

Inlets in the western English Channel

Area summaries

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Series editor: David Connor

Location

<i>Position (centre)</i>	SX4356	50° 20' N 04° 10' W
<i>Administrative area</i>	Cornwall and Devon	Caradon, West Devon, South Hams, Plymouth
<i>Conservation agency/area</i>	English Nature	Devon & Cornwall

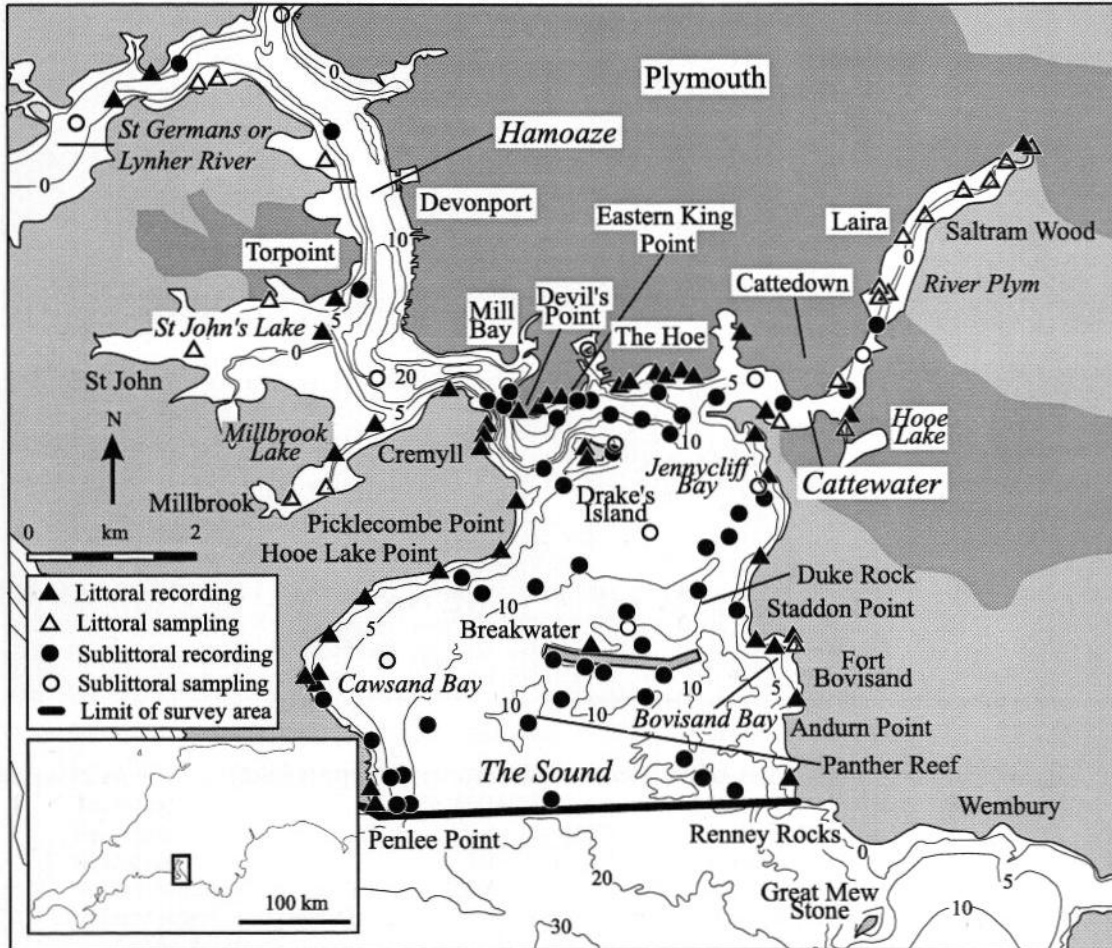


Figure 12.1 Main features of the area, and sites surveyed (lower inlet).

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Physical features

<i>Physiographic type</i>	Rias and embayment with estuaries
<i>Length of coast</i>	222 km
<i>Area of inlet</i>	Total 5,162 ha; intertidal 1,809 ha
<i>Length of inlet</i>	36 km
<i>Bathymetry</i>	Depths up to 40 m
<i>Wave exposure range</i>	Exposed to extremely sheltered
<i>Tidal stream range</i>	0.4 - 2.8 knots
<i>Tidal range</i>	4.7 m (spring); 2.2 m (neap)
<i>Salinity range</i>	Fully marine to upper estuarine

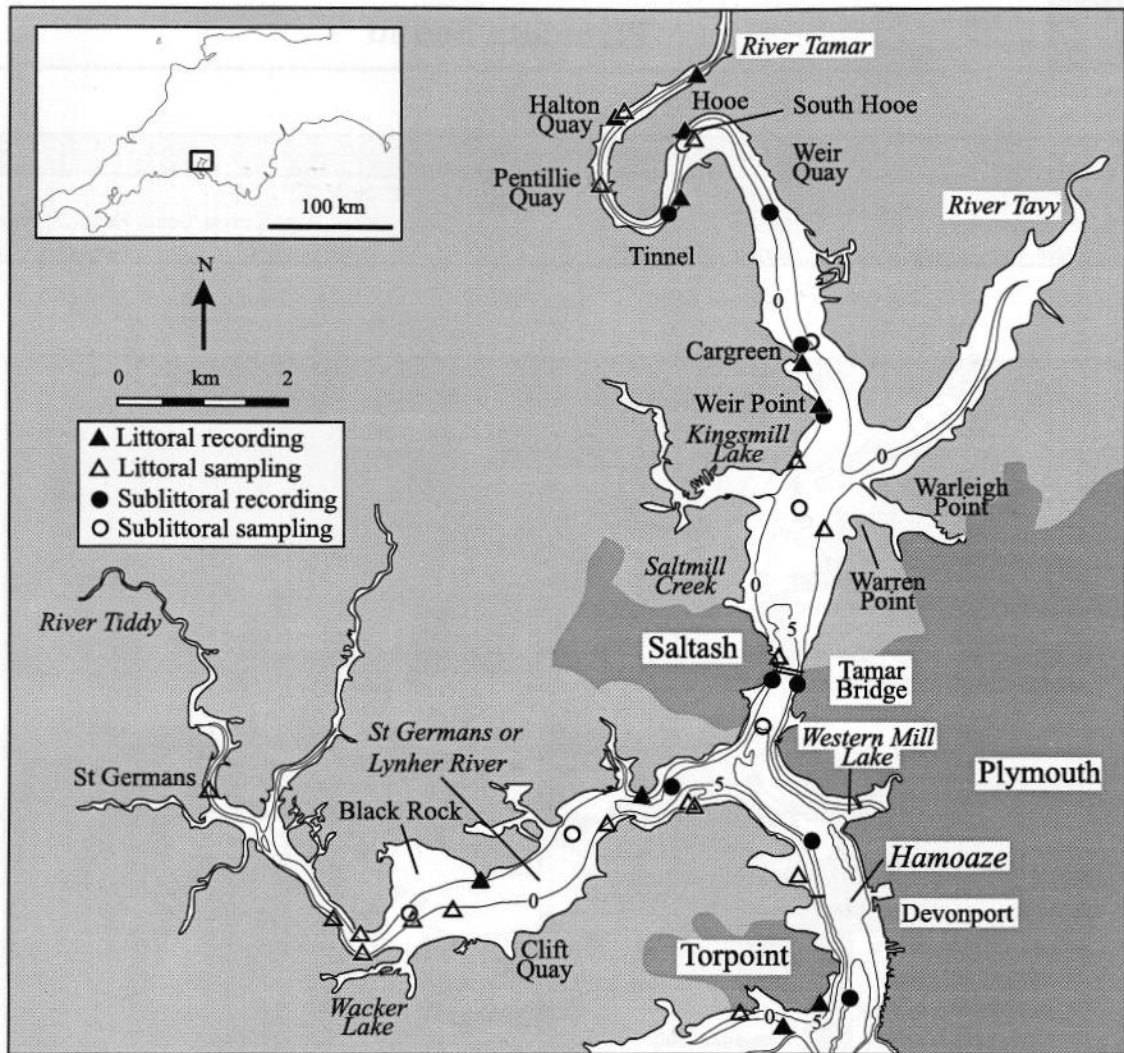


Figure 12.2 Main features of the area, and sites surveyed (upper inlet).

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Introduction

Plymouth Sound and its associated estuaries, on the south coast of Devon, comprise a complex of marine inlets (rias) of considerable biological and historical importance. Plymouth Sound, an open bay with an artificial breakwater at its entrance, is the final confluence of the River Tamar (and its tributaries, the Tavy and the Lynher) and the River Plym. The coastline of the Sound is steeply-sloping and rocky, especially to the east and west of the mouth. The coastlines of the associated estuaries are topographically more gentle and there are large expanses of intertidal mud overlying bedrock. Rocky outcrops are present, however, and steep rock slopes occur on some river bends. Underwater, a steep-sided channel winds a course through Plymouth Sound from the entrance to the Tamar and out past the breakwater, reaching depths of 40 m. Strong tidal streams are found at the narrow mouth of the Tamar and also between Drake's Island and the western side of Plymouth Sound. While the inner Sound is sheltered by a breakwater, the outer coast is subject to strong wave action from the prevailing south-westerly winds. Fully marine conditions are not reached in the Tamar until it enters Plymouth Sound and the northern area of the Sound is influenced by the substantial freshwater input from the Tamar. Water quality within the estuary is classified as grade A (highest quality) except for a small part of the upper Plym which is of grade B. The area is a nursery ground for Dover sole *Solea solea* and bass

Dicentrarchus labrax. The protected fish species, lampren *Lampetra fluviatilis*, sea lamprey *Petromyzon marinus*, allis shad *Alosa alosa* and twaite shad *Alosa fallax* (scheduled under the Wildlife and Countryside Act 1981) have all been recorded from Plymouth Sound and its estuaries.

The area has a long history of marine biological study both for research and education. The Marine Biological Association of the United Kingdom was established in Plymouth in 1884 and a considerable amount of literature published by the Association has been concerned with the flora and fauna of the area. The Institute of Marine Environmental Research was established at Plymouth in 1970 and the Tamar estuary in particular has been the focus of many studies undertaken by IMER and its successor institutes, the Plymouth Marine Laboratory and Centre for Coastal and Marine Science Plymouth. Staff and students from Plymouth Polytechnic (now the University of the South West) have also generated much information on Plymouth Sound and its estuaries.

The marine conservation importance of Plymouth Sound and its associated estuaries has been recognised in the inlet's status as a candidate Special Area of Conservation (cSAC). The range of habitats and communities reflect the changing salinity gradient from upper estuarine to open coast, across sediments and bedrock. Some habitats are particularly species-rich, for example limestone reefs, supporting many rock-boring organisms, and sublittoral sediments supporting diverse infaunal communities. Equally important, although relatively impoverished, are rock outcrops in the Tamar which have been colonised by the hydroid *Cordylophora caspia*. The presence of littoral rock in low-salinity regions so far up an estuary is unusual.

Marine biological surveys			
	<i>Survey methods</i>	<i>Date(s) of survey</i>	<i>Source</i>
Littoral	Recording	July 1996	Posford Duvivier Environment (1996)
	Recording	January-November 1992	Devon Wildlife Trust (1993)
	Recording	February 1992-November 1993	Devon Wildlife Trust (1993)
	Recording	July 1986	MNCR (unpublished data)
	Recording	April-May 1986	Hiscock & Moore (1986)
	Infaunal sampling (cores)	January-November 1992	Wilson (1992)
	Infaunal sampling (cores)	August 1992	NRA (1992)
	Infaunal sampling (cores)	November 1991	NRA (1992)
	Infaunal sampling (cores)	April-May 1986	Hiscock & Moore (1986)
Sublittoral	RoxAnn acoustic mapping	July 1996	Posford Duvivier Environment (1996)
	Recording	July 1996	Posford Duvivier Environment (1996)
	Recording	June-July 1993	Devon Wildlife Trust (1993)
	Recording	July 1986	Hiscock & Moore (1986)
	Infaunal sampling (Day grab)	July 1996	Posford Duvivier Environment (1996)
	Infaunal sampling (pipe dredge & suction sampling)	July 1986	Hiscock & Moore (1986)

Marine biology

Eight major biogeographical zones have been identified for the River Tamar and Plymouth Sound, on the basis of salinity, wave exposure and the communities and species found within them. These zones and their associated communities are described below. The River Plym is described separately.

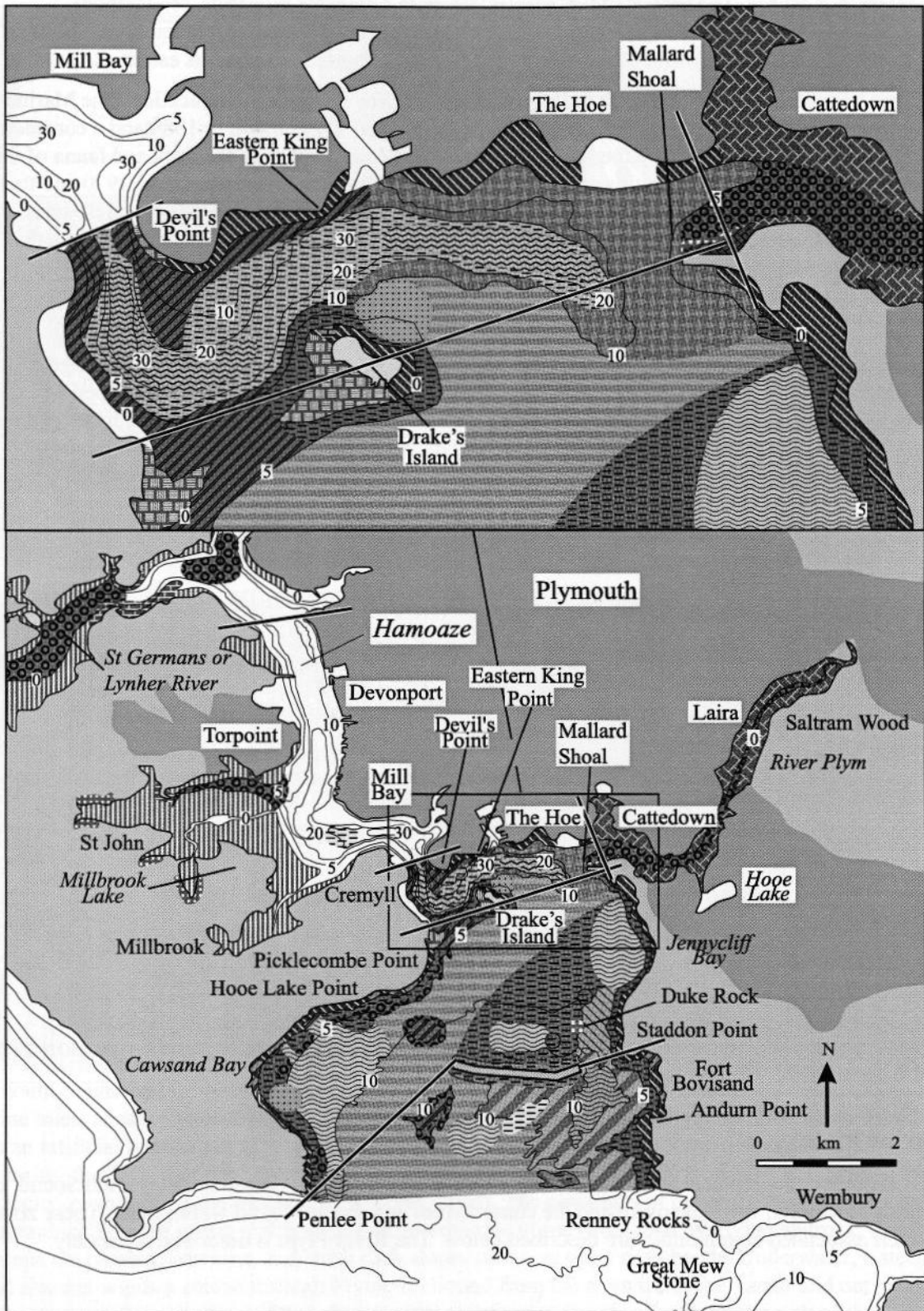


Figure 12.3 Indicative distribution of the main biotopes in the lower inlet (based on data from survey sites shown in Figure 12.1, cited literature and additional field observations) (Key to biotope symbols on next page).
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	Moderately exposed littoral rock with barnacles, fucoids and red algae (Pel; Fspi; BPat.Cht; FvesB; Fser.R; Him)		Moderately exposed infralittoral rock with <i>Laminaria ochroleuca</i> kelp forest and ephemeral red algae (Lhyp.Loeh; EphR)
	Tide-swept littoral rock with fucoids and barnacles (Asc.T; Fserr.T; Ldig.Ldig.Bo; Ldig.T)		Sand-scoured infralittoral rock and mobile substrata with kelp and scour-tolerant algae (Sac; XKScrR)
	Sheltered littoral rock with fucoids (BPat.Sem; Asc.Asc)		Moderately exposed infralittoral rock with kelp (Ldig.Ldig; Lhyp.Ft; Lhyp.Pk; XKScrR) and areas of mixed sediment (IMX; Ven; FaMx)
	Estuarine artificial hard and mixed substrata (Fspi; FvesX; Asc.VS; FserX; Fser.Fser.Bo)		Sublittoral mud with algae (Lsac.Cod)
	Estuarine littoral rock with fucoids (Pel; Fspi; Asc.VS; Fserr.VS)		Sublittoral gravel and sand with rock outcrops supporting sand-scoured kelp (FaS; Lhyp.Loeh; XKScrR)
	Littoral mixed substrata with <i>Mytilus edulis</i> beds (MytX)		Shallow sublittoral mud (MarMu) or muddy sand (AbrNucCor) with patches of kelp on hard substrata (Lsac.Ft; Lsac.Pk)
	Littoral sand (LGS; BarSnd; AEur; Lan)		Sheltered circalittoral tide-swept rock with sponges, hydroids and ascidians (CuSH; SNemAdia; Flu.Hocu) and muddy gravel (CMX)
	Estuarine littoral coarse sediments with oligochaetes (Ol)		Deep silty sublittoral rock with sponges and ascidians (SubSoAS) and mud (MarMu)
	Saltmarsh (Sm)		Sublittoral sand (FaS)
	Littoral sandy mud (SMu; HedMac; HedMac.Are; HedMac.Pyg; HedMac.Mare) and littoral soft mud (HedScr; HedStr)		Sublittoral sand and gravel (Sell; FaS; ScupHyd)
	Littoral soft mud (Mu; HedScr; HedStr; HedOl)		Sublittoral gravel and sand (Ven)
	Exposed shallow sublittoral rock with <i>Laminaria hyperborea</i> (LhypR.Ft; LhypR.Pk)		Shallow sublittoral sediment with <i>Zostera marina</i> beds (Zmar)
	Exposed infralittoral rock with kelp (Sac; LhypR.Ft; LhypR.Pk) and exposed sand-scoured rock and mobile substrata with kelp and scour-tolerant algae (Sac; XKScrR)		Sublittoral muddy sand with bivalves (FaMS; AbrNucCor)
	Moderately exposed infralittoral rock with kelp (Ldig.Ldig; Lhyp.Ft; Lhyp.Pk; XKScrR)		Sublittoral sandy mud (MarMu)
	Moderately exposed infralittoral rock with kelp-known isolated bedrock outcrops (Ldig.Ldig; Lhyp.Ft; Lhyp.Pk; EphR)		Sublittoral estuarine mud (EstMu; AphTub)
	Moderately exposed tide-swept infralittoral rock with kelp (Ldig.T; Lyp.TFt)		Biogeographical zones

Open coast (south of breakwater). This zone extends northwards from Renney Rocks to Staddon Point, on the eastern side of the Sound, and includes Penlee Point on the western side of the mouth. The coastline is exposed to the prevailing south-westerly winds, and the rocky shores, which dominate most of the Sound, hold typical wave-exposed open coast communities. The supralittoral or splash zone is dominated by lichens (YG; Ver.Ver), with occasional mobile species *Littorina saxatilis* generally associated with the much-creviced slate bedrock. The majority of the shore below the lichen fringe is dominated by a barnacle/limpet community with patches of black lichen *Lichina pygmaea* which typify these south-western shores (BPat). Gastropods, anemones and other fauna are also present among the barnacles. Brown, green and red algal communities are found throughout the eulittoral zone, reflecting varying local conditions. The barnacle zone gives way to thongweed *Himantalia elongata* or serrated wrack *Fucus serratus* with red algae on the lower shore (Him; Fser.R). The many overhangs and gullies support a diverse range of species including hydroids *Tubularia indivisa*, Devonshire cup-coral *Caryophyllia smithii*, sponges, bryozoans and ascidians. At

Andurn Point, on the eastern side of the Sound, slate ridges jut out to sea forming scoured surge gullies with mobile gravel, sand and cobbles at the base. The steep, broken bedrock gives rise to many rockpools on rugged ridged shores: high shore green algal-dominated pools, shallow pools with red algae *Corallina officinalis*, *Mesophyllum lichenoides* and *Ceramium nodulosum*, or shaded rockpools with kelp (G; Cor; FK). Sediment-influenced pools may contain japweed *Sargassum muticum* (SwSed). Rocky shores predominate on the west coast. On the east coast Bovisand Bay is the most extensive sandy bay. However, the clean sands contain very few species, the polychaete *Scolecopsis* spp. being the most abundant (BarSnd).

At the lower limit of the rocky shores kelp *Laminaria digitata* forms a band in the sublittoral fringe (Ldig.Ldig), sometimes mixed with *Laminaria saccharina* on more sheltered rock (Lsac.Ldig). In the shallow sublittoral, algal and animal communities typical of the open coast are present, with *Laminaria hyperborea* kelp forest (Lhyp.Ft; LhypR.Ft; Lhyp.Pk) and a wide variety of foliose red algae. Sponges, anemones, ascidians and echinoderms are present on steep wave-surfed rock (SCAs.ByH; CorMetAlc; AlcMaS). The highly-fissured outcrops of slate bedrock in deeper water, such as found at Panther Reef, Knapp Shoal and Tinker Shoal, are rich in ascidians and sponges, including the nationally rare sponge *Axinella damicornis*, and provide a habitat for many crevice-dwelling holothurians (*Pawsonia saxicola* and *Aslia lefevrei*) and the nationally rare brittlestar *Ophiopsila aranea*. High-sided gullies at Panther Reef support a diverse range of species on vertical rock (SCAs.ByH), with kelp on the tops of the gullies. Low shale reefs off the south side of the breakwater are also covered by *L. hyperborea* and dense stands of red algae (LhypR.Ft). Similarly, the vertical and overhanging edges of the reefs are covered by encrusting bryozoans, hydroids and ascidians, while frequent ophiuroid arms protrude from crevices (SCAs.ByH). The scoured base of the reefs support scour-resistant algae and kelp *Saccorhiza polyschides* (XKScrR). These reefs give way to broken shale and coarse and/or muddy sand overlying shale gravel with the anemone *Cerianthus lloydii*, bivalves *Abra* spp., *Moerella donacina*, *Dosinia exoleta* and *Tapes rhomboides* and polychaetes (FaMx; Ven). A tremendous variety of red algae exist on the broken shale including *Scinia trigona*, *Naccaria wiggii*, *Schmitzia neapolitana*, *Halarachnion ligulatum* and various filamentous brown algae (EphR).

Off Bovisand Bay, coarse shell sand supports a diverse community, dominated by the bivalves *Spisula elliptica*, *Dosinia lupinus*, *Gari tellinella*, *Glycera lapidum* and polychaetes *Pisione remota* and *Polygordius lacteus* (Sell); this is the only site within Plymouth Sound where these species are known to occur.

