Mitigation and Monitoring for the Stour and Orwell Estuaries SPA and Hamford Water SPA Annual Review 2011/12

March 2012

9W1517

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Document title	Mitigation and Monitoring for the Stour and Orwell Estuaries SPA and Hamford Water SPA Annual Review 2011/12
Status	Final
Date	March 2012
Project number	9W1517
Client	Harwich Haven Authority
Reference	9W1517/R/303957/Leeds

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Date/initials check / approve	…MS……………… …19/3/12……………….

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1 INTRODUCTION

1.1 Background

In October 1998, works to deepen the approach channel to the Haven Ports commenced. The works were completed in April 2000. The Harwich Haven Authority's (HHA) *Mitigation and Monitoring Package* (MMP) for the scheme (PDE and HR Wallingford, 1998) was included by the Department for Transport (DfT) (formerly the DTLR) as part of their consent for the works under the Coast Protection Act, 1949. The Department for Environment, Food and Rural Affairs (Defra) (formerly MAFF) also issued consents to the HHA for the various sediment placement schemes associated with the package under the Food and Environment Protection Act (FEPA) 1985, which include annual monitoring conditions.

In 2002, consent was granted for the Trinity III Terminal (Phase 2) Extension, which was completed in September 2004. A *Compensation, Mitigation and Monitoring Agreement* (CMMA) for the extension was produced. FEPA consents were issued for the habitat enhancement schemes and the disposal of capital silts at sea, which included monitoring conditions. Under the CMMA, the HHA undertook to implement the actions set out therein as an agent to the Port of Felixstowe in respect of compensation arising from the quay extension.

The first phase of the Felixstowe South Reconfiguration (FSR) project, completed in 2010, involved reclamation, new quay construction and widening of the channel adjacent to the reclamation. Although this project did not require a formal CMMA, there was a need to agree detailed monitoring with CEFAS for the disposal sites and the area around the works. This was agreed in July 2008 and was set out in the following documents:

- Specification for Monitoring Biological Communities at Inner Gabbard and Inner Gabbard East Disposal Sites, May 2008,
- Specification for Monitoring Biological Communities local to the Felixstowe South Reconfiguration, May 2008.

Compliance with the actions set out in the compensation packages, the mitigation measures proposed as part of the Environmental Impact Assessment process and the conditions of the FEPA consents for all of the above schemes must be ensured; this responsibility lies with the HHA. An Annual Report is produced presenting the information collated on the various habitat and sediment replacement schemes and monitoring activities during the preceding year. In addition to these Annual Reports, the HHA is required to undertake a more detailed and comprehensive review of conditions within the estuary every five years.

In 2005, the first stage of the five-yearly review was compiled using the results of bathymetric surveys completed for the Stour estuary. At the time of its production, bathymetric surveys of the Orwell were not complete. The second stage of the review in 2006 incorporated the results of bathymetric surveys for the Orwell, undertaken that year. Findings from related studies completed since the production of the first review were also presented.

In addition to being to Annual Review for 2011/2012, this document represents the second five-yearly review.

The area of study can be seen in Figure 1.1.

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Figure 1.1 Study area

This report is produced primarily to provide feedback to Natural England, the Environment Agency, the DfT and Defra on the results of the HHA's ongoing monitoring programme. The report also details progress against the objectives of mitigation and a summary of the future strategy for monitoring. The report is one of the management initiatives to ensure compliance with the objectives outlined in the Approach Channel Deepening MMP and the Trinity III (Phase 2) Extension CMMA. It also includes reporting of the findings for the monitoring work carried out as a requirement of the licensing for the Felixstowe South Reconfiguration project.

1.2 Objectives of Compensation, Mitigation and Monitoring

The primary objectives of the compensation, mitigation and monitoring for both schemes are:

1. To avoid any impacts as a result of the works on the favourable conservation status of both habitats, as defined under Article 1(e) of the Habitats Directive, and species, as defined under the Article 1(i); and,
2. To remove any adverse effects arising from the works in order to maintain site integrity in so far as this will be affected by the schemes.

Where 'favourable conservation status' is defined as:

Intertidal habitats (i.e. saltmarsh, soft muddy and granular habitats) that, in combination, maintain the geomorphological form and functioning of the estuaries, so that they are capable of sustaining the populations of internationally and nationally important overwintering birds for which the site qualifies.

In 1997 and 2001, when the MMP and CMMA were produced, the qualification of the Stour and Orwell Estuaries SPA was as follows:

Populations of internationally / nationally important overwintering birds, based on:

- *Notable numbers of golden plover (under Article 4.1);and*
- *Important populations of dunlin; shelduck; dark-bellied geese; redshank; grey plover; black-tailed godwit; turnstone; ringed plover; wigeon; knot; curlew; pintail; mute swans; goldeneye and scaup (under Article 4.2).*

Since qualification in 2003, the boundaries of the constituent SSSIs were extended and in May 2005, the SPA boundary was extended to include an additional 360 hectares. The SPA boundary extensions coincide with areas incorporated within enlarged boundaries of the Orwell Estuary SSSI and Stour Estuary SSSI, as well as the whole of Cattawade Marshes SSSI. Following the renotification of SSSIs in 2003 and the SPA in 2005, the site now qualifies under Article 4.1 of the Wild Birds Directive (79/409/EEC) by supporting 1% or more of the Great Britain population of avocet *Recurvirostra avosetta*. Over the period 1996 to 2000 the SPA supported 21 breeding pairs. It also qualifies under Article 4.2 of the Directive as it is used regularly by 1% or more of the biogeographical populations of a number of migratory species.

The site further qualifies under Article 4.2 as it is used regularly by over 20,000 waterbirds in any season. In the non-breeding season, the site regularly supports around 63,000 individual waterbirds (based on the 5 year peak mean recorded between 1993/94 and 1997/98).

1.3 Detailed objectives for mitigation and compensation

1.3.1 Approach channel deepening

Detailed objectives for mitigation and compensation of the effects associated with the 1998/2000 Approach Channel Deepening have also been defined in order to ensure the achievement of the primary objectives (set out above). They can be summarised as follows:

Stour and Orwell Estuaries

To create 16.5 hectares of intertidal habitat (compensation) and to prevent the loss of up to 5 hectares per annum of intertidal habitat due to increased rates of erosion, through sediment replacement (mitigation).

Hamford Water

To monitor the system, as appropriate, in order to determine the potential for an effect associated with the dredge to arise, and to define existing sand transport pathways offshore and in/out of Hamford Water.

1.3.2 Trinity III Terminal (Phase 2) Extension

Detailed objectives of the mitigation and compensation for the Trinity III (Phase 2) Extension are as follows:

1. To provide an enhanced level of protection to the seawalls along the Shotley and Trimley frontages by raising the intertidal area;
2. By creating additional protection for the seawalls, to enhance the ecological value of some 23ha of the intertidal habitat (of which approximately 20ha will be intertidal mud and 3ha saltmarsh), replacing the feeding habitat lost due to the immediate effect of the quay extension and dredge over the short to medium term;
3. To raise the level of the intertidal mud, thereby increasing its exposure and providing a feeding habitat for waterfowl for a longer period in the tidal cycle (*i.e*. increasing the number of bird feeding hours), mitigating the effect of a reduced tidal range; and

*Objectives 1 to 3 find expression through the establishment of the Habitat Enhancement Schemes on the Shotley and Trimley foreshores (see **Section 2.7**).*

4. To offset the predicted increase in the rate of erosion of the intertidal in the Stour and Orwell Estuaries by increasing the existing sediment replacement programme by 5%.

The habitat enhancement schemes (see **Section 2.7**), proposed in conjunction with the Trinity III Terminal (Phase 2) Extension, also have the following objectives:

1. To increase the stability of the lower Orwell flood defences and provide the opportunity for the development of a long term strategy for the sustainable management of the estuary; and

2. To compensate for any adverse effect on the integrity associated with the works, while not constraining future options for the sustainable management of flood defences and habitats in the estuarine system

1.3.3 Monitoring

Detailed objectives for monitoring have also been defined in order to determine whether or not any impacts on the favourable conservation status of the European site(s) arise as a result of the dredging, quay extension and their associated mitigation schemes. They can be summarised as:

1. To increase understanding of the processes operating in the Stour and Orwell estuaries and Hamford Water and to define those aspects that relate to the deepening;
2. To measure the change in habitat distribution and to understand the relationship between morphology, habitat and the populations and distribution of designated bird species;
3. To validate and refine the mitigation actions; and
4. To fully monitor the effect and thereby success of mitigation.

This report sets out progress against these objectives.

2 ACTIVITIES TO DATE

2.1 Introduction

This section provides summary information on accretion, dredging volumes, shipping activity and the sediment replacement activities within the estuary system. Information presented here covers the period 2007-2011 which is relevant to the present licence. The reader is referred to the previous annual reports for more detail (Royal Haskoning and HR Wallingford, 2010).

2.2 Approach Channel Deepening: Dredging and Disposal

Based on HHA dredger records a total of about 1,367,000 dry tonnes of maintenance dredged material from Harwich Harbour was deposited at the Inner Gabbard between 1 January 2011 and 31 December 2011. A further 57,500 dry tonnes was distributed within the estuarine system as part of the sediment replacement programme. The total amount of dredging, based on dredger records, was thus 1,424,500 dry tonnes.

Based on bathymetric records for the maintained area of the Harbour it is estimated that for the period 1 January 2011 to 31 December 2011 the average rate of observed siltation in the Harbour was equivalent to about 8,100m^3/day. This equates to an annual siltation rate of about 3.00Mm^3. Over the year the backlog of material in the Harbour reduced by about 785,000m^3. Thus, based on the bathymetric surveys, about 3.78Mm^3 of material was removed through maintenance dredging. At an in-situ dry density of 530kg/m^3 this is estimated to be equivalent to about 2.0M dry tonnes of material. It should be noted that the observed siltation rate (of 8,100m^3/day) is based on comparison of pre- and post dredge surveys and, due to the effect of the dredging on the characteristics of the surface of the seabed, there two surveys are measuring a surface with different physical properties (in terms of consolidation) which means the siltation rate quoted above must be viewed as an approximation.

From the dredger records described above it is apparent that, during the 2011 calendar year, the total mass dredged from the Harbour and berths was less than the total mass removed when assessed by survey. However, these two methods of assessing mass of material removed have differing degrees of accuracy for the reason described above.

Deep drafted vessel movements in Harwich Harbour have increased over the last year. This is summarised in **Table 2.1** which shows the vessel movements and measured accumulation rate data calculated on an annual basis between 2007 and 2011. The average annual observation of rates of accumulation in the Harbour during this period has been about 6,100m^3/day.

Table 2.1 Number of deep drafted shipping movements at Felixstowe on an annual basis

Period	Number of vessel movements (>13.5m) *	Number of vessel movements (15m or greater)	Observed average daily accumulation rates of silt (m^3)
Jan 1 2007 to Dec 31 2007	112	0	5,000
Jan 1 2008 to Dec 31 2008	153	0	4,900
Jan 1 2009 to Dec 31 2009	179	0	4,100
Jan 1 2010 to Dec 31 2010	112	0	8,500
Jan 1 2011 to Dec 31 2011	161	25	8,100
Average for period	-	-	~6,100

*** Draft of 'greater than 13.5m' does not include 13.5m**

In 2011 the observed average daily accumulation rate of silt (8,100m^3/day) was very similar to that observed during 2010 (8,500m^3/day). It has already been established that, based on previous data, there appeared to be a relationship between the number of vessel movements within the Harbour and the daily accumulation rate. During 2011, whereas there were considerably more deep-drafted vessel movements than in the previous year (112 compared with 161 for vessels greater than 13.5m draft, plus 25 vessels of greater than 15m draft), the observed average daily accumulation rate was similar. This may be an indication that the dredging and reclamation works carried out for the construction of the Felixstowe South Reconfiguration caused a temporary increase in rate of siltation within the Harbour area.

2.3 Approach Channel Deepening: Habitat Replacement

Objective: *To create 4 hectares (ha) of intertidal habitat to replace the habitat lost due to the immediate effect of the change on tidal range and to create 12.5ha of intertidal habitat to mitigate losses that could occur before sediment replacement measures can be expected to be fully effective.*

The managed realignment site at Trimley Marsh was completed in February 2001, with the sea wall breached in November 2000. Since the sea wall was breached, ecological surveys have been carried out to monitor the rate at which the site has been colonised by fauna and flora, as well as use by birds and the particle size of sediments. An update on the monitoring programme for Trimley Marsh is presented in Section 5.

2.4 Approach Channel Deepening: Sediment Replacement

Objective: *To prevent, through the immediate reintroduction of sediment into the system for as long as the channel is maintained, the annual loss of 1.7ha of intertidal (mean springs) (plus 1.1ha from the 1994 dredge) and 3.3ha of intertidal (mean neaps) (plus 2.2ha from the 1994 dredge) due to increased rates of erosion.*

Following the 2007 Annual Review Meeting the sediment replacement technique was modified. HHA agreed to place 50,000 dry tonnes of material back into the estuaries on an annual basis. This was to be undertaken by pumped discharge whilst the dredger was underway (35,000 TDS into the Stour and 15,000 TDS into the Orwell) at a minimum of 4 knots discharging over a track. In addition, subtidal placement at North Shelf was to be reduced to 50,000 dry tonnes per year. This revised sediment replacement strategy commenced in the autumn of 2008. No material has been placed subtidally at the North Shelf since early April 2009 when the capital dredging works associated with the Felixstowe South Reconfiguration (i.e. widening the north side of the channel in the vicinity of North Shelf) commenced. The modified concept of placing material along tracks in the Stour and Orwell estuaries is illustrated in Figure 2.2.

2.4.1 Stour Estuary

The water column placements shown in Table 2.2 were made in the middle and lower Stour up to the end of December 2011.

Table 2.2 Water column recharge in the Stour Estuary

Timing	**Sediment replacement (TDS)**
Late November 2008	9,000
Late January 2009	8,300
Early April 2009	11,200
Late December 2009	11,400
Mid February 2010	14,700
Early April 2010	10,900
Early November 2010	11,800
Mid January 2011	11,500
Mid April 20101	9,700
Late October 2011	8,800
Mid December 2011	11,700
Total	**119,000**

2.4.2 Orwell Estuary

The water column placements shown in Table 2.3 were made in the Orwell estuary:

Table 2.3 Water column recharge in the Orwell Estuary

Timing	**Sediment replacement (TDS)**
Late November 2008	5,000
Late January 2009	4,200
Early April 2009	4,700
Late December 2009	4,600
Mid February 2010	5,800
Early April 2010	4,400
Early November 2010	5,200
Mid January 2011	3,000
Mid April 20101	5,200
Late October 2011	2,700
Mid December 2011	4,600
Total	**49,400**

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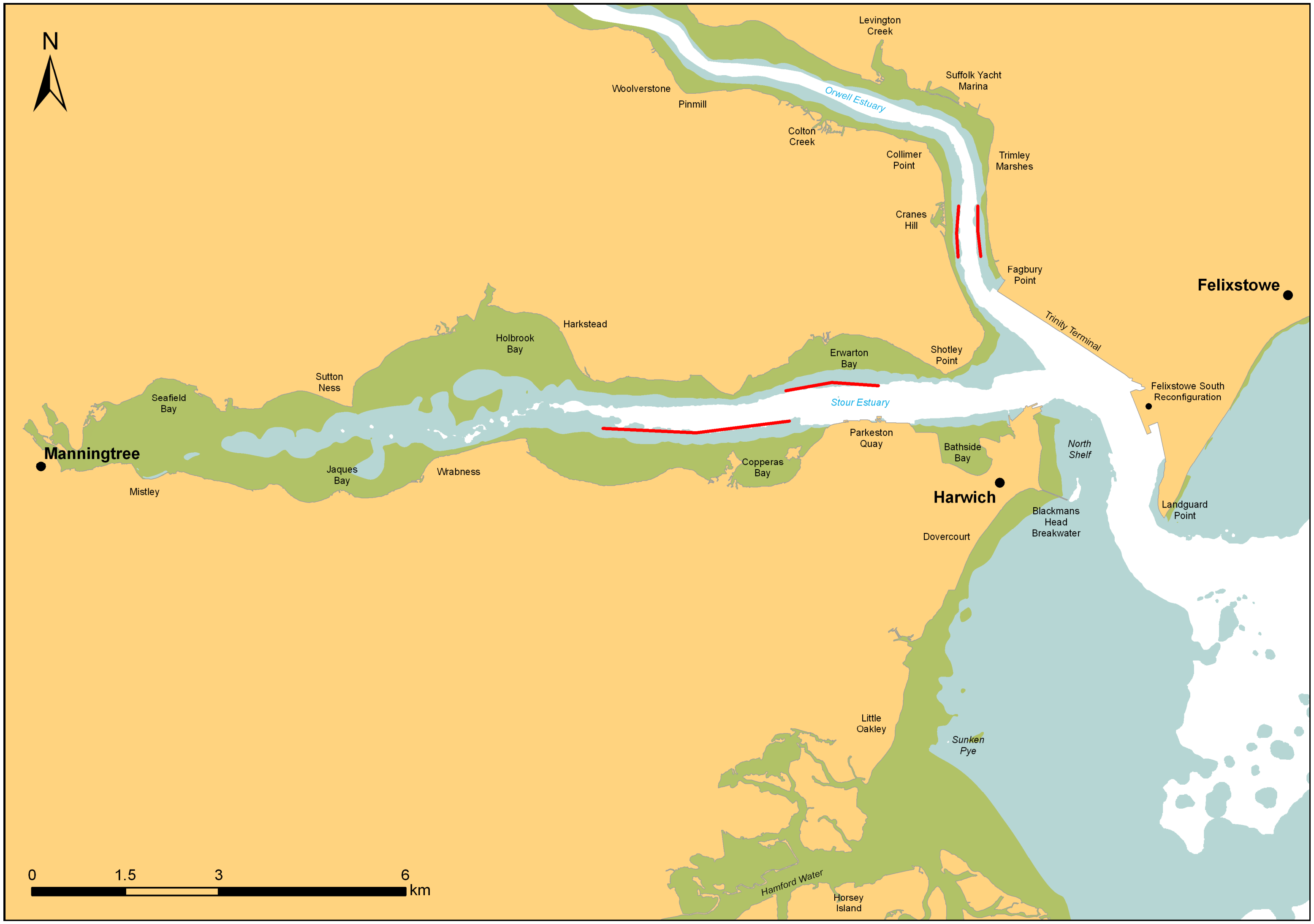


Figure 2.2 Illustration of placement strategy (commenced early April 2009)

2.4.3 Lower Harbour

Subtidal placements have ceased at the North Shelf since early April 2009.

2.4.4 Conclusion

HHA is compliant with the original requirements of the Approach Channel Deepening consent in terms of the in estuary placement and is compliant with the agreement with the regulators that there would be no further placement of material subtidally at the North Shelf. Total amounts of material placed within the estuaries on an annual basis as part of the sediment replacement programme are given in Table 2.4.

Table 2.4 Total amounts of material placed each year as part of the sediment replacement programme on an annual basis

Period	Annual placement TDS within Stour/Orwell (dry Tonnes)	Annual placement TDS to North Shelf (dry Tonnes)
Jan 1 2007 to Dec 31 2007	132,182	99,901
Jan 1 2008 to Dec 31 2008	89,418	58,597
Jan 1 2009 to Dec 31 2009	44,374	30,832
Jan 1 2010 to Dec 31 2010	52,835	0*
Jan 1 2011 to Dec 31 2011	57,455	0*

*** Subtidal placements ceased at the North Shelf in early April 2009**

2.5 Approach Channel Deepening: Beneficial Use Schemes

Objective: *To meet the FEPA requirement to seek beneficial uses, as far as possible, for the material arising from the channel deepening.*

Details of the beneficial use schemes that have been implemented by the HHA were provided in the 2001 Annual Report (PDE and HR Wallingford, 2001) and recorded in the 2003 Compliance Report (Royal Haskoning and HR Wallingford, 2003).

2.6 Trinity III Terminal (Phase 2) Extension: Disposal at Sea

Objective: *To allow the construction of the Trinity III (Phase 2) Extension.*

Dredging and disposal for this scheme was completed on 28th March 2003. Approximately 500,000m^3 was deposited at the Inner Gabbard, with 28,000m^3 used to feed an Environment Agency beneficial use scheme at Horsey Island. Bathymetric and benthic invertebrate surveys of the Inner Gabbard have since been carried out, the findings of which were reported in the 2004 annual report.

2.7 Trinity III Terminal (Phase 2) Extension: Habitat Enhancement

Objective: *To provide an improved level of protection to the seawalls along the Shotley and Trimley frontages through the placement of dredged materials (clay/gravel bunds and silts) and enhance the ecological value of the associated intertidal habitat.*

The habitat enhancement schemes for the Trinity III (Phase 2) Extension were completed in October 2003. The schemes utilised about 107,000 dry tonnes of maintenance dredged silts which would otherwise have been placed offshore at the Inner Gabbard disposal site. The schemes comprised the placement of clay and gravel bunds on the Trimley and Shotley foreshores which were backfilled with silt and sandy gravel.

The habitat enhancement schemes are being monitored by Royal Haskoning on behalf of the HHA as part of the Trinity III (Phase 2) Extension CMMA and LiDAR data is now also available. Further details on the construction of the bunds are available in the 2004 Annual Report. A description of the monitoring that has taken place is presented in Section 6.

In addition to the HHA monitoring, a DEFRA research project being undertaken by HR Wallingford and CEFAS looked at the correlation between benthic recovery and physical processes on parts of the site on the Shotley side of the Orwell through intensive benthic and physical process monitoring for 3 years following construction. Monitoring of the site under this scheme ceased in September 2005. The technical reports arising from this project were produced in December 2006.

2.8 Trinity III Terminal (Phase 2) Extension: Sediment Replacement

Objective: *To offset the predicted increase in the rate of erosion of the intertidal in the Stour and Orwell Estuaries.*

The CMMA for Trinity III (Phase 2) specified that the sediment replacement volumes should be increased by 5% to mitigate the effect of the extension on intertidal erosion. However, in light of modelling on the effects of the Trinity III (Phase 2) Extension, which has showed that the extension is predicted to reduce erosion in the estuary the volume of sediment replacement has not been increased (Royal Haskoning and HR Wallingford, 2010).

2.9 Other activities and events

Objective: *To determine if any monitored changes could be due to other activities and events in the estuary system.*

During the winter of 2010 there were two periods of severe cold weather. The second of these events, which occurred in December 2010, resulted in ice forming on the intertidal areas of the estuaries and associated rafting of ice and increased sediment transport. The maintenance requirements in January 2011 were therefore unusually severe.

In 2010 the Port of Ipswich modified its maintenance dredging strategy resulting in greater volumes of material being deposited subtidally in the deeper sections of the main navigational channel in the Orwell Estuary. Table 2.5 summarises the quantity of material deposited in the Orwell Estuary in 2011 (figures are wet tonnes).

Table 2.5 Dredge disposal returns for quantity of material deposited in the River Orwell (wet tonnes)

Dredge area:	*Ipswich*	*Ipswich*
Licence number:	*34278/10/2*	*L/2011/00044/1*
Deposit code:	*TH034*	*TH034*
Deposit name:	*River Orwell*	*River Orwell*
Valid from:	*16/11/2010*	*21/05/2011*
Expires:	*20/05/2012*	*23/05/2012*
January 2011	28,695	-
February 2011	45,122	-
March 2011	-	-
April 2011	-	-
May 2011	-	76,033
June 2011	-	-
July 2011	-	-
August 2011	-	59,805
September 2011	-	-
October 2011	-	-
November 2011	-	50,700
December 2011	-	-
Total deposited (2011) (wet tonnes)	**73,817**	**186,538**
Licensed quantity	100,099	200,000

During the period 1 January 2011 and 31 December 2011 no material was dredged from the Harwich approach channel.

3 BATHYMETRIC AND TOPOGRAPHIC DATA

Purpose: *To determine the changes in the intertidal and subtidal habitats in relation to the erosion or accretion of sediment.*

Bathymetric data should assist in answering the following monitoring objectives (as set out in the Approach Channel Deepening Mitigation and Monitoring Package):

- To define those aspects of system change that relate to the deepening and port development;
- To understand the relationship between morphology, habitat and the populations and distribution of designated bird species;
- To fully monitor the success of mitigation;
- To ensure that the mitigation measures (and beneficial use schemes) do not cause adverse environmental impact; and
- To define the extent of each habitat type and to measure change in habitat distribution.

3.1 Offshore

Results of bathymetric survey in the offshore areas were reported in the 2005 Five-Yearly Review report (Royal Haskoning and HR Wallingford, 2005). Bathymetry surveys for Inner Gabbard and Inner Gabbard East (following on from Felixstowe South Reconfiguration works) were completed in late summer 2010.

3.2 Interim report on bathymetric and topographic data for the Stour and Orwell Estuaries

3.2.1 Background

In October 2011, an ‘interim report’ was produced (Royal Haskoning and HR Wallingford, 2011) to present an analysis of bathymetric and topographic data for the Stour and Orwell Estuaries. This data was not able to be fully reported in the 2010/2011 Annual Report because there was a ‘streaking’ effect in the LiDAR data for the Orwell estuary and the bathymetry for the Orwell and a proportion of the Stour had been re-surveyed and the results were being analysed at the time of the production of the 2010/2011 Annual Report. The aims of the interim report were, therefore, to:

- Assess LiDAR data and aerial photography data from 2005 and 2010 to assess which is most appropriate to use for analysis of saltmarsh extent and any changes between 2005 and 2010;
- Digitise areas of saltmarsh and compare saltmarsh extent between 2005 and 2010;
- Assess change in intertidal (between +1m CD and +4m CD) and subtidal area and volume below 0m CD over the period 2005/2006 and 2010/2011 using a combination of LiDAR data and bathymetric data.

Full details of the analysis method, results and conclusions are presented in the interim report (Royal Haskoning and HR Wallingford (2011)). This section summarises the results presented in the interim report.

3.2.2 Monitoring of saltmarsh extent

One aspect of the monitoring is to determine any changes in the patterns of erosion and deposition within the saltmarsh habitats. HHA is, therefore, required to monitor the extent of this habitat. This is undertaken using aerial photography and LiDAR measurement. By monitoring the area of saltmarsh within the Stour and Orwell Estuaries, it is possible to identify areas of change in terms of erosion or accretion.

LiDAR

LiDAR flights over the Stour and Orwell Estuaries were undertaken in 2005 and 2010. The LiDAR data was provided by the Unit of Landscape Mapping (ULM) at the University of Cambridge.

The 2005 and 2010 Stour estuary LiDAR data were processed and reported on in the 2010/2011 Annual Report. As noted in Section 3.2.1, at that time it was not possible to analyse the differences in the LiDAR data between 2005 and 2010 for the Orwell estuary as the 2005 LiDAR data contained a large number of streaking anomalies where elevations were not correctly recorded.

After further investigation by ULM, a post-processed version of the 2005 LiDAR data was received in April 2011. The 2005 reprocessed data showed a considerable reduction of the streaking anomalies found around the Orwell (Figure 3.1).

Aerial photographs

Aerial photography surveys were undertaken throughout the Stour and Orwell estuaries in 2005 and 2010. The 2010 aerial photographs were supplied as a continuous ECW (Enhanced Compression Wavelet) image covering the extent shown in Figure 3.2.

3.2.3 Monitoring of intertidal area and volume

Monitoring of intertidal area and volume between +1m CD and +4m CD over the period 2005 to 2011 has been undertaken using a combination of the 2005 and 2010 LiDAR data and bathymetric data collected by the HHA.

HHA undertook bathymetric surveys of the Stour estuary in 2005 and the Orwell estuary in 2006. The surveys of the two estuaries were repeated in 2010. The bathymetric surveys enable an analysis of changes in subtidal accretion or erosion to be made and provide the basis for establishing changes in the subtidal area below CD (and hence intertidal area above CD).

The 2010 bathymetry data for the Stour and Orwell appeared to be inconsistent with the earlier surveys, possibly as a consequence of HHA changing their survey vessel. As described in Section 3.2.1, since the 2010/2011 Annual Report the HHA has re-surveyed both of the estuaries. The interim report (Royal Haskoning and HR Wallingford (2011)) presents a comparison of the 2005/2006 and the 2010/2011 (re-surveyed) Stour and Orwell bathymetry data.

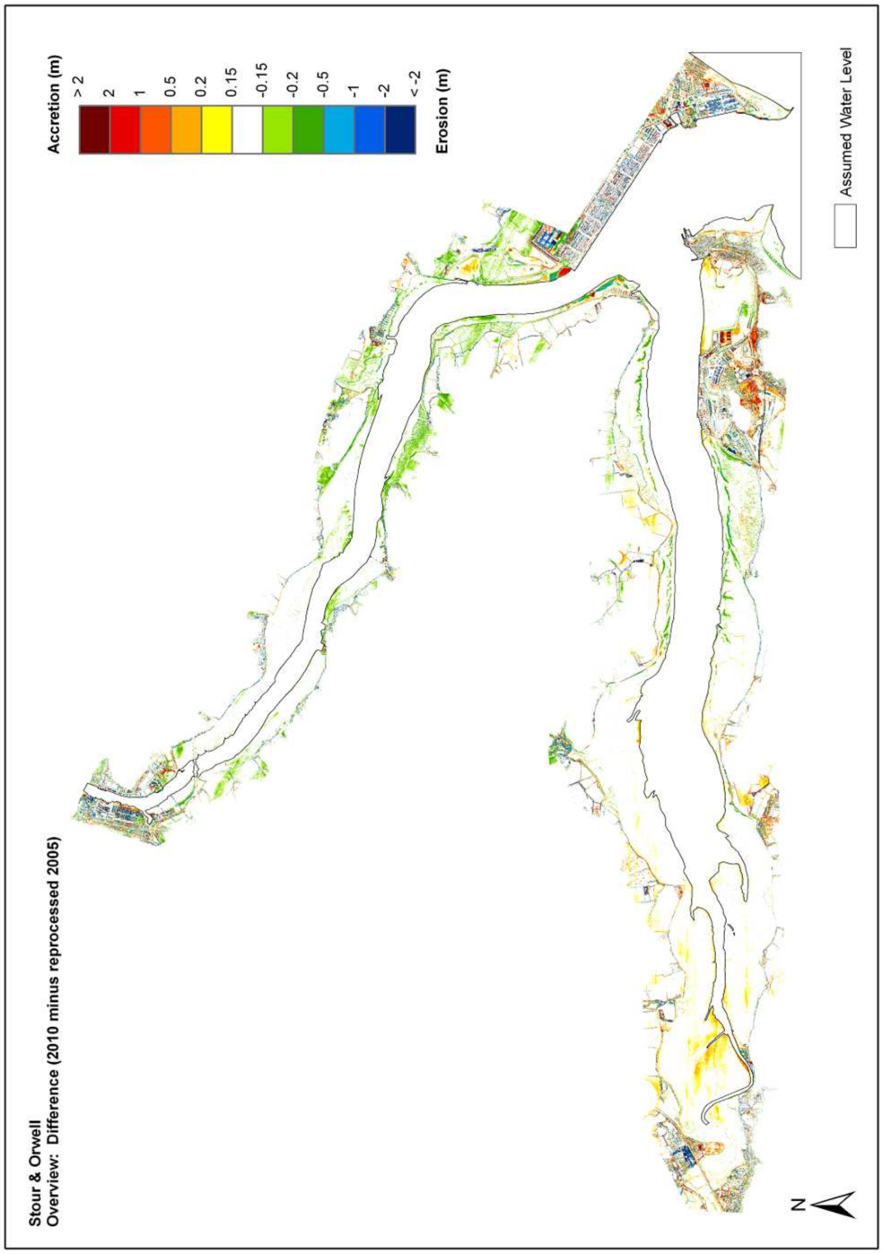


Figure 3.1 Overview of difference between the re-processed 2005 and 2010 LiDAR data demonstrating correction of the streaking observed in the original 2005 data

Figure 3.2 Overview of the 2010 aerial photographs mosaic

3.3 Results of analysis of saltmarsh extent

The analysis concluded that saltmarsh extent has increased in all units of the estuary system over the period 2005 to 2010. The largest increases in extent were in the Harbour, lower Stour and lower Orwell units. In the other units of the estuary system, although the analysis concluded an increase in area, the changes are considered minor and are likely to be within the margin of error of the analysis technique. Table 3.1 summarises the findings of the analysis.

Table 3.1 Comparison of saltmarsh extent between 2005 and 2010

Units	Saltmarsh extent in 2005 (ha)	Saltmarsh extent in 2010 (ha)	Difference (ha)
Harbour	1.80	4.05	+2.25
Lower Orwell	23.20	25.48	+2.28
Lower Stour	49.80	56.00	+6.20
Mid Stour	18.10	18.40	+0.30
Upper Orwell	8.00	9.12	+1.12
Upper Stour	23.90	24.48	+0.58
TOTAL	**124.80**	**137.53**	**+12.73**

The increase in saltmarsh in the lower Orwell is largely due to saltmarsh development within the intertidal habitat creation schemes on the Shotley foreshore. In the lower Stour and Harbour units, the aerial photographs revealed that some of the existing areas of saltmarsh had increased in extent. It should be noted that some of the increase quoted in these units is likely to be due to the margin of error within the analysis technique (e.g. areas of shadow) although such error has been minimised as far as possible through visually assessing each area of saltmarsh as part of the analysis process. Full details of the analysis techniques are reported in (Royal Haskoning and HR Wallingford (2011).

3.4 Intertidal and subtidal area and volume

3.4.1 Introduction

All previous analysis of change in intertidal area has been made on the basis of analysis of bathymetric data. Bathymetric data provides a means to consider the spatial extent of the subtidal area of the estuaries. Knowledge of the subtidal area can be used to estimate the intertidal area based on the assumption that the total area of the estuaries is fixed by flood defences or rising ground. A reduction in subtidal area implies an increase in intertidal area. The bathymetric data typically extends up to a maximum of +2m CD. Hence the bathymetric data does not provide a direct means to analyse the full extent of changes over the intertidal area.

LiDAR provides full coverage of the upper intertidal but does not reliably cover the lowest part of the intertidal area (between approximately +1m CD and CD). The LiDAR data can be reliably used to estimate the surface area and the changes in intertidal volume between about +1m CD and +4m CD.

2010 is the first time when two reliable sets of LiDAR data are available for the estuary system. Hence surface area and volume changes between +1m CD and +4m CD can be directly established. These data will provide the best evidence of change in the intertidal areas of the estuary system and will be the means of comparison going forward. However, at this point in time, it is also necessary to consider the evidence regarding intertidal change based on knowledge of the subtidal area determined from bathymetric data for continuity with data presented in previous Annual Reports.

It is proposed that in future the bathymetry and LiDAR data be combined to create a single surface for the determination of changes in subtidal and intertidal volume and area. This is discussed further in Section 3.4.6.

Throughout this section, reference to an increase (or decrease) in intertidal volume refers to a change in volume of sediment above a given horizontal level. Reference to an increase (or decrease) in subtidal volume refers to change in volume of water and, therefore, an increase in subtidal volume translates to erosion and a decrease in subtidal volume translates to accretion.

3.4.2 Orwell estuary

Intertidal volume

Analysis of the 2005 and 2010 LiDAR data showed that with the exception of an area upstream of the Trinity III (Phase 2) Extension, there has been a loss in the Orwell estuary intertidal volume of 370,000 m^3 between the levels of +1m CD and +4m CD over this period.

This trend for a loss of intertidal volume in the Orwell estuary is consistent with the findings of calculations made in 2006 based on changes in the subtidal bathymetry when the loss in the intertidal volume between 1999 and 2006 was estimated to be about 150,000 m^3. It should be noted that in 2006 the intertidal volume was calculated between 0m CD and the upper limit of the surveyed bathymetry (which would have been below +4m CD) and only included areas of the estuary that had not been dredged during the analysis period (i.e. above Levington Creek). The 2011 calculation, which used the 2005 and 2010 LiDAR data, was based on volume changes between reference levels of +1m CD and +4m CD and covered the whole estuary.

Intertidal area

Calculations of the changes in intertidal area were carried out based on both the bathymetry data (for continuity with previous 5 yearly reviews) and the LiDAR data. The analysis based on bathymetry data showed that there had been an increase in intertidal area above 0m CD of 2.8ha per year.

Based on the LiDAR data analysis, the areas of the Orwell estuary that have seen the largest losses over the intertidal areas are those on the south side of the river where there has been net erosion equivalent to between 0.10m and 0.19m. Those areas on the north side of the river have seen smaller net losses over the 5 year period of about 0.04m. The area upriver of the Trinity III (Phase 2) Extension has shown a net accretion over the intertidal areas equivalent to 0.06m.

Subtidal volume

Based on the 2006 and 2011 bathymetry data the subtidal volume of the Orwell estuary below 0m CD has reduced by about 1.09M m^3 over this period. This trend for subtidal accretion is consistent with calculations undertaken in 2006 that showed that the subtidal volume below 0m CD had reduced by about 500,000 m^3 since 1999. The 2006 calculation was based on the estuary above Levington Creek whereas the 2011 calculation was based on the whole estuary. Distribution of the 2011 volume change over the planar area of the subtidal below 0m CD equates to a net accretion of about 0.27 m.

3.4.3 Stour estuary

Intertidal volume

Analysis of the 2005 and 2010 LiDAR data showed that in the Stour estuary there was a net increase in the intertidal volume between +1m CD and +4m CD of about 90,000m^3.

Intertidal area

For continuity with previous 5 yearly reviews the change in the intertidal area based on the bathymetry data was undertaken. This analysis showed that there had been an increase in intertidal area above 0m CD of 2.2ha per year.

Subtidal volume

Based on the 2005 and 2011 bathymetry data the subtidal volume of the Stour estuary below 0m CD has reduced by about 960,000 m^3 over this period. This trend for subtidal accretion is consistent with calculations undertaken in 2005 that showed that the subtidal volume below 0m CD had reduced by about 900,000 m^3 since 1999. Distribution of the 2011 volume change over the planar area of the subtidal below 0m CD equates to a net accretion of about 0.1 m.

3.4.4 Estuary-wide changes in intertidal area since 1976

Table 5.1 summarises the surveyed and predicted rate of change in the intertidal area of the estuary system above 0m CD between 1976 and 2011 (ha per year) based on bathymetric data. The rates of change in intertidal area for 1976, 1986 and 1997 were calculated based on surveys undertaken in 1965, 1978, 1982, 1994 and 1999.

Table 3.2 shows that, based on the 2005/2006 and 2010/2011 bathymetry data the intertidal area for the estuary system has over the last five years increased by about 5ha per year. This is a reversal from the situation observed before the channel deepening. The evidence does not indicate that the channel deepening led to an acceleration of erosion in the estuary system as a whole although there are clearly differences in the behaviour of the Stour and Orwell Estuaries.

Table 3.2 Changes to intertidal area above 0m CD based on bathymetry data

Period	Prediction or Survey	Rate of change of intertidal area above 0m CD (ha/year)		
		Stour	Orwell	Estuary system
1976[a]	Survey	Loss 10.3 to 10.9	Gain 6.0 to 6.5	Loss 3.8 to 4.9
1986[b]	Survey	Loss 13.5 to 13.6	Gain 3.9 to 4.0	Loss 9.5 to 9.7
1997[1c]	Survey	Loss 13.1	Gain 3.8	Loss 9.3
Post 1998/2000 deepening	*Prediction*	*Loss 13.2 to 13.3*	*Gain 3.6 to 3.7*	*Loss 9.5 to 9.7*
Post completion of Trinity III(2)	*Prediction*	*Loss 12.0*	*Gain 4.3*	*Loss 7.7*
1999 to 2005/2006	Survey	Loss 0.37	Gain 1.8	Loss 2.17
2005/2006 to 2010/2011	Survey	Gain 2.2	Gain 2.8	Gain 5.0

The rates predicted (highlighted grey, with text in italics) do not include for the effects of mitigation undertaken since completion of the channel deepening

[1] Taken to be the pre-works baseline for the purposes of the MMP and the CMMA

[a] Based on 1965 and 1978 surveys

[b] Based on 1982 and 1994 surveys

[c] Based on 1994 and 1999 surveys

LiDAR flights were flown over the estuary system in 2005 and 2010. These data sets indicate a small annual loss in both the Stour and Orwell Estuaries during this period (Table 3.3) with the intertidal area for the estuary system reducing by about 0.7ha per year between +1m and +4m CD based on LiDAR data.

Table 3.3 Changes to intertidal area based on LiDAR data

Period	Rate of change of intertidal area between +1m and +4m CD (ha/year)		
	Stour	Orwell	Estuary System
2005 to 2010	Loss 0.19	Loss 0.49	Loss 0.68

Clearly, the changes in intertidal area when calculated based on bathymetry and LiDAR data are showing different results, however, it is important that neither technique shows losses of the intertidal area of 10ha per year as surveyed and predicted for the estuary system post the 1998/2000 channel deepening (Table 3.2).

The differences in the results are considered to be due to the different analysis techniques used and the fact that different elevation bands are considered. The bathymetric data typically extends up to a maximum of +2m CD and therefore does not provide a direct means to analyse the full extent of changes over the intertidal area. The LiDAR provides full coverage of the upper intertidal but does not reliably cover the lowest part of the intertidal area (between approximately +1m CD and CD).

The use of a combination of bathymetry and LiDAR data for the assessment of intertidal areas is considered to be a more reliable analysis method and will be used as the basis for future assessments of changes to the intertidal area of the estuary system. This is considered in more detail in Section 3.4.5.

3.4.5 Combined bathymetry and LiDAR

It is proposed that future analyses of intertidal and subtidal volumes and areas be undertaken based on a combined bathymetry and LiDAR surface of the Stour and Orwell estuaries. To date, predictions of changes to intertidal extent have been derived from analysis of how the subtidal volume has changed. Given the relatively minor changes reported in this document, it is clear that this method of assessing intertidal extent is not sufficiently sensitive. For the current reporting period a test of the analysis methodology which combines bathymetry data and LiDAR data has been carried out.

The methodology adopted was to crop both the Orwell and Stour estuary bathymetry data sets at a level of +1m CD. The bathymetry data could then be used to represent the estuaries below +1m CD. The LiDAR data sets were cropped below +1m CD and above +4m CD. The LiDAR could then be used to represent the estuaries between the levels of +1m CD and +4m CD. The two data sets were then combined and uniform raster grids with 10m spacing created. An overview of the surface created for the Orwell and Stour estuaries based on the combined 2010 bathymetry and LiDAR data is shown in Figures 3.3 and 3.4.–To test how well the LiDAR and bathymetry data sets fit together (i.e. how ‘smooth’ the transition is between data sets), a number of cross sections were tested and it was found that there was a very good fit between the data sets.

Surfaces were created for both the Orwell and Stour estuaries using the method described above for the 2005/2006 and the 2010/2011 bathymetry and LiDAR data sets. These surfaces were then used to calculate subtidal and intertidal volumes and areas using a cut level of 0m CD. The results of these calculations for the subtidal volumes and surface areas below 0m CD were comparable to those computed based on bathymetry alone (less than 2% variation).

For the case of the intertidal volumes and surface areas between 0m CD and +4m CD the calculations give different results to those reported in Sections 3.4.2 and 3.4.3 as those were based on LiDAR data alone which considered an elevation band between +1m CD and +4m CD only.

Tables 3.4 and 3.5 show the changes in subtidal and intertidal volumes and areas calculated based on the combined 2005/2006 and the 2010/2011 bathymetry and LiDAR data sets. Note that a loss is represented by a negative figure and a gain is represented by a positive figure.

Table 3.4 Changes in subtidal volume and area between 2005/6 and 2010/11

Estuary	Subtidal volume below 0m CD (m^3)	Subtidal area below 0m CD (m^2)
Orwell	-557,700	-96,150
Stour	-838,200	-96,350

Table 3.5 Changes in intertidal volume and area between 2005/6 and 2010/11

Estuary	Intertidal volume between 0m CD and +4m CD (m^3)	Intertidal area between 0m CD and +4m CD (m^2)
Orwell	-219,400	95,120
Stour	923,300	242,700

Overall, the two analysis methods have shown to produce very similar results in the subtidal area. The combined data set gives a more accurate reflection of changes taking place in the intertidal area as the full surface above 0m CD is considered. The elevation band between 0m CD and +1m CD is clearly one which makes a large contribution to overall intertidal volumes and areas and as such it is important that it should be taken into consideration in the future; a benefit afforded by the use of combined bathymetry and LiDAR surfaces.

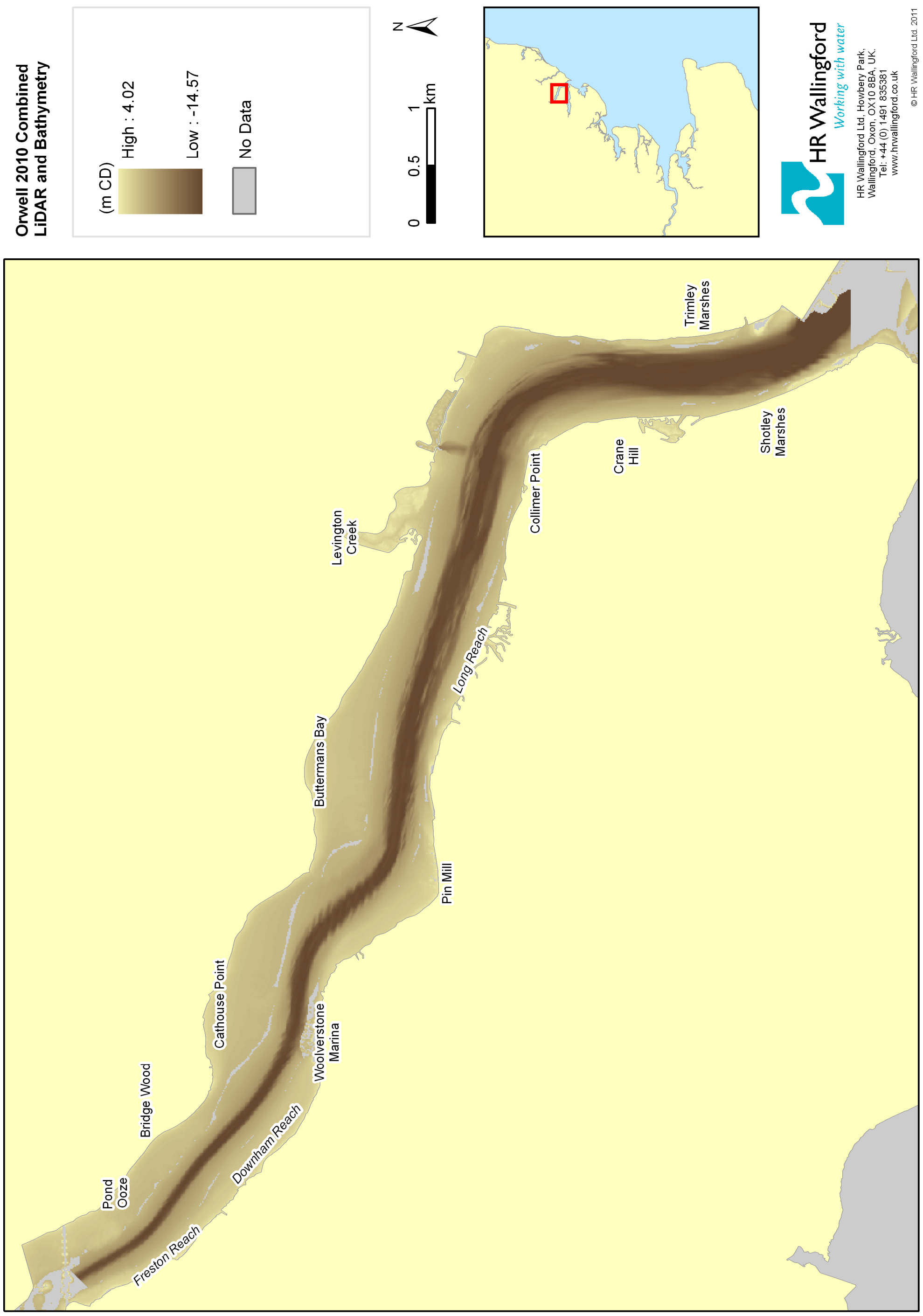


Figure 3.3 Orwell estuary combined 2010 bathymetry and LiDAR data

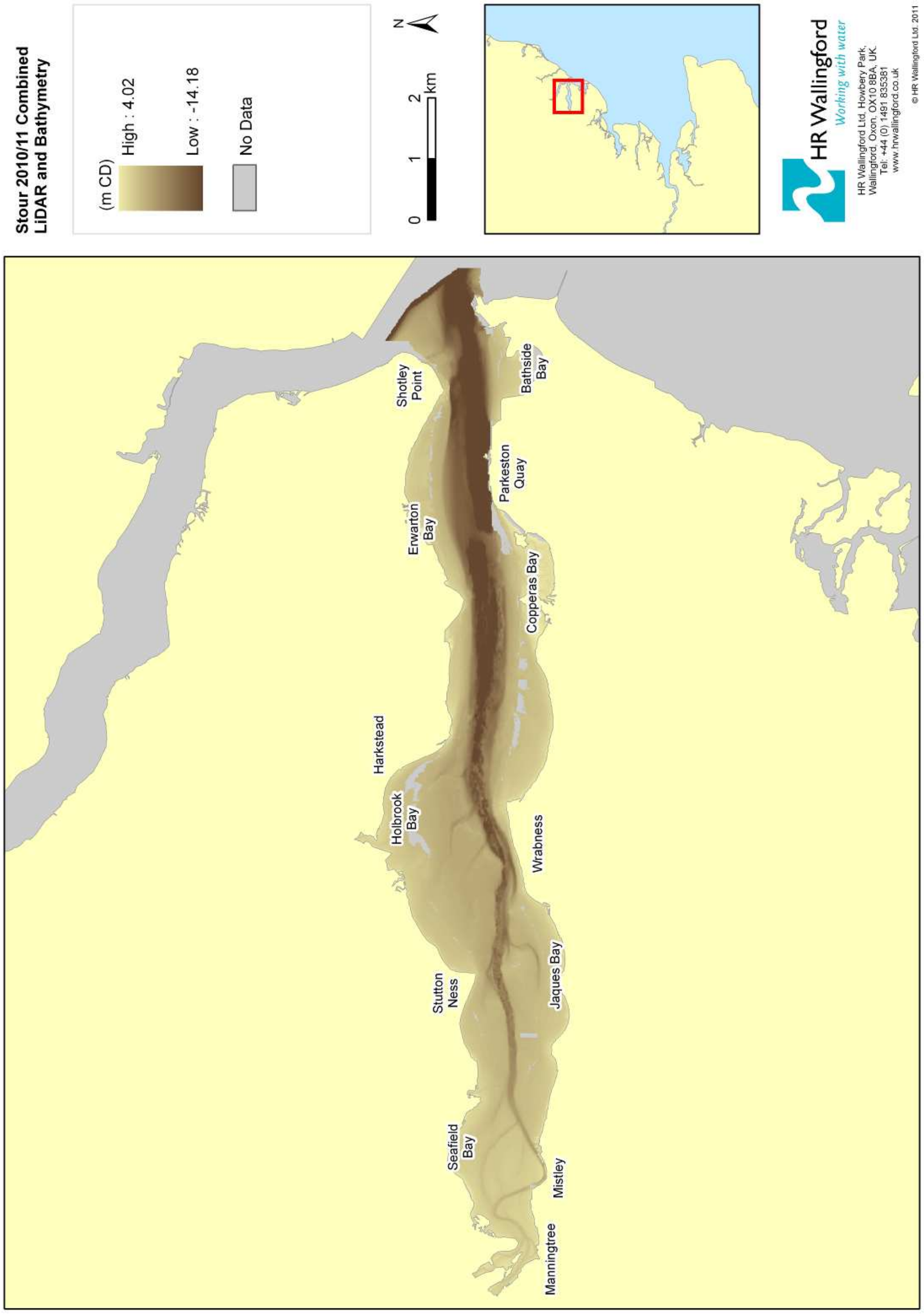


Figure 3.4 Stour estuary combined 2010 bathymetry and LiDAR data

4 BENTHIC MONITORING

4.1 Stour and Orwell Estuaries

4.1.1 Annual benthic monitoring

The two large-scale surveys of the estuary system were undertaken in 1997 (June-August) and 2003 (July, with biotope mapping). The first of the annual monitoring surveys was undertaken 5 years later in 2008 and subsequent surveys have been undertaken annually in July (2009 to 2011). A further survey will be undertaken in July 2012 to complete the current 5 year block of annual surveys. The surveys are undertaken by Thompson Unicomarine.

This section discusses the data collected during the 2011 survey and provides a comparison of the data collected in the annual surveys between 2008 and 2011. Full details of the survey and results are provided in Appendix A.

The survey locations to which this data correlates are those sampled in 1997 and 2003. The survey locations represent replicates within a selection of biotopes in each estuary, or different parts of an estuary.

Methods

Groups of four samples were selected within target biotopes in the estuary system. There are four sample groups on the Orwell and seven on the Stour (see Figure 4.1).

Two 0.04m^2 Shipek grab samples were taken at each station; one for particle size analysis (PSA) and one for benthic biological analysis. Sampling points from the 2011 survey were plotted and numbers of taxa and individuals, total biomass, and cluster groups were plotted and biotopes extrapolated.

Results

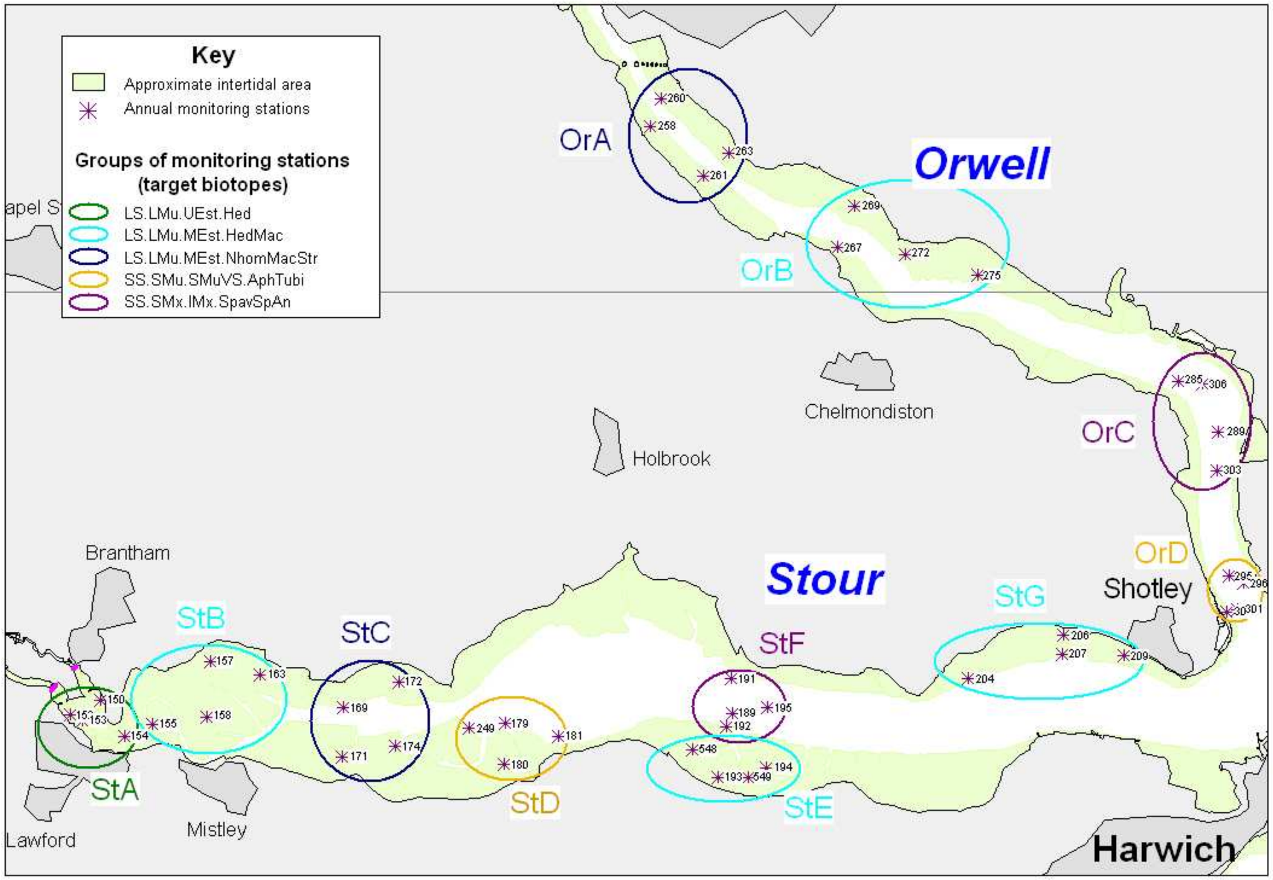
The results from the 2011 survey indicate that the particle size at most stations was dominated by high proportions of silt and clay but some stations had equal or greater proportions of pebble or various sand fractions. There seemed to be little correlation between sediment composition and the biological clustering pattern.

The majority of the macrofaunal communities represented mud-dominated communities. The highest numbers of taxa were recorded in the subtidal samples targeted as biotope SS.SMx.IMx.SpavSpAn (*Sabella pavonina* with sponges and anemones on infralittoral mixed sediment). The lowest numbers of taxa were recorded from intertidal biotopes.

Abundance was greatest intertidally and the lowest was in the subtidal groups in the two most seaward sites in the River Orwell, OrC and OrD (see Figure 4.1). Diversity ranged from 1.05 at Station 152 (in StA) to 3.101 at Station 285 (in OrC).

Total biomass was highest in the subtidal Stour group (StF) and lowest subtidally in group OrD. Mean biomass was highest in sample group StF and lowest in sample group StC. The taxa with the highest mean biomass for the survey as a whole were American slipper limpets *Crepidula fornicata*, cockles *Cerastoderma edule* and fanworms *Sabella pavonina*.

Figure 4.1 Location of benthic monitoring sample sites on the Stour and Orwell Estuaries



The SIMPROF test identified nine groups of samples that could be statistically separated at the 5% significance level. These were assigned to five biotopes, all but one of which had been recorded in 2003. While some sample groups have four samples within the same cluster groups and/or biotopes as previous years, there are others for which the classification can be seen to have changed. Changes are most apparent in the subtidal groups but can also be seen on the mid estuary mudflats.

A list of all of the biotopes recorded at the annual monitoring stations from 2003 to 2011 and a description of each biotope type is provided in Appendix B.

4.1.2 Conclusions of monitoring undertaken to date

From analysis of the monitoring results from each year between 2008 and 2011 it can be seen that the number of taxa in each target biotope group has not varied significantly between the surveys. The largest number of taxa is seen in SS.SMx.IMx.SpavSpAn in all surveys between 2008 and 2011. The largest increase in taxa occurred in biotope type SS.SMu.SmuVS.AphTubi.

Abundance is typically the same in each biotope group across the surveys with the exception of LS.LMu.Est.NhomMacStr where a large decline in abundance was recorded in 2009. The biomass appears to have increased in three of the five biotope groups across the survey period and only declined within one (remaining constant within one group also).

A comparison of the biotopes found at each sample site is provided for the Orwell and Stour Estuaries in Tables 4.1 and 4.2 respectively. It can be seen that typically the biotope types have not changed significantly from the target biotope at each site, but the biotopes have diversified with the biotope type only rarely remaining at 100% of the target biotope. This is natural progression of the habitat and is to be expected.

The multi-dimensional scaling (MDS) ordination plots for the macrobenthic data indicate that in general the samples show grouping according to the target biotope, with samples from different years still in close proximity to samples from the same target biotope. This would indicate that there has been little change to the biotopes over the years. The samples from biotope SS.SMu.SMuVS.AphTubi (*Aphelochaeta marioni* and *Tubificoides* spp. in variable salinity infralittoral mud) show the greatest spread across the plot. This biotope is located at StD and OrD.

Statistical testing for similarities between biotope groups and years indicate that there are significant differences within each biotope group between the years, but also within each biotope group each year. The only two biotope groups which were not significantly different to each other between each survey year were LS.LMu.MEst.HedMac and LS.LMu.MEst.NhomMacStr in 2010.

In summary the data shows that similar communities have been present in the Stour and Orwell in each of the survey years to date. As would be expected, there have been some minor changes between years and shifts between biotopes for certain stations. It seems that the upper Stour biotope (StA) is relatively stable while the lower Orwell (OrD) has changed with each survey and often includes several biotopes within the group.

Table 4.1 Biotopes for the Orwell Estuary from 2008 to 2011

Sample Site	Target Biotope	Survey Year			
		2008	2009	2010	2011
OrA	LS.LMu.MEst.NhomMacStr	LS.LMu.MEst.HedMac	LS.LMu.MEst.HedMac	LS.LMu.MEst.HedMac	LS.LMu.MEst.HedMac
OrB	LS.LMu.MEst.HedMac	LS.LMu.MEst.HedMac	LS.LMu.MEst.HedMac LS.LMu.MEst.NhomMacStr (50:50)	LS.LMu.MEst.HedMac LS.LMu.MEst.NhomMacStr (75:25)	LS.LMu.MEst.HedMac
OrC	SS.SMx.IMx.SpavSp.An	SS.SMx.IMx.SpavSp.An SS.SMu.SMuVS.AphTubi (75:25)	SS.SMx.IMx.SpavSp.An LS.LMu.MEst.NhomMacStr (50:50)	SS.SMx.IMx.SpavSp.An	SS.SMu.SMuVS.AphTubi SS.SMx.IMx.SpavSp.An SS.SMu.SMuVS.NhomTubi (50:25:25)
OrD	SS.SMu.SMuVS.AphTubi	SS.SMu.SMuVS.AphTubi SS.SMu.SMuVS.PolCvol (25:75)	SS.SMu.SMuVS.NhomTubi SS.SMu.SMuVS.PolCvol LS.LMu.MEst.NhomMacStr (25:25:50)	SS.SMu.SMuVS.NhomTubi LS.LMu.MEst.NhomMacStr (50:50)	SS.SMu.SMuVS.NhomTubi SS.SMx.IMx.SpavSp.An (75:25)

Key: LS – Littoral sediments; LMU – Littoral mud; MEst – Polychaete/bivalve dominated mid estuarine mud shores; HedMac – *Hediste deversicolor* and *Macoma balthica* in littoral sandy mud; Nhom.MacStr – *Nephtys hombergii*, *Macoma balthica* and *Streblospio shrubsolii* in littoral sandy mud; SMx – Sublittoral mixed sediment; IMx – Infralittoral mixed sediment; SpavSPAn – *Sabella pavonina* with sponges and anemones on infralittoral mixed sediment; NhomTubi – *Nephtys hombergii* and *Tubificoides* spp. in variable salinity infralittoral soft mud; PolCvol – Polydora ciliate and Corophium volutator in variable salinity infralittoral firm mud or clay.

Note: Ratio assumes that each sample location represents 25% of the biotope

Table 4.2 Biotopes for the Stour Estuary from 2008 to 2011

Sample Site	Target Biotope	Survey Year			
		2008	2009	2010	2011
StA	LS.LMu.UEst.Hed	LS.LMu.UEst.Hed	LS.LMu.UEst.Hed	LS.LMu.UEst.Hed	LS.LMu.UEst.Hed
StB	LS.LMu.MEst.HedMac	LS.LMu.MEst.HedMac	LS.LMu.MEst.HedMac	LS.LMu.MEst.HedMac	LS.LMu.MEst.HedMac
StC	LS.LMu.MEst.NhomMacStr	LS.LMu.MEst.HedMac LS.LMu.UEst.Hed (75:25)	LS.LMu.MEst.NhomMacStr LS.LMu.MEst.HedMac (75:25)	LS.LMu.MEst.HedMac LS.LMu.MEst.NhomMacStr (75:25)	LS.LMu.MEst.HedMac
StD	SS.SMu.SMuVS.AphTubi	SS.SMu.SMuVS.AphTubi LS.LMu.MEst.HedMac (50:50)	SS.SMu.SMuVS.AphTubi LS.LMu.MEst.NhomMacStr (50:50)	SS.SMu.SMuVS.AphTubi LS.LMu.MEst.HedMac SS.SMx.IMx.SpavSp.An (50:25:25)	SS.SMu.SMuVS.AphTubi LS.LMu.MEst.HedMac (50:50)
StE	LS.LMu.MEst.HedMac	LS.LMu.UEst.Hed LS.LMu.MEst.HedMac (75:25)	LS.LMu.MEst.HedMac	LS.LMu.MEst.HedMac	LS.LMu.MEst.HedMac
StF	SS.SMx.IMx.SpavSp.An	SS.SMx.IMx.SpavSp.An SS.SCS.SCSVS SS.SMu.SMuVS.AphTubi (50:25:25)	SS.SMx.IMx.SpavSp.An SS.SMu.SMuVS.AphTubi (75:25)	SS.SMx.IMx.SpavSp.An SS.SMu.SMuVS.AphTubi (50:50)	SS.SMu.SMuVS.AphTubi SS.SMu.SMuVS.NhomTubi (75:25)
StG	LS.LMu.MEst.HedMac	LS.LMu.MEst.HedMac	LS.LMu.MEst.NhomMacStr LS.LMu.MEst.HedMac (50:50)	LS.LMu.MEst.NhomMacStr LS.LMu.MEst.HedMac (50:50)	LS.LMu.MEst.HedMac

Key: LS – Littoral sediments; LMu – Littoral mud; UEst – Polychaete/oligochaete dominated upper estuarine mud shores; Hed – Hediste diversicolor in littoral mud; MEst – Polychaete/bivalve dominated mid estuarine mud shores; HedMac – *Hediste deversicolor* and *Macoma balthica* in littoral sandy mud; Nhom.MacStr – *Nephtys hombergii*, *Macoma balthica* and *Streblospio shrubsolii* in littoral sandy mud; SMx – Sublittoral mixed sediment; IMx – Infralittoral mixed sediment; SpavSPAn – *Sabella pavonina* with sponges and anemones on infralittoral mixed sediment; NhomTubi – *Nephtys hombergii* and *Tubificoides* spp. in variable salinity infralittoral soft mud; PolCvol – Polydora ciliate and Corophium volutator in variable salinity infralittoral firm mud or clay; SCSVS – Sublittoral coarse sediment in variable salinity (estuaries). Note: Ratio assumes that each sample location represents 25% of the biotope

4.2 Felixstowe South Reconfiguration monitoring

A monitoring schedule was established for the Felixstowe South Reconfiguration project, comprising six Shipek grab stations (each with three replicate macrofaunal samples and one PSA sample) and five 2-metre beam trawl samples (Figure 4.2). The first monitoring survey was completed in July 2008, with a second in 2009, a third in 2010 and the fourth in 2011. Construction work had begun on the project by July 2009 and the June/July 2011 survey represents the third survey after some potential impact.

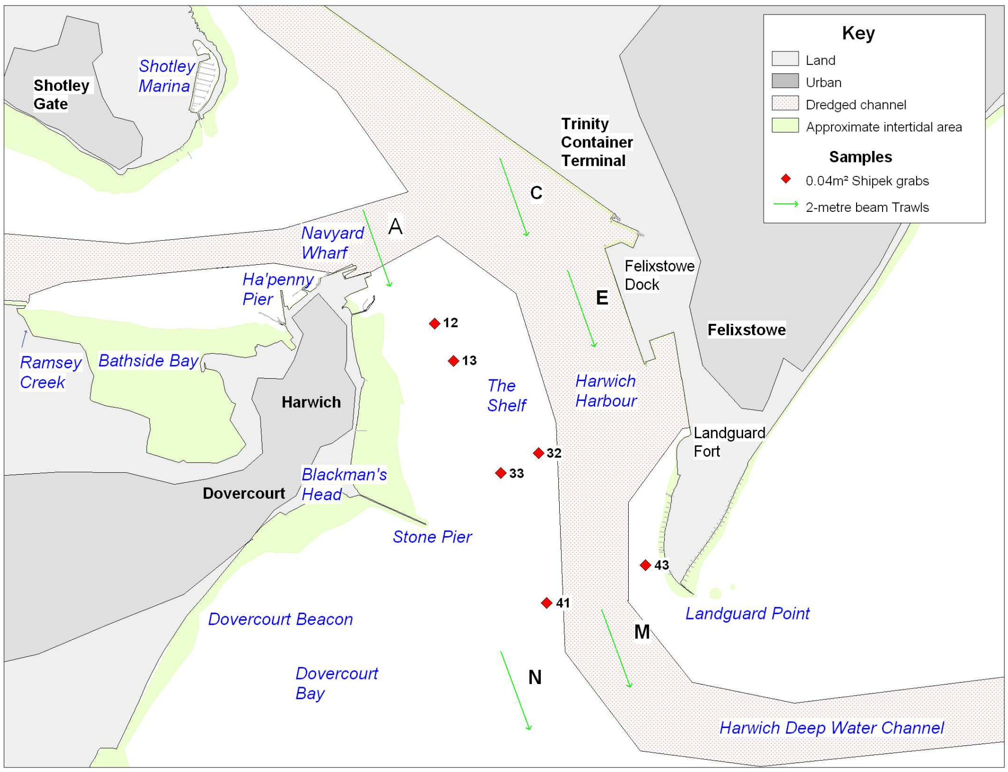


Figure 4.2 Locations of grab and trawl monitoring stations for the Felixstowe South Reconfiguration

In all four years, the grab samples formed two main community types. One included Stations 32 and 41 (and, in 2008 and 2011, Station 33), to the west of the channel in relatively deep water. The biota included typical infaunal species for the biotope SS.SMu.SMuVS.NhomTubi. The sediment was dominated by silt/clay in this community.

The other community included station 43 from the east side of the dredged channel and other stations (12 and 13 in all years; 33 in 2009 and 2010) on the Shelf. The infauna were typical of the biotope SS.SMu.SMuVS.AphTubi, which is here taken as the classification for the community, as it appears to represent an infaunal component common to several biotopes in the area and to be the community most reliably recorded by Shipek grabs. Overlap with epifaunal biotopes is suggested by the presence of fanworms (*Sabella pavonina*) at Station 43 and ross (*Sabellaria spinulosa*) on the Shelf; these species characterise their own biotopes. The sediment in these samples was mixed.

The apparent shift of Station 33 from SS.SMu.SMuVS.NhomTubi to SS.SMu.SMuVS.AphTubi between 2008 and 2009 and back to SS.SMu.SMuVS.NhomTubi between 2010 and 2011 has been the only significant change between the surveys to date. The biological changes have been associated with corresponding changes in sediment type. They do not represent impoverishment and are unlikely to have been the result of development activity because this station is not the closest to the dredging or development area for the Felixstowe South Reconfiguration.

The data from the trawl surveys showed that, in all the years, sessile organisms, such as algae, hydroids and bryozoans were found in all trawls and the most common large invertebrates were shore crabs (*Carcinus maenas*) and brown shrimp (*Crangon crangon*), which are mainly epibenthic, and sea gooseberries (*Pleurobranchus pileus*), which are pelagic. There was a tendency for echinoderms (Echinocardium and *Ophiura* spp.) to be most abundant in the samples furthest from the estuary (M and N; see Figure 4.2).

Dover sole (*Solea solea*) were the most common fish species throughout the years, with the exception of 2009, when gobies (Pomatoschistus), with a large catch in Trawl A, outnumbered other fish. There were few other biological differences between years.

4.3 Inner Gabbard East disposal site

The Inner Gabbard East disposal site was proposed as a disposal ground for dredged material from the Felixstowe South Reconfiguration project. A biological survey was undertaken in summer 2002 prior to disposal, and disposal ended in June 2010, when another survey was completed; the latest survey was in July 2011. Three replicate biological samples were collected from nine stations, using a 0.1m² Hamon grab, along with samples for particle size analysis from each station.

The biota found were typical for an area of mixed sediment at depths of 20-40m. SIMPROF cluster analysis identified 8 separate cluster groups and there was also a group of samples without biota. The groups were assigned to four biotopes. Several stations had replicates that clustered separately in SIMPROF analysis and communities were difficult to assign to standard biotopes. They were characterised by mixed substrata, dominated by infaunal polychaetes, with some Crustacea and varying epifaunal components.

The stations within the disposal ground and those from just to the north of the disposal area had a relatively reduced fauna, with lower numbers of taxa and individuals than the surrounding stations and including two samples with no biota recorded. This reduced biota is likely to result from the disposal of dredged material.

