer	03/08/2012	0	0	0	35	35	0	0	10	0	20
C9	54.05574	-2.91707	340064	462588	2012	summer	03/08/2012	3	0	0	7	15	0	40	0	0	5
D10	54.05532	-2.91629	340114	462541	2012	summer	03/08/2012	2	0	0	5	0	0	0	0	0	0
D11	54.05487	-2.91627	340114	462491	2012	summer	03/08/2012	2	0	0	10	40	0	0	3	0	15
D6	54.05712	-2.91637	340112	462741	2012	summer	03/08/2012	5	0	0	30	40	0	0	0	0	0
D7	54.05667	-2.91635	340112	462691	2012	summer	03/08/2012	0	0	0	5	60	0	0	5	0	25
D8	54.05622	-2.91633	340113	462641	2012	summer	03/08/2012	8	0	0	10	61	0	0	8	0	5
D9	54.05577	-2.91631	340113	462591	2012	summer	03/08/2012	5	2	0	60	18	0	0	0	0	15
E10	54.05535	-2.91553	340163	462543	2012	summer	03/08/2012	3	0	0	15	29	0	20	0	0	3
E11	54.05490	-2.91551	340164	462493	2012	summer	03/08/2012	5	0	0	25	20	0	0	0	0	0
E5	54.05760	-2.91562	340161	462794	2012	summer	03/08/2012	5	0	0	20	75	0	0	0	0	0
E6	54.05715	-2.91561	340161	462744	2012	summer	03/08/2012	2	0	0	0	8	0	0	0	0	0
E7	54.05670	-2.91559	340162	462694	2012	summer	03/08/2012	10	0	0	15	50	0	0	15	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
E8	54.05625	-2.91557	340162	462644	2012	summer	03/08/2012	0	0	0	0	5	5	0	10	0	0
E9	54.05580	-2.91555	340163	462593	2012	summer	03/08/2012	0	24	0	3	10	0	0	0	0	3
F10	54.05539	-2.91477	340213	462546	2012	summer	03/08/2012	10	0	0	55	20	0	3	0	0	10
F11	54.05493	-2.91476	340214	462496	2012	summer	03/08/2012	5	0	0	9	15	0	0	0	0	1
F5	54.05763	-2.91486	340211	462796	2012	summer	03/08/2012	0	0	0	60	40	0	0	0	0	0
F6	54.05718	-2.91485	340211	462746	2012	summer	03/08/2012	1	1	0	2	2	0	0	0	0	0
F7	54.05673	-2.91483	340212	462696	2012	summer	03/08/2012	10	0	0	75	10	0	0	0	0	5
F8	54.05628	-2.91481	340212	462646	2012	summer	03/08/2012	8	70	7	15	0	0	0	0	0	0
F9	54.05584	-2.91479	340213	462596	2012	summer	03/08/2012	2	0	0	18	0	0	0	0	0	0
G10	54.05542	-2.91401	340263	462549	2012	summer	20/08/2012	4	0	0	6	49	0	0	0	0	1
G11	54.05497	-2.91400	340264	462499	2012	summer	20/08/2012	3	0	0	46	25	0	0	0	0	1
G6	54.05721	-2.91409	340261	462749	2012	summer	03/08/2012	5	60	10	3	10	0	0	2	0	0
G7	54.05676	-2.91407	340261	462699	2012	summer	03/08/2012	0	0	0	5	5	0	90	0	0	0
G8	54.05631	-2.91405	340262	462649	2012	summer	03/08/2012	2	1	0	10	66	0	0	10	0	10
G9	54.05586	-2.91403	340262	462599	2012	summer	03/08/2012	35	0	0	20	20	0	0	0	0	15
H10	54.05545	-2.91325	340313	462552	2012	summer	20/08/2012	10	0	0	30	17	0	0	2	0	1
H5	54.05769	-2.91335	340310	462802	2012	summer	03/08/2012	5	0	0	25	25	0	0	10	0	10
H6	54.05724	-2.91333	340311	462752	2012	summer	03/08/2012	30	0	5	20	20	0	0	0	0	10
H7	54.05680	-2.91331	340311	462702	2012	summer	03/08/2012	10	20	0	23	20	0	0	0	0	2
H8	54.05634	-2.91329	340312	462652	2012	summer	03/08/2012	8	0	0	30	22	0	0	0	0	0
H9	54.05590	-2.91327	340312	462602	2012	summer	03/08/2012	1	0	0	35	23	0	0	0	0	1
HF1	54.05790	-2.90955	340559	462822	2012	autumn	15/10/2012	0	30	15	55	0	0	0	0	0	0
HF10	54.06190	-2.90895	340604	463266	2012	autumn	15/10/2012	0	0	0	50	50	0	0	0	0	0
HF11	54.06150	-2.90892	340605	463222	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF12	54.06100	-2.90891	340605	463166	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF13	54.06060	-2.90890	340605	463121	2012	autumn	15/10/2012	1	0	0	10	43	0	0	1	0	0
HF14	54.06010	-2.90888	340606	463066	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF15	54.06200	-2.90819	340654	463277	2012	autumn	15/10/2012	5	0	0	45	50	0	0	0	0	0
HF16	54.06150	-2.90818	340654	463221	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
HF17	54.06110	-2.90815	340655	463176	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF18	54.06060	-2.90814	340655	463121	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF19	54.06020	-2.90812	340656	463076	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF2	54.05740	-2.90954	340559	462766	2012	autumn	15/10/2012	0	20	43	25	0	0	0	0	10	0