Sheltered bay (Central Sound, north of breakwater, including Cawsand Bay). The central part of Plymouth Sound, between the breakwater and Drake's Island, is a sheltered bay affected by increased turbidity and, rarely, by slightly reduced salinity. These arise as a result of the outflow from the rivers flowing into the Sound. Rocky shores are mainly of gradually-sloping broken bedrock with some boulders (Pel; Fspi; BPat; Fser.Fser.Bo; Ldig.Ldig.Bo). The abundant pools (Cor; FK) and overhangs (SR; SByAs) are colonised by rich communities of plants and animals including normally sublittoral species such as the jewel anemone *Corynactis viridis*. The sandy shores are generally species-poor (BarSnd; AEur).

The sublittoral predominantly consists of sediments. Sandy mud supports an abundant infauna of bivalves, polychaetes and amphipods (MarMu) dominated by the tellinid *Abra alba*. The shelter afforded by the breakwater allows mud to accumulate behind it on the north side. These soft mud plains are burrowed by the angular crab *Goneplax rhomboides* and the anemone *Edwardsia claparedii*, brittlestars *Ophiura* sp.; the opisthobranch mollusc *Philine aperta* and seapen *Virgularia mirabilis* are also evident (SpMeg; AbrNucCor). The infauna is characterised by high numbers of the polychaetes *Melinna palmata*, *Scalibregma inflatum*, *Magelona alleni*, *Nephtys hombergii* and *Cerebratulus* sp. Sandier mud at Jennycliff Bay also contains high numbers of the ampharetid polychaete *M. palmata* with lesser densities of the polychaetes *Euchymene oerstedii* and *Clymenura clypeata* and the bivalves *Chamelea gallina*, *A. alba*, *Nucula nitidosa* and *Thyasira flexuosa* (AbrNucCor). The muddy sand in Cawsand Bay supports both a high biomass and a species-rich infauna. *Scoloplos armiger* and *Chaetozone setosa* dominate the polychaete fauna, with *Magelona filiformis*, *Sthenelais limicola* and *S. inflatum* frequent. *C. gallina*, *Nucula nitidosa* and *Phaxas pellucidus* are the most abundant

bivalves. *Ampelisca brevicornis*, *Synchelidium maculatum*, *Perioculodes longimanus*, *Tanaopsis graciloides* and *Eudorella truncatula* are the dominant crustaceans. (AbrNucCor). Small beds of eelgrass *Zostera marina* (Zmar) are also present in Cawsand Bay. Off Picklecombe Point, further north on the west side of the Sound, occasional boulders among gravel and pebbles provide attachment for algae (EphR; LsacX; Lhyp.Pk). Sublittoral hard substratum communities are not particularly well-developed in this zone and generally show a reduction in species diversity compared to the open coast (for example *Echinus esculentus* is absent) (LhypLsac.Ft; Lhyp.Pk). A long slate ridge stretching across the Sound south-west from Drake's Island is poorly-colonised; boulders with associated bryozoan crusts and ascidians (Fser.Fser.Bo; Ldig.Ldig.Bo) extend from the shore in to the sublittoral. Areas of tide-swept mixed cobbles, pebbles and boulders with dense red algal populations are also present in the channels around Drake's Island (EphR). To the south-east, at Duke Rock, tide-swept cobbles and pebbles supporting ephemeral red seaweeds (*Scinia trigona*, *Stenogramme interrupta*, *Rhodomela confervoides*, *Acrosorium venulosum* and *Polyneura bonnemaisonii*) form open 'glades' between the bedrock outcrops (EphR). The south-western species of kelp *Laminaria ochroleuca* covers the tops of the bedrock ridges, with bryozoans, ascidians and particularly abundant sponge *Ulosa digitata* on the rock beneath (K. Northen, pers. obs.) (Lhyp.Loeh). To the west of Cawsand Bay, shallow slate bedrock abuts with sand extending from the lower shore and from the east in deeper water. Scoured kelp communities are found here with *Ahnfeltia plicata*, unusually large amounts of the ascidian *Distomus variolosus* and the anemone *Urticina felina* (XKScrR).

Outer estuarine (northern Sound). Conditions between Drake's Island and the mouths of the Rivers Tamar and Plym can be very turbid and surface salinity may fall below 30‰. The littoral and shallow sublittoral areas are colonised by a high proportion of open coast species, including the kelps *L. digitata* and *L. hyperborea* together with *L. ochroleuca* (Lhyp.Loeh; LhypLsac). The steep limestone bedrock shores continue to be dominated by limpets *Patella vulgata* and barnacles (BPat), within which *Chthamalus montagui* is less dense compared with the open coast. The communities present in the rockpools and on lower shore overhanging rock include a large variety of species (Cor; FK; SR; SByAs). These steep limestone rock surfaces continue into the sublittoral to form the sides of the deep channel. Shallow rock in the narrows is covered by a dense canopy of kelp *L. saccharina* (Lsac.T) or *L. digitata* in places (Ldig.T). The steeply-sloping rock below, extending from the narrows to Eastern King Point, supports some interesting communities. The limestone encourages the presence of rock-boring bivalves and worms, characteristically including the polychaete *Myxicola aesthetica*, the piddock *Hiatella arctica* and the spionid *Polydora* spp. (Ldig.Pid). The featherstar *Antedon bifida* and the sponges *Suberites ficus* and *Haliclona oculata* are characteristic of the tide-swept nature of this habitat and the animal communities are both diverse and abundant. Dense aggregations of ascidians *Dendrodoa grossularia* thrive in these very strong tidal streams, dominating the steep rock-faces with a wide variety of hydroids including *Nemertesia* spp. Similar communities are found off Eastern King Point with abundant *D. variolosus*, *A. bifida* and often dense patches of the anemones *Sagartia elegans* and *Metridium senile* (?CuSH; SNemAdia; Flu.Hocu). As depth increases, sloping bedrock eventually gives way to extensive patches of muddy or clean shell gravel between flat-topped ridges of limestone (CMX). Rock continues to be dominated by rock-boring organisms, particularly *Polydora* sp. Other species on the silted rock include anemones *Sagartia troglodytes* and *Actinothoe sphyrodeta*, hydroids and sponges *S. ficus* and *Hymeniacion perleve* with high numbers of *H. arctica* and *A. bifida* on the vertical rock with *M. senile* favouring the ridge tops (SubSoAs). This deep silted rock that emerges from the mixed sediment and mud at the base of the channel extends towards Mount Batten breakwater. No infaunal data exists for the deep mud in the channel (MarMu). Shallower sediments, west of Mallard Shoal support many anemones *Edwardsia claparedii* and *S. troglodytes* with an infaunal population of the bivalves *Corbula gibba* and *A. alba* and the polychaete *M. palmata* (AbrNucCor). The concrete supports of the Mallard Shoal beacon and natural limestone outcrops support *L. saccharina* (Lsac.Ft; Lsac.Pk), while the concrete breakwater supports and bedrock exposures at the base of Mount Batten breakwater have been colonised by *L. saccharina* and *L. ochroleuca* (Lhyp.Loeh).

A sublittoral area of muddy sand on the north side of Drake's Island, and on the opposite bank near Eastern King Point, is colonised by beds of the eelgrass *Zostera marina* (Zmar) which thin out towards the edge of the channel slope.

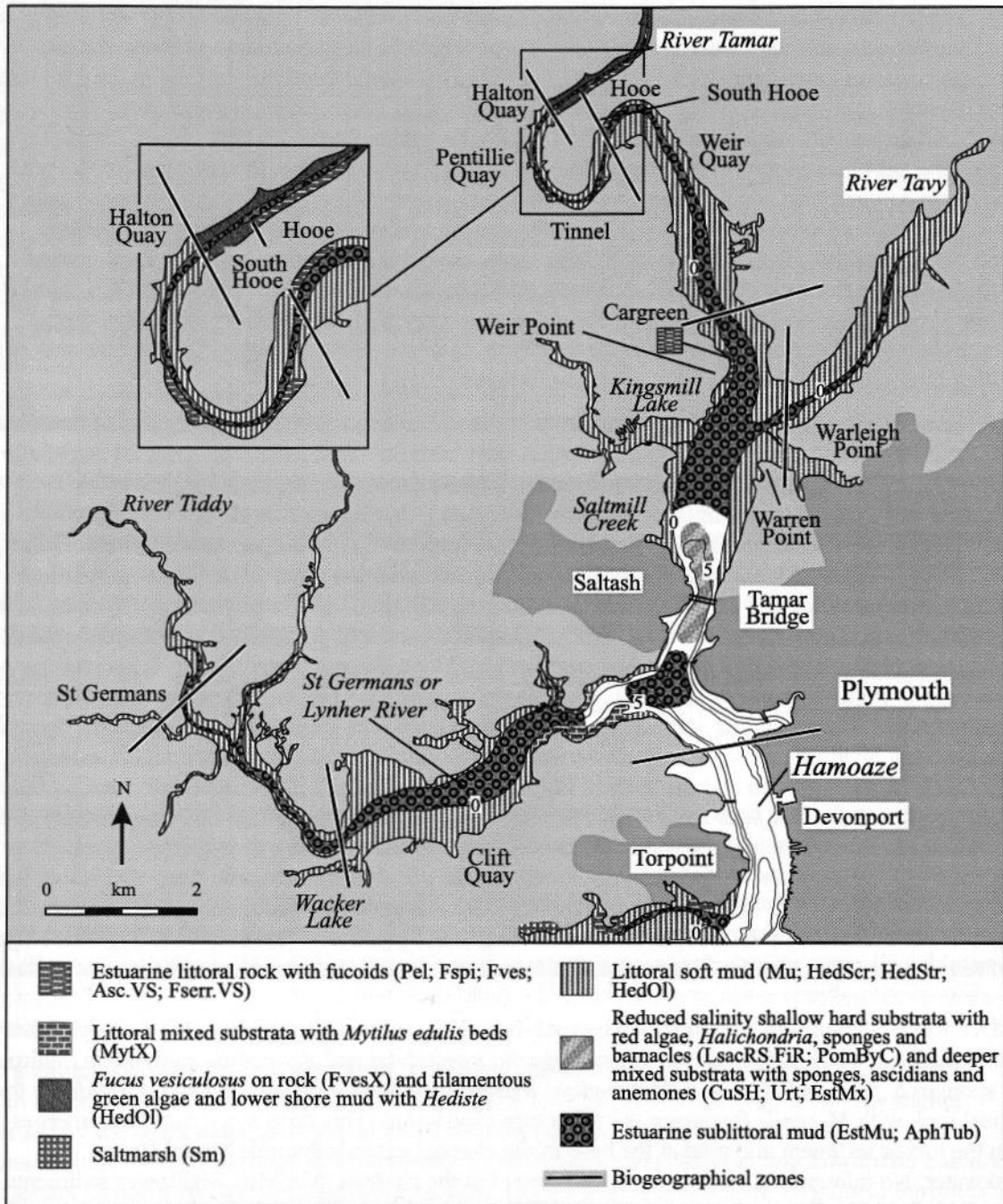


Figure 12.4 Indicative distribution of the main biotopes in the upper inlet (based on data from survey sites shown in Figure 12.2, cited literature and additional field observations).

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Lower estuarine. This zone extends up the Tamar from Devil's Point to south of the entrance to the River Lynher and includes the embayment of St John's Lake. Salinity is usually between 20 and 30‰. The variety of algae and animals is greatly reduced. The limpet *Patella vulgata* still occurs on the shores along with the barnacles *Semibalanus balanoides* and a high abundance of *Elminius modestus*. Furoid algae are generally dominant (Fspi; Asc.VS; Fserr.VS) on rocky substrata. A few typically estuarine littoral species, notably the hydroid *Clava squamata* and the bryozoan *Bowerbankia imbricata* are present. Sediment shores are colonised by a comparatively rich variety of species (polychaetes *Nephtys hombergii*, *Pygospio elegans*, *Streblospio shrubsolii*, *Cirratulus* spp., *Manayunkia aestuarina*, oligochaetes *Tubificoides* spp. and bivalves *Cerastoderma edule* and *Scrobicularia plana*) with small numbers of ragworm *Hediste diversicolor* (HedScr; HedStr). Filamentous algae are abundant in this zone although there are a few foliose red algae. Sublittoral rock communities are typical of sheltered estuarine areas. Kelp is absent and predominantly filamentous algae, including *Erythroglossum laciniatum* and *Hypoglossum hypoglossoides*, extend no deeper than about one metre below chart datum (LsacRS.FiR). The breadcrumb sponge *Halichondria panicea* dominates animal communities with a high abundance of the barnacle *Balanus crenatus* (CuSH; PomByC).

Central estuarine. This zone extends from the confluence of the River Lynher with the Tamar, upstream as far as Cargreen and someway along the Lynher. Shores continue to be dominated by furoid algae (Asc.VS; AscX; FvesX). *Patella* spp. are absent and barnacle populations are dominated by *E. modestus* on the upper shore and *B. crenatus* on the lower shore, with some *S. balanoides* present. *Chthamalus stellatus* is found as far upstream as Saltash Bridges. Cargreen marks the northern limit of many species including the algae *F. serratus* and *Polysiphonia lanosa*, and the hydroids *Dynamena pumila*, *Clava multicornis* and *C. squamata*. On the mudflats, the typically estuarine polychaetes *N. hombergii* and *H. diversicolor* and bivalve *S. plana* are common (HedScr; HedStr). Sublittoral rocks are dominated by *Halichondria panicea* and *B. crenatus*, with abundant shore crabs *Carcinus maenas* (CuSH; PomByC). Deeper than approximately 5 m below chart datum the most conspicuous species are bryozoans (*Bowerbankia pustulosa*) and several species of anemone including *M. senile* and *Sagartiogeton undatus*. In the tide-swept channels, the shores are colonised by typically estuarine species including the bryozoan *Conopeum reticulum* and the nationally rare hydroid *Hartlaubella gelatinosa* (HarCon). The common shrimp *Crangon crangon* is present in large numbers. Sublittoral sediments (AphTub) are dominated by those species found on the mudflats: the polychaete *Tharyx* sp., other polychaete and oligochaete worms and species more typical of the central and northern sound.

Upper estuarine. This zone extends from Cargreen to South Hooe. Salinity may be as low as 5‰. The shore communities are impoverished with liquid mud occurring among dense *Fucus vesiculosus* and *Ascophyllum nodosum* on rock (Asc.VS; Fserr.VS). This zone marks the upstream limit of littoral mudflats; the fauna of these areas is sparse, comprising predominantly polychaete worms (including the capitellid *Tharyx* sp.) (HedScr; HedStr). The cockle *Cerastoderma edule* and the burrowing amphipod *Corophium* sp. are present in small numbers. The sublittoral community is a similar but reduced form of that of the central estuarine zone: mud with gravel and debris supports an impoverished community of polychaetes *H. diversicolor*, *Tharyx* sp. and oligochaetes (AphTub), whilst the estuarine hydroid *H. gelatinosa* forms clumps on hard substrata (HarCon).

Riverine - estuarine transition. Between South Hooe and Halton Quay, the river narrows and there is a region of rapid and obvious change. Salinity may drop to zero ‰. Furoid algae continue to dominate the shores (Asc.VS); however, only *F. vesiculosus* is present at Pentillie Quay (FvesX). Barnacles may still be found (*E. modestus* and *B. crenatus*) on hard substrata in channels; *Balanus improvisus* once occurred here (K. Hiscock pers. comm.). The hydroid *Cordylophora lacustris* occurs on the lower shore and dominates shallow sublittoral rocks. *S. plana* and *H. diversicolor* are present in the muddy sediment shores (HedScr). At the northern limit of this zone, the reed *Phragmites* sp. appears, fringing the shore.

Riverine. *B. improvisus*, *E. modestus* and *C. reticulum* reach their upstream limits just north of Halton Quay. *Fucus vesiculosus* continues as far upstream as Cotehele Quay, 2.5 km north of Halton (FvesX).

Other estuarine species (for example *C. crangon*, *H. diversicolor* and *C. maenas*) may continue as far upstream as Calstock, a further 1 km north-east of Cotehele (HedScr; HedOl).

Plym. The River Plym is dominated by sediments with large expanses of littoral sandy mud above Laira Bridge, derived in part from china clay waste. The Cattewater is fringed by wharves and in places by muddy shores backed by walls, with some muddy shingle. Hard substrata in this area hold similar, but less species-rich, communities to those on sheltered limestone bedrock of the lower Tamar and the River Lynher (lower and central estuarine zones) (Fspi; FvesX; Fser.Fser.Bo). Shore crabs and amphipods are particularly abundant in these areas. Hydroids and bryozoans are frequent at Oreston Spit, reflecting the greater shelter and more variable salinity further upstream. In the muddy sediments downstream of the Laira Bridge, *Hediste diversicolor* is ubiquitous, as are *Tharyx* sp. and *Nephtys hombergii* (HedMac). Other polychaete and oligochaete worms are abundant and the cockle *Cerastoderma edule* is occasionally found.

Upstream of the Laira Bridge, the sediments have a high china clay content. *H. diversicolor* is ubiquitous and *Scrobicularia plana* is locally abundant, particularly on the mudflats off Saltram Wood (HedScr; HedStr). Other polychaete and oligochaete worms are present, including the spionid *Streblospio shrubsolii*. The clam *Mya arenaria* is also found in these muddy sediments (HedMac.Are).

Nature conservation

Conservation sites			
Site name	Position	Status	Main features
Plymouth Sound and Estuaries	SX475505	cSAC	Shore dock <i>Rumex rupestris</i> ; estuaries, large shallow inlets and bays; sandbanks which are slightly covered by seawater all the time.
Tamar estuaries complex	SX4361	SPA	Ornithological importance (avocet and little egret)
Plymouth Sound, Tamar, Yealm & Eddystone	SX418481- SX524468	SMA	Marine biological
Tamar Valley	N/A	AONB	High scenic quality
Bovisand Bay	SX490496	SSSI/GCR	Geological
Jennycliff Bay	SX489515	SSSI/GCR	Geological
Wembury Point	SX500483	SSSI	Biological
Richmond Walk	SX460543	SSSI/GCR	Geological
Western King	SX462533	SSSI/GCR	Biological, geological
Mount Wise	SX456541	SSSI/GCR	Geological
Warleigh Point	SX448610	SSSI	
Tavy-Tamar-estuary	SX436711	SSSI/NCR	Biological
Lynher estuary	SX375565	SSSI/NCR	Biological
St John's Lake	SX430540	SSSI/NCR	Biological
Rame Head & Whitesand Bay	SX367537	SSSI	
Warleigh Point Wood	SX447610	DWT	Clifftop woodland
Hangingcliffe Wood	SX427655	DWT	Clifftop woodland
Tamar Estuary Cargreen	SX432630	CWT	Estuary
Wembury Bay and Yealm Estuary(North and South Banks)	SX530480	NT	Foreshore, woodland, cliff, beach and farmland
Saltram House	SX520557	NT	Parkland, farmland and woodland
Erth Barton & Erth Island	SX385565	NT	Saltings, foreshore and farmland
Mount Edgumbe	SX408511- SX455533	CP	
Wembury	N/A	VMCA/VMNR	Seabed from Gara Point to Fort Bovisand

Human influences

The eastern shore of the lower estuary is dominated by the city of Plymouth and Devonport dockyard. Ship and boat-building yards are present at the Royal Navy Dock, Lynher, Calstock, Plym and Mountbatten. There is a naval base opposite St John's Lake and the whole area is a military port with naval exercises and ship movement throughout.

Salmon netting and eel fyke-netting occur in the Tamar, Tavy and Lynher rivers and lower estuary. In the latter area, lobster *Homarus Gammarus* and crab *Cancer pagurus* potting is carried out. Mussels *Mytilus edulis*, cockles *Cerastoderma edule* and native oyster *Ostrea edulis* have been collected in the Lynher and Tamar (although these activities may cease periodically due to reduced water quality). Extensive laying of tiles for 'peeler' crabs *Carcinus maenas* occurs in the Plym. Bait-digging and collecting occurs throughout the lower inlets. The inlet is an important bass *Dicentrarchus labrax* nursery area and is subject to a year round closed season. Atlantic salmon *Salmo salar* and sea trout *Salmo trutta* migrate to the inlet to spawn in the Lynher, Tamar and Plym rivers. These salmonids are protected by Net Limitation Orders which restrict the number of nets used in the Lynher and Tamar.

Leisure activities include power boating, sailing, water-skiing, windsurfing, angling and canoeing, the latter mainly confined to the upper reaches of the inlet. In the lower reaches, scuba diving, snorkelling and beach recreation are popular. Seven marinas provide berthing for approximately 2,000 craft and there are 27 boat-yards. Additional single moorings bring the total number of boats in the inlet to approximately 4,000.

References and further reading

- Devon Wildlife Trust 1993. *Marine Survey Report. Plymouth Sound and Approaches, 1993*. A report on a survey carried out by Devon Wildlife Trust in co-operation with South West Water.
- Hiscock, K., & Moore, J. 1986. Surveys of harbours, rias and estuaries in southern Britain: Plymouth area including the Yealm. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke.) *Nature Conservancy Council, CSD Report, No. 752*. (FSC Report, No. FSC/OPRU/36/86.)
- National Rivers Authority South West Region. 1992. *NRA South-west Region estuary data 1990 to 1992*. Unpublished, National Rivers Authority South-west Region.
- Posford Duvivier Environment. 1997. Broad scale biological mapping of Plymouth Sound and estuaries 1997. *English Nature Research Report, No. 208*.
- Powell, H.T., Holme, N.A., Knight, S.J.T., & Harvey, R. 1978. Survey of the littoral zone of the coast of Great Britain: Report of the shores of Devon and Cornwall. (Contractor: Scottish Marine Biological Association/Marine Biological Association Intertidal Survey Unit.) *Nature Conservancy Council, CSD Report, No. 209*.
- Wilson, S.J. 1992. *HND conservation management industrial placement 1992*. Unpublished report to Devon Wildlife Trust.

Sites surveyed

- Survey 14: 1991 NRA SW Region littoral survey of the Yealm estuary (unpublished data).
- Survey 242: 1986 HRE survey of Plymouth Harbour and the Yealm estuary (Hiscock & Moore 1986).
- Survey 306: 1992-94 Devon Wildlife Trust littoral survey of Plymouth (Devon Wildlife Trust 1993).
- Survey 336: 1993-96 Devon Wildlife Trust Seasearch survey of Plymouth (unpublished data).
- Survey 439: 1990 NRA SW Region littoral survey of the Plym estuary (NRA 1992).
- Survey 440: 1992 NRA SW Region littoral survey of the Tamar estuary (NRA 1992).
- Survey 484: 1993 MNCR training week - Plymouth (MNCR, unpublished data).
- Survey 611: 1992 Devon Wildlife Trust littoral survey of the Plym estuary (unpublished data).