5 TRIMLEY MARSHES MANAGED REALIGNMENT MONITORING

5.1 Conclusions based on monitoring undertaken to date

The monitoring of the Trimley Marshes managed realignment site has been ongoing for 10 years. The monitoring has shown that the site has an established intertidal benthic community which supports a wide range of waterfowl and contributes to maintaining the integrity of the internationally designated sites.

Saltmarsh at the site has thrived and, in line with the design criteria for the site, a diverse community has developed but is unlikely to exceed the 30% threshold for vegetative growth.

The period of monitoring as specified within the Mitigation and Monitoring Package is now complete and the 10 years of monitoring has provided a clear indication of the development and successional changes within the site, a clear sign of the success of this habitat realignment site.

5.2 Agreement reached at the 2011 Regulators meeting

At the 2011 Regulators meeting it was agreed that the monitoring has demonstrated that the objectives of the site have been met and, therefore, no survey will be undertaken in 2011. It was, however, agreed that future surveys will be undertaken at five year intervals to verify whether the site is continuing to meet its objectives. The site will therefore next be monitored for benthic invertebrates in 2015 (when the next LiDAR survey is also due).

The Annual Report will continue to report on the site in terms of the birds and the habitats (i.e. as part of the overall assessment of the habitats of the estuary system from LiDAR and aerial photograph data) and the site will be discussed at each meeting.

6 TRINITY III TERMINAL HABITAT ENHANCEMENT MONITORING

6.1 Background

As part of the planning consent for the extension of Trinity III Terminal, HHA were granted a Food and Environment Protection Act 1985 (FEPA) licence in 2002 to beneficially dispose of dredged material through the construction of intertidal bunds on the foreshore at two sites along the River Orwell at Shotley and Trimley.

Monitoring of the sites commenced in November 2003 following the completion of the Shotley bunds in September 2003 and the Trimley Bund in October 2003. Since then 16 surveys have been conducted.

The surveys comprise the collection of cores for biological and particle size analysis, and monitoring the development of the bunds and any vegetation with photographs and notes. A topographic survey is also undertaken by Wallingford Environmental Surveys Limited, and low water bird counts are taken by the Suffolk Wildlife Trust (SWT) as part of the Stour and Orwell Estuary counts.

The full results of the surveys with analysis and discussion is available in the 2011 annual report (Royal Haskoning, 2012).

6.2 Methodology

Figure 6.1 illustrates the location of the sample stations for the Trimley and Shotley Habitat Enhancement Sites. The locations of the topographic transects are shown in Figure 6.2.

Typically in recent surveys a hovercraft has been used to navigate the site, from which benthic invertebrate and sediment samples were taken. In 2011 however, adverse weather conditions prevented the hovercraft from being used and all sites were sampled on foot. As a result, it was not possible to access all sites due to soft mud so samples were taken from the closest safe point to the actual site.

6.3 Trimley Enhancement Scheme

6.3.1 Introduction

The Trimley site comprises one relatively homogenous mudflat, enclosed by a single bund. When the Trimley bund was first created, the mudflat behind the bund was very soft and fluid. By 2007, many small creeks had formed, making the mud flat more natural in appearance.

To date, there has been no evidence of saltmarsh colonisation. The main reason for this is that the mudflat is at too low a height in the tidal frame for saltmarsh species to colonise.

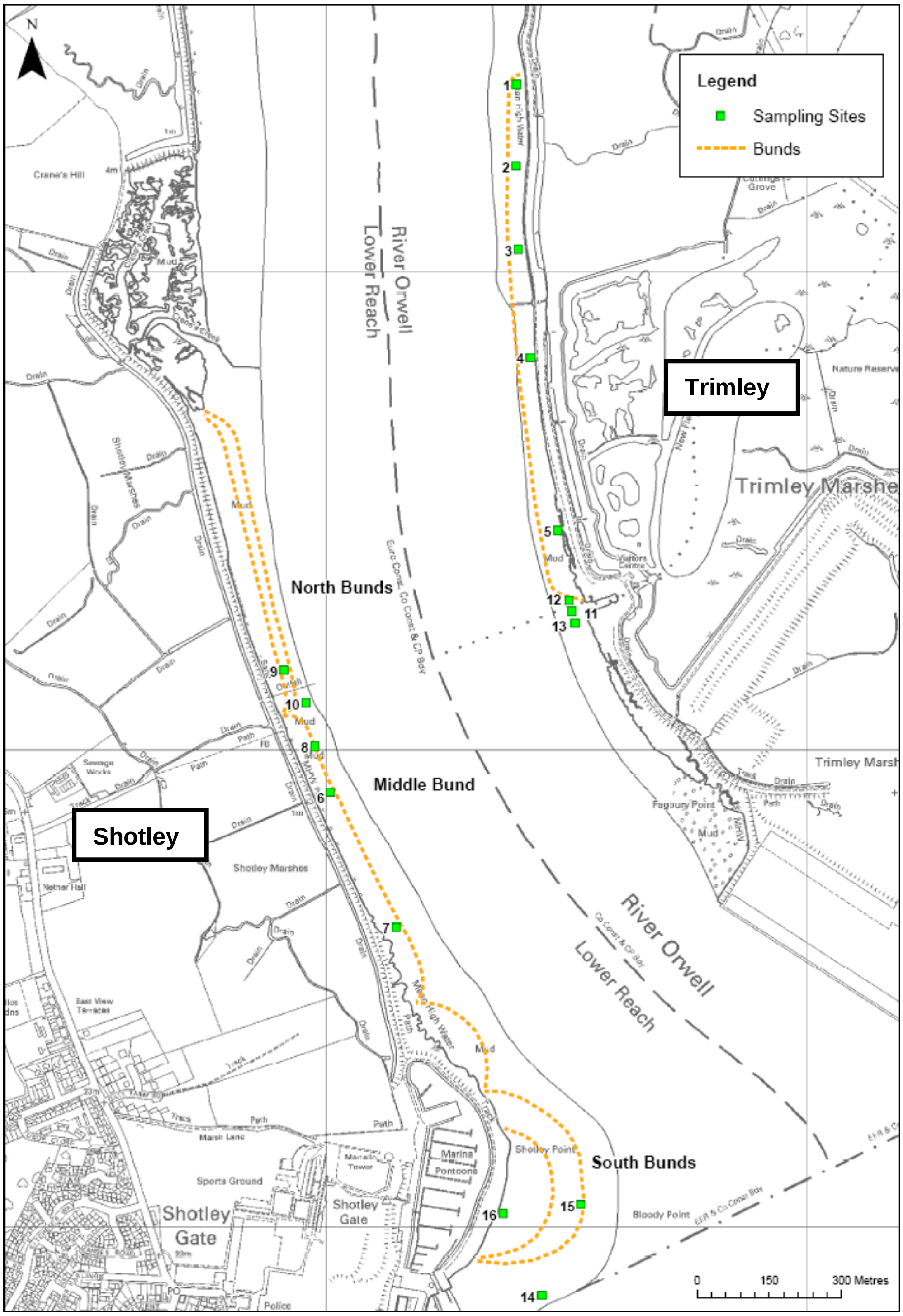


Figure 6.1 Location of sample stations for Trimley and Shotley enhancement schemes

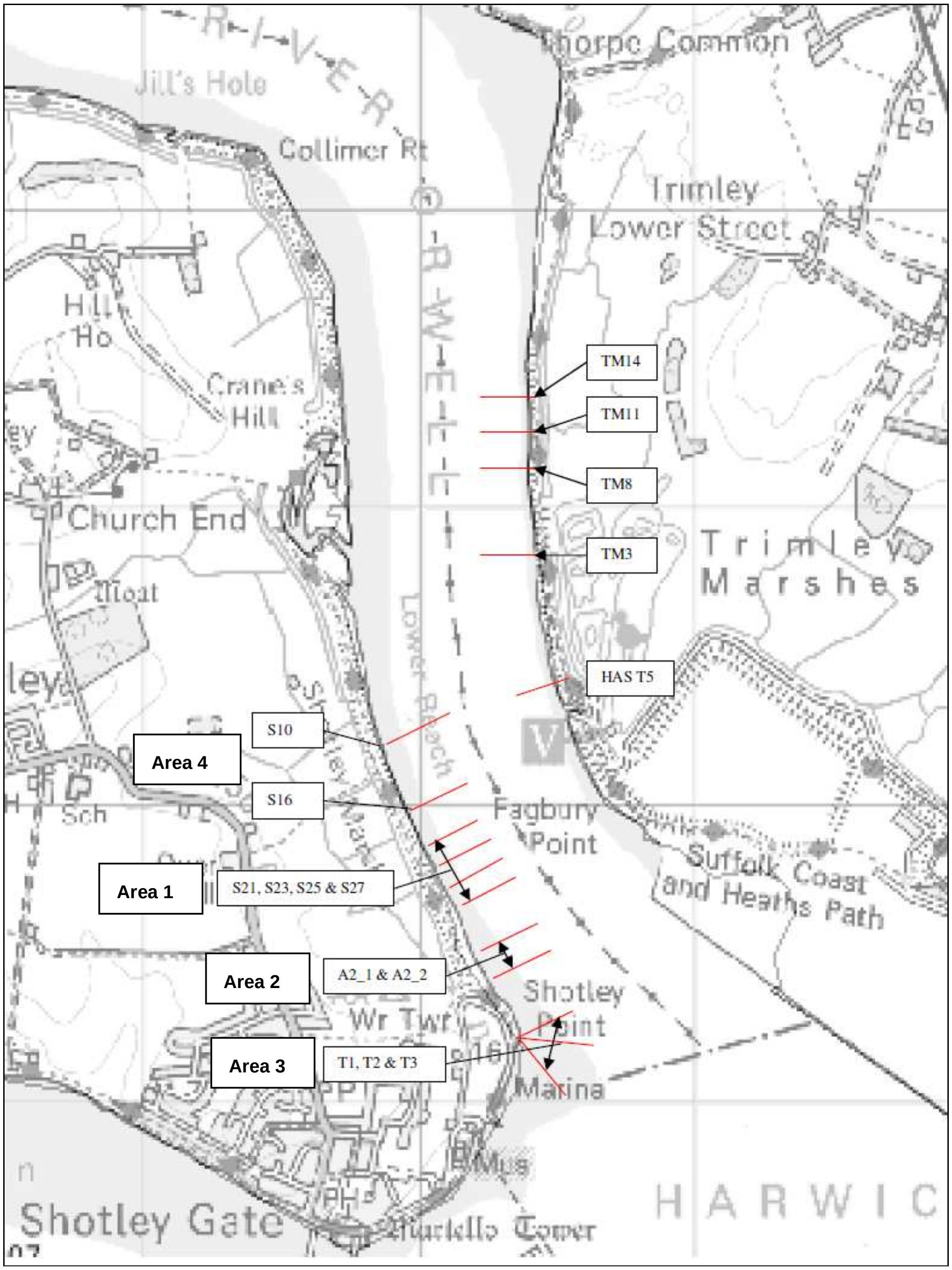


Figure 6.2 Location of topographic transects for Trimley and Shotley

6.3.2 Particle Size Analysis

The overall classification of particle size at the Trimley recharge sites can be described as silt, despite some coarser sediments recorded at site 1. The most recent survey indicated that the sediment sizes were similar across all recharge sites. Particle size at the reference sites is also classified as silt and all samples at the reference sites had similar Phi to each other and the recharge sites.

6.3.3 Benthic Invertebrate Univariate Results

Species richness

Directly after construction (November 2003), the number of species at the recharge sites was much lower than those at the reference sites, however, in the more recent surveys numbers have been generally the same between sites, occasionally higher at the recharge sites. The species richness at the recharge and reference sites is similar in the September 2011 survey.

Abundance

Site 1 has significantly higher abundance than the other recharge sites and the reference sites in the most recent survey. Numbers of individuals at recharge sites 2-5, which had been low in survey 15 (September 2010), remained low in the latest survey (survey 16, September 2011).

Diversity

The Shannon-Wiener diversity index emphasises the species richness or equitability components of diversity to varying degrees. Three of the five recharge sites show an increase in diversity from that seen in the previous survey (survey 15, September 2010). The two sites showing decreased diversity in survey 16 correspond to the two sites showing decreased species richness in survey 16.

The diversity at the reference site has not changed dramatically across the whole monitoring period. Four new species were recorded at the Trimley site in the September 2011 survey.

Biomass

Biomass (measured as weight of benthic invertebrates per core) can provide an important indicator of a habitat's ability to support predators such as birds. The biomass data is available only for survey 5 (June 2005) onwards as biomass analysis was not provided as part of the infauna analysis prior to this survey.

The biomass at the Trimley recharge site is greater than that at the reference site. The most dominant taxa at the recharge site are polychaetes and molluscs, whereas polychaetes are more dominant at the reference site.

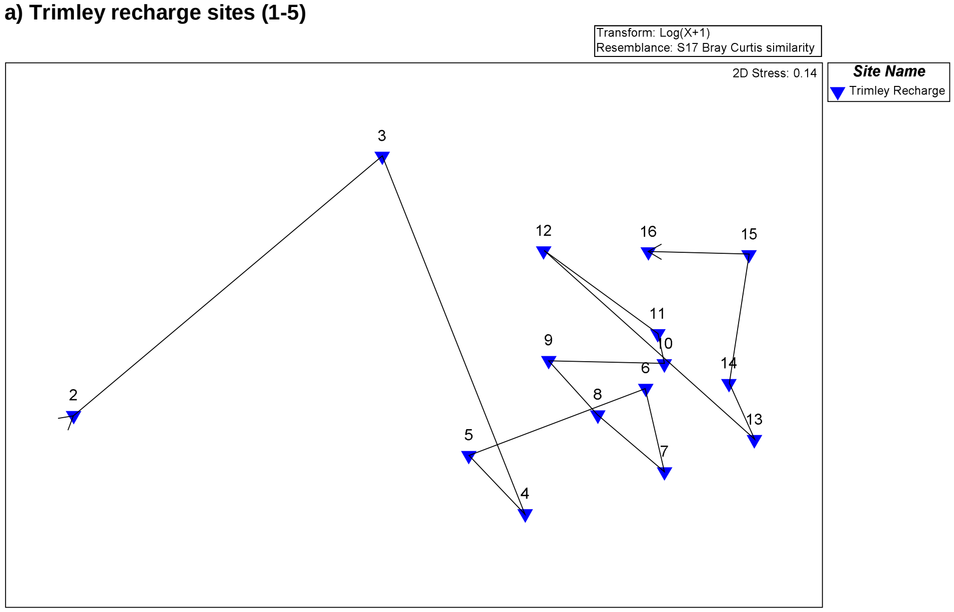
6.3.4 Benthic Invertebrate Multivariate Results

Multivariate analysis of the sample data was carried out using the PRIMER (Plymouth Routines in Multivariate Ecological Research) computer software package.

MDS ordination plots indicate a clear temporal shift in the benthic community at the recharge sites as it has developed and the community has stabilised (**Figure 6.3**). The community composition at the reference site, however, varies from survey to survey and there is no clear change over time.

The SIMPER analysis indicates a degree of variability between surveys and also suggests that the communities at the recharge site are more similar to one another than those at the reference site.

a) Trimley recharge sites (1-5)



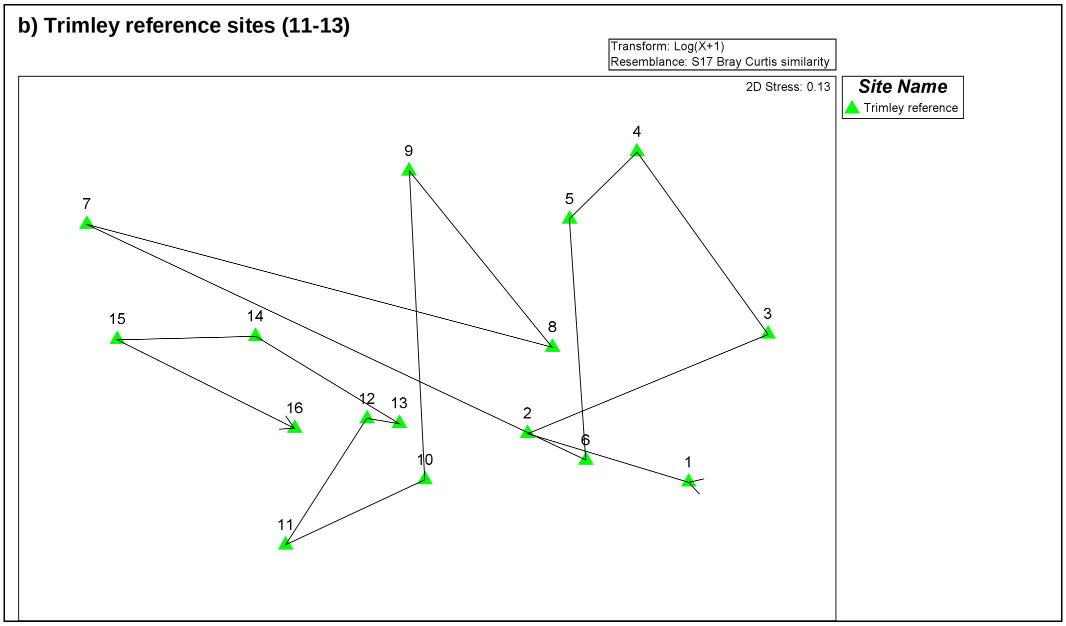


Figure 6.3 Multi-dimensional scaling (MDS) ordinance for the benthic macrofaunal communities of Trimley recharge (1-5) and reference (11-13) sites between survey 1 (November 2003) and survey 16 (September 2011). Calculated using Bray-Curtis similarity index with log transformation

6.3.5 Topography

The topography survey has investigated the shape of the bund and how it has changed through time. The 2011 survey indicated that the crest of the bund is continuing to migrate inshore and increase in height. The migration is very gradual and the loss of habitat is negligible.

The retained mudflat has continued to be colonised with marine invertebrates (worm casts and snail tracks visible) and wading birds are using the area hence the area has developed naturally and is serving its intended purpose.

6.3.6 Vegetation

No evidence of saltmarsh colonisation was observed during the most recent surveys. Creeks within the mud have continued to develop over time but no vegetation has grown in these areas. The mudflat is highly unlikely to ever be colonised with vegetation as it is some 1.5m to 2m below the optimum level for saltmarsh plants to establish (WES, 2011).

Gutweed *Enteromoprha intestinalis* was spread across the mudflats in pockets in survey 16 (September 2011) but no other species were present on site.

6.3.7 Waterfowl

In 2010/11 the peak number of birds at Trimley was the highest since the construction of the bund in 2003. There were large increases in a number of the key species, including dunlin, redshank, lapwing, avocet and shelduck which were all recorded to have the highest peak numbers either since construction or for the entire monitoring period.

Some species are consistently recorded in low numbers at Trimley including dark-bellied Brent goose, ringed plover, grey plover and wigeon. These declines are likely to be due to widespread declines across the region and not specific to Trimley. Data collected by the Suffolk Wildlife Trust (SWT, 2011) has been used to analyse trends in mean and peak numbers of waterbirds at the Trimley recharge site over the period 2000/01 to 2010/11 (Figure 6.4).

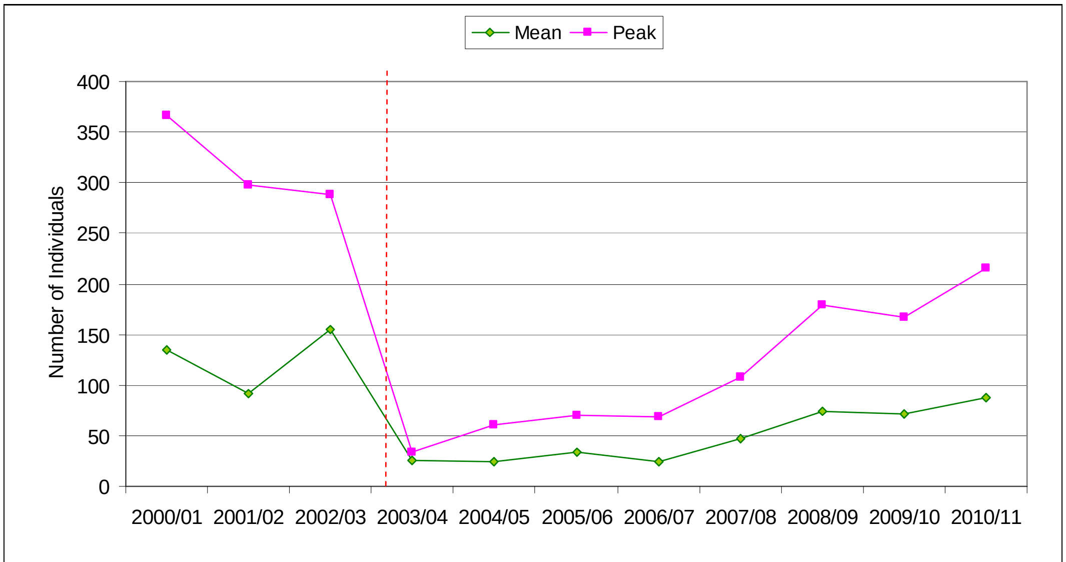


Figure 6.4 Mean and peak waterbird abundance at Trimley Recharge Site (sector 10) counted at low water, 2000/01 to 2010/11 (SWT, 2011)

6.4 Shotley Enhancement Scheme

6.4.1 Introduction

At Shotley, three reference sites (8, 10 and 14) have been included in the surveys to enable a comparison with the five recharge sites (6, 7, 9, 15 and 16).

The recharge sites are becoming more similar to the reference sites in terms of species richness, abundance and diversity, and communities have begun to stabilise after an initial boom. At the southern recharge and reference sites, drainage was noted to be variable, with large areas of ponded water.

6.4.2 Particle Size Analysis

The sediment size at north Shotley coarsened slightly in the September 2011 survey to fall under the classification of sand. The mid Shotley recharge sites recorded finer sediment after coarsening to gravel in the last survey, and the overall classification at the recharge sites was coarse silt. The mid Shotley reference sites were both classified as sand. There appears to be no correlation between the particle size at the recharge and reference sites at mid Shotley.

The sediment at the south Shotley recharge sites is coarser than at mid and north Shotley and is classified as sand, but the south Shotley reference site has the coarsest sediment of all the sites and is classified as gravel. This could be due to erosion of material and exposure of the original sandy gravel bed, as described in the topography section.

6.4.3 Benthic Invertebrate Univariate Results

Species richness

Colonisation and community development of benthic invertebrates has increased at the recharge sites since construction. The September 2011 survey showed a decrease in species richness at mid and one of the south Shotley recharge sites but an increase at north Shotley.

The species richness at the mid Shotley reference sites (8 and 10) is similar to the species richness at the mid Shotley recharge sites. Overall species richness at the south Shotley reference remains greater than that at the south Shotley recharge sites but they are becoming increasingly similar over time in terms of species richness.

Abundance

The mean abundance (number of individuals) at the Shotley sites has typically been higher at the recharge sites than the reference sites. In the latest survey (survey 16, September 2011) high abundance was recorded at site 9 (approximately 130 individuals) but at the mid Shotley recharge sites the abundance declined and was less than 20 individuals (falling from a peak of 349 at site 6). The abundance at the mid Shotley reference sites increased, particularly at site 10 with a peak of 293 individuals.

South Shotley recharge sites (15 and 16) have in previous surveys shown abundance in excess of 200 individuals however more recently abundance has been much lower (with the exception of a peak at site 15 in September 2010). The south Shotley reference site (site 14) had shown typically lower but more consistent abundance.

Diversity

The species diversity at north Shotley recharge (site 9) has supported a relatively consistent diversity of species throughout the surveys. The mid Shotley recharge sites recorded higher, but similar, diversity to site 9 in 2011. Surveys 15 and 16 (September 2010 and September 2011 respectively) indicated similar diversity at the mid Shotley reference sites to that seen at the recharge sites.

The analyses of survey 16 (September 2011) data on south Shotley recharge sites indicate an increase in diversity at site 15 compared to survey 15 (September 2010) and a decrease in diversity from the peak seen in survey 15 at site 16. Diversity at the reference site 14 has generally increased since survey 9 (September 2006) in line with the increase in species richness.

Biomass

The biomass at south Shotley reference site (which has the largest sediment size) has the greatest biomass of all Shotley sites. North Shotley and mid Shotley reference site 10 (the two most northerly sites) have greater biomass than the other mid Shotley sites. South Shotley recharge sites showed similar biomass in September 2011 to the north and mid Shotley sites. Polychaetes tend to dominate all the biomass at all sites except for at south Shotley sites where molluscs dominate.

6.4.4 Benthic Invertebrate Multivariate Results

The benthic invertebrate communities at mid and south Shotley recharge sites have displayed a temporal shift over the surveys. North Shotley recharge community structure is more comparable to the reference sites, which are typically more varied in community composition between sites and across the surveys.

6.4.5 Shotley topographical results

North Shotley sites are represented in Area 4 (sites S10 and S16) (**Figure 6.2**). Since construction the relatively soft bunds have been eroded away although some of the deposited material may have remained as bed levels still appear to be higher than that of the baseline.

At mid Shotley (Area 1) saltmarsh growth has been encouraged behind the bund since the 'topping-up'. Like the offshore bund at Trimley, the gravel crest of the retaining bund is slowly migrating inshore at some sections covering the mudflats. It was evident in 2011 that many more plants had colonised the bank crest (above the high water mark) binding the sandy gravel material and reducing the crests progress. In September 2011 drainage was occurring at section S27 via a narrow breach in the shingle bund which joins the water channel draining Area 2 (**Plate 6.1**).

The exit channel at section S19 (approximately 100m north of S21) has migrated further northwards and has been undercutting the main seawall. Some remedial works has been carried out at this point to fortify the base of the seawall with concrete and stone rubble (see **Plate 6.2**) (WES, 2011).

Plate 6.1 View south towards Area 2 showing offshore bund at S27

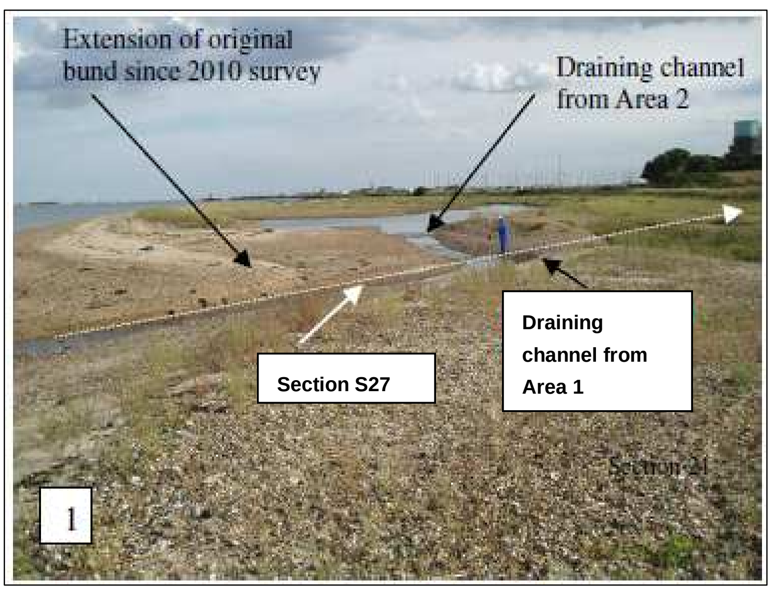
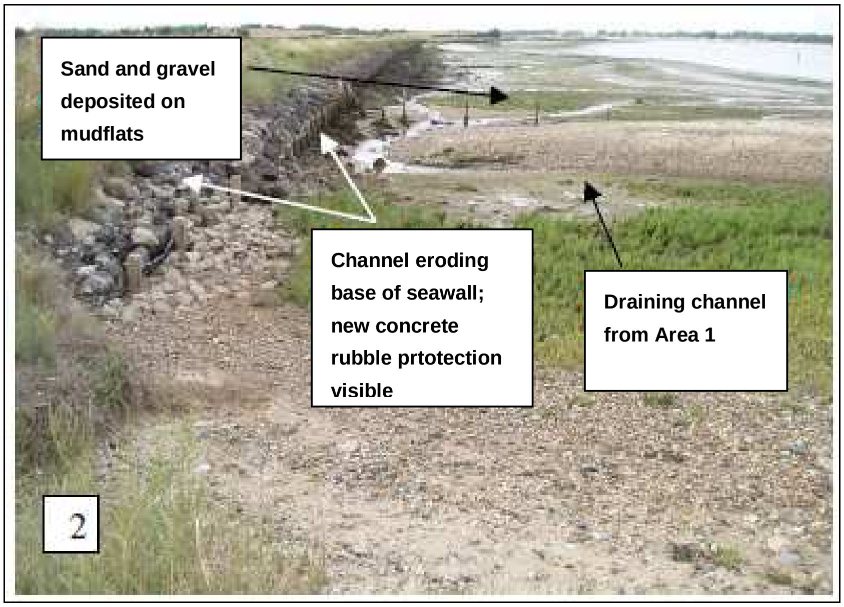


Plate 6.2 View north of Area 1 from S19



In Area 2 (A2_1 and A2_2) the grassed gravel and sand crest has remained at the same place but 'overtopping' sand has migrated some 5m westwards at section A2_2 smothering the mature saltmarsh plants.

Area 3 incorporates sites around the marina, T1, T2 and T3. This area is very exposed and soon after completion it succumbed to the effects of wave action resulting in the muddy material being washed out from behind the bunds and the bunds migrating inshore. There remains an area of sticky mud retained in the lower lagoon behind the now relatively stable offshore bund. The upper lagoon showed a few depressions which retain pools of water and have signs of habitation, such as crabs and small fish fry together with worm casts (WES, 2011).

6.4.6 Vegetation

The saltmarsh development is most prominent on the mid-Shotley recharge sites (6 and 7 on Figure 6.1). Saltmarsh vegetation has flourished in the area behind the old bund and in the 2011 survey it was noted that saltmarsh had started to colonise even the most northerly area where the waters drain back into the Orwell which has not occurred previously.

Plant colonisation in the southern bunds (recharge sites 15 and 16) has been limited to *Enteromorpha* sp. with some seaweed species such as knotted wrack *Ascophyllum nodosum*.

One of the objectives for the enhancement scheme was to create 3ha of saltmarsh habitat across the sites. The majority of the saltmarsh growth is around the mid to north Shotley sites, but it is unlikely that the target of 3ha will be reached by the end of the ten year monitoring period.

6.4.7 Waterfowl

In 2010/11 the total peak numbers of birds at Shotley was the highest since 2004/05 (Figure 6.5) and the number of species recorded was equivalent to species numbers prior to construction. However, it is likely that previous decreases at the site may not have been solely due to construction and could be attributable to more widespread declines.

Dark-bellied Brent goose were recorded in the highest numbers since 2002/03 but the overall trend appears to be stable. Lapwing, shelduck and bar-tailed godwit also increased in numbers. Dunlin, redshank, ringed plover and grey plover declined in 2010/11, however, these species are all still present at the site and the declines are in line with regional trends.

*Note; dotted line represent the construction of the bund in 2003

Figure 6.5 Mean and peak waterfowl abundance at Shotley Recharge Site (sector 30) counted at low water, 2000/01 to 2010/11 (Suffolk Wildlife Trust, 2011)

6.5 Conclusion

The Trimley and Shotley Habitat Enhancement Sites were established in 2003 and have been monitored every year since. The recharge sites on both sides of the estuary are fully functioning habitats which support a variety of benthic infauna and contribute to SPA designated habitat for overwintering birds at low tide.

The particle size at Trimley has generally remained as silty over the monitoring period, whereas the sediment on the Shotley side has become coarser over time, particularly at the south Shotley sites.

Although there has been some variation in the trends over the years, the benthic communities have increased in species richness, abundance and diversity at all recharge sites over the nine year monitoring period. Communities have become more stable at the majority of the recharge sites, in comparison to the reference sites which have shown no temporal change as would be expected from already established sites.

Saltmarsh vegetation has not become established at the Trimley recharge site but in the areas of the Shotley recharge site, saltmarsh has become increasingly abundant over the years and continues to develop each year.

Bird numbers at Trimley and Shotley fluctuate between the years as is also seen across the entire Orwell and Stour Estuaries. Although some of the recharge material may have eroded on the Shotley side, the habitat enhancement sites are achieving the objectives set out in the CMMP of providing intertidal feeding habitat, and increasing the exposure of the area for longer in the tidal cycle (particularly at Trimley).

7 SUSPENDED SEDIMENT MONITORING

Purpose: *To meet the objective of providing sediment budgets that will enable refinement of mitigating/compensating measures, if required. To ensure that turbidity levels stay within acceptable limits following ongoing dredging and sediment reintroduction activities.*

7.1 Monitoring results

No further suspended sediment monitoring has been undertaken over the last year. Results from previous years have been presented in past annual reports.

8 BIRD DISTRIBUTION AND ABUNDANCE

Purpose: *To measure the position of the Stour and Orwell Estuaries SPA relative to regional and national trends for the designated species.*

8.1 Background

The Stour and Orwell Estuaries are comprised of a range of habitats including extensive mudflats, low cliffs, saltmarsh and small areas of vegetated shingle, making them a wetland of major international importance. The estuaries provide overwintering habitat for a number of wildfowl and wader species. The estuaries are designated as an SPA and Ramsar site due to the presence of these wintering waterfowl populations. When first designated in 1992, the SPA was known to regularly support over 20,000 waterfowl and populations of a number of species which were considered to be of national or international importance[1].

High water counts are gathered as part of the Wetland Bird Survey (WeBS)[2]. The scheme has a long-running data set, with the most recent information available for surveys undertaken in 2009/10. Low water counts are also undertaken as part of the WeBS scheme, but only at larger estuaries and on an infrequent basis, approximately one winter every six years; therefore, to ensure there is a full data set which is comparable to the high water counts, the low water counts undertaken by the SWT are reported in this document.

The WeBS Alerts are reviewed every three years. The last evaluation period for the Stour and Orwell Estuaries was 2007/08; therefore the data presented for the WeBS Alerts in this section has been reported previously.

Low water count surveys of the overwintering bird populations on the Stour and Orwell estuaries are undertaken by the Suffolk Wildlife Trust (SWT) as part of the monitoring programme to assess the effects of deepening the approach channel to the Haven ports.

The results of both the high water (WeBS) and low water (SWT) counts provide a good basis for describing waterbird populations of the Stour and Orwell estuaries. This section discusses all of the currently available bird data for the estuaries available from recent reports and includes the high water counts up to and including the winter of 2009/10 (Holt *et al*, 2011) and low water counts to 2010/11 (SWT, 2011).

Figure 8.1 shows a location plan of the Stour and Orwell estuaries with place names referred to in this section.

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[1] To be classified as being of national or international importance, over 1% of the Great Britain and East Atlantic populations respectively, must be present,

[2] WeBS is a scheme run by the British Trust for Ornithology, The Wildfowl & Wetlands Trust, the Royal Society for the Protection of Birds and the Joint Nature Conservation Committee

ROYAL HASKONING

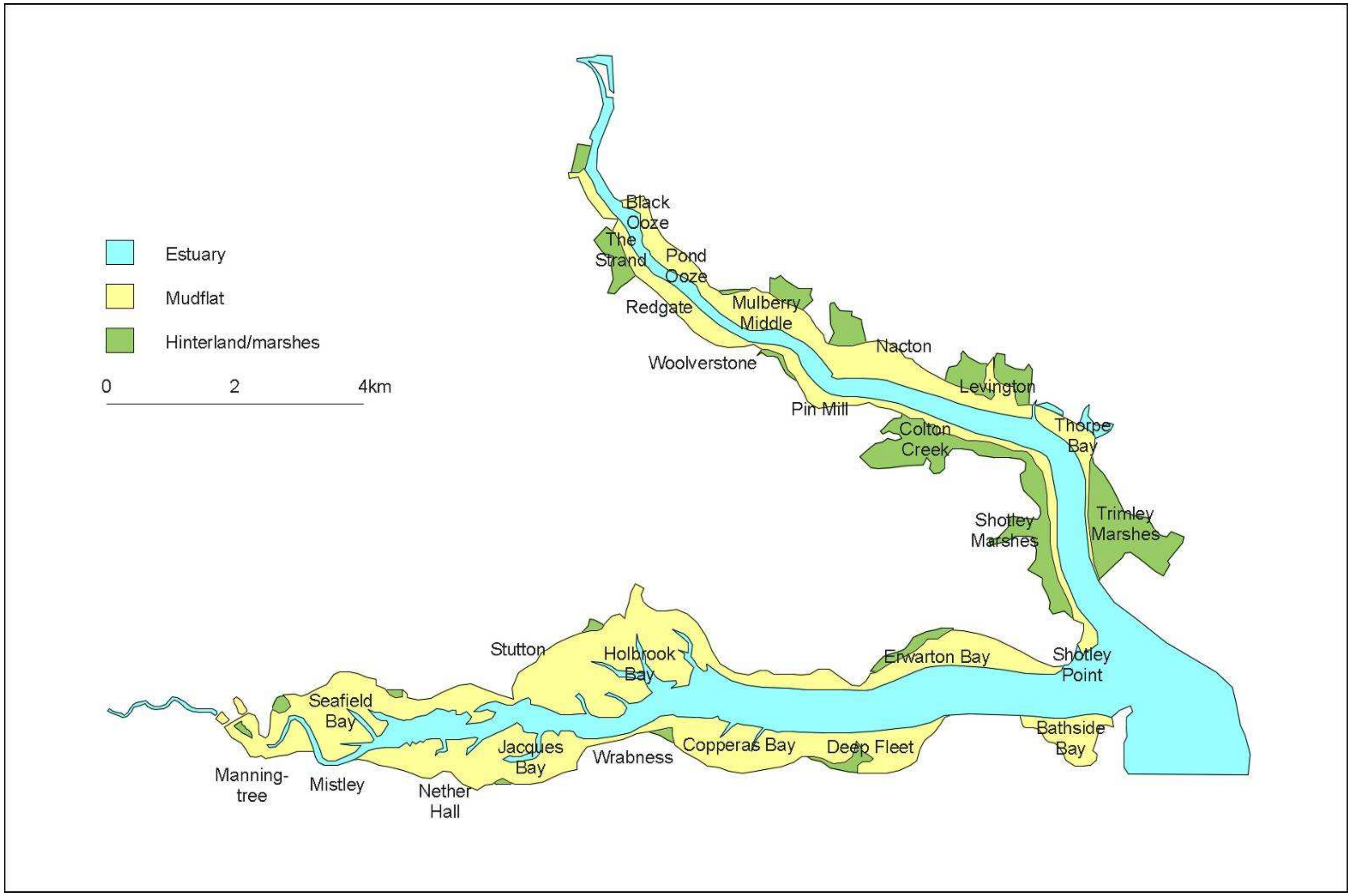

Figure 8.1 The features and place names of the Stour and Orwell estuaries at low tide

8.1.1 Weather conditions in eastern England

Bird numbers can be significantly impacted by weather conditions during the winter period. Cold weather in late December and through January and February affected water birds to varying degrees. For example, when intertidal areas freeze over, estuarine birds are unable to feed and have to move to find alternative feeding areas. During hard weather, large scale bird movement is known to occur. During extremes of weather estuaries may act as refuges for migrating bird populations. A sudden increase in numbers in a UK estuary may reflect this movement of birds from the continent.

Meteorological Office weather data is recorded in the WeBS annual report. In 2009/10 (the latest year for which WeBS data is available), the weather leading up to the winter period (July-November) was unusually warm with temperatures generally 1.5 to 2.5˚C higher than the average for that time of year. However, December was the coldest recorded since 1995, with the cold extending into January, and temperatures only returned to the expected averages in April. In addition to being particularly cold this period was also considered to be dry with many areas recording less than 50% of the typical rainfall.

8.2 High water count trends

High water data from WeBS is available up to the winter of 2009/10 (Holt *et al*, 2011). The numbers of waterfowl over the winter periods for the most recent 5 years (2005/06 to 2009/10) are presented for the Stour and Orwell Estuaries in Figure 8.2 below. Only five years of data have been included due to older data recorded by the BTO being unreliable.

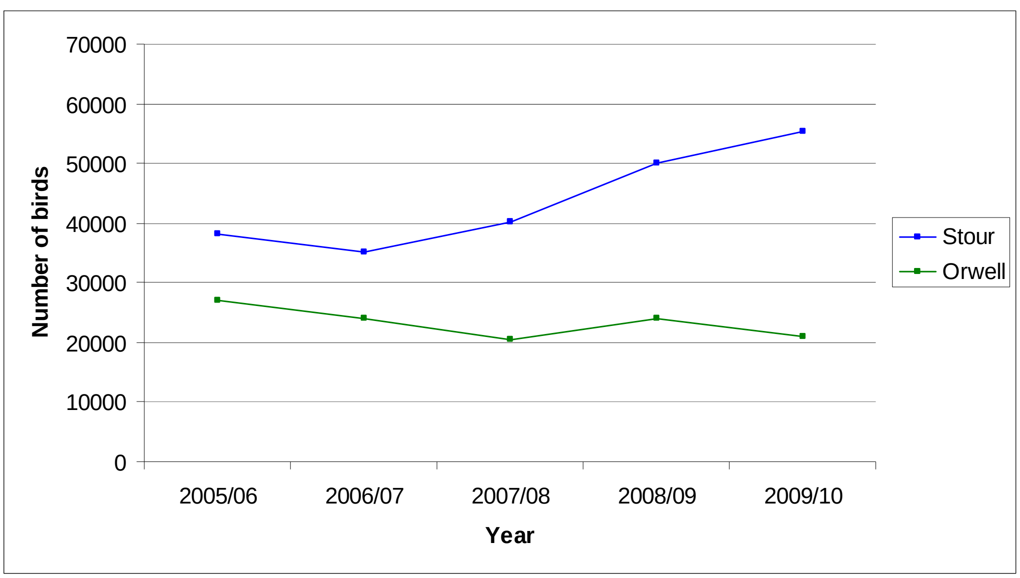

Figure 8.2 Total number of waterbirds on the Stour and Orwell estuaries (Holt *et al.*, 2011)

The two estuaries are geographically very close and it can be seen from Figure 8.2 that the rate of increase in number of birds for the Stour is greater than the rate of decrease for the Orwell (i.e. there is a net increase in bird populations for the estuary system as w whole). The Stour Estuary continuously attracts a higher proportion of the SPAs overwintering waterfowl. The number of birds recorded on the Stour has been increasing since 2006/07 with almost 20,000 more birds recorded in 2009/10 than in 2005/06.

The trend in the Orwell estuary seems to be relatively stable with little fluctuation between years. The number of birds recorded in 2009/10 was lower than those recorded in 2005/06, 2006/07 and 2008/09.

It has become apparent that the data presented in the 2008/09 WeBS Report was incorrect and the data in the 2008/09 WeBS Report was used to produce an equivalent graph to that shown in Figure 8.2 above. The author of the WeBS Report has confirmed that the data used in the most recent WeBS report is correct and this data has been used to produce Figure 8.2. This explains the difference between Figure 8.2 presented above and the equivalent graph presented in the previous Annual Report.

8.2.1 WeBS Alerts

The WeBS Alerts system was developed to provide a standardised method of identifying the direction and magnitude of changes in bird population numbers. Species that have undergone significant changes in numbers can then be flagged by issuing an Alert (BTO, 2011a). The Alerts are then reviewed every three years. The last evaluation period for the Stour and Orwell Estuaries was 2007/08. The Alerts will be reviewed following the processing of 2010/11 data. The WeBS Alerts are two years behind the WeBS core count data and three years behind the Suffolk Wildlife Trust low water data.

In summary, alerts data has been analysed for the Stour and Orwell Estuaries SPA to provide a comparison of all WeBS bird count data against regional and national trends for short-term (5 year), medium-term (10 year) and long-term (25 year or maximum available if less) timescales.

The only alerts triggered for the short-term period were for 3 species - goldeneye, grey plover and black-tailed godwit. In addition, two species (cormorant and dunlin) were considered to have natural fluctuations which would have, under normal circumstances, led to an alert. Alerts were recorded for 10 species in total over the medium term (10 years). In the longer term (25 years) only 2 alerts have been triggered (cormorant and dunlin), and many species have shown medium or high increases over this period (see Table 8.2).

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Table 8.2 Wetland Bird Survey Alerts (to winter 2009/10 inclusive) (BTO)

Species	Alert status for SPA suite GB			Alert status for Stour and Orwell SPA			
	Short term (5yr)	Medium term (10yr)	Long term (25yr)	Short term (5yr)	Medium term (10yr)	Long term (25yr)	Since design. 1994
Dark bellied Brent Goose	o	o	+	o	o	++	o
Shelduck	o	o	o	o	-	o	-
Wigeon	o	o	+	o	o	+	-
Pintail	o	o	o	o	(-)	(+)	(-)
Goldeneye	o	-	o	-	-	+	-
Great Crested Grebe	o	o	+	o	-	+	-
Cormorant	o	o	+	(-)	-	--	-
Oystercatcher	o	o	o	o	o	++	o
Ringed Plover	o	-	o	(+)	o	o	-
Grey Plover	o	-	+	-	-	++	-
Lapwing	o	o	++	o	-	++	--
Knot	o	o	o	o	+	++	+
Dunlin	o	-	-	(-)	--	-	--
Black Tailed Godwit	o	+	++	-	--	++	-
Curlew	o	o	+	o	o	+	o
Redshank	o	o	o	o	-	o	-
Turnstone	o	o	o	o	o	+	o

Symbols: - medium alert, -- high alert, + medium increase, ++ high increase, o no substantial change, ( ) indicate species prone to natural fluctuations in numbers

8.3 Low water trends

8.3.1 Suffolk Wildlife Trust report results

The objective of the Suffolk Wildlife Trust reports is to assess the low water wintering population of waterbirds and their distribution within the Stour and Orwell Estuaries SPA.

The results from the report produced in June 2011 have been used to inform this section which reports on the number of species recorded in the SPA, trends in the mean and peak numbers of each species over the winter period and provides distribution maps for these species.

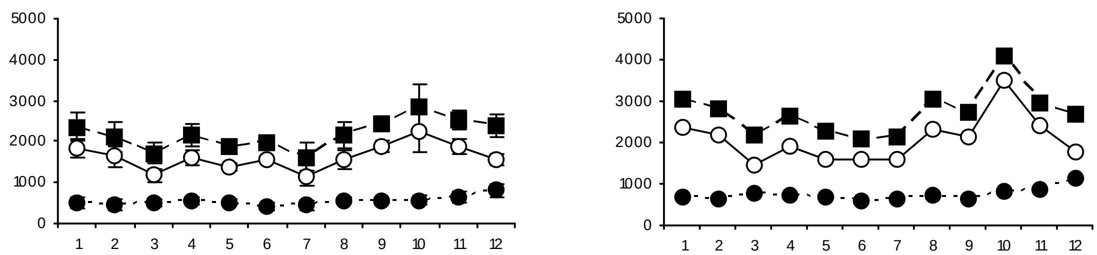
8.3.2 Species accounts

Bird distributions within the Stour and Orwell estuaries have been compared using low water data from 1999/2000 to 2009/10 to provide an indication of bird movements and usage of areas of the estuaries. The species studied were shelduck, dunlin, black-tailed godwit and redshank, as these have been previously identified as species of interest on the estuaries.

Shelduck

Declines in the SPA as a whole during the early years of monitoring were reversed from the winter of 2005/2006. However, in the last three winters declines have occurred in the SPA due to decreasing numbers on the Stour (Figure 8.3). Despite this trend for the SPA as a whole, there has been a recent positive trend on the Orwell; in 2010/2011 an average of 820 birds were present (means were 400-560 in every winter 1999/00 to 2008/09). Mean numbers in 2010/11 for the whole SPA (2377) were similar to those at the start of monitoring in 1999/2000 (2351).

Figure 8.3 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■) in winters 1999/2000 (1) to 2010/2011 (12).

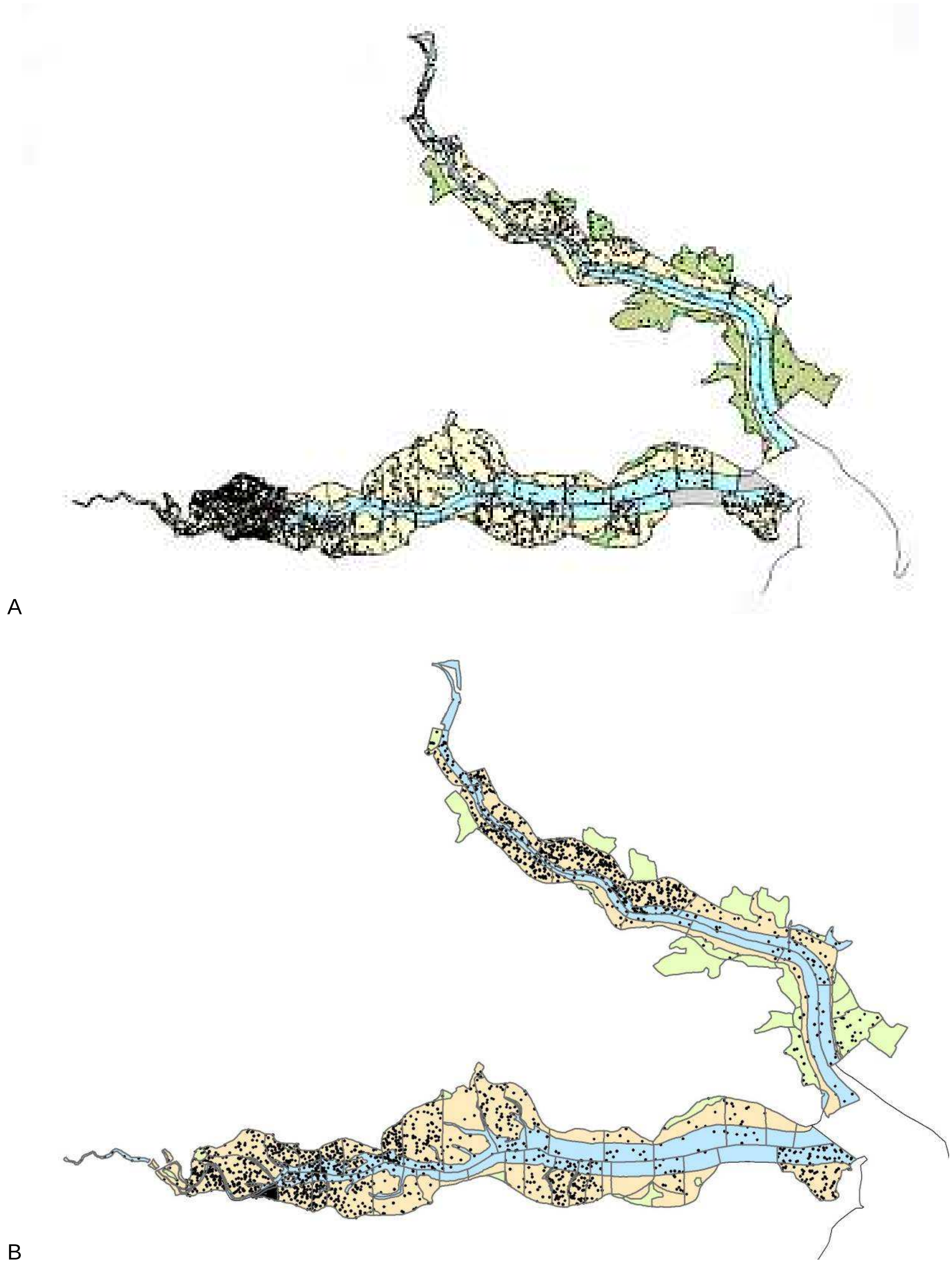


A

B

When comparing the distribution of shelduck in 1999/2000 and 2010/2011 (Figure 8.4), the species showed no particular areas of concentration on the Orwell, although there seem to be a higher density in the upper half of the estuary. On the Stour, shelduck concentrated in the upper reaches of the estuary and the larger bays of Copperas, Bradfield, Holbrook, Jacques and Bathside. Their distribution seems to have remained largely unchanged throughout the monitoring period.

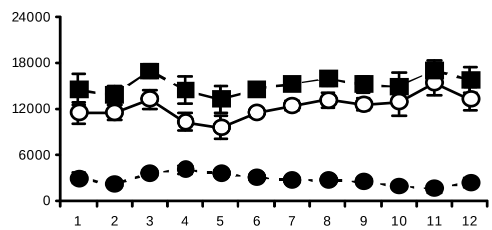
Figure 8.4 The distribution of Shelduck in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries.



Dunlin

Mean and peak numbers (Figure 8.5) increased slightly on the Orwell in recent years but the overall trend on this estuary is still in decline from the large numbers that used to winter on the estuary. Numbers dropped slightly on the Stour after the large numbers that wintered in 2009/2010, but the overall trend for the period of monitoring (1999/00-2010/11) is increasing. The SPA is also showing a weak positive trend over the monitoring period.

Figure 8.5 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■)in winters 1999/2000 (1) to 2010/2011 (12).



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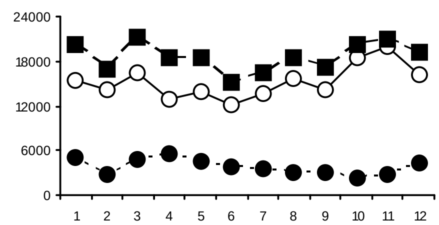
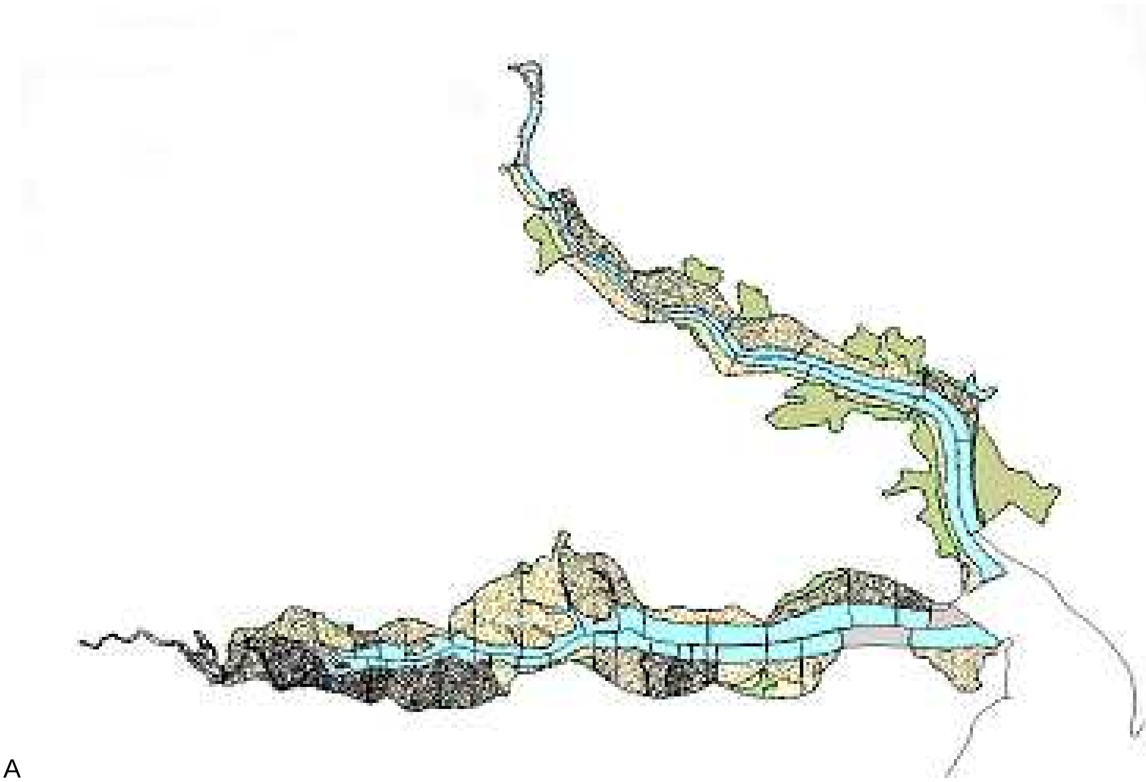


B

The birds are well distributed throughout both estuaries at low tide (Figure 8.6), although relatively few birds occur on the southern shores of the Orwell. The distribution of dunlin in 2010/2011 is similar to that in 1999/2000 in that birds are distributed throughout the two estuaries.

Figure 8.6 The distribution of Dunlin in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries.



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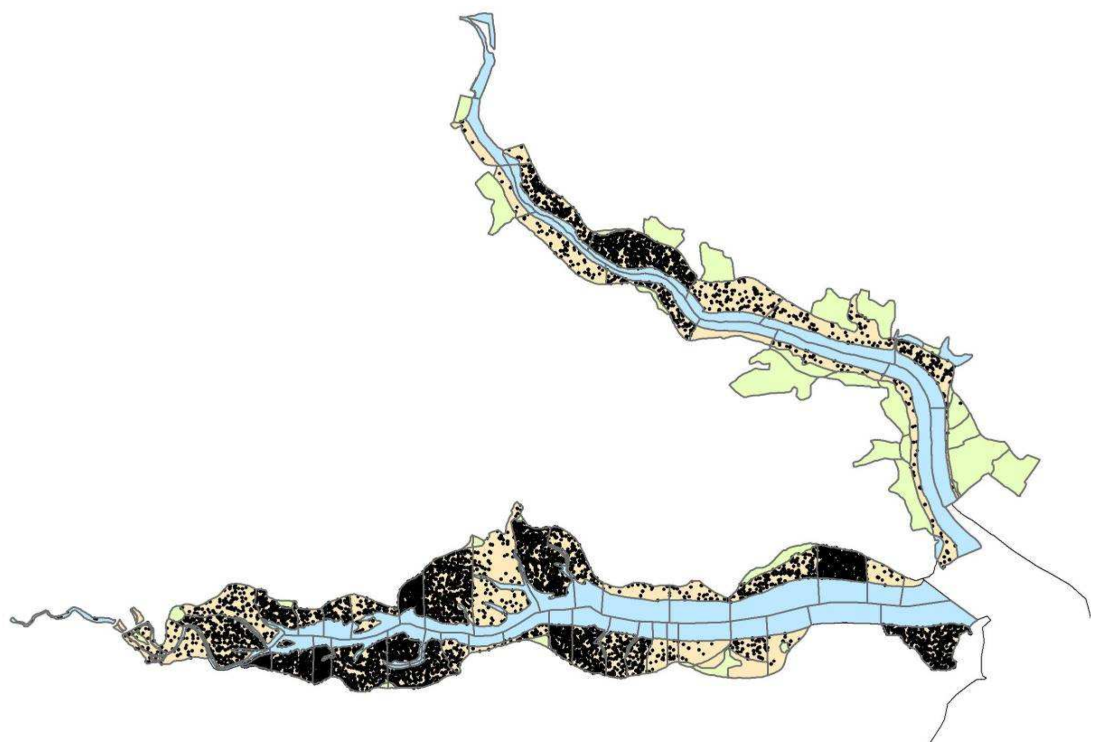
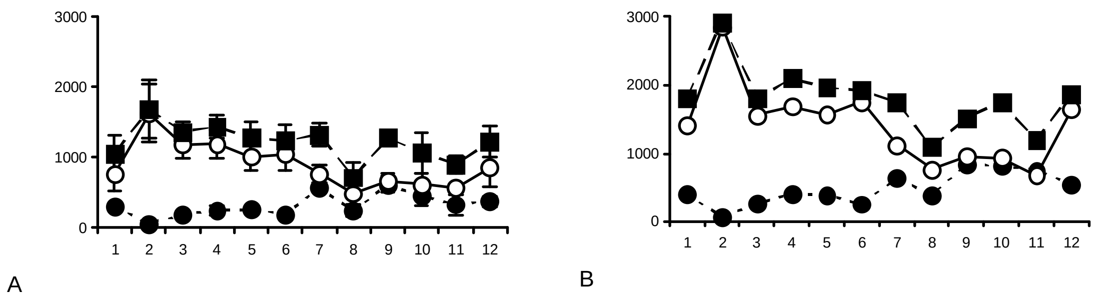


B

Black-tailed godwit

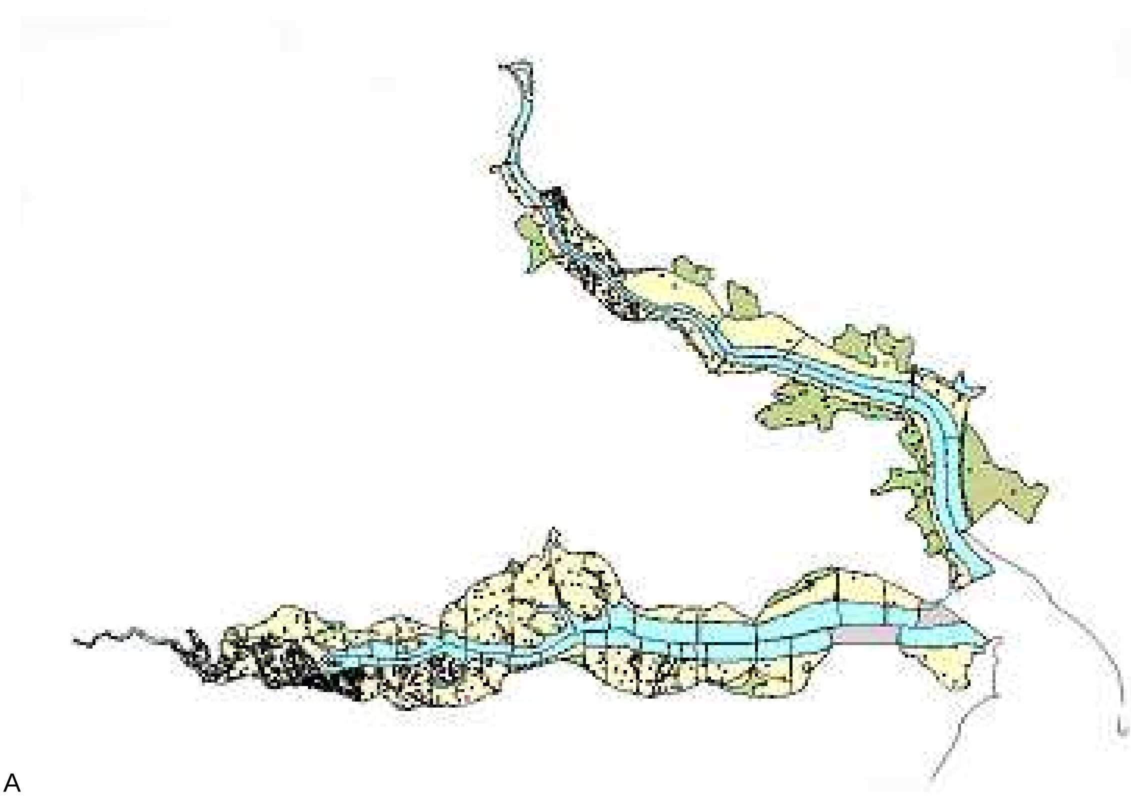
Numbers of black-tailed godwit increased on the Stour from the previous winter (Figure 8.7), resulting in an overall increase in numbers for the SPA for the winter of 2010/2011 compared with recent winters, although the overall longer term trend is one of decline. While the mean number of birds on the Orwell has been fairly stable for the last four winters the peak numbers, for the same period, showed a decline.

Figure 8.7 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■)in winters 1999/2000 (1) to 2010/2011 (12).

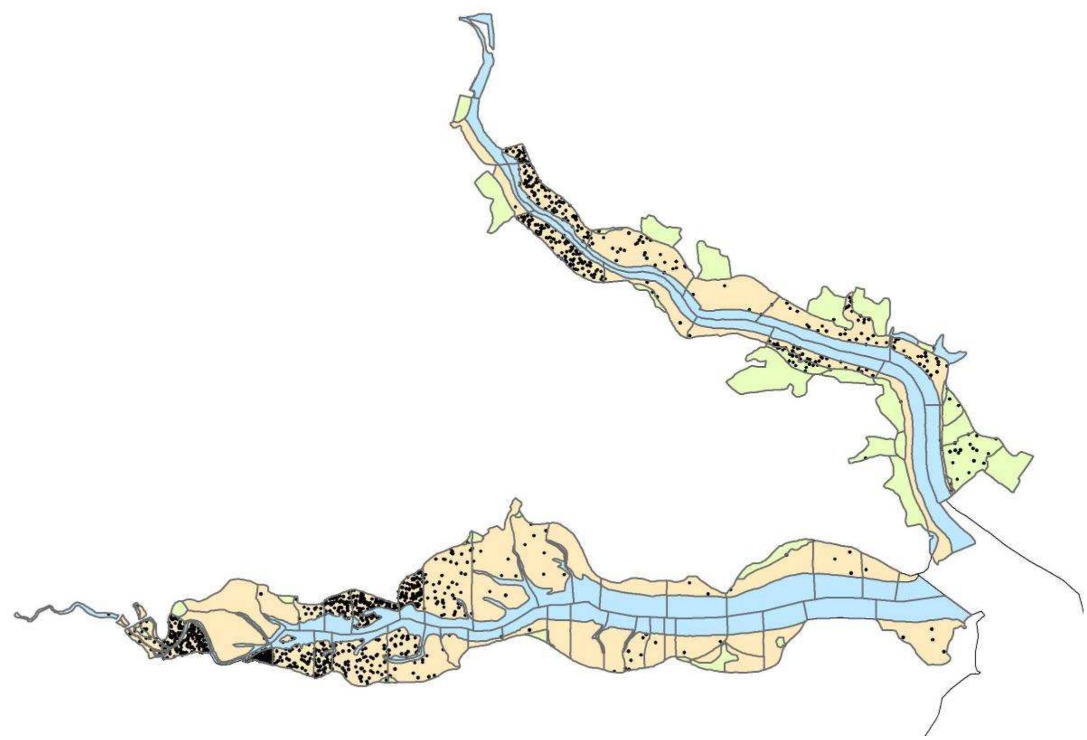


It can be seen from Figure 8.8 that the population is concentrated at the head of the Orwell. On the Stour, black-tailed godwit also appears to have become restricted to the head of the estuary and, as in recent winters, most birds occurred on the Mistley foreshore in 2010/2011.

Figure 8.8 The distribution of Black-tailed godwit in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries.



A

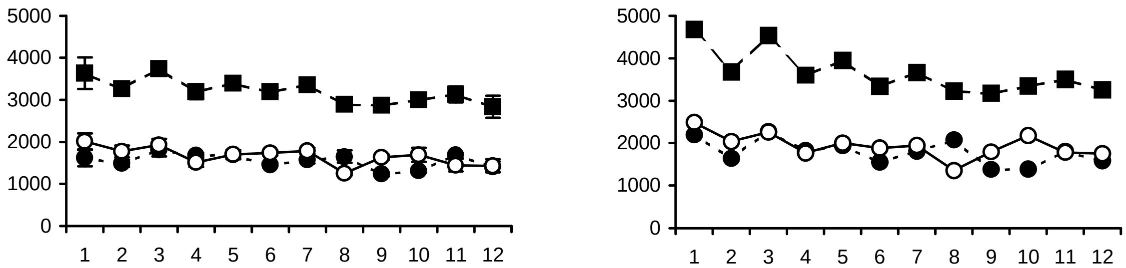


B

Redshank

There has been an overall decline in both mean and peak numbers (Figure 8.9) of redshank in the SPA since monitoring began and the numbers in 2010/2011 continued this trend. A decline (1999/00 – 2010/11) in the number of birds on the Stour is clear from the graphs below which is mirrored on the Orwell.

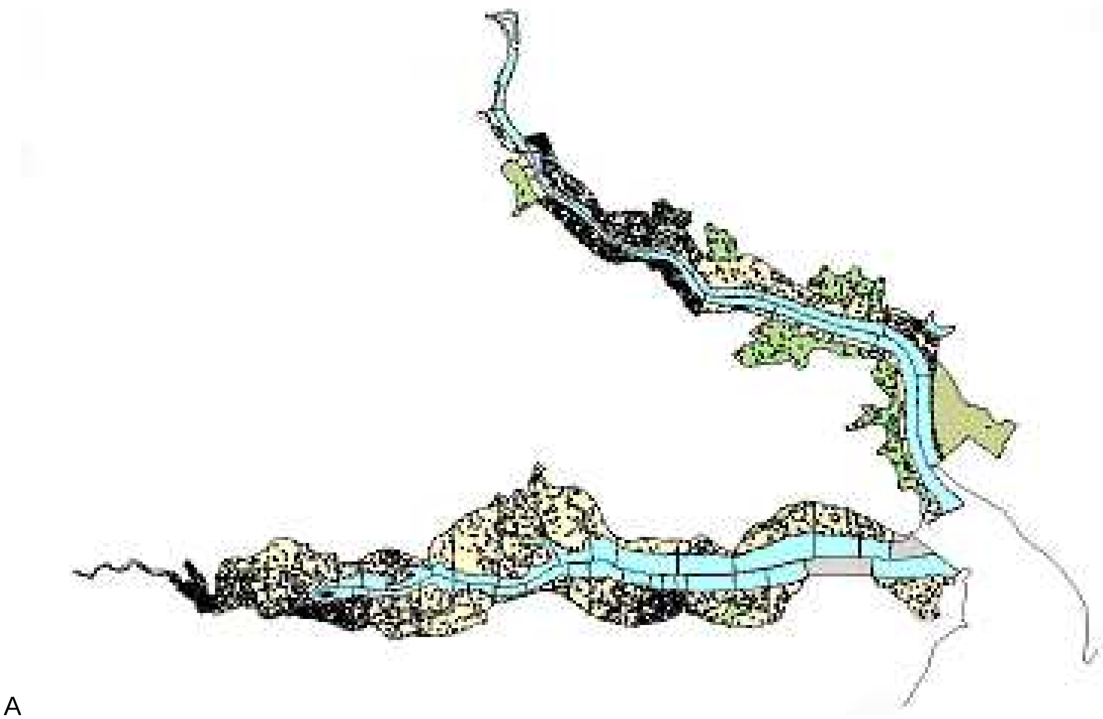
Figure 8.9 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■)in winters 1999/2000 (1) to 2010/2011 (12).



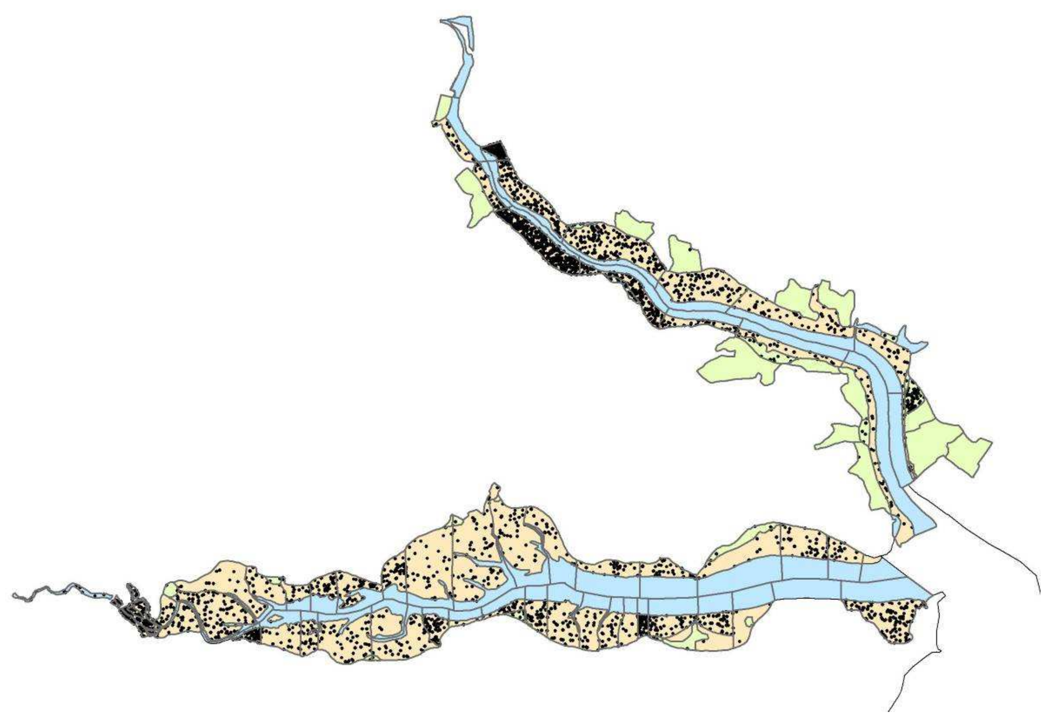
A B

Redshank is well distributed on both estuaries and the decline in numbers does not appear to be concentrated in any particular areas of the estuaries (Figure 8.10), although, as in previous winters, there are perhaps indications of a particular reduction in usage of parts of the mid and upper Stour.