HF20	54.05970	-2.90811	340656	463021	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF21	54.05930	-2.90808	340657	462976	2012	autumn	15/10/2012	5	2	63	30	0	0	0	0	0	0
HF22	54.06200	-2.90744	340703	463276	2012	autumn	15/10/2012	1	3	0	10	66	0	0	5	10	0
HF23	54.06150	-2.90741	340704	463220	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF24	54.06110	-2.90740	340704	463176	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF25	54.06060	-2.90738	340705	463120	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF26	54.06020	-2.90737	340705	463076	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF27	54.05970	-2.90734	340706	463020	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF28	54.05930	-2.90732	340707	462975	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF29	54.06200	-2.90667	340753	463275	2012	autumn	15/10/2012	0	4	44	44	0	0	0	2	0	6
HF3	54.05700	-2.90951	340560	462721	2012	autumn	15/10/2012	2	2	46	15	5	0	0	0	25	0
HF30	54.06160	-2.90666	340753	463231	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF31	54.06110	-2.90664	340754	463175	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF32	54.06070	-2.90661	340755	463131	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF33	54.06020	-2.90660	340755	463075	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF34	54.05980	-2.90658	340756	463030	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF35	54.05930	-2.90655	340757	462975	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF36	54.05660	-2.90798	340660	462676	2012	autumn	15/10/2012	0	35	20	25	20	0	0	0	0	0
HF37	54.05920	-2.90961	340557	462966	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF38	54.05880	-2.90958	340558	462922	2012	autumn	15/10/2012	0	0	0	1	3	0	0	1	0	0
HF39	54.05830	-2.90957	340558	462866	2012	autumn	15/10/2012	0	10	30	30	0	0	0	0	0	0
HF4	54.05650	-2.90949	340561	462666	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF40	54.05920	-2.90884	340607	462966	2012	autumn	15/10/2012	0	35	45	20	0	0	0	0	0	0
HF41	54.05880	-2.90883	340607	462921	2012	autumn	15/10/2012	0	5	0	15	78	0	0	0	0	0
HF42	54.05830	-2.90881	340608	462865	2012	autumn	15/10/2012	0	20	45	35	0	0	0	0	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
HF43	54.05790	-2.90878	340609	462821	2012	autumn	15/10/2012	0	25	0	40	28	0	6	0	0	0
HF44	54.05740	-2.90877	340609	462765	2012	autumn	15/10/2012	0	20	5	74	0	0	0	0	0	0
HF45	54.05700	-2.90875	340610	462721	2012	autumn	15/10/2012	0	30	49	20	0	0	0	0	0	0
HF46	54.05650	-2.90872	340611	462665	2012	autumn	15/10/2012	0	10	0	10	5	0	0	0	15	0
HF47	54.05880	-2.90807	340657	462920	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF48	54.05840	-2.90805	340658	462876	2012	autumn	15/10/2012	0	75	14	10	0	0	0	0	0	1
HF49	54.05790	-2.90804	340658	462820	2012	autumn	15/10/2012	0	5	10	75	0	0	10	0	0	0
HF5	54.05970	-2.90885	340607	463021	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF50	54.05750	-2.90801	340659	462776	2012	autumn	15/10/2012	0	0	0	13	40	0	5	0	0	2
HF51	54.05700	-2.90799	340660	462720	2012	autumn	15/10/2012	0	5	25	20	20	0	0	0	0	0
HF52	54.05880	-2.90731	340707	462920	2012	autumn	15/10/2012	0	0	0	5	10	0	0	3	15	2
HF53	54.05840	-2.90728	340708	462875	2012	autumn	15/10/2012	0	2	8	80	8	0	0	0	0	2
HF54	54.05790	-2.90727	340708	462820	2012	autumn	15/10/2012	0	0	0	50	15	0	30	0	0	4
HF55	54.05750	-2.90725	340709	462775	2012	autumn	15/10/2012	0	3	0	15	20	0	0	2	0	0
HF56	54.05700	-2.90724	340709	462719	2012	autumn	15/10/2012	0	0	0	5	33	0	0	2	0	10
HF57	54.05660	-2.90721	340710	462675	2012	autumn	15/10/2012	0	0	0	15	52	0	0	3	0	5
HF58	54.05890	-2.90654	340757	462930	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF59	54.05840	-2.90653	340757	462875	2012	autumn	15/10/2012	0	0	0	10	27	0	60	0	0	3