Littoral sites (listed north to south)					
<i>Survey</i>	<i>Site</i>	<i>Place</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotores present</i>
14	1	Cotehele Quay, River Tamar.	SX 424 681	50°29.4'N 04°13.3'W	FvesX
242	32	N Hooe, Plymouth estuaries.	SX 425 661	50°28.3'N 04°13.1'W	Fves, HedOl
440	1	Halton Quay, Tamar estuary.	SX 415 656	50°28.0'N 04°14.0'W	HedOl
14	2	Halton Quay, River Tamar.	SX 414 655	50°28.0'N 04°14.1'W	FvesX
242	30	S Hooe, Plymouth estuaries.	SX 421 653	50°27.9'N 04°13.5'W	Pel, Fspi, Fves, Asc.VS
242	29	Opposite S Hooe, Plymouth estuaries.	SX 423 652	50°27.8'N 04°13.3'W	HedMac, HedStr
242	24	S of Pentillie Quay, Plymouth estuaries.	SX 412 644	50°27.4'N 04°14.2'W	Fves, Mu
242	31	N of Tinnel, Plymouth estuaries.	SX 421 643	50°27.4'N 04°13.4'W	Asc.VS
242	28	Cargreen Quay, Plymouth estuaries.	SX 436 626	50°26.5'N 04°12.1'W	Fves, Fser.Fser, BLlit, Asc.VS
242	27	Weir Point, Plymouth estuaries.	SX 438 618	50°26.0'N 04°11.9'W	YG, Ver.Ver, Pel, Fspi, Asc.VS
242	25	Neal Point W Shore, Plymouth estuaries.	SX 436 613	50°25.8'N 04°12.1'W	HedStr
440	2	Below Warren Point, Tamar estuary.	SX 439 603	50°25.2'N 04°11.8'W	HedStr
242	26	W shore below Tamar Bridge, Plymouth estuaries.	SX 433 588	50°24.4'N 04°12.3'W	BPat.Sem, Fves, Fserr.VS, FserX
242	1	St Germans Quay, Plymouth estuaries.	SX 364 572	50°23.4'N 04°18.1'W	Fves, HedOl
242	15	W of Passage Point, Plymouth estuaries.	SX 418 572	50°23.5'N 04°13.5'W	YG, Ver.Ver, Pel, Asc.VS, Fserr.VS, MytX
242	16	Mussel bed S of Beggars Island, Plymouth estuaries.	SX 424 571	50°23.5'N 04°13.0'W	MytX
242	17	Muddy shore adjacent to site 16, Plymouth estuaries.	SX 425 571	50°23.5'N 04°12.9'W	HedOl
242	18	Mussel bed near Jupiter Point, Plymouth estuaries.	SX 413 569	50°23.3'N 04°13.9'W	MytX
439	1	N Saltram Wood, Plym estuary.	SX 517 562	50°23.1'N 04°05.1'W	HedStr
440	3	Opposite Devonport Naval Docks, Tamar estuary.	SX 437 562	50°23.0'N 04°11.9'W	HedStr
242	2	Black Rock, Plymouth estuaries.	SX 398 561	50°22.9'N 04°15.2'W	YG, Ver.Ver, Pel, Fspi, Asc.VS
611	1	Upper Laira, The Laira.	SX 516 561	50°23.1'N 04°05.2'W	HedMac.Mare, HedOl
611	10	Middle Laira, The Laira.	SX 514 559	50°23.0'N 04°05.4'W	HedMac.Mare, HedOl
242	19	Opposite Black Rock, Plymouth estuaries.	SX 395 558	50°22.7'N 04°15.4'W	HedStr
242	39	N Saltram Wood, N bank of River Plym, Plymouth estuaries.	SX 515 558	50°22.9'N 04°05.3'W	HedScr
611	9	Lower Laira, The Laira.	SX 511 558	50°22.9'N 04°05.6'W	HedMac.Mare, HedOl
242	20	Sandbank near Wacker Lake Buoy, Plymouth estuaries.	SX 392 557	50°22.7'N 04°15.7'W	HedStr
242	38	Saltram Wood, S side R. Plym, Laira, Plymouth estuaries.	SX 511 557	50°22.9'N 04°05.6'W	HedScr
611	8	Laira Junction.	SX 508 557	50°22.9'N 04°05.9'W	HedMac.Are, HedOl
611	2	Saltram Wood, Saltram Point.	SX 512 557	50°22.9'N 04°05.5'W	HedMac.Mare, HedOl
242	23	Opposite Erth Hill, Plymouth estuaries.	SX 380 556	50°22.6'N 04°16.7'W	Asc.VS, HedOl
439	2	S Saltram Wood, Plym estuary.	SX 507 555	50°22.7'N 04°06.0'W	HedStr
242	22	Redshank Point, Plymouth estuaries.	SX 385 554	50°22.5'N 04°16.2'W	Ol
611	3	Saltram Point.	SX 507 554	50°22.7'N 04°06.0'W	HedMac.Mare, HedScr, HedOl
242	21	Opposite Redshank Point, Plymouth estuaries.	SX 385 552	50°22.4'N 04°16.2'W	HedOl
242	37	Point Quay, Arnold's Point, Laira, Plymouth estuaries.	SX 504 552	50°22.6'N 04°06.2'W	HedOl
611	7	Point Quay, Below Arnold's Point.	SX 504 551	50°22.5'N 04°06.2'W	HedOl
611	4	Quay, Below Arnold's Point.	SX 506 551	50°22.5'N 04°06.0'W	HedMac.Mare, HedOl
611	6	NW Laira Bridge, Below Arnold's Point.	SX 502 547	50°22.3'N 04°06.4'W	HedScr, HedOl
439	3	Laira Bridge, Plym estuary.	SX 503 546	50°22.2'N 04°06.3'W	HedStr
242	33	Torpoint, Plymouth estuaries.	SX 439 545	50°22.1'N 04°11.7'W	Pel, Fspi, Asc.VS, Fser.Fser, FserX

Littoral sites (listed north to south) continued

Survey	Site	Place	Grid reference	Latitude/longitude	Biotores present
242	14	St John's Lake, landing stage, Plymouth estuaries.	SX 432 545	50°22.1'N 04°12.3'W	Fser.Fser
242	35	Sandbank opposite Blagdon's Boatyard, Laura, Plymouth estuaries.	SX 503 545	50°22.2'N 04°06.3'W	HedStr
242	36	Sandbank near Blue Circle sluice, Laura, Plymouth estuaries.	SX 504 545	50°22.2'N 04°06.2'W	HedStr
611	5	NE Laura Bridge, Below Arnold's Point.	SX 504 545	50°22.2'N 04°06.2'W	HedMac.Mare, HedOl
242	12	St John's Lake, mussel bed, Plymouth estuaries.	SX 436 542	50°21.9'N 04°11.9'W	MytX, HedMac, AphTub
242	13	St John's Lake, Upper Reaches, Plymouth estuaries.	SX 422 541	50°21.9'N 04°13.1'W	HedScr, HedStr
306	15	Queen Anne's Battery, Queen Anne's Battery to Devil's Point.	SX 485 540	50°21.9'N 04°07.8'W	YG, Ent, Asc.Asc, Fser.Fser.Bo
242	40	E Tinside (men's bathing area), Plymouth estuaries.	SX 479 537	50°21.7'N 04°08.3'W	YG, Ver.Ver, BPat.Cht, Him, Fser.Pid, Fserr.VS, Cor, FK, SByAs
306	1	Plymouth Hoe Seafront, Queen Anne's Battery to Devil's Point.	SX 477 537	50°21.7'N 04°08.4'W	Pel, Fspi, BPat, Him, Fser.R, Rkp, XKScrR
306	22	MBA Beach, Queen Anne's Battery to Devil's Point.	SX 479 537	50°21.7'N 04°08.2'W	Ov, SR
306	2	Plymouth Hoe - W Hoe Pier, Queen Anne's Battery to Devil's Point.	SX 474 537	50°21.7'N 04°08.7'W	YG, Ver, Pel, Fspi, Fves, Him, Lsac.Ldig
242	41	W Hoe (Millbay Pier-RWYC), Plymouth estuaries.	SX 472 536	50°21.7'N 04°08.9'W	Pel, Fspi, BPat, BPat.Lic, Him, Cor, SR
242	63	Tinside Swimming Pool, Plymouth estuaries.	SX 478 536	50°21.7'N 04°08.4'W	Him, SR
242	34	Cockle Bank, Cattedown, Plymouth estuaries.	SX 497 536	50°21.7'N 04°06.8'W	Asc.Asc, MacArc, HedScr, HedStr, HedOl, AphTub
306	3	Plymouth Hoe - W Hoe, Queen Anne's Battery to Devil's Point.	SX 473 536	50°21.7'N 04°08.8'W	Him, Fser.Fser.Bo, Cor, XKScrR
242	8	Cremyll W, Plymouth estuaries.	SX 451 535	50°21.6'N 04°10.6'W	YG, Ver.Ver, Pel, Fspi, Asc.Asc, Fser.Fser, FK, SR, HedOl
306	25	Firestone Bay (E), Queen Anne's Battery to Devil's Point.	SX 464 534	50°21.6'N 04°09.5'W	YG, Ver.Ver, Pel, Fspi, AscX, Him, Fser.Pid
306	13	Firestone Bay, northern narrows, Queen Anne's Battery to Devil's Point.	SX 463 534	50°21.5'N 04°09.6'W	Him, Fser.Fser.Bo, Sac
242	45	W of Clovelly Bay slip, Plymouth estuaries.	SX 489 533	50°21.5'N 04°07.4'W	Fspi, FvesX, Asc.VS, Fser.Fser.Bo, FserX
242	47	Oreston Spit, Plymouth estuaries.	SX 498 533	50°21.5'N 04°06.7'W	FvesX, Fserr.VS, FserX
242	54	Devil's Point, Plymouth estuaries.	SX 460 533	50°21.5'N 04°09.9'W	BPat, BPat.Lic, Fser.R, Fser.Fser, Ldig.Ldig, Lsac.Ldig
242	4	Cremyll Bay, Plymouth estuaries.	SX 455 533	50°21.5'N 04°10.3'W	FserX, Lan
306	19	Wilderness Point, Devil's Point to Penlee Point.	SX 457 533	50°21.5'N 04°10.1'W	Ver.Ver, Pel, Asc.T, Fserr.T, Fser.Pid, Rkp, Ldig.Ldig.Bo
306	12	Devil's Point, northern narrows, Queen Anne's Battery to Devil's Point.	SX 461 533	50°21.5'N 04°09.8'W	YG, Ver.Ver, Him, Fser.Fser, Fser.Fser.Bo, Sac
242	3	Wilderness Point, Plymouth estuaries.	SX 456 532	50°21.4'N 04°10.2'W	Ver.Ver, Pel, BPat, XR, Asc.VS, Fser.Fser, Cor, G, FK, SR, SByAs, Lsac.Ldig
439	4	Cattedown (Cockle Bank), Plym estuary.	SX 498 532	50°21.5'N 04°06.7'W	HedStr

Littoral sites (listed north to south) continued					
<i>Survey</i>	<i>Site</i>	<i>Place</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotores present</i>
242	44	Clovelly Bay slip Cattewater, Plymouth estuaries.	SX 489 532	50°21.5'N 04°07.4'W	FvesX, HedMac.Pyg, HedOl, AphTub
242	49	Opposite Empacombe Quay Millbrook Lake, Plymouth estuaries.	SX 444 532	50°21.4'N 04°11.2'W	Mu
242	11	Drake's Island North Bay, Plymouth estuaries.	SX 467 529	50°21.3'N 04°09.3'W	BPat, Him, Fser.Fser.Bo, SByAs, Lsac.Ldig, Ol
242	50	Southdown Quay Wall, Plymouth estuaries.	SX 439 528	50°21.2'N 04°11.6'W	Fser.Fser, SByAs
306	18	Batten Bay, Renney Point to Mount Batten Breakwater.	SX 487 528	50°21.3'N 04°07.6'W	Him, FK, Fser.Fser.Bo, SByAs
242	53	S Drake's Island, Plymouth estuaries.	SX 468 527	50°21.2'N 04°09.2'W	BPat, Him, Fser.R, FK, SR, Ldig.Ldig, XKScrR
242	51	Millbrook Lake Hamoaze, Plymouth estuaries.	SX 438 524	50°21.0'N 04°11.7'W	HedStr
242	46	Jennycliff Bay, Plymouth estuaries.	SX 491 522	50°20.9'N 04°07.2'W	YG, Ver.Ver, PelB, Fspi, FvesB, Him, Fser.R, Fser.Fser, Rkp, Cor, FK, SR, Ldig.Ldig
306	11	The Bridge, Devil's Point to Penlee Point.	SX 460 522	50°20.9'N 04°09.8'W	FvesX, Fser.Fser.Bo, Ldig.Ldig, Bo, Lhyp.TFt
242	52	E of Foss Point Millbrook Lake, Plymouth estuaries.	SX 434 521	50°20.8'N 04°12.0'W	HedStr
306	5	Picklecombe Point, Devil's Point to Penlee Point.	SX 457 516	50°20.6'N 04°10.1'W	BPat.Sem, EntPor, Fser.Fser.Bo, G
306	23	N of Ramscliff Point, Renney Point to Mount Batten Breakwater.	SX 488 515	50°20.6'N 04°07.5'W	YG, Ver.Ver, Pel, BPat.Cht, Him, Fser.Fser.Bo, Rkp, Cor, FK, Ov
242	10	Hooe Lake Point, Plymouth estuaries.	SX 450 513	50°20.4'N 04°10.7'W	Fspi, PelB, BPat.Lic, Him, Cor, Cor.Bif, FK, SByAs, Ldig.Ldig
306	21	Sandway Point, Devil's Point to Penlee Point.	SX 442 510	50°20.2'N 04°11.3'W	BPat.Sem, Asc.Asc, Him, SwSed, Ldig.Ldig, Lhyp.Ft
242	64	Staddon Point Pools, Plymouth estuaries.	SX 486 507	50°20.1'N 04°07.6'W	Cor.Bif, FK
484	1	Bovisand Bay.	SX 492 507	50°20.1'N 04°07.1'W	YG, BPat.Cht, BPat.Sem, FvesB, Fser.R, Fser.Fser, Cor, FK, SR, SByAs, AEur
306	24	Kingsand (N), Devil's Point to Penlee Point.	SX 435 506	50°20.0'N 04°11.9'W	Ver.Ver, Pel, BPat.Cht, BPat.Fvesl, Him, Cor, SR, Ldig.Ldig
242	43	Bovisand Bay S, Plymouth estuaries.	SX 491 505	50°20.0'N 04°07.2'W	PelB, BPat.Cht, Him, Fser.R, FserX, G, FK, SR, Lsac.Ldig
242	48	Breakwater, N side, W end, Plymouth estuaries.	SX 467 505	50°20.0'N 04°09.2'W	Fspi, FvesB, Him, Fser.R, Ldig.Ldig
242	42	Bovisand Bay Beach, The Sound, Plymouth estuaries.	SX 492 505	50°20.0'N 04°07.1'W	BarSnd
242	5	Cawsands Bay (N), Plymouth estuaries.	SX 434 502	50°19.8'N 04°12.0'W	BarSnd
306	16	Cawsands S Reef, Devil's Point to Penlee Point.	SX 435 502	50°19.8'N 04°11.9'W	Asc.Asc, SwSed, SR
242	6	Cawsands Bay (S), Plymouth estuaries.	SX 435 501	50°19.7'N 04°11.9'W	BPat, Asc.Asc, Him, Fser.Fser, FK, FK.Sar, Lsac.Ldig
242	7	Cawsands Bay (S Cave), Plymouth estuaries.	SX 435 501	50°19.7'N 04°11.9'W	Ov

Littoral sites (listed north to south) continued

<i>Survey</i>	<i>Site</i>	<i>Place</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotores present</i>
306	7	Andum Point, Renney Point to Mount Batten Breakwater.	SX 489 497	50°19.6'N 04°07.3'W	BPat.Lic, Him, Cor, FK.Sar, Ldig.Ldig
306	6	Renney Rocks, Gara Point to Renney Rocks.	SX 492 487	50°19.1'N 04°07.1'W	YG, Ver.Ver, Ver.B, BPat.Cht, Him, Fser.Fser.Bo, Cor, SwSed, FK.Sar, Ldig.Ldig
242	9	Penlee Point, Plymouth estuaries.	SX 444 487	50°19.0'N 04°11.1'W	Fser.Fser, Cor, G, FK, SCAn.Tub
306	4	Penlee Point, Devil's Point to Penlee Point.	SX 443 486	50°18.9'N 04°11.2'W	Cor, G, FK

Sublittoral sites (listed north to south)

<i>Survey</i>	<i>Site</i>	<i>Place</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotores present</i>
242	D4	South Hooc, River Tamar, Plymouth estuaries.	SX 423 653	50°27.9'N 04°13.3'W	AphTub
242	78	Below Tinnel, Plymouth estuaries.	SX 420 642	50°27.3'N 04°13.5'W	CorEle
242	79	Wier Quay, Plymouth estuaries.	SX 432 639	50°27.2'N 04°12.5'W	Mu
242	80	Cargreen, Plymouth estuaries.	SX 437 627	50°26.5'N 04°12.0'W	HarCon
242	D5	Cargreen, River Tamar, Plymouth estuaries.	SX 436 626	50°26.5'N 04°12.1'W	AphTub
242	81	Weir Point, Plymouth estuaries.	SX 440 620	50°26.1'N 04°11.8'W	HarCon
242	D6	Off Warren Point, River Tamar, Plymouth estuaries.	SX 435 606	50°25.4'N 04°12.2'W	AphTub
242	92	Tamar (Royal Albert) Bridge, Plymouth estuaries.	SX 435 588	50°24.4'N 04°12.1'W	Fserr.VS, LsacRS.FiR, CuSH, Urt, EstMx
242	82	Ferry slip, St Budeaux, Plymouth estuaries.	SX 438 587	50°24.4'N 04°11.9'W	ScupHyd
242	D1	S of Saltash Bridge, Plymouth estuaries.	SX 434 581	50°24.0'N 04°12.2'W	AphTub
242	113	Sand Acre Point, Plymouth estuaries.	SX 419 572	50°23.5'N 04°13.4'W	Fserr.VS, LsacRS.FiR, SubSoAs
242	91	Looking Glass Point, Plymouth estuaries.	SX 436 566	50°23.2'N 04°12.0'W	LsacRS.FiR, AlcByH, Flu.SerHyd, FaMx
242	D3	Off Ince Point River Lynher, Plymouth estuaries.	SX 406 566	50°23.2'N 04°14.5'W	MytV
242	D2	Dandy Hole, S of Erth Hill River Lynher, Plymouth estuaries.	SX 386 554	50°22.5'N 04°16.2'W	AphTub
242	114	Off Ballast Pound, Plymouth estuaries.	SX 443 546	50°22.2'N 04°11.3'W	LsacRS.FiR
242	108	Laira Bridge-Piling, Plymouth estuaries.	SX 502 542	50°22.0'N 04°06.4'W	Ent, MytX, PomByC
242	D7	Off Devonport, Hamoaze, Plymouth estuaries.	SX 445 539	50°21.8'N 04°11.1'W	Ven
242	D10	E Cattewater River Plym, Plymouth estuaries.	SX 500 539	50°21.9'N 04°06.5'W	AphTub
242	107	Off Tinside Swimming Pool, Plymouth estuaries.	SX 477 536	50°21.7'N 04°08.4'W	Lhyp.Loeh, LhypLsac.Pk, SubSoAs, MarMu, LsacX, FaMx
242	D11	W Cattewater, River Plym, Plymouth estuaries.	SX 487 536	50°21.7'N 04°07.6'W	AphTub
242	111	Cattedown Wharf Piles, Plymouth estuaries.	SX 496 535	50°21.6'N 04°06.8'W	AlcByH, EstMx
242	74	N Devil's Point, Plymouth estuaries.	SX 459 534	50°21.5'N 04°10.0'W	SNemAdia, Flu.Hocu
242	87	Eastern King Point, Plymouth estuaries.	SX 467 534	50°21.5'N 04°09.3'W	Lsac.T, Flu.Hocu, SubSoAs
242	106	Millbay Pit, Plymouth estuaries.	SX 468 534	50°21.5'N 04°09.2'W	PomByC
336	9	Firestone Bay, Northern Channels.	SX 463 533	50°21.5'N 04°09.6'W	CuSH
242	73	Battery Buoy, Plymouth estuaries.	SX 458 533	50°21.5'N 04°10.0'W	Lsac.Ft, Lsac.T, AlcMaS, CuSH, SNemAdia

Sublittoral sites (listed north to south) continued					
Survey	Site	Place	Grid reference	Latitude/longitude	Biotopes present
242	109	N of Mountbatten Breakwater, Plymouth estuaries.	SX 483 533	50°21.5'N 04°07.9'W	SCAs.ByH, Lsac.Ft, EstMu
336	8	Devil's Point, Northern Channels.	SX 459 533	50°21.5'N 04°10.0'W	Ldig.T, Lhyp.TFt, Lsac.T
336	19	Asia Shoal, Northern Channels.	SX 469 532	50°21.5'N 04°09.1'W	Zmar
242	100	W of Mallard Shoal, Plymouth estuaries.	SX 476 532	50°21.5'N 04°08.5'W	SubSoAs, MarMu, AbrNucCor
242	101	Mallard Shoal (Beacon), Plymouth estuaries.	SX 480 532	50°21.5'N 04°08.2'W	Lhyp.Pk, XKScrR, CuSH, SubSoAs
242	99	S of Mallard Shoal, Plymouth estuaries.	SX 479 531	50°21.4'N 04°08.3'W	SubSoAs, CMX
242	110	Clorelly Bay, Plymouth estuaries.	SX 491 531	50°21.4'N 04°07.3'W	EstMu
242	D12	NE Drake's Island, Plymouth Sound, Plymouth estuaries.	SX 470 530	50°21.3'N 04°09.0'W	Zmar
242	77	N of Drake's Island, Plymouth estuaries.	SX 470 529	50°21.3'N 04°09.0'W	Zmar
242	98	N of the bridge, Plymouth estuaries.	SX 462 527	50°21.2'N 04°09.7'W	Lsac.T, PomByC, EphR
336	11	The Bridge, north drop-off, Northern Channels.	SX 463 525	50°21.1'N 04°09.5'W	MolPol
242	D14	Jennycliff Bay, Plymouth Sound, Plymouth estuaries.	SX 488 522	50°20.9'N 04°07.5'W	AbrNucCor
242	103	Jennycliff Bay, Plymouth estuaries.	SX 489 521	50°20.9'N 04°07.4'W	Lhyp.Loach, Sac, Lsac.Ft, AbrNucCor, LsacX
336	14	Jennycliff S, inner Sound.	SX 485 518	50°20.8'N 04°07.7'W	FaMS
242	D13	Mid Sound, Plymouth Sound, Plymouth estuaries.	SX 474 518	50°20.7'N 04°08.7'W	FaG
242	75	Ramscliff Point, Plymouth estuaries.	SX 482 514	50°20.5'N 04°08.0'W	Lhyp.Ft, SCAs.DenCla
242	97	Offshore Picklecombe Point, Plymouth estuaries.	SX 465 514	50°20.5'N 04°09.4'W	Lhyp.Pk, EphR, LsacX
242	104	Hooe Lake Point (inner), Plymouth estuaries.	SX 450 512	50°20.3'N 04°10.7'W	SCAs.ByH, XKScrR, EphR
336	17	Queens Ground, inner Sound.	SX 459 510	50°20.3'N 04°09.9'W	LhypR.Ft, XKScrR
242	105	Off Hooe Lake Point, Plymouth estuaries.	SX 452 510	50°20.2'N 04°10.5'W	Lhyp.Pk, FaMx
242	76	Duke Rock Buoy, Plymouth estuaries.	SX 480 509	50°20.2'N 04°08.1'W	SCAs.ByH, Lhyp.Pk, EphR
242	70	Staddon Point Gully, Plymouth estuaries.	SX 486 507	50°20.1'N 04°07.6'W	SCAs.ByH, CC.BalPom, Lhyp.Ft, XKScrR
242	72	N of Breakwater, Plymouth estuaries.	SX 472 507	50°20.1'N 04°08.8'W	SpMeg
242	D9	N of Breakwater Plymouth Sound, Plymouth estuaries.	SX 472 505	50°20.0'N 04°08.8'W	AbrNucCor
242	102	N Breakwater (Fort), Plymouth estuaries.	SX 473 504	50°19.9'N 04°08.7'W	Lsac.Cod
242	D8	Cawsands Bay Plymouth Sound, Plymouth estuaries.	SX 445 504	50°19.9'N 04°11.1'W	AbrNucCor
242	65	SW Breakwater, Plymouth estuaries.	SX 462 503	50°19.9'N 04°09.6'W	SCAs.ByH, Lhyp.Ft, Lhyp.Pk, Sac, AlcMaS, FaG
336	10	SW outer Breakwater, outer Sound and open coast.	SX 466 502	50°19.9'N 04°09.3'W	Ldig.Ldig, SCAs.ByH, XKScrR, AlcMaS
336	20	Outer central Breakwater, outer Sound and open coast.	SX 468 502	50°19.9'N 04°09.1'W	LhypR.Ft, FaG, FaMS
336	7	SE outer Breakwater, outer Sound and open coast.	SX 477 502	50°19.9'N 04°08.4'W	Ldig.Ldig, SCAs.ByH, LhypR.Ft
242	D15	E end of Breakwater, Plymouth Sound, Plymouth estuaries.	SX 482 500	50°19.7'N 04°07.9'W	Sell
242	71	S of Breakwater, Plymouth estuaries.	SX 473 499	50°19.7'N 04°08.7'W	SCAs.ByH, XKScrR, CorMetAlc, EphR, FaMx
242	115	Cawsand Bay S, Plymouth estuaries.	SX 437 499	50°19.6'N 04°11.7'W	Lhyp.Loach, Zmar, FaMS
242	S1	S of Plymouth Breakwater, Plymouth estuaries.	SX 473 499	50°19.7'N 04°08.7'W	Ven