Figure 8.10 The distribution of Redshank in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries.



A

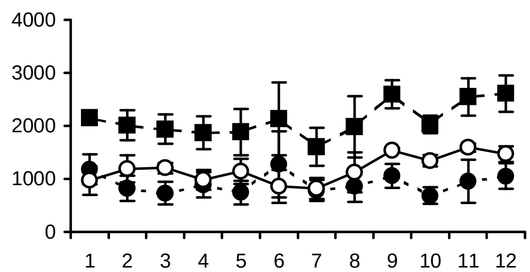


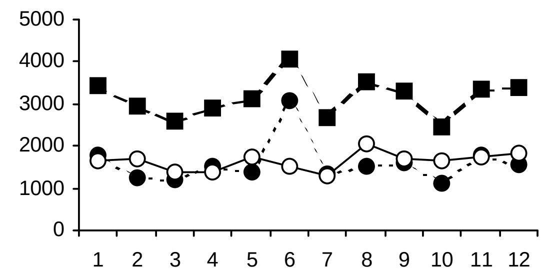
B

Brent Goose

The population has been fairly stable in the SPA with approximately 2000 birds since 1999 (Figure 8.11a), usually split about equally between the two estuaries. Within the last four winters, however, including 2010/2011, larger numbers have been wintering on the Stour (Figure 8.11b), while the Orwell population has remained stable, leading to a small increase in the mean SPA population (2500 birds).

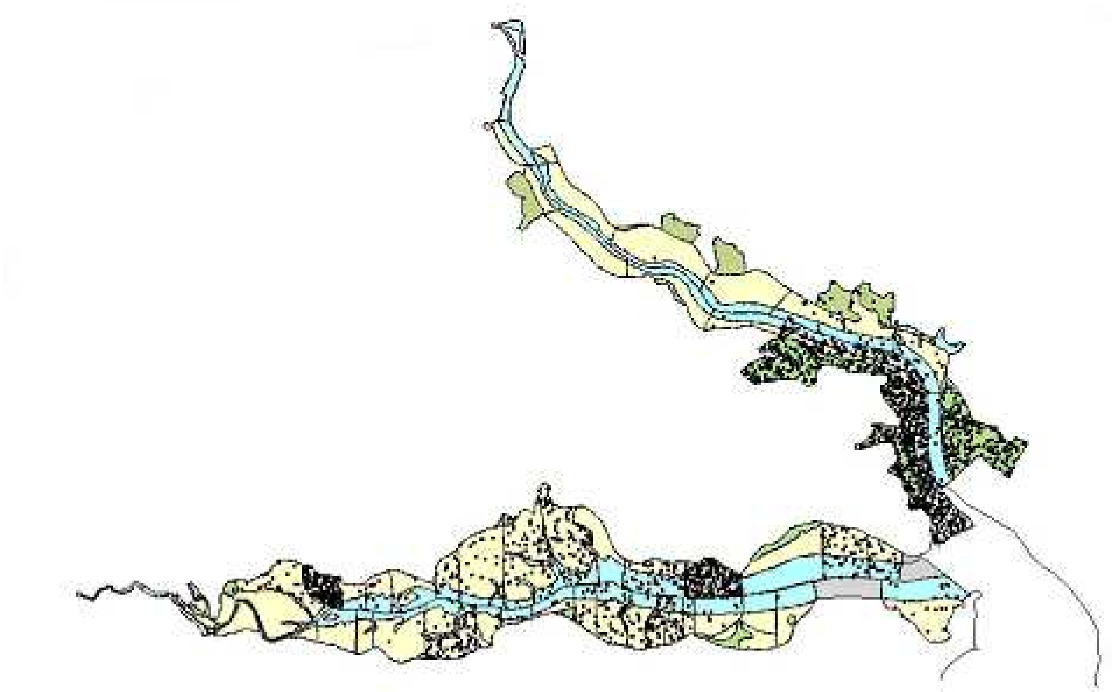
Figure 8.11 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■)in winters 1999/2000 (1) to 2010/2011 (12).



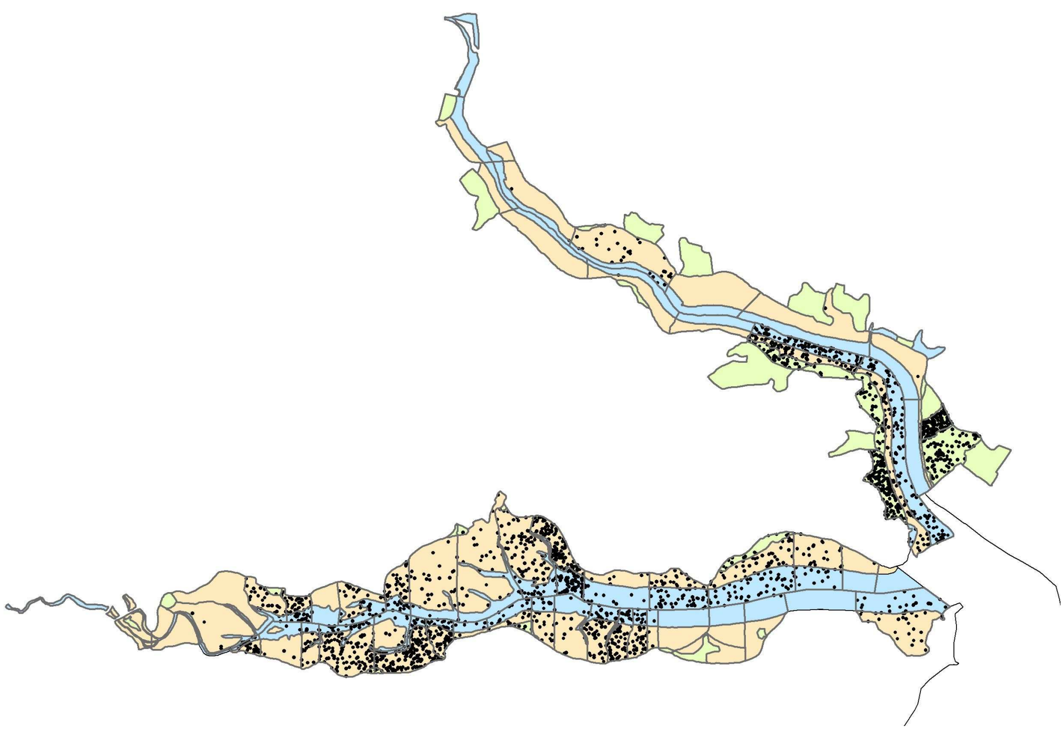


Similarly to 2009/2010 (Figure 8.12), few birds used Bathside Bay in the Stour in 2010/2011, where they have been frequent in previous winters. Otherwise, the distribution of geese has been fairly consistent – concentrated in the lower reaches of the Orwell (especially Shotley Marshes and Thorpe Bay) and throughout the Stour.

Figure 8.12 The distribution of Brent goose in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries.



A

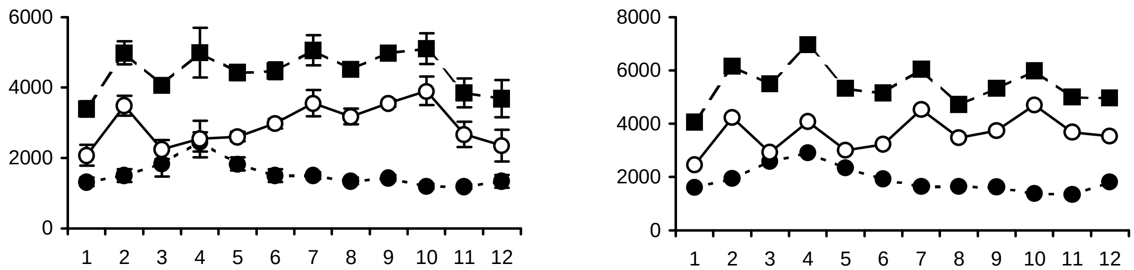


B

Wigeon

Numbers dropped for the second consecutive winter on the Stour, negating the positive trend seen in previous years, and numbers in 2010/2011 were similar to the start of monitoring (Figure 8.13). Numbers on the Orwell were higher in 2010/2011 compared with the previous winter, and similar to 1999/2000.

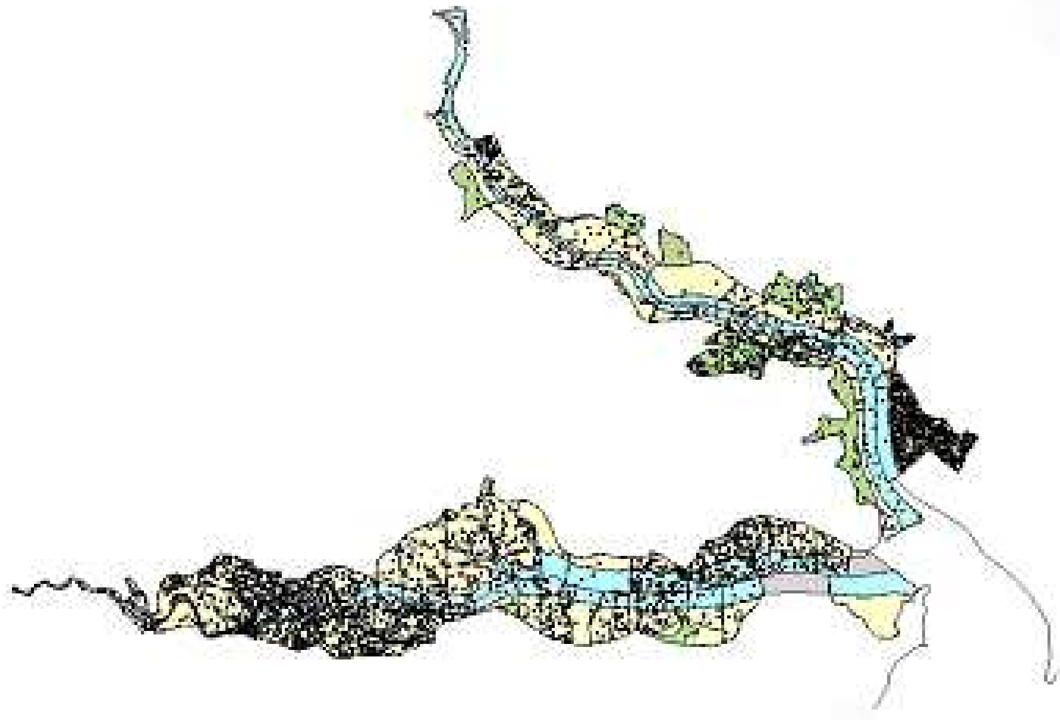
Figure 8.13 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■)in winters 1999/2000 (1) to 2010/2011 (12).



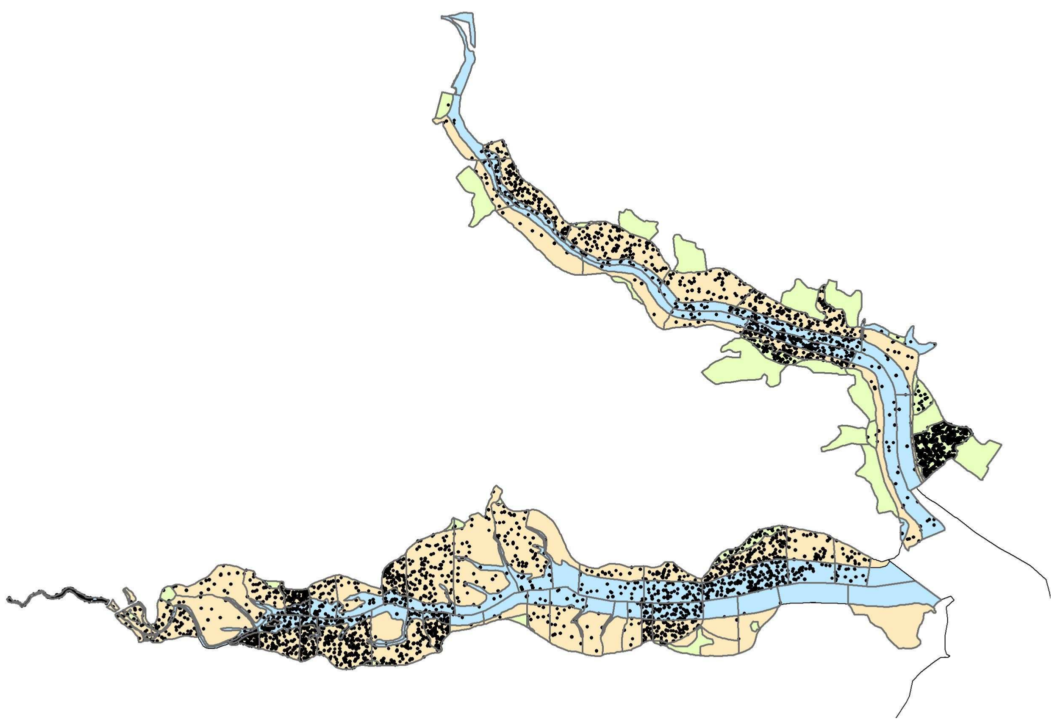
a **b**

Distribution on both estuaries has not changed significantly and the majority of the birds frequent Trimley Marshes on the Orwell, the mudflats and saltmarsh around Colton Creek, Hare's Creek and Jill's Hole on the southern shore, with smaller numbers of birds along the Nacton foreshore. On the Stour, the upper reaches of the estuary are favoured: Jacques Bay, Seafield Bay and Mistley and Stutton foreshores, and concentrations occur consistently at the mouth of the estuary on the northern shore in Erwarton Bay (Figure 8.14).

Figure 8.14 The distribution of wigeon in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries.



A

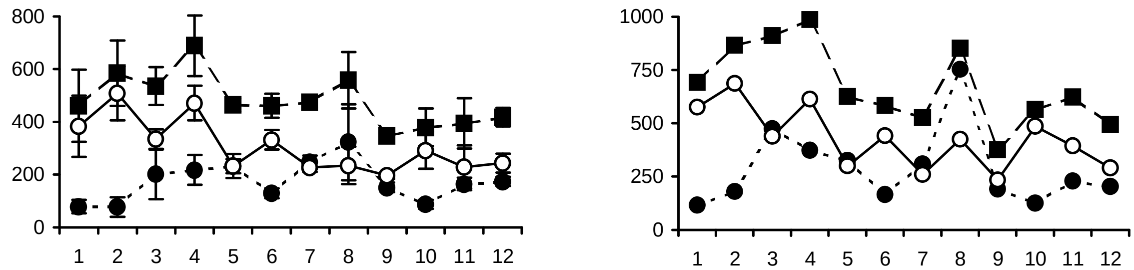


B

Pintail

The decline in peak numbers recorded on the Stour in the previous winters continued in 2010/2011 and given the peak count on the Orwell was similar to the previous winter, the Stour count resulted in a decline in peak number recorded for the SPA as a whole (Figure 8.15). In the first four winters of monitoring, mean numbers of 300-500 birds occurred on the Stour (peak 686), but in recent winters numbers have been 200-300 birds (mean 243 and peak 290 in 2010/2011). It should be noted, however, that a trend of increased mean numbers of pintail over the last four winters is apparent for the SPA as a whole.

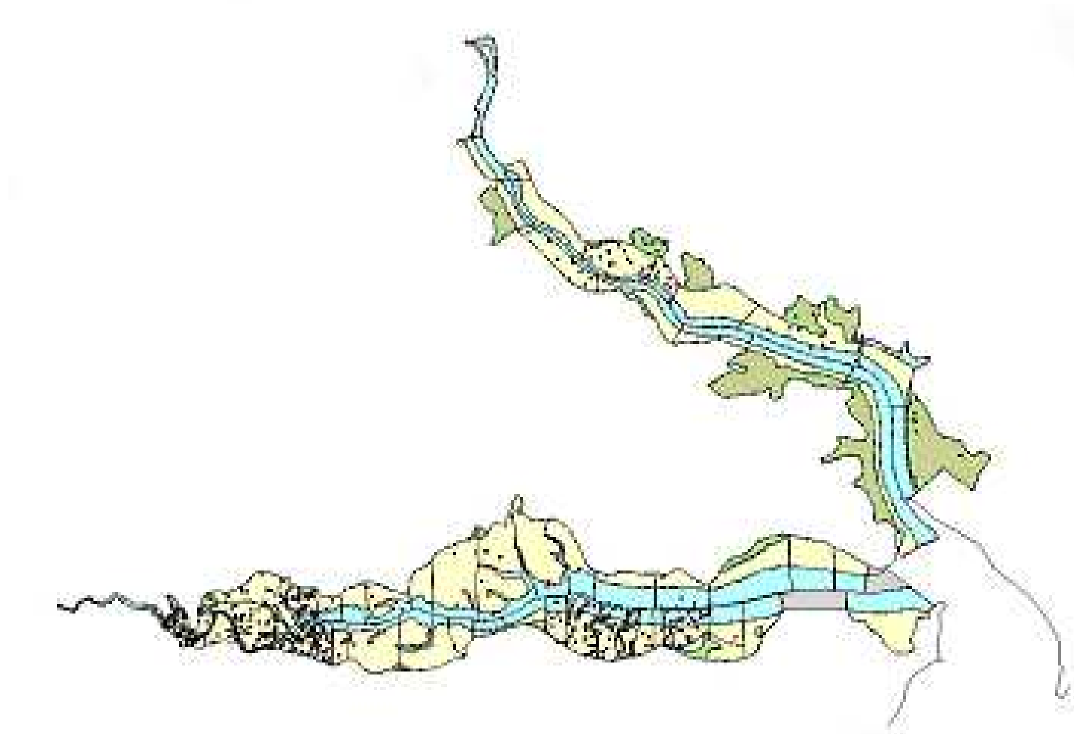
Figure 8.15 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■)in winters 1999/2000 (1) to 2010/2011 (12).



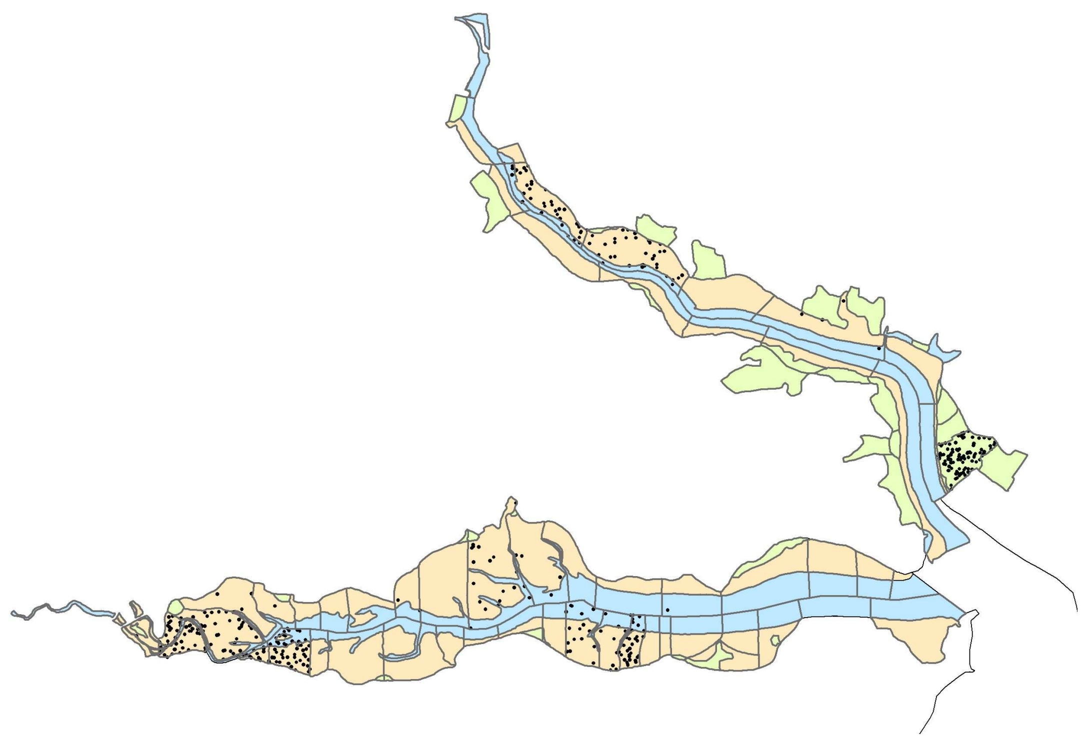
a b

The changes in distribution of birds in the SPA noted in 2009/10 were also apparent this winter. On the Orwell, most birds occurred on Trimley Marshes with small numbers on Pond and Black Ooze and Mulberry Middle and very few on Nacton foreshore (Figure 8.16). Within the Stour, birds were once again relatively scarce in Copperas Bay where large numbers occurred regularly during the first 10 winters of monitoring, and most birds occurred on the Mistley foreshore.

Figure 8.16 The distribution of pintail in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries.



A

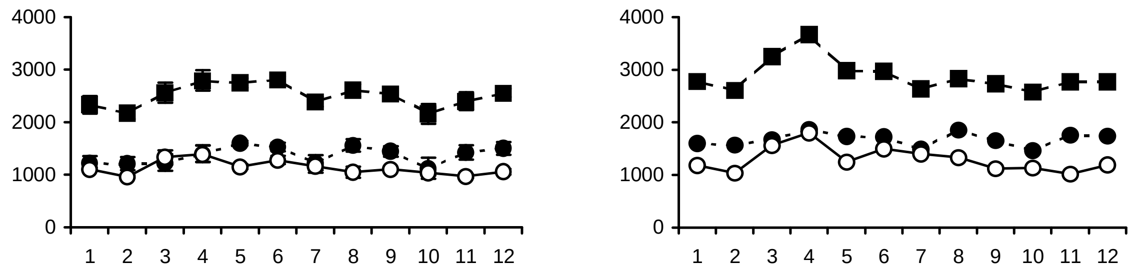


B

Oystercatcher

The mean winter numbers have been stable in the SPA since 1999/2000 (Figure 8.17a) at between 2160 and 2806 birds and this was unchanged in 2010/2011 (mean 2556 peak 2774 birds). Peak numbers also appear consistent on both estuaries (Figure 8.17b).

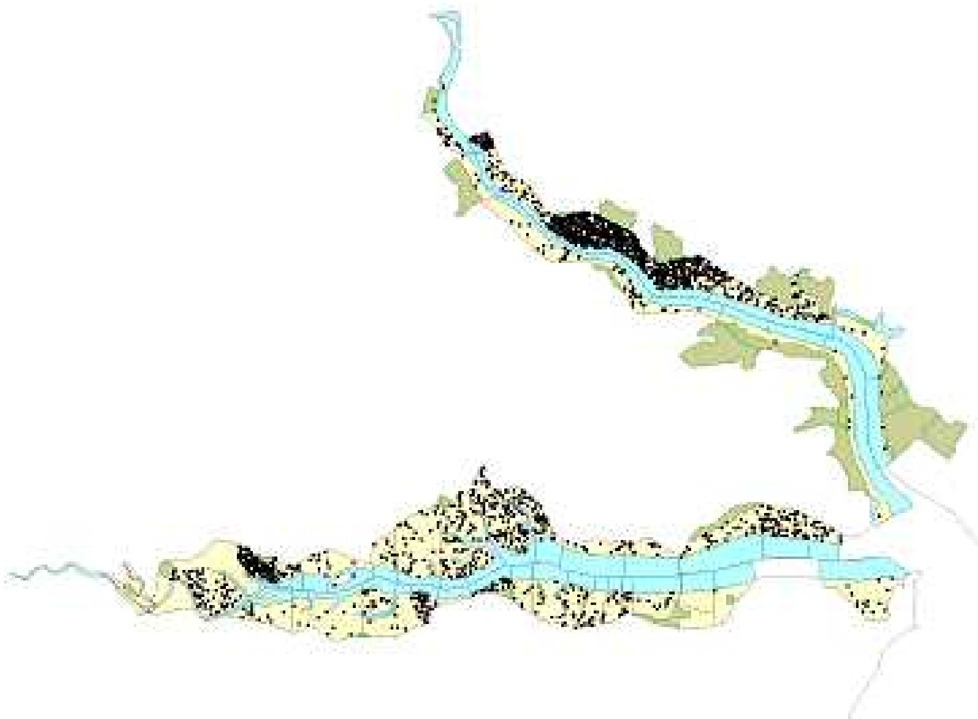
Figure 8.17 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■)in winters 1999/2000 (1) to 2010/2011 (12).



a b

The majority of the birds on the Orwell winter in the upper reaches, especially along the northern (Mulberry Middle and Pond Ooze). Birds are distributed widely in the Stour, and notable concentrations occur in the larger bays. Distribution appears not to have altered since monitoring started (Figure 8.18).

Figure 8.18 The distribution of oystercatcher in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries.



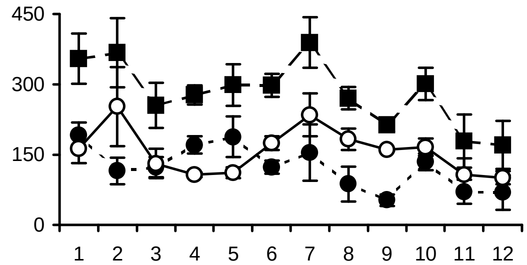
A

B

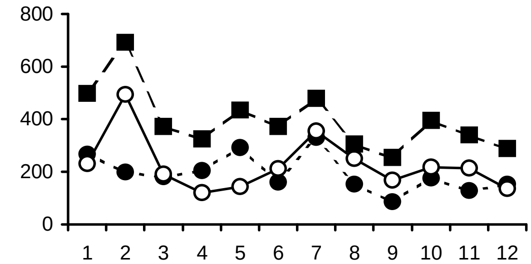
Ringed Plover

The recent trend of decrease in peak and mean numbers for the SPA continued in 2010/2011 (Figure 8.19). Decreases in mean numbers on both estuaries in winter 2010/2011 was reflected in the SPA population data, and although peak numbers increased on the Orwell compared with the previous winter, a decline on the Stour resulted in a continued overall decrease in peak numbers for the SPA as a whole.

Figure 8.19 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■)in winters 1999/2000 (1) to 2010/2011 (12).



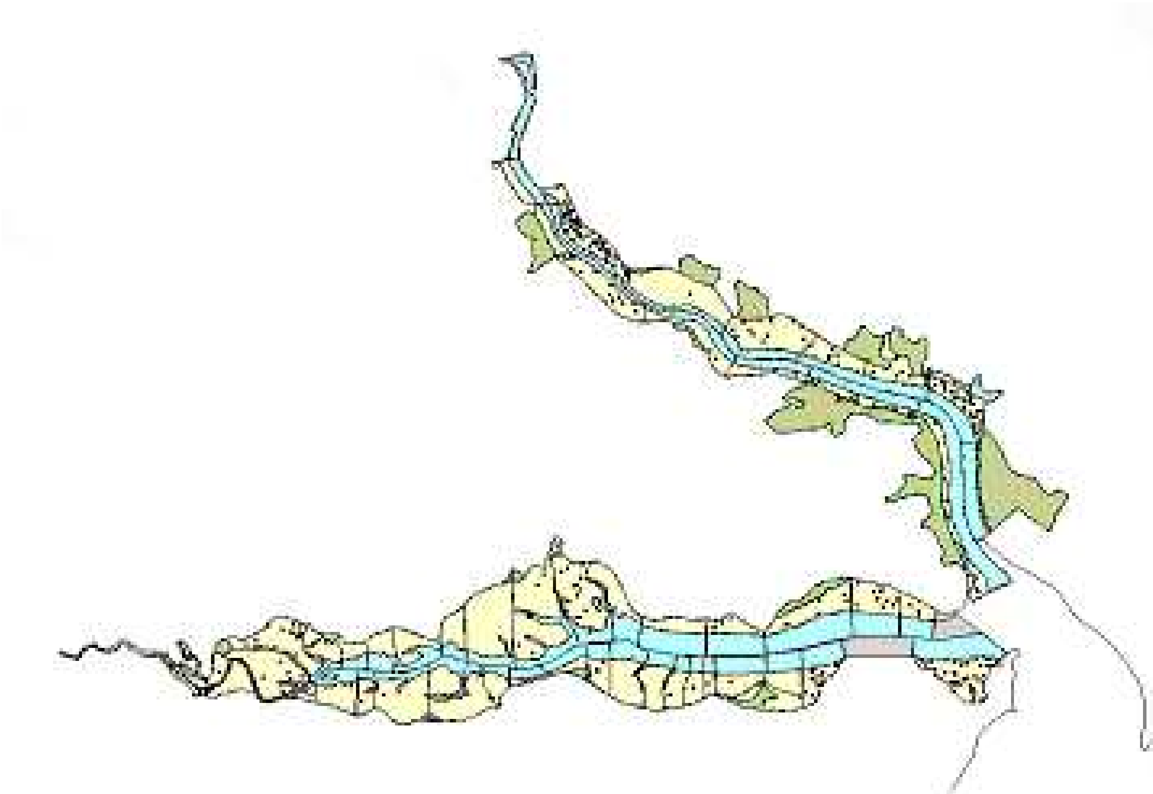
a



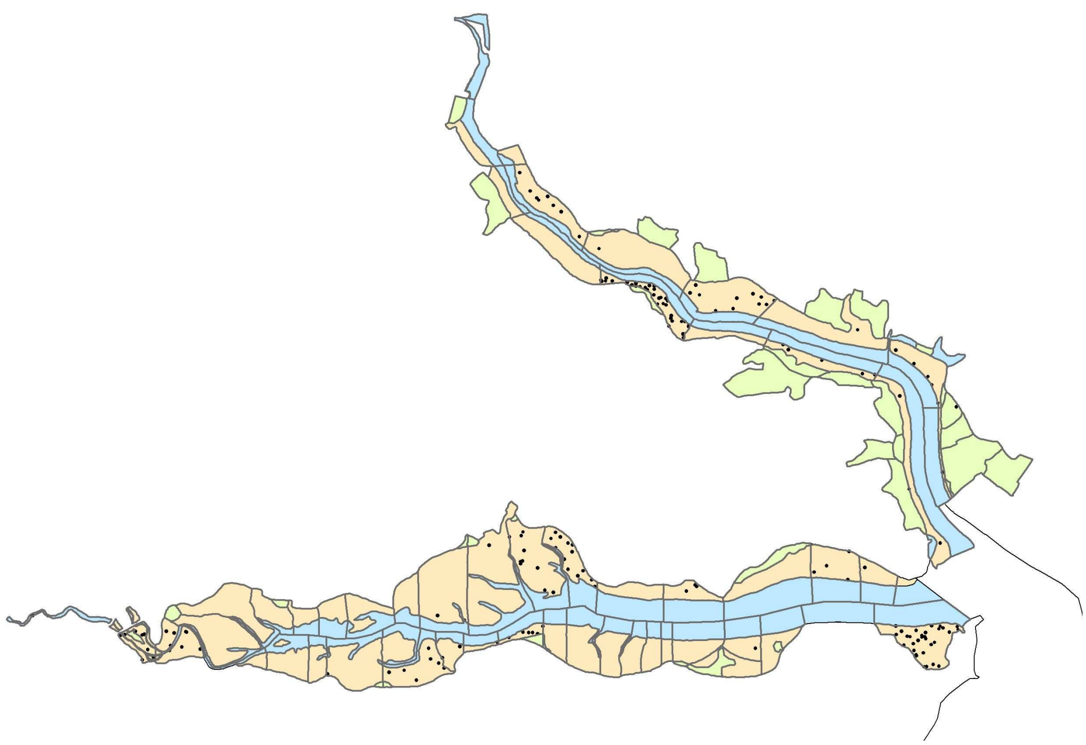
b

Bird distribution was scattered throughout both estuaries, but in 2010/2011 practically all birds of the Orwell occurred on the Pin Mill shore (Figure 8.20). Once again, birds were largely absent from the uppermost mudflats of the Orwell around Pond and Black Oozes. On the Stour, the only notable numbers were in Bathside Bay.

Figure 8.20 The distribution of ringed plover in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries



A

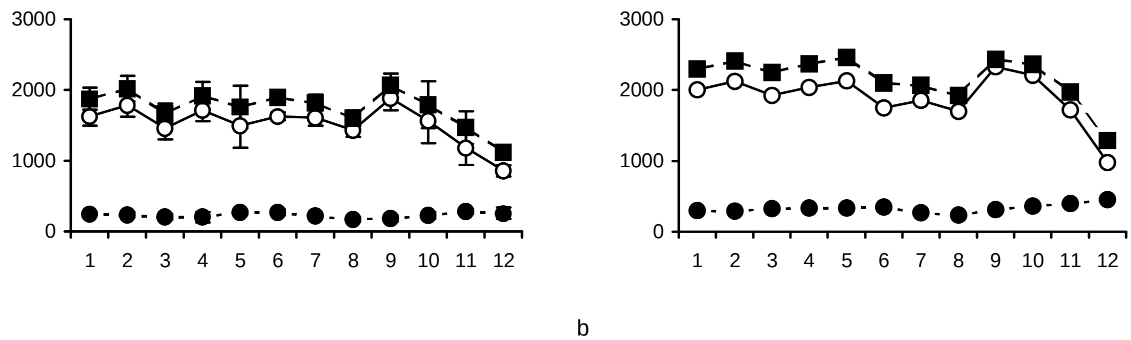


B

Grey Plover

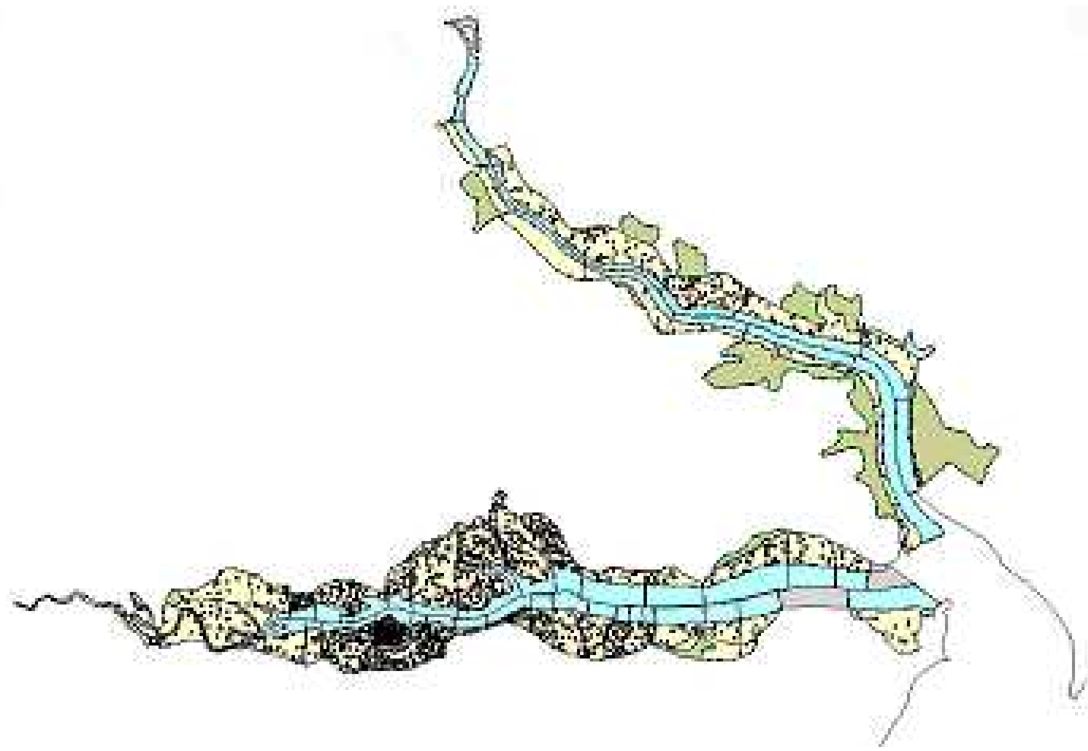
A drop in the population of the SPA recorded in 2009/2010 continued in 2010/2011 due to continued decreases in mean and peak numbers on the Stour (Figure 8.21). Previous to this, the population of the SPA was stable with winter means of 1700-2000 birds and winter peaks of 1900-2400 birds. In 2010/2011 the winter mean was 1116 birds and the winter peak 1288 birds. However, the increase in mean and peak numbers recorded in recent winters on the Orwell continued in the winter of 2010/2011.

Figure 8.21 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■) in winters 1999/2000 (1) to 2010/2011 (12).



The large drop on the Stour appears concentrated in Holbrook Bay, and to a lesser extent Copperas and Jacques Bays. A peak of only 146 birds was recorded in Holbrook Bay compared with counts approaching 1000 birds earlier in the monitoring programme. As a result, birds appeared relatively evenly spread on the estuary in 2010/2011 compared with previous winters when they were concentrated in mid-estuary (Figure 8.22). On the Orwell, birds used to be well-spread along the estuary, but their distribution has become strongly mid-estuary in recent winters, being concentrated primarily on Nacton foreshore and Mulberry Middle, and this pattern was repeated in 2010/2011.

Figure 8.22 The distribution of grey plover in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries



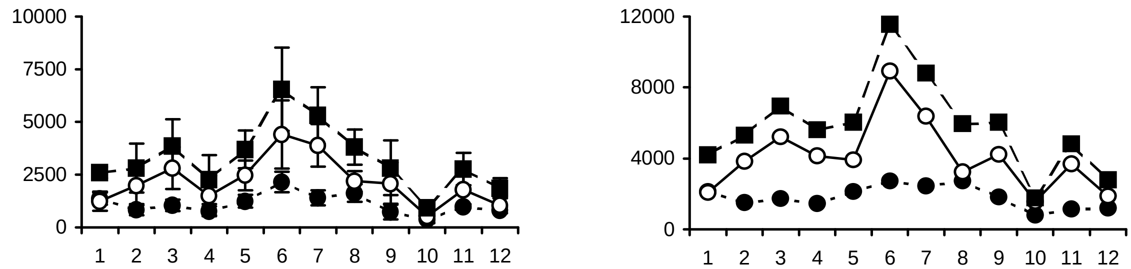
A

B

Lapwing

After large peaks in the population of the SPA in the mid 2000s, particularly on the Stour, both mean and peak numbers remained low in 2010/2011 (consistent with recent winters) (Figure 8.23).

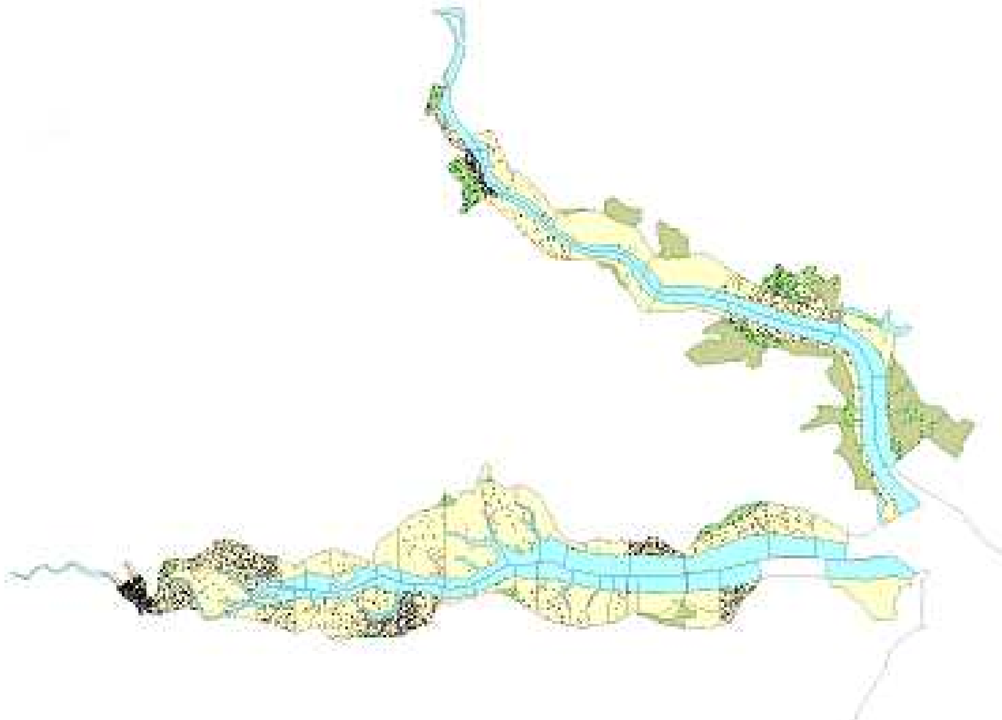
Figure 8.23 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■)in winters 1999/2000 (1) to 2010/2011 (12)..



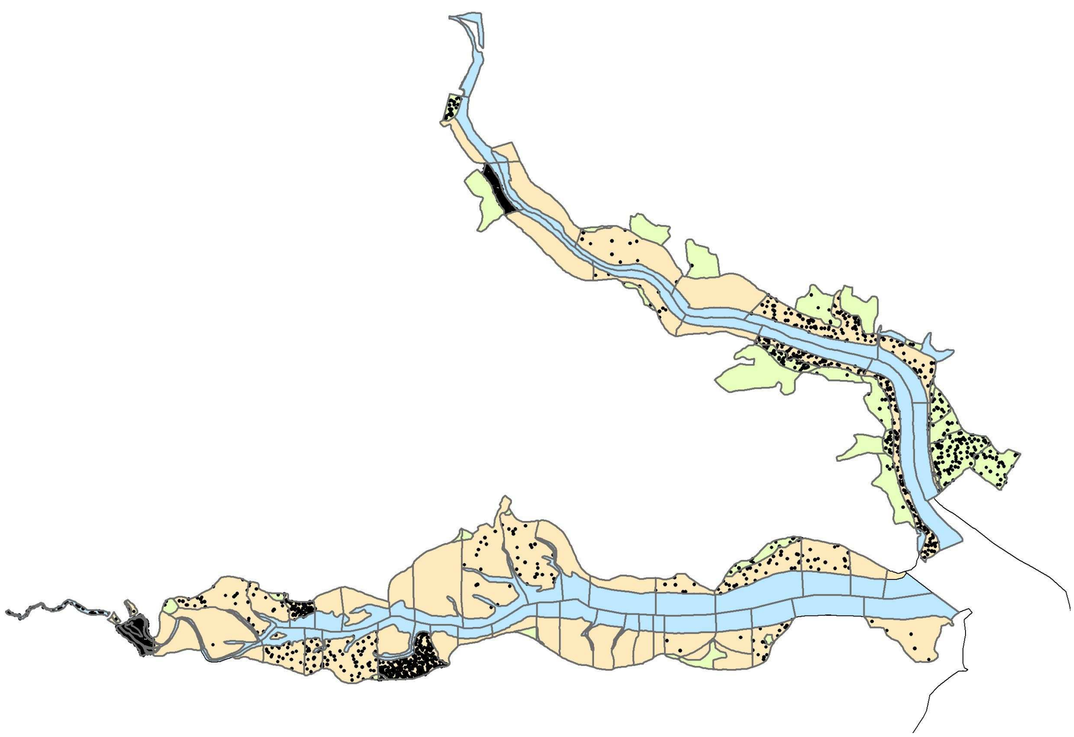
a b

Despite the large variation in numbers, the distribution of birds in the SPA has remained much the same with concentrations of birds in each estuary – in Jacques Bay, Seafield Bay, around Erwarton bay and at the head of the estuary on the Stour, and on the Strand, Trimley Marshes and Levington on the Orwell (Figure 8.24).

Figure 8.24 The distribution of Lapwing in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries



A

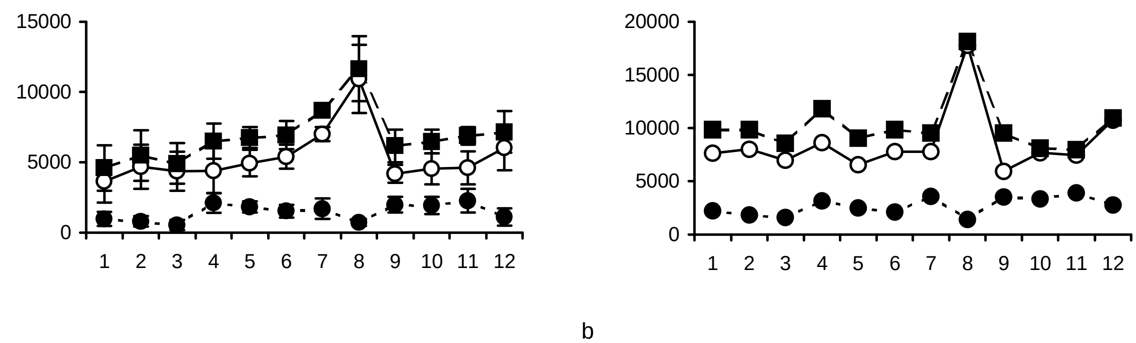


B

Knot

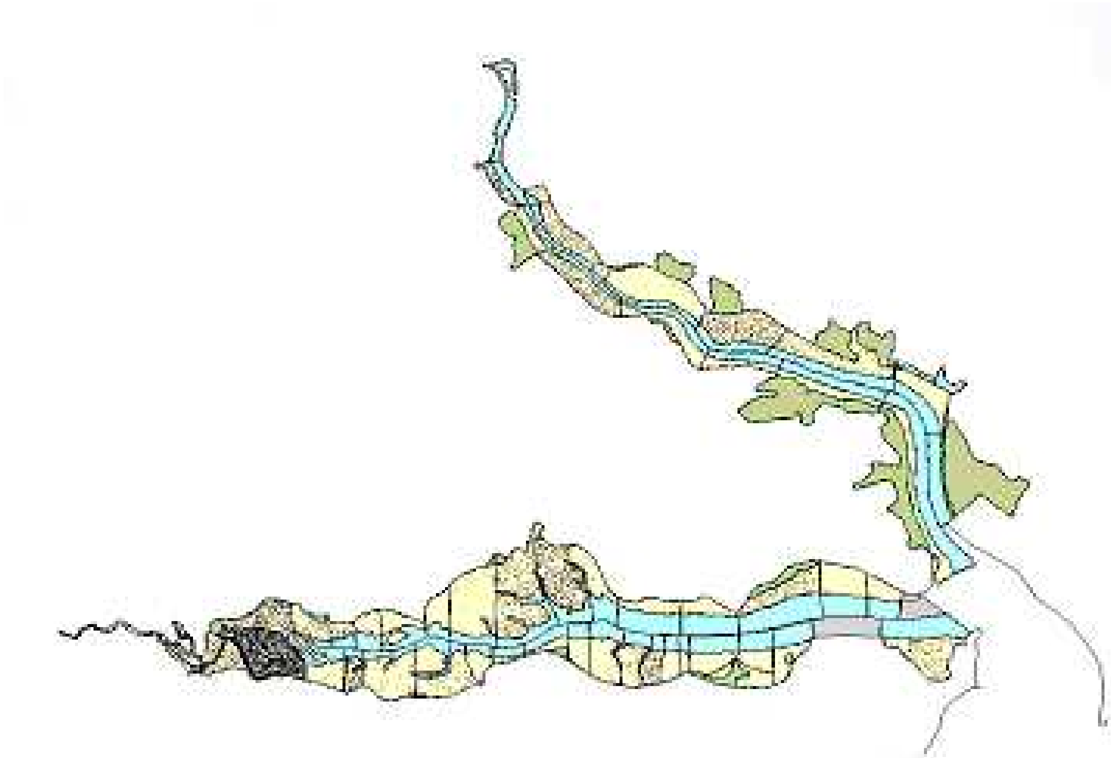
After several winters of increase on the SPA (from a mean population of 4591 birds in 1999/2000 to 11655 in 2006/2007) numbers have dropped to means of 6000 - 7000 birds in the last four winters, but overall the trend is still one of increase in the SPA (Figure 8.25). Practically all this variation has been caused by fluctuations in numbers on the Stour – numbers on the Orwell have increased steadily from a mean population of 956 birds in 1999/2000 to 2268 in 2009/10, although they dropped to 1117 in 2010/2011.

Figure 8.25 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■)in winters 1999/2000 (1) to 2010/2011 (12).



As in most winters, birds were concentrated on the wider mudflats of both estuaries in 2010/2011: Holbrook, Jacques, Bathside, Erwarton and especially Seafield Bays on the Stour, and Nacton and Mulberry Middle on the Orwell (Figure 8.26).

Figure 8.26 The distribution of knot in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries



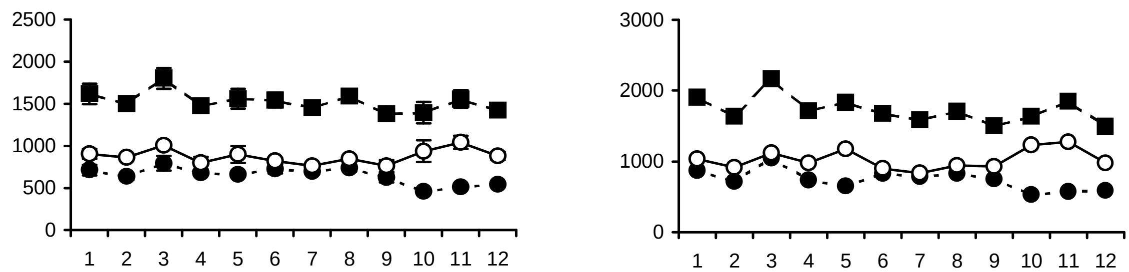
A

B

Curlew

After three winters of relatively low numbers, a decreasing trend was apparent for the first time on the Orwell over the monitoring period (Figure 8.27). Mean numbers were 450-540 over the last three winters compared with 650-800 previously. Numbers on the Stour have remained stable over the monitoring period, but a decrease in mean and peak numbers on the Stour in the winter of 2010/2011 was reflected in a weak decline on the SPA overall.

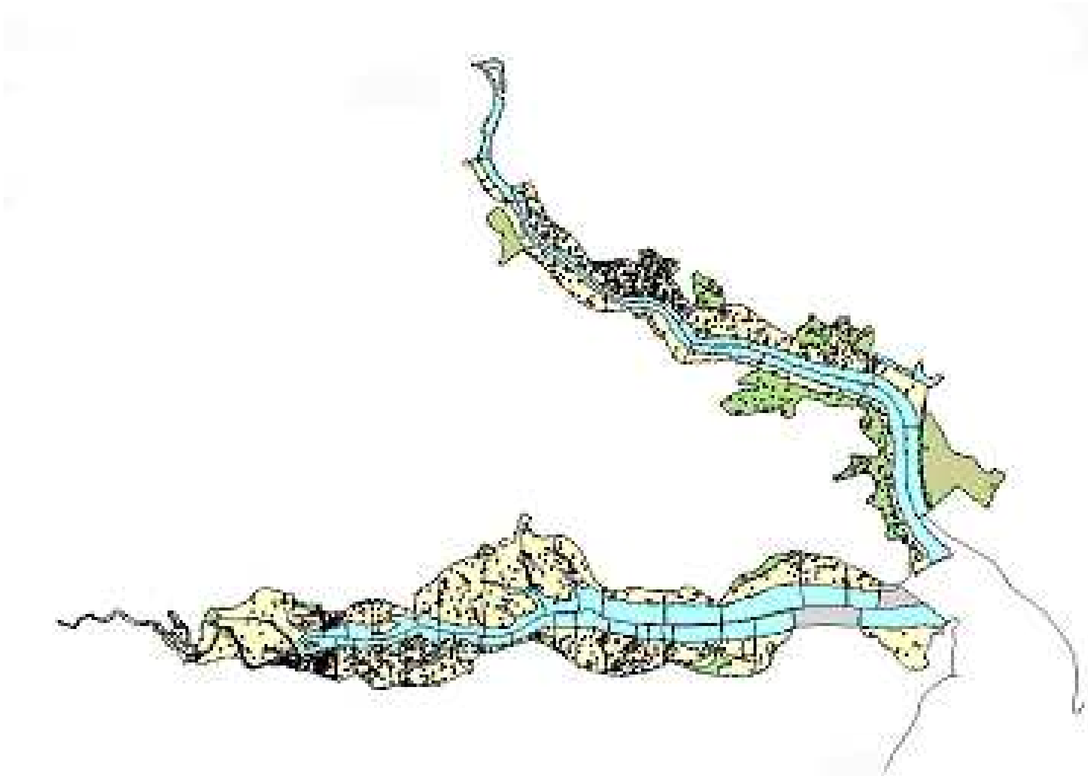
Figure 8.27 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■)in winters 1999/2000 (1) to 2010/2011 (12).



a b

Birds were well distributed throughout the Stour, as they have been in all winters, but few birds used the lower parts of the Orwell and were concentrated in the middle of the estuary; on Mulberry Middle and the Nacton foreshore (Figure 8.28). These two areas have always held good numbers of curlew, but they were also spread more widely on the Orwell during winters early in the monitoring programme.

Figure 8.28 The distribution of curlew in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries



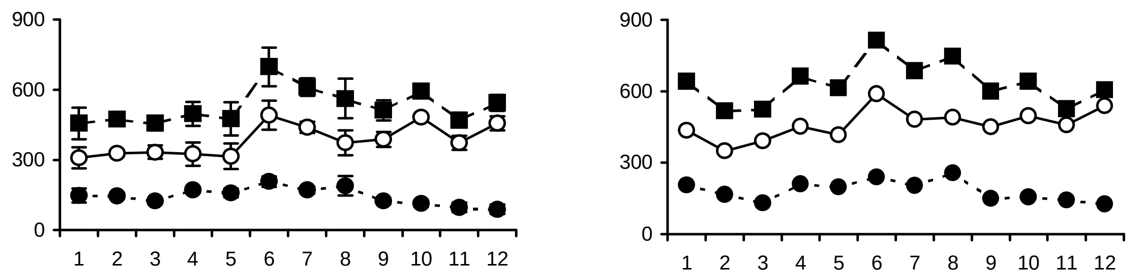
A

B

Turnstone

As in the previous three winters, the increasing trend in mean and peak numbers continued on the Stour (Figure 8.29), although numbers showed a further slight drop on the Orwell. Overall, the population of the SPA has been relatively stable during the monitoring programme, but a decreasing trend since the winter of 2004/2005 is apparent.

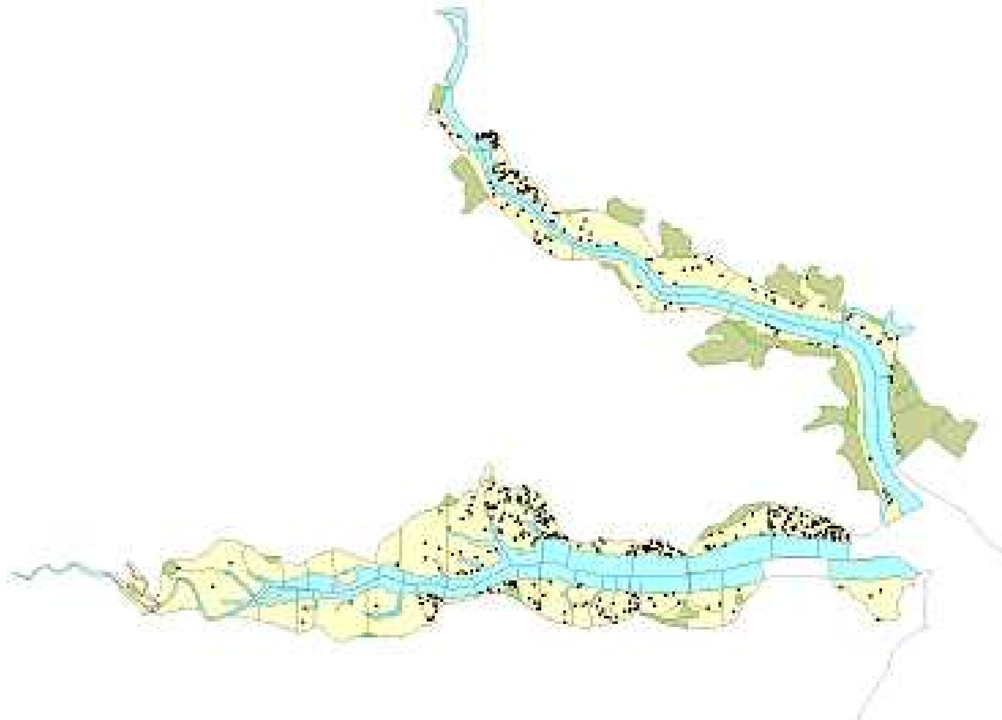
Figure 8.29 The (a) mean (± SE) and (b) peak numbers of birds on the Orwell (●), Stour (○) and SPA (■)in winters 1999/2000 (1) to 2010/2011 (12)



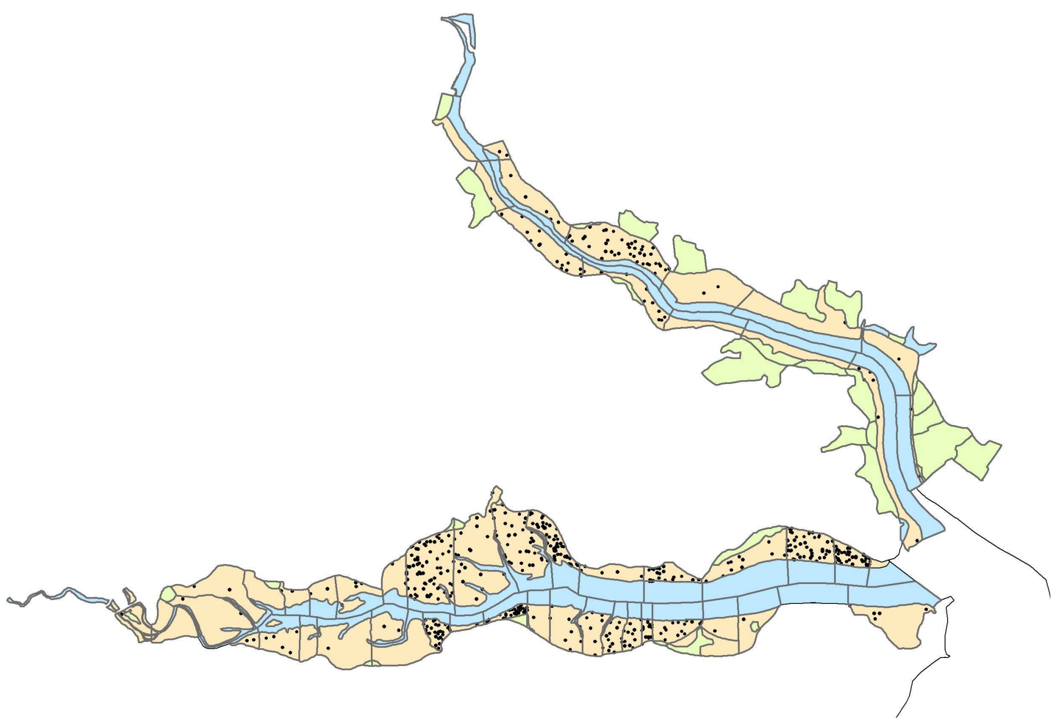
a b

Birds were once again absent from Pond Ooze at the head of the Orwell where they used to occur in good numbers, and they were mainly confined to Mulberry Middle and Nacton as in recent winters. On the Stour, distribution appears to have remained more or less consistent despite the increase in population, with the primary concentrations occurring in Erwarton and Holbrook Bays (Figure 8.30).

Figure 8.28 The distribution of turnstone in (a) 1999/2000 and (b) 2010/2011 on the Stour and Orwell Estuaries



A



B

8.4 Bird movements

Bird movements were recorded on the 8th and 25th November, 7th December 2010 and 24th January 2011 at two locations: Ha'penny Pier and Stone Point. The results of these surveys were presented in last years annual report (Royal Haskoning, 2010).

Although not conclusive initial results suggest that very few birds leave the estuaries (Vonk, *pers. comm*.).

9 STOUR AND ORWELL CONDITION ASSESSMENT REPORT

This section is included to discuss the current condition assessment of the Stour and Orwell Estuaries in the context of the anthropogenic impacts that may lead to 'unfavourable-no change' or 'unfavourable declining' assessments.

9.1 Condition assessment

The current assessment of the SSSI condition is available from Natural England and on the *Nature on the Map website;* for the Stour at:

http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?report=sdrt13&category=S&reference=1004172

and for the Orwell at:

http://www.sssi.naturalengland.org.uk/Special/sssi/reportAction.cfm?report=sdrt13&category=S&reference=1002511

The Stour and Orwell SPA covers the same area as the combined Stour and Orwell SSSIs.

The latest condition assessment (2010, reported in 2011) has concluded that the majority of sections within the Stour and Orwell Estuaries are considered to be in 'favourable' condition.

Within the Stour Estuary (see Figure 9.1), 8 out of 9 units are in 'favourable' condition. The unit which is in 'unfavourable declining' condition is adjacent to Manningtree in the upper estuary and is considered unfavourable due to coastal squeeze, which is discussed in the notes as the erosion of the seaward edges of the intertidal mud and saltmarsh. Sea level rise is given as a potential reason for the erosion but this is not qualified. All other units are in favourable condition within the Stour.

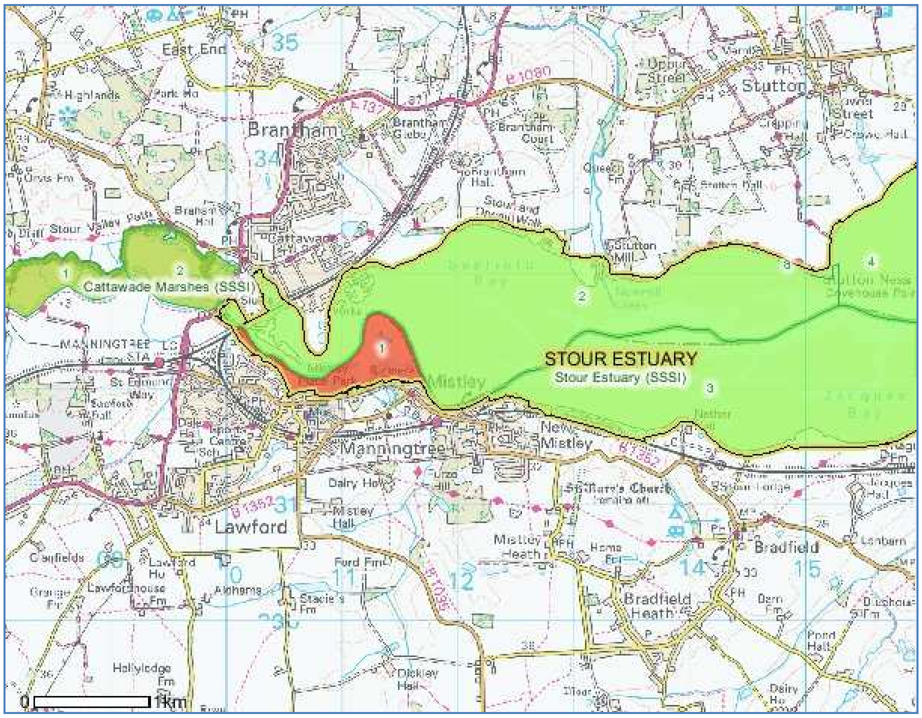


Figure 9.1 Upper reaches of the Stour Estuary

Within the Orwell estuary (see Figure 9.2 and Figure 9.3), there are 21 units of which 3 are 'unfavourable – declining', 4 are 'unfavourable – no change' and the remaining 14 are considered to be in 'favourable' condition. The units in 'unfavourable declining' condition are:

- Unit 1 in the upper estuary where coastal squeeze is given as the reason preventing development of extensive salt marsh in this area;
- Unit 8 (east of Chelmondiston) is cited as experiencing coastal squeeze which has lead to the loss of pioneer saltmarsh; and,
- Unit 13 (Trimley) where coastal squeeze is cited as the cause of the condition status leading to loss of saltmarsh vegetation.

The units classified as 'unfavourable no change' are 12, 15 and 16 which occur around the mouth of the Orwell and unit 11 on the east side of the estuary south of Levington. Each of these units is considered to be 'unfavourable no change' due to the presence of sea walls causing coastal squeeze thereby constraining the natural development of saltmarsh.

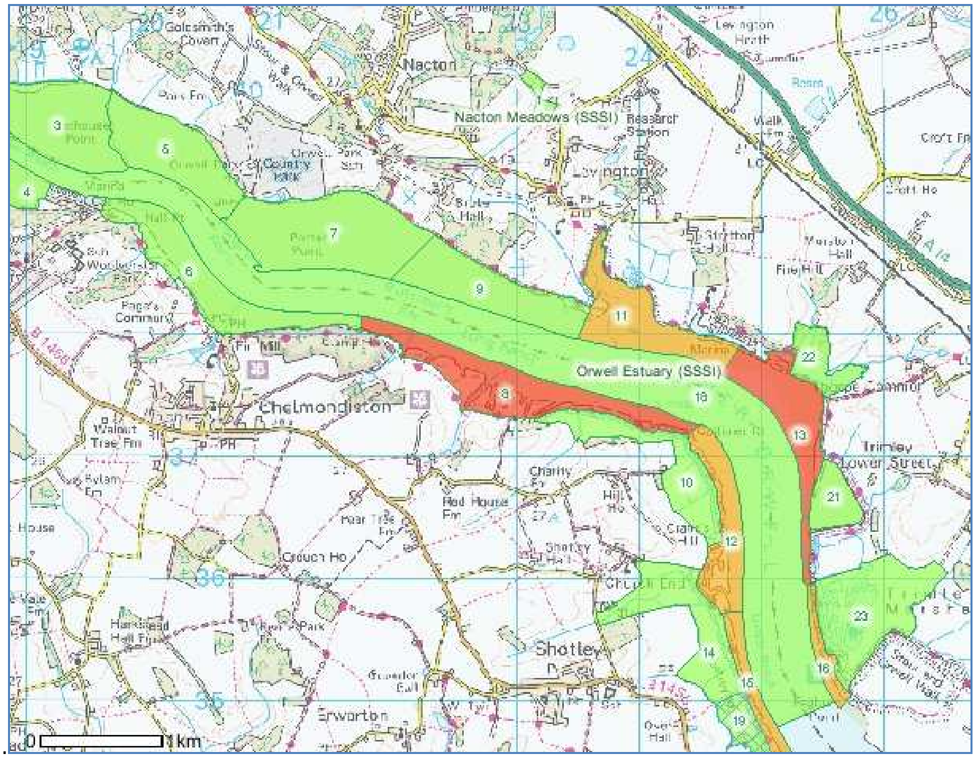


Figure 9.2 Lower reaches of the Orwell Estuary

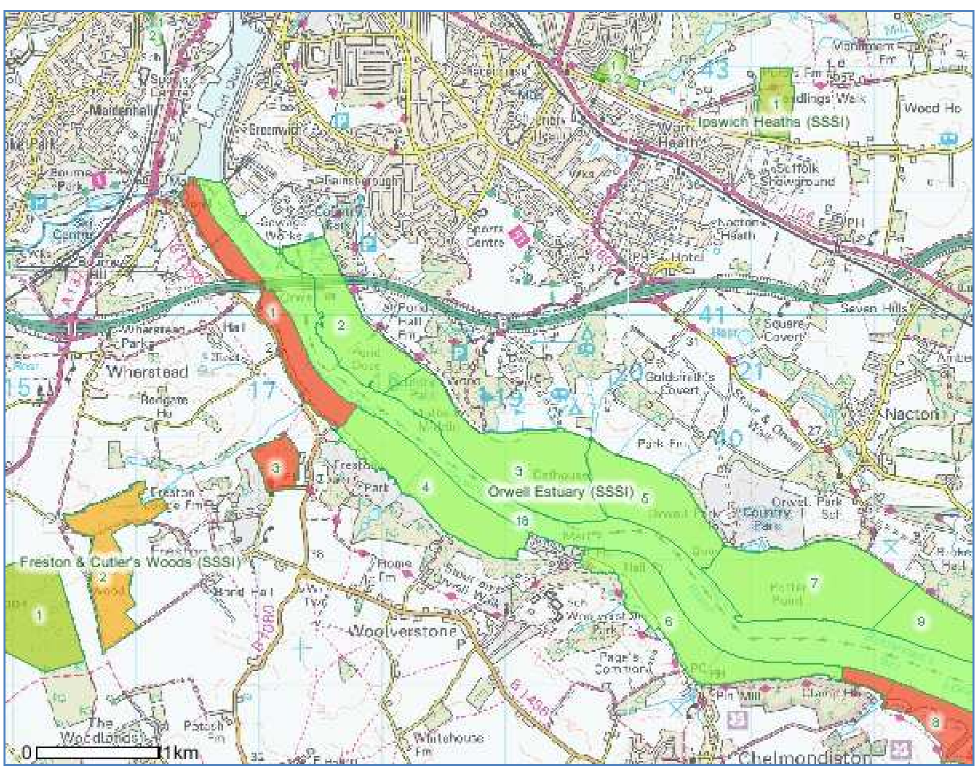


Figure 9.3 Upper reaches of the Orwell Estuary

10 SUMMARY AND CONCLUSIONS

In addition to reporting Annual Review for 2011/2012, this document represents the second five-yearly review of the monitoring programme as a whole. This section therefore draws together conclusions for each aspect of the monitoring programme for the whole of the monitoring programme to date.

10.1 Bathymetric and topographic data

10.1.1 Saltmarsh extent

The analysis concluded that saltmarsh extent has increased in all units of the estuary system over the period 2005 to 2010. The largest increases in extent were in the Harbour, lower Stour and lower Orwell units. In the other units of the estuary system, although the analysis concluded an increase in area, the changes are considered minor and are likely to be within the margin of error of the analysis technique.

The increase in saltmarsh in the lower Orwell is largely due to saltmarsh development within the intertidal habitat creation schemes on the Shotley foreshore. In the lower Stour and Harbour units, the aerial photographs revealed that some of the existing areas of saltmarsh had increased in extent.

10.1.2 Intertidal and subtidal area and volume

The analysis of intertidal and subtidal area and volume based on combined 2005/2006 and 2010/2011 bathymetric and LiDAR data has shown that both the Stour and Orwell estuaries are experiencing significant subtidal accretion. With regards intertidal volume, the analysis shows contrasting results for the two estuaries, with accretion in the Stour and erosion in the Orwell.

In the 2006 Annual Report various factors were considered and discussed as to why there was a trend for accretion of the intertidal areas in the Stour and erosion of the intertidal areas in the Orwell. The following factors were identified as being possible factors that could influence variation in intertidal morphology between the two estuaries, and these factors are discussed in Royal Haskoning and HR Wallingford (2011):

- Changes to wind patterns (possible reduction in westerly or easterly storms);
- Changes to sediment inputs from offshore;
- For sediment supply to the Stour Estuary the possibility of changes to sediment inputs from the Orwell Estuary;
- Sediment input during construction activities;
- Changes to intertidal sediment type (i.e. had the intertidal eroded to the point from which it could erode no more);
- Efficiency of the sediment replacement programme;
- Disturbance of bed material by deep drafted vessels;
- Changes in tidal energy (relative position in 18.6 year nodal cycle).

Given that the analysis presented in this report has shown that both estuaries are experiencing subtidal accretion, it is apparent that the main difference is associated with the ability of the estuaries to retain sediment on the intertidal rather than the sediment supply (i.e. there is no issue with the subtidal supply of material into the rivers).

10.2 Benthic monitoring

10.2.1 Stour and Orwell Estuaries

Analysis of the benthic monitoring data shows that similar communities have been present in the Stour and Orwell in each of the survey years to date. As would be expected, there have been some minor changes between years and shifts between biotopes for certain stations. It seems that the upper Stour biotope (StA) is relatively stable while the lower Orwell (OrD) has changed with each survey and often includes several biotopes within the group.

It can be concluded from the benthic monitoring undertaken to date that there has not been a marked change in abundance, biomass, number of taxa or biotope composition beyond what would be expected to occur through natural variation over time.

10.2.2 Felixstowe South Reconfiguration

The only significant change between the monitoring surveys has been an apparent shift in the benthic community of Station 33 from SS.SMu.SMuVS.NhomTubi to SS.SMu.SMuVS.AphTubi between 2008 and 2009 and back to SS.SMu.SMuVS.NhomTubi between 2010 and 2011. These changes corresponded with changes in sediment type but are unlikely to have been the result of development activity because this station is not the closest to the dredging or development area for the Felixstowe South Reconfiguration.

10.2.3 Inner Gabbard East disposal site

The stations within the disposal ground and those from just to the north of the disposal area had a relatively reduced fauna, with lower numbers of taxa and individuals than the surrounding stations and including two samples with no biota recorded. This reduced biota is likely to result from the disposal of dredged material.