HF6	54.06100	-2.90968	340555	463167	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF60	54.05800	-2.90651	340758	462830	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	100	0
HF61	54.05750	-2.90648	340759	462774	2012	autumn	15/10/2012	0	50	0	5	34	0	0	1	0	7
HF62	54.05710	-2.90648	340759	462730	2012	autumn	15/10/2012	0	0	0	5	69	0	0	7	0	4
HF63	54.05660	-2.90646	340759	462674	2012	autumn	15/10/2012	0	0	0	15	62	0	0	21	0	0
HF7	54.06060	-2.90965	340556	463122	2012	autumn	15/10/2012	0	0	0	0	0	0	0	0	0	0
HF9	54.05970	-2.90962	340557	463022	2012	autumn	15/10/2012	0	5	0	20	73	0	0	0	0	0
I10	54.05548	-2.91250	340362	462554	2012	summer	20/08/2012	15	0	0	15	22	0	0	0	10	3
I5	54.05773	-2.91259	340360	462805	2012	summer	20/08/2012	0	1	0	5	59	0	0	15	0	10
I6	54.05727	-2.91257	340360	462754	2012	summer	20/08/2012	10	0	0	33	5	0	0	0	0	2
I7	54.05683	-2.91255	340361	462704	2012	summer	20/08/2012	10	0	0	25	28	0	0	2	0	10

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
I8	54.05638	-2.91253	340361	462654	2012	summer	20/08/2012	10	0	0	35	25	0	0	10	0	2
I9	54.05593	-2.91251	340362	462604	2012	summer	20/08/2012	15	0	0	40	20	0	0	0	0	10
J1	54.05955	-2.91190	340407	463008	2012	summer	20/08/2012	5	0	0	10	21	0	0	2	0	2
J10	54.05551	-2.91174	340412	462557	2012	summer	20/08/2012	5	0	0	40	30	0	0	0	0	0
J11	54.05506	-2.91172	340413	462507	2012	summer	20/08/2012	10	0	0	5	41	0	0	3	0	1
J2	54.05910	-2.91188	340408	462957	2012	summer	20/08/2012	10	0	0	70	12	0	0	0	0	6
J4	54.05821	-2.91185	340409	462858	2012	summer	20/08/2012	5	0	0	15	22	0	0	5	0	8
J5	54.05775	-2.91183	340410	462807	2012	summer	20/08/2012	0	0	0	0	15	0	0	0	0	0
J6	54.05731	-2.91181	340410	462757	2012	summer	20/08/2012	1	0	0	10	43	0	0	25	0	1
J7	54.05686	-2.91179	340411	462707	2012	summer	20/08/2012	5	10	0	3	17	0	0	10	0	5
J8	54.05641	-2.91177	340411	462657	2012	summer	20/08/2012	0	95	0	3	2	0	0	0	0	0
J9	54.05596	-2.91176	340412	462607	2012	summer	20/08/2012	1	0	0	10	48	0	0	0	0	1
K1	54.05962	-2.91038	340507	463013	2012	summer	20/08/2012	8	0	0	60	31	0	0	0	0	1
K10	54.05557	-2.91022	340512	462563	2012	summer	20/08/2012	12	0	0	10	42	0	0	6	5	5
K11	54.05512	-2.91020	340512	462513	2012	summer	20/08/2012	20	0	0	5	43	0	0	7	0	10
K12	54.05467	-2.91018	340513	462462	2012	summer	20/08/2012	1	0	0	2	35	0	0	2	0	15
K2	54.05916	-2.91036	340507	462963	2012	summer	20/08/2012	0	0	0	40	58	0	0	0	0	2
K3	54.05872	-2.91034	340508	462913	2012	summer	20/08/2012	0	0	0	0	23	0	0	15	0	2
K4	54.05827	-2.91033	340509	462863	2012	summer	20/08/2012	0	70	27	1	0	0	0	0	0	0
K5	54.05782	-2.91031	340509	462813	2012	summer	20/08/2012	0	70	0	1	29	0	0	0	0	0
K6	54.05737	-2.91029	340510	462763	2012	summer	20/08/2012	2	20	0	1	46	0	0	10	20	1
K7	54.05692	-2.91027	340510	462713	2012	summer	20/08/2012	0	75	0	1	24	0	0	0	0	0
K8	54.05647	-2.91025	340511	462663	2012	summer	20/08/2012	0	85	0	1	14	0	0	0	0	0
K9	54.05602	-2.91024	340511	462613	2012	summer	20/08/2012	0	15	0	2	32	0	0	0	0	1
L1	54.05958	-2.91114	340457	463010	2012	summer	20/08/2012	5	0	0	20	73	0	0	1	0	1
L10	54.05554	-2.91098	340462	462560	2012	summer	20/08/2012	8	0	0	8	44	0	0	5	0	5
L11	54.05509	-2.91096	340463	462510	2012	summer	20/08/2012	2	0	0	5	67	0	0	0	0	1
L12	54.05464	-2.91094	340463	462460	2012	summer	20/08/2012	12	0	0	15	65	0	0	0	0	0
L2	54.05914	-2.91112	340458	462960	2012	summer	20/08/2012	15	0	0	25	23	0	0	5	0	2

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
L3	54.05869	-2.91110	340458	462910	2012	summer	20/08/2012	0	0	0	55	33	0	0	0	0	2
L4	54.05824	-2.91109	340459	462860	2012	summer	20/08/2012	3	0	0	5	52	0	0	15	0	5
L5	54.05779	-2.91107	340459	462810	2012	summer	20/08/2012	1	82	0	1	10	0	0	0	0	1
L6	54.05734	-2.91105	340460	462760	2012	summer	20/08/2012	0	80	0	1	12	0	0	5	0	2
L7	54.05689	-2.91103	340460	462710	2012	summer	20/08/2012	0	60	38	2	0	0	0	0	0	0