Sublittoral sites (listed north to south) continued

<i>Survey</i>	<i>Site</i>	<i>Place</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotopes present</i>
336	4	Panther Reef, outer Sound and open coast.	SX 464 499	50°19.7'N 04°09.4'W	SCAs.ByH, XKScrR
336	21	Knapp Shoal, outer Sound and open coast.	SX 460 496	50°19.5'N 04°09.8'W	Lhyp.TFt, Lhyp.TPk
242	90	Inner Broady Cove, Plymouth estuaries.	SX 443 492	50°19.2'N 04°11.2'W	Sac, XKScrR, MolPol, FaS
336	1	Tinker Shoal, outer Sound and open coast.	SX 478 489	50°19.1'N 04°08.2'W	LhypR.Ft, Lhyp.Pk
242	69	E Tinker Buoy, Plymouth estuaries.	SX 480 488	50°19.1'N 04°08.1'W	CorMctAlc, Sac

Compiled by: Kate Northen, Jan Smith and Jon Moore

13

East and West River Looe

Location

<i>Position (centre)</i>	SX2554	50° 21' N 04° 27' W
<i>Administrative area</i>	Cornwall	Caradon
<i>Conservation agency/area</i>	English Nature	Devon & Cornwall

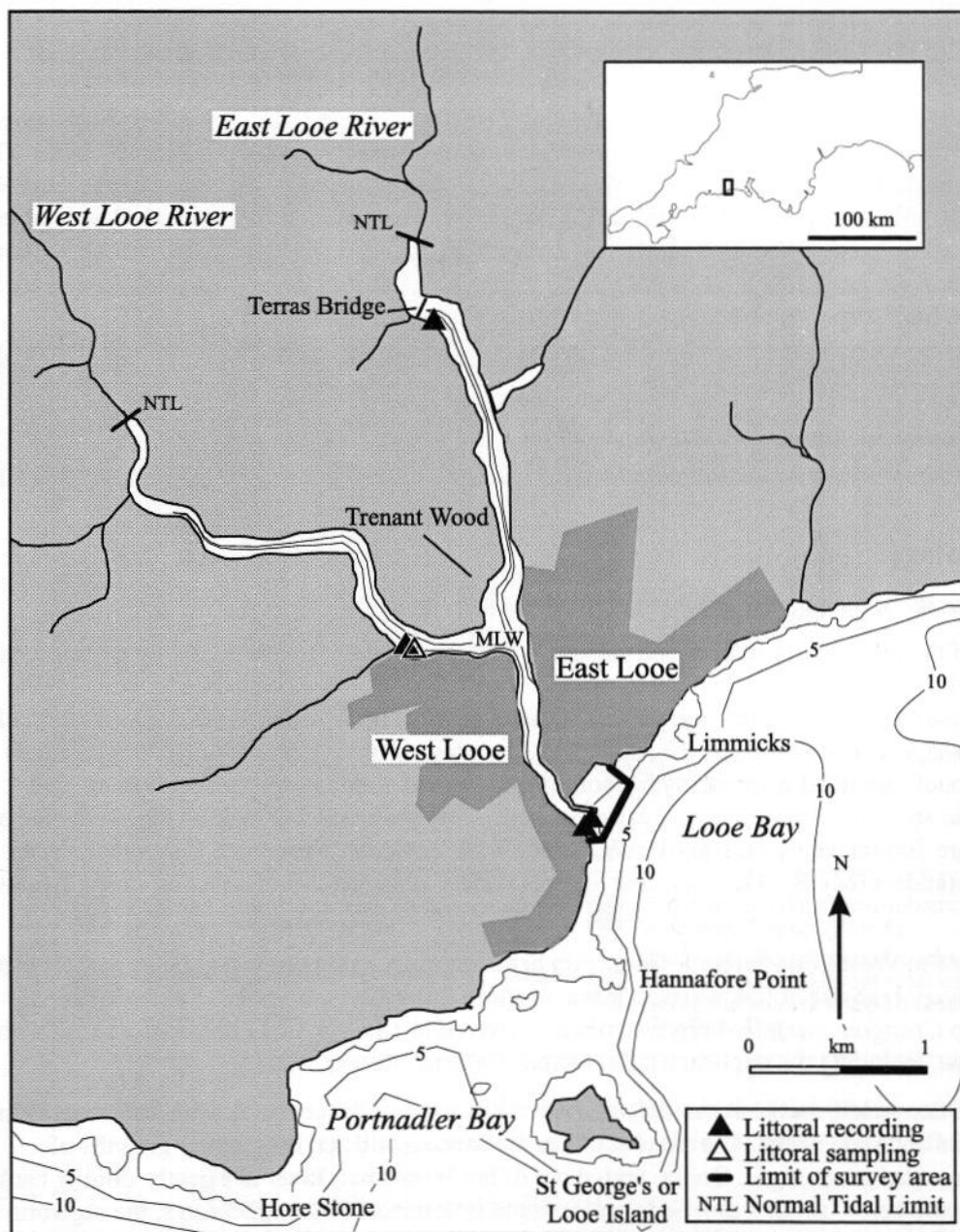


Figure 13.1 Main features of the area, and sites surveyed.

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Physical features	
<i>Physiographic type</i>	Ria
<i>Length of coast</i>	12.6 km
<i>Area of inlet</i>	Total 56 ha; intertidal 43 ha
<i>Length of inlet</i>	4.1 km
<i>Bathymetry</i>	Very shallow; maximum depth 3 m
<i>Wave exposure range</i>	Moderately exposed to extremely sheltered
<i>Tidal stream range</i>	Maximum 5 knots at mouth
<i>Tidal range</i>	4.8 m (spring); 2.2 m (neap)
<i>Salinity range</i>	Reduced to upper estuarine

Introduction

The small ria of the East and West Looe Rivers lies due south of Liskeard on the south coast of Cornwall. The inlet is very shallow, draining almost totally at low tide, and mostly comprising of sediment. The banks have been straightened and protected by harbour walls, railway embankments and revetments on bends. The western bank is more natural at the mouth with a steep bedrock shore. The hinterland is predominantly rural except at the mouth which is bounded by the towns of East and West Looe. There is little industrial activity within the catchment area although there is a history of silver and lead extraction on the West Looe River. Water quality is classified as grade A. Atlantic salmon *Salmo salar* and sea trout *Salmo trutta* migrate to the inlet to spawn up river. The Looe Rivers are an Area of Great Landscape Value (designated by Cornwall County Council).

Marine biological surveys			
	<i>Survey methods</i>	<i>Date(s) of survey</i>	<i>Source</i>
<i>Littoral</i>	Recording	July 1987	Little (1988)
	Infaunal sampling (cores)	July 1987	Little (1988)

Marine biology

There is a paucity of data on the sediment communities of this inlet.

The mouth of the inlet is very narrow and subject to strong tidal streams. Below the lichen zone, the steep mid-shore is dominated by barnacles, principally *Chthamalus montagui*, and limpets *Patella* sp. (BPat.Cht). In overhangs and crevices, the red algae *Ceramium nodulosum* and *Lomentaria articulata* thrive in the shade, accompanied by the calcareous keel worm *Pomatoceros* sp. and *Mytilus edulis* (SR). Small pools are lined with encrusting coralline algae and dominated by *Ceramium* sp. and *Enteromorpha* sp. (Cor). Lower shore areas of smooth, steeply-sloping bedrock on the south side of the harbour are dominated by mussels *Mytilus edulis* with abundant green algae *Enteromorpha* sp. and *Ulva* sp. on boulders (MytB). The very poor species variety is suggestive of a locally strong freshwater influence.

At the entrance to West Looe harbour, the stream bed comprises coarse gravel, pebbles and cobbles. This habitat, very brackish at low water, is home to shore crabs *Carcinus maenas* and occasional brown shrimp *Crangon crangon*. Larger stones are covered in *Ulva* sp. and *Enteromorpha* sp. with some red algae, including the opportunist *Dumontia contorta*, present.

The shores of the middle and lower middle tidal levels of the inlet (except at the mouth) are principally a series of sand and mud banks. The more stable areas are consolidated by summer growths of microalgal mats and green algae. On the mid-shore of the West Looe River is a gently sloping bank of sandy silt, anoxic below about 1 cm. Sediment infauna is dominated by oligochaetes, the ragworm *Hediste diversicolor* and the tubicolous amphipod *Corophium volutator* (HedO1). Low numbers of cockles *Cerastoderma edule*; shrimps and the polychaete worm *Capitella* sp. are present. On the north side of the channel of the West Looe River is a low bank of tide-swept sand. The only conspicuous animal is the lugworm *Arenicola marina*. Sediment infauna is dominated by the spionid polychaete *Pygospio elegans* (HedMac.Pyg).

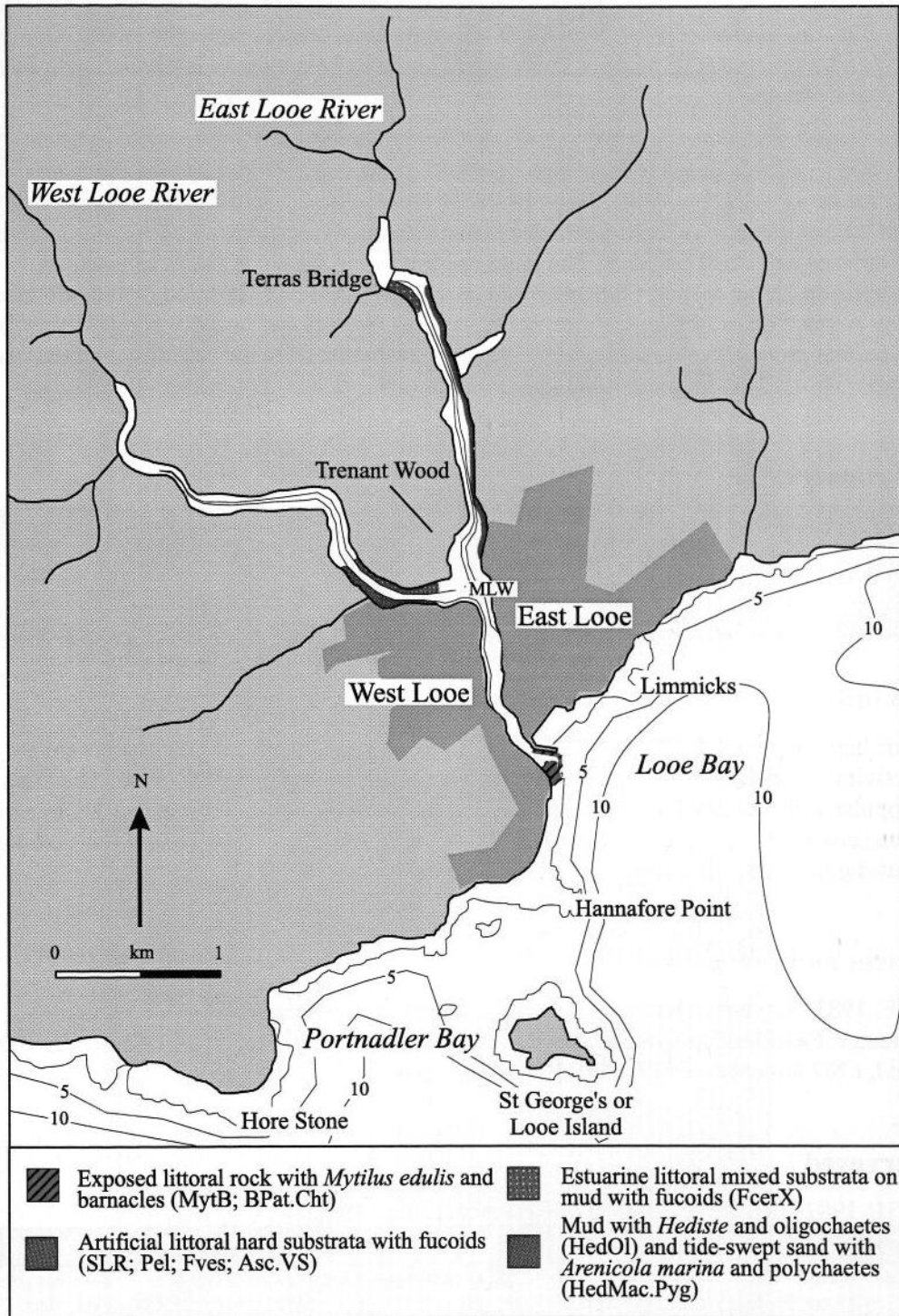


Figure 13.2 Indicative distribution of the main biotopes in the inlet (based on data from survey sites shown in Figure 13.1, cited literature and additional field observations).

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In addition to the sediment shores, bedrock outcrops are also present at Trenant Wood, occupying the upper-middle and higher shore. The algae *Pelvetia canaliculata*, *Bostrychia scorpioides* and *Catenella caespitosa* are found (Pel), with *Ascophyllum nodosum* (Asc.VS) lower down the shore. The only animals recorded are the winkle *Littorina littorea* and amphipods. Also at this site and at Terras Bridge, there are upper or mid-shore banks of pebbles or cobbles on mud or muddy shingle. The stones

are covered in fucoid algae with a very limited associated fauna, principally *L. littorea* and occasional barnacles *Elminius modestus* (Fspi, FvesX). *H. diversicolor* is present under the stones. Opposite Trenant Wood, a revetment of pebbles, cobbles and boulders held by wire is covered with fucoid algae and *Enteromorpha* sp.

Man-made walls provide the principal substratum from mid-tide level upwards on the eastern shore of the East Looe River. At Terras Bridge, high up the inlet, the algae *B. scorpioides* and *C. caespitosa* are present at the upper tidal level with many slaters *Ligia oceanica* in the crevices between blocks of the bridge. Lower down the shore, the stream is fast flowing over muddy shingle and sand, with scattered cobbles and small boulders. The latter are covered in the algae *Fucus ceranoides*, *Enteromorpha* sp., *Ulva* sp. and *Chaetomorpha* sp. (FcerX). Animals recorded include flounders *Platichthys flesus*, gobies, shrimps, shore crabs *Carcinus maenas* and mysid shrimps. This mixed substrata habitat probably covers the majority of the stream bed from the confluence of the two rivers northwards.

Nature conservation

Conservation sites			
Site name	Position	Status	Main features
Looe	N/A	VMNR	Marine biology
Kilminorth Wood	SX243540	LNR	Coastal woodland

Human influences

West Looe harbour is used by a small fishing fleet and by pleasure craft in summer. There are few leisure activities associated with the inlet although some sailing and canoeing occur. The town of Looe is very popular with tourists during the summer and the rocky shores on the west of the inlet mouth attract a considerable number of visitors. The Shark Angling Club of Great Britain operates from Looe. Bait-digging and collecting occur within the inlet.

References and further reading

Little, A.E. 1988. Surveys of harbours, rias and estuaries in southern Britain: Looe estuary. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke.) *Nature Conservancy Council, CSD Report*, No. 817. (FSC Report, No. FSC/OPRU/27/87.)

Sites surveyed

Survey 251: 1987 HRE survey of the Looe estuary (Little 1988).

Littoral sites (listed north to south)					
Survey	Site	Place	Grid reference	Latitude/longitude	Biotopes present
251	4	Terras Bridge, West Looe River.	SX 248 556	50°22.4'N 04°27.8'W	Fves, Fcer, FcerX
251	3	S of Trenant Wood, East Looe River.	SX 248 538	50°21.4'N 04°27.7'W	Pel, Fves, Asc.VS, FvesX, FcerX, HedMac.Pyg, HedOI
251	2	Looe Harbour wall, Looe estuary.	SX 256 530	50°21.0'N 04°27.1'W	BPat, MytB
251	1	Harbour entrance, W side, Looe estuary.	SX 257 529	50°20.9'N 04°27.0'W	YG, Ver.Ver, BPat.Cht, MytB, Cor, SR

Compiled by: Jan Smith and Jon Moore

Location

Position (centre)	SX1255	50° 20' N 04° 38' W
Administrative area	Cornwall	Caradon; Restormel
Conservation agency/area	English Nature	Devon & Cornwall

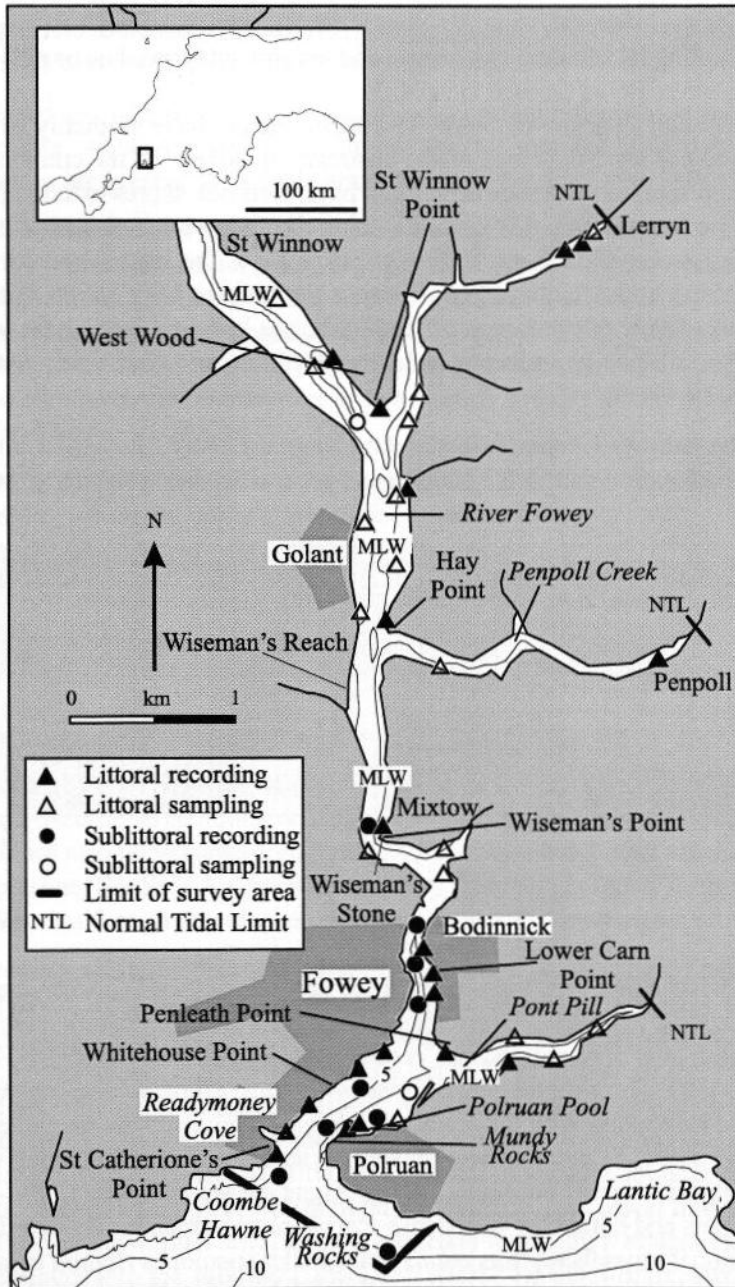


Figure 14.1 Main features of the area, and sites surveyed.

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Physical features	
<i>Physiographic type</i>	Ria
<i>Length of coast</i>	39.2 km
<i>Area of inlet</i>	Total 305 ha; intertidal 146 ha
<i>Length of inlet</i>	11.1 km
<i>Bathymetry</i>	Deep in channel; maximum depth 12 m
<i>Wave exposure range</i>	Exposed to extremely sheltered
<i>Tidal stream range</i>	Maximum approximately 1.5 knots
<i>Tidal range</i>	4.8 m (spring); 2.3 m (neap)
<i>Salinity range</i>	Fully marine to upper estuarine

Introduction

The River Fowey, including its tributary the Lerryn and several side branches or pills, lies on the south coast of Cornwall. The river flows through steep-sided and mostly wooded valleys and empties into the English Channel through a narrow entrance. The upper reaches have gradually silted up and extensive intertidal mud and sand flats are present upstream of Golant. At the entrance to the inlet are outcrops of bedrock interspersed with sediment-filled bays. Bedrock shores extend up river as far as Polruan and Whitehouse Points. Above Wiseman's Point, the shores become increasingly sedimentary in nature. Water quality is classified as grade A (highest quality). The inlet is a major nursery area for bass *Dicentrarchus labrax*, and Atlantic salmon *Salmo salar* and sea trout *Salmo trutta* migrate to the inlet to spawn upstream. The lampern *Lampetra fluviatilis*, sea lamprey *Petromyzon marinus* and twaite shad *Alosa fallax*, all species protected under the Wildlife and Countryside Act 1981, have been recorded from the Fowey.

The inlet lies within the Cornwall Area of Outstanding Natural Beauty. Nationally important populations of greenshank occur during the autumn and several species of wader overwinter in the inlet.

Marine biological surveys			
	<i>Survey methods</i>	<i>Date(s) of survey</i>	<i>Source</i>
<i>Littoral</i>	Recording	May-July 1986	Scott & Moore (1986)
	Infaunal sampling (cores)	July 1991	NRA (1992)
	Infaunal sampling (cores)	May-July 1986	Scott & Moore (1986)
<i>Sublittoral</i>	Recording	June 1986	Scott & Moore (1986)
	Infaunal sampling (grab)	August 1991	NRA (1992)
	Infaunal sampling (pipe dredge)	June 1986	Scott & Moore (1986)

Marine biology

Littoral biotopes

At the entrance to the River Fowey are areas of exposed and semi-exposed broken, generally steeply-sloping, bedrock. Rockpools (Cor; FK), overhangs (SR, SByAs) and vertical rock are present from upper shore to low water level. The splash zone is dominated by lichens, especially *Verrucaria maura* and grey lichens (YG; Ver). The winkles *Melarhaphé neritoides*, *Littorina neglecta* and *Littorina saxatilis* agg. are found here along with the sea slater *Ligia oceanica* and the barnacle *Chthamalus montagui*. On the upper shore, *C. montagui* dominates the surfaces of the rock along with *C. stellatus*, the limpet *Patella vulgata* and small littorinids (BPat). Algae are very restricted. Mid-shore areas are also dominated by limpets and barnacles with dense *Porphyra* sp. which grows over the sessile animals (BPat). Occasional mussels *Mytilus edulis* and beadlet anemones *Actinia equina* are present. On the lower mid-shore, algae are much more abundant with high fucoid and red algal cover, including coralline algae (Fser.R). Barnacles *Balanus perforatus* and *Semibalanus balanoides* are found along with very abundant *Patella vulgata* (BPat). The lower shore is characterised by a dense band of kelp *Laminaria digitata* and other algae (Ldig.Ldig). Animals present include the purse sponge *Grantia compressa* and keel worms *Pomatoceros* spp.