10.3 Trimley Marshes managed realignment monitoring

The period of monitoring as specified within the Mitigation and Monitoring Package is now complete and the 10 years of monitoring has provided a clear indication of the development and successional changes within the site, a clear sign of the success of this habitat realignment site.

At the 2011 Regulators meeting it was agreed that the monitoring has demonstrated that the objectives of the site have been met and, therefore, no survey will be undertaken in 2011. It was, however, agreed that future surveys will be undertaken at five year intervals to verify whether the site is continuing to meet its objectives. The next benthic invertebrate survey will, therefore, be undertaken in 2015.

10.4 Trinity III Terminal habitat enhancement schemes

The Trimley and Shotley recharge sites have developed over the years since construction into valuable intertidal feeding habitat for a variety of waterbirds. They support a diverse community of benthic invertebrates which provide suitable prey species for the foraging birds. The vegetation, particularly around the Shotley sites, has developed over time into a well-established saltmarsh. The monitoring which has been undertaken at the sites since 2003 indicates that the objectives of the habitat enhancement sites have been achieved.

It is proposed that the monitoring of the Trimley and Shotley Habitat Enhancement Sites (including birds, benthic invertebrates and sediment, and topography) will continue until 2012 when the ten years of monitoring will be complete and more long-term objectives for the site may be established.

The continued use of the hovercraft is recommended for collecting samples in the 2012 survey for health and safety purposes.

10.5 Bird distribution and abundance

10.5.1 WeBS Alerts

The WeBS Alerts are then reviewed every three years. The last evaluation period for the Stour and Orwell Estuaries was 2007/08. The Alerts will be reviewed following the processing of 2010/11 data.

The only alerts triggered for the short-term period were for 3 species - goldeneye, grey plover and black-tailed godwit. In addition, two species (cormorant and dunlin) were considered to have natural fluctuations which would have, under normal circumstances, led to an alert. Alerts were recorded for 10 species in total over the medium term (10 years). In the longer term (25 years) only 2 alerts have been triggered (cormorant and dunlin), and many species have shown medium or high increases over this period.

10.5.2 Low water counts

Trends in the populations of some species in the SPA continued in 2010/2011. Previous declines in the numbers of pintail and redshank strengthened overall. These declines have resulted primarily from reductions in the populations wintering on the Stour. Numbers of black-tailed godwit also continued to show a declining trend on the Stour, despite an increase in numbers over the winter of 2010/2011.

Other species showed continued declines on the Orwell (wigeon, ringed plover, dunlin and curlew), although none of these were large enough to affect overall SPA populations.

Species that showed increasing trends for the monitoring period as a whole were shelduck (on the Orwell), knot (in the SPA), dunlin (on the Stour), black-tailed godwit (Orwell) and turnstone (Stour), although some of these species show declines in the winter of 2010/2011 compared with previous years.

Some changes in the distribution of species within the SPA are evident but these assessments are subjective and analysis of changes in the distribution of species is required from the data. Some species (e.g. ringed plover and turnstone) were once again more or less absent in the upper Orwell where they used to be frequent. Other species appear to have become more confined to the upper reaches of the estuaries (e.g. black-tailed godwit) and others appear to have declined in the lower reaches (e.g. curlew and redshank).

10.6 Stour and Orwell condition assessment

The latest condition assessment (2010, reported in 2011) has concluded that the majority of SSSI units within the Stour and Orwell Estuaries are considered to be in 'favourable' condition.

One unit in the Stour and 3 units in the Orwell are classified as 'unfavourable declining'. In each case, coastal squeeze is cited as the reason for this classification.

10.7 Overview of findings for the period 2005-2011

Over the period 2005 to 2011 it is apparent from the monitoring that has been undertaken for habitat extent based, including mudflats and saltmarsh, that there is a positive trend with an increase in habitat area throughout the estuary system as a whole. In addition, the benthic monitoring has not shown any marked changes in abundance, biomass, number of taxa or biotope composition beyond what would be expected to occur through natural variation over time. Taken together, these findings indicate that there does not appear to be a cause for concern with regards habitat extent and quality throughout the estuarine system.

As would be expected, there is variation in waterbird populations over the monitoring period. For most species, no substantial change occurred (based on WeBS data), whereas declines were seen for other species which led to short term alerts being triggered. In most cases, these declines were reflected at the national level, although black tailed godwit and cormorant declines were not reflected nationally.

It is difficult to attribute changes in waterbird populations to factors influencing the estuary system, and many external factors are likely to influence waterbird populations at greater geographic scales. However, it is important to note that those aspects that do have the potential to be directly affected by the channel dredging project (habitat extent and quality) do not appear to be adversely affected on the basis of the findings of the monitoring programme. As waterbirds depend on these habitats, it can be implied, therefore, that the channel dredging project is not in itself having a significant effect on bird populations.

10.8 Recommendations for future monitoring

10.8.1 Future monitoring and analysis strategy

- Monitoring of intertidal and subtidal area and volume should continue at the current frequency (5 yearly survey), with the analysis carried out using a combination of bathymetry and LiDAR data as described in Section 3.4.5.
- Benthic community monitoring for the Stour and Orwell Estuaries should continue at the current frequency.
- The Trimley Marshes managed realignment site will be monitored at 5 yearly intervals, with the next benthic invertebrate survey planned for 2015.
- Monitoring of the Trimley and Shotley habitat enhancement sites (including birds, benthic invertebrates and sediment, and topography) will continue in 2012. This will complete 10 years of monitoring; the objectives of the site will be reviewed in 2012 which may lead to amendments to the monitoring for these sites.
- Waterbird population monitoring will continue at the current annual frequency.

10.8.2 Future mitigation strategy

- Although no changes to the current sediment replacement programme are being proposed, in light of the findings reported on the subtidal accretion in the Stour and Orwell estuaries we would like to discuss the rationale behind continuing the programme.

10.8.3 Future Regulators meetings

- It is recommended that the meetings continue to be held in March of each year.

11 REFERENCES

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Appendix A

Stour and Orwell Estuaries benthic monitoring report

Appendix B

Description of biotopes

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	AMBI Score	AMBI Notes	1997 150	1997 152	1997 153	1997 154	1997 155	1997 157	1997 158	1997 163	1997 169	1997 171	1997 172	1997 174	1997 179	1997 180	1997 181	1997 189	1997 191	1997 192	1997 193	1997 194	1997 195	1997 204	1997 206	1997 207	1997 209	1997 249	1997 258	1997 260	1997 261	1997 263	1997 267	1997 269	1997 272	1997 275	1997 285	1997 289	1997 295	1997 296	1997 300	1997 301	1997 303	1997 306	2003 150	2003 152
	Gloeotrichia	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0001	RHODOPHYTA	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0170	Palmaria palmata	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0417	Polyides rotundus	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0431	Gracilaria	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0443	Plocamium cartilagineum	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0507	Ceramium	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0554	Pterothamnion plumula	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0592	Cryptopleura ramosa	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0655	Polysiphonia	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZR0015	Ectocarpus	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0001	CHLOROPHYTA	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0039	Spongomorpha	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0149	Enteromorpha	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0174	Ulva	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0189	Chaetomorpha	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0195	Cladophora	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BRYOPHYTA	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lemnaceae	-	Excluded: non-invertebrate taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ANIMALIA (eggs)	-	Excluded: Taxonomic Level not in AMBI database	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A0001	PROTOZOA (?)	-	Excluded: Taxonomic Level not in AMBI database	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lagotia viridis	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0001	PORIFERA	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0053	Leucosolenia	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0133	Scypha ciliata	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	P	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0475	Cliona	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C1686	Halisarca dujardini	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0158	Tubulariidae	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0218	Eudendrium	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0246	Bougainvilliidae	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0336	Lovenella clausa	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0341	Opercularella lacerata	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0348	Calycella syringa	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0390	Halecium	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-
D0424	Hydrallmania falcata	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0427	Sertularella	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0433	Sertularia	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-
D0445	Tridentata distans	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0447	Plumulariidae	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0455	Kirchenpaueria pinnata	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0469	Plumularia setacea	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0491	Campanulariidae	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P
D0502	Clytia gracilis	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0503	Clytia hemisphaerica	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0515	Laomedea flexuosa	-	Excluded: epifauna	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0662	ACTINIARIA	-	Excluded: non soft-sediment taxa	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	9	-	-	1	2	1	-	2	1	-	7	-	-	-	-	-	1	-	-	10	-	-	-	-	7	4	1	-	-
D0759	Edwardsiidae	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0761	Nematostella vectensis	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G0001	NEMERTEA	III		1	-	-	1	2	5	2	11	-	2	-	-	-	-	2	4	1	-	-	-	3	-	1	4	-	5	-	7	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
HD0001	NEMATODA	III		1	8	-	1	3	7	35	75	-	-	3	5	-	1	-	1	4	14	2	2	13	2	45	45	5	11	1	38	2	-	-	42	-	-	-	-	-	-	-	5	-	-	1	-
K0045	Pedicellina	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K0050	Barentsia	-	Excluded: epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N0014	Golfingia elongata	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0025	Polynoidae (juv)	-	Exluded, juvenile not ID'd to species	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0049	Gattyana cirrhosa	III		-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0052	Harmothoe antilopes	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0064	Harmothoe imbricata	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
P0065	Harmothoe impar	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	2	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	2	6	-	-	-	-	1	-	-	-
	Harmothoe pagenstecheri	II	Changed to Harmothe sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0067	Malmgreniella arenicolae	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0082	Lepidonotus squamatus	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	2	1	-	-	-
P0092	Pholoe baltica (sensu Petersen)	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0094	Pholoe inornata (sensu Petersen)	IV		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
P0106	Sthenelais (juv)	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0107	Sthenelais boa	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
P0118	Eteone longa (Type A)	III	As Eteone longa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0118	Eteone longa (agg)	III	As Eteone longa	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-
P0124	Hypereteone foliosa	III		-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0145	Anaitides mucosa	III		-	-	-	-	28	77	26	38	6	1	2	3	-	-	2	-	3	1	8	5	1	3	20	4	-	4	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-	-	-
P0164	Eumida bahusiensis	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0167	Eumida sanguinea	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	4	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	12	5	-	-	-
P0262	Glycera oxycephala	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0265	Glycera tridactyla	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0271	Goniada maculata	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0305	Psamathe fusca	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
P0321	Syllidia armata	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	7	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	13	39	-	-	-	9	16	-	-	-
P0326	Microphthalmus	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0346	Syllidae (epitoke)	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0358	Syllis	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Syllis "species A"	II	Changed to Syllis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0365	Syllis armillaris	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0360	Syllis gracilis	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0371	Syllis variegata	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0380	Eusyllis blomstrandi	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0411	Brania	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0421	Exogone hebes	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0422	Exogone naidina	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	6	5	-	-	-
P0423	Exogone verugera	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0426	Sphaerosyllis erinaceus	II		-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	AMBI Score	AMBI Notes	1997 150	1997 152	1997 153	1997 154	1997 155	1997 157	1997 158	1997 163	1997 169	1997 171	1997 172	1997 174	1997 179	1997 180	1997 181	1997 189	1997 191	1997 192	1997 193	1997 194	1997 195	1997 204	1997 206	1997 207	1997 209	1997 249	1997 258	1997 260	1997 261	1997 263	1997 267	1997 269	1997 272	1997 275	1997 285	1997 289	1997 295	1997 296	1997 300	1997 301	1997 303	1997 306	2003 150	2003 152
P0430	Sphaerosyllis taylori	II		-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	7	3	-	-	16	-	-	-	-	1	-	-	-	-	-	-	-	-	9	20	-	-	-	2	7	-	-	-
P0431	Sphaerosyllis tetralix	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
P0434	Autolytus	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	4	-	-	-	-
P0451	Proceraea	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0458	Nereididae (juv)	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0471	Alitta succinea	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0472	Alitta virens	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
P0475	Eunereis longissima	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1	-	-	-
P0462	Hediste diversicolor	III		46	92	139	16	-	-	-	-	12	4	3	7	-	1	-	-	2	-	-	-	1	12	3	7	-	4	8	-	45	2	7	3	10	32	-	-	-	-	2	-	-	-	90	102
P0484	Platynereis dumerilii	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0494	Nephtys (juv)	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0499	Nephtys hombergii	II		-	-	-	-	-	-	-	-	3	3	1	6	4	5	3	-	-	7	2	6	-	5	3	-	2	5	-	-	1	-	1	3	3	3	-	-	5	2	-	-	-	1	-	-
P0502	Nephtys kersivalensis	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0566	Marphysa sanguinea	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0579	Lumbrineris gracilis	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0613	Ophryotrocha	IV		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
P0638	Protodorvillea kefersteini	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3	-	-	-	-	10	2	-	-
P0672	Scoloplos armiger	III		-	-	-	-	-	-	-	517	-	-	-	-	-	-	-	1	1	-	2	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	1	1	-	-	-	-	2	-	-	-
P0677	Aricidea minuta	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
P0722	Aonides oxycephala	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
P0737	Malacoceros fuliginosus	V		-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0750	Dipolydora coeca (agg)	IV	As Diploydora coeca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0751	Dipolydora caulleryi	IV		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0752	Polydora ciliata (agg)	IV	As Polydora ciliata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	4	-	-	-	-	-	-	-
P0753	Polydora cornuta	IV		-	3	-	10	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	84	-	9	-	2	2	45	1	-	-	-	-	1	-	-	-	-	10
P0760	Dipolydora quadrilobata	IV		-	-	-	-	-	1	5	3	14	-	3	-	-	-	-	-	-	-	8	-	-	-	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0774	Pseudopolydora pulchra	IV		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0776	Pygospio elegans	III		-	1	-	1	8	-	18	1	-	1	1	-	-	-	-	-	-	-	4	-	-	6	-	7	-	-	11	22	5	8	2	-	-	-	-	-	1	2	7	-	-	-	-	-
P0791	Spio martinensis	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0799	Streblospio shrubsolii	III		27	307	4	29	1	23	-	-	5	3	7	2	5	-	-	-	-	-	1	2	-	1	1	-	4	-	57	1	12	2	2	1	167	2	-	-	15	-	-	-	-	-	107	164
P0824	Aphelochaeta marioni	IV		-	-	-	-	-	-	-	4	7	1	3	-	180	2	91	25	15	116	2	7	15	83	-	131	76	206	-	3	-	1	-	-	15	94	7	-	32	274	12	3	10	37	-	-
P0829	Caulleriella alata	IV		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0831	Chaetozone zetlandica	IV		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	4	-	1	-	1	-	-	-	-	-	-	-	-	1	5	1	24	3	1	17	-	-	-
P0838	Cirriformia (juv)	IV		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0839	Cirriformia tentaculata	IV		-	-	-	-	-	-	-	-	-	-	1	-	-	8	-	1	-	1	-	12	-	20	-	11	15	26	-	-	-	-	-	25	-	12	-	-	-	-	-	1	-	-	-	-
P0847	Tharyx "species A"	IV	As Tharyx sp.	134	9	-	11	22	11	367	-	109	15	13	-	1	-	-	-	5	2	243	-	-	5	-	6	26	1	4	8	43	60	24	1	4	14	1	-	1	5	-	-	-	1	1	-
P0853	Ctenodrilus serratus	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0871	Cossura pygodactyla	IV		-	-	-	-	-	-	-	-	1	1	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
P0906	Capitella	V		1	-	-	-	2	87	3	2	-	-	-	-	-	1	-	1	-	2	-	-	2	-	1	-	-	2	-	76	-	13	-	4	-	2	3	-	-	-	-	-	4	-	-	-
P0919	Mediomastus fragilis	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	3	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-
P0920	Notomastus	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0928	Arenicolidae	I	As Arenicola sp.	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0964	Euclymene oerstedii	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1026	Scalibregma celticum	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1093	Galathowenia oculata	III		-	-	-	-	-	-	-	-	-	-	102	-	2	28	21	2	-	-	67	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1107	Lagis koreni	IV		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1117	Sabellaria spinulosa	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
P1118	Ampharetidae (juv)	I	As Ampharete sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-
P1124	Melinna palmata	III		-	-	-	-	-	-	-	-	14	2	20	8	-	5	23	1	-	2	-	7	4	19	-	2	8	19	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
P1138	Ampharete grubei	I		-	-	-	-	2	1	1	-	47	3	14	-	1	7	7	14	5	11	-	7	5	27	3	3	7	3	-	-	-	-	2	-	3	-	-	-	-	3	-	1	4	-	-	2
P1139	Ampharete lindstroemi	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
P1143	Amphicteis midas	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
P1195	Lanice conchilega	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
P1206	Neoamphitrite figulus	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1211	Nicolea zostericola	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1235	Polycirrus	IV		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1257	Sabellidae (juv)	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1283	Fabricia stellaris	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1294	Manayunkia aestuarina	III		2	119	-	5	-	2	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	3
P1320	Sabella pavonina	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	16	1	324	-	-
P1340	Spirobranchus lamarcki	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	2	-	-	-
P1402	OLIGOCHAETA (eggs)	-	Excluded: Taxonomic Level not in AMBI database	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1420	Paranais litoralis	V		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1425	Tubificidae (Type A)	V	As Tubificoides sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1479	Heterochaeta costata	V		118	165	9	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	26	-	-	-	-	-	-	-	2	-	-	-	-	-	-	1	-	147	2
P1489	Tubificoides amplivasatus	V		-	-	-	-	-	-	-	-	13	8	2	14	-	-	-	-	3	-	-	-	2	-	-	-	1	3	-	-	-	-	-	-	1	-	10	-	-	-	-	1	1	-	-	-
P1490	Tubificoides benedii	V		23	19	128	1	291	247	358	482	4	251	39	120	-	173	1	1	1	1	398	121	1	229	819	142	520	7	5	28	4	1	-	364	19	152	-	-	-	1	1	2	2	2	-	-
P1496	Tubificoides insularis	V		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1498	Tubificoides pseudogaster (agg)	V		48	19	-	11	-	28	5	-	4	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	3	-	9	1	-	-	3	-	-	-	-	-	-	-	2	-	-	-	-
P1500	Tubificoides swirencoides	V		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tubificoides galiciensis	V		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	5	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-
	Psammoryctides barbatus	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1501	Enchytraeidae	V		-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0002	PYCNOGONIDA (juv)	-	Non soft-sediment taxa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0005	Nymphon brevirostre	-	Non soft-sediment taxa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0015	Achelia echinata (agg)	-	Non soft-sediment taxa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	8	2	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	1	-	-
Q0018	Achelia longipes (agg)	-	Non soft-sediment taxa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ammothea hilgendorfi	-	Non soft-sediment taxa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0032	Callipallene	-	Non soft-sediment taxa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0044	Anoplodactylus petiolatus	-	Non soft-sediment taxa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
Q0045	Anoplodactylus pygmaeus	-	Non soft-sediment taxa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	2	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0051	Pycnogonum littorale	-	Non soft-sediment taxa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0054	ACARINA	-	Taxonomic level not in database	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0142	COPEPODA	-	Taxonomic level not in database	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0142	COPEPODA (Type A)	-	Taxonomic level not in database	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0704	Notodelphys	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0732	Ascidicola rosea	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R1035	Alteutha	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R1820	Sabelliphilus elongatus	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	AMBI Score	AMBI Notes	1997 150	1997 152	1997 153	1997 154	1997 155	1997 157	1997 158	1997 163	1997 169	1997 171	1997 172	1997 174	1997 179	1997 180	1997 181	1997 189	1997 191	1997 192	1997 193	1997 194	1997 195	1997 204	1997 206	1997 207	1997 209	1997 249	1997 258	1997 260	1997 261	1997 263	1997 267	1997 269	1997 272	1997 275	1997 285	1997 289	1997 295	1997 296	1997 300	1997 301	1997 303	1997 306	2003 150	2003 152
R2122	Cancerilla tubulata	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2412	OSTRACODA	-	Not assigned	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2413	MYODOCOPIDA	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2432	Eusarsiella zostericola	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2458	PODOCOPIDA	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27
S0074	Mesopodopsis slabberi	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0086	Schistomysis kervillei	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0102	Apherusa bispinosa	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	1	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0107	Apherusa ovalipes	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0158	Amphilochus manudens	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0159	Amphilochus neapolitanus	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0164	Gitana sarsi	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0213	Stenothoe marina	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2	-	-	-	-
S0257	Harpinia pectinata	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0360	Argissa hamatipes	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0380	Iphimedia minuta	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0410	Atylus falcatus	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0415	Dexamine spinosa	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0416	Dexamine thea	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0420	Tritaeta gibbosa	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0423	Ampelisca (juv)	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0427	Ampelisca brevicornis	I		-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0429	Ampelisca diadema	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0464	Gammaridae (juv)	I		-	-	-	4	1	-	-	-	-	1	-	1	-	3	-	-	1	-	1	4	-	-	2	-	-	-	-	-	-	2	-	2	40	-	-	-	-	-	-	-	1	-	-	-
S0481	Gammarus spooneri	I	As Gammarus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0495	Melitidae	I	As Melita sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0498	Abludomelita obtusata	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0503	Cheirocratus	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	-	-	-	-	-	-	-	-	-	-
S0505	Cheirocratus intermedius	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0506	Cheirocratus sundevallii	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
S0525	Melita palmata	I		-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-	-	7
S0541	Gammaropsis maculata	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0550	Microprotopus maculatus	I		-	-	-	-	-	-	-	-	13	-	-	38	1	1	5	-	55	-	-	2	-	-	-	-	-	4	-	-	-	-	-	-	4	-	1	4	-	-	-	-	-	-	-	-
S0561	Ericthonius (female)	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0562	Ericthonius difformis	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0564	Ericthonius punctatus	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0568	Jassa	V		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0577	Aoridae	I		-	-	-	-	-	-	-	-	5	-	-	3	-	2	-	-	8	3	-	6	-	-	3	-	3	-	-	-	-	-	-	12	18	-	2	57	-	-	-	4	23	19	-	-
S0579	Aora gracilis	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	6	-	-	-	-	3	5	-	-
S0593	Microdeutopus anomalus	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0596	Microdeutopus gryllotalpa	III		-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	1	-	-	3	-	-	1	-	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
	Grandidierella japonica	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0616	Corophium volutator	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
S0606	Monocorophium acherusicum	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	8	-	-	-	-	11	2	-	-
S0612	Monocorophium insidiosum	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0615	Monocorophium sextonae	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0610	Crassicorophium bonnellii	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0611	Crassicorophium crassicorne	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0607	Apocorophium acutum	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0621	Unciola crenatipalma	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0628	Dyopedos monacanthus	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0646	Caprella linearis	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0651	Pariambus typicus	III		-	-	-	-	-	-	-	-	1	3	-	120	-	-	147	6	5	-	-	2	-	3	-	3	1	72	-	-	-	-	-	-	-	-	17	14	-	-	-	14	4	3	-	-
S0805	Cyathura carinata	III		-	20	-	3	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	14	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	29
	Lekanesphaera levii	III		-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	21	-	-	4	-	-	-	1	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0885	Jaera albifrons (agg)	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	5	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0901	Munna	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0935	Idotea baltica	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0936	Idotea chelipes	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1112	Heterotanais oerstedi	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1197	Bodotria scorpioides	II		-	-	-	-	-	-	-	-	-	-	-	1	-	-	9	3	2	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
S1208	Eudorella truncatula	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
S1224	Cumella pygmaea	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1	-	-	-	4	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-
S1276	DECAPODA (zoea)	-	Excluded, planktonic species	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1315	Palaemon	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1350	Hippolyte varians	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1360	Thoralus cranchii	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1385	Crangon crangon	I		-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
S1577	Liocarcinus (juv)	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1594	Carcinus maenas	III		-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	1
	THYSANOPTERA	-	INSECTA and salinity >10ppt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DIPTERA	-	INSECTA and salinity >10ppt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chironomidae	-	INSECTA and salinity >10ppt	-	-	-	-	1	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-
	Dolichopodidae (larva)	-	INSECTA and salinity >10ppt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	COLEOPTERA (larva)	-	INSECTA and salinity >10ppt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	COLLEMBOLA	-	INSECTA and salinity >10ppt	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0079	Lepidochitona cinerea	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0163	Gibbula cineraria	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
W0296	Littorina littorea	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0305	Littorina saxatilis	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0328	Rissoa interrupta	I	As Rissoa parva	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
W0385	Hydrobia ulvae	III		62	-	8	4	64	11	40	12	-	-	1	-	-	4	-	-	-	-	1	-	-	-	-	-	-	1	20	421	52	207	8	17	4	8	-	-	-	-	-	1	-	-	100	102
W0421	Tornus subcarinatus	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0439	Crepidula fornicata (eggs)	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0439	Crepidula fornicata	III		-	-	-	-	-	-	-	-	7	-	3	-	-	2	-	-	26	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21	-	-	-	-	29	4	-	-	-
W0913	Odostomia plicata	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0919	Brachystomia	II		-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1077	Retusa obtusa	II		-	-	-	-	13	3	7	-	-	1	15	-	-	-	-	-	-	-	9	-	-	1	-	1	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1118	Elysia viridis (juv)	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	AMBI Score	AMBI Notes	1997 150	1997 152	1997 153	1997 154	1997 155	1997 157	1997 158	1997 163	1997 169	1997 171	1997 172	1997 174	1997 179	1997 180	1997 181	1997 189	1997 191	1997 192	1997 193	1997 194	1997 195	1997 204	1997 206	1997 207	1997 209	1997 249	1997 258	1997 260	1997 261	1997 263	1997 267	1997 269	1997 272	1997 275	1997 285	1997 289	1997 295	1997 296	1997 300	1997 301	1997 303	1997 306	2003 150	2003 152
W1127	Alderia modesta	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1136	Limapontia depressa	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1292	Embletonia pulchra	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1431	Cuthona	-	Not assigned	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1563	Nuculidae (juv)	I	As Nucula sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-
W1569	Nucula nitidosa	I		-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1570	Nucula nucleus	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1695	Mytilus edulis	-	Excluded, non soft-sediment taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	2	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	16	1	-	-	-
W1906	Kurtiella bidentata	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1949	Parvicardium exiguum	I		-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
W1961	Cerastoderma edule	III		-	1	-	1	1	1	4	-	8	10	-	-	-	-	-	-	-	-	4	3	-	3	2	3	-	-	-	34	10	11	3	11	7	18	1	-	-	-	-	6	-	-	-	-
W1997	Ensis americanus (juv)	I		-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	1	1	-	-	-	-	-	-
W2029	Macoma balthica	III		1	-	2	-	5	7	8	8	-	2	5	1	3	-	-	-	-	-	7	-	-	-	2	5	8	-	2	12	8	7	4	9	6	5	-	-	-	1	-	1	-	-	-	-
W2068	Scrobicularia plana	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2059	Abra alba	III		-	-	-	-	-	-	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	-	-
W2061	Abra nitida	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2064	Abra tenuis	III		6	1	11	-	26	74	24	13	-	16	34	2	-	1	-	-	2	-	28	1	-	4	8	12	4	1	-	6	-	3	-	3	-	2	-	-	-	-	1	-	-	-	4	2
	Tapes philippinarum	III		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2124	Venerupis senegalensis	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2137	Petricola pholadiformis	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2147	Mya truncata (juv)	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
W2149	Mya arenaria	II		-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	28	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0075	Alcyonidium cellarioides	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0076	Alcyonidium diaphanum	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0080	Alcyonidium mytili	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0081	Alcyonidium parasiticum	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0091	Nolella	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0096	Anguinella palmata	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	P	P	-	P	-
Y0098	Victorella	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0112	Walkeria uva	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0122	Farrella repens	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0131	Vesicularia spinosa	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0137	Bowerbankia	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0172	Conopeum reticulum	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	P	-	P	-	-	P	-	-	-	-	P	-	-	-	-	-	-	-	-	P	P	-	-	-	P	P	-	-	-
Y0177	Electra monostachys	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0178	Electra pilosa	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0182	Aspidelectra melolontha	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0240	Bugula	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0246	Bugula plumosa	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-
Y0256	Bicellariella ciliata	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	P	P	-	-	-
Y0279	Scrupocellaria scruposa	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0280	Tricellaria (Type A)	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0411	Cryptosula pallasiana	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0463	Smittoidea reticulata	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZA0003	Phoronis	II		-	-	-	-	-	-	-	2	143	724	-	17	20	-	22	-	-	-	1	10	2	53	8	-	190	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
ZB0148	Amphiuridae (juv)	II		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZB0161	Amphipholis squamata	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZB0262	Thyone fusus	I		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZC0012	ENTEROPNEUSTA	-	Excluded, taxonomic level not in AMBI database	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0002	ASCIDIACEA	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0002	ASCIDIACEA (juv)	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0041	Didemnidae	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0078	Perophora listeri	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0084	Ascidiella aspersa	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	5	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	2	10	-	-	-	13	5	1	-	-
ZD0088	Ascidia conchilega	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0104	Styela clava	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0115	Polycarpa pomaria	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0120	Dendrodoa grossularia	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0126	Botryllus schlosseri	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0128	Botrylloides leachi	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0140	Pyura squamulosa	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0146	Molgula	-	Epifauna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
ZG0001	OSTEICHTHYES	-	Non benthic taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0034	Clupea harengus (eggs)	-	Non benthic taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0476	Pomatoschistus	-	Non benthic taxon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Group			StA	StA	StA	StA	StB	StB	StB	StB	StC	StC	StC	StC	StD	StD	StD	StF	StF	StF	StE	StE	StF	StG	StG	StG	StG	StD	OrA	OrA	OrA	OrA	OrB	OrB	OrB	OrB	OrC	OrC	OrD	OrD	OrD	OrD	OrC	OrC	StA	StA
	No. Taxa (S)			15	16	8	17	17	22	18	14	21	20	22	21	14	20	16	33	37	35	20	22	34	21	19	24	19	40	12	19	12	19	11	20	20	17	32	30	9	10	10	39	44	15	10	13
	No. Individuals (N)			473	770	302	111	471	601	928	1169	429	1052	271	352	230	245	337	109	204	192	790	213	93	492	928	421	893	449	201	714	192	332	60	508	357	350	101	203	61	314	30	167	157	402	458	451
	Margalef's species richness (d)			2.273	2.257	1.226	3.185	2.600	3.282	2.488	1.840	3.135	2.730	3.570	3.240	2.207	3.090	2.577	6.182	6.581	5.326	2.848	3.917	6.398	3.227	2.634	3.806	2.649	6.059	2.074	2.739	2.092	3.101	2.442	3.050	3.233	2.731	6.067	4.705	1.946	1.565	2.646	6.448	7.515	2.335	1.306	1.800
	Pielou's evenness (J)			0.704	0.616	0.554	0.838	0.502	0.626	0.546	0.476	0.704	0.323	0.697	0.601	0.367	0.431	0.605	0.823	0.798	0.540	0.463	0.616	0.841	0.616	0.205	0.625	0.472	0.597	0.669	0.558	0.769	0.476	0.811	0.415	0.651	0.601	0.840	0.758	0.639	0.245	0.780	0.871	0.846	0.304	0.684	0.665
	Shannon Wiener (H'(loge))			1.906	1.708	1.152	2.323	1.423	1.936	1.578	1.257	2.110	0.968	2.123	1.799	0.942	1.245	1.679	2.798	2.860	1.819	1.386	1.905	2.859	1.876	0.604	1.986	1.389	2.172	1.662	1.642	1.910	1.402	1.945	1.244	1.950	1.704	2.828	2.469	1.404	0.563	1.797	3.071	3.099	0.824	1.502	1.653

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2003 153	2003 154	2003 155	2003 157	2003 158	2003 163	2003 169	2003 171	2003 172	2003 174	2003 179	2003 180	2003 181	2003 189	2003 191	2003 192	2003 193	2003 194	2003 195	2003 204	2003 206	2003 207	2003 209	2003 249	2003 258	2003 260	2003 261	2003 263	2003 267	2003 269	2003 272	2003 275	2003 285	2003 289	2003 295	2003 296	2003 300	2003 301	2003 303	2003 306	2008 150	2008 152	2008 153	2008 154	2008 155	2008 157	2008 158	2008 163	2008 169	2008 171	2008 172	2008 174
	Gloeotrichia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0001	RHODOPHYTA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-
ZM0170	Palmaria palmata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-
ZM0417	Polyides rotundus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0431	Gracilaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0443	Plocamium cartilagineum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0507	Ceramium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0554	Pterothamnion plumula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0592	Cryptopleura ramosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0655	Polysiphonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZR0015	Ectocarpus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0001	CHLOROPHYTA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	P	P	-	-	-	-	-	-	-
ZS0039	Spongomorpha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0149	Enteromorpha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	P	-	-	P	-	-	-	P
ZS0174	Ulva	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0189	Chaetomorpha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0195	Cladophora	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BRYOPHYTA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
	Lemnaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ANIMALIA (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	P	P	P	P	-	-
A0001	PROTOZOA (?)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lagotia viridis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0001	PORIFERA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0053	Leucosolenia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0133	Scypha ciliata	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0475	Cliona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C1686	Halisarca dujardini	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0158	Tubulariidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0218	Eudendrium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0246	Bougainvilliidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0336	Lovenella clausa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0341	Opercularella lacerata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0348	Calycella syringa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0390	Halecium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0424	Hydrallmania falcata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	P	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-
D0427	Sertularella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0433	Sertularia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0445	Tridentata distans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0447	Plumulariidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0455	Kirchenpaueria pinnata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0469	Plumularia setacea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0491	Campanulariidae	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	P	-	-	-	P	-	-	-	-	-	-	-	-
D0502	Clytia gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0503	Clytia hemisphaerica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0515	Laomedea flexuosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0662	ACTINIARIA	-	-	-	-	-	-	-	-	-	-	-	-	-	21	1	-	1	1	8	-	-	12	1	-	-	-	-	-	-	3	-	1	3	28	-	-	-	-	4	48	-	-	-	-	-	-	-	1	-	-	-	1
D0759	Edwardsiidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0761	Nematostella vectensis	-	-	-	44	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G0001	NEMERTEA	-	-	2	-	8	2	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	12	-	-	-	-	-	2	-	20	-	-	-	-
HD0001	NEMATODA	-	5	65	12	31	2	25	25	35	22	-	5	-	8	6	61	16	22	39	6	136	12	206	21	-	3	21	222	3	43	24	27	-	4	2	-	-	-	7	34	1	1	-	3	20	74	32	527	109	217	21	2
K0045	Pedicellina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-
K0050	Barentsia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N0014	Golfingia elongata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0025	Polynoidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0049	Gattyana cirrhosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0052	Harmothoe antilopes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0064	Harmothoe imbricata	-	-	-	-	-	-	-	-	-	-	-	-	-	1	14	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
P0065	Harmothoe impar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	5	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-
	Harmothoe pagenstecheri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0067	Malmgreniella arenicolae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0082	Lepidonotus squamatus	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
P0092	Pholoe baltica (sensu Petersen)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0094	Pholoe inornata (sensu Petersen)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
P0106	Sthenelais (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0107	Sthenelais boa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
P0118	Eteone longa (Type A)	-	-	2	7	-	-	4	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	3	4	55	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	9	-	-
P0118	Eteone longa (agg)	1	-	-	-	8	1	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
P0124	Hypereteone foliosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0145	Anaitides mucosa	1	-	24	9	114	15	135	17	1	2	-	-	-	6	1	-	3	-	2	-	14	7	1	-	10	2	3	6	8	38	3	5	-	-	-	-	-	-	8	-	-	-	-	2	120	33	10	10	24	14	11	-
P0164	Eumida bahusiensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
P0167	Eumida sanguinea	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0262	Glycera oxycephala	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
P0265	Glycera tridactyla	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0271	Goniada maculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
P0305	Psamathe fusca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0321	Syllidia armata	-	-	-	-	-	-	-	-	-	-	-	-	-	22	188	10	-	-	28	-	-	-	-	-	-	1	-	-	-	-	-	-	29	24	1	-	-	-	6	16	-	-	-	-	-	-	-	-	-	-	-	-
P0326	Microphthalmus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0346	Syllidae (epitoke)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0358	Syllis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Syllis "species A"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0365	Syllis armillaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0360	Syllis gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0371	Syllis variegata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-
P0380	Eusyllis blomstrandi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0411	Brania	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-
P0421	Exogone hebes	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0422	Exogone naidina	-	-	-	-	-	-	-	5	3	1	-	1	-	1	-	34	5	-	9	8	2	-	-	2	-	-	-	-	-	-	3	-	2	16	-	-	1	-	16	5	-	-	-	-	-	-	-	-	-	14	-	-
P0423	Exogone verugera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0426	Sphaerosyllis erinaceus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2003 153	2003 154	2003 155	2003 157	2003 158	2003 163	2003 169	2003 171	2003 172	2003 174	2003 179	2003 180	2003 181	2003 189	2003 191	2003 192	2003 193	2003 194	2003 195	2003 204	2003 206	2003 207	2003 209	2003 249	2003 258	2003 260	2003 261	2003 263	2003 267	2003 269	2003 272	2003 275	2003 285	2003 289	2003 295	2003 296	2003 300	2003 301	2003 303	2003 306	2008 150	2008 152	2008 153	2008 154	2008 155	2008 157	2008 158	2008 163	2008 169	2008 171	2008 172	2008 174
P0430	Sphaerosyllis taylori	-	-	-	-	-	-	-	-	-	-	-	-	-	2	46	8	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	1	4	1	-	-	-	-	-	-	-	-	-	-	-	-
P0431	Sphaerosyllis tetralix	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0434	Autolytus	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	5	-	1	45	1	-	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-
P0451	Proceraea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0458	Nereididae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0471	Alitta succinea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0472	Alitta virens	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
P0475	Eunereis longissima	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-
P0462	Hediste diversicolor	57	35	10	56	-	-	2	-	2	1	-	-	-	1	2	-	-	1	-	-	-	-	5	-	1	2	5	2	18	-	-	1	-	-	-	-	1	-	-	-	37	33	36	26	2	-	-	-	1	-	2	-
P0484	Platynereis dumerilii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
P0494	Nephtys (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	1	-	-	-	-	4	-	-	-	-	-	-	1	-	-	-	-	3	-	6	1	-	-	-	-	-	1	-	-	-	-	-	1	1
P0499	Nephtys hombergii	-	-	-	-	1	-	5	4	5	3	9	7	11	-	-	8	3	9	-	7	4	2	5	4	1	-	11	10	1	8	10	10	-	-	2	-	23	1	-	8	-	-	-	-	1	-	1	-	7	8	4	3
P0502	Nephtys kersivalensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0566	Marphysa sanguinea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0579	Lumbrineris gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0613	Ophryotrocha	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0638	Protodorvillea kefersteini	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
P0672	Scoloplos armiger	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	382	1	-	-	-
P0677	Aricidea minuta	-	-	-	-	-	-	-	-	-	-	-	-	-	4	22	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-
P0722	Aonides oxycephala	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0737	Malacoceros fuliginosus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
P0750	Dipolydora coeca (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
P0751	Dipolydora caulleryi	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0752	Polydora ciliata (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0753	Polydora cornuta	-	117	-	100	-	-	-	-	3	-	-	2	-	-	2	-	17	1	-	-	-	1	-	-	-	5	8	9	1	-	12	6	1	1	1	-	-	-	-	8	-	-	-	5	-	-	-	-	-	-	-	1
P0760	Dipolydora quadrilobata	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	3	3	-	-	-	-
P0774	Pseudopolydora pulchra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0776	Pygospio elegans	-	-	13	1	38	9	-	-	-	-	-	-	-	-	-	-	10	-	-	14	1	-	-	-	-	4	15	15	1	-	-	1	-	-	-	-	4	-	1	-	-	-	-	1	13	7	27	9	1	-	2	-
P0791	Spio martinensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0799	Streblospio shrubsolii	49	112	16	440	-	4	459	557	1539	570	26	12	1	1	2	3	213	5	-	21	78	2	5	11	689	318	1779	1258	11	16	104	103	1	-	17	15	62	51	59	2	1	12	-	27	-	1	-	-	89	460	735	172
P0824	Aphelochaeta marioni	-	-	-	-	5	-	-	-	-	11	357	58	77	16	29	71	-	2	63	26	-	86	20	71	-	-	6	4	184	15	6	5	1	-	1	-	12	-	7	3	-	-	-	-	-	-	-	-	-	-	4	-
P0829	Caulleriella alata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0831	Chaetozone zetlandica	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	3	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-
P0838	Cirriformia (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0839	Cirriformia tentaculata	-	-	-	-	-	-	-	-	-	-	-	3	-	12	7	1	-	4	12	-	-	12	14	-	-	-	-	-	-	39	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	3	-
P0847	Tharyx "species A"	-	-	1	31	138	49	134	211	14	4	1	-	-	-	13	-	18	-	2	-	-	-	-	-	84	64	102	141	73	-	-	5	-	-	3	-	2	-	4	-	-	-	-	-	181	10	1	3	60	265	27	9
P0853	Ctenodrilus serratus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	68	-	-
P0871	Cossura pygodactyla	-	-	-	-	-	-	1	-	4	2	2	-	-	-	3	2	1	-	2	-	-	-	-	2	-	-	1	-	-	-	2	-	-	-	2	3	5	-	-	-	-	-	-	1	-	-	-	-	15	30	10	2
P0906	Capitella	-	-	-	2	2	3	-	-	-	-	-	-	-	6	5	1	2	-	3	-	-	-	-	-	-	4	-	1	37	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	8	-	-	53	-	2	-	-
P0919	Mediomastus fragilis	-	-	-	-	-	-	-	-	-	-	-	-	-	12	18	-	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	1	-	-	-	-	-	-	-	-	-	-	-	-
P0920	Notomastus	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
P0928	Arenicolidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0964	Euclymene oerstedii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1026	Scalibregma celticum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1093	Galathowenia oculata	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	1	44	-	-	63	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1107	Lagis koreni	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1117	Sabellaria spinulosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1118	Ampharetidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1124	Melinna palmata	-	-	-	-	-	-	-	1	1	-	1	14	10	24	1	3	6	5	3	81	3	11	18	6	-	-	1	-	-	-	4	-	-	1	-	-	-	-	4	1	-	-	-	-	-	-	-	-	-	-	-	-
P1138	Ampharete grubei	-	-	-	-	-	-	1	-	-	-	1	1	-	5	2	1	-	-	-	3	4	9	16	-	-	-	-	1	1	2	2	2	-	-	1	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-
P1139	Ampharete lindstroemi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
P1143	Amphicteis midas	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1195	Lanice conchilega	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1206	Neoamphitrite figulus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1211	Nicolea zostericola	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1235	Polycirrus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1257	Sabellidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1283	Fabricia stellaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1294	Manayunkia aestuarina	3	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	2	5	1	-	-	-	-	-	-	-	-	-	-	-	15	5	-	38	2	4	1	1	-	1	3	-
P1320	Sabella pavonina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1	51	1	-	-	-	11	1938	-	-	-	-	-	-	-	-	-	-	-	-
P1340	Spirobranchus lamarcki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1402	OLIGOCHAETA (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1420	Paranais litoralis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	145	-	-
P1425	Tubificidae (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1479	Heterochaeta costata	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	11	-	-	-	-	-	-	-	-	-	-	1	59	12	-	3	-	-	-	-	-	-	-	-
P1489	Tubificoides amplivasatus	-	-	-	-	-	-	1	129	12	2	4	-	1	1	1	3	3	4	5	10	-	-	2	4	1	-	-	-	-	-	-	-	3	1	-	-	-	2	5	-	-	-	-	-	-	-	-	-	99	123	45	1
P1490	Tubificoides benedii	1	1	501	224	363	391	1	30	2	2	-	22	-	1	19	1	25	48	65	1	65	9	46	-	4	6	13	210	129	57	7	41	-	-	-	-	2	-	1	10	-	1	2	-	428	414	119	506	-	49	-	-
P1496	Tubificoides insularis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1498	Tubificoides pseudogaster (agg)	-	-	-	4	-	-	54	-	26	47	-	-	-	-	1	1	13	-	-	6	-	-	-	24	18	3	50	61	2	-	1	2	-	-	1	-	6	-	-	4	-	-	-	1	-	4	-	4	53	56	86	63
P1500	Tubificoides swirencoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tubificoides galiciensis	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	5	-	-	1	-	7	-	-	-	-	-	-	38	41	7	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
	Psammoryctides barbatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-
P1501	Enchytraeidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0002	PYCNOGONIDA (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0005	Nymphon brevirostre	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-
Q0015	Achelia echinata (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	24	-	21	1	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	17	-	-	-	-	2	63	-	-	-	-	-	-	-	-	-	-	-	-
Q0018	Achelia longipes (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ammothea hilgendorfi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0032	Callipallene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0044	Anoplodactylus petiolatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0045	Anoplodactylus pygmaeus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0051	Pycnogonum littorale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0054	ACARINA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0142	COPEPODA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	-	-	-	17	-	-
R0142	COPEPODA (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0704	Notodelphys	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0732	Ascidicola rosea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R1035	Alteutha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R1820	Sabelliphilus elongatus	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1247	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2003 153	2003 154	2003 155	2003 157	2003 158	2003 163	2003 169	2003 171	2003 172	2003 174	2003 179	2003 180	2003 181	2003 189	2003 191	2003 192	2003 193	2003 194	2003 195	2003 204	2003 206	2003 207	2003 209	2003 249	2003 258	2003 260	2003 261	2003 263	2003 267	2003 269	2003 272	2003 275	2003 285	2003 289	2003 295	2003 296	2003 300	2003 301	2003 303	2003 306	2008 150	2008 152	2008 153	2008 154	2008 155	2008 157	2008 158	2008 163	2008 169	2008 171	2008 172	2008 174
R2122	Cancerilla tubulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2412	OSTRACODA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2413	MYODOCOPIDA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2432	Eusarsiella zostericola	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	51	17	1	18	3	-	-	1
R2458	PODOCOPIDA	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	130	62	26	1	-	-	-	-	-	-	-
S0074	Mesopodopsis slabberi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0086	Schistomysis kervillei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0102	Apherusa bispinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0107	Apherusa ovalipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0158	Amphilochus manudens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0159	Amphilochus neapolitanus	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
S0164	Gitana sarsi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0213	Stenothoe marina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
S0257	Harpinia pectinata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0360	Argissa hamatipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0380	Iphimedia minuta	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0410	Atylus falcatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0415	Dexamine spinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0416	Dexamine thea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0420	Tritaeta gibbosa	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0423	Ampelisca (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0427	Ampelisca brevicornis	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0429	Ampelisca diadema	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0464	Gammaridae (juv)	-	-	-	-	4	-	13	5	-	-	-	1	-	-	-	-	1	1	-	-	7	-	4	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0481	Gammarus spooneri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0495	Melitidae	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
S0498	Abludomelita obtusata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0503	Cheirocratus	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0505	Cheirocratus intermedius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0506	Cheirocratus sundevallii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0525	Melita palmata	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
S0541	Gammaropsis maculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0550	Microprotopus maculatus	-	1	-	-	-	-	-	-	-	1	-	1	-	1	3	4	-	2	-	5	1	-	19	-	-	-	-	-	1	1	37	2	-	-	-	-	-	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-
S0561	Ericthonius (female)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0562	Ericthonius difformis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0564	Ericthonius punctatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	6	-	-	-	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-
S0568	Jassa	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	2	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-
S0577	Aoridae	1	1	-	18	-	1	2	1	-	-	-	-	-	-	2	19	2	1	2	-	10	3	7	-	-	-	1	-	-	12	28	6	2	35	1	-	-	-	6	141	-	-	-	1	-	-	4	2	2	-	3	1
S0579	Aora gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-	11	-	-	1	-	-	-	-	-	45	-	-	-	-	-	-	-	-	-	-	-	-
S0593	Microdeutopus anomalus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0596	Microdeutopus gryllotalpa	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	5	-	6	-	-	1	-	1	-	2	-	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	4	2	-
	Grandidierella japonica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0616	Corophium volutator	-	-	-	38	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-
S0606	Monocorophium acherusicum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0612	Monocorophium insidiosum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	28	-	-	-	-	-	-	-	-	-	-	-	-
S0615	Monocorophium sextonae	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0610	Crassicorophium bonnellii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0611	Crassicorophium crassicorne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0607	Apocorophium acutum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0621	Unciola crenatipalma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0628	Dyopedos monacanthus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
S0646	Caprella linearis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
S0651	Pariambus typicus	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1	17	-	-	1	5	-	-	3	-	-	-	-	-	-	-	2	-	1	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0805	Cyathura carinata	-	29	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	5	-	-	-	-	-	-	-	-
	Lekanesphaera levii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0885	Jaera albifrons (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
S0901	Munna	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0935	Idotea baltica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0936	Idotea chelipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
S1112	Heterotanais oerstedi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1197	Bodotria scorpioides	-	-	-	-	-	-	-	-	-	-	-	-	-	2	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
S1208	Eudorella truncatula	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1224	Cumella pygmaea	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-
S1276	DECAPODA (zoea)	-	-	-	-	1	-	2	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1315	Palaemon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1350	Hippolyte varians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1360	Thoralus cranchii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1385	Crangon crangon	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
S1577	Liocarcinus (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1594	Carcinus maenas	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-	2	-	1	-	2	3	1	-	1	-	5	4	2	4	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	-	-	-	-	-	-	-
	THYSANOPTERA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
	DIPTERA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chironomidae	-	1	1	-	18	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	1	-	2	-	-	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	4	-	2	-	-	1	2	-
	Dolichopodidae (larva)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	COLEOPTERA (larva)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	COLLEMBOLA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0079	Lepidochitona cinerea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0163	Gibbula cineraria	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0296	Littorina littorea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0305	Littorina saxatilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0328	Rissoa interrupta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0385	Hydrobia ulvae	23	8	430	39	190	61	4	4	1	1	-	19	-	-	1	-	56	10	-	-	249	-	25	1	20	1	2	146	336	116	5	23	-	1	-	-	2	-	4	2	4	-	4	2	71	9	46	39	1	9	-	-
W0421	Tornus subcarinatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0439	Crepidula fornicata (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0439	Crepidula fornicata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	18	-	1	-	-	-	2	1	-	-	-	-	-	-	-	1	-	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0913	Odostomia plicata	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0919	Brachystomia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1077	Retusa obtusa	-	-	3	10	45	5	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-	-
W1118	Elysia viridis (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2003 153	2003 154	2003 155	2003 157	2003 158	2003 163	2003 169	2003 171	2003 172	2003 174	2003 179	2003 180	2003 181	2003 189	2003 191	2003 192	2003 193	2003 194	2003 195	2003 204	2003 206	2003 207	2003 209	2003 249
W1127	Alderia modesta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1136	Limapontia depressa	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1292	Embletonia pulchra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1431	Cuthona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1563	Nuculidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1569	Nucula nitidosa	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-
W1570	Nucula nucleus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1695	Mytilus edulis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
W1906	Kurtiella bidentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
W1949	Parvicardium exiguum	-	-	-	-	-	-	-	-	-	-	-	1	-	3	7	-	-	1	2	-	-	-	-	-
W1961	Cerastoderma edule	-	-	4	-	5	1	18	9	1	-	1	2	4	-	1	-	7	14	-	39	3	4	2	1
W1997	Ensis americanus (juv)	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	2	-	-	1	-	-	-	1
W2029	Macoma balthica	3	-	7	6	7	24	2	4	3	-	-	2	-	-	-	-	13	6	-	8	9	-	-	-
W2068	Scrobicularia plana	-	-	1	-	-	1	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
W2059	Abra alba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	-	-
W2061	Abra nitida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2064	Abra tenuis	3	4	398	8	39	68	5	30	2	1	-	4	-	-	1	-	102	4	-	2	101	1	8	-
	Tapes philippinarum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2124	Venerupis senegalensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2137	Petricola pholadiformis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2147	Mya truncata (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2149	Mya arenaria	-	4	-	-	-	1	3	2	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-
Y0075	Alcyonidium cellarioides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0076	Alcyonidium diaphanum	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-
Y0080	Alcyonidium mytili	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-
Y0081	Alcyonidium parasiticum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0091	Nolella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-
Y0096	Anguinella palmata	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	-	-	-	-	-	-
Y0098	Victorella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0112	Walkeria uva	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0122	Farrella repens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0131	Vesicularia spinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0137	Bowerbankia	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	-	-	-	-	P	-
Y0172	Conopeum reticulum	-	P	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	-	-	-	-	-	-
Y0177	Electra monostachys	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0178	Electra pilosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0182	Aspidelectra melolontha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0240	Bugula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0246	Bugula plumosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-
Y0256	Bicellariella ciliata	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	P	-	-	P	-	-	-	-	-
Y0279	Scrupocellaria scruposa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0280	Tricellaria (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0411	Cryptosula pallasiana	-	-	-	-	-	-	-	-	-	-	P	-	-	-	P	-	-	-	-	-	-	-	-	-
Y0463	Smittoidea reticulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZA0003	Phoronis	-	-	-	-	-	-	3	48	2	4	-	1	-	-	-	-	-	-	-	-	-	-	-	-
ZB0148	Amphiuridae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZB0161	Amphipholis squamata	-	-	-	-	-	-	-	-	-	-	-	-	-	1	18	-	-	-	4	-	-	4	-	-
ZB0262	Thyone fusus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
ZC0012	ENTEROPNEUSTA	-	-	-	-	-	-	-	-	-	-	-	-	1	20	2	1	-	-	-	-	-	-	-	-
ZD0002	ASCIDIACEA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0002	ASCIDIACEA (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0041	Didemnidae	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	-	-	-	-	-
ZD0078	Perophora listeri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0084	Ascidiella aspersa	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	11	-	-	-	-	-
ZD0088	Ascidia conchilega	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0104	Styela clava	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0115	Polycarpa pomaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
ZD0120	Dendrodoa grossularia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0126	Botryllus schlosseri	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-
ZD0128	Botrylloides leachi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-
ZD0140	Pyura squamulosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0146	Molgula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
ZG0001	OSTEICHTHYES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0034	Clupea harengus (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0476	Pomatoschistus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Group	StA	StA	StB	StB	StB	StB	StC	StC	StC	StC	StD	StD	StD	StF	StF	StF	StE	StE	StF	StG	StG	StG	StG	StD
	No. Taxa (S)	13	16	18	21	24	20	23	20	22	16	11	20	11	59	54	44	31	26	56	23	23	24	28	13
	No. Individuals (N)	145	338	1480	1056	1032	647	876	1087	1663	674	403	158	115	285	451	298	578	158	398	312	711	191	435	152
	Margalef's species richness (d)	2.411	2.404	2.329	2.873	3.314	2.936	3.247	2.718	2.697	2.303	1.500	3.753	2.108	8.846	7.200	6.495	4.717	4.741	8.018	3.831	3.350	4.189	4.115	2.389
	Pielou's evenness (J)	0.587	0.628	0.520	0.635	0.643	0.494	0.503	0.536	0.144	0.256	0.224	0.716	0.517	0.849	0.644	0.708	0.654	0.783	0.759	0.749	0.628	0.702	0.652	0.678
	Shannon Wiener (H'(loge))	1.507	1.702	1.504	1.933	2.042	1.479	1.579	1.606	0.437	0.709	0.516	2.146	1.240	3.337	2.451	2.574	2.245	2.519	2.954	2.349	1.969	2.201	2.126	1.738

Species directory code	Taxon Name	2003 258	2003 260	2003 261	2003 263	2003 267	2003 269	2003 272	2003 275	2003 285	2003 289	2003 295	2003 296	2003 300	2003 301	2003 303	2003 306	2008 150	2008 152	2008 153	2008 154	2008 155	2008 157	2008 158	2008 163	2008 169	2008 171	2008 172	2008 174
W1127	Alderia modesta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	6	1	4
W1136	Limapontia depressa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	2	1
W1292	Embletonia pulchra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1431	Cuthona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
W1563	Nuculidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1	-
W1569	Nucula nitidosa	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1570	Nucula nucleus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1695	Mytilus edulis	-	-	-	-	1	-	-	-	-	1	-	-	-	-	1	9	-	-	-	-	-	-	-	-	-	-	-	-
W1906	Kurtiella bidentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
W1949	Parvicardium exiguum	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1961	Cerastoderma edule	20	-	26	28	14	30	5	58	-	-	-	-	4	-	-	-	-	-	-	-	1	1	10	-	1	-	1	1
W1997	Ensis americanus (juv)	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2029	Macoma balthica	1	-	14	13	3	15	-	2	-	-	1	-	1	-	-	1	-	-	-	-	8	3	4	1	7	10	4	3
W2068	Scrobicularia plana	-	-	-	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	108	-	-	-	-	-	-	-	-	-
W2059	Abra alba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
W2061	Abra nitida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2064	Abra tenuis	-	-	3	21	8	22	1	6	-	-	-	-	-	-	-	-	-	-	115	-	70	196	92	39	2	1	-	-
	Tapes philippinarum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
W2124	Venerupis senegalensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2137	Petricola pholadiformis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2147	Mya truncata (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2149	Mya arenaria	37	6	61	39	4	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0075	Alcyonidium cellarioides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0076	Alcyonidium diaphanum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0080	Alcyonidium mytili	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-
Y0081	Alcyonidium parasiticum	-	-	-	-	-	-	-	-	P	P	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-
Y0091	Nolella	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0096	Anguinella palmata	-	-	-	-	-	-	-	-	P	P	-	-	-	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-
Y0098	Victorella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-
Y0112	Walkeria uva	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0122	Farrella repens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0131	Vesicularia spinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0137	Bowerbankia	-	-	P	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0172	Conopeum reticulum	-	-	-	-	-	-	-	-	P	P	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0177	Electra monostachys	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0178	Electra pilosa	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0182	Aspidelectra melolontha	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0240	Bugula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0246	Bugula plumosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0256	Bicellariella ciliata	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-
Y0279	Scrupocellaria scruposa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0280	Tricellaria (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0411	Cryptosula pallasiana	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0463	Smittoidea reticulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZA0003	Phoronis	-	-	-	-	-	-	-	-	-	-	2	-	-	2	-	1	-	-	-	-	-	-	-	-	1	44	-	175
ZB0148	Amphiuridae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZB0161	Amphipholis squamata	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZB0262	Thyone fusus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZC0012	ENTEROPNEUSTA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	1	7	-	-	-	-	-	-
ZD0002	ASCIDIACEA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0002	ASCIDIACEA (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
ZD0041	Didemnidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0078	Perophora listeri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0084	Ascidiella aspersa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0088	Ascidia conchilega	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0104	Styela clava	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0115	Polycarpa pomaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-
ZD0120	Dendrodoa grossularia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0126	Botryllus schlosseri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0128	Botrylloides leachi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0140	Pyura squamulosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0146	Molgula	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	26	-	-	-	-	-	-	-	-	-	-	-	-
ZG0001	OSTEICHTHYES	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0034	Clupea harengus (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-	-	-
ZG0476	Pomatoschistus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Group	OrA	OrA	OrA	OrA	OrB	OrB	OrB	OrB	OrC	OrC	OrD	OrD	OrD	OrD	OrC	OrC	StA	StA	StA	StA	StB	StB	StB	StB	StC	StC	StC	StC
	No. Taxa (S)	16	15	24	29	29	23	29	24	33	45	20	4	14	7	51	51	12	11	8	21	27	21	17	22	21	29	22	18
	No. Individuals (N)	894	423	2134	2276	857	468	326	323	67	275	44	21	126	64	222	3727	121	199	329	146	999	799	354	1638	485	1595	970	441
	Margalef's species richness (d)	2.207	2.315	2.870	3.622	4.146	3.578	4.666	3.981	5.708	5.163	5.021	0.657	2.688	1.443	7.959	5.351	1.877	1.511	1.208	3.411	3.330	2.843	2.556	2.567	3.072	3.661	3.054	2.628
	Pielou's evenness (J)	0.346	0.355	0.266	0.510	0.557	0.789	0.731	0.712	0.747	0.742	0.806	0.725	0.654	0.419	0.800	0.365	0.574	0.531	0.678	0.721	0.577	0.510	0.668	0.547	0.696	0.693	0.343	0.481
	Shannon Wiener (H'(loge))	0.960	0.960	0.835	1.716	1.877	2.474	2.435	2.262	2.405	2.524	2.414	0.796	1.726	0.814	3.028	1.389	1.322	1.166	1.410	2.083	1.835	1.528	1.851	1.637	2.084	2.310	1.062	1.361

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2008 179	2008 180	2008 181	2008 189	2008 191	2008 192	2008 193	2008 194	2008 195	2008 204	2008 206	2008 207	2008 209	2008 249	2008 258	2008 260	2008 261	2008 263	2008 267	2008 269	2008 272	2008 275	2008 285	2008 289	2008 295	2008 296	2008 300	2008 301	2008 303	2008 306	2009 150	2009 152	2009 153	2009 154	2009 155	2009 157	2009 158	2009 163	2009 169	2009 171	2009 172	2009 174	2009 179	2009 180	2009 181	2009 189	2009 191	2009 192	2009 193	2009 194	2009 195	2009 204
	Gloeotrichia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0001	RHODOPHYTA	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0170	Palmaria palmata	-	-	-	-	P	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0417	Polyides rotundus	-	-	-	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-
ZM0431	Gracilaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0443	Plocamium cartilagineum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0507	Ceramium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-
ZM0554	Pterothamnion plumula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-
ZM0592	Cryptopleura ramosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-
ZM0655	Polysiphonia	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	P	-	-	-	-	-	-	-	-	-	-
ZR0015	Ectocarpus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-
ZS0001	CHLOROPHYTA	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0039	Spongomorpha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0149	Enteromorpha	-	-	-	-	-	P	-	P	P	-	P	-	P	-	-	P	-	-	P	P	-	P	-	-	-	P	-	-	-	-	P	P	-	-	P	P	-	P	-	-	P	-	-	P	-	-	-	-	P	P	P	P
ZS0174	Ulva	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	-	-	P	P	P	-	-	-
ZS0189	Chaetomorpha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0195	Cladophora	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	P	-	-	-	-
	BRYOPHYTA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-
	Lemnaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ANIMALIA (eggs)	-	-	-	P	-	-	-	P	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	P	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A0001	PROTOZOA (?)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lagotia viridis	-	-	-	-	P	-	-	-	P	-	-	-	-	P	-	-	-	-	-	-	P	-	P	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	P	-	-	-	P	-
C0001	PORIFERA	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	-	-
C0053	Leucosolenia	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
C0133	Scypha ciliata	-	-	-	P	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0475	Cliona	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C1686	Halisarca dujardini	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
D0158	Tubulariidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0218	Eudendrium	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0246	Bougainvilliidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0336	Lovenella clausa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0341	Opercularella lacerata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0348	Calycella syringa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0390	Halecium	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0424	Hydrallmania falcata	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
D0427	Sertularella	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0433	Sertularia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0445	Tridentata distans	-	-	-	P	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0447	Plumulariidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0455	Kirchenpaueria pinnata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-
D0469	Plumularia setacea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0491	Campanulariidae	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	P	-	P	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-
D0502	Clytia gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0503	Clytia hemisphaerica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0515	Laomedea flexuosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0662	ACTINIARIA	-	-	-	12	-	-	-	-	12	-	-	1	-	-	-	-	-	-	-	2	3	-	2	11	-	-	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-	16	-
D0759	Edwardsiidae	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0761	Nematostella vectensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	1	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G0001	NEMERTEA	-	-	-	4	-	-	-	1	11	-	1	-	-	-	-	-	-	-	-	-	-	-	3	5	-	-	-	-	-	-	-	-	-	-	-	1	-	13	-	-	-	-	-	-	1	1	-	-	-	-	2	-
HD0001	NEMATODA	-	3	-	132	15	7	804	31	84	4	42	39	3	6	6	11	60	78	83	135	87	10	-	92	-	-	-	-	5	13	-	3	1	10	35	6	3	129	11	-	12	-	-	-	18	159	62	2	34	-	30	-
K0045	Pedicellina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
K0050	Barentsia	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N0014	Golfingia elongata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0025	Polynoidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0049	Gattyana cirrhosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
P0052	Harmothoe antilopes	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0064	Harmothoe imbricata	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
P0065	Harmothoe impar	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Harmothoe pagenstecheri	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0067	Malmgreniella arenicolae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-
P0082	Lepidonotus squamatus	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P0092	Pholoe baltica (sensu Petersen)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P0094	Pholoe inornata (sensu Petersen)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
P0106	Sthenelais (juv)	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0107	Sthenelais boa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0118	Eteone longa (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	8	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0118	Eteone longa (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	1	-	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0124	Hypereteone foliosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0145	Anaitides mucosa	-	-	-	1	5	6	93	4	1	12	7	10	2	-	1	4	1	7	-	4	9	2	-	-	-	-	-	-	-	-	1	3	2	2	2	-	1	8	-	-	-	-	-	-	1	1	1	-	5	1	-	-
P0164	Eumida bahusiensis	-	-	-	-	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0167	Eumida sanguinea	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P0262	Glycera oxycephala	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0265	Glycera tridactyla	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
P0271	Goniada maculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0305	Psamathe fusca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P0321	Syllidia armata	-	-	-	6	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	5	7	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
P0326	Microphthalmus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0346	Syllidae (epitoke)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0358	Syllis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	Syllis "species A"	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	-
P0365	Syllis armillaris	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0360	Syllis gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-
P0371	Syllis variegata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0380	Eusyllis blomstrandi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0411	Brania	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0421	Exogone hebes	-	-	-	3	1	-	-	-	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	1	-	-	-	5	-
P0422	Exogone naidina	-	6	-	36	2	2	26	2	18	2	-	-	-	-	-	-	-	-	-	-	-	-	5	23	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	41	9	-	2	-	3	-
P0423	Exogone verugera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0426	Sphaerosyllis erinaceus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory		2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008
code	Taxon Name	179	180	181	189	191	192	193	194	195	204	206	207	209	249	258	260	261	263	267	269	272	275	285	289	295	296	300	301	303	306
P0430	Sphaerosyllis taylori	-	-	-	12	12	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	-	-
P0431	Sphaerosyllis tetralix	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	2	-
P0434	Autolytus	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12	-	-	-	-	7	-
P0451	Proceraea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0458	Nereididae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-
P0471	Alitta succinea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0472	Alitta virens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	7	-	-	-	-	-	-	-	-	-	-
P0475	Eunereis longissima	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	2
P0462	Hediste diversicolor	-	1	-	-	-	-	-	1	-	-	3	1	1	-	1	12	13	7	-	-	-	-	-	-	-	-	-	-	-	-
P0484	Platynereis dumerilii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0494	Nephtys (juv)	-	3	3	-	-	3	-	2	2	2	-	-	1	6	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-
P0499	Nephtys hombergii	15	12	8	-	-	2	7	7	1	11	1	-	5	7	2	-	11	4	1	7	7	10	-	-	1	-	1	3	1	3
P0502	Nephtys kersivalensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0566	Marphysa sanguinea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0579	Lumbrineris gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P0613	Ophryotrocha	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0638	Protodorvillea kefersteini	-	-	-	1	3	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3	4	-	-	-	-	-	2
P0672	Scoloplos armiger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0677	Aricidea minuta	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-	-	-	-	-
P0722	Aonides oxycephala	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-
P0737	Malacoceros fuliginosus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0750	Dipolydora coeca (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0751	Dipolydora caulleryi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0752	Polydora ciliata (agg)	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
P0753	Polydora cornuta	-	-	-	-	-	-	-	-	-	-	-	1	1	-	7	33	38	9	6	4	4	-	-	-	7	-	-	-	-	2
P0760	Dipolydora quadrilobata	-	-	-	-	-	-	-	2	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0774	Pseudopolydora pulchra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P0776	Pygospio elegans	-	4	3	-	-	-	73	1	-	-	-	3	-	-	20	31	12	8	11	1	2	-	-	-	-	-	-	-	-	-
P0791	Spio martinensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0799	Streblospio shrubsolii	5	188	1	1	-	1	10	1	1	108	17	2	14	12	368	836	408	168	127	33	83	25	-	1	-	-	-	49	-	2
P0824	Aphelochaeta marioni	378	2	102	74	12	141	-	45	61	3	-	32	1	3	-	-	1	-	9	-	4	-	6	-	-	-	-	-	3	1
P0829	Caulleriella alata	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P0831	Chaetozone zetlandica	-	-	1	7	1	14	1	7	1	-	-	7	1	-	-	-	-	-	-	-	1	1	33	18	2	-	-	-	1	5
P0838	Cirriformia (juv)	-	-	-	-	-	-	-	15	2	-	-	37	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	1	-
P0839	Cirriformia tentaculata	-	1	-	10	5	-	-	33	6	-	-	54	-	-	-	2	-	-	-	41	-	-	-	3	-	-	-	-	-	-
P0847	Tharyx "species A"	3	29	-	-	2	-	143	27	-	16	-	9	10	5	69	310	51	-	22	12	48	11	1	-	-	-	-	1	-	-
P0853	Ctenodrilus serratus	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0871	Cossura pygodactyla	-	1	-	-	-	-	1	-	20	-	-	-	-	4	-	-	-	-	-	1	9	1	-	-	-	1	-	5	2	2
P0906	Capitella	-	-	-	-	1	4	3	2	-	-	-	-	-	-	-	113	-	-	1	1	1	-	1	3	-	-	-	-	-	-
P0919	Mediomastus fragilis	-	-	-	14	6	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	9	-	-	-	-	5	-
P0920	Notomastus	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	6	-	-	-	-	-	-
P0928	Arenicolidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0964	Euclymene oerstedii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1026	Scalibregma celticum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
P1093	Galathowenia oculata	-	-	46	1	-	13	14	1	-	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1107	Lagis koreni	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1117	Sabellaria spinulosa	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1118	Ampharetidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1124	Melinna palmata	2	3	18	10	-	11	2	4	4	21	-	-	9	4	-	-	1	-	-	-	5	1	1	1	-	-	-	3	-	3
P1138	Ampharete grubei	-	-	2	-	-	5	2	18	-	1	-	3	4	-	-	-	-	1	1	1	4	-	2	-	-	-	-	-	-	4
P1139	Ampharete lindstroemi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1143	Amphicteis midas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1
P1195	Lanice conchilega	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	5	-	-	-	-	-	-
P1206	Neoamphitrite figulus	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
P1211	Nicolea zostericola	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1235	Polycirrus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1257	Sabellidae (juv)	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1283	Fabricia stellaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1294	Manayunkia aestuarina	3	1	-	-	-	-	422	-	-	-	-	-	-	-	-	3	3	8	36	-	-	1	-	-	-	-	-	-	-	-
P1320	Sabella pavonina	-	-	-	-	-	-	-	-	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	116	-
P1340	Spirobranchus lamarcki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
P1402	OLIGOCHAETA (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1420	Paranais litoralis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
P1425	Tubificidae (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
P1479	Heterochaeta costata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1489	Tubificoides amplivasatus	1	33	-	-	-	1	17	31	55	17	1	7	18	29	-	-	-	-	-	-	23	5	8	8	-	-	-	1	13	-
P1490	Tubificoides benedii	-	-	-	1	6	-	105	61	1	2	84	47	29	-	5	35	4	31	32	14	-	1	3	1	-	-	-	-	7	7
P1496	Tubificoides insularis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1498	Tubificoides pseudogaster (agg)	1	36	1	1	1	-	27	7	12	16	-	-	-	49	12	40	12	5	21	18	3	-	1	-	-	-	-	-	18	-
P1500	Tubificoides swirencoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tubificoides galiciensis	-	-	-	-	-	-	-	49	-	2	-	-	34	-	-	-	-	-	-	17	38	10	-	-	-	-	-	-	-	-
	Psammoryctides barbatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1501	Enchytraeidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0002	PYCNOGONIDA (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0005	Nymphon brevirostre	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Q0015	Achelia echinata (agg)	-	-	-	3	-	-	-	-	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-
Q0018	Achelia longipes (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ammothea hilgendorfi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0032	Callipallene	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0044	Anoplodactylus petiolatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0045	Anoplodactylus pygmaeus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Q0051	Pycnogonum littorale	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0054	ACARINA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0142	COPEPODA	-	-	-	6	-	-	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0142	COPEPODA (Type A)	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0704	Notodelphys	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0732	Ascidicola rosea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R1035	Alteutha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
R1820	Sabelliphilus elongatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-