L8	54.05644	-2.91101	340461	462660	2012	summer	20/08/2012	2	2	0	1	34	0	0	25	0	1
L9	54.05599	-2.91099	340462	462610	2012	summer	20/08/2012	5	0	0	7	43	0	0	10	0	5
P1	54.05898	-2.91268	340355	462945	2012	summer	20/08/2012	0	0	0	3	6	0	0	0	0	1
P2	54.05845	-2.91349	340302	462886	2012	summer	20/08/2012	5	0	2	80	3	0	0	0	0	5
P3	54.06005	-2.91032	340511	463061	2012	summer	20/08/2012	3	0	0	5	30	0	0	5	0	2
Q4	54.05583	-2.90947	340561	462591	2012	summer	20/08/2012	5	0	0	3	31	0	0	15	0	6
Q5	54.05626	-2.90912	340584	462638	2012	summer	20/08/2012	0	5	0	2	11	0	0	3	5	4
Q6	54.05661	-2.90919	340581	462678	2012	summer	20/08/2012	0	50	0	0	15	0	0	0	0	0
001	54.05880	-2.91183	340411	462924	2013	autumn	10/10/2013	0	2	6	2	0	0	0	0	0	0
002	54.05602	-2.91611	340127	462618	2013	summer	27/06/2013	2	20	9	4	0	15	0	0	0	2
8	54.05875	-2.91422	340254	462921	2013	summer	24/07/2013	1	0	0	2	12	0	0	0	0	0
9	54.05903	-2.91361	340295	462950	2013	summer	24/07/2013	0	0	0	5	14	0	0	0	0	1
10	54.05919	-2.91327	340317	462969	2013	summer	24/07/2013	0	30	39	5	0	0	0	0	0	1
11	54.05949	-2.91305	340332	463002	2013	summer	24/07/2013	1	1	10	10	5	0	0	1	0	2
12	54.06008	-2.91265	340359	463067	2013	summer	24/07/2013	0	0	1	0	8	0	0	0	0	1
12	54.06008	-2.91265	340359	463067	2013	autumn	10/10/2013	0	0	3	2	0	0	0	0	0	0
13	54.06019	-2.91207	340397	463079	2013	summer	24/07/2013	0	0	0	30	41	0	0	1	0	8
13	54.06019	-2.91207	340397	463079	2013	autumn	10/10/2013	0	0	20	35	0	0	0	0	0	5
A10	54.05523	-2.91857	339964	462532	2013	summer	27/06/2013	0	1	0	15	74	5	0	0	0	5
A10	54.05523	-2.91857	339964	462532	2013	autumn	10/10/2013	0	0	3	2	3	0	0	0	0	2
A11	54.05478	-2.91855	339965	462482	2013	summer	27/06/2013	0	0	0	0	100	0	0	0	0	0
A12	54.05433	-2.91853	339966	462432	2013	summer	27/06/2013	0	0	0	0	100	0	0	0	0	0
A13	54.05388	-2.91852	339966	462382	2013	summer	27/06/2013	0	0	0	0	100	0	0	0	0	0
A8	54.05613	-2.91861	339963	462632	2013	summer	27/06/2013	0	0	0	1	98	1	0	0	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
A9	54.05568	-2.91859	339964	462582	2013	summer	27/06/2013	0	0	0	5	66	5	0	4	0	0
A9	54.05568	-2.91859	339964	462582	2013	autumn	10/10/2013	2	0	0	2	0	0	0	0	55	1
B10	54.05526	-2.91781	340014	462535	2013	summer	27/06/2013	0	35	20	10	9	0	0	1	0	0
B10	54.05526	-2.91781	340014	462535	2013	autumn	10/10/2013	0	0	5	0	0	0	0	0	30	0
B11	54.05481	-2.91779	340015	462485	2013	summer	27/06/2013	0	0	0	0	100	0	0	0	0	0
B12	54.05436	-2.91778	340015	462435	2013	summer	27/06/2013	0	0	0	1	99	0	0	0	0	0
B13	54.05391	-2.91776	340016	462385	2013	summer	27/06/2013	0	0	0	0	100	0	0	0	0	0
B7	54.05661	-2.91787	340013	462685	2013	summer	27/06/2013	0	0	0	0	100	0	0	0	0	0
B7	54.05661	-2.91787	340013	462685	2013	autumn	10/10/2013	0	35	0	10	0	1	0	8	17	6
B8	54.05616	-2.91785	340013	462635	2013	summer	27/06/2013	0	10	35	20	10	0	0	0	0	5
B8	54.05616	-2.91785	340013	462635	2013	autumn	10/10/2013	0	20	11	0	0	0	0	2	7	2
B9	54.05571	-2.91783	340014	462585	2013	summer	27/06/2013	0	60	15	10	0	0	0	0	0	15
C10	54.05529	-2.91705	340064	462538	2013	autumn	10/10/2013	0	50	0	10	37	0	0	0	0	1
C10	54.05529	-2.91705	340064	462538	2013	summer	27/06/2013	0	55	20	0	0	0	0	0	0	0
C11	54.05484	-2.91703	340064	462488	2013	summer	27/06/2013	0	0	0	1	99	0	0	0	0	0
C12	54.05439	-2.91702	340065	462438	2013	summer	27/06/2013	0	0	0	0	100	0	0	0	0	0
C7	54.05664	-2.91711	340062	462688	2013	autumn	10/10/2013	0	55	0	5	40	0	0	0	0	0
C7	54.05664	-2.91711	340062	462688	2013	summer	27/06/2013	0	25	50	3	0	5	0	5	0	2
C8	54.05619	-2.91709	340063	462638	2013	summer	27/06/2013	0	60	29	0	0	0	0	1	0	10
C8	54.05619	-2.91709	340063	462638	2013	autumn	10/10/2013	0	30	0	6	62	0	0	0	0	0
C9	54.05574	-2.91707	340064	462588	2013	summer	27/06/2013	0	75	20	2	0	0	0	0	0	0
D10	54.05532	-2.91629	340114	462541	2013	summer	27/06/2013	0	79	20	0	0	0	0	0	0	0
D11	54.05487	-2.91627	340114	462491	2013	autumn	10/10/2013	0	0	0	52	8	0	0	0	0	0