At more sheltered sites just inside the entrance, the algae *Pelvetia canaliculata* (Pel) and *Fucus spiralis* (Fspi) are frequent on the upper shore, with green algae abundant on the mid-shore. Limpets are absent from the upper shore and *S. balanoides* is abundant on the middle shore (BPat.Sem). *Elminius modestus* is frequent on mid- and lower shores. Several animals not recorded on the more exposed shores are present, including the topshells *Osilinus lineatus* and *Gibbula umbilicalis*.

Rockpools are found at all levels of the shores around the entrance to the Fowey (Cor; FK). In contrast to the generally animal-dominated open rock surfaces, the pools tend to be algae-dominated, although a wide variety of fauna is also present.

Vertical and overhanging bedrock occurs around low water level; particularly extensive areas are found at Mundy Rocks (SR). Dense algal cover is characteristic; animals present include sponges, encrusting bryozoans and ascidians. The starfish *Asterias rubens* and the jewel anemone *Corynactis viridis* among other species are found on more exposed shores.

Caves at Polruan Point and Mundy Rocks possess distinct communities which vary depending on their location within the cave. Algae are most abundant towards the mouths; limpets, barnacles, gastropods, sponges and anemones are present in variable abundances within the caves (SR, Ov).

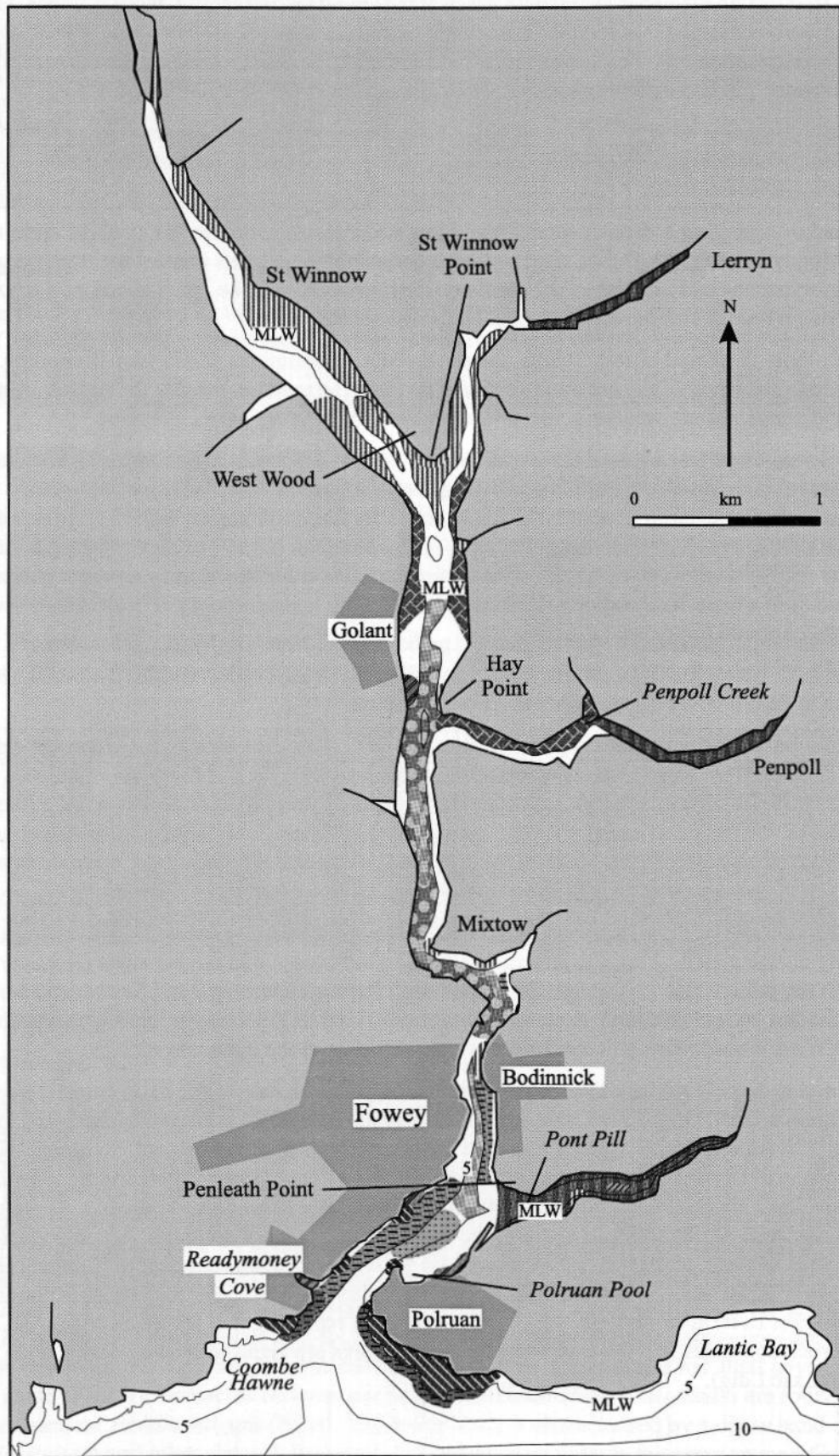
At Readymoney Cove and north of the Royal Fowey Yacht Club, sediments consisting of clean coarse sand and gravel with pebbles are colonised by lugworms *Arenicola marina* with a few other polychaetes and oligochaetes (BarSnd; AP.P). At the latter site, sand mason worms *Lanice conchilega* are found on the lower shore with the polychaete *Ophelia rathkei* (Lan). An area of better-sorted, finer sediment at the Harbour Commissioner's Wharf possesses low numbers of the polychaetes *Anaitides mucosa* and *Spio martinensis* and oligochaetes with a slightly greater variety of crustaceans such as *Eurydice pulchra* and *Idotea* sp. (AEur).














Within the inlet, bedrock shores exhibit a rapid transition from exposed to sheltered communities, with an increase in fucoid cover on the upper and middle shores.

At Penleath Point, the splash zone is lichen-dominated (YG; Ver.Ver) above dense upper shore cover of *P. canaliculata* (Pel) and *F. spiralis* (Fspi). Barnacles are common and there are abundant *L. saxatilis*. Mid-shore rocks are covered by dense growths of *Ascophyllum nodosum* (Asc.Asc) and *Fucus serratus*. On steeply-sloping bedrock, barnacles and limpets *Patella vulgata* are dominant (BPat). Some red algae are present and on the mid-shore littorinids are frequent. Lower shore areas are dominated by *F. serratus* and a fairly wide variety of fauna and other algae (Fser.Fser).

In the sheltered creek of Pont Pill, areas of gravelly silt and clay are dominated by polychaetes, and additionally characterised by large numbers of *Hediste diversicolor* and oligochaetes (HedScr). Mudflats in the pill are also polychaete-dominated with *Nephtys hombergii* and *Streblospio shrubsolii* and oligochaetes present (HedStr). A similar community (HedScr) is found further up the main channel at West Wood, although abundances are much higher at the upstream site.

Sheltered and extremely sheltered bedrock is found along the east side of the main channel above North Bodinnick ferry. On the west side, the hard substrata are mainly artificial. Lichens are found in the generally much compressed splash zone and a few mobile species are present, including the sea slug *L. oceanica*. Upper shores are characterised by dense *P. canaliculata* (Pel) and *F. spiralis* (Fspi). Fauna at this level are infrequent, mostly littorinids, *Anurida maritima* and amphipods. *Ascophyllum nodosum* (Asc.Asc; AscX) covers the mid-shore and animals are more common. Amphipods, shore crabs *Carcinus maenas*, barnacles and littorinids are present in varying abundances. Limpets are abundant lower down the inlet but decrease in number upstream. The lower mid-shore is dominated by *F. serratus* (Fser.Fser) at lower inlet sites, with *A. nodosum* replacing it at upstream sites (Asc.VS). Where bedrock continues into the sublittoral the lower shores are algal-dominated with a wide variety of animals (Lsac.Ldig).



	Moderately exposed littoral rock (Coff; BPat; PelB; FvesB; Fser.R)		Moderately exposed infralittoral fringe rock with <i>Laminaria hyperborea</i> forests (Ldig.Ldig; Lhyp.Ft; LhypLsac.Ft) and fringed by sand-scoured rock (XKScrR)
	Sheltered littoral rock with fucoids (Pel; Fspi; Fves; Asc.Asc; Asc.VS; AscX; Fserr.VS; FserX)		Shallow sublittoral bedrock and mixed substrata with <i>Laminaria saccharina</i> (Lsac.Ldig; Lsac.Ft; LsacX)
	Littoral sand (BarSnd; AEur)		Estuarine sublittoral mixed substrata and bedrock outcrops with sponges and red algae (LsacRS.FiR; SubSoAS; Bug)
	Littoral muddy sand (AP.P; Lan)		Coarse sediment with tanaid crustaceans and bivalves (Sell)
	Littoral sandy mud with <i>Hediste</i> and <i>Macoma</i> (HedMac.Are; HedMac.Pyg)		Sublittoral sand with <i>Zostera marina</i> beds (Zmar)
	Littoral soft mud (HedScr; HedStr; HedOl)		Estuarine sublittoral mud with polychaetes and oligochaetes (CMX; EstMu; NhomTub)
	Littoral soft mud (HedScr; HedStr; HedOl) and shallow sublittoral mud (EstMu)		

< **Figure 14.2** Indicative distribution of the main biotopes in the inlet (based on data from survey sites shown in Figure 14.1, cited literature and additional field observations) (Key to biotopes symbols above).

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Communities under boulders and stones in the sheltered/extremely sheltered reach, north of Hay Point, are typically dominated by amphipods and shore crabs and barnacles *E. modestus* are frequent. Several species appear to reach their limits of upstream penetration at St Winnow Point.

Bedrock is scarce in the inner reaches of the inlet but there are bridge walls at Lerryn and Penpoll which provide hard substratum. Flora and fauna are very limited on bedrock; *Fucus ceranoides* is dense on the bridge stones (Fcer) and also present on stones in mud (FcerX). Some red and green algae are also present. *E. modestus* is found at all sites, as are amphipods, mysids and prawns *Crangon crangon*. Eels *Anguilla anguilla* and *C. maenas* are common under stones at Penpoll. Other animals are found only sporadically, including peppery furrow shells *Scrobicularia plana* and the barnacle *Balanus crenatus*.

Sublittoral biotopes

Sublittoral rocky habitats are restricted to the lower reaches of the inlet south of Wiseman's Stone. The associated communities are not especially diverse.

At the mouth of the inlet are areas of exposed and semi-exposed shallow sublittoral bedrock, which gives way to sand and other loose substrata at a shallow depth. Upward-facing shallow bedrock is colonised by a dense kelp *Laminaria hyperborea* forest (Lhyp.Ft). Encrusting coralline algae are common. Animal species which are found throughout this habitat are starfish *Asterias rubens*, the bryozoan *Alcyonidium diaphanum* and the ascidian *Botryllus schlosseri*. Other species are more site-specific but include sponges, anthozoans, ascidians, sea urchins and bryozoans. Barnacles, keel worms *Pomatoceros* sp. and Devonshire cup coral *Caryophyllia smithii* are abundant or common.

Vertical and overhanging bedrock surfaces at the point south of Readymoney Cove are algal-dominated (SCAs.ByH). Animals present include sponges, spirorbid worms, encrusting bryozoans and starfish. The jewel anemone *Corynactis viridis* is present at a few sites. Slightly different communities are found on bedrock where there is evidence of sand-scour (XKScrR). At St Catherine's Point, red algae characteristic of sand-scour, *Ahnfeltia plicata* and *Grateloupia filicina*, are found, along with many other encrusting and coralline algae. Encrusting bryozoans are dominant on the broken bedrock east of Mundy Rocks. The variety of animal species present reflects the degree of scouring and differences in topography at each site.

Areas of boulders, cobbles and pebbles in sand and gravel are present at sites near the entrance to the harbour. A wide variety of algae but fewer animals are found in this habitat (XKScrR). Surfaces of stones are generally scoured as they are frequently mobile. *Enteromorpha* sp. and *Asperococcus* sp. are characteristic as is *Laminaria saccharina*. With a decrease in substratum mobility away from the mouth, fauna and flora become more diverse. Species common to most sites include the keel worm *Pomatoceros* sp., starfish, the netted dog whelk *Hinia reticulata* and the grey top shell *Gibbula cineraria*.

Sand in the channel at the entrance to the Harbour has an impoverished fauna dominated by the polychaete *Nephtys cirrosa* and the bivalve *Moerella pygmaea* (FaMS). At Polruan Pool, areas of fine sand are algal-dominated giving way to eelgrass *Zostera marina* (Zmar) at around low water level. In the eelgrass beds, the community includes *L. saccharina*, the hydroids *Obelia geniculata* on algal fronds, the daisy anemone *Cereus pedunculatus*, the hairy sea mat *Electra pilosa* and the anemone *Sagartiogeton undatus*. *Zostera* leaves support banded chink shells *Lacuna vincta*, colonial diatoms and hydroids. In the area off the town of Fowey, hard substrata in the sublittoral fringe are silty with heavy algal cover (LhypLsac.Ft; Lsac.Ft). Keel worms, encrusting bryozoans, sponges and barnacles *Verruca stroemia* are present along with netted dogwhelks *H. reticulata*, crustaceans and ascidians.

Mud slopes are present between Polruan Pool and Wiseman's Reach. They are of a predominantly black silty mud with a high organic content. Communities present are dominated by polychaetes including *Nephtys hombergii*, *Anaitides mucosa* and *Melinna palmata* (EstMu). Oligochaetes are abundant and nearer to the mouth of the inlet, bivalve molluscs are found including *Abra alba*, *Mya truncata* and *Chamelea gallina* (AbrNucCor).

Sublittoral bedrock in the upper reaches of the inlet extends to between 6 m and 8 m depth. A rock spur north of Bodinnick Ferry extends to 2 m only. Communities in the sublittoral fringe are extensions of those described for the lower shores at these sheltered sites (Lsac.Ldig; Lsac.Ft). Algae are common, becoming less varied upstream. A wide variety of infralittoral animals is present in the lower reaches, also becoming more restricted upstream. Sponges, hydroids, decapod crustaceans, bryozoans and opisthobranchs are commonly found. Circalittoral rock has few algal species but a wide variety of animals, especially hydroids and sponges (SubSoAs).

Off Lower Carn Point, an area of coarse sediment in the middle of the channel has been noted as possessing a dense and diverse infauna, dominated by the tanaid crustacean *Apseudes latreilli*, although amphipods, bivalves, polychaetes and brittlestars are all represented (Sell). Anemones and keel worms *Pomatoceros* sp. colonise the stones.

Between Wiseman's Reach and St Winnow Point, the sublittoral coarse sediments possess typically estuarine communities. Polychaetes are dominant, especially *Pygospio elegans*, *Malacoceros fuliginosus* and *H. diversicolor*. Some cockles *Cerastoderma edule* are also present (FaMx; EstMx).

Nature conservation

Conservation sites			
Site name	Position	Status	Main features
Cornwall	N/A	AONB	High scenic quality
Gribbin Head-Polperro	SX087531- SX244518	HC	Coastal scenery
Fowey: several sites	SX1--5--	NT	Creek, foreshore, coastal farmland, cliff, woodland, headland

Human influences

The inlet is a very busy commercial waterway with a harbour at Fowey. There are boat-building yards at Lostwithiel and Polruan. The majority of the hinterland is rural in character.

Fyke and elver nets are used to catch eels *Anguilla anguilla*. Salmon *Salmo salar* and sea trout *Salmo trutta* are farmed commercially at Upper Carn Point. Crabs *Carcinus maenas* are collected for bait from beneath boulders. There are also exploitable mussel *Mytilus edulis* populations in the inlet. Pacific oysters *Crassostrea gigas* and Manila clams *Tapes philippinarum* are also cultivated in the Fowey. As a designated bass *Dicentrarchus labrax* nursery area the inlet is subject to a closed season over the summer months. Salmonids are protected by Net Limitation Orders which restrict the number of nets used in the inlet.

Leisure activities are concentrated in the lower reaches of the inlet where there are over 1,400 moorings; sailing, windsurfing, canoeing and angling take place with beach recreation and scuba diving popular at Readymoney beach. There is a field study centre at Lanlivery.

References and further reading

National Rivers Authority South West Region. 1992. *NRA South-west Region estuary data 1990 to 1992*. Unpublished, National Rivers Authority South-west Region.

Scott, S., & Moore, J. 1986. *Surveys of Harbours, Rias and Estuaries in Southern Britain: Fowey. Draft*. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke). Unpublished, Joint Nature Conservation Committee.

Sites surveyed

Survey 260: 1986 HRE survey of the Fowey estuary (Scott & Moore 1986).

Survey 435: 1990 NRA SW Region littoral survey of the Fowey estuary (National Rivers Authority 1992).

Littoral sites (listed north to south)					
Survey	Site	Place	Grid reference	Latitude/longitude	Biotores present
435	1	Lostwithiel, Fowey estuary.	SX 105 591	50°24.0'N 04°40.0'W	HedOl
435	2	Milltown, Fowey estuary.	SX 108 581	50°23.5'N 04°39.7'W	HedOl
435	5	Lerryn, Fowey estuary.	SX 140 571	50°23.0'N 04°37.0'W	HedOl
260	31	Lerryn, Fowey.	SX 139 570	50°22.9'N 04°37.0'W	Ent, Fcer, HedMac, HedScr
260	34	Lerryn to Manely Wood, Fowey.	SX 138 569	50°22.9'N 04°37.1'W	Asc.VS
435	4	St Winnow, Fowey estuary.	SX 118 567	50°22.7'N 04°38.8'W	Ol
260	27	NW of West Wood, Fowey.	SX 123 563	50°22.5'N 04°38.4'W	Ver.Ver, Pel, Fspi, Ent, Asc.VS, Fcer, FcerX
260	25	W of Westwood, Fowey.	SX 121 562	50°22.5'N 04°38.5'W	HedScr, Mare
435	6	Brockles Quay, Fowey estuary.	SX 128 560	50°22.4'N 04°37.9'W	HedOl
260	28	St Winnow Point, Fowey.	SX 125 559	50°22.3'N 04°38.2'W	YG, Ver.Ver, Pel, Fspi, Asc.VS, FvesX
435	3	Lerryn Point, Fowey estuary.	SX 127 559	50°22.3'N 04°38.0'W	HedMac.Pyg
260	D1	St Winnow Point, Fowey estuary.	SX 125 558	50°22.3'N 04°38.1'W	HedStr
260	D2	Golant Channel, Fowey estuary.	SX 137 556	50°22.2'N 04°37.1'W	HedMac.Pyg
260	18	Cliff Pill, S Point, Fowey.	SX 127 554	50°22.0'N 04°38.0'W	YG, Ver.Ver, Pel, Fspi, Asc.VS, Ov
435	7	Cliff, Fowey estuary.	SX 126 554	50°22.0'N 04°38.1'W	HedMac.Are
435	8	Upper Golant, Fowey estuary.	SX 124 552	50°21.9'N 04°38.2'W	HedMac
260	26	E of Golant, Fowey.	SX 126 548	50°21.7'N 04°38.1'W	HedMac.Mare
435	9	Lower Golant, Fowey estuary.	SX 124 546	50°21.6'N 04°38.2'W	LMS
260	17	Hay Point, Fowey.	SX 126 545	50°21.5'N 04°38.1'W	YG, Ver.Ver, Pel, Fspi, Asc.VS, SByAs
260	35	Penpoll, Fowey.	SX 145 543	50°21.5'N 04°36.4'W	FcerX, HedScr, HedOl
435	10	Penpoll Creek (St Cadix), Fowey estuary.	SX 129 542	50°21.4'N 04°37.8'W	HedMac
435	11	Upstream of Bodmin Pill, Fowey estuary.	SX 124 539	50°21.2'N 04°38.2'W	Lan

Littoral sites (listed north to south) continued					
<i>Survey</i>	<i>Site</i>	<i>Place</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotopes present</i>
260	16A	Wiseman's Stone, Fowey.	SX 125 531	50°20.8'N 04°38.1'W	YG, Ver.Ver, Pel, Fspi, Asc.VS, Fserr.VS, SR
260	21	Mixtow Pill, Fowey.	SX 130 529	50°20.7'N 04°37.7'W	HedStr, HedOl
435	12	Mixtowe Pill, Fowey estuary.	SX 130 529	50°20.7'N 04°37.7'W	Pcer
260	15	Polmort Point, Fowey.	SX 129 528	50°20.6'N 04°37.8'W	YG, Ver.Ver, Pel, Fspi, Asc.Asc, Fser.Fser, SByAs
260	10A	N of Bodinnick Ferry, Fowey.	SX 128 523	50°20.4'N 04°37.8'W	Ver.Ver, Pel, Fspi, BPat.Sem, Asc.VS, Fserr.T, Fserr.VS
260	32	Lower Carn Point (Brodinnick Ferry), Fowey.	SX 129 521	50°20.3'N 04°37.7'W	
260	11	Pontoon opposite slipway (Pont Pill), Fowey.	SX 134 517	50°20.1'N 04°37.3'W	HedStr
260	13	Upper Channel, Pont Pill, Fowey.	SX 140 517	50°20.1'N 04°36.8'W	HedStr
260	12	Penleath Point, Fowey.	SX 129 516	50°20.0'N 04°37.7'W	YG, Pel, Fspi, Asc.Asc, Fser.Fser
435	13	Pont Pill, Fowey estuary.	SX 137 516	50°20.0'N 04°37.0'W	HedOl
260	7	NE of Royal Fowey Yacht Club.	SX 125 515	50°19.9'N 04°38.0'W	BPat, AP.P, Lan
260	14	Pont Pill, NE of Slipway, Fowey.	SX 134 515	50°19.9'N 04°37.3'W	YG, Ver.Ver, Pel, Fspi, Asc.Asc
260	9	White House Slip, Fowey.	SX 124 514	50°19.9'N 04°38.1'W	BPat, Fser.Fser, Fser.Fser.Bo, SR
260	8	Cave NE of Mundy Rocks, Fowey.	SX 121 512	50°19.8'N 04°38.4'W	BPat, Ov, SR
260	2	Readymoney Cove (Pools), Fowey.	SX 118 511	50°19.7'N 04°38.6'W	FK, BarSnd, AP.P
260	4	S of Polruan Point, Fowey.	SX 123 511	50°19.7'N 04°38.2'W	Ver.Por, PelB, FvesB, Fser.R, Ov, SR, Ldig.Ldig
260	3	Harbour Commissioner's Wharf, Polruan Pool, Fowey.	SX 127 511	50°19.7'N 04°37.9'W	LGS, BarSh, AEur
260	1	St Catherine's Point, Fowey.	SX 119 509	50°19.6'N 04°38.5'W	YG, Ver.Ver, BPat, BPat.Fvesl, XR, Fser.R, Fser.Fser, R, Cor, Rkp, FK, SByAs