Species directory		2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009	2009
code	Taxon Name	150	152	153	154	155	157	158	163	169	171	172	174	179	180	181	189	191	192	193	194	195	204
P0430	Sphaerosyllis taylori	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	18	-	-	-	1	-
P0431	Sphaerosyllis tetralix	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0434	Autolytus	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	4	3	-	-	-	-	-
P0451	Proceraea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0458	Nereididae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
P0471	Alitta succinea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0472	Alitta virens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0475	Eunereis longissima	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0462	Hediste diversicolor	52	38	49	33	-	-	-	-	1	1	1	-	-	-	-	-	2	-	2	13	-	-
P0484	Platynereis dumerilii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	5	-
P0494	Nephtys (juv)	-	-	-	-	-	-	-	-	5	1	-	7	8	4	-	1	-	2	-	-	-	4
P0499	Nephtys hombergii	5	-	-	-	-	2	1	-	5	-	6	3	4	9	9	-	-	2	3	-	1	13
P0502	Nephtys kersivalensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
P0566	Marphysa sanguinea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0579	Lumbrineris gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0613	Ophryotrocha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-
P0638	Protodorvillea kefersteini	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P0672	Scoloplos armiger	-	-	-	-	2	8	3	633	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0677	Aricidea minuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
P0722	Aonides oxycephala	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0737	Malacoceros fuliginosus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0750	Dipolydora coeca (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	2	-	-	-	-	-
P0751	Dipolydora caulleryi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0752	Polydora ciliata (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0753	Polydora cornuta	-	-	-	5	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
P0760	Dipolydora quadrilobata	-	-	-	-	-	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0774	Pseudopolydora pulchra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0776	Pygospio elegans	1	-	-	-	15	-	4	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
P0791	Spio martinensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0799	Streblospio shrubsolii	32	11	1	43	3	2	-	-	3	9	4	1	-	-	-	-	-	-	31	1	-	13
P0824	Aphelochaeta marioni	-	-	1	-	-	1	-	-	1	-	1	-	511	-	117	114	65	9	-	-	259	1
P0829	Caulleriella alata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0831	Chaetozone zetlandica	-	-	-	-	-	-	-	-	1	-	-	-	-	-	5	-	6	1	-	-	39	-
P0838	Cirriformia (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
P0839	Cirriformia tentaculata	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	10	1	-	-	-	3	-
P0847	Tharyx "species A"	3	-	-	1	176	-	14	40	-	18	-	-	-	-	-	-	9	-	15	12	-	-
P0853	Ctenodrilus serratus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0871	Cossura pygodactyla	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0906	Capitella	1	-	-	1	119	1	-	23	-	-	-	-	-	-	-	-	2	-	-	2	1	-
P0919	Mediomastus fragilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31	26	-	-	-	38	-
P0920	Notomastus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0928	Arenicolidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
P0964	Euclymene oerstedii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1026	Scalibregma celticum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1093	Galathowenia oculata	-	-	-	-	-	-	-	2	-	-	-	-	13	-	41	1	-	1	3	-	1	36
P1107	Lagis koreni	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1117	Sabellaria spinulosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
P1118	Ampharetidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1124	Melinna palmata	-	-	-	-	-	-	-	-	-	-	-	-	3	1	15	4	1	2	-	1	5	13
P1138	Ampharete grubei	-	-	-	-	-	-	-	-	-	-	-	-	2	-	3	-	2	3	1	4	-	-
P1139	Ampharete lindstroemi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1143	Amphicteis midas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
P1195	Lanice conchilega	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	1	-	-	-	-	-
P1206	Neoamphitrite figulus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-
P1211	Nicolea zostericola	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1235	Polycirrus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P1257	Sabellidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P1283	Fabricia stellaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1294	Manayunkia aestuarina	-	9	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
P1320	Sabella pavonina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	4	-	-	-	-	24	-
P1340	Spirobranchus lamarcki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1402	OLIGOCHAETA (eggs)	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1420	Paranais litoralis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1425	Tubificidae (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1479	Heterochaeta costata	1	37	-	1	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
P1489	Tubificoides amplivasatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
P1490	Tubificoides benedii	4	-	3	4	1700	49	178	360	-	24	1	-	-	1	-	-	12	-	58	9	9	-
P1496	Tubificoides insularis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1498	Tubificoides pseudogaster (agg)	-	-	-	1	8	3	-	-	-	1	-	-	-	-	-	-	20	-	-	-	3	-
P1500	Tubificoides swirencoides	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tubificoides galiciensis	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	2	3
	Psammoryctides barbatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1501	Enchytraeidae	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0002	PYCNOGONIDA (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0005	Nymphon brevirostre	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0015	Achelia echinata (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	1	17	-	-	-	3	-
Q0018	Achelia longipes (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ammothea hilgendorfi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0032	Callipallene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0044	Anoplodactylus petiolatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Q0045	Anoplodactylus pygmaeus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-
Q0051	Pycnogonum littorale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Q0054	ACARINA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0142	COPEPODA	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	4	-
R0142	COPEPODA (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0704	Notodelphys	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0732	Ascidicola rosea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R1035	Alteutha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R1820	Sabelliphilus elongatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2008 179	2008 180	2008 181	2008 189	2008 191	2008 192	2008 193	2008 194	2008 195	2008 204	2008 206	2008 207	2008 209	2008 249	2008 258	2008 260	2008 261	2008 263	2008 267	2008 269	2008 272	2008 275	2008 285	2008 289	2008 295	2008 296	2008 300	2008 301	2008 303	2008 306	2009 150	2009 152	2009 153	2009 154	2009 155	2009 157	2009 158	2009 163	2009 169	2009 171	2009 172	2009 174	2009 179	2009 180	2009 181	2009 189	2009 191	2009 192	2009 193	2009 194	2009 195	2009 204
R2122	Cancerilla tubulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-
R2412	OSTRACODA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2413	MYODOCOPIDA	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
R2432	Eusarsiella zostericola	3	17	24	1	-	7	83	1	2	51	-	4	3	1	-	-	-	-	-	-	1	-	1	-	4	-	1	11	6	3	-	-	-	2	-	-	2	3	4	-	4	3	20	2	12	-	1	1	41	-	6	32
R2458	PODOCOPIDA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0074	Mesopodopsis slabberi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0086	Schistomysis kervillei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0102	Apherusa bispinosa	-	-	-	1	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0107	Apherusa ovalipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0158	Amphilochus manudens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0159	Amphilochus neapolitanus	-	-	-	7	1	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-
S0164	Gitana sarsi	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
S0213	Stenothoe marina	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0257	Harpinia pectinata	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0360	Argissa hamatipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0380	Iphimedia minuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0410	Atylus falcatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0415	Dexamine spinosa	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0416	Dexamine thea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0420	Tritaeta gibbosa	-	-	-	13	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32	-	-	-	-	-	-
S0423	Ampelisca (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0427	Ampelisca brevicornis	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0429	Ampelisca diadema	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
S0464	Gammaridae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0481	Gammarus spooneri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0495	Melitidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0498	Abludomelita obtusata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
S0503	Cheirocratus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-
S0505	Cheirocratus intermedius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
S0506	Cheirocratus sundevallii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0525	Melita palmata	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	4	4	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0541	Gammaropsis maculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0550	Microprotopus maculatus	-	-	1	-	6	5	-	6	-	-	-	-	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-	-	1	-	-	1	1	-	24	-	10	1	-	-	-	-
S0561	Ericthonius (female)	-	-	-	-	-	-	-	-	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
S0562	Ericthonius difformis	-	-	-	-	-	-	-	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
S0564	Ericthonius punctatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
S0568	Jassa	-	-	-	2	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	1	-	-	-	-
S0577	Aoridae	-	-	-	-	-	-	6	3	8	1	-	2	2	-	-	-	-	3	-	55	21	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	45	12	1	1	2	9	-
S0579	Aora gracilis	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	4	-	-	-	2	-
S0593	Microdeutopus anomalus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0596	Microdeutopus gryllotalpa	-	-	-	-	-	-	2	1	-	-	-	-	3	-	-	-	-	1	-	7	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
	Grandidierella japonica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0616	Corophium volutator	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-	-	-	-	-	-	-	-	-	4	1394	31	21	2	-	-	1	3	-	1	-	-	-	1	-	-	-	-	-	-	-	-
S0606	Monocorophium acherusicum	-	-	-	-	-	1	-	-	-	-	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	9	2	4	-	-	10	-
S0612	Monocorophium insidiosum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0615	Monocorophium sextonae	-	-	-	2	-	-	-	-	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0610	Crassicorophium bonnellii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0611	Crassicorophium crassicorne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0607	Apocorophium acutum	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0621	Unciola crenatipalma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0628	Dyopedos monacanthus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0646	Caprella linearis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
S0651	Pariambus typicus	-	1	5	2	-	18	-	10	1	50	-	-	3	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	1	1	24	-	3	1	-	-	1	-
S0805	Cyathura carinata	-	-	-	-	1	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	12	1	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lekanesphaera levii	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
S0885	Jaera albifrons (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0901	Munna	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0935	Idotea baltica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0936	Idotea chelipes	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1112	Heterotanais oerstedi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1197	Bodotria scorpioides	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
S1208	Eudorella truncatula	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
S1224	Cumella pygmaea	-	-	-	10	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
S1276	DECAPODA (zoea)	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1315	Palaemon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1350	Hippolyte varians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1360	Thoralus cranchii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1385	Crangon crangon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1577	Liocarcinus (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1594	Carcinus maenas	-	-	-	1	-	1	-	1	-	-	-	-	1	-	1	-	1	1	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	1	1	-	-	-	-	-
	THYSANOPTERA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DIPTERA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chironomidae	-	1	-	-	-	-	116	-	-	-	-	1	-	-	-	1	-	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-
	Dolichopodidae (larva)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	COLEOPTERA (larva)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	COLLEMBOLA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0079	Lepidochitona cinerea	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
W0163	Gibbula cineraria	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0296	Littorina littorea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0305	Littorina saxatilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0328	Rissoa interrupta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0385	Hydrobia ulvae	-	1	-	-	-	-	172	-	-	-	68	-	2	-	6	4	6	1	14	7	-	1	-	-	-	-	-	-	-	-	1	22	6	-	21	3	91	20	-	-	-	-	-	2	-	-	-	-	44	356	-	-
W0421	Tornus subcarinatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0439	Crepidula fornicata (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	-	-
W0439	Crepidula fornicata	-	-	-	37	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	13	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	32	-	-	-	1	-
W0913	Odostomia plicata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0919	Brachystomia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1077	Retusa obtusa	-	-	-	-	-	-	2	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1118	Elysia viridis (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2008 179	2008 180	2008 181	2008 189	2008 191	2008 192	2008 193	2008 194	2008 195	2008 204	2008 206	2008 207	2008 209	2008 249	2008 258	2008 260	2008 261	2008 263	2008 267	2008 269	2008 272	2008 275	2008 285	2008 289	2008 295	2008 296	2008 300	2008 301	2008 303	2008 306
W1127	Alderia modesta	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	4	31	-	-	-	-	-	-	-	-	-
W1136	Limapontia depressa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	-	-	-	-	-	-	-	-	-
W1292	Embletonia pulchra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1431	Cuthona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1563	Nuculidae (juv)	-	-	-	2	-	1	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
W1569	Nucula nitidosa	-	-	-	-	-	-	-	1	-	5	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	4	2	-	-
W1570	Nucula nucleus	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1695	Mytilus edulis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
W1906	Kurtiella bidentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
W1949	Parvicardium exiguum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1961	Cerastoderma edule	-	2	-	-	-	-	-	1	-	3	1	3	-	-	7	8	9	4	-	14	-	12	-	-	-	-	-	-	-	-
W1997	Ensis americanus (juv)	-	-	2	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2029	Macoma balthica	2	5	-	-	-	-	13	1	-	17	7	-	1	-	6	1	-	1	14	3	1	6	-	-	-	-	1	-	-	-
W2068	Scrobicularia plana	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	-	-	-
W2059	Abra alba	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2061	Abra nitida	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
W2064	Abra tenuis	-	3	-	-	-	-	419	7	-	-	55	2	6	-	1	-	-	3	3	1	-	3	-	-	-	-	-	-	-	-
	Tapes philippinarum	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
W2124	Venerupis senegalensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2137	Petricola pholadiformis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2147	Mya truncata (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	9	-	1	-	-	-	-	-	-	-	-	-	-	-	-
W2149	Mya arenaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0075	Alcyonidium cellarioides	-	-	-	P	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	P
Y0076	Alcyonidium diaphanum	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0080	Alcyonidium mytili	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
Y0081	Alcyonidium parasiticum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0091	Nolella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0096	Anguinella palmata	-	-	-	P	-	P	-	-	P	-	-	-	P	-	-	-	-	P	-	-	-	-	P	P	P	P	-	-	-	-
Y0098	Victorella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0112	Walkeria uva	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0122	Farrella repens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-
Y0131	Vesicularia spinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-
Y0137	Bowerbankia	-	-	P	P	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P
Y0172	Conopeum reticulum	-	-	-	P	P	-	-	-	P	-	-	-	-	P	-	-	-	-	-	-	P	-	P	P	-	-	-	-	-	P
Y0177	Electra monostachys	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	P	-	-	-	-	-
Y0178	Electra pilosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-
Y0182	Aspidelectra melolontha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0240	Bugula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0246	Bugula plumosa	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0256	Bicellariella ciliata	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	-	P	-
Y0279	Scrupocellaria scruposa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0280	Tricellaria (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0411	Cryptosula pallasiana	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0463	Smittoidea reticulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZA0003	Phoronis	-	2	3	-	-	-	-	-	-	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	93	-	-
ZB0148	Amphiuridae (juv)	-	-	-	24	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
ZB0161	Amphipholis squamata	-	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZB0262	Thyone fusus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZC0012	ENTEROPNEUSTA	-	-	1	7	-	4	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	1	-
ZD0002	ASCIDIACEA	-	-	-	P	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0002	ASCIDIACEA (juv)	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	24	-	-	-	-	-	-
ZD0041	Didemnidae	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0078	Perophora listeri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0084	Ascidiella aspersa	-	-	-	1	-	-	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0088	Ascidia conchilega	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0104	Styela clava	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0115	Polycarpa pomaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0120	Dendrodoa grossularia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0126	Botryllus schlosseri	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0128	Botrylloides leachi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0140	Pyura squamulosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0146	Molgula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0001	OSTEICHTHYES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0034	Clupea harengus (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0476	Pomatoschistus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Group	StD	StD	StD	StF	StF	StF	StE	StE	StF	StG	StG	StG	StG	StD	OrA	OrA	OrA	OrA	OrB	OrB	OrB	OrB	OrC	OrC	OrD	OrD	OrD	OrD	OrC	OrC
	No. Taxa (S)	11	24	20	79	32	29	30	37	58	28	16	26	27	18	20	26	18	24	19	29	37	20	50	45	6	4	5	13	30	26
	No. Individuals (N)	414	356	237	456	101	252	2606	386	541	559	291	282	158	140	519	1472	633	347	390	397	425	105	121	276	14	1	8	172	208	84
	Margalef's species richness (d)	1.660	3.915	2.926	8.983	5.200	4.340	3.687	5.709	7.468	3.952	2.468	4.431	4.741	3.035	2.879	3.153	2.635	3.761	2.849	4.512	5.453	3.653	7.298	7.117	1.137	-	1.924	2.331	4.309	4.965
	Pielou's evenness (J)	0.191	0.570	0.652	0.703	0.874	0.586	0.660	0.778	0.775	0.739	0.678	0.752	0.799	0.765	0.402	0.464	0.485	0.564	0.733	0.711	0.734	0.837	0.802	0.728	0.845	-	0.861	0.523	0.590	0.911
	Shannon Wiener (H'(loge))	0.459	1.813	1.848	2.830	2.814	1.888	2.243	2.767	2.999	2.409	1.836	2.451	2.570	2.121	1.185	1.476	1.402	1.767	2.120	2.368	2.589	2.418	2.874	2.705	1.171	-	1.386	1.341	1.876	2.856

Species directory code	Taxon Name	2009 150	2009 152	2009 153	2009 154	2009 155	2009 157	2009 158	2009 163	2009 169	2009 171	2009 172	2009 174	2009 179	2009 180	2009 181	2009 189	2009 191	2009 192	2009 193	2009 194	2009 195	2009 204
W1127	Alderia modesta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1136	Limapontia depressa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1292	Embletonia pulchra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1431	Cuthona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1563	Nuculidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1569	Nucula nitidosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	4
W1570	Nucula nucleus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	1	-
W1695	Mytilus edulis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
W1906	Kurtiella bidentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1949	Parvicardium exiguum	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	1	3	-	-	-	-
W1961	Cerastoderma edule	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	1	-	-	22
W1997	Ensis americanus (juv)	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
W2029	Macoma balthica	-	-	-	-	2	-	1	2	1	1	1	-	-	-	-	-	-	-	3	-	1	3
W2068	Scrobicularia plana	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2059	Abra alba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2061	Abra nitida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2064	Abra tenuis	49	2	-	4	-	4	191	41	1	1	2	-	-	2	-	-	-	-	64	3	1	3
	Tapes philippinarum	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-
W2124	Venerupis senegalensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2137	Petricola pholadiformis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2147	Mya truncata (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2149	Mya arenaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0075	Alcyonidium cellarioides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0076	Alcyonidium diaphanum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	-
Y0080	Alcyonidium mytili	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
Y0081	Alcyonidium parasiticum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0091	Nolella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0096	Anguinella palmata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	-	P	-
Y0098	Victorella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0112	Walkeria uva	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0122	Farrella repens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0131	Vesicularia spinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0137	Bowerbankia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	P	-
Y0172	Conopeum reticulum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	P	-
Y0177	Electra monostachys	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0178	Electra pilosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0182	Aspidelectra melolontha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0240	Bugula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0246	Bugula plumosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0256	Bicellariella ciliata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-
Y0279	Scrupocellaria scruposa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0280	Tricellaria (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0411	Cryptosula pallasiana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-
Y0463	Smittoidea reticulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-
ZA0003	Phoronis	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-	-	1	-	1
ZB0148	Amphiuridae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47	6	-	-	-	-	-
ZB0161	Amphipholis squamata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	5	-	-	-	-	-
ZB0262	Thyone fusus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
ZC0012	ENTEROPNEUSTA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0002	ASCIDIACEA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	P	-
ZD0002	ASCIDIACEA (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	1	-	-	-	-	2	-
ZD0041	Didemnidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	P	-
ZD0078	Perophora listeri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0084	Ascidiella aspersa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-
ZD0088	Ascidia conchilega	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0104	Styela clava	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0115	Polycarpa pomaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0120	Dendrodoa grossularia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0126	Botryllus schlosseri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
ZD0128	Botrylloides leachi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-
ZD0140	Pyura squamulosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
ZD0146	Molgula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0001	OSTEICHTHYES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0034	Clupea harengus (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0476	Pomatoschistus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Group	StA	StA	StA	StA	StB	StB	StB	StB	StC	StC	StC	StC	StD	StD	StD	StF	StF	StF	StE	StE	StF	StG
	No. Taxa (S)	21	14	9	24	18	13	18	15	15	13	11	9	9	12	33	61	67	20	21	16	48	18
	No. Individuals (N)	1561	201	85	134	2095	81	512	1280	36	63	33	17	563	24	338	584	339	35	311	408	498	153
	Margalef's species richness (d)	2.176	2.074	1.801	4.492	1.961	2.503	2.725	1.817	3.349	2.896	2.574	2.118	1.263	2.832	4.980	7.535	8.411	4.219	2.962	2.329	6.119	3.181
	Pielou's evenness (J)	0.187	0.851	0.576	0.714	0.281	0.611	0.519	0.543	0.841	0.682	0.820	0.845	0.209	0.847	0.707	0.655	0.760	0.896	0.752	0.241	0.562	0.783
	Shannon Wiener (H'(loge))	0.531	2.114	1.265	2.240	0.779	1.518	1.501	1.433	2.158	1.749	1.889	1.644	0.460	1.950	2.403	2.548	2.973	2.485	2.172	0.653	2.059	2.218

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2009 206	2009 207	2009 209	2009 249	2009 258	2009 260	2009 261	2009 263	2009 267	2009 269	2009 272	2009 275	2009 285	2009 289	2009 295	2009 296	2009 300	2009 301	2009 303	2009 306	2010 150	2010 152	2010 153	2010 154	2010 155	2010 157	2010 158	2010 163	2010 169	2010 171	2010 172	2010 174	2010 179	2010 180	2010 181	2010 189	2010 191	2010 192	2010 193	2010 194	2010 195	2010 204	2010 206	2010 207	2010 209	2010 249	2010 258	2010 260	2010 261	2010 263	2010 267	2010 269
	Gloeotrichia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	P	-	-	-	-	-	-	-	-	-	-
ZM0001	RHODOPHYTA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
ZM0170	Palmaria palmata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0417	Polyides rotundus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0431	Gracilaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0443	Plocamium cartilagineum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	P	-	-	-	-	-	-
ZM0507	Ceramium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0554	Pterothamnion plumula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0592	Cryptopleura ramosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0655	Polysiphonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
ZR0015	Ectocarpus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0001	CHLOROPHYTA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	P	-	-	-	P	-	-	P	-	-	-	P	-	-	-	-	-	-
ZS0039	Spongomorpha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0149	Enteromorpha	P	-	P	-	P	-	P	P	P	-	-	P	-	P	-	-	-	-	-	-	P	-	-	-	P	-	-	P	P	-	-	-	P	-	P	-	P	-	P	P	-	P	P	P	P	P	P	-	P	P	P	-
ZS0174	Ulva	-	-	-	-	P	-	-	-	P	P	-	-	-	-	-	-	P	-	-	-	P	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-
ZS0189	Chaetomorpha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0195	Cladophora	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BRYOPHYTA	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	P	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lemnaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	-	-	-	-	-
	ANIMALIA (eggs)	-	-	-	-	P	-	-	P	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	-	-	-	P	-	-	P	-	-	-	-	P	-	-	P	-	-	P	-	-
A0001	PROTOZOA (?)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lagotia viridis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0001	PORIFERA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	-	-	-	-	-	-
C0053	Leucosolenia	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0133	Scypha ciliata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0475	Cliona	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C1686	Halisarca dujardini	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0158	Tubulariidae	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0218	Eudendrium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0246	Bougainvilliidae	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0336	Lovenella clausa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0341	Opercularella lacerata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0348	Calycella syringa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0390	Halecium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0424	Hydrallmania falcata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0427	Sertularella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0433	Sertularia	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0445	Tridentata distans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0447	Plumulariidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0455	Kirchenpaueria pinnata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0469	Plumularia setacea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0491	Campanulariidae	-	-	-	-	-	-	-	-	P	P	-	-	-	P	-	-	-	-	-	P	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P
D0502	Clytia gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0503	Clytia hemisphaerica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0515	Laomedea flexuosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0662	ACTINIARIA	1	-	-	-	-	-	-	2	-	12	2	-	8	11	-	-	-	-	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	5	-	-	-	30	-	-	-	-	2	-	-	-	1	-	-
D0759	Edwardsiidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0761	Nematostella vectensis	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G0001	NEMERTEA	-	8	-	-	-	-	-	-	-	-	-	-	1	6	-	-	-	-	-	-	-	4	1	-	1	-	-	4	-	-	-	-	-	-	-	7	-	4	-	1	-	-	-	-	-	1	1	1	-	-	-	-
HD0001	NEMATODA	514	33	-	1	5	-	13	59	289	144	5	-	4	25	-	1	-	-	3	4	3	1	1	7	120	45	12	195	14	4	3	2	-	1	-	210	45	4	5	3	37	-	134	49	-	11	16	26	24	100	17	162
K0045	Pedicellina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
K0050	Barentsia	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
N0014	Golfingia elongata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
P0025	Polynoidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0049	Gattyana cirrhosa	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-
P0052	Harmothoe antilopes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0064	Harmothoe imbricata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
P0065	Harmothoe impar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Harmothoe pagenstecheri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0067	Malmgreniella arenicolae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0082	Lepidonotus squamatus	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0092	Pholoe baltica (sensu Petersen)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0094	Pholoe inornata (sensu Petersen)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0106	Sthenelais (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0107	Sthenelais boa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0118	Eteone longa (Type A)	-	-	-	-	5	4	12	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	50	5	1	-	-
P0118	Eteone longa (agg)	-	-	-	-	-	-	-	-	22	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	174	4	13	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
P0124	Hypereteone foliosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0145	Anaitides mucosa	22	-	-	-	36	24	3	10	1	10	-	-	-	-	-	-	-	-	-	1	-	-	-	1	23	8	21	2	44	1	-	-	-	-	-	2	6	1	2	3	-	-	-	1	-	1	1	11	-	8	1	5
P0164	Eumida bahusiensis	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0167	Eumida sanguinea	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	8	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-
P0262	Glycera oxycephala	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0265	Glycera tridactyla	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0271	Goniada maculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
P0305	Psamathe fusca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0321	Syllidia armata	-	-	-	-	-	-	-	-	-	-	-	-	6	20	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0326	Microphthalmus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0346	Syllidae (epitoke)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0358	Syllis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Syllis "species A"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0365	Syllis armillaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0360	Syllis gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0371	Syllis variegata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0380	Eusyllis blomstrandi	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0411	Brania	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0421	Exogone hebes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	2	-	-	-	11	-	-	-	-	-	-	-	-	-	-	-
P0422	Exogone naidina	-	-	-	1	-	-	-	-	-	-	-	-	37	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	15	28	3	-	1	2	-	-	-	-	4	-	-	-	-	-	-
P0423	Exogone verugera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0426	Sphaerosyllis erinaceus	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2009 206	2009 207	2009 209	2009 249	2009 258	2009 260	2009 261	2009 263	2009 267	2009 269	2009 272	2009 275	2009 285	2009 289	2009 295	2009 296	2009 300	2009 301	2009 303	2009 306	2010 150	2010 152	2010 153	2010 154	2010 155	2010 157	2010 158	2010 163	2010 169	2010 171	2010 172	2010 174	2010 179	2010 180	2010 181	2010 189	2010 191	2010 192	2010 193	2010 194	2010 195	2010 204	2010 206	2010 207	2010 209	2010 249	2010 258	2010 260	2010 261	2010 263	2010 267	2010 269
P0430	Sphaerosyllis taylori	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	36	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-
P0431	Sphaerosyllis tetralix	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0434	Autolytus	-	-	-	-	-	-	-	-	-	3	1	-	-	13	-	-	-	-	3	6	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	1	8	4	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P0451	Proceraea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0458	Nereididae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0471	Alitta succinea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P0472	Alitta virens	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	13	-	-	-	-	11
P0475	Eunereis longissima	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0462	Hediste diversicolor	12	1	-	-	11	5	12	3	43	-	1	2	-	-	-	-	-	-	-	-	44	52	30	58	18	-	3	-	1	8	1	-	-	-	-	-	-	1	1	2	-	1	7	27	1	1	14	9	-	23	2	1
P0484	Platynereis dumerilii	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0494	Nephtys (juv)	-	-	-	2	-	-	1	-	-	-	-	2	1	-	-	3	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0499	Nephtys hombergii	4	-	9	5	-	-	4	4	3	2	11	9	-	4	-	-	1	3	14	5	-	-	-	-	-	1	-	-	8	1	12	4	7	10	2	1	-	3	5	12	5	10	5	10	12	1	1	-	4	4	5	7
P0502	Nephtys kersivalensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	1	-	-	3	-	-	-	-	-	-	-	-	-	-
P0566	Marphysa sanguinea	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P0579	Lumbrineris gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0613	Ophryotrocha	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0638	Protodorvillea kefersteini	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0672	Scoloplos armiger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	281	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0677	Aricidea minuta	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0722	Aonides oxycephala	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
P0737	Malacoceros fuliginosus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0750	Dipolydora coeca (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0751	Dipolydora caulleryi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0752	Polydora ciliata (agg)	-	-	-	-	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	6	15	-	-	-	-	-	5	-	-	26	-	-	3	-	-	-
P0753	Polydora cornuta	-	-	-	-	1	-	4	5	15	2	4	3	-	-	2	-	-	-	-	1	-	3	-	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32	-	-	22	220	7	42	5	49
P0760	Dipolydora quadrilobata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0774	Pseudopolydora pulchra	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0776	Pygospio elegans	4	-	-	-	5	6	13	7	68	1	-	8	-	-	-	-	15	-	-	-	3	-	-	1	417	1	37	2	-	-	-	-	-	-	-	-	2	-	12	-	-	-	23	189	-	-	2	1	8	63	6	-
P0791	Spio martinensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0799	Streblospio shrubsolii	44	-	7	2	38	68	24	26	721	32	15	487	1	5	-	3	39	3	7	15	3	104	16	288	494	140	3	233	646	24	247	240	8	131	P	-	1	7	51	15	-	73	120	27	1	1	63	258	88	182	738	83
P0824	Aphelochaeta marioni	-	27	1	1	-	-	-	-	-	-	-	-	7	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	374	-	375	220	206	314	-	1	303	14	4	142	-	41	-	-	-	-	-	-
P0829	Caulleriella alata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0831	Chaetozone zetlandica	-	3	-	-	-	-	-	-	-	1	-	1	71	10	-	-	3	1	1	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	7	16	-	-	8	-	-	-	-	3	-	-	-	-	-	-
P0838	Cirriformia (juv)	-	1	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	1	5	28	-	-	-	-
P0839	Cirriformia tentaculata	-	14	-	-	-	7	-	-	-	60	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	2	-	-	-	-	-	-	5	-	33	8	4	-	-	-	95
P0847	Tharyx "species A"	-	1	-	-	183	48	43	7	115	9	3	5	6	-	-	-	8	-	-	-	-	-	-	1	38	8	586	71	121	-	17	16	-	10	-	-	16	1	18	3	-	-	-	-	-	2	191	1212	63	79	92	3
P0853	Ctenodrilus serratus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0871	Cossura pygodactyla	-	-	-	-	-	-	-	-	-	-	3	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
P0906	Capitella	1	-	-	-	5	29	-	-	99	2	1	-	4	1	-	-	-	-	-	1	-	-	2	6	1129	4	-	89	-	-	-	-	-	-	-	8	13	3	-	-	3	-	-	-	-	1	3	61	-	-	-	3
P0919	Mediomastus fragilis	-	-	-	-	-	-	-	-	-	-	-	-	2	8	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43	52	-	-	-	17	-	-	-	-	-	-	-	-	-	-	-
P0920	Notomastus	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0928	Arenicolidae	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0964	Euclymene oerstedii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1026	Scalibregma celticum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1093	Galathowenia oculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	3	1	52	1	-	34	17	-	5	12	-	-	-	-	-	-	-	-	-	-
P1107	Lagis koreni	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1117	Sabellaria spinulosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
P1118	Ampharetidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1124	Melinna palmata	-	-	1	-	2	1	1	1	-	-	-	1	3	2	1	-	1	1	7	4	-	-	-	-	-	-	-	-	-	-	1	-	1	1	19	2	-	7	1	3	44	3	-	5	2	1	-	1	-	-	1	-
P1138	Ampharete grubei	29	-	1	1	-	-	-	-	1	1	2	4	5	-	-	1	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2	5	-	-	2	-	1	4	1	2	-	-	-	-	3	1
P1139	Ampharete lindstroemi	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1143	Amphicteis midas	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
P1195	Lanice conchilega	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1206	Neoamphitrite figulus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P1211	Nicolea zostericola	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1235	Polycirrus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1257	Sabellidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	22	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1283	Fabricia stellaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1294	Manayunkia aestuarina	-	-	-	-	-	-	-	6	98	-	-	1	1	-	-	-	-	-	-	-	1	5	5	52	32	-	4	1	-	-	-	-	-	-	-	-	-	-	4	-	-	-	93	304	-	-	-	-	1	-	-	-
P1320	Sabella pavonina	-	-	-	-	-	-	-	-	-	-	-	-	-	95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1340	Spirobranchus lamarcki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1402	OLIGOCHAETA (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1420	Paranais litoralis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1425	Tubificidae (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1479	Heterochaeta costata	-	-	-	-	25	23	-	-	-	22	-	-	-	1	-	-	-	-	-	-	25	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	25
P1489	Tubificoides amplivasatus	12	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	50	-	6	12	48	-	22	-	-	-	-	-	-	-	-	-	-	-	12
P1490	Tubificoides benedii	394	105	23	-	3	1	6	23	956	57	-	1	-	1	-	-	1	-	1	-	-	-	-	10	2359	919	207	436	-	2	2	2	-	3	-	10	-	18	115	13	2	1	455	473	3	1	8	15	6	76	1	186
P1496	Tubificoides insularis	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1498	Tubificoides pseudogaster (agg)	-	-	-	-	-	2	3	-	-	1	-	-	1	-	-	-	-	-	-	-	-	1	-	1	-	16	29	25	193	31	1	10	-	6	-	1	3	11	30	-	2	27	96	-	-	14	91	88	11	7	4	4
P1500	Tubificoides swirencoides	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tubificoides galiciensis	-	31	-	-	-	-	-	-	-	6	10	1	-	7	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	11	-	-	-	-	-	-	-	-	-	-	-	114
	Psammoryctides barbatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1501	Enchytraeidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0002	PYCNOGONIDA (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0005	Nymphon brevirostre	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0015	Achelia echinata (agg)	-	-	-	-	-	-	-	-	-	-	-	-	13	4	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	79	9	-	-	-	9	-	-	-	-	20	-	-	-	-	-	-
Q0018	Achelia longipes (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ammothea hilgendorfi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Q0032	Callipallene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Q0044	Anoplodactylus petiolatus	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0045	Anoplodactylus pygmaeus	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	2	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Q0051	Pycnogonum littorale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0054	ACARINA	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
R0142	COPEPODA	-	-	-	-	2	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2	5	-	-	-	-	-	-	-	-	3	-	1	-	-	-	-
R0142	COPEPODA (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0704	Notodelphys	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0732	Ascidicola rosea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R1035	Alteutha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R1820	Sabelliphilus elongatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2009 206	2009 207	2009 209	2009 249	2009 258	2009 260	2009 261	2009 263	2009 267	2009 269	2009 272	2009 275	2009 285	2009 289	2009 295	2009 296	2009 300	2009 301	2009 303	2009 306	2010 150	2010 152	2010 153	2010 154	2010 155	2010 157	2010 158	2010 163	2010 169	2010 171	2010 172	2010 174	2010 179	2010 180	2010 181	2010 189	2010 191	2010 192	2010 193	2010 194	2010 195	2010 204	2010 206	2010 207	2010 209	2010 249	2010 258	2010 260	2010 261	2010 263	2010 267	2010 269
R2122	Cancerilla tubulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2412	OSTRACODA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2413	MYODOCOPIDA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2432	Eusarsiella zostericola	-	-	2	2	-	-	-	1	-	-	1	-	-	1	2	-	2	6	21	8	-	1	-	-	-	1	3	3	4	3	4	-	10	14	14	2	-	-	14	4	15	12	-	-	1	1	-	-	-	-	-	-
R2458	PODOCOPIDA	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56	37	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0074	Mesopodopsis slabberi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0086	Schistomysis kervillei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0102	Apherusa bispinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0107	Apherusa ovalipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
S0158	Amphilochus manudens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0159	Amphilochus neapolitanus	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
S0164	Gitana sarsi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0213	Stenothoe marina	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0257	Harpinia pectinata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0360	Argissa hamatipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0380	Iphimedia minuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0410	Atylus falcatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0415	Dexamine spinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0416	Dexamine thea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0420	Tritaeta gibbosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
S0423	Ampelisca (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0427	Ampelisca brevicornis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0429	Ampelisca diadema	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0464	Gammaridae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	1	-	-	-	-	-	-	-	-	1	-
S0481	Gammarus spooneri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0495	Melitidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0498	Abludomelita obtusata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0503	Cheirocratus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0505	Cheirocratus intermedius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0506	Cheirocratus sundevallii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0525	Melita palmata	-	-	-	-	-	-	-	2	-	13	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0541	Gammaropsis maculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0550	Microprotopus maculatus	-	-	1	6	-	-	-	-	-	-	-	-	-	1	-	-	1	-	1	5	-	-	-	-	-	-	-	-	1	1	-	1	-	-	-	-	12	7	-	3	-	1	-	-	-	9	-	-	-	-	-	-
S0561	Ericthonius (female)	-	-	-	-	-	-	-	-	-	-	-	-	-	162	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0562	Ericthonius difformis	-	-	-	-	-	-	-	-	-	-	-	-	-	64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0564	Ericthonius punctatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0568	Jassa	-	-	-	1	-	-	-	-	-	-	2	2	-	4	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1	-	1	-	-	-	1	1	-	-	-	-	1	-
S0577	Aoridae	28	-	-	-	1	-	-	-	-	20	2	-	4	62	-	-	-	-	1	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	1	-	-	1	4	1	-	-	-	-	-	-	-	-	3	-	6
S0579	Aora gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0593	Microdeutopus anomalus	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0596	Microdeutopus gryllotalpa	16	-	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-	-
	Grandidierella japonica	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	1
S0616	Corophium volutator	-	-	-	-	-	12	-	-	-	-	-	-	-	-	1	-	-	-	3	3	3	-	1	-	24	225	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	62	-	-	-	104
S0606	Monocorophium acherusicum	-	-	-	-	1	-	-	-	-	-	-	8	-	37	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	15	1
S0612	Monocorophium insidiosum	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	4	4	-	-	6	-
S0615	Monocorophium sextonae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0610	Crassicorophium bonnellii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0611	Crassicorophium crassicorne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0607	Apocorophium acutum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0621	Unciola crenatipalma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0628	Dyopedos monacanthus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0646	Caprella linearis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
S0651	Pariambus typicus	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	1	1	-	1	5	-	-	-	-	-	-	-	-	-	-	-	-	4	1	3	-	3	15	-	-	9	-	-	-	-	22	-	-	1	-	-	-
S0805	Cyathura carinata	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	52	-	37	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
	Lekanesphaera levii	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0885	Jaera albifrons (agg)	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0901	Munna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0935	Idotea baltica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0936	Idotea chelipes	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
S1112	Heterotanais oerstedi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1197	Bodotria scorpioides	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
S1208	Eudorella truncatula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1224	Cumella pygmaea	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1276	DECAPODA (zoea)	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1315	Palaemon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
S1350	Hippolyte varians	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1360	Thoralus cranchii	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1385	Crangon crangon	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1577	Liocarcinus (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1594	Carcinus maenas	-	1	-	-	-	1	1	-	-	2	2	1	1	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	1	-	-	-	-	1	-
	THYSANOPTERA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DIPTERA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chironomidae	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
	Dolichopodidae (larva)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-	-
	COLEOPTERA (larva)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	COLLEMBOLA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0079	Lepidochitona cinerea	-	10	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0163	Gibbula cineraria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0296	Littorina littorea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0305	Littorina saxatilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
W0328	Rissoa interrupta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0385	Hydrobia ulvae	9	-	1	-	47	4	39	2	90	7	-	1	-	-	-	-	-	-	-	-	3	35	7	15	601	2	110	66	2	20	1	-	-	8	-	-	-	-	108	93	-	-	11	1	1	-	48	3	47	88	11	5
W0421	Tornus subcarinatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0439	Crepidula fornicata (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
W0439	Crepidula fornicata	-	-	-	-	1	-	-	-	-	1	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	135	315	103	-	-	2	-	-	-	-	10	-	-	-	-	-	-
W0913	Odostomia plicata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0919	Brachystomia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1077	Retusa obtusa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	7	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
W1118	Elysia viridis (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2009 206	2009 207	2009 209	2009 249	2009 258	2009 260	2009 261	2009 263	2009 267	2009 269	2009 272	2009 275	2009 285	2009 289	2009 295	2009 296	2009 300	2009 301	2009 303	2009 306	2010 150	2010 152	2010 153	2010 154	2010 155	2010 157	2010 158	2010 163	2010 169	2010 171	2010 172	2010 174	2010 179	2010 180	2010 181	2010 189	2010 191	2010 192	2010 193	2010 194	2010 195	2010 204	2010 206	2010 207	2010 209	2010 249	2010 258	2010 260	2010 261	2010 263	2010 267	2010 269
W1127	Alderia modesta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-	-
W1136	Limapontia depressa	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1292	Embletonia pulchra	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1431	Cuthona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1563	Nuculidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1569	Nucula nitidosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1570	Nucula nucleus	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1695	Mytilus edulis	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1906	Kurtiella bidentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1949	Parvicardium exiguum	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1961	Cerastoderma edule	-	3	1	-	10	4	2	2	-	11	4	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	1	1	-	3	-	-	-	1	-	-	21	10	-	16	13	4
W1997	Ensis americanus (juv)	-	-	-	-	-	1	1	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-
W2029	Macoma balthica	-	-	-	-	5	1	10	1	14	-	-	11	-	-	-	1	-	-	-	-	-	-	1	-	7	15	1	30	14	-	8	-	-	3	-	-	-	-	27	23	-	10	15	8	5	-	1	13	20	18	5	10
W2068	Scrobicularia plana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	4	-	-	-	-	-	-	6	10
W2059	Abra alba	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2061	Abra nitida	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
W2064	Abra tenuis	46	1	1	-	1	-	7	2	70	2	3	1	-	-	-	-	-	-	-	-	-	-	-	1	68	9	71	494	2	-	1	-	-	6	-	-	-	-	95	22	-	-	8	18	2	-	-	4	9	281	8	18
	Tapes philippinarum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
W2124	Venerupis senegalensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2137	Petricola pholadiformis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
W2147	Mya truncata (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2149	Mya arenaria	-	-	-	-	4	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	58	3	48	5	1
Y0075	Alcyonidium cellarioides	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0076	Alcyonidium diaphanum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-
Y0080	Alcyonidium mytili	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0081	Alcyonidium parasiticum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0091	Nolella	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0096	Anguinella palmata	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	P	P	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	P	P	-	-	-	P	P	-	P	-	P	-	-	-	-	-	-
Y0098	Victorella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0112	Walkeria uva	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0122	Farrella repens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0131	Vesicularia spinosa	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0137	Bowerbankia	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	-	-	-	P	-	-	-	-	-	-
Y0172	Conopeum reticulum	-	-	-	-	-	-	-	-	-	P	-	-	P	P	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	P	-	-	-	-	P	-	-	-	-	-	-
Y0177	Electra monostachys	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-
Y0178	Electra pilosa	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0182	Aspidelectra melolontha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0240	Bugula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0246	Bugula plumosa	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0256	Bicellariella ciliata	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0279	Scrupocellaria scruposa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0280	Tricellaria (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0411	Cryptosula pallasiana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0463	Smittoidea reticulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZA0003	Phoronis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	53	1	-	50	-	1	11	-	-	-	-	-	-	56	-	1	-	-	-	-	1	-	8	-
ZB0148	Amphiuridae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZB0161	Amphipholis squamata	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZB0262	Thyone fusus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZC0012	ENTEROPNEUSTA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0002	ASCIDIACEA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0002	ASCIDIACEA (juv)	-	-	-	-	-	-	-	-	-	-	-	-	7	17	-	-	-	-	2	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	39	3	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
ZD0041	Didemnidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0078	Perophora listeri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0084	Ascidiella aspersa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0088	Ascidia conchilega	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0104	Styela clava	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0115	Polycarpa pomaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
ZD0120	Dendrodoa grossularia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0126	Botryllus schlosseri	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0128	Botrylloides leachi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0140	Pyura squamulosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0146	Molgula	-	-	-	-	-	-	-	-	-	-	-	-	10	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0001	OSTEICHTHYES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0034	Clupea harengus (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0476	Pomatoschistus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	1	-	3	-	2	2	3	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Group	StG	StG	StG	StD	OrA	OrA	OrA	OrA	OrB	OrB	OrB	OrB	OrC	OrC	OrD	OrD	OrD	OrD	OrC	OrC	StA	StA	StA	StA	StB	StB	StB	StB	StC	StC	StC	StC	StD	StD	StD	StF	StF	StF	StE	StE	StF	StG	StG	StG	StG	StD	OrA	OrA	OrA	OrA	OrB	OrB
	No. Taxa (S)	16	20	12	13	27	21	23	24	21	31	24	22	52	72	5	12	19	7	25	37	14	15	11	23	18	18	20	28	26	16	15	11	11	18	15	66	66	31	27	26	38	22	16	25	12	52	28	24	18	23	28	27
	No. Individuals (N)	1136	264	48	24	392	247	214	167	2609	437	79	568	250	681	7	15	80	16	88	105	89	319	102	561	5522	1407	1123	1943	1141	103	311	330	412	248	495	795	581	543	512	249	520	225	978	1325	30	235	537	2141	301	1054	961	921
	Margalef's species richness (d)	1.990	3.407	2.583	3.461	3.517	3.630	3.914	4.103	2.161	4.276	5.035	3.154	7.969	8.584	2.056	3.323	2.967	2.164	4.914	6.661	2.228	2.428	2.162	3.160	1.857	2.345	2.705	2.905	3.267	3.236	2.439	1.724	1.329	2.902	1.934	7.786	8.170	4.446	3.366	4.169	4.957	2.585	2.033	2.921	2.940	7.327	3.818	2.999	2.804	2.873	3.786	3.663
	Pielou's evenness (J)	0.550	0.687	0.686	0.894	0.625	0.740	0.830	0.722	0.640	0.714	0.874	0.252	0.738	0.696	0.963	0.945	0.662	0.868	0.827	0.873	0.631	0.668	0.690	0.570	0.616	0.414	0.540	0.647	0.468	0.716	0.348	0.409	0.218	0.577	0.386	0.617	0.686	0.540	0.712	0.728	0.511	0.725	0.630	0.617	0.808	0.769	0.676	0.518	0.749	0.759	0.331	0.728
	Shannon Wiener (H'(loge))	1.490	2.058	1.644	2.222	1.932	2.252	2.566	2.230	1.851	2.353	2.740	0.768	2.811	2.813	1.550	2.176	1.746	1.689	2.594	3.025	1.513	1.809	1.654	1.734	1.744	1.198	1.617	2.027	1.489	1.986	0.942	0.981	0.479	1.634	0.989	2.449	2.725	1.819	2.201	2.314	1.771	1.963	1.705	1.907	1.937	2.855	2.177	1.645	2.121	2.312	1.092	2.371

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2010 272	2010 275	2010 285	2010 289	2010 295	2010 296	2010 300	2010 301	2010 303	2010 306	2011 150	2011 152	2011 153	2011 154	2011 155	2011 157	2011 158	2011 163	2011 169	2011 171	2011 172	2011 174	2011 179	2011 180	2011 181	2011 189	2011 191	2011 192	2011 193	2011 194	2011 195	2011 204	2011 206	2011 207	2011 209	2011 249	2011 258	2011 260	2011 261	2011 263	2011 267	2011 269	2011 272	2011 275	2011 285	2011 289	2011 295	2011 296	2011 300	2011 301	2011 303	2011 306
	Gloeotrichia	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0001	RHODOPHYTA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	P	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0170	Palmaria palmata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0417	Polyides rotundus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0431	Gracilaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0443	Plocamium cartilagineum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-
ZM0507	Ceramium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0554	Pterothamnion plumula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0592	Cryptopleura ramosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZM0655	Polysiphonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZR0015	Ectocarpus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0001	CHLOROPHYTA	-	P	-	-	-	-	-	P	-	-	-	-	-	P	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	P	P	P	-	-	-	-	-	-	-	-	P	-
ZS0039	Spongomorpha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-
ZS0149	Enteromorpha	-	P	P	-	-	-	-	P	-	P	-	P	P	-	-	P	P	-	P	-	-	P	P	P	P	-	P	-	-	P	-	-	P	P	P	P	-	-	-	P	P	P	P	-	-	-	-	P	-	P	P	-
ZS0174	Ulva	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-
ZS0189	Chaetomorpha	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZS0195	Cladophora	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	P	-	P	-	-	P	-	-	-	-	-	-	-	P	-	-	-	-	-	P	P	P	-	-	-	-	-	-	-	-
	BRYOPHYTA	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	P	-	P	P	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	P	-	-	-	-	-	-	-	-	P	-	-
	Lemnaceae	-	P	-	-	-	-	-	P	-	-	P	P	P	-	P	P	-	-	P	P	P	P	P	P	P	-	P	-	-	P	-	-	-	-	-	P	P	-	P	P	P	-	P	P	P	P	P	-	-	P	P	-
	ANIMALIA (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	P	-	-	-	-	-	-	P	-	-	P	P	-	-	-	-	-	P	P	P	P	-	-	-	-	P	-	-	-	-
A0001	PROTOZOA (?)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lagotia viridis	-	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
C0001	PORIFERA	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0053	Leucosolenia	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0133	Scypha ciliata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C0475	Cliona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C1686	Halisarca dujardini	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0158	Tubulariidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0218	Eudendrium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0246	Bougainvilliidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0336	Lovenella clausa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0341	Opercularella lacerata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0348	Calycella syringa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-
D0390	Halecium	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0424	Hydrallmania falcata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0427	Sertularella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0433	Sertularia	-	-	P	P	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
D0445	Tridentata distans	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0447	Plumulariidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0455	Kirchenpaueria pinnata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0469	Plumularia setacea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0491	Campanulariidae	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	P	-	-	-	-	-	-	P
D0502	Clytia gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0503	Clytia hemisphaerica	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0515	Laomedea flexuosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0662	ACTINIARIA	1	-	11	10	-	-	-	-	10	5	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	24	1	1	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	19	18	-	-	-	-	1	-
D0759	Edwardsiidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D0761	Nematostella vectensis	-	-	-	1	-	-	-	-	-	-	5	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G0001	NEMERTEA	-	-	4	-	-	-	-	-	-	1	2	-	2	-	10	-	1	22	-	-	-	-	-	-	1	5	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	6	-	-	-	-	-	2
HD0001	NEMATODA	8	1	27	4	-	-	-	-	16	1	5	1	-	9	280	58	7	12	70	10	1	-	2	1	8	209	122	4	49	14	60	1	237	113	4	3	177	4	128	105	3	439	9	85	22	118	1	-	-	56	2	5
K0045	Pedicellina	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P
K0050	Barentsia	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N0014	Golfingia elongata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0025	Polynoidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0049	Gattyana cirrhosa	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
P0052	Harmothoe antilopes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0064	Harmothoe imbricata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
P0065	Harmothoe impar	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Harmothoe pagenstecheri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0067	Malmgreniella arenicolae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0082	Lepidonotus squamatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-
P0092	Pholoe baltica (sensu Petersen)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0094	Pholoe inornata (sensu Petersen)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
P0106	Sthenelais (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0107	Sthenelais boa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0118	Eteone longa (Type A)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0118	Eteone longa (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	16	5	4	2	-	1	-	-	-	-	-	-	-	-	-	-
P0124	Hypereteone foliosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0145	Anaitides mucosa	12	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3	1	16	-	-	-	-	-	-	3	-	16	-	7	2	-	2	4	-	-	-	-	-	-	-	-	11	-	-	-	-	-	-	-	-	-	1
P0164	Eumida bahusiensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0167	Eumida sanguinea	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	6	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
P0262	Glycera oxycephala	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0265	Glycera tridactyla	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
P0271	Goniada maculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0305	Psamathe fusca	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0321	Syllidia armata	-	-	14	13	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	12	-	-	-	1	-	-
P0326	Microphthalmus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0346	Syllidae (epitoke)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0358	Syllis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Syllis "species A"	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0365	Syllis armillaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0360	Syllis gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
P0371	Syllis variegata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0380	Eusyllis blomstrandi	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0411	Brania	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0421	Exogone hebes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
P0422	Exogone naidina	-	-	5	3	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	4	9	1	-	3	-	-	-	2	-	-	3	-	-	-	-	-	-	-	-	5	9	-	-	-	1	-	-
P0423	Exogone verugera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0426	Sphaerosyllis erinaceus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2010 272	2010 275	2010 285	2010 289	2010 295	2010 296	2010 300	2010 301	2010 303	2010 306	2011 150	2011 152	2011 153	2011 154	2011 155	2011 157	2011 158	2011 163	2011 169	2011 171	2011 172	2011 174	2011 179	2011 180	2011 181	2011 189	2011 191	2011 192	2011 193	2011 194	2011 195	2011 204	2011 206	2011 207	2011 209	2011 249	2011 258	2011 260	2011 261	2011 263	2011 267	2011 269	2011 272	2011 275	2011 285	2011 289	2011 295	2011 296	2011 300	2011 301	2011 303	2011 306
P0430	Sphaerosyllis taylori	-	-	6	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	6	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
P0431	Sphaerosyllis tetralix	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0434	Autolytus	-	-	7	4	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	5	-	-	-	-	-	-
P0451	Proceraea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0458	Nereididae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0471	Alitta succinea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0472	Alitta virens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0475	Eunereis longissima	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3	-	-	-	-	-	6
P0462	Hediste diversicolor	2	-	-	-	-	-	-	-	1	-	49	64	15	49	91	-	4	-	8	-	1	-	-	-	-	-	-	-	3	1	-	-	5	7	2	3	2	1	8	93	1	7	1	-	-	-	-	1	-	-	-	-
P0484	Platynereis dumerilii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0494	Nephtys (juv)	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
P0499	Nephtys hombergii	11	8	-	-	-	7	7	1	3	4	-	-	-	-	-	2	1	-	5	4	6	4	4	5	5	2	-	4	14	10	3	8	12	5	6	4	-	-	2	-	7	3	8	4	-	-	-	2	2	1	4	1
P0502	Nephtys kersivalensis	-	6	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0566	Marphysa sanguinea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0579	Lumbrineris gracilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
P0613	Ophryotrocha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0638	Protodorvillea kefersteini	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0672	Scoloplos armiger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	279	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0677	Aricidea minuta	-	-	7	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	21	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-
P0722	Aonides oxycephala	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0737	Malacoceros fuliginosus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0750	Dipolydora coeca (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
P0751	Dipolydora caulleryi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0752	Polydora ciliata (agg)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0753	Polydora cornuta	5	-	-	-	5	-	-	-	1	2	4	-	-	2	-	-	-	-	5	-	-	-	-	-	1	4	-	-	2	-	-	-	1	2	1	-	11	11	8	31	-	11	-	-	-	-	1	-	-	-	-	5
P0760	Dipolydora quadrilobata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0774	Pseudopolydora pulchra	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	-	-
P0776	Pygospio elegans	-	-	-	1	-	-	4	-	-	-	-	-	-	-	12	-	46	4	-	-	-	-	-	-	-	-	-	-	26	-	-	-	9	26	-	2	9	2	5	9	-	-	-	3	-	-	-	-	1	-	-	-
P0791	Spio martinensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0799	Streblospio shrubsolii	277	38	1	3	12	-	36	23	6	9	151	18	-	98	26	17	3	-	134	214	32	49	12	28	3	1	2	4	206	59	20	66	91	5	70	58	1359	437	292	76	83	33	145	78	3	-	9	11	16	14	5	16
P0824	Aphelochaeta marioni	-	-	5	5	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	440	3	400	267	130	118	-	2	-	2	-	2	5	15	-	-	-	-	6	-	-	-	4	-	-	-	1	-	-	5
P0829	Caulleriella alata	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0831	Chaetozone zetlandica	-	-	24	14	3	1	1	1	3	6	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	4	9	28	-	1	1	-	1	-	1	-	-	-	-	-	-	-	-	-	13	3	3	1	-	3	3	1
P0838	Cirriformia (juv)	-	-	-	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	18	-	-	1	6	-	-	-	-	-	-
P0839	Cirriformia tentaculata	2	-	-	4	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	17	-	-	-	82	-	-	-	10	-	-	-	-	-	-
P0847	Tharyx "species A"	17	1	-	-	-	-	4	-	10	1	4	-	-	-	1	25	397	24	19	67	1	5	80	4	112	-	29	4	63	4	-	30	7	4	48	8	389	186	303	246	80	109	89	8	2	1	3	4	6	2	-	1
P0853	Ctenodrilus serratus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0871	Cossura pygodactyla	1	-	-	-	-	-	1	1	5	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	1	3	2	-	3	19	9	1	-	-	2	5	-	-	-	-	-	-	9	1	-	-	-	10	3	18	-	-
P0906	Capitella	-	-	5	2	-	-	-	-	1	2	-	-	-	-	8	1	-	1	-	-	-	-	3	-	1	2	1	1	-	-	-	-	-	-	-	-	-	18	-	17	-	11	-	-	3	2	-	-	-	-	-	-
P0919	Mediomastus fragilis	-	-	6	41	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	35	114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	69	-	-	-	-	-	2
P0920	Notomastus	-	-	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	1	-	-	-	-	-	-
P0928	Arenicolidae	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P0964	Euclymene oerstedii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1026	Scalibregma celticum	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1093	Galathowenia oculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	8	-	-	6	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1107	Lagis koreni	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1117	Sabellaria spinulosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1
P1118	Ampharetidae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
P1124	Melinna palmata	1	-	2	7	-	-	2	3	-	4	-	-	-	-	-	-	-	-	-	-	-	-	7	-	9	3	-	7	3	1	-	4	-	-	5	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	2
P1138	Ampharete grubei	4	-	5	1	-	-	1	-	1	5	-	-	-	-	-	-	1	-	-	-	-	-	8	-	9	2	1	20	8	4	-	3	4	1	3	2	-	-	-	-	-	-	2	2	3	-	-	-	-	-	-	3
P1139	Ampharete lindstroemi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
P1143	Amphicteis midas	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1195	Lanice conchilega	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-
P1206	Neoamphitrite figulus	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1211	Nicolea zostericola	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1235	Polycirrus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1257	Sabellidae (juv)	-	-	-	59	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
P1283	Fabricia stellaris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1294	Manayunkia aestuarina	-	-	-	-	-	-	-	-	-	-	18	6	-	24	8	-	-	-	-	-	-	-	-	-	-	-	-	-	55	1	-	-	19	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1320	Sabella pavonina	-	-	95	10	-	-	-	-	127	31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	54	-	-	-	58	-	5
P1340	Spirobranchus lamarcki	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1402	OLIGOCHAETA (eggs)	-	-	-	-	-	-	-	-	P	-	-	P	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-
P1420	Paranais litoralis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1425	Tubificidae (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1479	Heterochaeta costata	-	-	-	-	-	-	-	-	-	-	7	340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1489	Tubificoides amplivasatus	16	2	7	14	-	-	-	2	-	-	-	-	1	-	-	-	1	-	36	5	13	10	8	22	23	2	13	16	189	121	-	13	1	27	74	53	-	-	-	-	-	15	8	16	12	30	1	-	-	16	4	10
P1490	Tubificoides benedii	-	-	-	2	2	-	-	-	18	-	1	-	-	4	653	266	297	954	1	9	-	-	-	2	-	-	24	-	85	9	-	-	224	194	8	9	1	8	-	25	17	345	1	-	-	17	-	-	-	1	-	-
P1496	Tubificoides insularis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1498	Tubificoides pseudogaster (agg)	-	54	5	1	1	-	-	-	190	-	2	23	1	-	-	32	7	8	22	32	16	1	-	-	-	20	40	-	-	17	56	21	1	13	-	4	604	135	58	60	9	46	41	2	14	36	-	-	21	60	-	-
P1500	Tubificoides swirencoides	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tubificoides galiciensis	42	8	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32	4	-	-	-	-	-	-	-	-	4
	Psammoryctides barbatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1501	Enchytraeidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0002	PYCNOGONIDA (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0005	Nymphon brevirostre	-	-	5	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0015	Achelia echinata (agg)	-	-	12	6	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	8	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-	-	-
Q0018	Achelia longipes (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	Ammothea hilgendorfi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0032	Callipallene	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0044	Anoplodactylus petiolatus	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Q0045	Anoplodactylus pygmaeus	-	-	1	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Q0051	Pycnogonum littorale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q0054	ACARINA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0142	COPEPODA	-	-	-	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-
R0142	COPEPODA (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0704	Notodelphys	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R0732	Ascidicola rosea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R1035	Alteutha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R1820	Sabelliphilus elongatus	-	-	-	-	-	-	-	-	385	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	278	-	-	-	224	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2010 272	2010 275	2010 285	2010 289	2010 295	2010 296	2010 300	2010 301	2010 303	2010 306	2011 150	2011 152	2011 153	2011 154	2011 155	2011 157	2011 158	2011 163	2011 169	2011 171	2011 172	2011 174	2011 179	2011 180	2011 181	2011 189	2011 191	2011 192	2011 193	2011 194	2011 195	2011 204	2011 206	2011 207	2011 209	2011 249	2011 258	2011 260	2011 261	2011 263	2011 267	2011 269	2011 272	2011 275	2011 285	2011 289	2011 295	2011 296	2011 300	2011 301	2011 303	2011 306
R2122	Cancerilla tubulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2412	OSTRACODA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2413	MYODOCOPIDA	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R2432	Eusarsiella zostericola	4	-	-	-	3	-	7	2	2	6	-	-	-	1	-	-	-	-	5	1	-	-	10	2	5	-	-	-	-	1	-	6	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	1	2	-	-	4
R2458	PODOCOPIDA	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0074	Mesopodopsis slabberi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0086	Schistomysis kervillei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0102	Apherusa bispinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0107	Apherusa ovalipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0158	Amphilochus manudens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0159	Amphilochus neapolitanus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
S0164	Gitana sarsi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0213	Stenothoe marina	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0257	Harpinia pectinata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0360	Argissa hamatipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0380	Iphimedia minuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0410	Atylus falcatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0415	Dexamine spinosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0416	Dexamine thea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0420	Tritaeta gibbosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0423	Ampelisca (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0427	Ampelisca brevicornis	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0429	Ampelisca diadema	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0464	Gammaridae (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0481	Gammarus spooneri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0495	Melitidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0498	Abludomelita obtusata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0503	Cheirocratus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
S0505	Cheirocratus intermedius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0506	Cheirocratus sundevallii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0525	Melita palmata	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	-	-	-	-	-	-	-	-	-	-
S0541	Gammaropsis maculata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0550	Microprotopus maculatus	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
S0561	Ericthonius (female)	-	-	-	1	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0562	Ericthonius difformis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0564	Ericthonius punctatus	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0568	Jassa	-	1	-	-	-	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0577	Aoridae	35	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	1	-	4	2	2	-	-	2	-	-	-	-	-	-	-	-	5	-	-	-	9	-	-	-	-	-	-
S0579	Aora gracilis	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0593	Microdeutopus anomalus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0596	Microdeutopus gryllotalpa	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
	Grandidierella japonica	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0616	Corophium volutator	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0606	Monocorophium acherusicum	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0612	Monocorophium insidiosum	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0615	Monocorophium sextonae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0610	Crassicorophium bonnellii	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0611	Crassicorophium crassicorne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0607	Apocorophium acutum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0621	Unciola crenatipalma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0628	Dyopedos monacanthus	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0646	Caprella linearis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
S0651	Pariambus typicus	-	-	4	-	-	-	4	-	-	11	-	-	-	-	-	-	-	-	-	-	-	-	1	-	4	-	-	8	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
S0805	Cyathura carinata	-	-	-	-	-	-	-	-	-	-	-	16	-	7	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lekanesphaera levii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0885	Jaera albifrons (agg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0901	Munna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0935	Idotea baltica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S0936	Idotea chelipes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1112	Heterotanais oerstedi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1197	Bodotria scorpioides	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
S1208	Eudorella truncatula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1224	Cumella pygmaea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1276	DECAPODA (zoea)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1315	Palaemon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1350	Hippolyte varians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1360	Thoralus cranchii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1385	Crangon crangon	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1577	Liocarcinus (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S1594	Carcinus maenas	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	THYSANOPTERA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DIPTERA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chironomidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dolichopodidae (larva)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	COLEOPTERA (larva)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	COLLEMBOLA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0079	Lepidochitona cinerea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	4	-	-	-	-	-	-	-	-	-	-
W0163	Gibbula cineraria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0296	Littorina littorea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0305	Littorina saxatilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0328	Rissoa interrupta	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0385	Hydrobia ulvae	1	3	-	-	-	-	-	-	-	-	44	5	17	8	82	35	7	73	1	1	13	-	-	15	-	-	-	-	63	75	-	-	48	-	9	-	9	1	1	64	3	105	-	-	-	-	-	-	-	-	-	-
W0421	Tornus subcarinatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
W0439	Crepidula fornicata (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0439	Crepidula fornicata	9	-	34	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	72	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-
W0913	Odostomia plicata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W0919	Brachystomia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1077	Retusa obtusa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1118	Elysia viridis (juv)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 12. Combined biological data matrix for 1997-2011 data, with univariate statistics, subsampling details and AMBI scores for each taxon with changes required for AMBI entry into AMBI database where applicable.

Species directory code	Taxon Name	2010 272	2010 275	2010 285	2010 289	2010 295	2010 296	2010 300	2010 301	2010 303	2010 306	2011 150	2011 152	2011 153	2011 154	2011 155	2011 157	2011 158	2011 163	2011 169	2011 171	2011 172	2011 174	2011 179	2011 180	2011 181	2011 189	2011 191	2011 192	2011 193	2011 194	2011 195	2011 204	2011 206	2011 207	2011 209	2011 249	2011 258	2011 260	2011 261	2011 263	2011 267	2011 269	2011 272	2011 275	2011 285	2011 289	2011 295	2011 296	2011 300	2011 301	2011 303	2011 306
W1127	Alderia modesta	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1136	Limapontia depressa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1292	Embletonia pulchra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1431	Cuthona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1563	Nuculidae (juv)	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
W1569	Nucula nitidosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1570	Nucula nucleus	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1695	Mytilus edulis	-	-	5	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	4	5	-	1	-	2	-	-
W1906	Kurtiella bidentata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1949	Parvicardium exiguum	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1961	Cerastoderma edule	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	4	1	-	-	44	15	15	3	1	9	-	-	-	-	-	-	-	-	-	-
W1997	Ensis americanus (juv)	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	1	-	1	-	-	-	4	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
W2029	Macoma balthica	1	1	-	-	-	-	4	-	-	-	-	-	-	-	-	4	14	5	1	1	1	-	-	4	-	-	-	-	21	-	-	6	19	-	6	-	2	-	11	2	-	11	-	5	-	-	-	1	-	-	-	-
W2068	Scrobicularia plana	-	-	-	-	-	-	-	-	-	-	8	-	-	2	20	18	-	26	-	4	-	2	-	6	-	-	-	-	4	2	-	-	-	-	2	-	-	-	-	10	2	8	4	6	-	-	-	-	-	-	-	-
W2059	Abra alba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2061	Abra nitida	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2064	Abra tenuis	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	66	-	-	-	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tapes philippinarum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	5	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	-	-	-	1	-	-	-	-	-	-
W2124	Venerupis senegalensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2137	Petricola pholadiformis	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
W2147	Mya truncata (juv)	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W2149	Mya arenaria	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	8	12	3	5	-	1	-	2	1	-	-	-	-	-
Y0075	Alcyonidium cellarioides	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	P	-	-
Y0076	Alcyonidium diaphanum	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
Y0080	Alcyonidium mytili	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0081	Alcyonidium parasiticum	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0091	Nolella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	P	-	-	-	-	-	-
Y0096	Anguinella palmata	-	-	P	P	P	P	-	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-	P	-	P	P	P	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	P	-	P	-	P
Y0098	Victorella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0112	Walkeria uva	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0122	Farrella repens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0131	Vesicularia spinosa	-	-	P	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0137	Bowerbankia	-	P	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
Y0172	Conopeum reticulum	-	-	P	P	P	P	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	P	P	-	-	-	-	-	P
Y0177	Electra monostachys	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	P	-
Y0178	Electra pilosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0182	Aspidelectra melolontha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0240	Bugula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0246	Bugula plumosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0256	Bicellariella ciliata	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	P	P	-	-	-	P	-	P
Y0279	Scrupocellaria scruposa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0280	Tricellaria (Type A)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0411	Cryptosula pallasiana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Y0463	Smittoidea reticulata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZA0003	Phoronis	-	-	1	-	-	-	-	71	-	-	-	-	-	-	-	-	-	-	13	13	27	23	5	1	18	-	-	-	-	-	-	21	-	-	-	12	-	-	-	-	2	-	-	-	-	-	-	1	-	-	-	-
ZB0148	Amphiuridae (juv)	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZB0161	Amphipholis squamata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZB0262	Thyone fusus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZC0012	ENTEROPNEUSTA	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	6	11	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-
ZD0002	ASCIDIACEA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-
ZD0002	ASCIDIACEA (juv)	-	-	1	9	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0041	Didemnidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0078	Perophora listeri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0084	Ascidiella aspersa	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0088	Ascidia conchilega	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0104	Styela clava	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0115	Polycarpa pomaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0120	Dendrodoa grossularia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0126	Botryllus schlosseri	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0128	Botrylloides leachi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0140	Pyura squamulosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZD0146	Molgula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0001	OSTEICHTHYES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0034	Clupea harengus (eggs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ZG0476	Pomatoschistus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Group	OrB	OrB	OrC	OrC	OrD	OrD	OrD	OrD	OrC	OrC	StA	StA	StA	StA	StB	StB	StB	StB	StC	StC	StC	StC	StD	StD	StD	StF	StF	StF	StE	StE	StF	StG	StG	StG	StG	StD	OrA	OrA	OrA	OrA	OrB	OrB	OrB	OrB	OrC	OrC	OrD	OrD	OrD	OrD	OrC	OrC
	No. Taxa (S)	31	16	65	46	13	6	18	17	32	31	15	13	7	14	13	19	20	13	18	16	15	10	31	20	46	64	57	22	24	26	9	18	25	19	19	31	18	18	14	24	19	30	18	14	41	47	11	14	8	25	11	30
	No. Individuals (N)	482	123	309	261	31	11	80	111	808	102	300	477	36	206	1193	471	804	1425	322	362	114	94	612	100	637	687	609	244	878	349	157	187	736	510	248	199	2635	852	843	757	217	1333	322	211	170	723	22	33	52	464	20	93
	Margalef's species richness (d)	4.694	2.078	9.070	6.470	2.621	1.251	3.879	2.760	4.033	4.973	2.104	1.297	1.116	2.065	1.553	2.275	2.691	1.652	2.424	2.037	2.323	1.321	3.117	3.474	4.956	6.889	6.706	3.274	3.246	3.757	1.582	3.059	3.333	2.406	3.083	4.156	1.904	2.519	1.781	2.414	2.231	3.475	2.078	2.055	6.620	5.164	2.912	2.574	1.772	2.769	2.003	5.295
	Pielou's evenness (J)	0.535	0.643	0.751	0.772	0.830	0.746	0.724	0.480	0.484	0.807	0.629	0.478	0.670	0.631	0.552	0.581	0.431	0.434	0.664	0.535	0.765	0.690	0.383	0.776	0.424	0.537	0.662	0.670	0.738	0.638	0.669	0.734	0.608	0.655	0.668	0.720	0.486	0.507	0.602	0.746	0.620	0.647	0.606	0.611	0.860	0.628	0.822	0.777	0.743	0.586	0.927	0.890
	Shannon Wiener (H'(loge))	1.819	1.541	2.982	2.786	1.910	1.034	2.093	1.266	1.612	2.565	1.614	1.050	1.079	1.567	1.372	1.573	1.270	1.113	1.797	1.372	1.902	1.343	1.167	2.199	1.483	2.058	2.505	1.972	2.315	2.001	1.471	2.079	1.908	1.817	1.930	2.258	1.348	1.464	1.544	2.113	1.591	2.108	1.555	1.518	3.059	2.234	1.893	1.789	1.545	1.694	1.805	2.863

HHA73

Stour and Orwell estuaries annual benthic monitoring report: July 2011 survey, with a review of the data since 1997

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Pears, S. & Worsfold, T.M., 2011. *Stour and Orwell estuaries annual benthic monitoring report: July 2011 survey, with a review of the data since 1997*. Unicomarine Report HHASTO11 (HHA73) to Harwich Haven Authority, March 2012.

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Contents

Summary

Following large-scale macrobiota surveys of the Stour and Orwell estuaries, an annual monitoring schedule was established using a reduced sampling grid of forty-four stations, each with a 0.04 m² Shipek grab sample for biology and another for particle size analysis. Sampling stations were selected so that each group of four represented a typical biotope, as recorded for the 2003 survey. All but two of the stations had been previously sampled in 1997 and 2003. The first annual benthic monitoring survey was completed in July 2008, the second in July 2009 and the third in July 2010. The basic report for the fourth (2011) annual survey is presented here, along with comparisons with the data from previous surveys.

Numbers of taxa and individuals, as well as biomass were generally lower in 2011, than 2010 with variation between samples. The data were divided into nine cluster groups by the SIMPROF test, which could be assigned to six biotopes. The assignments of the upper estuary and intertidal samples generally correlated with target (2003) biotopes but the subtidal sample groups showed greater differences. Variation was greatest subtidally and lowest in the intertidal of the upper reaches of the estuaries. A summary of biotope characteristics is included with this report.