D3	54.05847	-2.91642	340110	462891	2013	summer	27/06/2013	0	0	0	0	100	0	0	0	0	0
D4	54.05802	-2.91640	340111	462841	2013	summer	27/06/2013	0	0	0	0	100	0	0	0	0	0
D5	54.05757	-2.91638	340111	462791	2013	summer	27/06/2013	0	0	0	1	99	0	0	0	0	0
D6	54.05712	-2.91637	340112	462741	2013	summer	27/06/2013	1	0	59	15	0	1	0	0	0	1
D7	54.05667	-2.91635	340112	462691	2013	summer	27/06/2013	0	45	55	0	0	0	0	0	0	0
D8	54.05622	-2.91633	340113	462641	2013	summer	27/06/2013	0	89	10	0	0	0	0	0	0	1

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
D8	54.05622	-2.91633	340113	462641	2013	autumn	10/10/2013	0	0	0	70	15	0	0	0	0	0
D9	54.05577	-2.91631	340113	462591	2013	summer	27/06/2013	0	70	30	0	0	0	0	0	0	0
E10	54.05535	-2.91553	340163	462543	2013	summer	27/06/2013	0	59	40	0	0	0	0	1	0	0
E10	54.05535	-2.91553	340163	462543	2013	autumn	10/10/2013	0	60	5	0	13	0	0	0	20	0
E11	54.05490	-2.91551	340164	462493	2013	summer	27/06/2013	2	68	10	0	0	0	0	0	0	0
E11	54.05490	-2.91551	340164	462493	2013	autumn	10/10/2013	0	30	0	10	40	0	0	0	0	0
E5	54.05760	-2.91562	340161	462794	2013	summer	27/06/2013	0	0	20	35	0	0	0	0	0	5
E6	54.05715	-2.91561	340161	462744	2013	summer	27/06/2013	0	55	25	1	0	0	0	0	0	0
E7	54.05670	-2.91559	340162	462694	2013	summer	27/06/2013	2	40	55	1	0	0	0	0	0	2
E8	54.05625	-2.91557	340162	462644	2013	summer	27/06/2013	0	80	20	0	0	0	0	0	0	0
E8	54.05625	-2.91557	340162	462644	2013	autumn	10/10/2013	0	0	0	30	50	0	0	0	0	0
E9	54.05580	-2.91555	340163	462593	2013	summer	27/06/2013	6	80	10	3	0	0	0	0	0	0
F10	54.05539	-2.91477	340213	462546	2013	autumn	10/10/2013	0	45	0	10	43	0	0	0	0	1
F10	54.05539	-2.91477	340213	462546	2013	summer	27/06/2013	1	54	10	0	0	0	0	0	0	0
F11	54.05493	-2.91476	340214	462496	2013	summer	27/06/2013	0	0	0	2	8	0	0	0	0	0
F4	54.05808	-2.91488	340210	462846	2013	summer	27/06/2013	1	0	54	40	0	0	0	1	0	3
F5	54.05763	-2.91486	340211	462796	2013	summer	27/06/2013	0	0	70	12	0	2	0	0	0	1
F6	54.05718	-2.91485	340211	462746	2013	summer	27/06/2013	0	80	19	0	0	0	0	0	0	1
F6	54.05718	-2.91485	340211	462746	2013	autumn	10/10/2013	1	5	9	15	0	0	0	0	0	0
F7	54.05673	-2.91483	340212	462696	2013	summer	27/06/2013	0	60	40	0	0	0	0	0	0	0
F8	54.05628	-2.91481	340212	462646	2013	summer	27/06/2013	0	80	20	0	0	0	0	0	0	0
F8	54.05628	-2.91481	340212	462646	2013	autumn	10/10/2013	0	60	37	2	0	0	0	0	0	0
F9	54.05584	-2.91479	340213	462596	2013	summer	27/06/2013	0	94	5	0	0	0	0	0	0	0
G10	54.05542	-2.91401	340263	462549	2013	summer	27/06/2013	2	40	0	4	0	0	0	4	0	0
G3	54.05856	-2.91414	340259	462899	2013	summer	24/07/2013	0	55	10	5	0	0	0	0	0	0
G4	54.05811	-2.91412	340260	462849	2013	summer	24/07/2013	1	0	67	20	0	0	0	1	0	11
G5	54.05766	-2.91411	340260	462799	2013	summer	27/06/2013	1	10	16	2	0	0	0	1	0	0
G6	54.05721	-2.91409	340261	462749	2013	summer	27/06/2013	2	76	20	2	0	0	0	0	0	0
G6	54.05721	-2.91409	340261	462749	2013	autumn	10/10/2013	1	5	29	35	0	0	0	0	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
G7	54.05676	-2.91407	340261	462699	2013	summer	27/06/2013	0	50	50	0	0	0	0	0	0	0
G7	54.05676	-2.91407	340261	462699	2013	autumn	10/10/2013	0	73	25	2	0	0	0	0	0	0
G8	54.05631	-2.91405	340262	462649	2013	summer	27/06/2013	3	55	40	0	0	0	0	0	0	2
G8	54.05631	-2.91405	340262	462649	2013	autumn	10/10/2013	0	80	19	1	0	0	0	0	0	0
G9	54.05586	-2.91403	340262	462599	2013	summer	27/06/2013	2	50	48	0	0	0	0	0	0	0
G9	54.05586	-2.91403	340262	462599	2013	autumn	10/10/2013	0	80	15	1	3	0	0	0	0	0
H10	54.05545	-2.91325	340313	462552	2013	summer	27/06/2013	0	0	0	2	76	0	0	2	0	0
H3	54.05859	-2.91338	340309	462902	2013	summer	27/06/2013	1	0	0	40	44	0	0	0	0	15
H4	54.05814	-2.91336	340310	462852	2013	summer	27/06/2013	2	0	48	30	0	0	0	0	0	1
H5	54.05769	-2.91335	340310	462802	2013	summer	27/06/2013	0	40	47	2	0	0	0	1	0	0