Sublittoral sites (listed north to south)					
<i>Survey</i>	<i>Site</i>	<i>Place</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotopes present</i>
260	D3	Wiseman's Reach, Fowey estuary.	SX 121 541	50°21.4'N 04°38.5'W	NhomTub
435	A	Bodmin Pill, Fowey estuary.	SX 135 537	50°21.1'N 04°37.3'W	Lcon
260	D4	Wiseman's Point, Fowey estuary.	SX 120 536	50°21.1'N 04°38.5'W	IMS
260	D5	Polmont Point, Fowey estuary.	SX 120 536	50°21.1'N 04°38.5'W	NhomTub
260	16B	Wiseman's Stone, Fowey estuary.	SX 125 531	50°20.8'N 04°38.1'W	Lsac.T, SubSoAs, Bug, CMX
260	D7	Penleath Point, Fowey estuary.	SX 125 525	50°20.5'N 04°38.1'W	AbrNucCor
260	24	No. 3 Quay, S of Upper Carn Point, Fowey estuary.	SX 127 525	50°20.5'N 04°37.9'W	SubSoAs, Bug, CMX
435	B	New Quay Cellars, Fowey estuary.	SX 129 524	50°20.4'N 04°37.7'W	EstMx
260	D8	Opposite Yacht Club, Fowey estuary.	SX 121 523	50°20.4'N 04°38.4'W	AbrNucCor
260	10B	N of Bodinnick Ferry, Fowey estuary.	SX 128 523	50°20.4'N 04°37.8'W	Lsac.Ldig, Lsac.T, LsacRS.FiR, SubSoAs
260	D9	Mid channel site, Fowey estuary.	SX 121 521	50°20.3'N 04°38.4'W	AbrNucCor, PolMtru
260	D10	Opposite Harbourmasters Wharf, Fowey estuary.	SX 123 521	50°20.3'N 04°38.2'W	FaMx
260	19	S of Bedinnick Ferry, Fowey.	SX 129 520	50°20.2'N 04°37.7'W	Lsac.Ldig, Lsac.Ft, EstMu, LsacX, CMX
260	D11	Mid-channel off Mundy Rocks, Fowey estuary.	SX 121 516	50°20.0'N 04°38.3'W	FaG
260	20	SW of Penreath Point, Fowey estuary.	SX 128 515	50°19.9'N 04°37.8'W	Lsac.Ft, MarMu, LsacX
260	D6	Lower Carn Point (deep), Fowey estuary.	SX 138 515	50°20.0'N 04°37.0'W	Sell
260	23	S of Inch's Quay, Fowey estuary.	SX 124 514	50°19.9'N 04°38.1'W	Lsac.Ft, LsacX
435	C	Polruan Pool, Fowey estuary.	SX 127 513	50°19.8'N 04°37.9'W	MarMu
260	30	W of Polruan Point, Fowey estuary.	SX 123 512	50°19.8'N 04°38.2'W	Lcon, LsacX
260	22	Polruan Pool, Fowey estuary.	SX 124 511	50°19.7'N 04°38.1'W	FaMS, Zmar, LsacX
260	29	E of Mundy Rocks, Fowey estuary.	SX 119 509	50°19.6'N 04°38.5'W	Lhyp.Ft, LhypLsac.Ft, LsacX
260	1	St Catherine's Point, Fowey.	SX 119 509	50°19.6'N 04°38.5'W	SCAs.ByH, Ldig.Ldig, Lhyp.Ft, XKScrR, AlcMaS, LsacX, FaS
260	5	Cove E of Washing Rocks, Fowey estuary.	SX 126 506	50°19.4'N 04°37.9'W	Coff, SR

Compiled by: Jan Smith, Jon Moore and Kate Northen

Location		
<i>Position (centre)</i>	SW8334	50° 10' N 05° 01' W
<i>Administrative area</i>	Cornwall	Carrick; Kerrier
<i>Conservation agency/area</i>	English Nature	Devon & Cornwall

Physical features	
<i>Physiographic type</i>	Ria
<i>Length of coast</i>	126.8 km
<i>Area of inlet</i>	Total 2,482 ha; intertidal 746 ha
<i>Length of inlet</i>	18.1 km
<i>Bathymetry</i>	Maximum depth of 30 m in channel
<i>Wave exposure range</i>	Exposed to extremely sheltered
<i>Tidal stream range</i>	0.9 knots maximum
<i>Tidal range</i>	4.7 m (spring); 2.3 m (neap)
<i>Salinity range</i>	Fully marine to upper estuarine

Introduction

The Fal is a steep-sided ria which lies on the south coast of Cornwall at the western entrance to the English Channel. It has a central sinuous deep channel, which represents the relict river valley, with extensive areas of shallow bank on each side. As well as the River Fal, the Tresillian, Truro and Percuil rivers and Restronguet Creek also enter the inlet. Areas of intertidal flats are found predominantly within the tributaries while the central part of the inlet is mainly subtidal and fringed by rocky shores; shingle shores are found in the lower ria. An extensive area of maerl (calcareous algae) on St Mawe's Bank and adjacent seabed is the most southerly example of this community in Britain and the most extensive known bed of living maerl in England and Wales.

The area has long been associated with a variety of mining activities. Metalliferous waste within the catchment of the Fal has leached into the rivers since mining began, while Restronguet Creek has received water pumped from copper and tin mines. Large quantities of china clay wastes have been brought into the ria by rivers draining the St Austell area to the east. Over the years, the influx of thousands of tons of micaceous waste and associated sediment has resulted in a gradual silting up of the side creeks. Much of the saltmarsh higher up river is built on china clay waste. Water quality within the ria is generally classified as grade A (highest quality); the upper reaches of the Fal, Restronguet Creek and the western parts of the ria mouth are grade B. The inlet is a major nursery for the bass *Dicentrarchus labrax*. Notable and rare flora and coastal invertebrate fauna are known to occur around the ria. The sea lamprey *Petromyzon marinus*, considered a threatened species in the UK, is known to occur in the inlet.

The predominant features of the Fal are the very slow tidal streams in most areas, the consequent deposition of fine sediments, the scarcity of sublittoral rock habitats and the large extent of the shallow sublittoral sediment banks. These features have a major influence on the range of communities present, particularly in the sublittoral. Several of these communities are characterised by a range of silt-tolerant species which occur commonly throughout the ria while many of the species present offshore are unable to penetrate far upstream into the Fal. Nevertheless, some rich littoral communities are found, particularly in gullies between Trefusis Point and Penarrow Point, in Percuil River and at St Mawes.

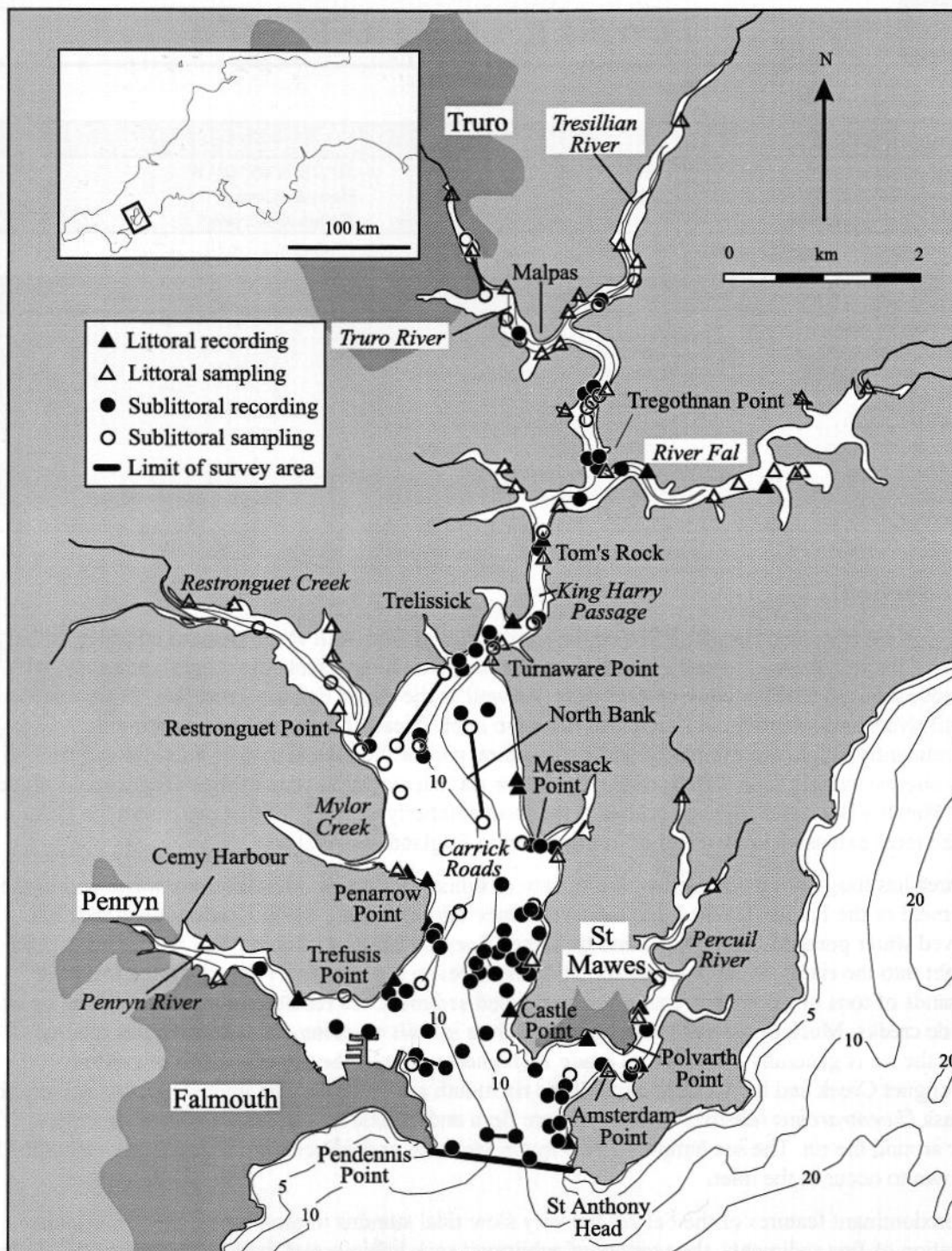


Figure 15.1 Main features of the area, and sites surveyed.

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Marine biological surveys

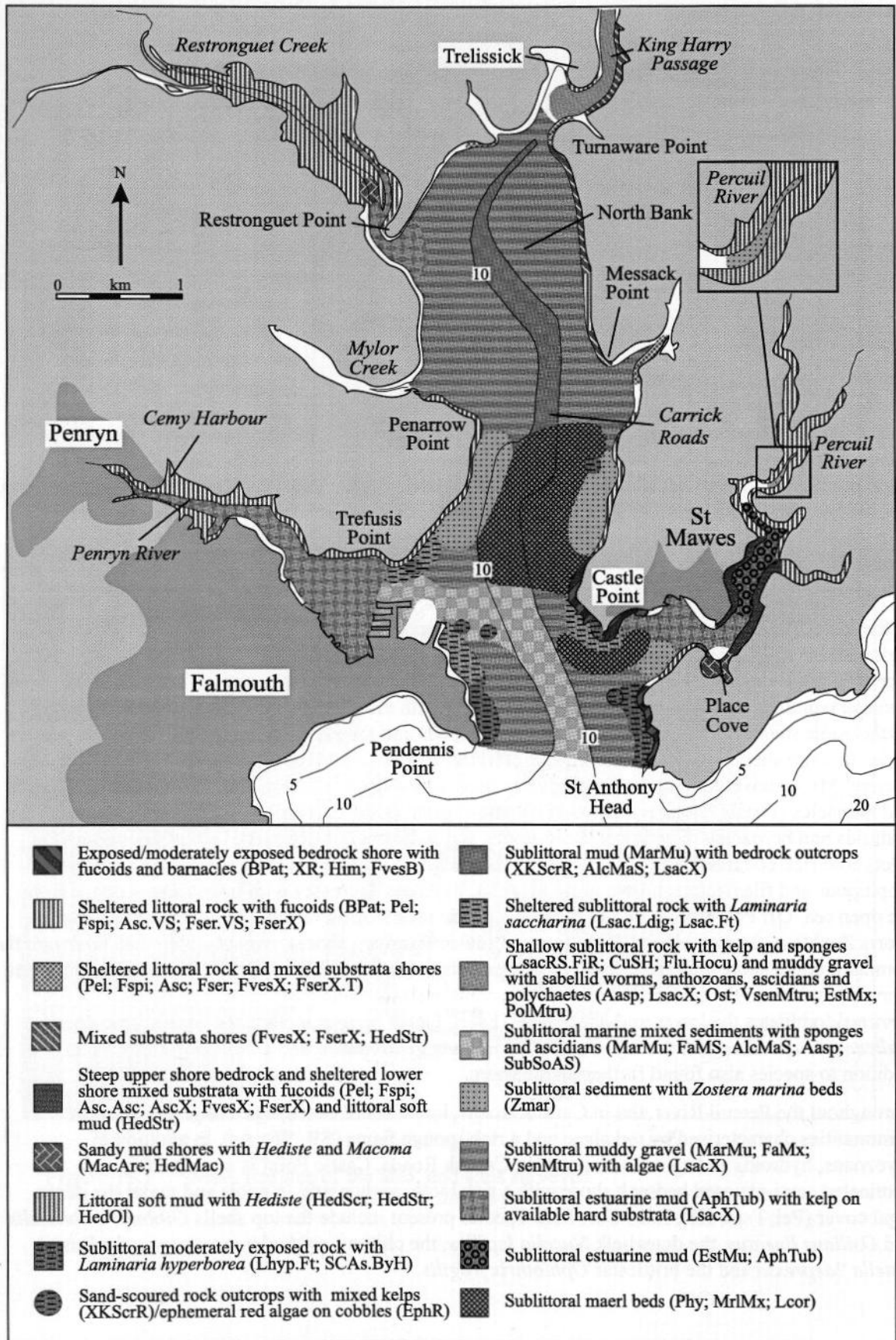
	<i>Survey methods</i>	<i>Date(s) of survey</i>	<i>Source</i>
Littoral	Recording	March 1989	MNCR (unpublished data)
	Recording	May 1985	Rostron (1985)
	Recording	April/September 1977	Powell <i>et al.</i> (1978)
	Infaunal sampling (cores)	September 1990	NRA (1992)
	Infaunal sampling (box quadrat)	May 1985	Rostron (1985)
Sublittoral	<i>RoxAnn</i> acoustic survey and ground-truthing including grab	July 1994	Davies & Sotheran (1995)
	Recording	June-July 1985	Rostron (1985)
	Infaunal sampling (grab)	September 1990	NRA (1992)
	Infaunal sampling (pipe dredge)	June-July 1985	Rostron (1985)

Marine biology**Littoral rock biotopes**

At St Anthony Head, at the mouth of the Fal, the exposed bedrock holds typical open coast littoral communities. Extensive lichen cover is present in the splash zone, *Caloplaca marina* (YG) and *Verrucaria maura* (Ver) being dominant. The upper shore is dominated by barnacles *Chthamalus* spp. and limpets *Patella vulgata* (BPat.Cht), along with a variety of gastropod molluscs, isopods and anemones. Barnacles and red algae continue into the mid-shore (BPat). A wide variety of algae are present on the lower shore with widespread encrusting bryozoans and sponges (XR; Him; Ldig.Ldig). Rockpools are present on the mid-shore with a variety of algae and a paucity of animal species (Cor).

In the lower Percuil River, the shores are of steep bedrock terminating in stony beaches. Zonation is well marked with distinct fucoid zones, although barnacle cover replaces fucoids on very steep rock faces (BPat). Below a lichen-dominated splash zone, the upper shore community comprises the algae *Pelvetia canaliculata* (Pel) and *Fucus spiralis* (Fspi) with the barnacles *Chthamalus montagui* and *Chthamalus stellatus*, the limpet *P. vulgata*, amphipods and the periwinkle *Littorina saxatilis* var. *rudis*. In more sheltered areas, the barnacle *Elminius modestus* and the winkle *Littorina littorea* are present. Mid-shore communities are similar to those of the upper shore and are dominated by fucoids and barnacles (FvesB) along with a wide variety of gastropods, encrusting and foliose red algae, hydroids and bryozoans. The lower shore stones and sediment (an extensive habitat throughout the inlet) hold rich communities with ubiquitous shore crabs *Carcinus maenas*, encrusting red algae, amphipods and filamentous brown algae (FserX). Richness decreases with increasing distance from the open sea. Off Polvarth Point, the shore is a gentle rock slope with sand prevalent on the lower shore. Zonation patterns are similar to those of the downstream shores, with *Ascophyllum nodosum* the dominant upper shore alga (Asc.Asc). *E. modestus* is the dominant barnacle. Common fauna includes amphipods, littorinids, spirorbid worms, shore crabs and the beadlet anemone *Actinia equina*. *Fucus serratus* dominates the lower mid-shore zone (Fser). Fauna present include the breadcrumb sponge *Halichondria panicea* and the bryozoans *Alcyonidium gelatinosum* and *Umbonula littoralis*, in addition to species also found further up the shore.

Throughout the Percuil River and in Carrick Roads, lower shore overhangs and gullies possess communities characterised by red algae and a rich sponge fauna (SR, SByAs), in addition to bryozoans, hydroids and spirorbid worms. In Carrick Roads, Castle Point is an area of fucoid-dominated semi-exposed bedrock shore with a rich biota, particularly in pools and under the dense algal cover (Pel; Fspi; XR; Fser; Cor; FK). Species present include the top shells *Gibbula umbilicalis* and *Osilinus lineatus*, the dogwhelk *Nucella lapillus*, the chiton *Lepidochitona cinerea*, the limpet *Patella ?depressa* and the brittlestar *Ophiothrix fragilis*.



< **Figure 15.2** Indicative distribution of the main biotopes in the lower inlet (based on data from survey sites shown in Figure 15.1, cited literature and additional field observations).

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Upstream, the shores at Penarrow Point and south of Messack Point are characterised by their slight gradient and low outcropping bedrock ridges between which sand or gravel is prevalent on the lower shore. Similar communities to those described for Percuil River (off Polvarth Point) are present; a lichen-dominated splash zone (YG; Ver) with some mobile species; a *Pelvetia/Fucus spiralis* zone (Pel; Fspi); an *Ascophyllum*-dominated zone (Asc) with littorinids and barnacle species, shore crabs, amphipods and other typical upper shore and mid-shore species. The lower mid-shore is dominated by *F. serratus* (Fser). Rockpools (Cor; FK) and gullies are present throughout. Downstream of Penarrow Point and north of Messack Point the shores are of steep bedrock (BPat) terminating in a stony beach (FserX). Communities are similar to those described from comparable shores in Percuil River.

Between Messack Point and King Harry Passage the lower shore comprises stones and sediment, as previously described from Percuil River. Upstream of King Harry Passage at Tom's Rock and in the Fal River, the littoral rocks are steep with some horizontal ridges usually covered with silt. Reduced salinity and high turbidity are prevalent, with a low density of species present. The splash zone holds only limited lichen species, mostly *C. marina*, *Caloplaca thallicola* and grey lichens (YG). The upper shore *Pelvetia/Fucus spiralis* zones (Pel; Fspi) include the red algae *Bostrychia scorpioides* and *Catenella caespitosa* and occasionally large amounts of *Enteromorpha* sp. The latter provides shelter for amphipods, littorinids and some *C. maenas*. The barnacle *E. modestus* is present, and upstream in the Fal, adjacent to mudflats, the laver spire shell *Hydrobia ulvae* is common. The mid-shore is *Ascophyllum*-dominated (Asc) with an under-storey of many other algal species. Littorinids, amphipods, *C. maenas*, and *E. modestus* are common here. At Tom's Rock, lower shore bedrock supports a luxuriant growth of sponges - many other species are present in low abundances at low water, including the native oyster *Ostrea edulis*, the barnacles *Balanus crenatus* and *Verruca stroemia* and many red algae (Fserr.T).

At Tregothnan Point and Malpas, the shores are of a shallow gradient on mixed substrata. Broken bedrock occurs on the upper shore with increasing amounts of mud and stones or shells lower down. Where bedrock is present on the upper shore, lichens (YG; Ver), *Pelvetia canaliculata* (Pel), *F. spiralis* (Fspi) and *Catenella caespitosa* are found. In other areas, *Enteromorpha* sp. and *B. scorpioides* are present. The only animals present are amphipods. The mid-shore is dominated by *Ascophyllum/Fucus vesiculosus* (Asc.VS; FvesX) with red algae. Amphipods, barnacles, littorinids, shore crabs, cirratulid worms and mussels *Mytilus edulis* are present, but in reduced numbers where furoid cover is absent. The lower shore is dominated by animals, notably the spionid worm *Polydora* sp., *E. modestus*, *M. edulis*, *C. maenas* and the hydroid *Laomedea flexuosa* (FserX). The red algae *Polysiphonia fucoides* and *Callithamnion* spp. are present in this zone.

Littoral sediment biotopes

Soft sediment communities within the Fal estuary exhibit a distinct gradation from the open sea to the upper reaches, in relation to various environmental factors including sediment type, salinity, turbidity, temperature and pollution levels. In fully marine conditions at the mouth of the Fal sheltered sand shores are very species-rich. Many species are found only at Amsterdam Point, including certain amphipods and polychaete worms, the sea cucumber *Leptopentacta ?elongata* and some bivalve molluscs (VsenMtru). Many other species including the brittlestars *Ophiura ophiura* and *Amphiura brachiata* and the sea potato *Echinocardium cordatum* are found around St Mawes and nowhere else in the inlet. These are generally species which prefer a sand substratum and high salinity. Dense beds of the sand mason worm *Lanice conchilega* are found in the lower shore muddy sand at Amsterdam Point (Lan). Where sandy mud is deposited, in Place Cove, east of Amsterdam Point, this is dominated by lugworm *Arenicola marina* (MacAre; HedMac). Higher up the Percuil River, at Percuil Boatyard, the sediment community is typical of a reduced salinity environment (Mu). Muddy sites upstream have a smaller range of species and are characterised by polychaete worms *Melinna palmata* and cirratulids

with the peppery furrow shell *Scrobicularia plana* and *Abra alba* (HedScr; HedStr). In the upper estuarine areas the sediment is dominated by *Hediste diversicolor* and oligochaetes (HedOl).

Bedrock and mixed substrata shores predominate in the main inlet, up to Trelissick. One area of sediment deposition in the mid-inlet is off Mylor Churchtown, at the entrance to Mylor Creek. Deep fine mud here contains polychaete worms, cirratulids, *Spio martinensis*, *Tubificoides* sp., *Heterochaeta costata* and cockles *Cerastoderma edule* (HedStr).

Restronguet Creek is dominated by estuarine muddy sediments with a low diversity of polychaetes, particularly *H. diversicolor* (HedScr) and oligochaetes including *Tubificoides* spp. and *H. costata* (HedOl). At Devoran the mudflats are fringed by the cord-grass *Spartina* sp. An area of muddy sand at the entrance to the creek is dominated by polychaetes *Nephtys* spp., *H. diversicolor* and *Pygospio elegans* (HedMac).

In the higher reaches of the inlet, the extensive reduced salinity muddy shores contain a reduced infauna dominated by *Nephtys hombergii* (HedStr). Muddy shores in the Ardevora inlet, River Fal, support *H. diversicolor*, *S. plana* and *C. edule* in abundance (HedScr). The eelgrass *Zostera noltii* is also present in widely-scattered patches on mid-and lower shore mudflats (Znol).

Sublittoral biotopes

There are only limited areas of sublittoral hard substrata within the Fal. Moderately exposed bedrock fringing the entrance to the Fal supports *Laminaria hyperborea* kelp forest (Lhyp.Ft). In more sheltered conditions further up the inlet, at St Mawe's Castle, *Laminaria ochroleuca* kelp forms a forest on broken bedrock with a dense understorey of red algae (Lhyp.Loeh). Broken bedrock below, interspersed with sandier patches, is covered by *Laminaria saccharina* kelp forest (Lsac.Ft). *L. saccharina* is also found with *Laminaria digitata* (Lsac.Ldig) where shallow sublittoral fringe bedrock and boulders occur in the lower Fal. Shallow bedrock outcrops and boulders scoured by sand in the lower inlet are covered by mixed kelps and a diverse range of scour-tolerant red algae (XKScrR; EphR). Where the inlet narrows, north of Turnaware Point, variable salinity bedrock provides attachment for epifauna and flora. Algae include *L. saccharina*, red algae such as *Hypoglossum hypoglossoides* and *Polysiphonia* spp.; the barnacle *Balanus crenatus*, keel worm *Pomatoceros* sp. and ascidians. Steep rock faces are covered with sponge *Halichondria panicea* and *Hymeniacidon perleve* (LsacRS.FiR). A bedrock slope at Tom's Rock supports such a community.