Comparisons with data from previous surveys showed mixed results. Samples from the upper estuary show least evidence of change over time. There was evidence of disturbance in some sample groups, but this may be party due to the naturally ‘stressed’ conditions in estuarine habitats. Results do also indicate a rise in opportunistic species in the estuary and a decline in *Sabella pavonina* in the most recent survey. Further study should aid in determining whether the observed differences represent long term change or cyclical variation.

List of Tables, Figures and Appendices

Tables

Figures

Appendices

1. Introduction

As part of the Compensation, Mitigation and Monitoring Agreement, originally introduced under the 1998-2000 Capital Dredge consent and subsequently amended by the Trinity III Extension consent, a wide scale benthic survey programme of the Stour and Orwell estuaries was introduced, to be repeated on a 5 year cycle.

The first survey was undertaken in 1997, when 154 stations were sampled with a 0.04 m^2 Shipek grab. At each station, two benthic biological samples were taken and one sample for particle size analysis (PSA). The biological samples were analysed by Unicomarine and the PSA by HR Wallingford. A report was produced for the survey (Dyer, 2000).

The second survey was undertaken in 2003; 267 stations were sampled in the Stour, Orwell and Harwich approaches. At each station, one benthic biological sample was taken and one sample for particle size analysis, again using the Shipek grab. Several reports were produced from the survey (Dyer *et al*., 2004, Dyer & Worsfold, 2004, Worsfold, 2002, Worsfold & Dyer, 2004, Worsfold, 2005; Bryant & McNulty, 2007). The results from the 1997 and 2003 surveys were also to inform a Royal Haskoning report on Environmental Trends on the Stour and Orwell Estuaries (Royal Haskoning, 2007).

The five year interval between surveys made changes difficult to interpret and, consequently, an annual monitoring programme was agreed, using fewer samples. Sampling each year should result in an effective long-term monitoring programme with enough data points to detect trends. The emphasis of the annual surveys is on monitoring rather than on mapping. Survey sites represent replicates within a selection of biotopes in each estuary or different parts of an estuary, to allow comparison between the benthos of like biotopes. This comparison should help highlight any areas that are showing unexpected trends in benthic populations. Biomass data are also incorporated into annual reports to allow comparison with bird data.

Annual benthic data (plus benthic invertebrate biomass) will allow relationships between prey availability and bird numbers (low water bird count data are submitted to HHA on an annual basis) to be compared more easily and with a more robust data set to support any findings.

It was agreed at the annual Steering Group in 2007 that Unicomarine should present the data in a report each year. The first year's report (Worsfold & Dyer, 2008) showed sampling positions and initial analyses and a baseline for future reporting. The second year's report (Worsfold & Dyer, 2009) and third year's report (Worsfold *et al*., 2011) included basic data (without analysis for multiple years) for 2009 and 2010, respectively. Each of the annual benthic data reports has been used to inform Royal Haskoning's annual Mitigation and Monitoring reports for the Stour and Orwell estuaries (Royal Haskoning, 2008, 2010 & 2011). The original proposal was to compare results with data from the Blackwater Estuary (see below) but that project was discontinued after its final surveys in 2009 (Dyer & Worsfold, 2009).

This report presents data for the fourth year of annual benthic monitoring. As HHA are required to report on a 5-6 year rolling programme from a 2000 dredge completion baseline, this report also includes comparisons with data from the previous three annual benthic surveys, as well as the large scale surveys from 1997 and 2003.

A summary of the surveys undertaken to date is shown below:

Original survey	June-August 1997	
5-yearly repeat	July	2003 (with biotope mapping)
Year 1	July	2008 (with introduction to annual programme)
Year 2	July	2009 (basic)
Year 3	July	2010 (basic, but with biotope descriptions)
Year 4	July	2011 (survey report and comparisons with past data)

2. Methods

2.1 Sampling grid

Groups of samples were selected to represent typical biotopes. Within each of these groups, four samples were taken, at positions that were sampled in both 1997 and 2003 (with 2 exceptions), to allow comparison between as many years as possible. The sampling dates will be comparable to the previous surveys (*i.e.* June - August).

A list of sampling stations is provided in Appendix 1 and mapped in Figure 1; the list includes biotope assignments based on analysis of data from the 2003 survey (Worsfold, 2005). Most stations were also sampled in 1997 (Dyer, 2000) but two new stations were added for annual monitoring from 2008, due to requests made at the December 2007 Regulators Group meeting for increased sampling in particular areas. Each of the four sampling points within any particular group belonged to a single biotope (following Connor *et al.*, 2004), for the 2003 data, although there may have been more than one (2003) cluster group included in a biotope. Each group has four stations, of similar community type, that can be treated as replicates. There are four sample groups for the Orwell and seven for the Stour.

Sample groups are summarised in Appendix 1 and Figure 1. The dark green area (2003 Cluster Group D), on the upper Stour, represents an upper estuarine intertidal biotope (LS.LMu.UEst.Hed; EUNIS: A2.322) that includes many ragworms and seems well defined. The pale blue areas (2003 Cluster Group E2) are represented in the upper reaches of both estuaries, and at Erwarton Bay, as the most widespread intertidal biotope (LS.LMu.MEst.HedMac; EUNIS: A2.312), with many bivalves, as well as ragworms. The dark blue areas (2003 Cluster Group E1) are also matched on both estuaries and represent a similar intertidal biotope (LS.LMu.MEst.NhomMacStr; EUNIS: A2.311), with higher abundance of small worms. The yellow areas (2003 Cluster Groups B1 and B2) are variations of the most widespread subtidal biotope (SS.SMu.SMuVS.AphTubi; EUNIS: A5.322), dominated by small worms, in each estuary. The purple areas (2003 Cluster Groups G1 and G2) are subtidal fanworm (*Sabella pavonina*) beds (SS.SMx.IMx.SpavSpAn; EUNIS: A5.432), though G1 had less dense *Sabella*.

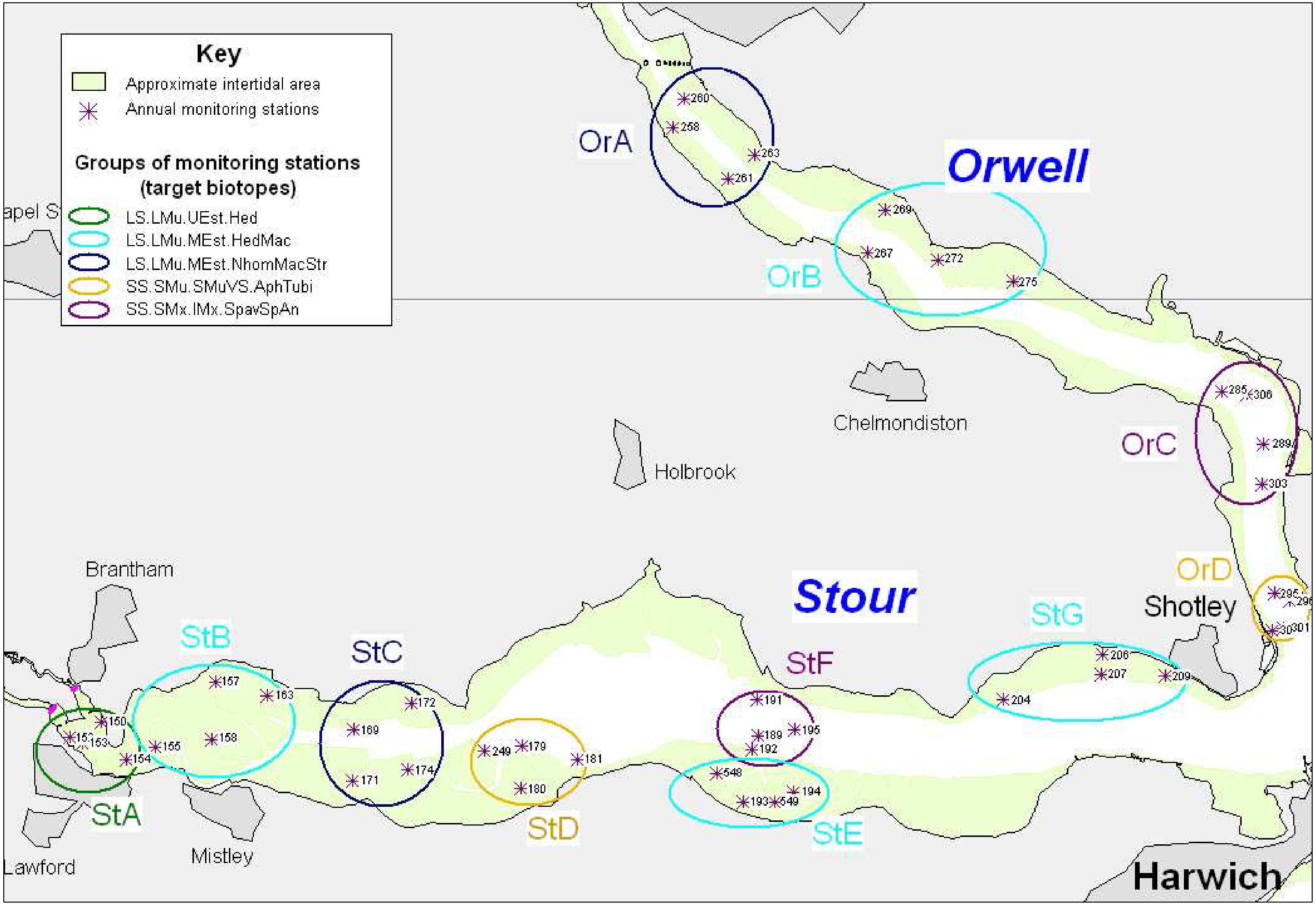

Figure 1. Locations of annual monitoring stations in the Stour and Orwell estuaries, with sample groups and target biotopes

2.2 Field work (2011)

Tony Freeston and Anita Gajda of Thomson Unicomarine and HHA staff conducted the grab sampling from the HHA vessel ‘Egret’ (Figure 2), using a 0.04 m^2 Shipek grab (Figure 3), between 5th and 6th July 2011. Two 0.04 m^2 Shipek grab samples were taken at each station: one for particle size analysis (PSA, Figure 4) and one for benthic biological analysis. A photograph was taken of each biological sample in the grab, before processing. The biological samples were sieved at 0.5 mm (figure 5) and fixed in formaldehyde solution on the day of sampling. Details of the samples collected are included in Appendix 1.

Figure 2. The HHA survey vessel ‘Egret’ (14/07/10).

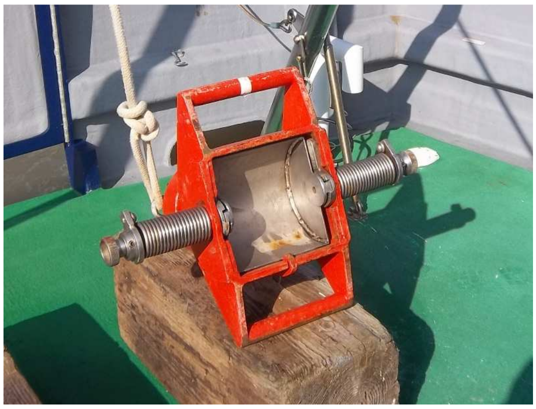

Figure 3. 0.04 m^2 Shipek grab (05/07/11).

Figure 4. Collection of the PSA sample (05/07/11).

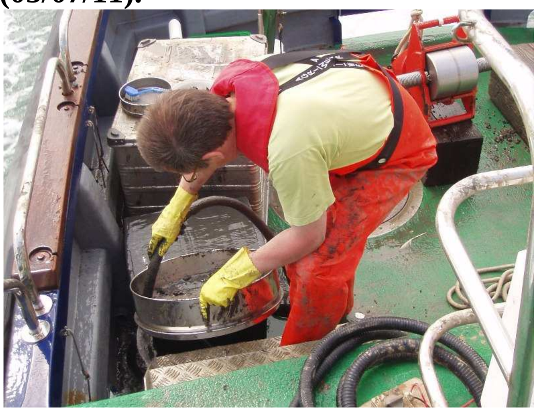

Figure 5. Onboard sieving of biological sample (05/07/11).

2.3 Laboratory work (2011)

2.3.1 Particle size analysis (PSA)

Thomson Unicomarine Ltd undertook PSA following procedures laid out in the National Marine Biological Analytical Quality Control (NMBAQC) scheme’s best practice guidelines (Mason, 2011) and following Thomson Unicomarine’s Particle Size Analysis standard operating procedures (White & Finbow, 2011).

A representative sub-sample was passed through a 1 mm sieve to determine whether there was a significant amount of sediment greater than 1mm. Sediment from the sub-sample that was less than 1mm was left to settle out for analysis by laser diffraction using a Malvern Mastersizer 2000 particle size analyser with Hydro 2000G sample dispersion unit. In samples where there was an insignificant amount of sediment greater than 1 mm, only laser analysis was required so no further analysis was required.

In samples where there was a significant proportion of sediment greater than 1 mm, the procedure continued by wet sieving the remainder of the sample through a 1mm sieve. The <1 mm and >1 mm sections were both oven dried for 12 hours at 100˚C. After drying, the >1 mm fraction was processed in the sieve shaker for 20 minutes and split to half phi intervals. Each half phi fraction was then weighed. The <1 mm fraction was also weighed after drying to produce a combined <1mm weight.

The sieve and laser data were then merged to produce a continuous particle size distribution which was entered into the GRADISTAT program (Blott & Pye, 2001) to obtain derived statistics. Basic statistics were also calculated (following Folk & Ward, 1957). These include mean phi, the spread of sizes around the mean (sorting), the spread of sizes around the average (skewness) and the degree of concentration of grain sizes relative to the mean (kurtosis). The sediment classification was simplified to the Wentworth (1922) scale, for the summary on the cluster dendrogram (see below).

2.3.2 Macrobiota analysis

Analysis of the macrobiota Shipek grab samples was carried out using Unicomarine's standard operating procedures (Worsfold *et al*., 2010), upon which current national recommendations (Worsfold *et al*., 2010b) are based, and according to the agreed specifications. All biological analysis was conducted at Unicomarine's Letchworth laboratory by Thomson Unicomarine staff (Jason Argent, Lydia Finbow, Tony Freeston, Anita Gajda, Luke Hine, Thomas Lord, Daniel Neilson, Charlotte Newberry, Melanie O'Rourke, Rebecca Quine, Sajan Sebastian, Jessica Taylor), with quality control for all identifications (Ceri Miller, Tim Worsfold).

After several days in preservative, the biological samples were re-sieved at 0.5 mm and biota extracted using low power stereo microscopes. Samples with large numbers of a particular taxon or very high volumes of light sediment were subsampled, using a divided column. Following in-house quality control procedures, which ensure that animals are not missed, the sediment residues (material from which biota has been extracted) were discarded. The extracted biota were preserved in 70% Industrial Methylated Spirits (IMS), with the exception of encrusting taxa, which were dried. Countable animals removed from the samples were identified to most accurate taxonomic level practicable, usually species, and individuals counted. Non-countable animals, such as colonial species, and plants were recorded as present "P". High power compound microscopes were used to confirm the identity of some species. For quality control purposes and to allow future taxonomic comparisons to be made, a reference collection of each taxon found was made for the project as a whole and will be kept at Thomson Unicomarine, along with the remaining extracted biota, which are stored at Thomson Unicomarine as one pot per sample. Biomass measurements were carried out as blotted wet weight by recorded taxa, for unattached taxa only.

2.4 Data analysis (2011 Survey)

All statistical analyses were carried out using the *PRIMER* (Plymouth Routines In Multivariate Ecological Research) suite of applications version 6.1.13 (Clarke & Warwick, 2001a; Clarke & Gorley, 2006).

2.4.1 Univariate statistics

Total numbers of taxa (*S*) and individuals (*N*), Margalef's index (*d*, species richness), Pielou's index (*J*′, evenness) and Shannon-Wiener ($H'(\log_e)$, diversity) were calculated for each sample using the *DIVERSE* component of *PRIMER*. Colonial taxa, such as bryozoans and hydroids were excluded from the calculations of total numbers of individuals and diversity indices, but included when calculating the total numbers of taxa.

2.4.2 SIMPROF Cluster analysis

To obtain a measure of the degree of similarity between the biota found, cluster analysis was carried out on the macrobenthic data, using *PRIMER*. Prior to analysis, taxa recorded only as present were given a unitary value. The analysis used the Bray-Curtis similarity, square root transformed data and the group averaging cluster algorithm (Clarke & Warwick, 2001a).

The clustering technique compares the abundance of each taxon in each sample, with its abundance in each of the other samples. The result is a matrix of similarity indices comparing each sample with all other samples. The similarity matrix resulting from the analysis is presented diagrammatically as a dendrogram. Samples that are similar link together towards the higher end of the similarity scale and those that are less similar link towards the lower end. The scale is an index from 0% to 100% and should be viewed as a relative indicator of similarity; it does not indicate the proportion of species in common.

The similarity profile (*SIMPROF*) test was run as part of the clustering routine. This permutational test identifies clusters of samples that cannot be statistically separated at the 5% significance level, which are then shown on the cluster dendrogram using red lines. Black lines on the cluster denote samples that are statistically different from one-another at the 5% significance level.

In order to assess the importance of differences in the sediment on the benthic biota, an overlay of the proportion of sediment in each major sediment size category for each sample was added to the resulting cluster dendrogram using categories from Wentworth (1922).

2.4.3 Significant taxa

The data were examined further to determine the characteristic biota of the communities recognised by the groupings of sites described above. The most abundant biota in each group identified by the *SIMPROF* test were listed. A list of samples in each cluster group was then created and the mean number of individuals of each taxon recorded in each cluster group was calculated and converted to numbers per square metre. The resulting lists represent, in decreasing order, the numerically dominant taxa in each cluster group. Only the top 20 taxa are given in each list. The report includes separate listings for those taxa that were fully enumerated in the samples and those which were not countable. The latter include taxa such as bryozoans, which are identified but recorded as present only. The list for this group is thus an average of the number of samples in which each of the listed taxa occurred, again sorted in decreasing order. The groups were then assigned to standard biotopes using the most recent classification (Connor *et al*., 2004).

2.4.4 Data mapping

Sampling points from the 2011 survey were plotted onto maps using *MapInfo Professional version 9.0*. Numbers of taxa and individuals, total biomass and *SIMPROF* cluster groups were plotted and biotopes extrapolated.

2.5 Comparisons with previous data

Further analyses were carried out comparing data from the 2011 with data from the three previous annual surveys, along with comparable stations from the 1997 and 2003 surveys to look for temporal changes. Statistical analyses were carried out using the *PRIMER* suite of applications along with the *PERMANOVA+* (Permutational ANOVA and MANOVA) add-on Version 1.0.3 (Anderson *et al*., 2008) and AZTI-Tecnalia's Marine Biotic Index (AMBI) software Version 4.1 (Borja & Mader, 2008). Some analyses were carried out on 42 comparable sampling stations from 1997, 2003 and the four annual monitoring surveys (2008-11), whilst others used only the data from the four annual surveys; each section specifies which dataset was used.

There have been some minor changes in the way certain taxa are recorded in the fourteen years since the 1997 survey. The taxon list for the combined surveys has, therefore, been modified so that data are comparable between years. Fortunately, standardisation of recording policy has meant that less modification was necessary than would have been the case for data sets produced by different laboratories. Details of standardisations are presented in Appendix 2.

2.5.1 Comparative annual survey plots

For each of the annual surveys (2008-2011), the mean number of taxa, mean number of individuals per m² and mean total biomass per m² was calculated for each of the target biotope groups assigned from the 2003 survey data. These data were then used to create bar charts to show any changes between survey years. In addition, abundances per m² for eight characteristic taxa from the target biotopes (*Hediste diversicolor*, *Streblospio shrubsolii*, *Aphelochaeta marioni*, *Sabella pavonina*, *Heterochaeta costata*, *Tubificoides amplivasatus*, *T. benedii* and *Hydrobia ulvae*) were plotted both by year and as means for each target biotope group. For *S. pavonina*, mean biomass values were similarly plotted. In order to examine whether changes in species abundance were related to a corresponding change in the silt/clay fraction of the sediment, a plot (Figure 25) was produced for the mean proportion of silt/clay in each target biotope group for each survey.

2.5.2 Multidimensional Scaling

An MDS plot of the comparable biological data for all six surveys (1997-2011) was produced, with different symbols used for different years and different colours representing target biotope groups to enable any patterns in similarity to be more clearly observed.

The analysis used a Bray-Curtis similarity matrix, derived from the square-root transformed combined macrobenthic data matrix. An iterative process places sample points placed on the two-dimensional plane in a configuration where the inter-sample similarities are most closely represented. The box that bounds the MDS plot does not represent axes or scale. Two samples with a high similarity index will appear close together, while those less similar will appear further apart. The "correct" configuration of sample points is multidimensional and the plot represents the best 2-dimensional solution to the problem (Clarke & Gorley, 2006). The 'stress' value denotes how faithfully the two-dimensional plot represents the true high-dimensional relationships between points on the plot and increases with increasing quantities of data. Low stress values (<0.1) correspond to a good ordination with little prospect of misleading interpretation (Clarke & Warwick, 2001a).

2.5.3 PERMANOVA

The *PERMANOVA* test uses permutational methods to test the simultaneous response of one or more variables to one or more factors (in this case time and target biotope) in an analysis of variance (ANOVA) experimental design. The routine correctly calculates an appropriate distance-based pseudo-F statistic for each term in the design, based on expected mean squares (EMS), in a way that is directly analogous to the construction of an F statistic for multi-factorial univariate ANOVA models (Anderson *et al*., 2008). This analysis has the advantage over *ANOSIM* of also being able to test for an interaction difference, i.e. does one factor have a different effect at different levels of the second factor? Where a significant interaction is found, pairwise tests can be carried out within each level of one factor for each pairing of the other factor to determine where the differences are found. The pairwise tests are a direct multivariate analogue to the univariate *t*-test (Anderson *et al*., 2008).

A two-way crossed design in the *PERMANOVA* routine was used for detailed analysis of the biological data from comparable stations in all six survey years. Epibiota and other non-countable taxa were excluded from this analysis as they were only recorded on a presence/absence basis and, as such, were not comparable to countable taxa. The analysis tested Survey Year (1997, 2003, 2008, 2009, 2010 or 2011) crossed with Target Biotope (LS.LMu.MEst.HedMac, LS.LMU.MEst.NhomMacStr, LS.LMu.UEst.Hed, SS.SMu.SMuVS.Aph.Tubi or SS.SMx.IMx.SpavSpAn) with the null hypotheses of 'no difference between years' and 'no difference between target biotope groups'.

2.5.4 Abundance Biomass Comparison Curves

The dominance curve component of PRIMER was used to produce Abundance Biomass Comparison (ABC) curves from mean data for the samples in each target biotope for each annual survey (2008-11).

A dominance curve is produced by ranking the species in a sample in decreasing order of abundance (or biomass). The ranked abundance (or biomass), expressed as a percentage of the total, is then plotted against the log of the species rank. If cumulative ranked abundances are plotted against the log of the species rank, the plot is referred to as a "*k*-dominance" curve (Lambshead *et al*., 1983).

To produce an ABC curve, separate *k*-dominance curves for abundance and biomass are plotted on the same axes for each sample, based upon methods proposed by Warwick (1986). The ABC curves are interpreted on the basis of the observation that climax communities tend to be characterised by large-bodied species, which dominate the biomass, but not the abundance, and are more susceptible to environmental impacts. In these cases, the biomass curve lies entirely above the abundance curve. Grossly disturbed communities tend to be characterised by high abundances of small-bodied 'opportunist' species, in which case the abundance curve lies entirely above the biomass curve. In moderately disturbed communities the curves lie close together and may cross over one or more times (Warwick & Clarke, 1994). In addition to visual inspection of the ABC curves, the abundance (*A*) values can be subtracted from the Biomass (*B*) values for each species rank and standardised to a common scale using the *W* statistic (Clarke, 1990):

$$W = \sum_{i=1}^{S} (B_i - A_i) / [50(S - 1)]$$

Positive values indicate undisturbed conditions, negative values suggest gross disturbance and values close to zero indicate moderate disturbance.

For the current study, ABC plots were produced using a reduced abundance matrix including only countable fauna from each of the four annual surveys (2008-2011). Values for the *W* statistic were calculated automatically in PRIMER in addition to the ABC curve for each sample.

2.5.5 Taxonomic Distinctness

Taxonomic distinctness indices were calculated using the DIVERSE component of Primer Version 6. The taxonomic hierarchy used was based on the Unicorn taxon list for the combined surveys from 1997, 2003 and 2008-2011, using Taxonomic Routines for Excel (TREx), which incorporates recent literature and agrees well with the World Register of Marine Species (WoRMS) list.

Warwick & Clarke (1995) observed that, in grossly perturbed environments, benthic communities are kept in an early successional stage with relatively few, closely related species. Less perturbed environments in a late successional stage tend to show a range of more distinct species belonging to many phyla.

The taxonomic distinctness index proposed by Warwick & Clarke (1995) and Clarke & Warwick (1998) use taxonomic path lengths to quantify the taxonomic diversity and distinctness of a faunal assemblage. This measure has been proposed to be more sensitive to environmental degradation and less responsive to natural environmental gradients (*e.g.* substrate grain size) than species richness. Values of taxonomic distinctness are based on equal step lengths between seven taxonomic levels (species, genus, family, order, class, phylum and kingdom) *i.e.* the weighting between taxonomic levels for different species in the same genus is 14.29; for species in different genera, but the same family the weighting is 28.57; for species in different families, but the same order the weighting is 42.86, etc., and the weighting is 100 for species only connected at the highest taxonomic level (Clarke & Warwick, 1998).

Average Taxonomic Distinctness (Δ^+), is used when abundance data is unavailable or is ignored (i.e. presence/absence data) and measures the average taxonomic distance apart of all the pairs of species in a sample and provides and intuitive definition of biodiversity, as average taxonomic breadth of a sample. This measure was allowed so that non-countable taxa (such as colonial taxa and algae) could be considered in the analysis.

Clarke & Warwick (2001b) also define **Variation in Taxonomic Distinctness (Λ^+)** as the total variance of the taxonomic distances between each pair of species in a sample about the sample's Average Taxonomic Distinctness (Δ^+).

A 'master species list' for the survey area was created using data from all samples collected from the Stour and Orwell during the large-scale 1997 and 2003 surveys and the 2008-11 annual surveys. This master list was then used, as recommended in Clarke and Warwick (2001a), to produce funnel plots of 95% of the expected values of Average Taxonomic Distinctness (Δ^+) and Variation in Taxonomic Distinctness (Λ^+). Each funnel plot is the result of 999 random permutations for between 2 and 100 species from the master list using the TAXDTEST routine. The actual values for the samples were then plotted on the funnel plots, and any that fall outside the funnel of expected values are considered to be significantly different to the expected values.

2.5.6 AZTI Marine Biotic Index

The AZTI Marine Biotic Index (AMBI) was designed to establish the ecological quality of European coasts (Borja *et al*., 2000) and has been used to assess disturbance with respect to several types of environmental impact, including dredging impacts and sand extraction (Muxika *et al*., 2005). The AMBI value is a biotic coefficient that is calculated with the following formula, based upon the relative proportions of five ecological groups (EG) to which the soft-sediment benthic species are allocated:

AMBI value = [(0 x % EGI) + (1.5 x % EGII) + (3x % EGIII) + (4.5 x % EGIV)
+ (6 x % EGV)]/100

Each species' Ecological Group is classified as below (Grall and Glémarec, 1997):

- EGI: very sensitive to organic enrichment and present under unpolluted conditions.
- EGII: indifferent to enrichment, always present in low densities with non-significant variations with time.
- EGIII: tolerant to excess organic matter enrichment; and may occur under normal conditions; however, their populations are stimulated by organic enrichment.
- EGIV: Second-order opportunistic species, adapted to slight to pronounced unbalanced conditions.
- EGV: First-order opportunistic species, adapted to pronounced unbalanced situations.

The AMBI value can then be used to derive several thresholds based upon the proportions of the Ecological Groups (Borja *et al*., 2000, Borja *et al*., 2003). These are summarized in Table 1 (overleaf). The AMBI software has also been used to determine ecological quality status within the context of the European Water Framework Directive (see Borja *et al*., 2003, Muxika *et al*., 2005).

AMBI Value	Biotic Index	Dominating Ecological Group	Benthic Community Health	Site disturbance Classification	Ecological Status (WFD)
$0.0 < BC \leq 0.2$	0	I	Normal	Undisturbed	High
$0.2 < BC \leq 1.2$	1		Impoverished		
$1.2 < BC \leq 3.3$	2	III	Unbalanced	Slightly disturbed	Good
$3.3 < BC \leq 4.3$	3		Transitional to pollution	Moderately disturbed	Moderate
$4.3 < BC \leq 5.0$	4	IV-V	Polluted		Poor
$5.0 < BC \leq 5.5$	5		Transitional to heavy pollution	Heavily disturbed	
$5.5 < BC \leq 6.0$	6	V	Heavy polluted		Bad
Azoic	7	Azoic	Azoic	Extremely disturbed	

Table 1. Summary of AMBI values and their equivalences (modified from Borja *et al*., 2000 and Muxika *et al*., 2005).

The AMBI value, Biotic Index (BI) and site disturbance classification calculations were made using AMBI version 4.1 (Borja and Mader, 2008) with the most up to date version of the species list (February 2010). Prior to importing the data into AMBI, some further truncation was required, including the removal of taxa considered as non-soft sediment/non-benthic, epifauna, non-invertebrate taxa and higher taxonomic levels not included in the AMBI species list, as recommended by Borja and Muxika (2005). Full data truncation details are included in the combined data matrix (see below). AMBI was used on a matrix of combined data from 42 comparable stations sampled in 1997, 2003 and the 2008-11 annual surveys.

3. Results

3.1 Particle size analysis (PSA): 2011

Photographs of each PSA sample are shown in Appendix 3 (odd photo numbers); most show muddy or mixed sediment. The raw PSA data are given in Appendix 4. The data are summarised by standard (Blott & Pye, 2001) size fractions in Appendix 5 and also shown diagrammatically on the dendrogram (Figure 9), summarised by the Wentworth (1922) scale.

Most stations were dominated by high proportions of Silt/clay but some had equal or greater proportions of Pebble, or various sand fractions. There seemed to be little correlation between sediment composition and the biological clustering pattern.

3.2 Macrobiota: 2011

Photographs of each biological sample are shown in Appendix 3 (even photo numbers). Most show mud-dominated communities. Green algae (*Enteromorpha*) can be seen at Stations 193, 194, 206 and 209 (Appendix 3, Photos 38, 40, 46 and 50), fanworm (*Sabella pavonina*) tubes can be seen at Stations 289 and 301 (Appendix 3, Photos 72 and 80).

3.2.1 Univariate statistics

Full macrobiological data for the 2011 monitoring survey are presented in Appendix 6, along with details of any subsampling carried out. The table also includes the total numbers of taxa and individuals, Pieliou's Evenness (J'), Shannon-Wiener diversity ($H'log_e$), Margalef's species richness index (d) and *SIMPROF* cluster group assignments. Univariate statistics are plotted on maps in Figures 6 (total number of taxa per sample), 7 (numbers of individuals calculated per m^2) and 8 (total wet weight biomass per m^2). Full biomass data are presented in Appendix 7.

Numbers of taxa (Figure 6) were highest in the subtidal samples targeted as biotope SS.SMx.IMx.SpavSpAn (Sample Groups StF and OrC); 64 taxa were recorded at Station 189 (in StF). The lowest numbers of taxa were from intertidal habitats: StA, targeted as biotope LS.LMu.UEst.Hed; Station 153 had only 7 taxa. Numbers of individuals (Figure 7) were highest intertidally, with 65,875 per m^2 at Station 258 (in OrA), and lowest in the subtidal sample groups OrC and OrD (500 per m^2 at Station 303, in OrC). Shannon Wiener Diversity ranged from 1.050, at Station 152 (in StA), to 3.101 at Station 285 (in OrC).

Total biomass (Figure 8) was highest in the subtidal Stour group StF (6,679g per m^2 at Station 189) and lowest subtidally in group OrD (0.2g per m^2 at Station 295). Mean biomass for each target group is presented in Appendix 8, ranked by mean weight for each taxon. Mean biomass per m^2 was highest in subtidal Group StF and lowest in Sample Group StC. The taxa with the highest mean biomass for the survey as a whole were American slipper limpets (*Crepidula fornicata*), cockles (*Cerastoderma edule*) and fanworms (*Sabella pavonina*). The biomass of cockles and slipper limpets would be skewed by shells; fanworms and slipper limpets are mainly subtidal.

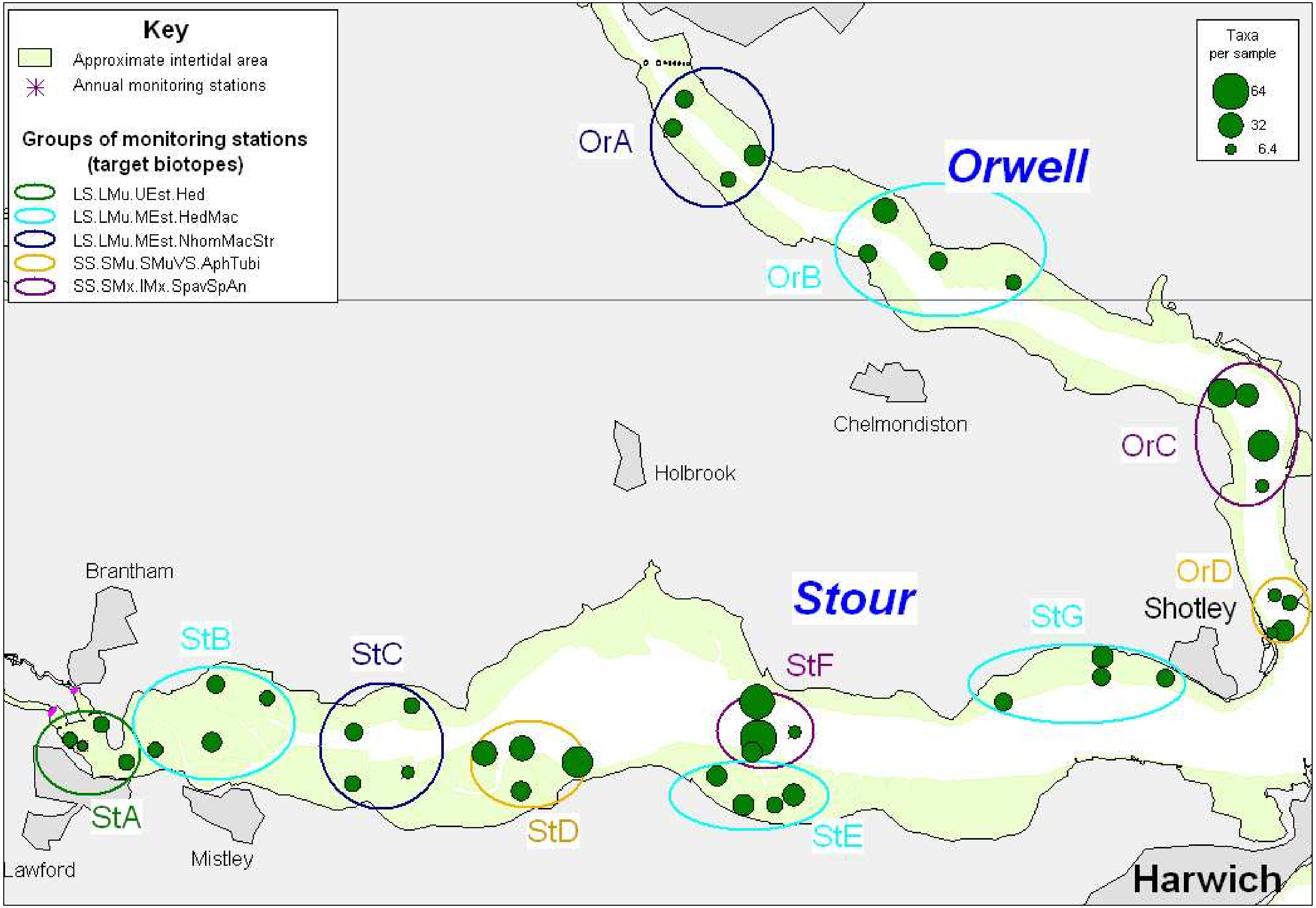

Figure 6. Numbers of taxa recorded per grab at each annual monitoring station in the Stour and Orwell - 2011 survey.

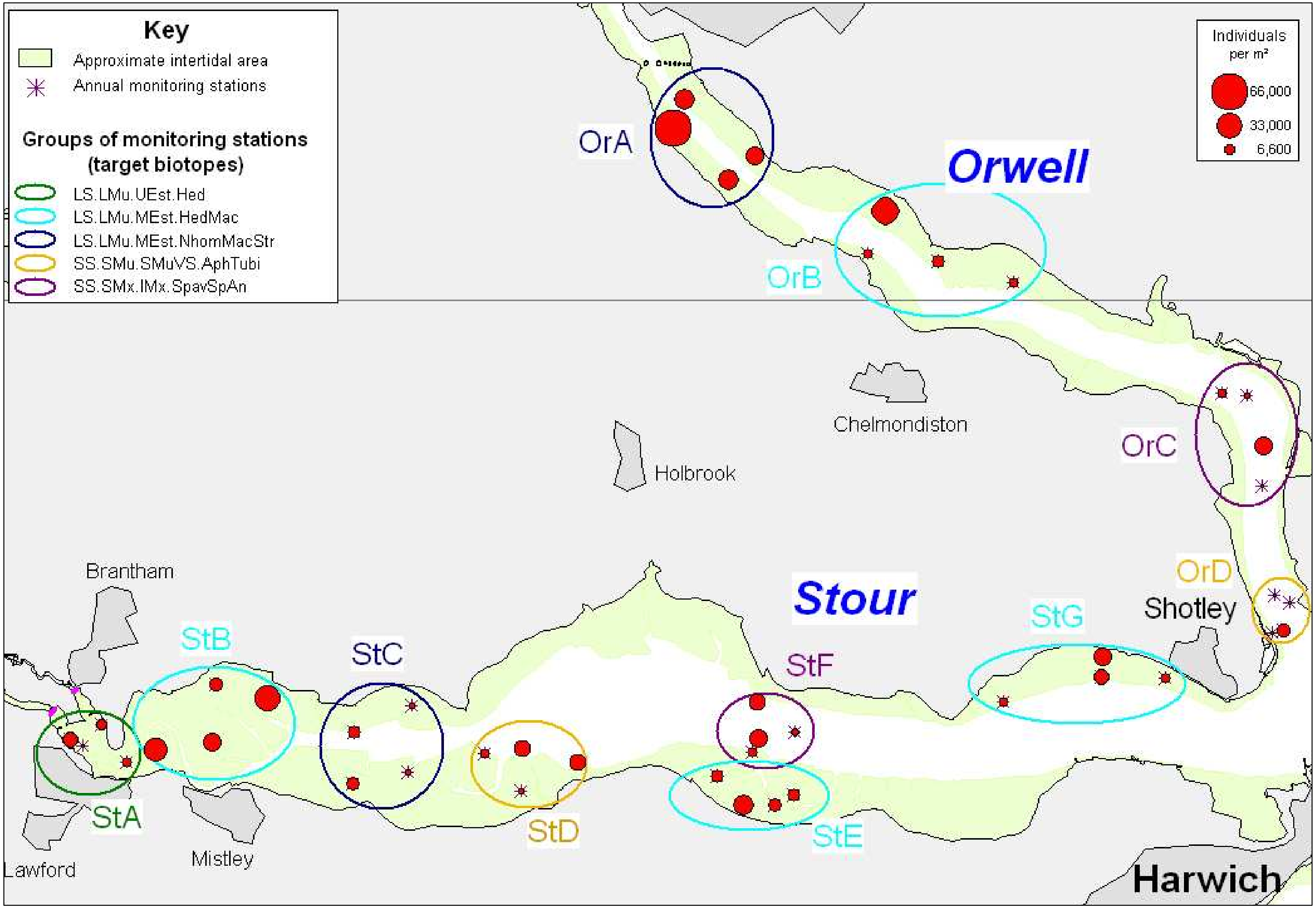

Figure 7. Numbers of individuals calculated per m² at each annual monitoring station in the Stour and Orwell - 2011 survey.

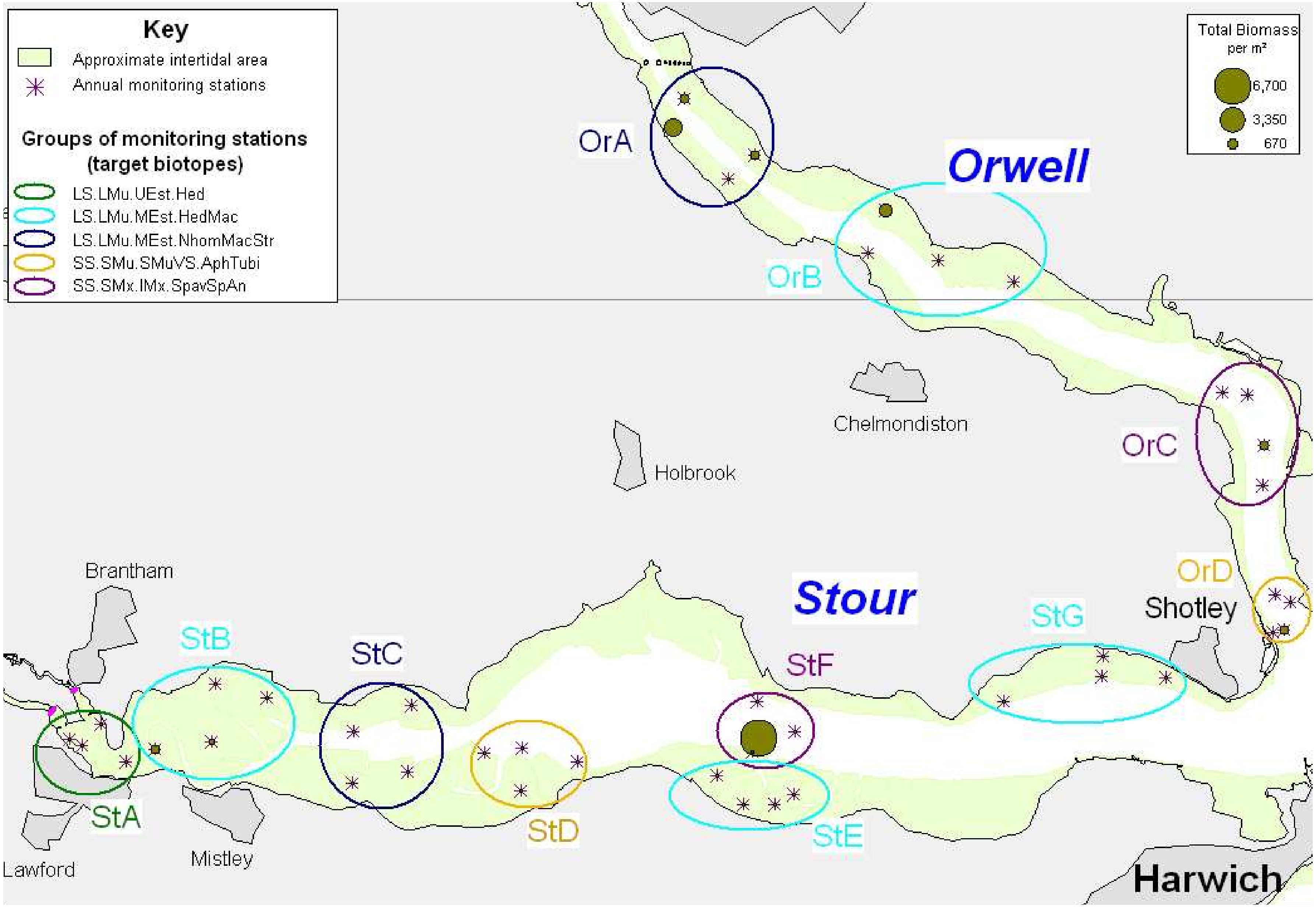

Figure 8. Total wet weight biomass (g per m²) for each annual monitoring station in the Stour and Orwell - 2011 survey.

3.2.2 SIMPROF Cluster analysis

The results of the *SIMPROF* cluster analysis for the 2011 Stour and Orwell survey are presented as a dendrogram in Figure 9. A summary of the sediment found at each station is also shown on the dendrogram as an overlay; the diameter of circles represents the proportion of each sediment component. The spatial distribution of the cluster groups is shown in Figure 10. The dominant taxa for each cluster group are given in Appendix 9, with separate lists for average numbers of countable taxa in each group and percentages of samples in which each non-countable taxon was found in each group. Biotope assignments are also provided in Appendix 9 (for 2011 data) and extrapolated onto Figure 11.

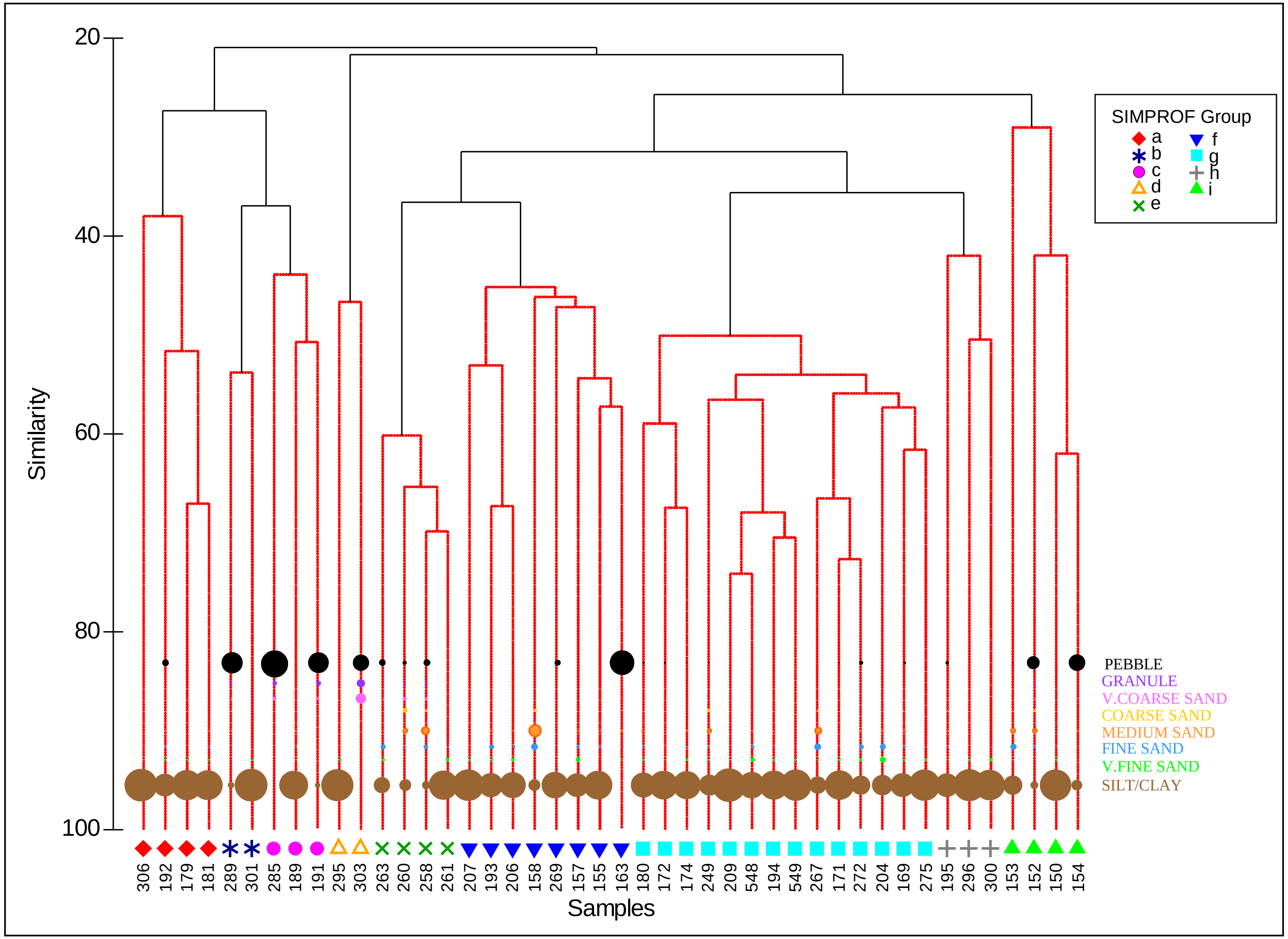

Figure 9. Cluster dendrogram of macrofaunal data from each grab sample (2011 data), with overlay of sediment size categories and symbols showing significantly different clusters at the 5% significance level.

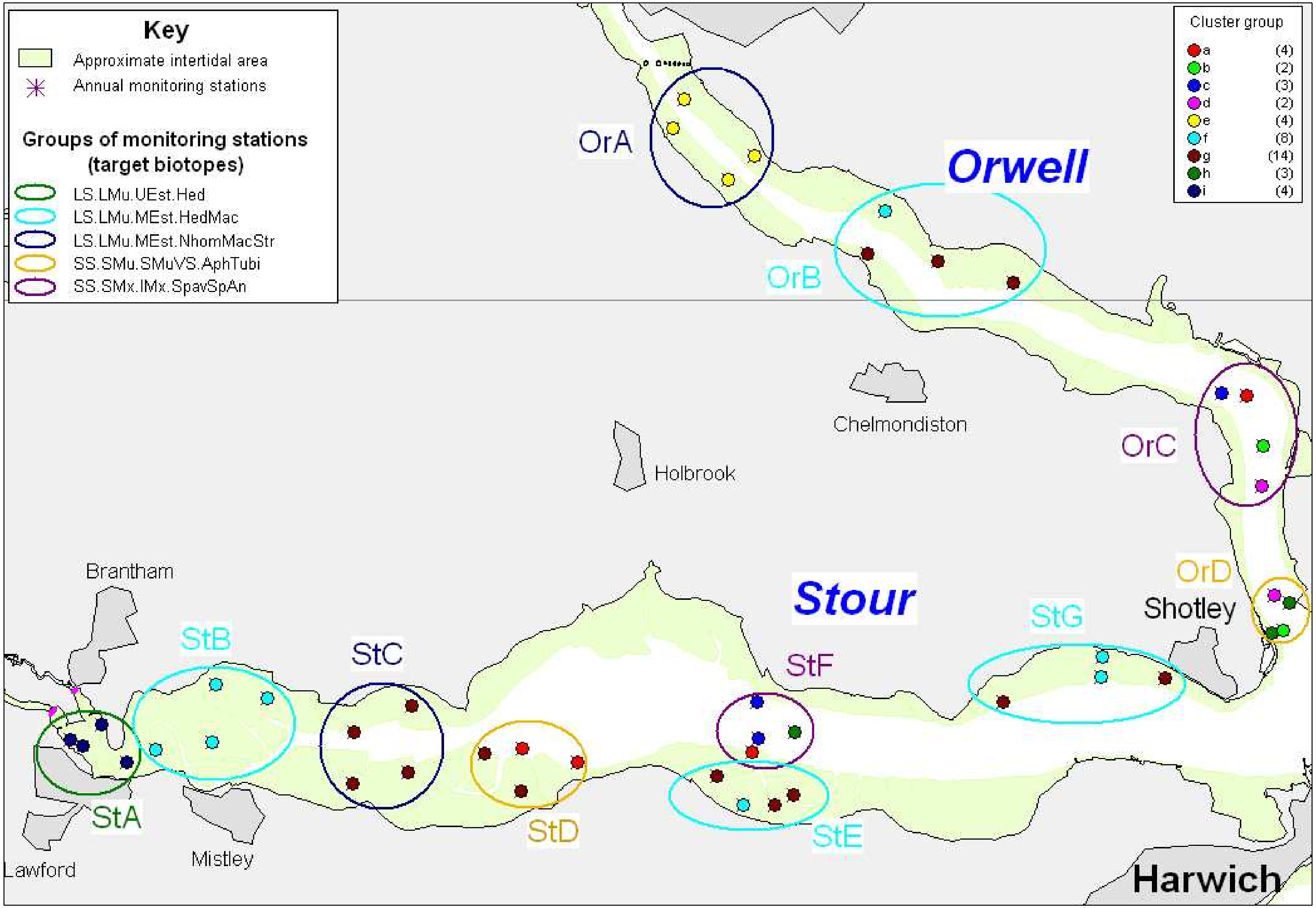

Figure 10. Cluster group assignments for each annual monitoring station.

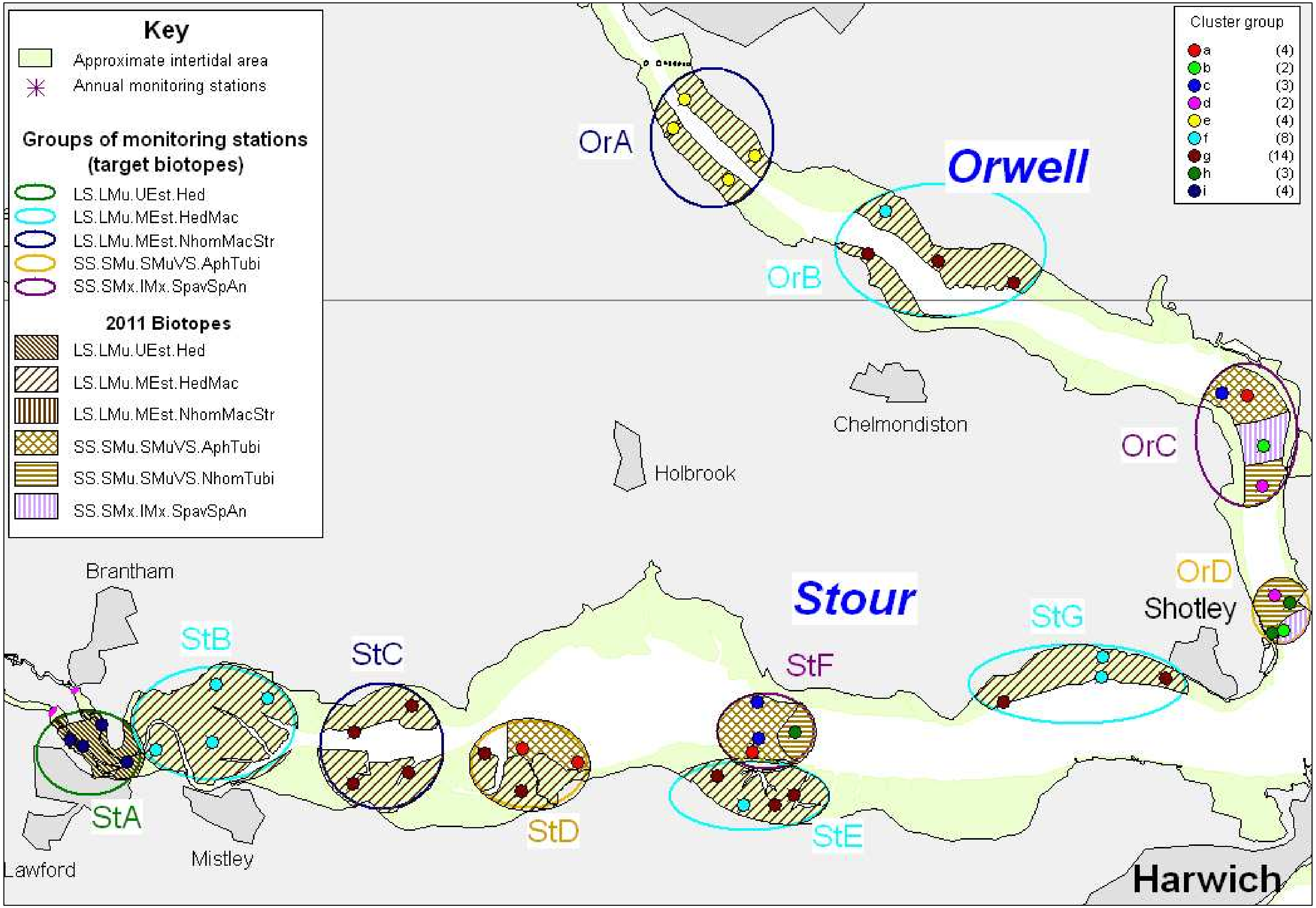

Figure 11. Cluster group assignments for each annual monitoring station, with extrapolated biotopes.

3.2.3 Significant taxa

The *SIMPROF* test identified nine groups of samples that could be statistically separated at the 5% significance level; these were assigned to five biotopes, all but one of which had been recorded in 2003, though not necessarily from stations selected for annual monitoring. While some sample groups have four samples within the same cluster groups and/or biotopes as previous years, there are others for which the classification can be seen to have changed. A table of biotope assignments for each station in each year is presented in Appendix 10. Stour groups StA, StB and StE and Orwell group OrA remained unchanged, as with the previous annual surveys. Changes are most apparent in the subtidal groups StF and OrC. Changes since 2010 were also seen on the mid-estuary mudflats in groups StG and OrB, although in these cases the new biotope assignments represent a return to those of the 2003 target biotope (LS.LMu.MEst.HedMac). 2011 saw a decrease in the mixed sediment fanworm biotope SS.SMx.IMx.SpavSpAn, with only two samples assigned (289 in OrC and 301 in OrD), compared to seven in 2010 and eight during the target biotope assignment in 2003. A list of all biotopes recorded at the annual monitoring stations from 2003 to 2011 is provided as Appendix 11, with notes on each biotope's characteristics, distribution and sensitivity.

3.2.4 Data mapping

Sampling points from the 2011 survey were plotted onto maps using the program *MapInfo Professional version 9*. Numbers of taxa and individuals, total biomass, and cluster groups were plotted and biotopes extrapolated

3.3 Comparisons with previous data

The combined, standardised matrix for the comparable data from 1997-20011 is presented in Appendix 12. The table includes the total numbers of taxa and individuals, Pieliou's Evenness (J'), Shannon-Wiener diversity (H'log$_e$) and Margalef's species richness (d) for each sample. In addition, the table includes columns giving the AMBI score for each taxon, where applicable, and notes of any truncation required for entry into the AMBI database.

3.3.1 Comparative plots of annual survey data

The plot of mean number of taxa in each target biotope for the four annual surveys is presented in Figure 12 (overleaf).

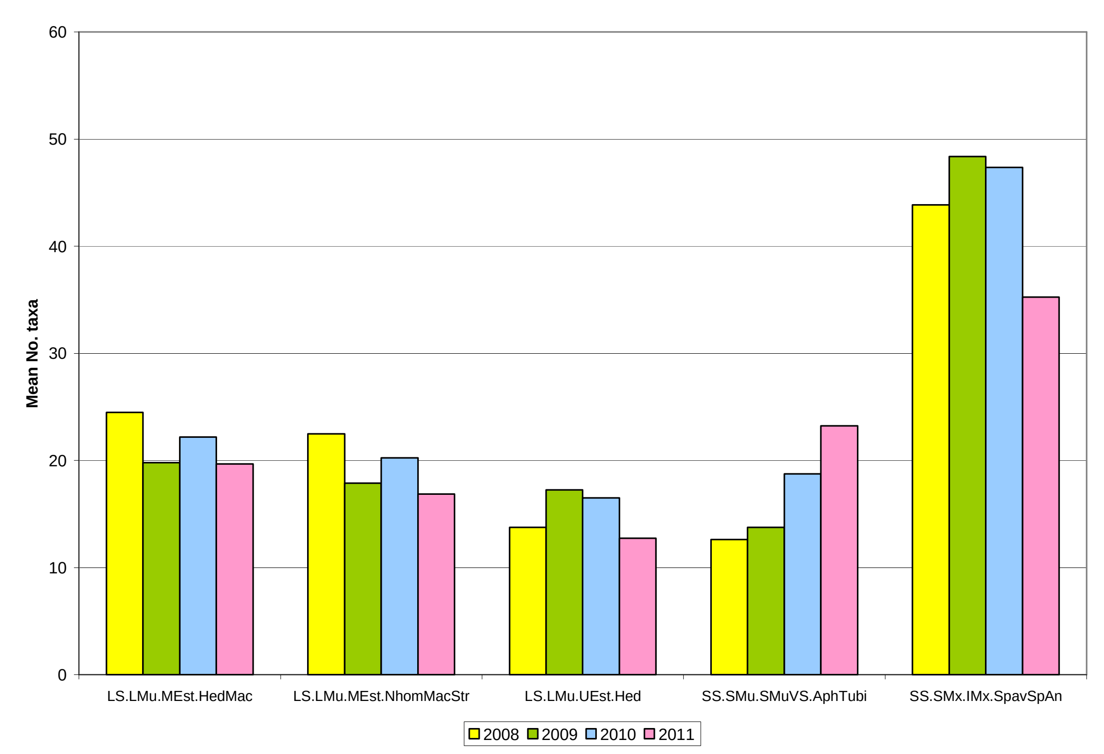

Figure 12. Mean number of taxa in each target biotope group in each of the annual survey years.

This chart shows that overall numbers of taxa were highest in the target Group SS.SMx.IMx.SpavSpAn. Numbers of taxa were highest in 2008 for target Groups LS.LMu.MEst.HedMac and LS.LMu.MEst.NhomMacStr, but lowest for SS.SMu.SMuVS.AphTubi, which has shown an increase each year. Mean numbers of taxa were lowest in 2011 for all biotope groups except SS.SMu.SMuVS.AphTubi, in which they were the highest. Changes between years were similar in LS.LMu.MEst.HedMac and LS.LMu.MEst.NhomMacStr, which showed a decrease between 2008 and 2009, increasing again in 2010 and then decreasing in 2011. Patterns of change were also generally similar between SS.SMx.IMx.SpavSpAn and LS.LMu.UEst.Hed, where numbers increased between 2008 and 2009, then decreased through 2010 to their lowest in 2011.

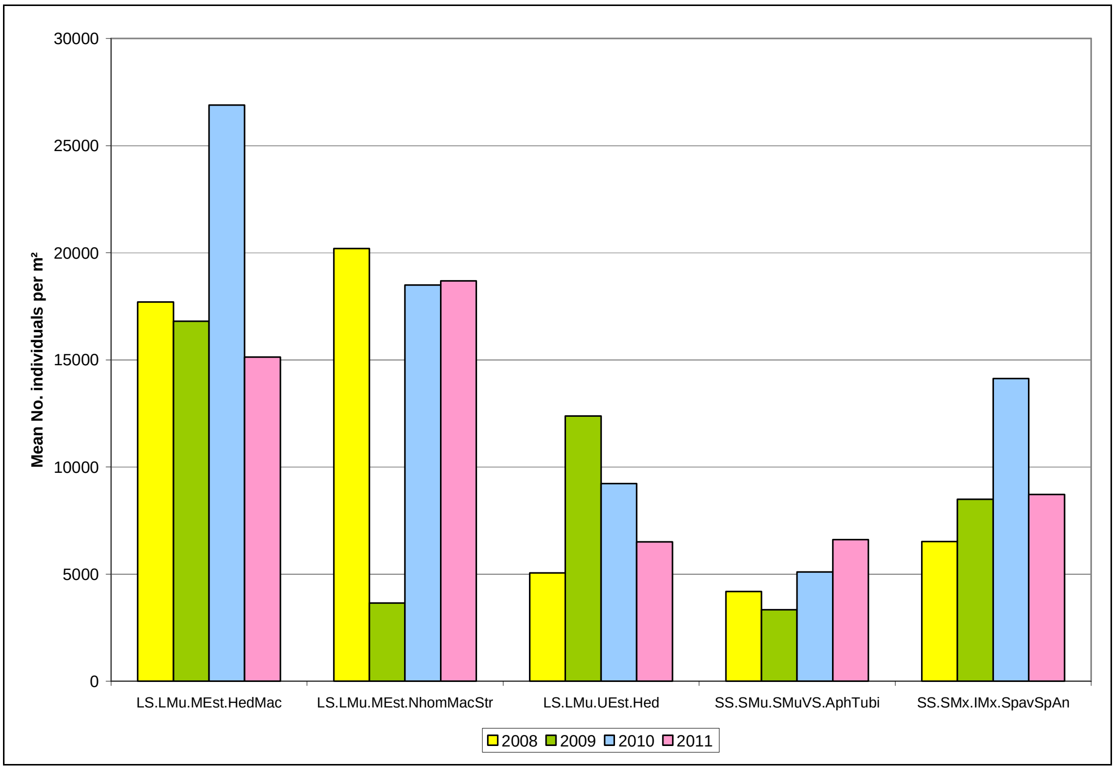

Figure 13. Mean number of individuals per m² for each target biotope group in each of the annual survey years.

The plot of mean numbers of individuals per m² in each target biotope for the four annual surveys is presented in Figure 13. Each of the biotopes shows a different pattern of change in number of individuals across the four annual survey years. In Group LS.LMu.MEst.HedMac, numbers decreased between 2008 and 2009, before increasing by around 60% in 2010 and then dropping to their lowest in 2011. In LS.LMu.MEst.NhomMacStr numbers were highest in 2008, dropping by over 80% in 2009, before rising back in 2010 and 2011. Within Group LS.LMu.UEst.Hed numbers were low in 2008, more than doubling in 2009 and then decreasing through 2010 and 2011. Within target Group SS.SMu.SMuVS.AphTubi numbers decreased between 2008 and 2009, then increased through 2010 and 2011. In SS.SMx.IMx.SpavSpAn, numbers increased from 2008 to 2010, then decreased in 2011.

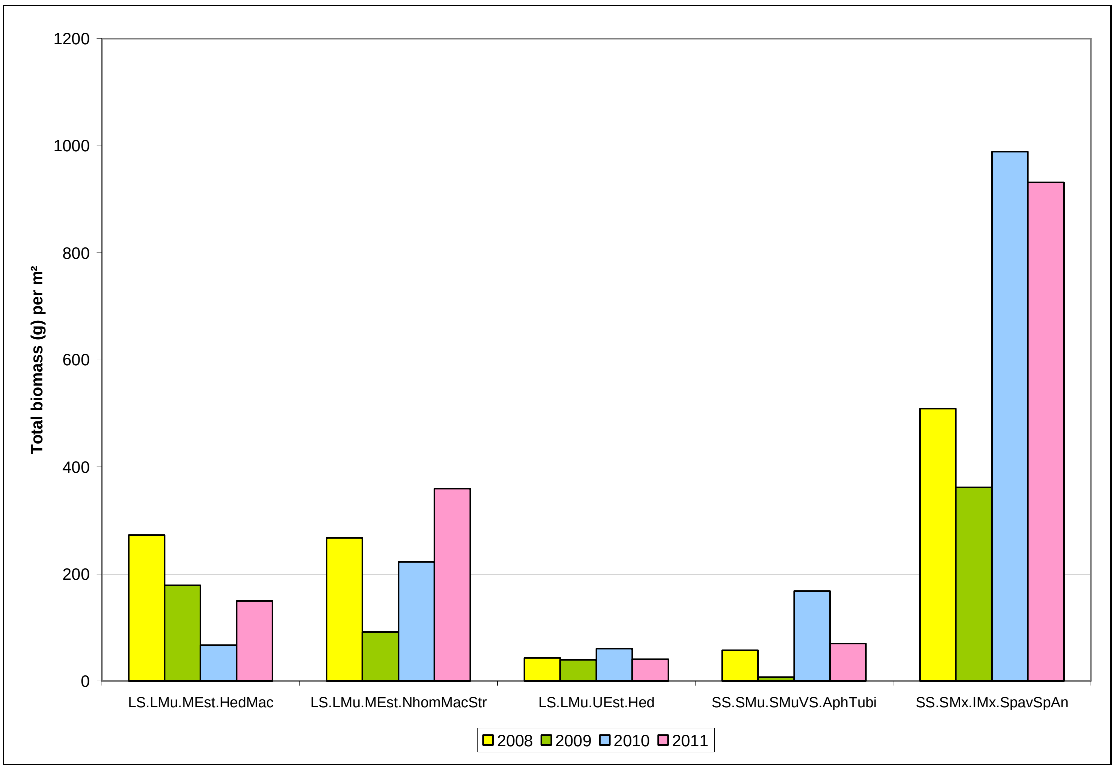

Figure 14. Mean total biomass (g wet weight) per m² for each target biotope group in each of the annual survey years.

The chart for the mean total biomass per m² in each target biotope for the four annual surveys is presented in Figure 14. The patterns differ from those seen for numbers of taxa and numbers of individuals. Within target Group LS.LMu.MEst.HedMac total biomass was highest in 2008, decreasing to its lowest in 2010, before increasing in 2011. In Group LS.LMu.MEst.NhomMacStr biomass decreased between 2008 and 2009, then increased to its highest level in 2011. Within Group LS.LMu.UEst.Hed biomass remained quite constant, being slightly higher in 2010. In target Group SS.SMu.SMuVS.AphTubi values were minimal in 2009 and highest in 2010. In Group SS.SMx.IMx.SpavSpAn values were generally higher than the other target groups, with highest values in 2010 and lowest in 2009.

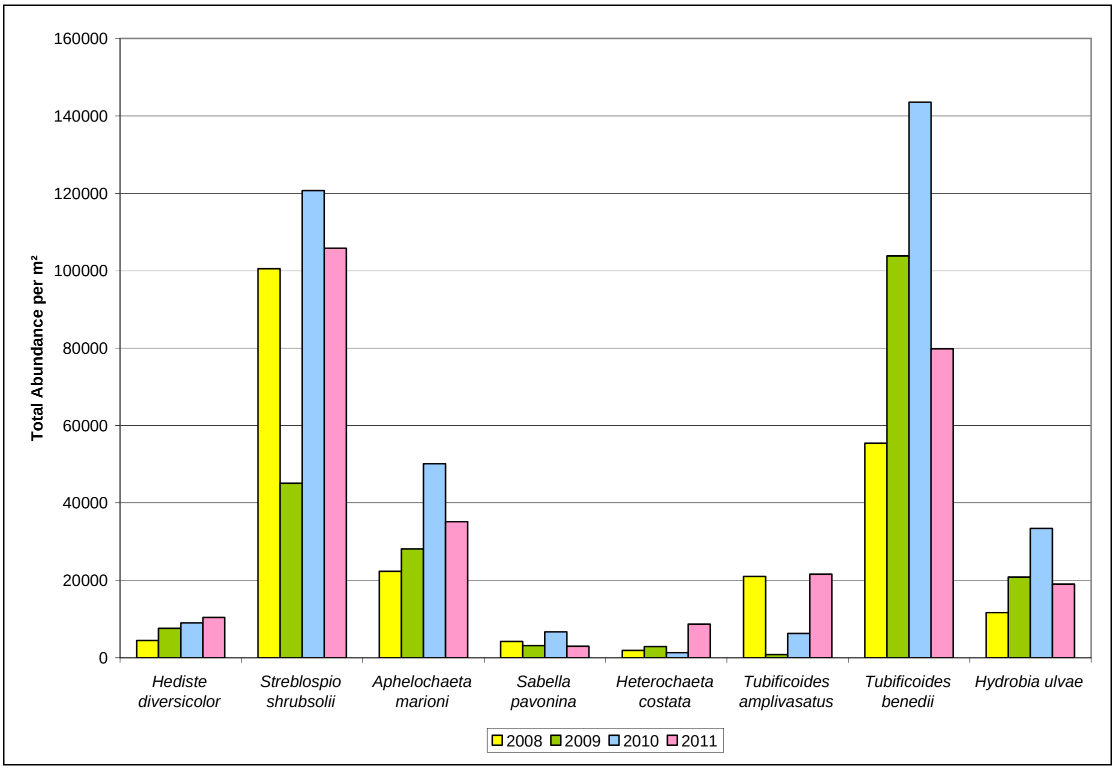

Figure 15. Total abundance (per m²) of eight characteristic species in each annual survey year.

Figure 15 shows the total abundance per m² of eight characteristic species from the survey area. The chart shows that numbers of *Aphelochaeta marioni*, *Tubificoides benedii* and *Hydrobia ulvae* all increased from 2008 to 2010 and then decreased in 2011. Numbers of *Streblospio shrubsolii* were high in 2008, decreasing significantly in 2009, reaching their highest abundance in 2010 before dropping slightly in 2011. Numbers of *Hediste diversicolor* have shown an increase each year. *Sabella pavonina* numbers decreased from 2008 to 2009, increased in 2010 and then decreased to their lowest abundance in 2011. *Heterochaeta costata* numbers increased from 2008 to 2009, decreased in 2010 and then reached their highest abundance in 2011. Abundance of *T. amplivasatus* was highest in 2008 and 2011, but minimal in 2009.