H5	54.05769	-2.91335	340310	462802	2013	autumn	10/10/2013	1	7	30	22	0	0	0	0	0	0
H6	54.05724	-2.91333	340311	462752	2013	summer	27/06/2013	2	90	5	3	0	0	0	0	0	0
H6	54.05724	-2.91333	340311	462752	2013	autumn	10/10/2013	1	20	29	50	0	0	0	0	0	0
H7	54.05680	-2.91331	340311	462702	2013	summer	27/06/2013	1	87	10	2	0	0	0	0	0	0
H7	54.05680	-2.91331	340311	462702	2013	autumn	10/10/2013	0	30	44	6	0	0	0	0	0	0
H8	54.05634	-2.91329	340312	462652	2013	summer	27/06/2013	0	40	60	0	0	0	0	0	0	0
H9	54.05590	-2.91327	340312	462602	2013	summer	27/06/2013	0	60	25	0	0	0	0	5	0	0
H9	54.05590	-2.91327	340312	462602	2013	autumn	10/10/2013	0	0	0	20	25	0	0	0	0	0
HF1	54.05790	-2.90955	340559	462822	2013	spring	02/04/2013	1	0	0	67	10	0	20	2	0	0
HF10	54.06190	-2.90895	340604	463266	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF11	54.06150	-2.90892	340605	463222	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF12	54.06100	-2.90891	340605	463166	2013	spring	02/04/2013	0	0	0	5	75	0	0	0	0	0
HF13	54.06060	-2.90890	340605	463121	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF14	54.06010	-2.90888	340606	463066	2013	spring	02/04/2013	0	0	0	30	70	0	0	0	0	0
HF15	54.06200	-2.90819	340654	463277	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF16	54.06150	-2.90818	340654	463221	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF17	54.06110	-2.90815	340655	463176	2013	spring	02/04/2013	0	0	0	1	99	0	0	0	0	0
HF18	54.06060	-2.90814	340655	463121	2013	spring	02/04/2013	3	0	0	10	81	0	0	0	0	3
HF19	54.06020	-2.90812	340656	463076	2013	spring	02/04/2013	0	0	0	15	80	0	0	0	0	1

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
HF2	54.05740	-2.90954	340559	462766	2013	spring	02/04/2013	0	0	0	6	54	0	36	4	0	0
HF20	54.05970	-2.90811	340656	463021	2013	spring	02/04/2013	2	0	0	25	72	0	0	0	0	1
HF21	54.05930	-2.90808	340657	462976	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF22	54.06200	-2.90744	340703	463276	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF23	54.06150	-2.90741	340704	463220	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF24	54.06110	-2.90740	340704	463176	2013	spring	02/04/2013	0	0	0	25	74	0	0	0	0	1
HF25	54.06060	-2.90738	340705	463120	2013	spring	02/04/2013	1	1	0	30	67	0	0	0	0	1
HF26	54.06020	-2.90737	340705	463076	2013	spring	02/04/2013	2	0	0	20	76	0	0	0	0	2
HF27	54.05970	-2.90734	340706	463020	2013	spring	02/04/2013	0	0	0	12	57	0	0	0	0	1
HF28	54.05930	-2.90732	340707	462975	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF29	54.06200	-2.90667	340753	463275	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF3	54.05700	-2.90951	340560	462721	2013	spring	02/04/2013	0	0	0	5	43	0	41	4	0	2
HF30	54.06160	-2.90666	340753	463231	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF31	54.06110	-2.90664	340754	463175	2013	spring	02/04/2013	0	0	0	1	99	0	0	0	0	0
HF32	54.06070	-2.90661	340755	463131	2013	spring	02/04/2013	0	0	0	7	91	0	1	0	0	1
HF33	54.06020	-2.90660	340755	463075	2013	spring	02/04/2013	0	0	0	5	71	0	5	4	0	3
HF34	54.05980	-2.90658	340756	463030	2013	spring	02/04/2013	1	0	0	10	79	0	0	2	0	5
HF35	54.05930	-2.90655	340757	462975	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF36	54.05660	-2.90798	340660	462676	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF37	54.05920	-2.90961	340557	462966	2013	spring	02/04/2013	4	0	0	5	42	0	15	4	0	5
HF38	54.05880	-2.90958	340558	462922	2013	spring	02/04/2013	1	0	0	10	62	0	6	2	0	4
HF39	54.05830	-2.90957	340558	462866	2013	spring	02/04/2013	0	1	0	25	49	0	23	2	0	0
HF4	54.05650	-2.90949	340561	462666	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF40	54.05920	-2.90884	340607	462966	2013	spring	02/04/2013	1	0	0	12	77	0	0	3	0	3
HF41	54.05880	-2.90883	340607	462921	2013	spring	02/04/2013	5	5	0	50	35	0	2	0	0	3
HF42	54.05830	-2.90881	340608	462865	2013	spring	02/04/2013	0	0	0	15	15	0	64	2	0	4