The remainder of the sublittoral Fal is predominantly comprised of sediments or mixed substrata. The deep-water channel which runs through Carrick Roads consists entirely of muddy substrata except for a few outcrops of bedrock. A wide variety of algae are found including the red algae *Dudresnaya verticillata* and *Antithamnion spirographidis* (XKScrR; CMX; FaMx). Animal populations include anthozoans, shore crabs, sponges and terebellid worms. At the entrance to the Fal, the deep channel consists of muddy sand and shells. The deep channel ascends from 30 m depth, increasing in gradient with decreasing depth, and adjoining dead maerl gravel in shallower water. This continues until it reaches the kelp-dominated bedrock fringing the inlet. Similarly, moving offshore, bedrock on the west side of the Fal entrance grades to boulders (XKScrR) and finally a flat plain of muddy shell gravel with cobbles (FaMx).

Extending further into the Fal, maerl beds are present off St Mawes. Live maerl is predominantly found in the central and southern part of the area where there are extensive patches of *Phymatolithon calcareum* (Phy.R) and *Lithothamnion corallioides* (Lcor), species protected by the EC Habitats Directive. Over 50 species of flora and many animal species are associated with the maerl. Common animals include the burrowing anemone *Cerianthus lloydii*, other anemones, crabs, polychaetes, fish and crustaceans. Areas of dead maerl gravel are found south of Penarrow Point. These hold a relatively reduced epifauna and flora, but are still species-rich. A smaller area of maerl is found south of Castle Point (Phy). Shallow sands bordering the maerl beds are important for their eelgrass *Zostera marina* beds (Zmar). Algae are commonly found among the *Zostera* plants. Animal species present include anemones, the swimming crab *Liocarcinus depurator*, hermit and shore crabs, sea urchins and brittlestars. High densities of cuttlefish *Sepia officinalis* (eggs and individuals) have been recorded here.

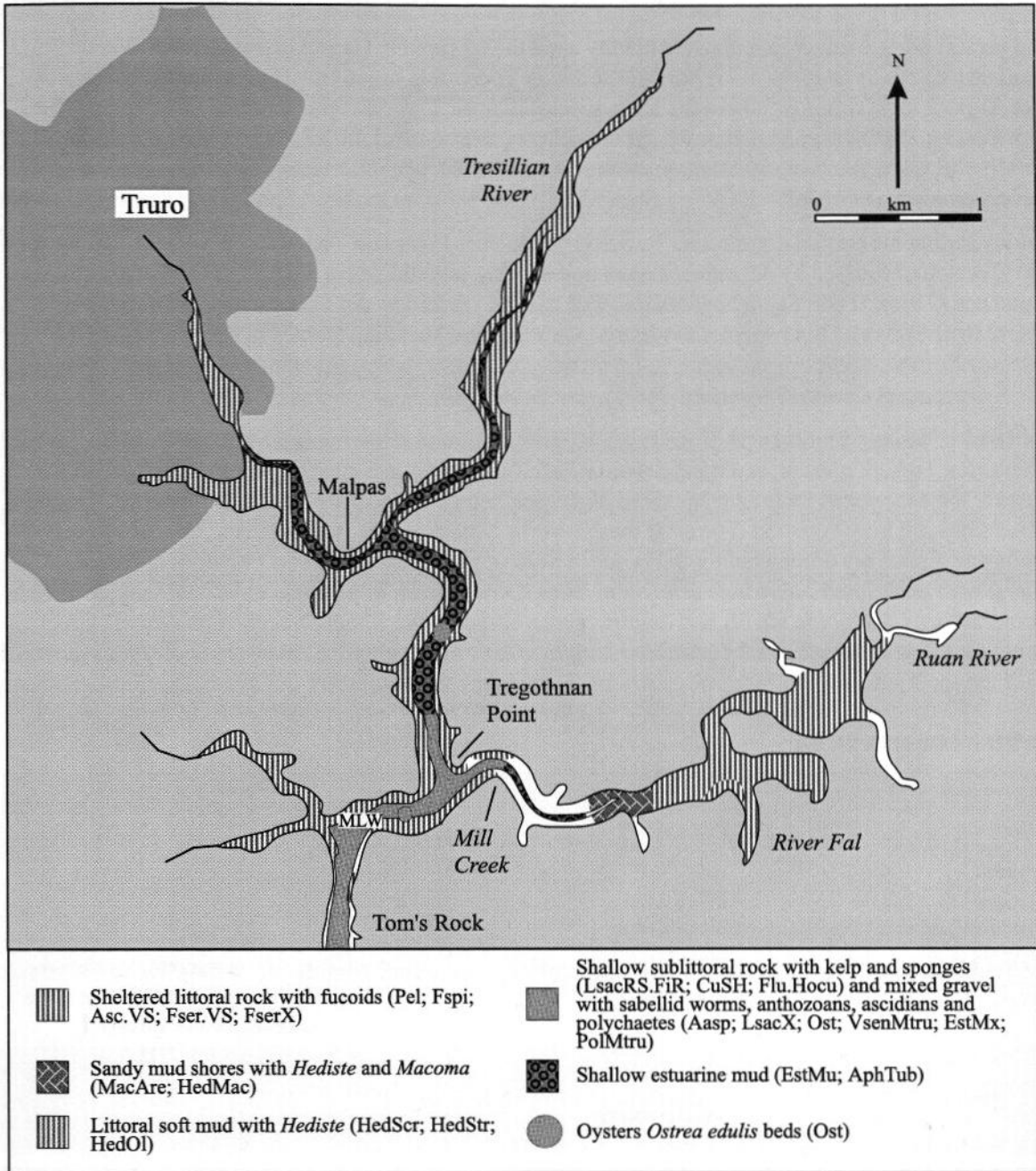


Figure 15.3 Indicative distribution of the main biotopes in the upper inlet (based on data from survey sites shown in Figure 15.1, cited literature and additional field observations).

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In shallow depths of the Penryn and Percuil Rivers are areas of brown mud lying over an anoxic layer (AphTub). Some attached algae may be present with animal populations including some crabs, swimming crabs, anthozoans, the slipper limpet *Crepidula fornicata*, the polychaete *Myxicola infundibulum* and sponges.

The central north bank is an extensive muddy shell gravel plain in Carrick Roads (FaMx; VsenMtru). Dead *Ostrea edulis* shells provide hard substrata for encrusting organisms. The habitat supports a species-poor algal meadow where the main species include *L. saccharina*, *Chorda filum* and *Gracilaria gracilis* (LsacX). Common fauna includes anemones *C. lloydii* and *Cereus pedunculatus*, the sabellid worm *M. infundibulum*, *H. panicea* and numerous mobile species including crabs and polychaete worms.

Muddy sediments continue upstream. Between Turnaware Point and Tom's Rock areas of muddy shell gravel are characterised by *M. infundibulum* and another sabellid worm *Megalomma vesiculosum*, anemones *C. lloydii* and *Sagartiogeton undatus* and the spionid worm *Chaetopterus variopedatus* (VsenMtru; EstMx). Other species associated with the hard substrata (stones or shells) include the barnacle *Balanus crenatus*, anthozoans, ascidians and the keel worm *Pomatoceros lamarcki*. Many free-living decapods and fish are also found here (Aasp).

The mud in the uppermost parts of the Fal is typically soft and estuarine (EstMu; AphTub). Soft white 'china clay', where present, is almost devoid of life. Very few algal species penetrate to these upper reaches, the exceptions including some red algae, sea lettuce *Ulva* sp. and *Enteromorpha* sp. Animal populations are impoverished. The sand mason worm *Lanice conchilega* is present in Truro River. Shells and stones are dominated by *B. crenatus*, keel worms *P. lamarcki* and *Polydora* sp. among others, with occasional *Metridium senile* and crabs. Downstream of Malpas, additional species include the anthozoans *Anemonia viridis* and *Sagartiogeton undatus*, the whelk *Buccinum undatum*, slipper limpet *Crepidula fornicata* and *Ophiothrix fragilis*.

Nature conservation

Conservation sites			
Site name	Position	Status	Main features
Cornwall	N/A	AONB	High scenic quality
Roseland	SW843395- SX016441	HC	Coastal scenery
Fal and Helford	SW935495	cSAC	<i>Rumex rupestris</i> (shore dock). Mudflats and sandflats not covered by seawater at low tide. Sandbanks which are slightly covered by sea water all the time.
Falmouth Bay and The Lizard	SW851309- SW662200	SMA	Marine biological
Fal & Ruan estuary	SW888423	SSSI	Biological
Upper Fal estuary & woods	SW850410	SSSI	Biological
Malpas estuary	SW835430	SSSI	Biological
Fal estuary: several sites	SW8--3--/ SW8--4--	NT	Foreshore, cliffs and fields, estuarine woodland
Fal-Ruan estuary (Upper Fal)	SW890405	CWT	Waders

Human influences

Falmouth is a major port where container and fishing vessels berth for transferring cargo. There are boat-building and repair yards at Penryn and Falmouth and passenger ferries run within the Fal. Smaller harbours are found at Truro, Mylor, Penrhyn and St Mawes. Dredgers carrying maerl gravel taken from Carrick Roads unload at Truro while the other harbours deal mainly with pleasure craft and fishing vessels. There are four marinas within the inlet. The port of Truro is becoming increasingly important for short sea shipping and cargo transfer and also provides lay-up facilities for large vessels.

There is a native oyster *Ostrea edulis* fishery within the Fal; dredging for oysters occurs in Carrick Roads in addition to experimental farming of Pacific oysters *Crassostrea gigas*. Fishery activities include netting for fish, potting for lobster *Homarus gammarus* and crab *Cancer pagurus*, and shrimping. There is some bait-digging around Truro.

Leisure activities are widespread including sailing and canoeing, power boating, water skiing and windsurfing. A number of yacht clubs operate within the inlet and there are several marinas at Falmouth. Beach recreation is centred on Looe beach and Flushing. Wildfowling takes place in the upper reaches of the Fal.

References and further reading

- Davies, J., & Sotheran, I. 1995. *Mapping the distribution of benthic biotopes in Falmouth Bay and the lower Fal Ruan estuary*. Peterborough, English Nature. (English Nature Research Report, No. 119.)
- National Rivers Authority South West Region. 1992. *NRA South-west Region estuary data 1990 to 1992*. Unpublished, National Rivers Authority South-west Region.
- Powell, H.T., Holme, N.A., Knight, S.J.T., & Harvey, R. 1978. Survey of the littoral zone of the coast of Great Britain: Report of the shores of Devon and Cornwall. (Contractor: Scottish Marine Biological Association/Marine Biological Association Intertidal Survey Unit.) *Nature Conservancy Council, CSD Report*, No. 209.
- Rostron, D. 1985. Surveys of harbours, rias and estuaries in southern Britain: Falmouth. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke.) *Nature Conservancy Council, CSD Report*, No. 623. (FSC Report, No. FSC/OPRU/49/85.)

Sites surveyed

- Survey 14: 1986-89 MNCR general surveys of Sector 8 - western Channel (MNCR, unpublished data).
- Survey 244: 1985 HRE survey of the Fal estuary (Rostron 1985).
- Survey 265: 1970-1980 SMBA/MBA Great Britain intertidal survey (Powell *et al.* 1978).
- Survey 433: 1990 NRA SW Region littoral and sublittoral survey of the Fal estuary (National Rivers Authority 1992).

Littoral sites (listed north to south)					
Survey	Site	Place	Grid reference	Latitude/longitude	Biotopes present
433	20	Pencalenick, Fal estuary.	SW 861 455	50°16.2'N 05°00.1'W	HedStr
433	15	Truro, Fal estuary.	SW 830 445	50°15.5'N 05°02.6'W	HedScr
433	19	St Clement, Fal estuary.	SW 853 438	50°15.2'N 05°00.7'W	HedStr
433	16	Truro/STW, Fal estuary.	SW 832 437	50°15.1'N 05°02.5'W	HedStr
433	21	Merther Lane, Fal estuary.	SW 856 436	50°15.1'N 05°00.4'W	HedStr
433	14	Malpas Road, Fal estuary.	SW 837 433	50°14.9'N 05°02.0'W	HedScr
433	18	Malpas 2, Fal estuary.	SW 847 431	50°14.8'N 05°01.2'W	HedStr
244	L18	Malpas, Tresillian River.	SW 847 429	50°14.7'N 05°01.2'W	YG, Ver. Ver, Pel, Fspi, Fves, Asc. VS, FvesX, Fserr. VS, HedScr
433	17	Malpas 1, Fal estuary.	SW 844 425	50°14.5'N 05°01.4'W	HedStr
433	13	Old Kea - Manor House, Fal estuary.	SW 842 423	50°14.4'N 05°01.6'W	HedScr
433	22	St Michael Penkevil, Fal estuary.	SW 852 418	50°14.1'N 05°00.7'W	HedStr
433	25	Ruan Lanhorne, Fal estuary.	SW 887 418	50°14.2'N 04°57.8'W	HedOl
433	24	Lamorran, Fal estuary.	SW 878 417	50°14.1'N 04°58.5'W	HedStr
433	12	Old Kea, Fal estuary.	SW 845 415	50°14.0'N 05°01.3'W	HedStr

Littoral sites (listed north to south) continued					
Survey	Site	Place	Grid reference	Latitude/longitude	Biotores present
244	L16	Warren Wood, Fal River.	SW 855 409	50°13.7'N 05°00.4'W	YG, Ver.Ver, Pel, Fspi, Asc.VS, Fserr.VS, FserX, SR
244	L8/2	Ardevora Inlet, Fal River.	SW 875 408	50°13.7'N 04°58.7'W	HedScr
244	L17	Tregothnam Point, Fal River.	SW 851 407	50°13.5'N 05°00.8'W	FserX, LMX
433	11	Coombe, Fal estuary.	SW 837 407	50°13.5'N 05°01.9'W	HedStr
433	23	Ardevora, Fal estuary.	SW 877 407	50°13.6'N 04°58.6'W	HedScr
244	L9	SW point, Ardevora Inlet, Fal River.	SW 874 405	50°13.5'N 04°58.8'W	Ver.Ver, Fspi, FvesX, ZnoI
433	10	Cowlands, Fal estuary.	SW 838 405	50°13.4'N 05°01.8'W	HedStr
433	26	Philleigh, Fal estuary.	SW 868 405	50°13.5'N 04°59.3'W	HedMac
244	8/1	Mill Creek, Fal River.	SW 853 404	50°13.4'N 05°00.6'W	HedStr
244	L15	Tom's Rock, King Harry's Passage.	SW 843 397	50°13.0'N 05°01.4'W	YG, Ver.Ver, Pel, Fspi, Asc.Asc, Fser.Fser, Fserr.T
433	6	Devoran 1, Fal estuary.	SW 794 389	50°12.5'N 05°05.5'W	HedOl
433	7	Devoran 2, Fal estuary.	SW 800 389	50°12.5'N 05°05.0'W	HedOl
433	M	E of Tallack Creek, Fal estuary.	SW 803 386	50°12.3'N 05°04.7'W	HedStr
244	L3	Trelissick Point, King Harry's Passage.	SW 839 386	50°12.4'N 05°01.7'W	YG, Ver.Ver, Pel, Fspi, Asc.Asc, FserX, LMX
433	8	Chycoose, Fal estuary.	SW 813 386	50°12.3'N 05°03.9'W	HedStr
244	L6	Turnaware Point, King Harry's Passage.	SW 836 383	50°12.2'N 05°01.9'W	YG, Ver.Ver, Pel, Fspi, Asc.Asc, Fves, FvesX, Fser.Fser, FserX.T, BarSh, Lsac.Ft
433	9	Penpol/Feock, Fal estuary.	SW 814 382	50°12.1'N 05°03.8'W	HedStr
265	315	Loe Beach, Feock.	SW 827 381	50°12.1'N 05°02.7'W	Pel, Fspi, Asc.Asc, Fser
433	N	Restronguet Creek, Fal estuary.	SW 813 378	50°11.9'N 05°03.8'W	HedMac.Pyg
433	5	Restronguet Passage, Fal estuary.	SW 814 375	50°11.7'N 05°03.7'W	Mare
244	L1	Messack, Fal estuary.	SW 839 364	50°11.2'N 05°01.6'W	YG, Ver.Ver, Pel, Fspi, Asc.Asc, Fves, Fser.Fser, FserX.T, Cor, G, SR
244	L2	Messack Rock, S, Fal estuary.	SW 839 363	50°11.1'N 05°01.6'W	YG, Ver.Ver, Pel, BPat, Asc.Asc, SR
433	31	Trethem Mill, Fal estuary.	SW 862 362	50°11.1'N 04°59.7'W	HedStr
265	337	St Just-In-Roseland.	SW 846 359	50°10.9'N 05°01.0'W	FserX
244	L19	St Just, Carrick Roads.	SW 844 356	50°10.8'N 05°01.2'W	YG, Ver.Ver, Pel, Fspi, BPat.Sem, Asc.Asc, Fser.Fser, Cor, Ov, LMS
433	4	Mylor Churchtown, Fal estuary.	SW 822 354	50°10.6'N 05°03.0'W	HedStr
244	L20	E of Mylor Quay, Carrick Roads.	SW 823 353	50°10.6'N 05°02.9'W	Fspi, Asc.Asc, Fser.Fser, SByAs
433	32	Adjacent to Portscatho, Fal estuary.	SW 865 351	50°10.6'N 04°59.4'W	HedStr
244	L7	S of Pennarrow Point, Carrick Roads.	SW 826 345	50°10.2'N 05°02.6'W	YG, Ver.Ver, Pel, Fspi, BPat.Cat, FvesB, Him, Fser.Fser, Cor, G, SR
433	3	Trevisson House, Fal estuary.	SW 797 343	50°10.0'N 05°05.1'W	HedStr
244	L24	St Mawe's Beach, North Point, Carrick Roads.	SW 842 341	50°10.0'N 05°01.3'W	LGS
433	2	Falmouth Marina, Fal estuary.	SW 798 337	50°09.7'N 05°05.0'W	HedOl
244	L22	Flushing Yacht Club Quay, Penrhyn River.	SW 809 336	50°09.6'N 05°04.0'W	YG, Ver.Ver, Pel, BPat.Cht, Fser.Fser
244	L13	Opposite N Hill Point Percuil, Percuil River.	SW 855 334	50°09.6'N 05°00.2'W	YG, Ver.Ver, Pel, Fspi, Asc.Asc, FvesX, FserX

Littoral sites (listed north to south) continued

Survey	Site	Place	Grid reference	Latitude/longitude	Biotores present
244	L11	N of Castle Point, Carrick Roads.	SW 837 333	50°09.5'N 05°01.7'W	Ver. Pel, Fspi, Asc, XR, Fser, Cor, FK, SByAs, Ldig.Ldig
244	L12	Percuil Boatyard, Percuil River.	SW 855 333	50°09.6'N 05°00.2'W	HedStr
244	L14	St Mawes Quay NE side, Percuil River.	SW 848 330	50°09.4'N 05°00.7'W	Ver.Ver, BPat.Cht, Sac
244	L5	Amsterdam Point, Percuil River.	SW 852 325	50°09.1'N 05°00.4'W	YG, Ver.Ver, Pel, Fspi, BPat, Asc.Asc, Fves, Fser.Fser.Bo, EphX, Cor, SR, Lan
244	L10	Cellar Beach East, Percuil River.	SW 855 324	50°09.1'N 05°00.1'W	YG, Ver.Ver, Pel, Fspi, Asc.Asc, Fser.Fser, SR, LMX
14	5	Place Cove/Amsterdam Point, Percuil River.	SW 855 323	50°09.0'N 05°00.1'W	MacAre, HedMac.Are
265	292	Carricknath, St Mawes.	SW 845 320	50°08.8'N 05°01.0'W	Pel, Fspi, Asc, Fser
244	L4	Great Molunan, Falmouth Bay.	SW 846 316	50°08.6'N 05°00.9'W	YG, Ver.Ver, BPat, BPat.Lic, FvesB, XR, Him, FK, SR, Ldig.Ldig, Lhyp.Ft

Sublittoral sites (listed north to south)

Survey	Site	Place	Grid reference	Latitude/longitude	Biotores present
244	44	Malpas, Tresillian River.	SW 847 429	50°14.7'N 05°01.2'W	LsacRS.FiR, EstMu, EstMx
244	45	Truro River.	SW 840 425	50°14.5'N 05°01.7'W	Lcon
244	46	Maggoty Bank, Truro River.	SW 849 419	50°14.2'N 05°01.0'W	EstMu, Ost
433	P	Kea Church, Fal River, Fal estuary.	SW 848 417	50°14.1'N 05°01.0'W	AphTub
244	35	W Warren Wood Point, Truro River.	SW 849 408	50°13.6'N 05°00.9'W	LsacRS.FiR, EstMu, EstMx
244	36	E Warren Wood Point, Fal River.	SW 854 408	50°13.6'N 05°00.5'W	LsacX
244	38	Barges, Warren Wood Point, Truro River.	SW 850 408	50°13.6'N 05°00.8'W	LsacRS.FiR, Flu.Hocu
433	Q	Polgerran Wood, Fal River, Fal estuary.	SW 845 404	50°13.4'N 05°01.2'W	PolMtru
433	27	Polgerran Woods, Fal estuary.	SW 845 403	50°13.3'N 05°01.2'W	AphTub
244	47	NE of Smugglers, Fal estuary.	SW 847 403	50°13.3'N 05°01.1'W	MytHAs, Aasp, EstMu, EstMx, Ost,
433	R	N of King Harry Ferry, Fal estuary.	SW 842 398	50°13.0'N 05°01.5'W	PolMtru
244	39	Tom's Rock, King Harry Passage.	SW 843 397	50°13.0'N 05°01.4'W	CuSH, CMX, LsacRS.FiR
433	28	King Harry Ferry, Fal estuary.	SW 843 395	50°12.9'N 05°01.4'W	AphTub
433	S	Tolcarne Wood, Fal River, Fal estuary.	SW 841 386	50°12.4'N 05°01.5'W	VsenMtru
244	31	Turnaware Point buoy, Fal estuary.	SW 835 385	50°12.3'N 05°02.0'W	LsacX
433	29	Turnaware Point, Fal estuary.	SW 836 384	50°12.3'N 05°01.9'W	AphTub
244	30	E of Pill Plantation, Fal estuary.	SW 833 384	50°12.3'N 05°02.2'W	Lsac.T, PomByC, FaMS, LsacX
244	40	Turnaware Rock Ledge, Fal estuary.	SW 835 384	50°12.3'N 05°02.0'W	CuSH, CMX
433	F	SW of Turnaware Point, Fal estuary.	SW 835 383	50°12.2'N 05°02.0'W	FaMx
244	26	Hole off Pill Point, Fal estuary.	SW 832 381	50°12.1'N 05°02.3'W	FaMx
244	4	Commererans Farm, Fal estuary.	SW 834 374	50°11.7'N 05°02.1'W	LsacX
244	48	Central N Bank, Fal estuary.	SW 832 374	50°11.7'N 05°02.2'W	LsacX
244	13	E Carrick Carlys Rock, Fal estuary.	SW 826 371	50°11.6'N 05°02.7'W	EstMu
244	50	Restronguet Point, Fal estuary.	SW 817 370	50°11.5'N 05°03.5'W	IMX, Aasp, EstMu, EstMx, LsacX
433	G	E of Carrick Carlys Rock, Fal estuary.	SW 825 369	50°11.4'N 05°02.8'W	VsenMtru
433	O	Restronguet Creek (mouth of), Fal estuary.	SW 817 369	50°11.4'N 05°03.5'W	EstMx
433	H	S of Restronguet Point, Fal estuary.	SW 820 367	50°11.3'N 05°03.2'W	AphTub
433	I	Greatwood, Fal estuary.	SW 822 363	50°11.1'N 05°03.0'W	NhomTub
244	3	Messack Point, Fal estuary.	SW 842 358	50°10.9'N 05°01.3'W	LsacX
244	37	Entrance, St Just Harbour, Fal estuary.	SW 843 357	50°10.8'N 05°01.3'W	Lsac.Ft, LsacX
433	E	Off Messack Point, Fal estuary.	SW 839 356	50°10.8'N 05°01.6'W	VsenMtru
433	D	Carclase Point, Fal estuary.	SW 841 347	50°10.3'N 05°01.4'W	VsenMtru