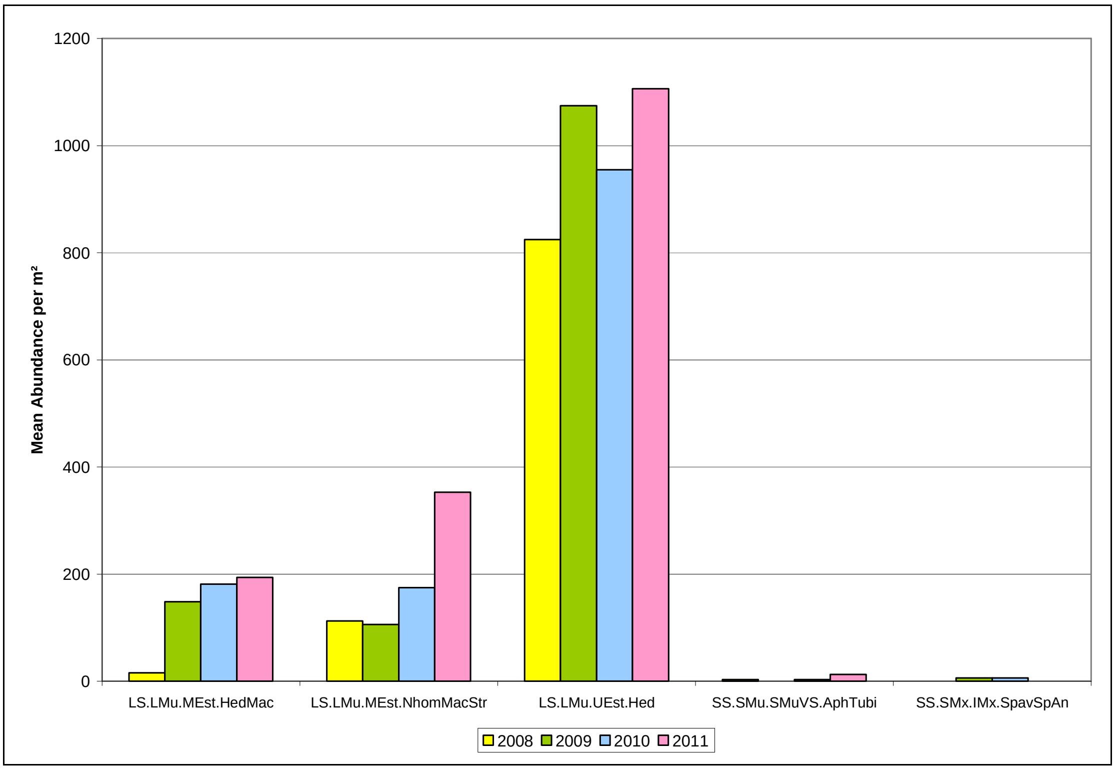

Figure 16. Mean abundance (per m²) of *Hediste diversicolor* in each target biotope group for each annual survey year.

The mean abundance for *H. diversicolor* in each target biotope is presented in Figure 16. Overall numbers were highest in the upper Stour intertidal biotope LS.LMu.UEst.Hed, for which *H. diversicolor* is a characteristic species. Within the intertidal target biotopes LS.LMu.MEst.HedMac, LS.LMu.MEst.NhomMacStr and LS.LMu.UEst.Hed, there was a general increasing trend across the annual surveys, with highest numbers in 2011. Within the subtidal biotopes SS.SMu.SMuVS.AphTubi and SS.SMx.IMx.SpavSpAn, numbers of *H. diversicolor* were low or absent.

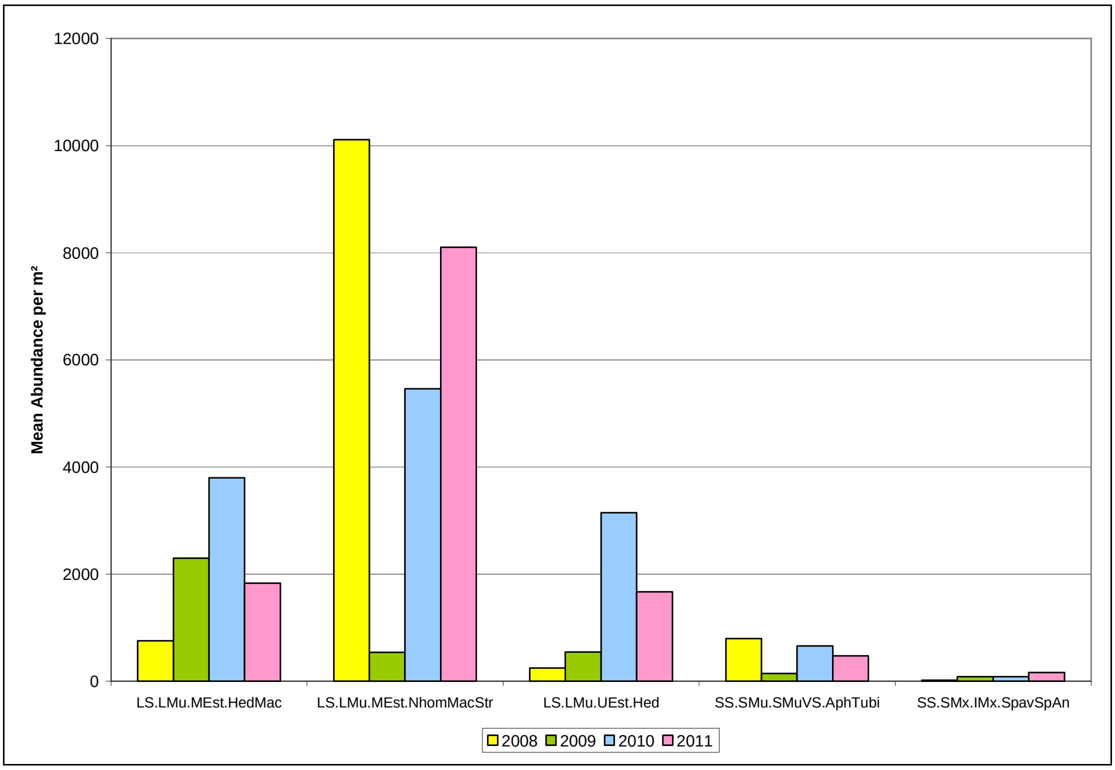

Figure 17. Mean abundance (per m²) of *Streblospio shrubsolii* in each target biotope group for each annual survey year.

Figure 17 shows the mean abundance of *S. shrubsolii* in each target biotope in each survey year. Numbers were highest in the lower shore biotope LS.LMu.MEst.NhomMacStr in 2008, but dropped considerably in 2009 before increasing again in 2010 and 2011. In both LS.LMu.MEst.HedMac and LS.LMu.UEst.Hed, numbers increased from 2008 to 2010 before decreasing in 2011. In SS.SMu.SMuVS.AphTubi, numbers decreased sharply between 2008 and 2009, increased in 2010 and then decreased again in 2011. Numbers in the subtidal biotope SS.SMx.IMx.SpavSpAn were low or absent in all survey years.

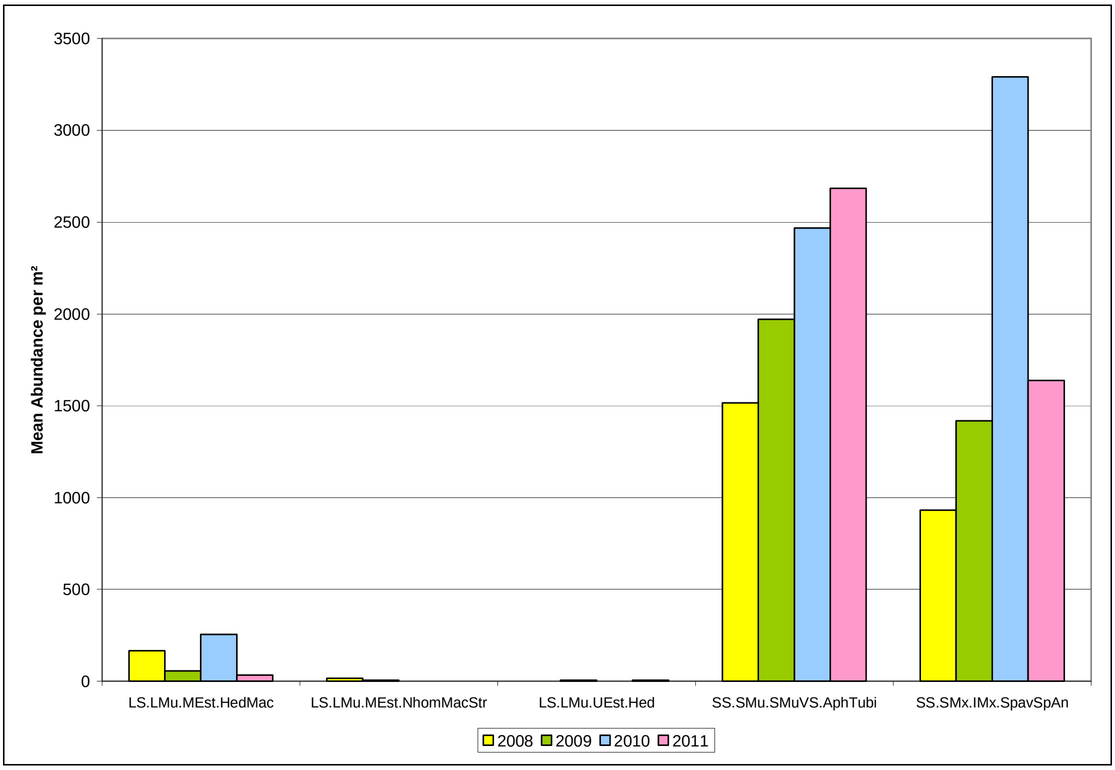

Figure 18. Mean abundance (per m²) of *Aphelochaeta marioni* in each target biotope group for each annual survey year.

Mean abundance of *A. marioni* in each target biotope in each survey year is shown in Figure 18. Numbers showed a steady increase from 2008 to 2011 in the subtidal biotope SS.SMu.SMuVS.AphTubi, of which *A. marioni* is a characteristic species. Within the other subtidal group SS.SMx.IMx.SpavSpAn numbers also increased steadily between 2008 and 2010, but dropped in 2011. In target biotope LS.LMu.MEst.HedMac numbers decreased between 2008 and 2009, increased in 2010 and then dropped to their lowest level in 2011. *A. marioni* was largely absent from the upper estuarine groups LS.LMu.MEst.NhomMacStr and LS.LMu.UEst.Hed.

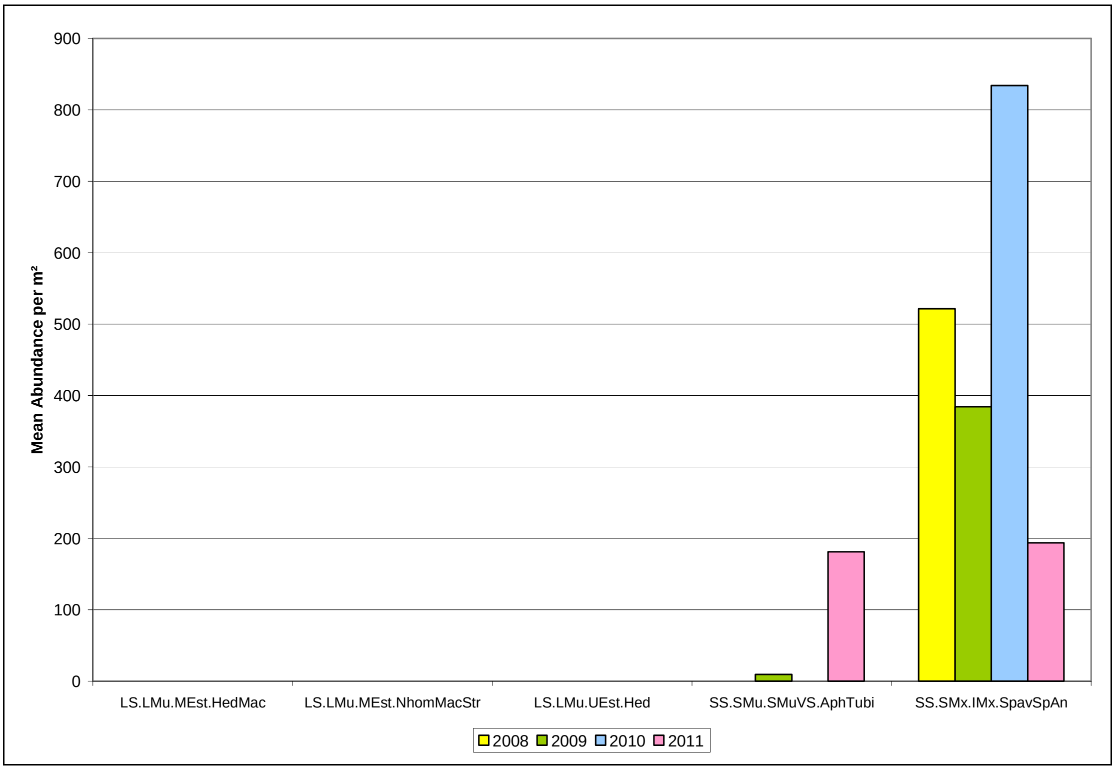

Figure 19. Mean abundance (per m²) of *Sabella pavonina* in each target biotope group for each annual survey year.

The chart for *S. pavonina* (Figure 19) shows that it was absent from the upper estuary and intertidal groups LS.LMu.MEst.HedMac, LS.LMu.MEst.NhomMacStr and LS.LMu.UEst.Hed. Low numbers were found in group SS.SMu.SMuVS.AphTubi in 2009, with higher numbers in 2011. In the subtidal group SS.SMx.IMx.SpavSpAn, for which this is a characteristic species, there was a decrease between 2008 and 2009, with a large increase in 2010, followed by a larger decrease in 2011.

In order to investigate whether this decrease represented an increase in relative size, a second plot was also produced showing mean biomass per m² for *S. pavonina* (Figure 20). This chart shows that the biomass pattern matches that of the abundance and that the decrease in individuals had a corresponding loss in biomass.

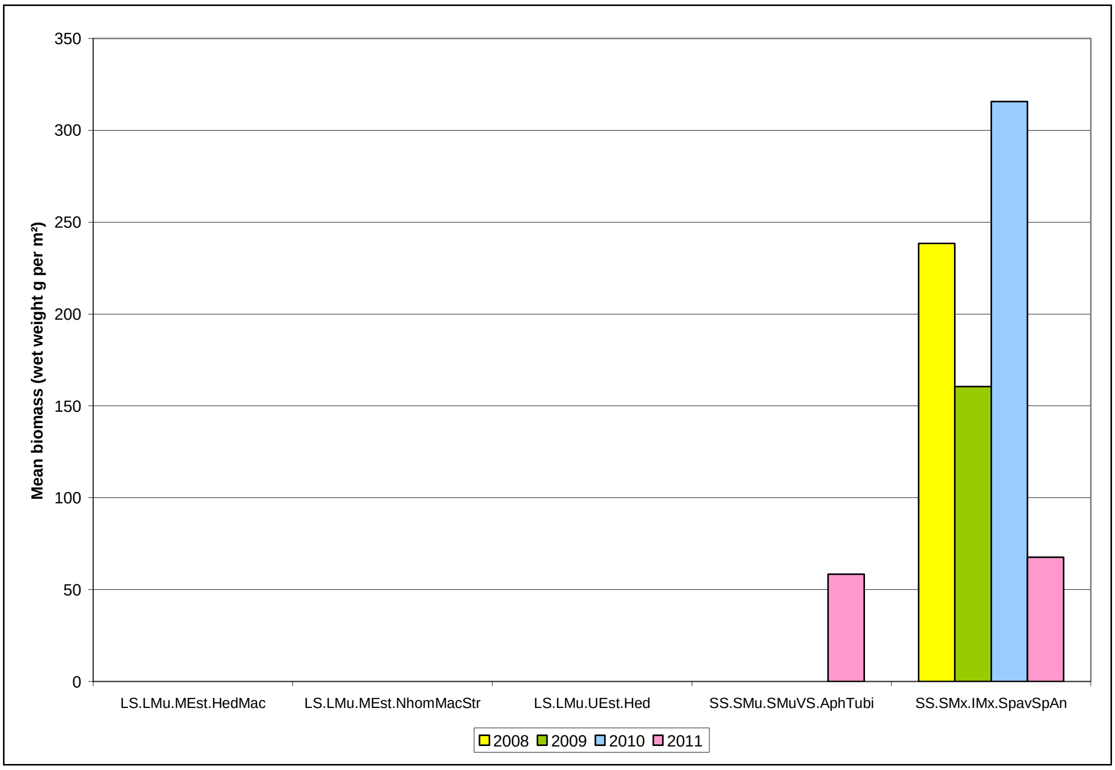

Figure 20. Mean biomass (per m²) of *Sabella pavonina* in each target biotope group for each annual survey year.

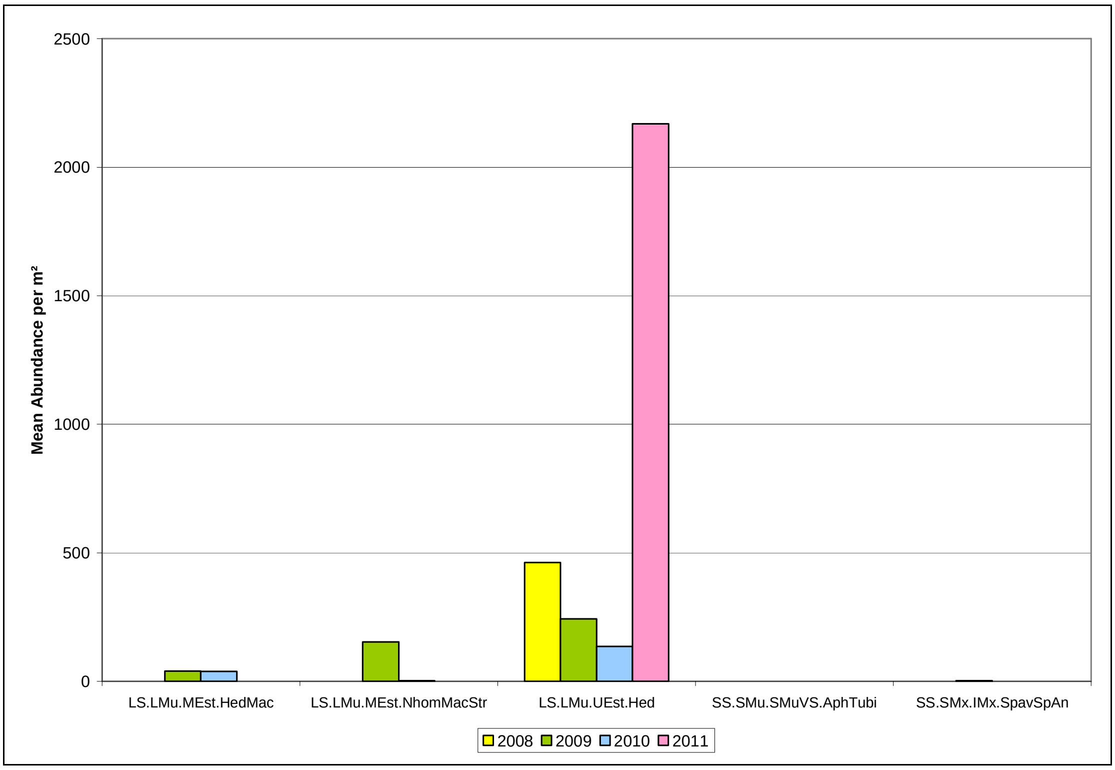

Figure 21. Mean abundance (per m²) of *Heterochaeta costata* in each target biotope group for each annual survey year.

Figure 21 shows the mean abundance of *H. costata* in each target biotope in each year. Since this species only occurs in variable or reduced salinity, it was not found in subtidal biotopes SS.SMu.SMuVS.AphTubi or SS.SMx.IMx.SpavSpAn and only occasionally in target Groups LS.LMu.MEst.HedMac and LS.LMu.MEst.NhomMacStr. In Group LS.LMu.UEst.Hed, numbers decreased from 2008 to 2010, before increasing considerably in 2011.

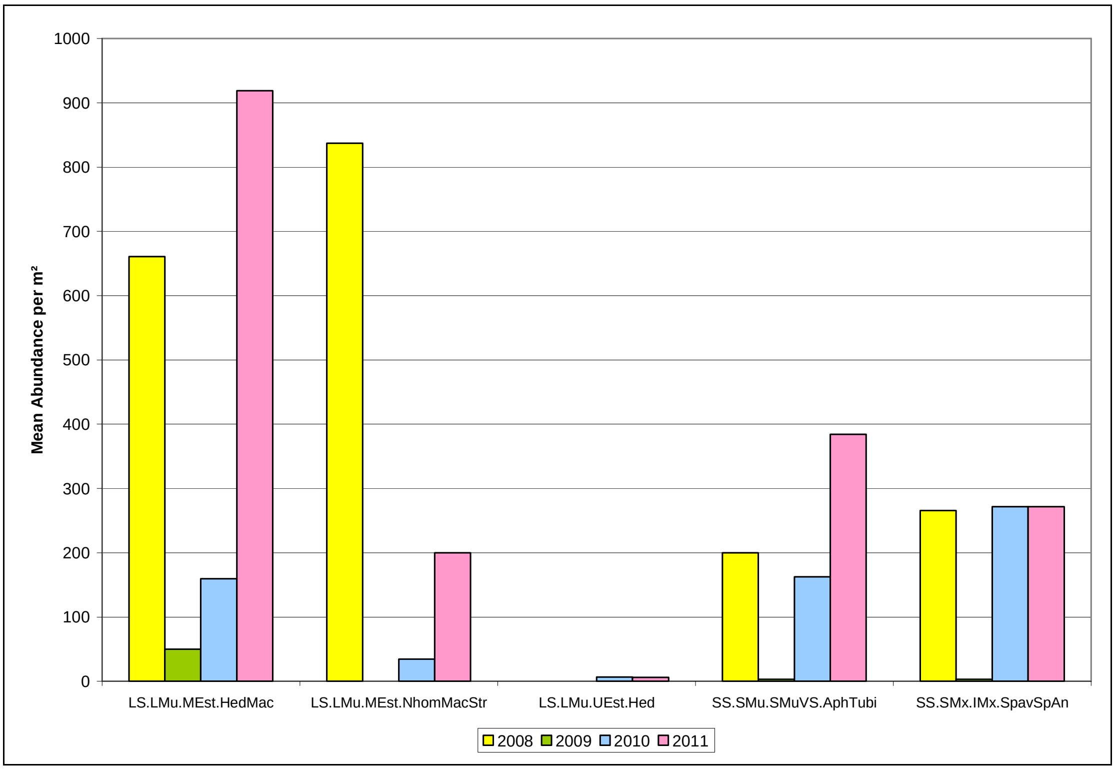

Figure 22. Mean abundance (per m²) of *Tubificoides amplivasatus* in each target biotope group for each annual survey year.

Mean abundance of *T. amplivasatus* in each target biotope in each survey year is shown in Figure 22. Numbers were low or absent in all biotope groups in 2009. In groups LS.LMu.MEst.HedMac, LS.LMu.MEst.NhomMacStr and SS.SMu.SMuVS.AphTubi, abundance was high in 2008, dropping to its lowest in 2009 and then steadily increasing to its highest level in 2011. Within the subtidal Group SS.SMx.IMx.SpavSpAn, numbers were fairly constant in 2008, 2010 and 2011, but very low in 2009. *T. amplivasatus* was only recorded occasionally in the upper estuary biotope LS.LMu.UEst.Hed.

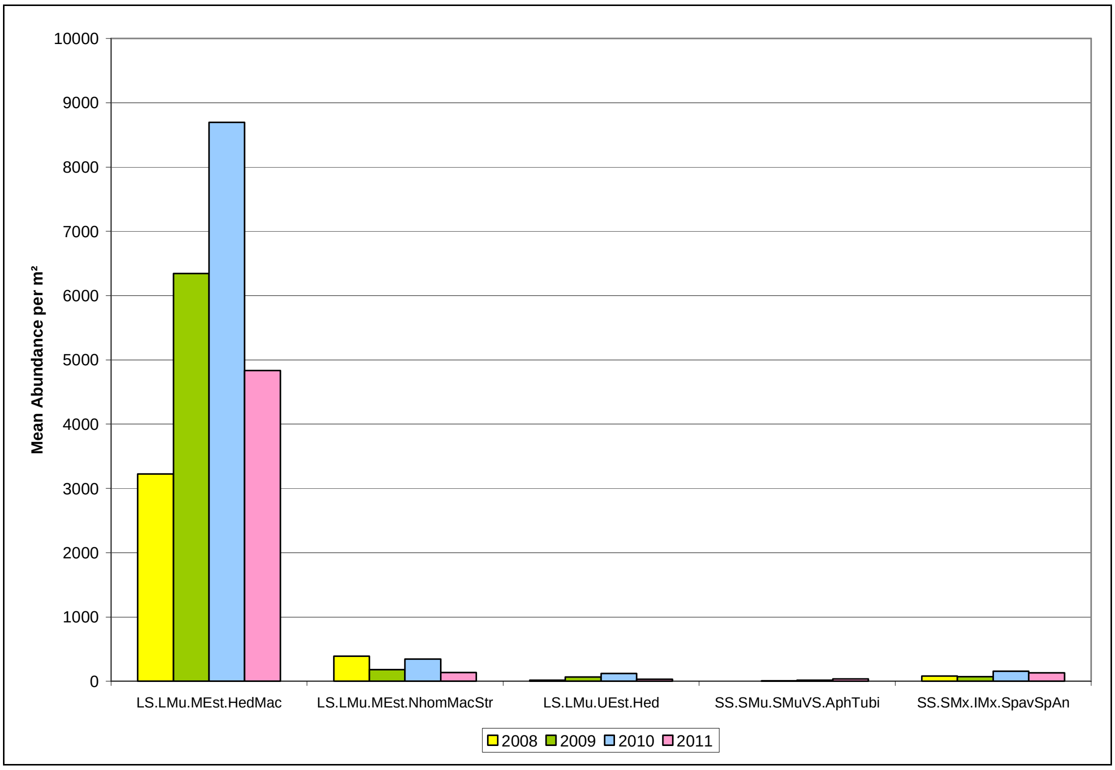

Figure 23. Mean abundance (per m²) of *Tubificoides benedii* in each target biotope group for each annual survey year.

Figure 23 shows the mean abundance of *T. benedii* in each target biotope group for each annual survey year. Numbers were highest in the intertidal Group LS.LMu.MEst.HedMac, increasing steadily from 2008 to 2010 before dropping in 2011. In target group LS.LMu.MEst.NhomMacStr, numbers decreased between 2008 and 2009, increasing in 2010 and decreasing in 2011. Numbers were low or absent in the other three upper estuary and subtidal biotope groups.

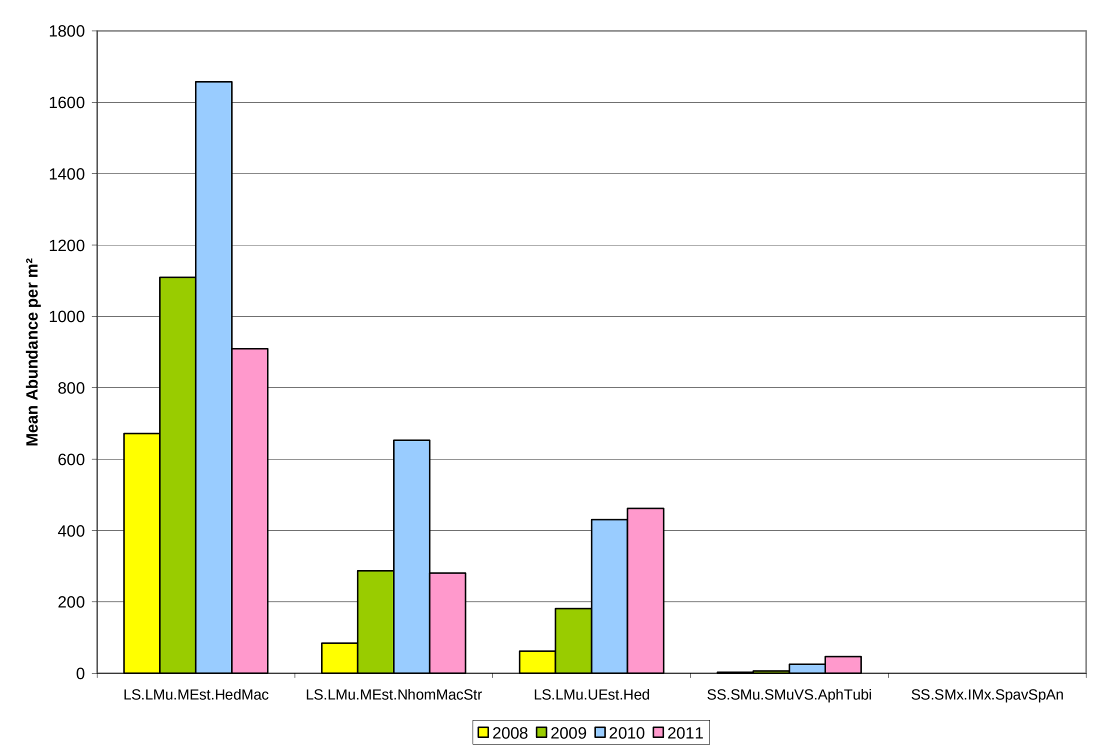

Figure 24. Mean abundance (per m²) of *Hydrobia ulvae* in each target biotope group for each annual survey year.

The mean abundance of *H. ulvae* in each target biotope group in each survey year is presented in Figure 24. Overall numbers were highest in the intertidal biotope group LS.LMu.MEst.HedMac. In both the LS.LMu.MEst.HedMac and LS.LMu.MEst.NhomMacStr groups abundance increased from 2008 to their highest in 2010, before decreasing in 2011. In target group LS.LMu.UEst.Hed, numbers increased from 2008 to their highest in 2011. In the subtidal group SS.SMu.SMuVS.AphTubi, *H. ulvae* was only recorded occasionally and it was not recorded at all in SS.SMx.IMx.SpavSpAn.

In order to examine whether changes in species abundance were related to a corresponding change in amounts of silt/clay, a further plot (Figure 25) was produced showing the mean proportion of silt/clay in each target biotope group for each survey year. The chart shows that there was a steady increase in silt/clay in the subtidal biotope SS.SMu.SMuVS.AphTubi and a gradual increase in the intertidal biotope LS.LMu.MEst.HedMac. The target Grouo LS.LMu.MEst.NhomMacStr saw an increase in silt/clay between 2008 and 2010 then a decrease in 2011. The upper estuary group LS.LMu.UEst.Hed had fluctuating proportions of silt/clay, being higher in 2009 and 2011 and lower in 2008 and 2010. In the subtidal group SS.SMx.IMx.SpavSpAn there was a decreasing trend between 2008 and 2010 followed by an increase in 2011.

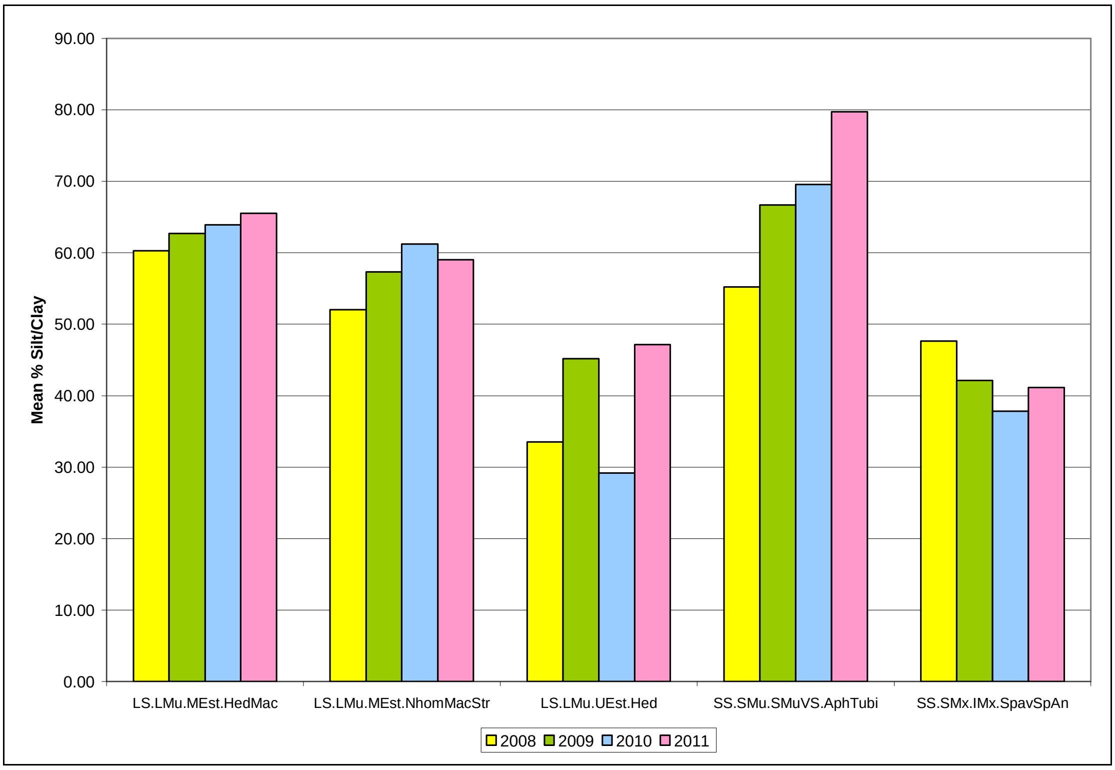

Figure 25. Mean proportion of silt/clay in each target biotope group in each survey year.

3.3.2 Multidimensional Scaling

The MDS ordination plot for the macrobenthic data for comparable samples from 1997, 2003 and 2008-11 is presented in Figure 26. The samples are coded by symbol for survey year and by colour for target biotope. The relatively high observed stress value of 0.2 indicates that whilst the plot gives a good overall representation of the high dimensional structure; it should not be used to interpret finer detailed relationships between compact groupings (Clarke and Warwick, 2001a).

In general, the samples show grouping according to target biotope, with samples from different years still in close proximity to samples from the same target biotope. The samples from SS.SMu.SMuVS.AphTubi show the greatest spread across the plot, whereas samples from the target biotope LS.LMu.UEst.Hed show least overlap with samples from other biotopes.

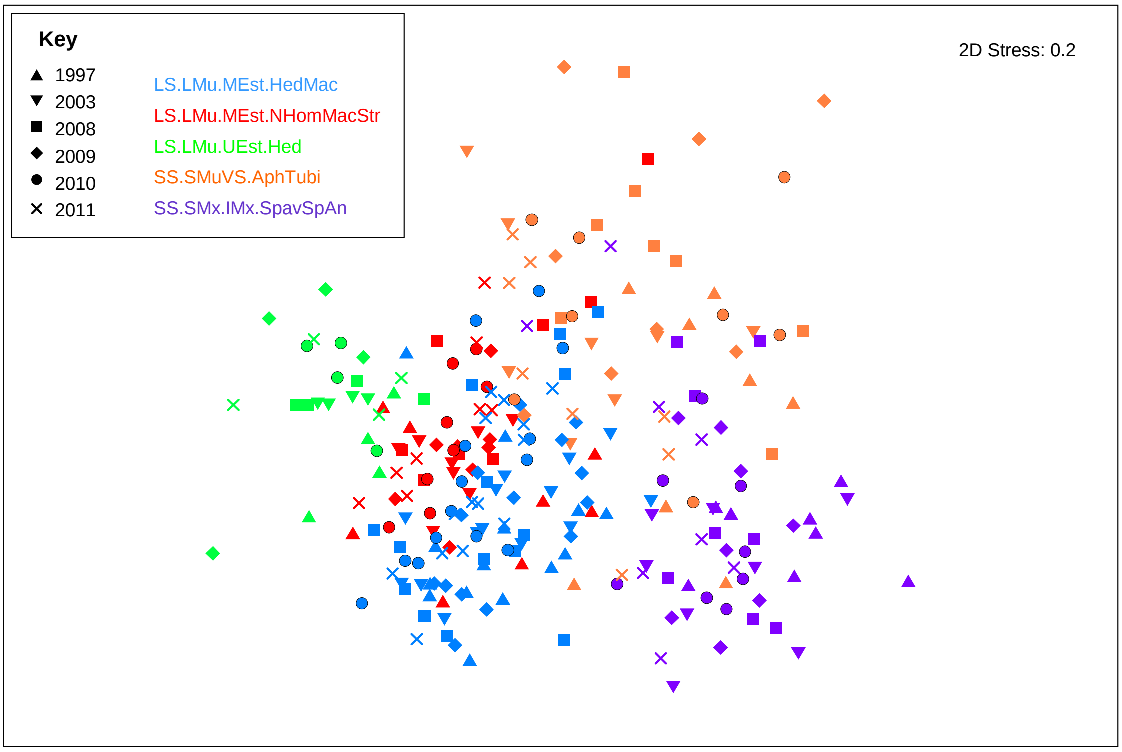

Figure 26. MDS ordination of biological data for comparable stations sampled in 1997, 2003 and 2008-11, with symbols denoting sampling year and colours denoting target biotope.

3.3.3 PERMANOVA Results

The results of the two-way crossed PERMANOVA test are presented in Table 2.

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Target biotope	4	202160	50539	23.774	0.001	999
Year	5	41630	8325.9	3.9167	0.001	996
Target biotope X Year	20	53591	2679.5	1.2605	0.001	995
Residuals	222	471920	2125.8			
Total	251	778080				

Table 2: Results of two-way crossed PERMANOVA analysis on comparable biological data from 1997-2011. ***df: degrees of freedom; SS: sums of squares; MS: means of squares; P(perm): permuted significance value.***

The results show significant differences between both years and target biotopes ($P < 0.05$ in both cases). However, the results also show that there is a significant interaction (represented by the 'Target biotope X Year' row in Table 2) between the two factors ($P<0.05$), indicating that differences between target biotopes are not consistent in each year, or that differences between years are not consistent across all target biotopes. As such, pairwise tests of the interaction term were carried out to test the differences between each pair of target biotopes groups within every year and also between each pair of years within every target biotope.

For the pairwise tests between years within each target biotope, not every pairing had enough replication to achieve 999 unique permutations and, as such, Monte Carlo P values were calculated, with values listed in the P(MC) columns of the following results tables. Anderson *et al*. (2008) advise that Monte Carlo P values should only be used when the number of possible unique permutations is below 100, which in this case only applies to the pairing between years within the biotope LS.LMu.UEst.Hed; in all other cases, the permuted P value (P(perm)) was used. For a full explanation of Monte Carlo P-values, please refer to Anderson *et al*. (2008). In each table, significant values of P at the 5% significant levels are denoted with an asterisk:

Tests between years within target biotope 'LS.LMu.UEst.Hed'

Years	t	P(perm)	Unique perms	P(MC)
1997, 2003	1.3437	0.118	35	0.151
1997, 2008	1.4814	0.037	35	0.095
1997, 2009	1.3726	0.056	35	0.108
1997, 2010	1.3306	0.191	35	0.136
1997, 2011	1.0212	0.476	35	0.404
2003, 2008	1.5963	0.03	35	0.051
2003, 2009	1.4661	0.029	35	0.092
2003, 2010	1.1626	0.235	35	0.271
2003, 2011	1.1039	0.247	35	0.326
2008, 2009	1.1354	0.227	35	0.258
2008, 2010	0.8683	0.715	35	0.568
2008, 2011	1.1914	0.145	35	0.258
2009, 2010	1.1057	0.285	35	0.326
2009, 2011	1.2034	0.133	35	0.242
2010, 2011	0.8549	0.765	35	0.625

Tests between years within target biotope 'LS.LMu.MEst.HedMac'

Years	t	P(perm)	Unique perms
1997, 2003	1.6357	0.014*	998
1997, 2008	1.6837	0.004*	999
1997, 2009	1.3669	0.04*	998
1997, 2010	1.9009	0.001*	999
1997, 2011	2.2653	0.001*	997
2003, 2008	1.1949	0.148	998
2003, 2009	1.1518	0.191	998
2003, 2010	1.4543	0.029*	999
2003, 2011	2.0161	0.001*	999
2008, 2009	0.9586	0.526	999
2008, 2010	1.2857	0.084	998
2008, 2011	1.5397	0.022*	998
2009, 2010	1.151	0.179	998
2009, 2011	1.5867	0.013*	999
2010, 2011	1.2884	0.082	999

Tests between years within target biotope ‘LS.LMu.MEst.NhomMacStr’

Years	t	P(perm)	Unique perms
1997, 2003	2.265	0.001*	922
1997, 2008	2.0391	0.001*	912
1997, 2009	1.3834	0.053	926
1997, 2010	1.6206	0.006*	917
1997, 2011	1.8738	0.003*	907
2003, 2008	1.2826	0.075	928
2003, 2009	2.3118	0.002*	928
2003, 2010	1.3677	0.065	929
2003, 2011	1.6391	0.025*	929
2008, 2009	1.993	0.001*	925
2008, 2010	1.122	0.255	928
2008, 2011	1.2331	0.17	922
2009, 2010	1.5502	0.029*	926
2009, 2011	1.8463	0.012*	926
2010, 2011	0.95623	0.423	931

Tests between years within target biotope ‘SS.SMu.SMuVS.AphTubi’

Years	t	P(perm)	Unique perms
1997, 2003	1.4761	0.014*	929
1997, 2008	1.415	0.016*	917
1997, 2009	1.5265	0.009*	929
1997, 2010	1.3177	0.054	916
1997, 2011	1.5593	0.013*	924
2003, 2008	1.2406	0.087	910
2003, 2009	1.5213	0.01*	917
2003, 2010	1.2622	0.094	924
2003, 2011	1.2889	0.094	911
2008, 2009	0.95647	0.526	924
2008, 2010	0.75597	0.919	926
2008, 2011	1.039	0.338	920
2009, 2010	0.99912	0.434	919
2009, 2011	1.5792	0.008*	921
2010, 2011	1.1175	0.192	912

Tests between years within target biotope 'SS.SMx.IMx.SpavSpAn'

Years	t	P(perm)	Unique perms
1997, 2003	1.3929	0.005*	927
1997, 2008	1.4793	0.002*	924
1997, 2009	1.5547	0.002*	925
1997, 2010	1.731	0.001*	927
1997, 2011	1.8286	0.001*	920
2003, 2008	1.2913	0.013*	938
2003, 2009	1.3614	0.008*	924
2003, 2010	1.4296	0.003*	924
2003, 2011	1.5199	0.003*	930
2008, 2009	1.0918	0.247	919
2008, 2010	0.99394	0.463	937
2008, 2011	1.0685	0.306	924
2009, 2010	1.0475	0.34	932
2009, 2011	1.359	0.045*	915
2010, 2011	1.0529	0.34	932

These results show that, within the upper estuary group LS.LMu.UEst.Hed, there was no significant difference between years (P(MC)>0.05 in all cases). Within the intertidal biotope group LS.LMu.MEst.HedMac, there was a significant difference between 1997 and all other survey years; there were also significant differences between 2003 and 2010, 2003 and 2011, 2008 and 2011 and 2009 and 2011. Within target biotope LS.LMu.MEst.NhomMacStr, there were significant differences between 1997 and 2008, 1997 and 2010, 1997 and 2011, 2003 and 2009, 2003 and 2011, 2008 and 2009, 2009 and 2010 and between 2009 and 2011. Within the subtidal biotope group SS.SMu.SMuVS.AphTubi, there were significant differences between 1997 and 2003, 1997 and 2008, 1997 and 2009, 1997 and 2011, 2003 and 2009, 2009 and 2011. Within target biotope SS.SMx.IMx.SpavSpAn, there were significant differences between 1997 and all other years, 2003 and all other years and between 2009 and 2011.

The results for the pairwise test between target biotope groups within each year were as follows (asterisks denote significant p values at the 5% significance level):

Test between target biotope groups within year 1997

Target biotopes	t	P(perm)	Unique perms
LS.LMu.UEst.Hed, LS.LMu.MEst.HedMac	2.116	0.001*	851
LS.LMu.UEst.Hed, LS.LMu.MEst.NhomMacStr	1.5173	0.026*	427
LS.LMu.UEst.Hed, SS.SMu.SMuVS.AphTubi	2.1227	0.002*	433
LS.LMu.UEst.Hed, SS.SMx.IMx.SpavSpAn	2.7558	0.005*	424
LS.LMu.MEst.HedMac, LS.LMu.MEst.NhomMacStr	1.4992	0.028*	998
LS.LMu.MEst.HedMac, SS.SMu.SMuVS.AphTubi	2.3055	0.001*	992
LS.LMu.MEst.HedMac, SS.SMx.IMx.SpavSpAn	3.2031	0.001*	996
LS.LMu.MEst.NhomMacStr, SS.SMu.SMuVS.AphTubi	1.7984	0.001*	932
LS.LMu.MEst.NhomMacStr, SS.SMx.IMx.SpavSpAn	2.5684	0.001*	923
SS.SMu.SMuVS.AphTubi, SS.SMx.IMx.SpavSpAn	1.6685	0.004*	918

Test between target biotope groups within year 2003

Target biotopes	t	P(perm)	Unique perms
LS.LMu.UEst.Hed, LS.LMu.MEst.HedMac	2.4298	0.001*	876
LS.LMu.UEst.Hed, LS.LMu.MEst.NhomMacStr	3.2712	0.003*	428
LS.LMu.UEst.Hed, SS.SMu.SMuVS.AphTubi	2.4251	0.005*	439
LS.LMu.UEst.Hed, SS.SMx.IMx.SpavSpAn	2.8636	0.001*	429
LS.LMu.MEst.HedMac, LS.LMu.MEst.NhomMacStr	2.5935	0.001*	996
LS.LMu.MEst.HedMac, SS.SMu.SMuVS.AphTubi	2.5878	0.001*	997
LS.LMu.MEst.HedMac, SS.SMx.IMx.SpavSpAn	2.7663	0.001*	998
LS.LMu.MEst.NhomMacStr, SS.SMu.SMuVS.AphTubi	2.9422	0.001*	935
LS.LMu.MEst.NhomMacStr, SS.SMx.IMx.SpavSpAn	3.448	0.001*	919
SS.SMu.SMuVS.AphTubi, SS.SMx.IMx.SpavSpAn	2.4097	0.001*	926

Test between target biotope groups within year 2008

Target biotopes	t	P(perm)	Unique perms
LS.LMu.UEst.Hed, LS.LMu.MEst.HedMac	2.6207	0.001*	845
LS.LMu.UEst.Hed, LS.LMu.MEst.NhomMacStr	3.0134	0.003*	426
LS.LMu.UEst.Hed, SS.SMu.SMuVS.AphTubi	2.0198	0.005*	436
LS.LMu.UEst.Hed, SS.SMx.IMx.SpavSpAn	2.5755	0.004*	415
LS.LMu.MEst.HedMac, LS.LMu.MEst.NhomMacStr	2.0635	0.001*	994
LS.LMu.MEst.HedMac, SS.SMu.SMuVS.AphTubi	2.1647	0.001*	998
LS.LMu.MEst.HedMac, SS.SMx.IMx.SpavSpAn	2.4807	0.001*	998
LS.LMu.MEst.NhomMacStr, SS.SMu.SMuVS.AphTubi	2.1755	0.002*	912
LS.LMu.MEst.NhomMacStr, SS.SMx.IMx.SpavSpAn	2.9915	0.001*	917
SS.SMu.SMuVS.AphTubi, SS.SMx.IMx.SpavSpAn	1.8039	0.001*	935

Test between target biotope groups within year 2009

Target biotopes	t	P(perm)	Unique perms
LS.LMu.UEst.Hed, LS.LMu.MEst.HedMac	1.7788	0.001*	848
LS.LMu.UEst.Hed, LS.LMu.MEst.NhomMacStr	1.646	0.016*	427
LS.LMu.UEst.Hed, SS.SMu.SMuVS.AphTubi	2.0695	0.002*	420
LS.LMu.UEst.Hed, SS.SMx.IMx.SpavSpAn	2.3343	0.002*	428
LS.LMu.MEst.HedMac, LS.LMu.MEst.NhomMacStr	1.3577	0.04*	998
LS.LMu.MEst.HedMac, SS.SMu.SMuVS.AphTubi	2.1439	0.001*	997
LS.LMu.MEst.HedMac, SS.SMx.IMx.SpavSpAn	2.292	0.001*	995
LS.LMu.MEst.NhomMacStr, SS.SMu.SMuVS.AphTubi	1.619	0.012*	926
LS.LMu.MEst.NhomMacStr, SS.SMx.IMx.SpavSpAn	2.1864	0.002*	921
SS.SMu.SMuVS.AphTubi, SS.SMx.IMx.SpavSpAn	1.7311	0.004*	918

Test between target biotope groups within year 2010

Target biotopes	t	P(perm)	Unique perms
LS.LMu.UEst.Hed, LS.LMu.MEst.HedMac	2.1169	0.002*	846
LS.LMu.UEst.Hed, LS.LMu.MEst.NhomMacStr	2.1335	0.003*	429
LS.LMu.UEst.Hed, SS.SMu.SMuVS.AphTubi	2.105	0.001*	423
LS.LMu.UEst.Hed, SS.SMx.IMx.SpavSpAn	2.7263	0.007*	430
LS.LMu.MEst.HedMac, LS.LMu.MEst.NhomMacStr	1.3117	0.069	998
LS.LMu.MEst.HedMac, SS.SMu.SMuVS.AphTubi	2.0254	0.002*	999
LS.LMu.MEst.HedMac, SS.SMx.IMx.SpavSpAn	2.7363	0.001*	997
LS.LMu.MEst.NhomMacStr, SS.SMu.SMuVS.AphTubi	2.0787	0.001*	935
LS.LMu.MEst.NhomMacStr, SS.SMx.IMx.SpavSpAn	2.8319	0.001*	928
SS.SMu.SMuVS.AphTubi, SS.SMx.IMx.SpavSpAn	1.8448	0.001*	929

Test between target biotope groups within year 2011

Target biotopes	t	P(perm)	Unique perms
LS.LMu.UEst.Hed, LS.LMu.MEst.HedMac	2.2042	0.001*	856
LS.LMu.UEst.Hed, LS.LMu.MEst.NhomMacStr	2.0592	0.002*	431
LS.LMu.UEst.Hed, SS.SMu.SMuVS.AphTubi	2.0819	0.004*	438
LS.LMu.UEst.Hed, SS.SMx.IMx.SpavSpAn	2.2369	0.004*	430
LS.LMu.MEst.HedMac, LS.LMu.MEst.NhomMacStr	1.7071	0.014*	998
LS.LMu.MEst.HedMac, SS.SMu.SMuVS.AphTubi	2.0922	0.002*	997
LS.LMu.MEst.HedMac, SS.SMx.IMx.SpavSpAn	2.4296	0.001*	995
LS.LMu.MEst.NhomMacStr, SS.SMu.SMuVS.AphTubi	1.875	0.003*	924
LS.LMu.MEst.NhomMacStr, SS.SMx.IMx.SpavSpAn	2.3388	0.001*	920
SS.SMu.SMuVS.AphTubi, SS.SMx.IMx.SpavSpAn	1.4736	0.036*	930

The tests for differences between target biotopes within each year show that target biotope groups were significantly different to one another in each survey year ($p<0.05$) with the exception of groups LS.LMu.MEst.HedMac and LS.LMu.MEst.NhomMacStr in 2010, which were not significantly different ($p>0.05$).

3.3.4 Abundance Biomass Comparison Curves

The ABC curves for mean data for each target biotope in each annual survey year, with associated *W* values, are presented in Appendix 13. Most of the graphs show little to no sign of disturbance, with biomass curves above the abundance curves and positive W values. Two of the graphs (for target biotopes LS.LMu.UEst.Hed and SS.SMu.SMuVS.AphTubi in 2009) have curves suggesting slight disturbance, with intersecting biomass and abundance but positive *W* values. Only one graph (for target biotope LS.LMu.MEst.HedMac in 2010) showed signs of moderate disturbance, with the abundance curves above the biomass curve for most of its length and a negative *W* value. In 2010, this group was dominated by high numbers of small-bodied worms: the oligochaete *Tubificoides benedii* (8,694 per m^2) and the polychaete species *Streblospio shrubsolii* (3,798 per m^2), *Capitella* sp. (1,914 per m^2) and *Tharyx* “species A” (1,486 per m^2).

3.3.5 Taxonomic Distinctness

The taxonomic distinctness results are summarised in Figures 27 and 28. Figure 27 shows the distribution of Average Taxonomic Distinctness (Δ^+) values and Figure 28 shows Variation in Taxonomic Distinctness (Λ^+) plotted against the 95% probability contours for their expected distribution based on random draws from the master species list, with the central line showing the expected mean values. Neither measure is dependent upon the number of species in a sample, but the probability limits become increasingly wide as sample size decreases, as the power of the test is reduced and therefore so is the likelihood of being able to detect a change in Δ^+ (Clarke and Warwick, 2001).

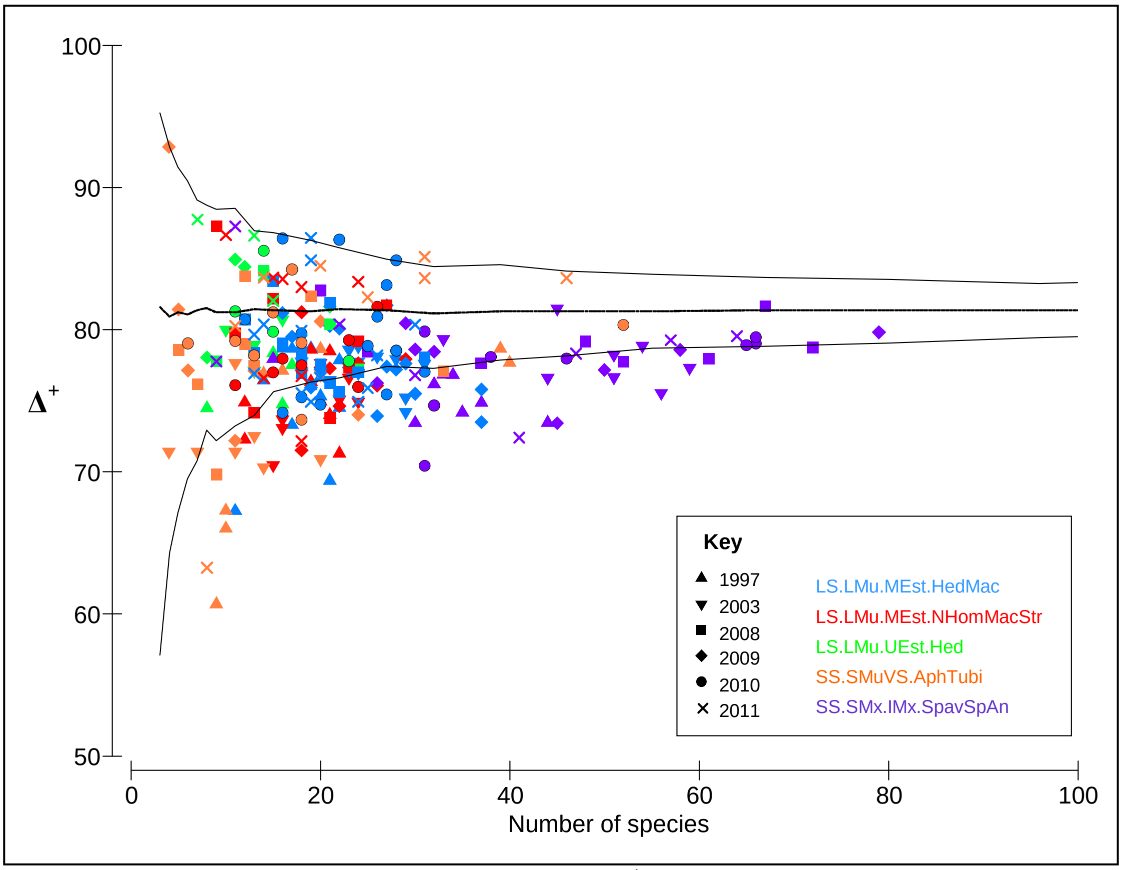

Figure 27. Average taxonomic distinctness (Δ^+) with symbols denoting sampling year and colours denoting target biotope.

The plot in Figure 27 shows that, whilst the majority of samples fall within the expected 95% contour lines, there are still a large number of samples with average taxonomic distinctness values that fall below the contours. Samples falling below the expected range are from all years and all target biotope groups, although only one sample from upper estuary biotope LS.LMu.UEst.Hed falls below the expected range. Many of the samples from the subtidal biotope SS.SMx.IMx.SpavSpAn fall below the expected range. The implication for samples falling below the expected range is that they have below expected diversity in terms of taxonomic breadth. Figure 28 shows that many more samples fitted within the expected range for variation in taxonomic distinctness, although there are samples from all target biotopes that appear above the expected range. These are samples that are considered to have higher than expected variance in taxonomic distances around the mean distance (Δ^+).

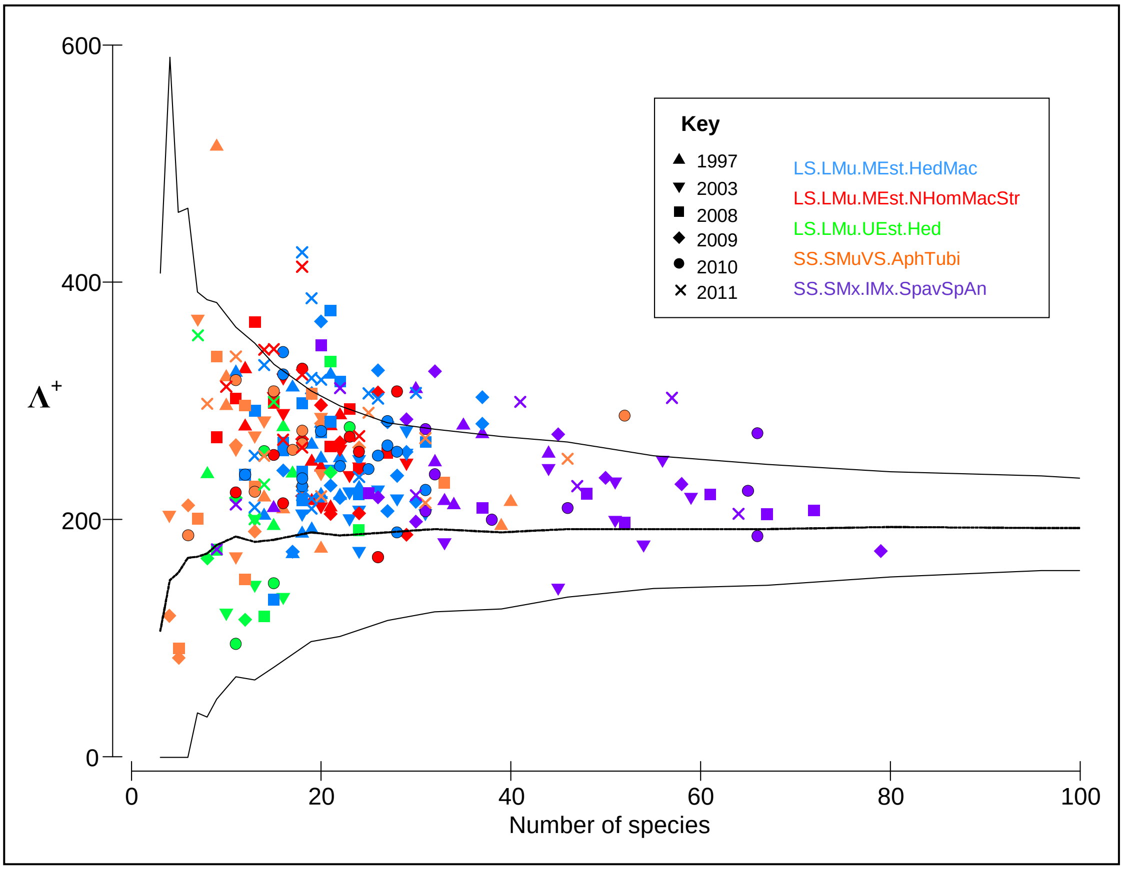

Figure 28. Variation in taxonomic distinctness (Λ^+) with symbols denoting sampling year and colours denoting target biotope.

3.3.6 AZTI Marine Biotic Index

The AMBI results are summarised in Figures 29 and 30. Figure 29 shows the mean percentage distribution of each ecological group at each station in each survey year. These results show that there is considerable variation in the proportions of ecological groups between both sampling groups and survey years.

The intertidal target biotope group LS.LMu.MEst.HedMac had the highest proportions of Group V fauna, with a decrease in fauna from the more sensitive Groups I and II over time. The lower shore biotope LS.LMu.MEst.NhomMacStr was mostly dominated by Group III species, with a gradual increase in the opportunistic Groups IV and V in recent years and a very high proportion of Group IV in 2003. Samples from the upper estuarine biotope LS.LMu.UEst.Hed were dominated by Group III fauna, with higher proportions of Groups IV and V in 1997 and 2003, but these groups were less evident in the 2008-11 annual surveys. Samples in the subtidal biotopes SS.SMu.SMuVS.AphTubi and SS.SMx.IMxSpavSpAn had highest proportions of the ecologically sensitive Group I and II fauna, although SS.SMu.SMuVS.AphTubi also had high proportions of Group IV fauna. The SS.SMx.IMxSpavSpAn biotope shows a decline in Group I and II fauna and increase in Group IV and V species in recent years.

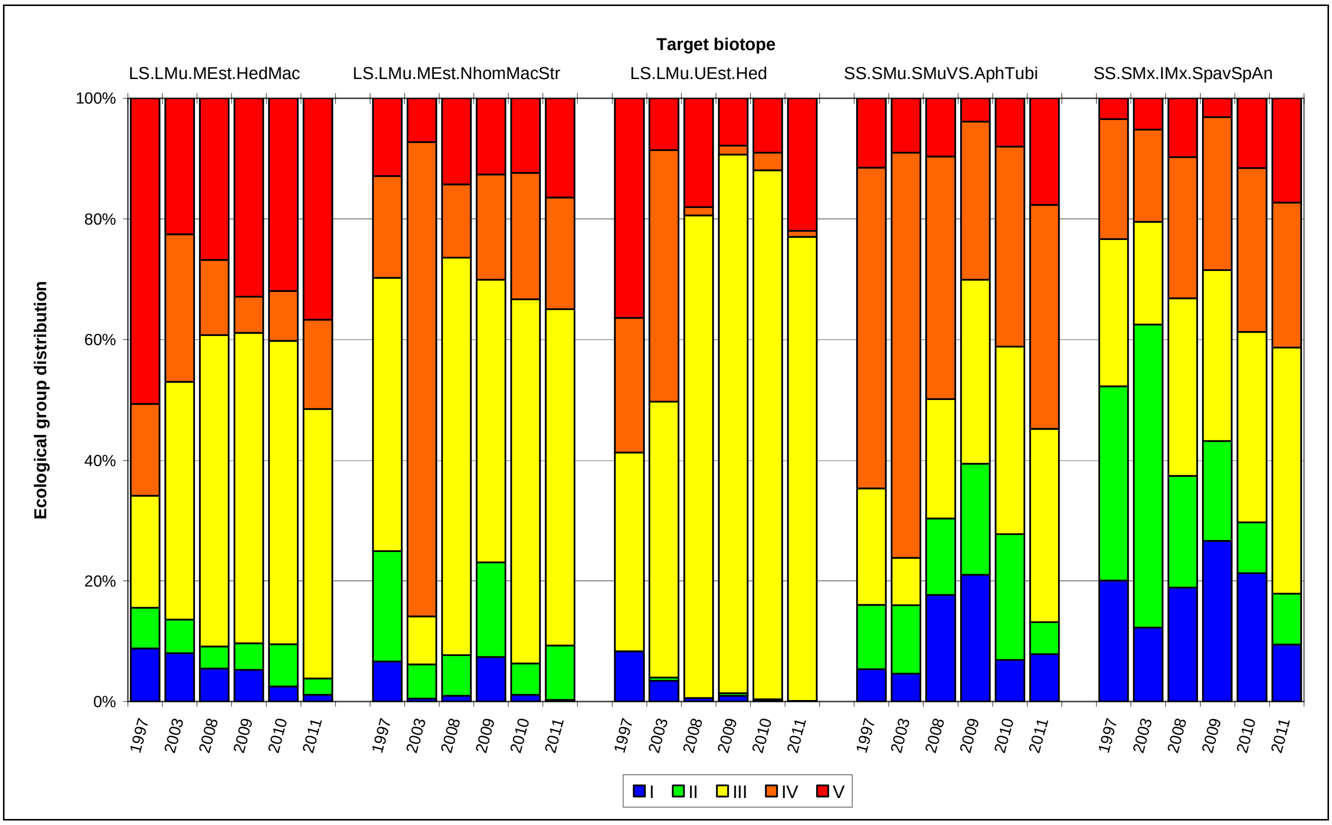

Figure 29. Segmented column chart showing the mean distribution of ecological groups in each target biotope group for each survey year.

The mean AMBI score for each target biotope group in each year is shown in Figure 24. Based upon the classifications in Table 1 (section 2.3.6), most of the values fall within the 'slight disturbance' (scores between 1.2 and 3.3) or 'moderate disturbance' (scores between 3.3 and 4.3) categories. The highest scores were those for the intertidal biotope LS.LMu.MEst.HedMac and the lowest were for the subtidal group SS.SMx.IMx.SpavSpAn. All the biotopes showed trend towards increasing AMBI scores between 2009 and 2011, suggesting an increase in disturbance.

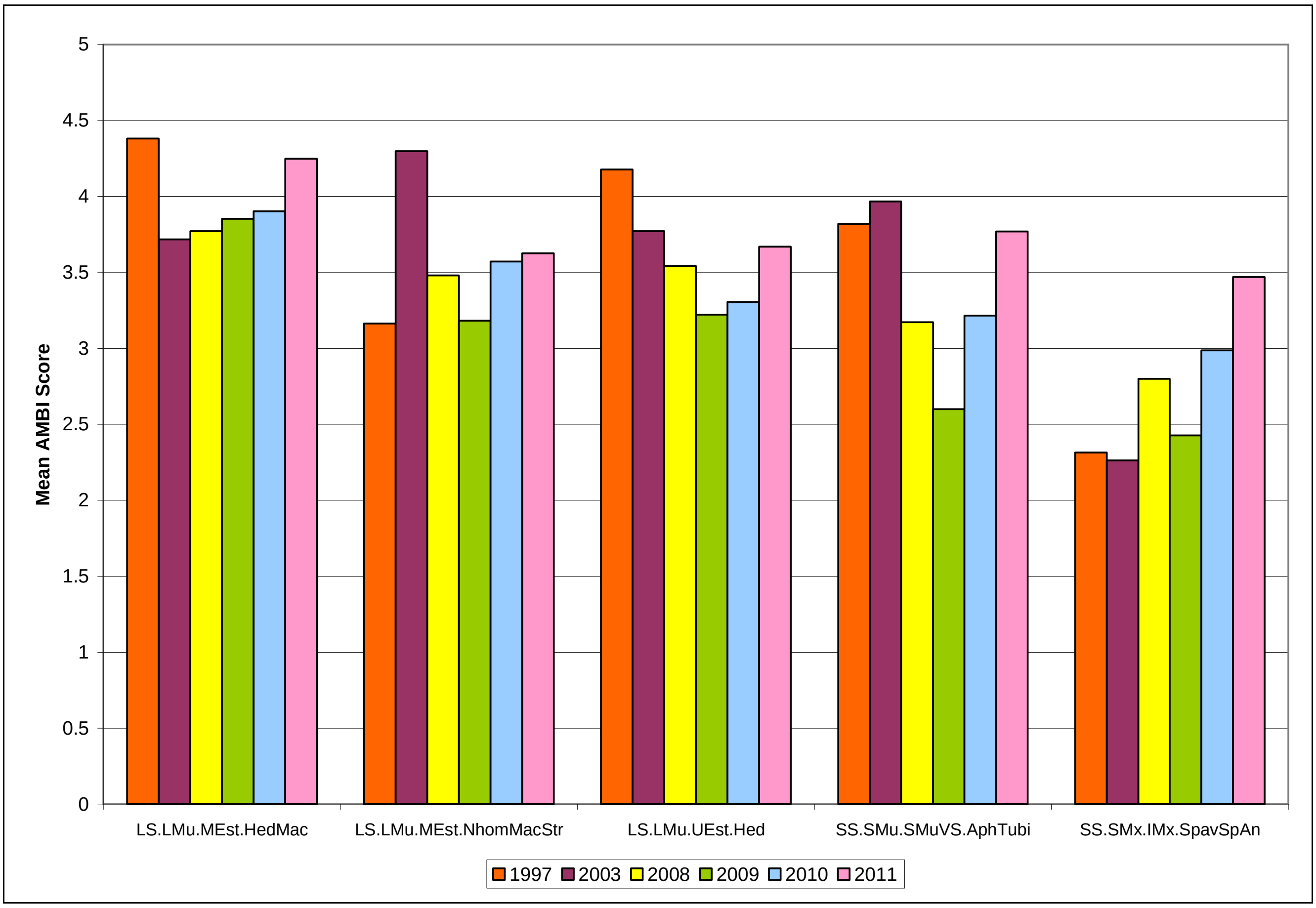

Figure 30. Bar chart showing the mean AMBI score for each target biotope group in each survey year.

4. Discussion

4.1 2011 Data

The 2011 data show that similar communities have been present in the Stour and Orwell in each of the six years of survey (including four years of annual monitoring) to date. As would be expected, there have been some changes between years and shifts between biotopes for certain stations. Biotope groups in the upper estuary (StA, StB and OrA) and the mid-estuary group StE have proven most stable, being consistently assigned to the same biotopes in all four annual survey years. The subtidal groups StF, OrC and OrD have changed with each survey and often include several biotopes within the same group. The intertidal biotope groups StG and OrB have seen a return to their target biotope from 2003. 2011 saw a reduction in samples assigned to the mixed substrate fanworm biotope SS.SMx.IMx.SPav.SpAn. The nationally scarce (Sanderson, 1996), though non-native (Reitzel *et al*., 2008) starlet anemone (*Nematostella vectensis*) was found at Stations 150 and 157.

4.2 Comparison with previous years

The target biotope groups in the upper reaches of the estuaries showed least changes over time in terms of biotope assignments and statistical significance. The subtidal biotope SS.SMx.IMx.SpavSpAn showed the greatest changes over time, with the annual surveys being significantly different to the 1997 and 2003 surveys.

The ABC curves suggest evidence of moderate disturbance in the target biotope group LS.LMu.MEst.HedMac in 2010, although statistical testing found no significant difference between this group in 2010 or any of the other three annual surveys. The curves for this group result from numerical dominance of small-bodied animals and, unlike other years, there was a lack of larger bivalves such as *Cerastoderma edule* and *Tapes philippinarum*. The ABC curves also indicate slight disturbance in LS.LMu.UEst.Hed and SS.SMu.SMuVS.AphTubi in 2009. Again, the PERMANOVA tests show different results, with no significant differences between years in the LS.LMu.UEst.Hed group and, within SS.SMu.SMuVS.AphTubi, there were significant differences between 2009 and 1997, 2003 and 2011, but not between 2009 and 2008 or 2010.

The taxonomic distinctness measures also indicate that the upper estuary samples show least deviation from the expected range and that the subtidal group SS.SMx.IMx.SpavSpAn shows greatest departure. However, many samples from the other biotope groups also fell below the expected range based upon the master species list for the area. Warwick *et al*., (2002) observed that decreased Average Taxonomic Distinctness and increased Variation in Taxonomic Distinctness can be considered as symptoms of environmental deterioration. However, Ellingsen *et al*. (2005) observed that it is not always possible to distinguish anthropogenic causes from natural processes on a local scale.

As with other studies using different ecological indicators (e.g. Salas *et al*., 2006, Teixeira *et al*., 2007), not all of the benthic indicators show the same patterns. The AMBI scores show a different pattern to the taxonomic distinctness results and ABC Curves, with lowest levels of disturbance in the subtidal group SS.SMx.IMx.SpavSpAn. The groups with highest AMBI scores (i.e. most 'disturbed') were those that actually showed the greatest stability over the course of the surveys. The likely reason is that species structuring the naturally impoverished communities in the upper estuary and intertidal groups are Group III-V species, in particular the Group V oligochaete species, such as *T. benedii* and *H. costata*, which tend to be numerically dominant and therefore have a strong influence on the final AMBI score. However, all of the target biotopes show an increase in proportions of more opportunistic Group IV and V species between 2009 and 2011, with a corresponding rise in the AMBI score. This does suggest that there may have been an increase in ecological stress over the past three years.