HF43	54.05790	-2.90878	340609	462821	2013	spring	02/04/2013	0	0	0	20	47	0	30	3	0	0
HF44	54.05740	-2.90877	340609	462765	2013	spring	02/04/2013	0	0	0	15	65	0	18	1	0	1
HF45	54.05700	-2.90875	340610	462721	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
HF46	54.05650	-2.90872	340611	462665	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF47	54.05880	-2.90807	340657	462920	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF48	54.05840	-2.90805	340658	462876	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF49	54.05790	-2.90804	340658	462820	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF5	54.05970	-2.90885	340607	463021	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF50	54.05750	-2.90801	340659	462776	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF51	54.05700	-2.90799	340660	462720	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF52	54.05880	-2.90731	340707	462920	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF53	54.05840	-2.90728	340708	462875	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF54	54.05790	-2.90727	340708	462820	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF55	54.05750	-2.90725	340709	462775	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF56	54.05700	-2.90724	340709	462719	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF57	54.05660	-2.90721	340710	462675	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF58	54.05890	-2.90654	340757	462930	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF59	54.05840	-2.90653	340757	462875	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF6	54.06100	-2.90968	340555	463167	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF60	54.05800	-2.90651	340758	462830	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF61	54.05750	-2.90648	340759	462774	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF62	54.05710	-2.90648	340759	462730	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF63	54.05660	-2.90646	340759	462674	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF7	54.06060	-2.90965	340556	463122	2013	spring	02/04/2013	0	0	0	0	0	0	0	0	0	0
HF8	54.06010	-2.90964	340556	463066	2013	spring	02/04/2013	2	0	0	8	49	0	0	0	0	1
HF9	54.05970	-2.90962	340557	463022	2013	spring	02/04/2013	0	0	0	30	70	0	0	0	0	0
I1	54.05952	-2.91266	340358	463005	2013	autumn	10/10/2013	0	5	10	1	0	0	0	0	8	1
I10	54.05548	-2.91250	340362	462554	2013	autumn	10/10/2013	0	0	0	0	100	0	0	0	0	0
I2	54.05907	-2.91264	340358	462955	2013	summer	24/07/2013	0	0	0	5	9	0	0	1	0	0
I2	54.05907	-2.91264	340358	462955	2013	autumn	10/10/2013	0	1	12	2	0	0	0	0	0	0
I3	54.05862	-2.91262	340359	462905	2013	summer	24/07/2013	0	0	0	2	26	0	0	1	0	1
I4	54.05817	-2.91260	340359	462855	2013	autumn	10/10/2013	0	10	20	20	0	0	0	0	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
I4	54.05817	-2.91260	340359	462855	2013	summer	24/07/2013	1	30	6	1	0	0	0	1	0	1
I5	54.05773	-2.91259	340360	462805	2013	summer	24/07/2013	0	80	20	0	0	0	0	0	0	0
I5	54.05773	-2.91259	340360	462805	2013	autumn	10/10/2013	0	25	50	25	0	0	0	0	0	0
I6	54.05727	-2.91257	340360	462754	2013	summer	24/07/2013	0	60	40	0	0	0	0	0	0	0
I6	54.05727	-2.91257	340360	462754	2013	autumn	10/10/2013	0	18	15	25	0	0	0	2	0	0
I7	54.05683	-2.91255	340361	462704	2013	summer	24/07/2013	0	55	43	0	0	0	0	0	0	2
I7	54.05683	-2.91255	340361	462704	2013	autumn	10/10/2013	0	5	59	25	0	0	0	0	0	1
I8	54.05638	-2.91253	340361	462654	2013	summer	27/06/2013	0	70	30	0	0	0	0	0	0	0
I9	54.05593	-2.91251	340362	462604	2013	summer	24/07/2013	0	20	40	0	0	0	0	10	0	0
J1	54.05955	-2.91190	340407	463008	2013	summer	24/07/2013	2	30	0	30	23	0	0	10	0	5
J1	54.05955	-2.91190	340407	463008	2013	autumn	10/10/2013	0	0	4	90	0	0	0	0	0	1
J10	54.05551	-2.91174	340412	462557	2013	autumn	10/10/2013	0	42	15	2	0	0	0	0	0	1