Overall results suggest that there have been changes within the subtidal target biotopes, particularly SS.SMx.IMx.SpavSpAn; in 2011, only two samples were assigned to this biotope, of which only one was amongst the eight samples assigned in 2003 to define the target biotope groups. Reasons for the observed changes are difficult to determine. The *Sabella pavonina* biotope would not have been particularly sensitive to smothering from the increased levels of siltation (Royal Haskoning, 2011) measured in 2010 but would be sensitive to changes in underlying substratum or hydrology. Also, the sediment data shows that silt/clay proportions were low in this target biotope group, only increasing slightly in 2011. It is possible that the biotope may have undergone a spatial shift and that grabs in the 2011 survey sampled from outside of the boundary of *S. pavonina*, but with only four years of annual survey data this can only be speculated upon.

The results indicate that disturbance may be at least partly due to the naturally stressed environment of estuarine habitats. These are characterised by variability in physico-chemical characteristics such as dissolved oxygen, salinity, temperature and bed dynamics and their associated fauna is adapted accordingly (Elliott & Quintino, 2007).

If the observed changes represent long-term shifts in biotopes, then the results of future surveys will help to reveal any patterns. With only single samples taken from each station, there is also the potential for slight spatial differences in actual sampling positions between years. As can be seen from some the photographs of biological and PSA samples in Appendix 3 (e.g. Photos 41 and 42 from Station 195, Photos 53 and 54 from Station 258 or Photos 79 and 80 from Station 301), there can be variation even between two replicate samples taken from the same target location. Sonar or underwater video could help determine the true extent of *S. pavonina* distribution. Statistical analysis of sediment data may also help determine whether changes in the biological data correlate with changes in sediment composition over time.

5. Conclusion

The Stour and Orwell annual monitoring stations have shown evidence of changes in biological structure over time, particularly in the subtidal sample groups. Reasons for the changes are difficult to determine but could result from changes in hydrology or sediment dynamics of the estuary, or could represent spatial shifts in biotopes. There is evidence to suggest in increase in more opportunistic species over the last three years. Further study is required to establish whether observed differences between years represent long-term change or short-term cyclical variations.

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Appendix 11. Biotopes recorded in the Stour and Orwell estuary annual monitoring surveys

Following the 2010 Regulators Meeting (16th March), it was decided a summary of biotopes and dominant species would help interpretation of the results of the Stour and Orwell annual monitoring of the benthos.

A biotope is defined as the combination of an abiotic habitat and its associated community of species (Connor *et al*., 2004). There is a classification hierarchy: broad habitats (EUNIS Level 2, *e.g.* littoral sediments, infralittoral rock), main habitats (EUNIS Level 3, *e.g.* littoral mud, sublittoral coarse sediment), biotope complexes (EUNIS Level 4, *e.g.* sublittoral coarse sediments in variable salinity) and biotopes (EUNIS Level 5, *e.g. Nephtys hombergii*, *Macoma balthica* and *Streblospio shrubsolii* in littoral sandy mud). EUNIS Level 1 defines the marine environment and Level 6 (sub-biotopes) are not considered here. Each level is represented by a group of letters in a biotope code, with letters separated by punctuation marks. For example, the biotope named above is coded as LS.LMu.MEst.NhomMacStr; note that there are four groups of letters separated by punctuation to represent EUNIS Levels 2-5.

A review of biotopes recorded from the Stour, Orwell and approaches to Harwich, including the Gabbard was included in the biotope distribution and data review report (Worsfold, 2005). Eighty five biotopes are recorded for the area. However, many of these are known only from outside the estuaries, from restricted areas or from habitats, such as boulders, that would not be expected to be sampled by Shipek grabs. The following biotope list is therefore restricted to those recorded from the annual monitoring surveys in 2008 (Worsfold & Dyer, 2008), 2009 (Worsfold & Dyer, 2009), 2010 (Worsfold *et al*., 2011) and 2011 (this report).

LS.LMu.UEst.Hed

LS (Littoral sediments)
LMu (Littoral mud)
UEst (Polychaete / oligochaete dominated upper estuarine mud shores)
Hed (*Hediste diversicolor* in littoral mud)

Biotope description

Typical habitat: mud or sandy mud in variable or reduced salinity, typically in sheltered inlets and the upper reaches of estuaries on the mid to lower shore.
Biology: infauna usually dominated by harbour ragworms (*Hediste diversicolor*); other typical species include several species of oligochaete worms, often including *Heterochaeta costata*, which has a restricted salinity range; there are usually small polychaete worms, such as *Streblospio shrubsolii* and *Manayunkia aestuarina* and the laver spire snail *Hydrobia ulvae* may be common. There is no typical epibiota except for mats of drifting algae such as *Enteromorpha*. There are three sub-biotopes: LS.LMu.UEst.Hed.Str (*Hediste diversicolor* and *Streblospio shrubsolii* in littoral sandy mud) has a higher proportion of small polychaetes, LS.LMu.UEst.Hed.Cvol (*Hediste diversicolor* and *Corophium volutator* in littoral mud) has more mud amphipods (*Corophium volutator*) and LS.LMu.UEst.Hed.Ol (*Hediste diversicolor* and oligochaetes in littoral mud) has a higher proportion of oligochaetes. An average of 7,754 animals per m² was recorded for this biotope in 2003.

Typical species; top 5 species
The five most common species recorded in this biotope for the 2003 survey (upon which the target biotopes were defined) are listed below:
Hediste diversicolor (harbour ragworm) is a large active worm (predator and particle feeder) common in mudflats with variable salinity. It is a prey species for fish and birds and sometimes used for bait.
Streblospio shrubsolii is a small burrowing worm (deposit feeder) common in mudflats with variable salinity and is also common in shallow water.
Hydrobia ulvae (laver spire snail) is a small snail (deposit feeder) common on mudflats and saltmarsh and able to drift over wide areas at high tide; it forms aggregations and populations may fluctuate. It is a prey species for some fish and birds
Polydora cornuta is a small burrowing worm (deposit feeder) that prefers stiff mud or clay in variable salinity on the lower shore or in shallow water.
Heterochaeta costata is a small oligochaete worm (deposit feeder) that is restricted to variable or reduced salinity at the heads of estuaries or in lagoons or areas of freshwater runoff.

Distribution in the estuaries
This is the target biotope for Group StA. It has been consistently recorded from the intertidal of the upper Stour. In addition, a few upper mid-shore sites were ascribed to it by the 1997 grab survey along with the saltmarsh erosion area, with *Enteromorpha* spp. on consolidated mud and channels between, of eastern Copperas Bay mapped in 2002.

Regional and national distribution
Many areas of soft mud, especially channels between saltmarshes and at the extreme heads of estuaries, are referable to this biotope and it is probably widely distributed in all estuaries with areas of appropriate salinity and sediment.

Key species for bird feeding and bait digging
Hediste diversicolor is an important bird feeding and bait species. Most of the other typical species are too small to be of interest to bait diggers or most birds but some birds may specialise in the smaller worms or *Hydrobia*.

Sensitivity
The biotope is likely to be sensitive to changes in substratum type and hydrology (especially salinity) and to chemical contamination but is less sensitive to smothering or disturbance (provided that the sediment type remains the same).

LS.LMu.MEst.HedMac

MEst (Polychaete / bivalve dominated mid estuarine mud shores)
HedMac (*Hediste diversicolor* and *Macoma balthica* in littoral sandy mud)

Biotope description
Typical habitat: sandy mud or mud in full, variable or reduced salinity, typically in sheltered bays and estuaries across the whole shore.
Biology: infauna with many harbour ragworms (*Hediste diversicolor*), as well as bivalves (such as *Abra tenuis*, baltic tellins, *Macoma balthica*, and cockles, *Cerastoderma edule*), small worms (*Streblospio shrubsolii*, *Tharyx* Type A, and

oligochaetes, such as *Tubificoides benedii*), laver spire snails (*Hydrobia ulvae*) and burrowing amphipods (*Corophium volutator*). There is no typical epibiota except for mats of drifting algae such as *Enteromorpha*. An average of 21,261 animals per m² was recorded for this biotope in 2003.

Lugworms (*Arenicola marina*), which might represent a different biotope, are often missed by remote sampling methods, due to their large size and low density. Lugworm casts are found in many sandy mud areas, particularly on the Stour, near areas of LS.LSa.MuSa.MacAre. *Pygospio elegans* is a minor component of many samples in this biotope as well as in LS.LMu.MEst.NhomMacStr. Sand gapers (*Mya arenaria*) are common in parts of upper reaches of both estuaries, especially the north side of the Orwell.

Typical species; top 5 species

The five most common species recorded in this biotope for the 2003 survey (upon which the target biotopes were defined) are listed below:

Tubificoides benedii is a small oligochaete (deposit feeder) worm that is common in estuarine mudflats.

Streblospio shrubsolii (see above)

Hydrobia ulvae (see above)

Tharyx (Type A) is a small burrowing worm (deposit feeder) that may common in mudflats, particularly in the mid reaches of estuaries.

Abra tenuis is a small bivalve (deposit feeder) found in mudflats and saltmarsh in variable salinity, particularly in the upper and mid shore.

Distribution in the estuaries

This is the target biotope for Groups StB, StE, StG and OrB. It included most of the intertidal samples taken for the 1997 survey (Dyer, 2000). It was the most extensive biotope on the Stour and was also widespread on the Orwell. Cluster analysis of the 2003 data divided the original biotope into two groups that were assigned to different biotopes, although the communities did not fit perfectly. Samples from mid estuary and mid shore areas were assigned to LS.LMu.MEst.HedMac. Samples from the Trimley Setback Site also belong to the present biotope; the breach had been made and the habitat stabilised by 2002.

Regional and national distribution

This is probably the most widespread estuarine mudflat biotopes nationally and is also common in sheltered muddy bays.

Key species for bird feeding and bait digging

Hediste diversicolor is an important bird feeding and bait species. Many of the bivalves present in the biotope would also be important bird food and cockles may be fished commercially. Most of the other typical species are too small to be of interest to bait diggers or most birds but some birds may specialise in the smaller worms or *Hydrobia*.

Sensitivity
The biotope is likely to be sensitive to changes in substratum type and hydrology (especially salinity) and to chemical contamination but is less sensitive to smothering or disturbance (provided that the sediment type remains the same). There is evidence that some of the area of intertidal mud had been lost since publication of the most recent Ordnance Survey map, especially in Copperas, Holbrook and Erwarton Bays. In these areas, erosion steps are present on the seaward edges of both the saltmarsh and mudflats.

LS.LMu.MEst.NhomMacStr

NhomMacStr (*Nephtys hombergii*, *Macoma balthica* and *Streblospio shrubsolii* in littoral sandy mud)

Biotope description
Typical habitat: sandy mud in variable salinity, typically in the upper reaches of estuaries on the mid to lower shore.
Biology: infauna dominated by the small worm *Streblospio shrubsolii*; harbour ragworms (*Hediste diversicolor*), bivalves (such as baltic tellins, *Macoma balthica*) and laver spire snails (*Hydrobia ulvae*) may also be common. There is no typical epibiota except for mats of drifting algae such as *Enteromorpha*. Some rare species (the burrowing anemone *Nematostella vectensis* and the polychaete *Alkmaria romijni*) have been recorded from this biotope in the western Stour (Hill *et al*., 1996). The biotope has much in common with LS.LMu.MEst.HedMac and is only loosely distinguishable from it. An average of 29,246 animals per m² was recorded for this biotope in 2003.

Typical species; top 5 species
The five most common species recorded in this biotope for the 2003 survey (upon which the target biotopes were defined) are listed below:
Streblospio shrubsolii (see above)
Tharyx (Type A) (see above)
Mya arenaria (gaper) is a large deposit and filter feeding bivalve (though juveniles were more common than adults in samples) that was originally introduced from eastern North America. It can be common on the lower shore and in shallow water in muddy sand in sheltered estuaries and bays, including areas of reduced and variable salinity; it burrows deeply. It could potentially be harvested for human consumption or bait and may be important for bird feeding.
Hydrobia ulvae (see above)
Cerastoderma edule (edible cockle) is a medium sized filter feeding bivalve (though juveniles were more common than adults in samples) found both in estuaries and sheltered bays in full or variable salinity, mostly near the surface of muddy sand or sandy mud on the mid or lower shore. It could be harvested for human consumption or bait and is an important bird feed species.

Distribution in the estuaries
This is the target biotope for Groups StC and OrA. Most of the upper Orwell and parts of the lower shore of the upper Stour were referred to this biotope by cluster analysis of samples from 2003. Some sites are typical of the described type but there were more bivalves than described as typical. Some rare species (the burrowing

anemone *Nematostella vectensis* and the polychaete *Alkmaria romijni*) have been recorded from this biotope in the western Stour (Hill *et al*., 1996).

Regional and national distribution
Many areas of soft substrata in the mid and upper reaches of estuaries are referable to this biotope and it is probably widely distributed in all estuaries with areas of appropriate salinity and sediment.

Key species for bird feeding and bait digging
Mya arenaria and *Cerastoderma edule* are important bird feeding and, potentially, bait and human food species. Some of the other bivalve present in the biotope would also be important bird food. Most of the other typical species are too small to be of interest to bait diggers or most birds but some birds may specialise in the smaller worms or *Hydrobia*.

Sensitivity
The biotope is likely to be sensitive to changes in substratum type and hydrology (especially salinity) and to chemical contamination but is less sensitive to smothering or disturbance (provided that the sediment type remains the same).

SS.SCS.SCSVS

SS (Sublittoral sediment)
SCS (Sublittoral coarse sediment)
SCSVS (Sublittoral coarse sediments in variable salinity (estuaries)

Biotope description
This biotope complex is not divided into biotopes so is treated as a whole.
Typical habitat: mixed substrata in variable or reduced salinity, in shallow water in estuaries
Biology: varied infauna and epifauna as biotopes not defined within complex. Typical species in annual monitoring surveys listed below. An average of 2,750 animals per m² was recorded for this biotope in 2008.

Typical species; top 5 species
The five most common species recorded (other than Nematoda) in this biotope for the 2008 annual monitoring survey (in which this biotope was first recorded at a monitoring station) are listed below:
Sphaerosyllis taylori is a very small mobile worm (possible predator) found in shallow water in mixed substrata.
Aphelochaeta marioni is a small burrowing worm (deposit feeder) that may be common in muddy sediment with some mixed substrata on the lower shore and in shallow water in variable salinity.
Syllidia armata is a very small mobile worm (predator) found in shallow water in mixed substrata.
Mediomastus fragilis is a small burrowing worm (deposit feeder) found in shallow mixed substrata.
Tubificoides benedii (see above)

Distribution in the estuaries
The complex was recorded at one station in Group StF in 2008. In 2003, it was recorded from off Parkeston, in the outer Stour Estuary.

Regional and national distribution
As the biotopes are not defined it is not possible to comment on national distribution.

Key species for bird feeding and bait digging
Most of the species recorded are too small to be of interest to birds. Subtidal habitats are generally inaccessible to bait diggers and many birds.

Sensitivity
The complex probably includes a series of transitional communities that are produced by distrurbance and likely to change with changes in substratum type and hydrology, as well as with changes such as smothering or disturbance.

SS.SMu.SMuVS.AphTubi

SMu (Sublittoral cohesive mud and sandy mud communities)
SMuVS (Sublittoral mud in variable salinity (estuaries)
AphTubi (*Aphelochaeta marioni and Tubificoides* spp. in variable salinity infralittoral mud)

Biotope description
Typical habitat: mud or sandy mud, sometimes with mixed substrata, in full or variable salinity, typically in the mid to lower reaches of estuaries and sheltered inlets in shallow water.
Biology: infauna characterised by the small worm *Aphelochaeta marioni* and oligochaete worms such as *Tubificoides amplivasatus*. Other worms may be frequent. An average of 6,969 animals per m² was recorded for this biotope in the richest cluster in 2003.

Typical species; top 5 species
The five most common taxa recorded in this biotope for the 2003 survey (upon which the target biotopes were defined) are listed below:
Aphelochaeta marioni (see above)
Streblospio shrubsolii (see above)
Phoronis are small worms (filter and deposit feeders) that live buried in mud in sandy tubes. They may be very common in shallow water in estuaries and sheltered bays.
Melinna palmata is a medium sized burrowing worm (deposit feeder) found in mud on the lower shore and in shallow water, where it may be very common.
Nephtys hombergii (a type of catworm) is a large active worm (predator) that can be found in many different sediment types in a wide range of depths but is particularly common in shallow water mud in estuaries.

Distribution in the estuaries
This is the target biotope for Groups StD and OrD. It is one of the principal subtidal biotopes of the estuaries, as identified by cluster analysis of 2003 data. Most of the fauna from the sediment grab samples recorded in previous surveys (Dyer, 2000) was referred to the equivalent of this biotope. Much of Holbrook Bay, mapped as intertidal in most maps and charts, fits SS.SMu.SMuVS.AphTubi on the basis of its fauna (Dyer, 2000). July 2002 dredge samples containing mud or muddy mixed sediment were assumed to belong to it. Most samples were typical of the described

biotope. Certain areas proved to contain more gravel and overlap with IMX biotopes, however (Dyer & Worsfold, 2001). There was also considerable overlap with other mud biotopes.

Regional and national distribution
This is probably one of the most widespread soft substratum biotopes in estuarine shallow water throughout the country. It is also likely to be widespread in sheltered inlets and bays.

Key species for bird feeding and bait digging
Catworms (*Nephtys hombergii*) would be suitable for bird feed and bait if accessible. Most of the other species recorded are too small to be of interest to birds. Subtidal habitats are generally inaccessible to bait diggers and many birds.

Sensitivity
The biotope is likely to be sensitive to changes in substratum type and hydrology and to chemical contamination but less sensitive to smothering or disturbance (provided that the sediment type remains the same).

SS.SMu.SMuVS.PolCvol

PolCvol (*Polydora ciliata* and *Corophium volutator* in variable salinity infralittoral firm mud or clay)

Biotope description
Typical habitat: clay or peat, with mud, in variable salinity, often in the lower reaches of estuaries and sheltered inlets in shallow water.
Biology: infauna characterised by the small worm *Polydora ciliata*, or *P. cornuta*, and the burrowing amphipod *Corophium volutator*, which may vary in abundance. Other worms may be frequent. An average of 192 animals per m² was recorded for this biotope in 2008.

Typical species; top 5 species
The five most common species recorded in this biotope for the 2008 annual monitoring survey (in which this biotope was first recorded at the monitoring stations) are listed below:
Polydora cornuta (see above)
Eusarsiella zostericola is a very small ostracod crustacean (clam shrimp) that was originally introduced from eastern North America and lives on and above lower shore and shallow water mud in estuaries.
Nucula nitidosa is a small bivalve (deposit feeder) that may be abundant in shallow water stiff mud or clay.
Nephtys hombergii (see above)
Chaetozone zetlandica is a small burrowing worm (deposit feeder) that lives in shallow water in the lower reaches of estuaries and sheltered locations in mixed and muddy substrata.

Distribution in the estuaries
This biotope was recorded Group OrD in 2008 and 2009. Similar communities have also been found at other stations in the estuaries (Station 290) and offshore. The fauna was variable, as evidenced by the cluster group scatter.

Regional and national distribution
As the biotope is restricted to particular substratum types, it is probably scattered in its distribution around the country and may be widespread but unlikely to cover wide areas.

Key species for bird feeding and bait digging
Catworms (*Nephtys hombergii*) would be suitable for bird feed and bait if accessible. Most of the other species recorded are too small to be of interest to birds. Subtidal habitats are generally inaccessible to bait diggers and many birds.

Sensitivity
The biotope is likely to be sensitive to changes in substratum type and hydrology and to chemical contamination. It would also be sensitive to smothering and disturbance, as these would necessarily affect the substratum type.

SS.SMu.SMuVS.NhomTubi

NhomTubi (*Nephtys hombergii and Tubificoides* spp. in variable salinity infralittoral soft mud)

Biotope description
Typical habitat: mud or sandy mud, in variable salinity, typically in the mid to lower reaches of estuaries and sheltered inlets in shallow water.
Biology: infauna characterised by catworms, *Nephtys hombergii* and oligochaete worms such as *Tubificoides amplivasatus*. Other worms may be frequent. An average of 425 animals per m² was recorded for this biotope in 2009.

Typical species; top 5 species
The five most common species recorded in this biotope for the 2009 annual monitoring survey (in which this biotope was first recorded at the monitoring stations) are listed below:
Nephtys (juv) most likely represents the young of *N. hombergii* (see above)
Streblospio shrubsolii (see above)
Aphelochaeta marioni (see above)
Cossura pygodactyla is a very small burrowing worm (deposit feeder) found in various substrata, often in disturbed conditions.
Ampharete grubei is a medium sized burrowing worm (deposit feeder) found in muddy substrata on the lower shore and in shallow water.

Distribution in the estuaries
This biotope was recorded Group OrD in 2009. It was not easily recognised on the basis of 1997 cluster groups but inspection of individual sample data showed a dominance of *Nephtys hombergii* to be associated with reduced cirratulid (*Aphelochaeta marioni*) numbers. Analysis of 2003 data revealed the biotope in the estuaries (mainly in Harwich Harbour but also in the mid Stour) and offshore, mainly in Pennyhole Bay. Some 2003 estuary samples may represent an undescribed biotope related to SS.SMu.SMuVS.NhomTubi. The echiuran *Maxmuelleria lankesteri* was

found in Harwich Harbour in July 2002 (Worsfold, 2002 – recorded as *Echiurus echiurus*) and may be an important food for fish (N. Britton, pers. comm.). Echiurans are known to emerge from the mud under anoxic conditions (Dyer *et al*., 1983). Such conditions could result from sediment dumping. The bivalve *Saxicavella jeffreysii* was often dominant.

Regional and national distribution
The biotope is likely to be widespread in shallow water mud throughout the country.

Key species for bird feeding and bait digging
Catworms (*Nephtys hombergii*) would be suitable for bird feed and bait if accessible. Most of the other species recorded are too small to be of interest to birds. Subtidal habitats are generally inaccessible to bait diggers and many birds.

Sensitivity
The biotope is likely to be sensitive to changes in substratum type and hydrology and to chemical contamination. It is probably much less sensitive to smothering and disturbance and may represent a relatively disturbed sediment community.

SS.SMx.IMx.SpavSpAn

SMx (Sublittoral mixed sediment)
IMx (Infralittoral mixed sediment)
SpavSpAn (*Sabella pavonina* with sponges and anemones on infralittoral mixed sediment)

Biotope description
Typical habitat: muddy gravelly sand with pebbles, in full or slightly reduced or variable salinity, often in the lower reaches of estuaries and sheltered inlets in shallow water.
Biology: characterised by fanworms, *Sabella pavonina*, which may form beds; epifauna, such as ascidians, sponges and anemones may be attached to the fanworm tubes. The infauna includes many small worms and crustaceans. An average of 17,089 animals per m² was recorded in the richest cluster for this biotope in 2003.

Typical species; top 5 species
The five most common taxa (other than Nematoda) recorded in this biotope for the 2003 survey (upon which the target biotopes were defined) are listed below:
Sabella pavonina (fanworm, spaghetti weed) is a large worm that builds muddy tubes attached to small stones or shells that are often buried in mud. The worms have crowns of tentacles that are extended for filter feeding. They may form extensive beds in shallow mixed substrata (sometimes on the lower shore) in estuaries and coastal areas, often with strong currents.
Sabelliphilus elongatus is a very small crustacean that parasitises fanworms.
Syllidia armata (see above)
Aoridae are small Crustacea (deposit feeders) that build tubes in mud or attached to stones, shells, debris, or other tubes in shallow water.
Aphelochaeta marioni (see above).

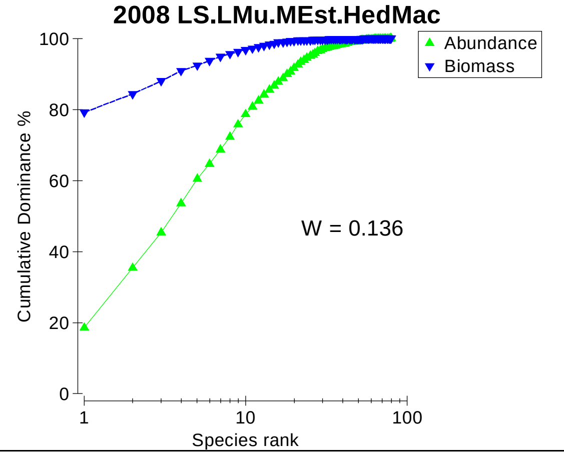
Distribution in the estuaries
This is the target biotope for Groups StF and OrC. Fanworms (*Sabella pavonina*) have been found in dense patches on mud or mixed substrata on both estuaries, but particularly on the Orwell (Worsfold, 2002; Jessop *et al*., 2003). There is also a 6ha. patch of dense *Sabella pavonina* on the north-western edge of the Shelf and another (3ha.) to the south, which have been mapped by towed video (Worsfold & Dyer, 2004). Much of the undredged mud to the west of Landguard Point is similarly colonised by fanworms (about 9ha.). The beds have dense *Sabella* and are good examples of the described biotope. Sample analysis suggests that there may be another bed off The Naze.

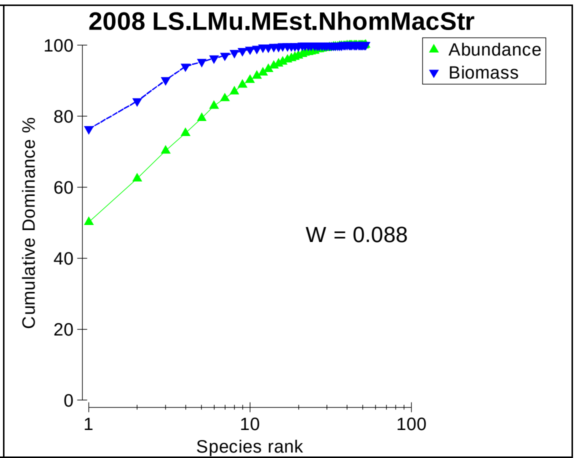
Regional and national distribution
There seems to be little information on the distribution of this biotope nationally but it would be reasonable to expect scattered patches in many UK estuaries.

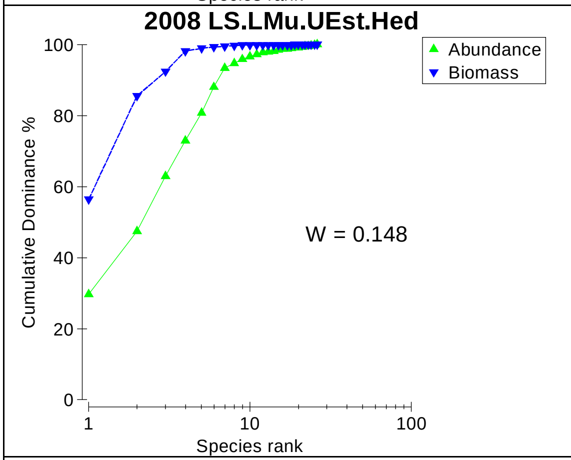
Key species for bird feeding and bait digging
Subtidal habitats are generally inaccessible to bait diggers and many birds. We have found no evidence that fanworms are targeted by birds, although some of the associated species, which may include large Crustacea, could be of interest. Fanworm beds may also be important as shelter for fish nurseries.

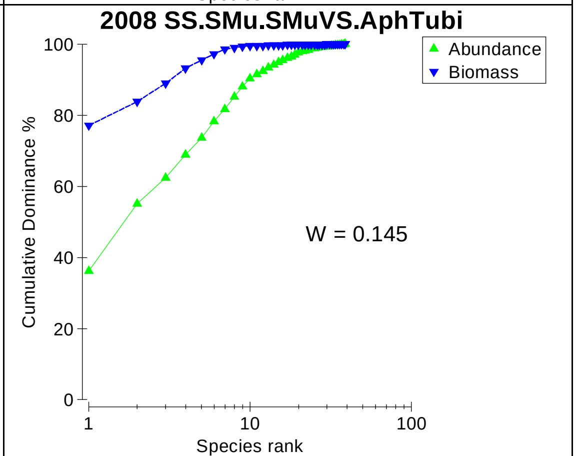
Sensitivity
The biotope is likely to be sensitive to changes in substratum type and hydrology and to chemical contamination but less sensitive to smothering, as the tubes are raised above the mud surface. Disturbance could remove fanworms and change the biotope. There is some evidence that *S. pavonina* has increased in abundance in the estuaries.

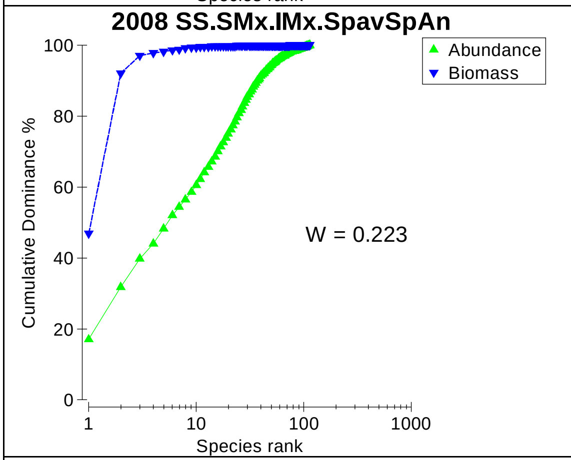
Appendix 13. Abundance Biomass Comparison (ABC) curves for each target biotope in each annual survey year, with calculated *W* scores.

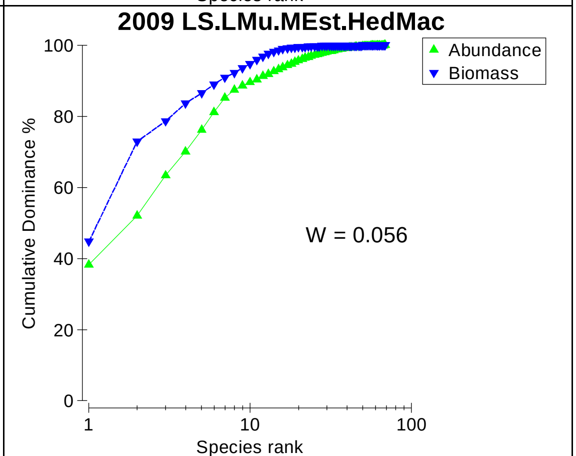


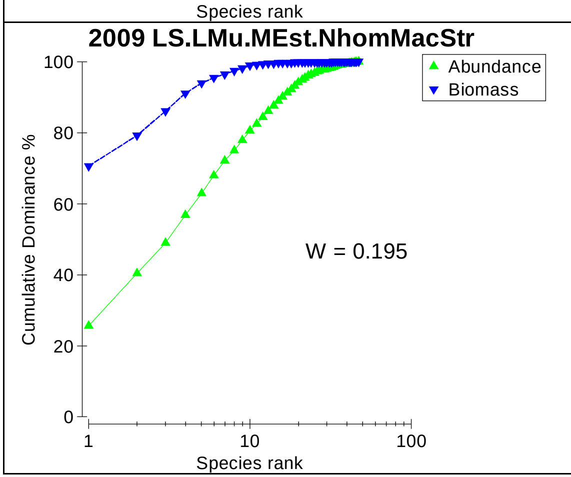


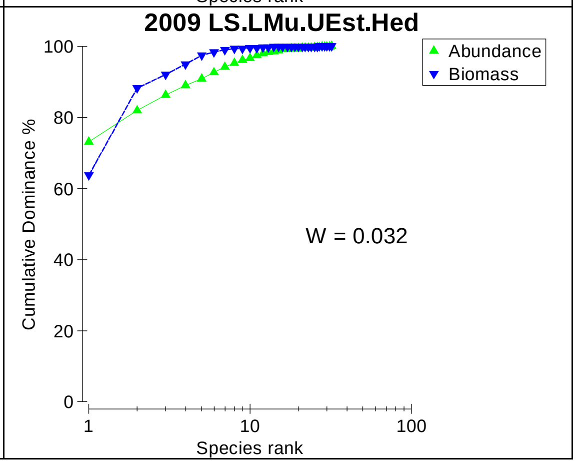


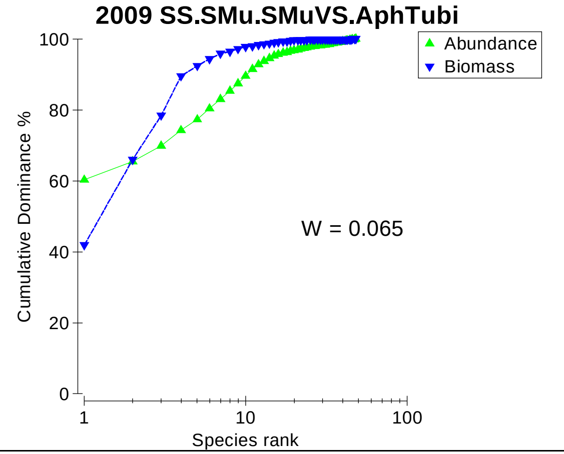


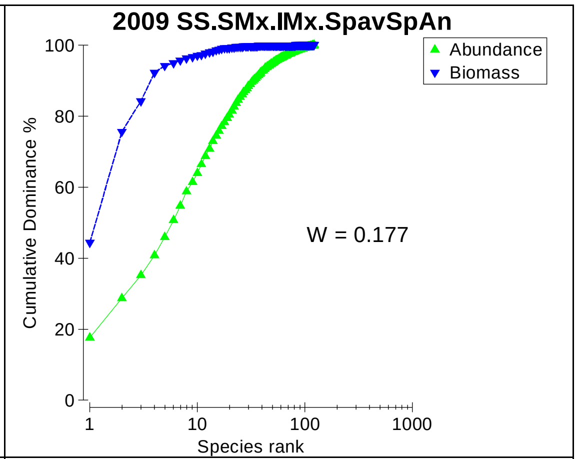


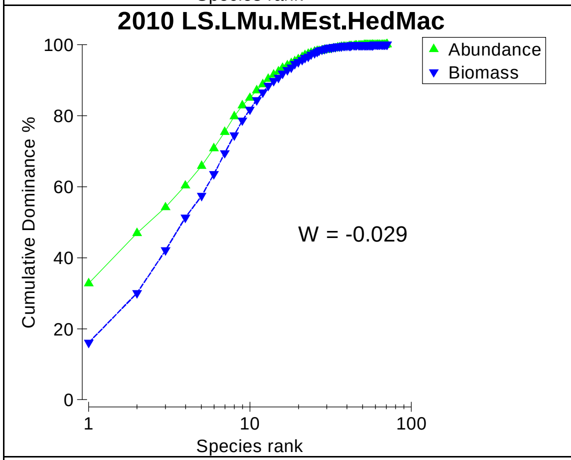


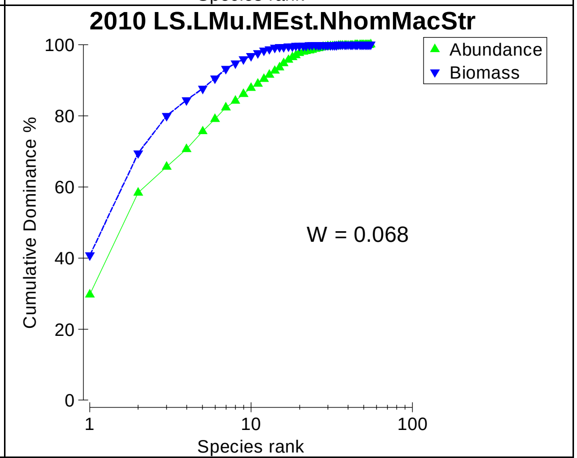


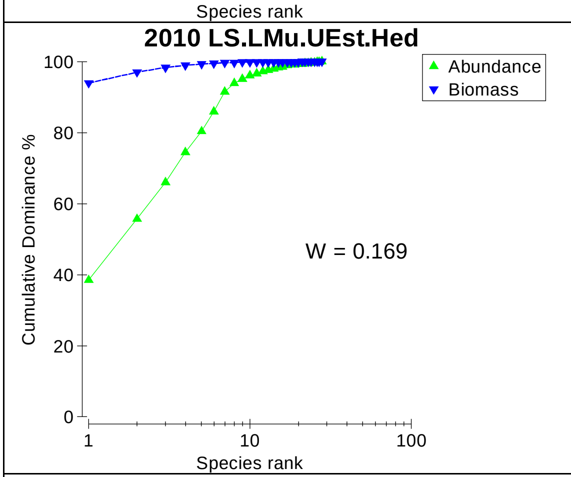


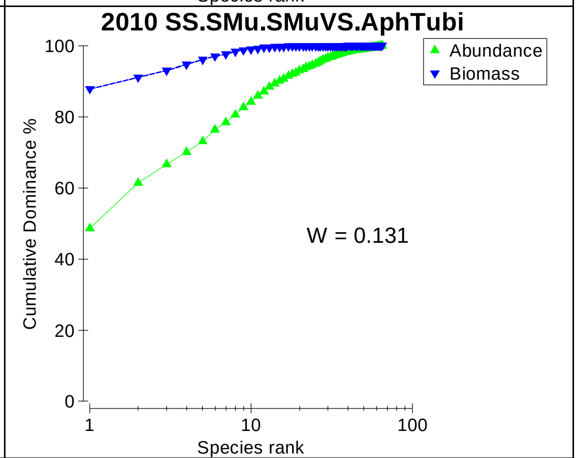

2009 SS.SMu.SMuVS.AphTubi
Abundance
Biomass
Cumulative Dominance %
W = 0.065
Species rank

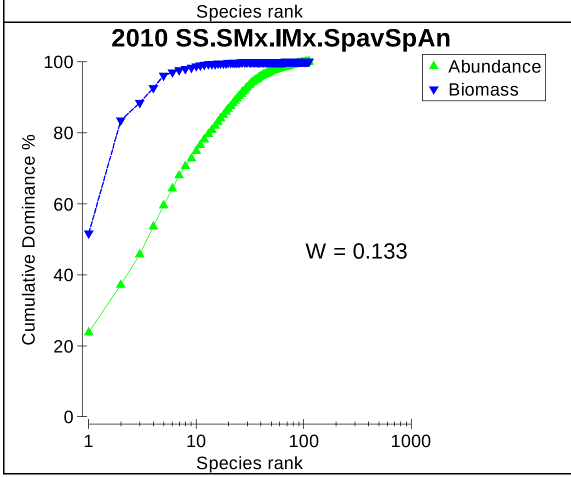

2009 SS.SMx.IMx.SpavSpAn
Abundance
Biomass
Cumulative Dominance %
W = 0.177
Species rank

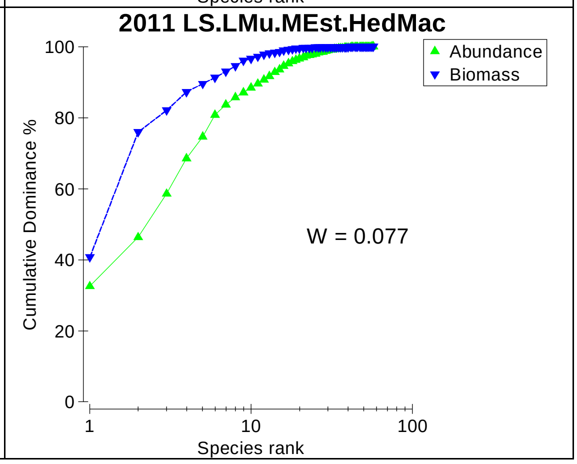

2010 LS.LMu.MEst.HedMac
Abundance
Biomass
Cumulative Dominance %
W = -0.029
Species rank

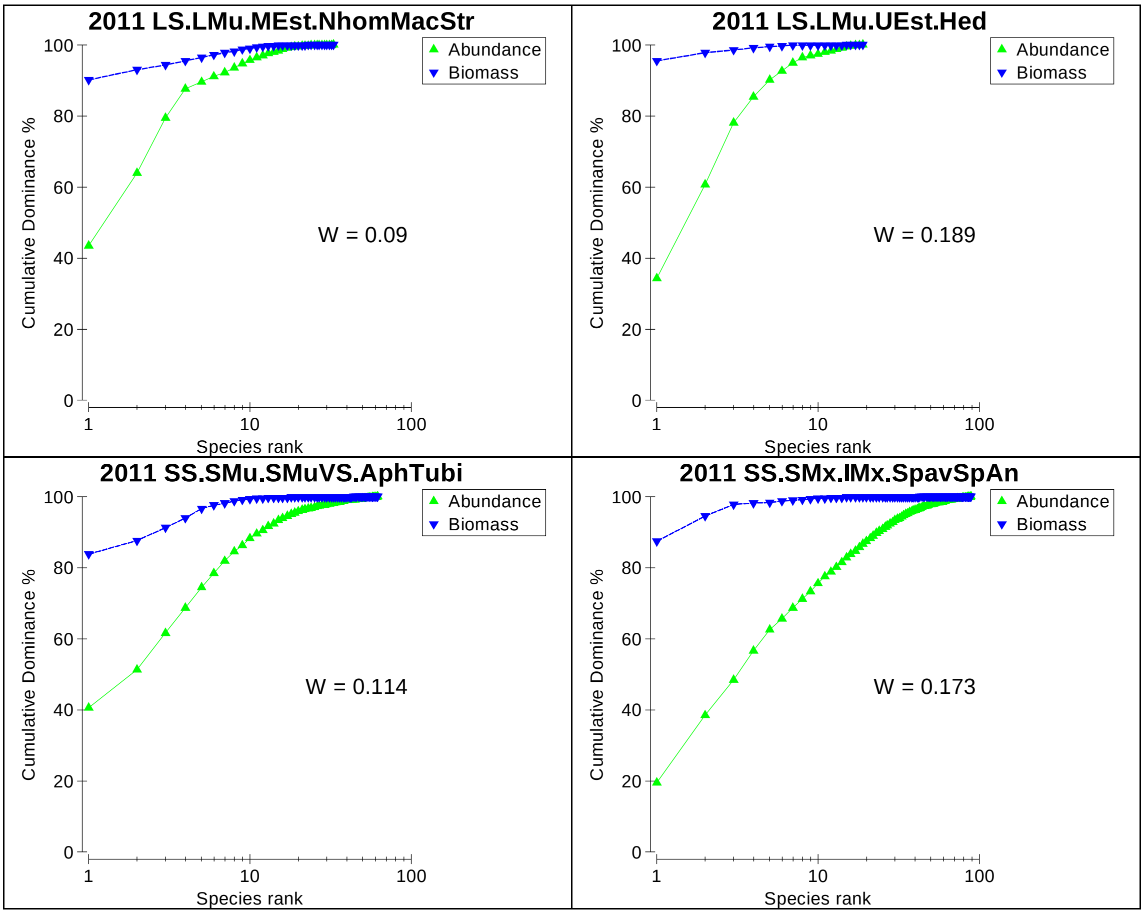

2010 LS.LMu.MEst.NhomMacStr
Abundance
Biomass
Cumulative Dominance %
W = 0.068
Species rank


2010 LS.LMu.UEst.Hed
Abundance
Biomass
Cumulative Dominance %
W = 0.169
Species rank


2010 SS.SMu.SMuVS.AphTubi
Abundance
Biomass
Cumulative Dominance %
W = 0.131
Species rank


2010 SS.SMx.IMx.SpavSpAn
Abundance
Biomass
Cumulative Dominance %
W = 0.133
Species rank


2011 LS.LMu.MEst.HedMac
Abundance
Biomass
Cumulative Dominance %
W = 0.077
Species rank


2011 LS.LMu.MEst.NhomMacStr
Abundance
Biomass
W = 0.09
Cumulative Dominance %
Species rank
2011 LS.LMu.UEst.Hed
Abundance
Biomass
W = 0.189
Cumulative Dominance %
Species rank
2011 SS.SMu.SMuVS.AphTubi
Abundance
Biomass
W = 0.114
Cumulative Dominance %
Species rank
2011 SS.SMx.IMx.SpavSpAn
Abundance
Biomass
W = 0.173
Cumulative Dominance %
Species rank

Appendix 3. Photographs of each PSA and biological sample collected between 5th and 6th July 2011.


Photo 1. St 150 PSA; 5 July 2011


Photo 2. St 150 Sample; 5 July 2011


Photo 3. St 152 PSA; 5 July 2011


Photo 4. St 152 Sample; 5 July 2011


Photo 5. St 153 PSA; 5 July 2011


Photo 6. St 153 Sample; 5 July 2011


Photo 7. St 154 PSA; 5 July 2011


Photo 8. St 154 Sample; 5 July 2011

Photo 9. St 155 PSA; 5 July 2011

Photo 10. St 155 Sample; 5 July 2011

Photo 11. St 157 PSA; 5 July 2011

Photo 12. St 157 Sample; 5 July 2011

Photo 13. St 158 PSA; 5 July 2011

Photo 14. St 158 Sample; 5 July 2011

Photo 15. St 163 Sample; 5 July 2011


Photo 16. St 163 Sample; 5 July 2011

Photo 17. St 169 PSA; 5 July 2011

Photo 18. St 169 Sample; 5 July 2011

Photo 19. St 171 PSA; 5 July 2011

Photo 20. St 171 Sample; 5 July 2011

Photo 21. St 172 PSA; 5 July 2011

Photo 22. St 172 Sample; 5 July 2011

Photo 23. St 174 PSA; 5 July 2011

Photo 24. St 174 Sample; 5 July 2011

Photo 25. St 179 PSA; 5 July 2011

Photo 26. St 179 Sample; 5 July 2011

Photo 27. St 180 PSA; 5 July 2011

Photo 28. St 180 Sample; 5 July 2011

Photo 29. St 181 PSA; 5 July 2011

Photo 30. St 181 Sample; 5 July 2011

Photo 31. St 189 PSA; 5 July 2011

Photo 32. St 189 Sample; 5 July 2011

Photo 33. St 191 PSA; 5 July 2011

Photo 34. St 191 Sample; 5 July 2011

Photo 35. St 192 PSA; 5 July 2011

Photo 36. St 192 Sample; 5 July 2011

Photo 37. St 193 PSA; 5 July 2011

Photo 38. St 193 Sample; 5 July 2011

Photo 39. St 194 PSA; 5 July 2011


Photo 40. St 194 Sample; 5 July 2011

Photo 41. St 195 PSA; 5 July 2011

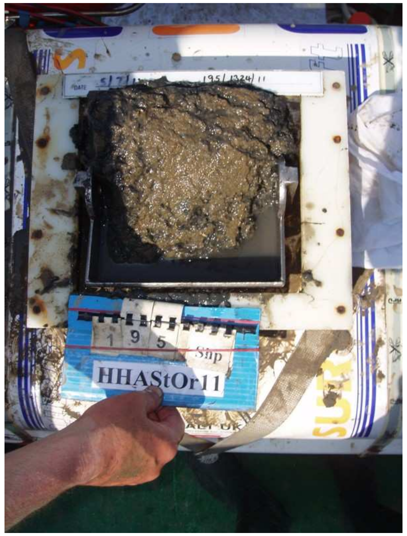


Photo 42. St 195 Sample; 5 July 2011

Photo 43. St 204 PSA; 6 July 2011

Photo 44. St 204 Sample; 6 July 2011

Photo 45. St 206 PSA; 6 July 2011

Photo 46. St 206 Sample; 6 July 2011

Photo 47. St 207 PSA; 6 July 2011

Photo 48. St 207 Sample; 6 July 2011

Photo 49. St 209 PSA; 6 July 2011

Photo 50. St 209 Sample; 6 July 2011

Photo 51. St 249 PSA; 5 July 2011

Photo 52. St 249 Sample; 5 July 2011

Photo 53. St 258 PSA; 6 July 2011

Photo 54. St 258 Sample; 6 July 2011

Photo 55. St 260 PSA; 6 July 2011

Photo 56. St 260 Sample; 6 July 2011

Photo 57. St 261 PSA; 6 July 2011

Photo 58. St 261 Sample; 6 July 2011

Photo 59. St 263 PSA; 6 July 2011

Photo 60. St 263 Sample; 6 July 2011

Photo 61. St 267 PSA; 6 July 2011

Photo 62. St 267 Sample; 6 July 2011

Photo 63. St 269 PSA; 6 July 2011

Photo 64. St 269 Sample; 6 July 2011

Photo 65. St 272 PSA; 6 July 2011

Photo 66. St 272 Sample; 6 July 2011

Photo 67. St 275 PSA; 6 July 2011

Photo 68. St 275 Sample; 6 July 2011


Photo 69. St 285 PSA; 6 July 2011


Photo 70. St 285 Sample; 6 July 2011

Photo 71. St 289 PSA; 6 July 2011

Photo 72. St 289 Sample; 6 July 2011

Photo 73. St 295 PSA; 6 July 2011

Photo 74. St 295 Sample; 6 July 2011

Photo 75. St 296 PSA; 6 July 2011

Photo 76. St 296 Sample; 6 July 2011

Photo 77. St 300 PSA; 6 July 2011

Photo 78. St 300 Sample; 6 July 2011

Photo 79. St 301 PSA; 6 July 2011

Photo 80. St 301 Sample; 6 July 2011

Photo 81. St 303 PSA; 6 July 2011

Photo 82. St 303 Sample; 6 July 2011

Photo 83. St 306 PSA; 6 July 2011

Photo 84. St 306 Sample; 6 July 2011

Photo 85. St 548 PSA; 5 July 2011

Photo 86. St 548 Sample; 5 July 2011

Photo 87. St 549 PSA; 5 July 2011

Photo 88. St 549 Sample; 5 July 2011

Biotopes recorded in the Stour and Orwell estuary annual monitoring surveys

Following the 2010 Regulators Meeting (16th March), it was decided a summary of biotopes and dominant species would help interpretation of the results of the Stour and Orwell annual monitoring of the benthos.

A biotope is defined as the combination of an abiotic habitat and its associated community of species (Connor *et al*., 2004). There is a classification hierarchy: broad habitats (EUNIS Level 2, *e.g.* littoral sediments, infralittoral rock), main habitats (EUNIS Level 3, *e.g.* littoral mud, sublittoral coarse sediment), biotope complexes (EUNIS Level 4, *e.g.* sublittoral coarse sediments in variable salinity) and biotopes (EUNIS Level 5, *e.g. Nephtys hombergii, Macoma balthica* and *Streblospio shrubsolii* in littoral sandy mud). EUNIS Level 1 defines the marine environment and Level 6 (sub-biotopes) are not considered here. Each level is represented by a group of letters in a biotope code, with letters separated by punctuation marks. For example, the biotope named above is coded as LS.LMu.MEst.NhomMacStr; note that there are four groups of letters separated by punctuation to represent EUNIS Levels 2-5.

A review of biotopes recorded from the Stour, Orwell and approaches to Harwich, including the Gabbard was included in the biotope distribution and data review report (Worsfold, 2005). Eighty five biotopes are recorded for the area. However, many of these are known only from outside the estuaries, from restricted areas or from habitats, such as boulders, that would not be expected to be sampled by Shipek grabs. The following biotope list is therefore restricted to those recorded from the annual monitoring surveys in 2008 (Worsfold & Dyer, 2008), 2009 (Worsfold & Dyer, 2009) and 2010 (this report).

LS.LMu.UEst.Hed

LS (Littoral sediments)
LMu (Littoral mud)
UEst (Polychaete / oligochaete dominated upper estuarine mud shores)
Hed (*Hediste diversicolor* in littoral mud)

Biotope description

Typical habitat: mud or sandy mud in variable or reduced salinity, typically in sheltered inlets and the upper reaches of estuaries on the mid to lower shore.
Biology: infauna usually dominated by harbour ragworms (*Hediste diversicolor*); other typical species include several species of oligochaete worms, often including *Heterochaeta costata*, which has a restricted salinity range; there are usually small polychaete worms, such as *Streblospio shrubsolii* and *Manayunkia aestuarina* and the laver spire snail *Hydrobia ulvae* may be common. There is no typical epibiota except for mats of drifting algae such as *Enteromorpha*. There are three sub-biotopes: LS.LMu.UEst.Hed.Str (*Hediste diversicolor* and *Streblospio shrubsolii* in littoral sandy mud) has a higher proportion of small polychaetes, LS.LMu.UEst.Hed.Cvol (*Hediste diversicolor* and *Corophium volutator* in littoral mud) has more mud amphipods (*Corophium volutator*) and LS.LMu.UEst.Hed.Ol (*Hediste diversicolor* and oligochaetes in littoral mud) has a higher proportion of oligochaetes. An average of 7,754 animals per m^2 was recorded for this biotope in 2003.

Typical species; top 5 species

The five most common species recorded in this biotope for the 2003 survey (upon which the target biotopes were defined) are listed below:
Hediste diversicolor (harbour ragworm) is a large active worm (predator and particle feeder) common in mudflats with variable salinity. It is a prey species for fish and birds and sometimes used for bait.
Streblospio shrubsolii is a small burrowing worm (deposit feeder) common in mudflats with variable salinity and is also common in shallow water.
Hydrobia ulvae (laver spire snail) is a small snail (deposit feeder) common on mudflats and saltmarsh and able to drift over wide areas at high tide; it forms aggregations and populations may fluctuate. It is a prey species for some fish and birds
Polydora cornuta is a small burrowing worm (deposit feeder) that prefers stiff mud or clay in variable salinity on the lower shore or in shallow water.
Heterochaeta costata is a small oligochaete worm (deposit feeder) that is restricted to variable or reduced salinity at the heads of estuaries or in lagoons or areas of freshwater runoff.

Distribution in the estuaries
This is the target biotope for Group StA. It has been consistently recorded from the intertidal of the upper Stour. In addition, a few upper mid-shore sites were ascribed to it by the 1997 grab survey along with the saltmarsh erosion area, with *Enteromorpha* spp. on consolidated mud and channels between, of eastern Copperas Bay mapped in 2002.

Regional and national distribution
Many areas of soft mud, especially channels between saltmarshes and at the extreme heads of estuaries, are referable to this biotope and it is probably widely distributed in all estuaries with areas of appropriate salinity and sediment.

Key species for bird feeding and bait digging
Hediste diversicolor is an important bird feeding and bait species. Most of the other typical species are too small to be of interest to bait diggers or most birds but some birds may specialise in the smaller worms or *Hydrobia*.

Sensitivity
The biotope is likely to be sensitive to changes in substratum type and hydrology (especially salinity) and to chemical contamination but is less sensitive to smothering or disturbance (provided that the sediment type remains the same).

LS.LMu.MEst.HedMac

MEst (Polychaete / bivalve dominated mid estuarine mud shores)
HedMac (*Hediste diversicolor* and *Macoma balthica* in littoral sandy mud)

Biotope description
Typical habitat: sandy mud or mud in full, variable or reduced salinity, typically in sheltered bays and estuaries across the whole shore.
Biology: infauna with many harbour ragworms (*Hediste diversicolor*), as well as bivalves (such as *Abra tenuis*, baltic tellins, *Macoma balthica*, and cockles, *Cerastoderma edule*), small worms (*Streblospio shrubsolii*, *Tharyx* Type A, and

oligochaetes, such as *Tubificoides benedii*), laver spire snails (*Hydrobia ulvae*) and burrowing amphipods (*Corophium volutator*). There is no typical epibiota except for mats of drifting algae such as *Enteromorpha*. An average of 21,261 animals per m^2 was recorded for this biotope in 2003.

Lugworms (*Arenicola marina*), which might represent a different biotope, are often missed by remote sampling methods, due to their large size and low density. Lugworm casts are found in many sandy mud areas, particularly on the Stour, near areas of LS.LSa.MuSa.MacAre. *Pygospio elegans* is a minor component of many samples in this biotope as well as in LS.LMu.MEst.NhomMacStr. Sand gapers (*Mya arenaria*) are common in parts of upper reaches of both estuaries, especially the north side of the Orwell.

Typical species; top 5 species

The five most common species recorded in this biotope for the 2003 survey (upon which the target biotopes were defined) are listed below:

Tubificoides benedii is a small oligochaete (deposit feeder) worm that is common in estuarine mudflats.

Streblospio shrubsolii (see above)

Hydrobia ulvae (see above)

Tharyx (Type A) is a small burrowing worm (deposit feeder) that may common in mudflats, particularly in the mid reaches of estuaries.

Abra tenuis is a small bivalve (deposit feeder) found in mudflats and saltmarsh in variable salinity, particularly in the upper and mid shore.

Distribution in the estuaries

This is the target biotope for Groups StB, StE, StG and OrB. It included most of the intertidal samples taken for the 1997 survey (Dyer, 2000). It was the most extensive biotope on the Stour and was also widespread on the Orwell. Cluster analysis of the 2003 data divided the original biotope into two groups that were assigned to different biotopes, although the communities did not fit perfectly. Samples from mid estuary and mid shore areas were assigned to LS.LMu.MEst.HedMac. Samples from the Trimley Setback Site also belong to the present biotope; the breach had been made and the habitat stabilised by 2002.

Regional and national distribution

This is probably the most widespread estuarine mudflat biotopes nationally and is also common in sheltered muddy bays.

Key species for bird feeding and bait digging

Hediste diversicolor is an important bird feeding and bait species. Many of the bivalves present in the biotope would also be important bird food and cockles may be fished commercially. Most of the other typical species are too small to be of interest to bait diggers or most birds but some birds may specialise in the smaller worms or *Hydrobia*.

Sensitivity

The biotope is likely to be sensitive to changes in substratum type and hydrology (especially salinity) and to chemical contamination but is less sensitive to smothering or disturbance (provided that the sediment type remains the same). There is evidence that some of the area of intertidal mud had been lost since publication of the most recent Ordnance Survey map, especially in Copperas, Holbrook and Erwarton Bays. In these areas, erosion steps are present on the seaward edges of both the saltmarsh and mudflats.

LS.LMu.MEst.NhomMacStr

NhomMacStr (*Nephtys hombergii*, *Macoma balthica* and *Streblospio shrubsolii* in littoral sandy mud)

Biotope description

Typical habitat: sandy mud in variable salinity, typically in the upper reaches of estuaries on the mid to lower shore.

Biology: infauna dominated by the small worm *Streblospio shrubsolii*; harbour ragworms (*Hediste diversicolor*), bivalves (such as baltic tellins, *Macoma balthica*) and laver spire snails (*Hydrobia ulvae*) may also be common. There is no typical epibiota except for mats of drifting algae such as *Enteromorpha*. Some rare species (the burrowing anemone *Nematostella vectensis* and the polychaete *Alkmaria romijni*) have been recorded from this biotope in the western Stour (Hill *et al*., 1996). The biotope has much in common with LS.LMu.MEst.HedMac and is only loosely distinguishable from it. An average of 29,246 animals per m^2 was recorded for this biotope in 2003.

Typical species; top 5 species

The five most common species recorded in this biotope for the 2003 survey (upon which the target biotopes were defined) are listed below:

Streblospio shrubsolii (see above)

Tharyx (Type A) (see above)

Mya arenaria (gaper) is a large deposit and filter feeding bivalve (though juveniles were more common than adults in samples) that was originally introduced from eastern North America. It can be common on the lower shore and in shallow water in muddy sand in sheltered estuaries and bays, including areas of reduced and variable salinity; it burrows deeply. It could potentially be harvested for human consumption or bait and may be important for bird feeding.

Hydrobia ulvae (see above)

Cerastoderma edule (edible cockle) is a medium sized filter feeding bivalve (though juveniles were more common than adults in samples) found both in estuaries and sheltered bays in full or variable salinity, mostly near the surface of muddy sand or sandy mud on the mid or lower shore. It could be harvested for human consumption or bait and is an important bird feed species.

Distribution in the estuaries

This is the target biotope for Groups StC and OrA. Most of the upper Orwell and parts of the lower shore of the upper Stour were referred to this biotope by cluster analysis of samples from 2003. Some sites are typical of the described type but there were more bivalves than described as typical. Some rare species (the burrowing anemone *Nematostella vectensis* and the polychaete *Alkmaria romijni*) have been recorded from this biotope in the western Stour (Hill *et al*., 1996).

Regional and national distribution
Many areas of soft substrata in the mid and upper reaches of estuaries are referable to this biotope and it is probably widely distributed in all estuaries with areas of appropriate salinity and sediment.

Key species for bird feeding and bait digging
Mya arenaria and *Cerastoderma edule* are important bird feeding and, potentially, bait and human food species. Some of the other bivalve present in the biotope would also be important bird food. Most of the other typical species are too small to be of interest to bait diggers or most birds but some birds may specialise in the smaller worms or *Hydrobia*.

Sensitivity
The biotope is likely to be sensitive to changes in substratum type and hydrology (especially salinity) and to chemical contamination but is less sensitive to smothering or disturbance (provided that the sediment type remains the same).

SS.SCS.SCSVS

SS (Sublittoral sediment)
SCS (Sublittoral coarse sediment)
SCSVS (Sublittoral coarse sediments in variable salinity (estuaries)

Biotope description
This biotope complex is not divided into biotopes so is treated as a whole.
Typical habitat: mixed substrata in variable or reduced salinity, in shallow water in estuaries
Biology: varied infauna and epifauna as biotopes not defined within complex. Typical species in annual monitoring surveys listed below. An average of 2,750 animals per m^2 was recorded for this biotope in 2008.

Typical species; top 5 species
The five most common species recorded (other than Nematoda) in this biotope for the 2008 annual monitoring survey (in which this biotope was first recorded at a monitoring station) are listed below:
Sphaerosyllis taylori is a very small mobile worm (possible predator) found in shallow water in mixed substrata.
Aphelochaeta marioni is a small burrowing worm (deposit feeder) that may be common in muddy sediment with some mixed substrata on the lower shore and in shallow water in variable salinity.
Syllidia armata is a very small mobile worm (predator) found in shallow water in mixed substrata.
Mediomastus fragilis is a small burrowing worm (deposit feeder) found in shallow mixed substrata.
Tubificoides benedii (see above)

Distribution in the estuaries
The complex was recorded at one station in Group StF in 2008. In 2003, it was recorded from off Parkeston, in the outer Stour Estuary.

Regional and national distribution

As the biotopes are not defined it is not possible to comment on national distribution.

Key species for bird feeding and bait digging

Most of the species recorded are too small to be of interest to birds. Subtidal habitats are generally inaccessible to bait diggers and many birds.

Sensitivity

The complex probably includes a series of transitional communities that are produced by distrurbance and likely to change with changes in substratum type and hydrology, as well as with changes such as smothering or disturbance.

SS.SMu.SMuVS.AphTubi

SMu (Sublittoral cohesive mud and sandy mud communities)
SMuVS (Sublittoral mud in variable salinity (estuaries)
AphTubi (*Aphelochaeta marioni and Tubificoides* spp. in variable salinity infralittoral mud)

Biotope description

Typical habitat: mud or sandy mud, sometimes with mixed substrata, in full or variable salinity, typically in the mid to lower reaches of estuaries and sheltered inlets in shallow water.
Biology: infauna characterised by the small worm *Aphelochaeta marioni* and oligochaete worms such as *Tubificoides amplivasatus*. Other worms may be frequent. An average of 6,969 animals per m^2 was recorded for this biotope in the richest cluster in 2003.

Typical species; top 5 species

The five most common taxa recorded in this biotope for the 2003 survey (upon which the target biotopes were defined) are listed below:
Aphelochaeta marioni (see above)
Streblospio shrubsolii (see above)
Phoronis are small worms (filter and deposit feeders) that live buried in mud in sandy tubes. They may be very common in shallow water in estuaries and sheltered bays.
Melinna palmata is a medium sized burrowing worm (deposit feeder) found in mud on the lower shore and in shallow water, where it may be very common.
Nephtys hombergii (a type of catworm) is a large active worm (predator) that can be found in many different sediment types in a wide range of depths but is particularly common in shallow water mud in estuaries.

Distribution in the estuaries

This is the target biotope for Groups StD and OrD. It is one of the principal subtidal biotopes of the estuaries, as identified by cluster analysis of 2003 data. Most of the fauna from the sediment grab samples recorded in previous surveys (Dyer, 2000) was referred to the equivalent of this biotope. Much of Holbrook Bay, mapped as intertidal in most maps and charts, fits SS.SMu.SMuVS.AphTubi on the basis of its fauna (Dyer, 2000). July 2002 dredge samples containing mud or muddy mixed sediment were assumed to belong to it. Most samples were typical of the described biotope. Certain areas proved to contain more gravel and overlap with IMX biotopes, however (Dyer & Worsfold, 2001). There was also considerable overlap with other mud biotopes.

Regional and national distribution
This is probably one of the most widespread soft substratum biotopes in estuarine shallow water throughout the country. It is also likely to be widespread in sheltered inlets and bays.

Key species for bird feeding and bait digging
Catworms (*Nephtys hombergii*) would be suitable for bird feed and bait if accessible. Most of the other species recorded are too small to be of interest to birds. Subtidal habitats are generally inaccessible to bait diggers and many birds.

Sensitivity
The biotope is likely to be sensitive to changes in substratum type and hydrology and to chemical contamination but less sensitive to smothering or disturbance (provided that the sediment type remains the same).

SS.SMu.SMuVS.PolCvol

PolCvol (*Polydora ciliata* and *Corophium volutator* in variable salinity infralittoral firm mud or clay)

Biotope description
Typical habitat: clay or peat, with mud, in variable salinity, often in the lower reaches of estuaries and sheltered inlets in shallow water.
Biology: infauna characterised by the small worm *Polydora ciliata*, or *P. cornuta*, and the burrowing amphipod *Corophium volutator*, which may vary in abundance. Other worms may be frequent. An average of 192 animals per m^2 was recorded for this biotope in 2008.

Typical species; top 5 species
The five most common species recorded in this biotope for the 2008 annual monitoring survey (in which this biotope was first recorded at the monitoring stations) are listed below:
Polydora cornuta (see above)
Eusarsiella zostericola is a very small ostracod crustacean (clam shrimp) that was originally introduced from eastern North America and lives on and above lower shore and shallow water mud in estuaries.
Nucula nitidosa is a small bivalve (deposit feeder) that may be abundant in shallow water stiff mud or clay.
Nephtys hombergii (see above)
Chaetozone zetlandica is a small burrowing worm (deposit feeder) that lives in shallow water in the lower reaches of estuaries and sheltered locations in mixed and muddy substrata.

Distribution in the estuaries
This biotope was recorded Group OrD in 2008 and 2009. Similar communities have also been found at other stations in the estuaries (Station 290) and offshore. The fauna was variable, as evidenced by the cluster group scatter.

Regional and national distribution

As the biotope is restricted to particular substratum types, it is probably scattered in its distribution around the country and may be widespread but unlikely to cover wide areas.

Key species for bird feeding and bait digging

Catworms (*Nephtys hombergii*) would be suitable for bird feed and bait if accessible. Most of the other species recorded are too small to be of interest to birds. Subtidal habitats are generally inaccessible to bait diggers and many birds.

Sensitivity

The biotope is likely to be sensitive to changes in substratum type and hydrology and to chemical contamination. It would also be sensitive to smothering and disturbance, as these would necessarily affect the substratum type.

SS.SMu.SMuVS.NhomTubi

NhomTubi (*Nephtys hombergii and Tubificoides* spp. in variable salinity infralittoral soft mud)

Biotope description

Typical habitat: mud or sandy mud, in variable salinity, typically in the mid to lower reaches of estuaries and sheltered inlets in shallow water.

Biology: infauna characterised by catworms, *Nephtys hombergii* and oligochaete worms such as *Tubificoides amplivasatus*. Other worms may be frequent. An average of 425 animals per m^2 was recorded for this biotope in 2009.

Typical species; top 5 species

The five most common species recorded in this biotope for the 2009 annual monitoring survey (in which this biotope was first recorded at the monitoring stations) are listed below:

Nephtys (juv) most likely represents the young of *N. hombergii* (see above)

Streblospio shrubsolii (see above)

Aphelochaeta marioni (see above)

Cossura pygodactyla is a very small burrowing worm (deposit feeder) found in various substrata, often in disturbed conditions.

Ampharete grubei is a medium sized burrowing worm (deposit feeder) found in muddy substrata on the lower shore and in shallow water.

Distribution in the estuaries

This biotope was recorded Group OrD in 2009. It was not easily recognised on the basis of 1997 cluster groups but inspection of individual sample data showed a dominance of *Nephtys hombergii* to be associated with reduced cirratulid (*Aphelochaeta marioni*) numbers. Analysis of 2003 data revealed the biotope in the estuaries (mainly in Harwich Harbour but also in the mid Stour) and offshore, mainly in Pennyhole Bay. Some 2003 estuary samples may represent an undescribed biotope related to SS.SMu.SMuVS.NhomTubi. The echiuran *Maxmuelleria lankesteri* was found in Harwich Harbour in July 2002 (Worsfold, 2002 – recorded as *Echiurus echiurus*) and may be an important food for fish (N. Britton, pers. comm.). Echiurans are known to emerge from the mud under anoxic conditions (Dyer *et al*., 1983). Such conditions could result from sediment dumping. The bivalve *Saxicavella jeffreysii* was often dominant.

Regional and national distribution
The biotope is likely to be widespread in shallow water mud throughout the country.

Key species for bird feeding and bait digging
Catworms (*Nephtys hombergii*) would be suitable for bird feed and bait if accessible. Most of the other species recorded are too small to be of interest to birds. Subtidal habitats are generally inaccessible to bait diggers and many birds.

Sensitivity
The biotope is likely to be sensitive to changes in substratum type and hydrology and to chemical contamination. It is probably much less sensitive to smothering and disturbance and may represent a relatively disturbed sediment community.

SS.SMx.IMx.SpavSpAn
SMx (Sublittoral mixed sediment)
IMx (Infralittoral mixed sediment)
SpavSpAn (*Sabella pavonina* with sponges and anemones on infralittoral mixed sediment)

Biotope description
Typical habitat: muddy gravelly sand with pebbles, in full or slightly reduced or variable salinity, often in the lower reaches of estuaries and sheltered inlets in shallow water.
Biology: characterised by fanworms, *Sabella pavonina*, which may form beds; epifauna, such as ascidians, sponges and anemones may be attached to the fanworm tubes. The infauna includes many small worms and crustaceans. An average of 17,089 animals per m^2 was recorded in the richest cluster for this biotope in 2003.

Typical species; top 5 species
The five most common taxa (other than Nematoda) recorded in this biotope for the 2003 survey (upon which the target biotopes were defined) are listed below:
Sabella pavonina (fanworm, spaghetti weed) is a large worm that builds muddy tubes attached to small stones or shells that are often buried in mud. The worms have crowns of tentacles that are extended for filter feeding. They may form extensive beds in shallow mixed substrata (sometimes on the lower shore) in estuaries and coastal areas, often with strong currents.
Sabelliphilus elongatus is a very small crustacean that parasitises fanworms.
Syllidia armata (see above)
Aoridae are small Crustacea (deposit feeders) that build tubes in mud or attached to stones, shells, debris, or other tubes in shallow water.
Aphelochaeta marioni (see above).

Distribution in the estuaries
This is the target biotope for Groups StF and OrC. Fanworms (*Sabella pavonina*) have been found in dense patches on mud or mixed substrata on both estuaries, but particularly on the Orwell (Worsfold, 2002; Jessop *et al*., 2003). There is also a 6ha. patch of dense *Sabella pavonina* on the north-western edge of the Shelf and another (3ha.) to the south, which have been mapped by towed video (Worsfold & Dyer, 2004). Much of the undredged mud to the west of Landguard Point is similarly

colonised by fanworms (about 9ha.). The beds have dense *Sabella* and are good examples of the described biotope. Sample analysis suggests that there may be another bed off The Naze.

Regional and national distribution
There seems to be little information on the distribution of this biotope nationally but it would be reasonable to expect scattered patches in many UK estuaries.

Key species for bird feeding and bait digging
Subtidal habitats are generally inaccessible to bait diggers and many birds. We have found no evidence that fanworms are targeted by birds, although some of the associated species, which may include large Crustacea, could be of interest. Fanworm beds may also be important as shelter for fish nurseries.

Sensitivity
The biotope is likely to be sensitive to changes in substratum type and hydrology and to chemical contamination but less sensitive to smothering, as the tubes are raised above the mud surface. Disturbance could remove fanworms and change the biotope. There is some evidence that *S. pavonina* has increased in abundance in the estuaries.