J2	54.05910	-2.91188	340408	462957	2013	summer	24/07/2013	0	0	0	30	35	0	0	10	0	5
J2	54.05910	-2.91188	340408	462957	2013	autumn	10/10/2013	1	10	22	2	0	0	0	0	0	0
J4	54.05821	-2.91185	340409	462858	2013	summer	24/07/2013	1	85	13	0	0	0	0	1	0	0
J4	54.05821	-2.91185	340409	462858	2013	autumn	10/10/2013	0	15	34	50	0	0	0	0	0	0
J5	54.05775	-2.91183	340410	462807	2013	summer	24/07/2013	0	85	15	0	0	0	0	0	0	0
J6	54.05731	-2.91181	340410	462757	2013	summer	24/07/2013	0	80	20	0	0	0	0	0	0	0
J6	54.05731	-2.91181	340410	462757	2013	autumn	10/10/2013	0	80	19	1	0	0	0	0	0	0
J7	54.05686	-2.91179	340411	462707	2013	summer	24/07/2013	0	100	0	0	0	0	0	0	0	0
J7	54.05686	-2.91179	340411	462707	2013	autumn	10/10/2013	0	25	0	10	65	0	0	0	0	0
J8	54.05641	-2.91177	340411	462657	2013	summer	24/07/2013	0	9	90	1	0	0	0	0	0	0
J9	54.05596	-2.91176	340412	462607	2013	summer	24/07/2013	0	30	70	0	0	0	0	0	0	0
K1	54.05962	-2.91038	340507	463013	2013	summer	24/07/2013	0	5	0	70	17	0	0	0	0	8
K10	54.05557	-2.91022	340512	462563	2013	autumn	10/10/2013	0	10	0	20	40	0	0	0	5	0
K2	54.05916	-2.91036	340507	462963	2013	summer	24/07/2013	0	15	0	62	20	0	0	1	0	2
K3	54.05872	-2.91034	340508	462913	2013	summer	24/07/2013	0	70	28	0	0	0	0	0	0	1
K3	54.05872	-2.91034	340508	462913	2013	autumn	10/10/2013	0	1	72	2	0	0	0	0	0	0
K4	54.05827	-2.91033	340509	462863	2013	summer	24/07/2013	0	90	9	1	0	0	0	0	0	0

Quadrat	Latitude	Longitude	Easting	Northing	Year	Season	Date	Adult	Seed	Mud	Shell	Sand	Rock	Cobble	Algae	Pool	Other
K5	54.05782	-2.91031	340509	462813	2013	summer	24/07/2013	0	85	15	0	0	0	0	0	0	0
K6	54.05737	-2.91029	340510	462763	2013	summer	24/07/2013	0	70	30	0	0	0	0	0	0	0
K7	54.05692	-2.91027	340510	462713	2013	summer	24/07/2013	0	85	15	0	0	0	0	0	0	0
K7	54.05692	-2.91027	340510	462713	2013	autumn	10/10/2013	0	6	0	0	80	10	0	0	0	4
K8	54.05647	-2.91025	340511	462663	2013	summer	27/06/2013	0	98	2	0	0	0	0	0	0	0
K8	54.05647	-2.91025	340511	462663	2013	autumn	10/10/2013	1	5	0	49	40	1	0	0	0	0
K9	54.05602	-2.91024	340511	462613	2013	summer	24/07/2013	0	85	15	0	0	0	0	0	0	0
K9	54.05602	-2.91024	340511	462613	2013	autumn	10/10/2013	0	0	0	48	50	0	0	0	0	0
L1	54.05958	-2.91114	340457	463010	2013	autumn	10/10/2013	0	1	54	10	0	0	0	0	0	20
L1	54.05958	-2.91114	340457	463010	2013	summer	24/07/2013	0	15	0	2	40	0	0	0	0	0
L10	54.05554	-2.91098	340462	462560	2013	summer	24/07/2013	0	65	35	0	0	0	0	0	0	0
L10	54.05554	-2.91098	340462	462560	2013	autumn	10/10/2013	0	15	0	60	5	0	0	0	0	0
L11	54.05509	-2.91096	340463	462510	2013	summer	24/07/2013	0	2	0	0	92	0	0	3	0	0
L2	54.05914	-2.91112	340458	462960	2013	summer	24/07/2013	0	5	0	7	84	0	0	1	0	3
L2	54.05914	-2.91112	340458	462960	2013	autumn	10/10/2013	0	70	20	10	0	0	0	0	0	0
L3	54.05869	-2.91110	340458	462910	2013	summer	24/07/2013	1	50	42	1	0	0	0	1	0	5
L3	54.05869	-2.91110	340458	462910	2013	autumn	10/10/2013	1	5	39	50	0	0	5	0	0	0
L4	54.05824	-2.91109	340459	462860	2013	summer	24/07/2013	1	85	13	0	0	0	0	1	0	0
L4	54.05824	-2.91109	340459	462860	2013	autumn	10/10/2013	1	40	16	40	0	0	0	0	0	0
L5	54.05779	-2.91107	340459	462810	2013	summer	24/07/2013	0	80	20	0	0	0	0	0	0	0
L6	54.05734	-2.91105	340460	462760	2013	summer	24/07/2013	2	50	48	0	0	0	0	0	0	0
L6	54.05734	-2.91105	340460	462760	2013	autumn	10/10/2013	1	30	49	20	0	0	0	0	0	0
L7	54.05689	-2.91103	340460	462710	2013	summer	24/07/2013	0	95	5	0	0	0	0	0	0	0
L8	54.05644	-2.91101	340461	462660	2013	summer	24/07/2013	0	20	74	3	1	0	0	0	0	0
L9	54.05599	-2.91099	340462	462610	2013	summer	24/07/2013	0	20	79	1	0	0	0	0	0	0
Q4	54.05583	-2.90947	340561	462591	2013	summer	24/07/2013	0	90	10	0	0	0	0	0	0	0
Q5	54.05626	-2.90912	340584	462638	2013	summer	24/07/2013	0	40	60	0	0	0	0	0	0	0
Q6	54.05661	-2.90919	340581	462678	2013	summer	24/07/2013	0	93	7	0	0	0	0	0	0	0