Sublittoral sites (listed north to south) continued

Survey	Site	Place	Grid reference	Latitude/longitude	Biotores present
244	14	Offshore Carclase Point, Fal estuary.	SW 839 347	50°10.3'N 05°01.6'W	EstMu
244	15	Inshore Carclase Point, Fal estuary.	SW 841 347	50°10.3'N 05°01.4'W	EstMu
244	1	S of Pennarrow Point, Carrick Roads.	SW 862 346	50°10.3'N 04°59.6'W	EstMx, Zmar
244	29	SW of Carclase Point near skiing buoy, Fal estuary.	SW 841 345	50°10.2'N 05°01.4'W	Lcor, FaMx
244	5	Stamwood wreck, Fal estuary.	SW 837 344	50°10.1'N 05°01.7'W	AlcMaS, FaMx
244	12	St Mawe's Bank, Carrick Roads.	SW 839 343	50°10.1'N 05°01.5'W	XKScrR, Phy, Zmar, FaMx, LsacX, Lcor
244	49	Trefusis Cliffs, Fal estuary.	SW 825 343	50°10.0'N 05°02.7'W	SedK, Zmar, LsacX
244	11	Vilt Buoy, Fal estuary.	SW 833 342	50°10.0'N 05°02.0'W	Phy, FaMx, Lcor
244	19	Vilt (St Mawes) Bank, Carrick Roads.	SW 838 342	50°10.0'N 05°01.6'W	Phy
244	20	S Vilt Buoy, Fal estuary.	SW 833 342	50°10.0'N 05°02.0'W	MrlMx
244	28	E of the Vilt, Fal estuary.	SW 833 339	50°09.8'N 05°02.0'W	LsacX
433	L	Percuil Slipway, Fal estuary.	SW 858 338	50°09.8'N 04°59.9'W	AphTub
244	2	Trefusis Gully, Fal estuary.	SW 821 337	50°09.7'N 05°03.0'W	XKScrR, Lsac.Ldig, Phy, Phy.R, LsacX
244	8	St Mawe's Bank (maerl), Fal estuary.	SW 837 336	50°09.7'N 05°01.7'W	Lcor
244	27	St Mawe's Bank Maerl Bed, Fal estuary.	SW 837 336	50°09.7'N 05°01.7'W	Lcor
433	K	Inner Harbour, Penryn River, Fal estuary.	SW 815 335	50°09.6'N 05°03.5'W	AphTub
244	43	Penryn River, Penrhyn River.	SW 804 334	50°09.5'N 05°04.4'W	CMX
244	23	Opposite boatyard, Percuil, Percuil River.	SW 857 333	50°09.6'N 05°00.0'W	EstMu, EstMx
244	16	E Narrows Buoy, Carrick Roads.	SW 836 332	50°09.5'N 05°01.8'W	AlcMaS, Aasp
244	42	Falmouth Inner Harbour, Penrhyn River.	SW 813 332	50°09.4'N 05°03.7'W	LsacX
244	41	Queens Jetty, Penrhyn River.	SW 819 330	50°09.3'N 05°03.2'W	Lsac.Ldig, SubSoAs
244	7	St Mawes Castle, Fal estuary.	SW 841 327	50°09.2'N 05°01.3'W	Lhyp.Loeh, Lsac.Ft
433	C	E Narrow, Fal estuary.	SW 837 327	50°09.2'N 05°01.7'W	Phy
244	34	NE of the Governor, Fal estuary.	SW 829 327	50°09.2'N 05°02.3'W	XKScrR, LsacX
433	J	Off Eastern Breakwater, Fal estuary.	SW 824 326	50°09.1'N 05°02.7'W	FaG
244	18	Off Eastern Breakwater, Fal estuary.	SW 825 326	50°09.1'N 05°02.7'W	Phy
244	22	St Anthony, North Point, Percuil River.	SW 856 326	50°09.2'N 05°00.1'W	LsacX
244	33	W of the Governor, Fal estuary.	SW 828 326	50°09.1'N 05°02.4'W	XKScrR, Phy, LsacX, FaG
433	A	Amsterdam Point, Percuil River, Fal estuary.	SW 854 325	50°09.1'N 05°00.2'W	VsenMtru
244	24	Pill Plantation, Fal estuary.	SW 831 325	50°09.1'N 05°02.2'W	Lsac.Ldig, EphR, SubSoAs, CMX
433	B	St Mawes Harbour, Fal estuary.	SW 846 324	50°09.1'N 05°00.9'W	VsenMtru
244	51	St Mawes Buoy, Fal estuary.	SW 842 324	50°09.1'N 05°01.2'W	Phy
244	6	Carrick north Point, Fal estuary.	SW 847 323	50°09.0'N 05°00.8'W	FaS, Zmar
244	21	W of Carrick north Point, Fal estuary.	SW 844 318	50°08.7'N 05°01.0'W	XKScrR, Phy.R, FaMS, LsacX
244	9	E Black Rock, Fal estuary.	SW 836 317	50°08.7'N 05°01.7'W	Sac, Phy, FaMS, LsacX, CMX
244	32	Pendennis Point, Falmouth Bay.	SW 828 315	50°08.5'N 05°02.4'W	Lhyp.Ft, SCAs.ByH, LsacX, Lcor

Compiled by: Jan Smith, Jon Moore and Kate Northen

Location

Position (centre)	SW7626	50° 05' N 05° 06' W
Administrative area	Cornwall	Kerrier
Conservation agency/area	English Nature	Devon & Cornwall

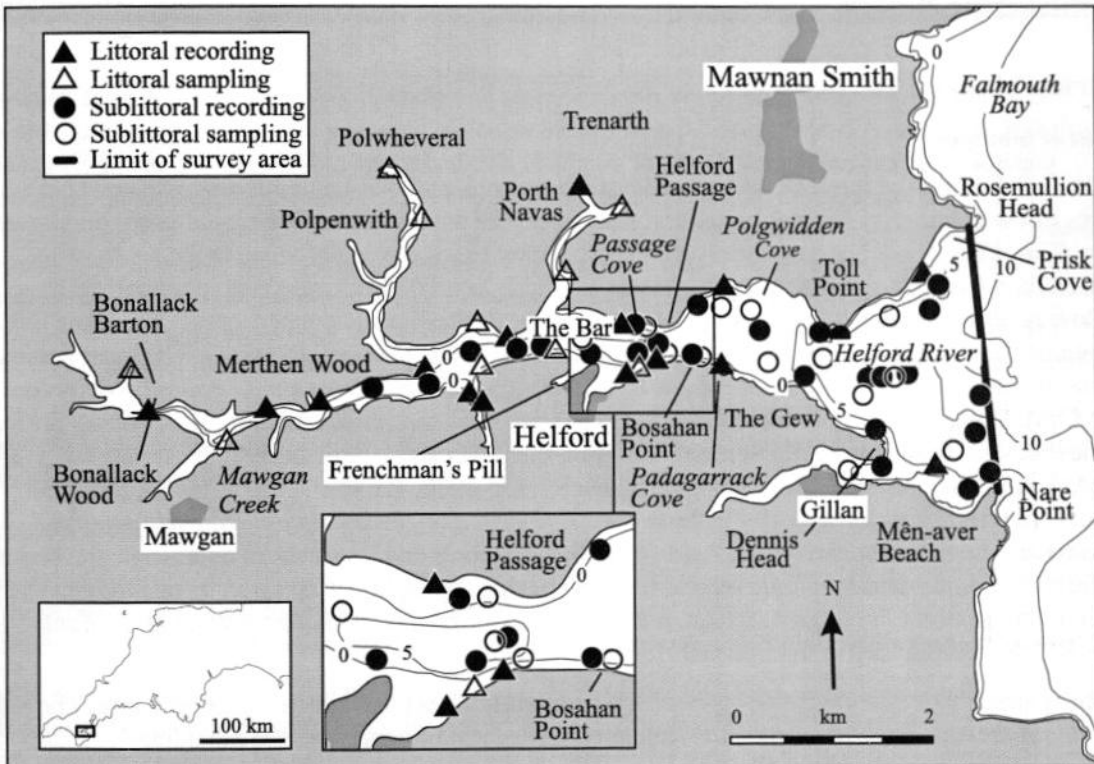


Figure 16.1 Main features of the area, and sites surveyed.

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Physical features

<i>Physiographic type</i>	Ria
<i>Length of coast</i>	47 km
<i>Area of inlet</i>	Total 820 ha; intertidal 190 ha
<i>Length of inlet</i>	10 km
<i>Bathymetry</i>	Very shallow; maximum depth 14 m
<i>Wave exposure range</i>	Moderately exposed to extremely sheltered
<i>Tidal stream range</i>	Very weak; never more than 1 knot
<i>Tidal range</i>	4.7 m (spring); 2.3 m (neap)
<i>Salinity range</i>	Fully marine to estuarine

Introduction

The ria of the Helford River lies on the east side of the Lizard peninsula in south Cornwall. It possesses a number of relatively short side branches and creeks which are generally narrow, steep-sided and densely wooded. The River itself is fairly narrow, widening at the entrance. The upper reaches are so silted-up that, at low tide, about 3.5 km of the river dries out. Most of the lower inlet consists of sublittoral sediments, fringed with rocky shores and cliffs.

The Helford River is a Voluntary Marine Conservation Area and lies within the Cornwall Area of Outstanding Beauty. It is also a major nursery for the bass *Dicentrarchus labrax*.

Marine biological surveys			
	Survey methods	Date(s) of survey	Source
Littoral	Recording	July 1994	MNCR (unpublished data)
	Recording	June/October 1986	Rostron (1987)
	Recording	February/March 1977	Powell <i>et al.</i> (1978)
	Infaunal sampling (cores)	October 1990	NRA (1992)
Sublittoral	Recording	July 1987	Rostron (1987)
	Infaunal sampling (pipe dredge & suction sampler)	July 1987	Rostron (1987)

Marine biology

Littoral biotopes

Extensive platforms of moderately exposed broken bedrock are found on both the north and south shores of the entrance to the Helford River. Rockpools are present on the lower mid-shore and lower shore (Cor; FK). These have extremely rich algal communities especially those to the south of Rosemullion Head. In this area, the substratum is a fairly level bedrock resulting in numerous large shallow pools containing a wide variety of algae. Many of these contain maerl gravel and some live *Phymatolithon calcareum*. Eelgrass *Zostera marina* grows in some pools (SwSed). The most notable feature is the abundant growth of the algae *Cystoseira* spp., *Jania rubens* and *Corallina officinalis* (Cor.Cys). Faunal diversity in these pools is low, anthozoans and prosobranch molluscs being the main species present. In the lower reaches, overhangs on the lower shore have fairly rich communities (SR; SByAs). Animals present include sponges, barnacles, top shells, the starfish *Asterina gibbosa* and anthozoans. Algal species typically include *Gelidium latifolium*, *Palmaria palmata*, *Mastocarpus stellatus* and *Lomentaria clavellosa*. Aside from the rockpools and lower shore overhangs, the bedrock platforms are dominated by barnacles and limpets (Ver.B; BPat.Cht) in the upper to mid-shore. The lower shore supports *Fucus serratus* and red algal turfs of *Osmundea pinnatifida* and *M. stellatus* (Fser.R; XR), giving way to thong weed *Himantalia elongata* below.

At Padagarrack Cove, smooth sloping bedrock outcrops adjacent to sand on the lower shore. The red alga *Rhodothamniella* is abundant (Rho) and a variety of sand-tolerant species including *Chondracanthus acicularis* and *Spyridia filamentosa* are present. No animals have been recorded from this site. South of Prisk Cove and at Padagarrack Cove, rich animal communities are associated with boulders or overhanging surfaces (SByAs; SR) on the lower shore. Animals present include serpulid worms, the barnacle *Verruca stroemia*, the broad-clawed porcelain 'crab' *Porcellana platycheles*, the sea urchin *Psammechinus miliaris* and the starfish *A. gibbosa*.

Further up the inlet the presence of littoral rock decreases. The Bar, on the north side of the inlet, opposite Helford, is an extensive area of littoral sediment flats backed by shingle. Substrata present range from sandy mud to pebbles and gravel, but are predominantly muddy sand. Some patches of muddy sand are colonised by eelgrass *Z. marina* (Zmar). In general the fauna is impoverished throughout, particularly in the more muddy areas. Dominant species include the sand mason worm *Lanice conchilega* (Lan), the polychaete worm *Myxicola infundibulum* and the hermit crab *Pagurus bernhardus*. The cockle *Cerastoderma edule* is also found in this muddy sand. A wide variety of algal species is found on pebbles including *Ceramium nodulosum*, *Gracilaria gracilis* and *Polysiphonia elongata*. *Sargassum muticum*, *Chorda filum* and other algae are also present (FserX). On the south side of the river channel, at Treath, the muddy sand flat supports extensive *Z. marina* beds (Zmar) with dense *L. conchilega* on the lower shore (Lan).

In Passage Cove (west of Helford Passage), areas of pebbles and gravel on the lower shore support dense populations of burrowing polychaetes, mostly *M. infundibulum* and *Branchiomma bombyx*. A few animals are associated with the pebbles including the chinaman's hat *Calyptrea chinensis* and the brittlestar *Ophiothrix fragilis*. The algae *Gracilaria multipartita*, *G. gracilis* and *Ulva* sp. are

dominant (LsacX). Sediment infauna is of limited diversity. Species present include the mollusc *Lucinoma borealis*, the capitellid worms *Capitella* sp. and *Mediomastus fragilis*, nematodes and oligochaetes (FaMS).

Opposite Passage Cove lower shore muddy sands at Treath support extensive patches of *Z. marina* (Zmar) and dense aggregations of *L. conchilega* (Lan).

There are extensive littoral mud-banks in the Helford River. At Trenarth Bridge, at the tidal limit of one of the creeks on the north of the inlet, there is a high cover of the brown alga *Fucus ceranoides* from near the upper shore to the stream in the creek base (FcerX). The green alga *Enteromorpha* sp. is also found here on the upper shore. Fauna includes shore crabs *Carcinus maenas* and the barnacle *Elminius modestus* while amphipods are found under stones. Mid-shore hard substrata supports the knotted wrack *Ascophyllum nodosum*. The lugworm *Arenicola marina* occurs in the mud (HedMac.Are); this community is also present on the south side at Frenchman's Pill.

Up-river, towards Bonallack Wood, shale and shingle shores are present, often replaced by mud towards low water. There is high furoid cover on these shores; *Pelvetia canaliculata* (Pel) and *Fucus spiralis* (Fspi) on the steep upper shore bedrock changing to *Fucus vesiculosus* and *A. nodosum* (AscX) on the mid-shore shingle. On the upper shore, the red algae *Bostrychia scorpioides* and *Catenella caespitosa* are ubiquitous. Throughout the shore, the fauna is limited, with only *C. maenas*, mussels *Mytilus edulis* and *E. modestus* being widespread. Lower shore muds are dominated by ragworm *Hediste diversicolor* and the peppery furrow shell *Scrobicularia plana* (HedScr).

Downstream of Merthen Wood, the fauna includes the gastropod molluscs *Littorina littorea* and *Littorina obtusata*, the limpet *Patella vulgata*, the barnacle *Semibalanus balanoides* and the sponge *Hymeniacidon perleve*.

Dense furoid-dominated shores are also found at Groyne Point, on sheltered bedrock (Pel; Fspi; Asc.Asc; Fser.Fser).

Sublittoral biotopes

Sublittoral bedrock is scarce and almost limited to the coastal fringe in the vicinity of the river mouth. In these areas the overall topography is fairly level and no circalittoral bedrock is present. The predominant substrata are sediments, grading from mud upstream to coarser sediments downstream.

At the entrance to the river, east of Polgwidden Cove and Dennis Head, kelp-dominated upper infralittoral bedrock is present (Lhyp.Ft; XKScrR), occasionally exposed to wave action. This is a fairly restricted habitat although it possesses a wide variety of algae including some unusual species. Animal populations are sparse, comprising mostly sponges and ascidians. Areas of vertical or overhanging bedrock in these areas are dominated by animals, with a small variety of algae (FaSwV). The main faunal species are the bryozoans *Scrupocellaria reptans* and *Bugula turbinata*, encrusting sponges and ascidians. Barnacles and spirorbid worms are also widespread.

Fine sand is found in the river mouth, east of The Gew and Toll Point. All hard substrata present are colonised by a great variety of algae. The rich fauna includes bivalves, molluscs and other typical sand-dwelling species such as the polychaete *Owenia fusiformis* and the sea potato *Echinocardium cordatum* (Sell; FabMag). In Gillan Harbour, *Lanice conchilega* reaches high abundances in the shallow sandy substratum (Lcon). Other species include shore crabs *Carcinus maenas*, anemones, sea urchins and polychaetes. In some areas, dense growths of *Ceramium nodulosum* cover the sand.

A thriving maerl bed, comprising up to 80% live *Lithothamnion corallioides*, a nationally rare species, is present off Bosahan Point (Lcor). Foliose algae are common, especially *Dictyota dichotoma*. Burrowing fauna include the sabellid worms *Branchiomma bombyx* and *Myxicola infundibulum*. Many species of anthozoans, crustaceans and molluscs are widespread. Maerl is also present elsewhere in the Helford. East of Dennis Head, maerl gravel *Phymatolithon calcareum* (Phy.R) occurs amongst shells and algal-encrusted pebbles.

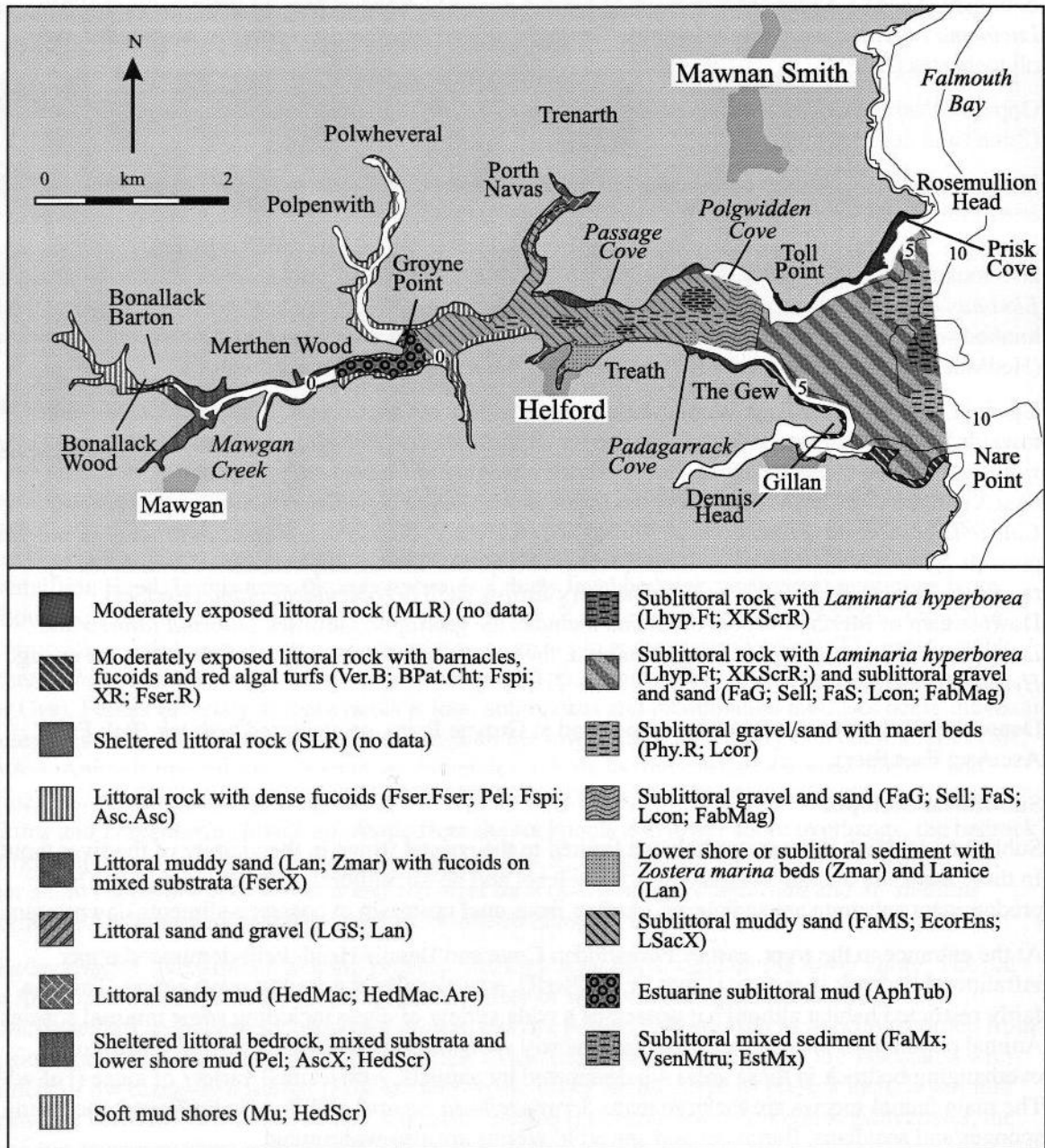


Figure 16.2 Indicative distribution of the main biotopes in the inlet (based on data from survey sites shown in Figure 16.1, cited literature and additional field observations).

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East of the Bosahan Point maerl gravel is a bed of eelgrass *Zostera marina* (Zmar). Few algae are present and polychaetes are the commonest fauna. Some anthozoan species are also present. The infauna is rich and includes the phyllodocid worm *Anaitides mucosa*, the polychaetes *Mediomastus fragilis* and *L. conchilega* and the amphipod *Microdeutopus versiculatus*.

In the upper infralittoral, boulders are sometimes present especially around the ria entrance. Communities present are similar to those of adjacent bedrock (XKScrR). On predominantly bedrock habitats at the river mouth, there are areas of cobbles and pebbles within the kelp forest. These possess a characteristic fauna including algal crusts, burrowing and encrusting fauna, gastropods, brittlestars and crustaceans.

Cobbles and pebbles lying on sediment substrata occur throughout the middle reaches of the inlet. There is a reasonable variety of algae, including *Cystoseira nodicaulis* and *Polysiphonia elongata* which grow well on larger rocks (LsacX). Few animal species are found, many of which use the algae for attachment. The non-native slipper limpet *Crepidula fornicata* and the sea hare *Aplysia punctata* are present.

Shell gravel, shells and stones are found in the upper infralittoral. Due to the shelter provided within the river, algal communities are able to develop over large expanses during the summer (LsacX). Many rare and interesting species are present. The (ubiquitous or common) fauna include the starfish *Asterias rubens*, hermit crabs *Pagurus berhardus*, razor shells *Ensis* sp. and terebellid worms. Many other species are present sporadically. The greater weaver fish *Trachinus draco* is present.

Where shallow muddy sand occurs, between Helford town and The Gew, *Echinocardium cordatum* and *Ensis* sp. are found (FaMS; EcorEns). Shallow sand with shells and pebbles is found in the middle reaches of the inlet (FaMx; VsenMtru; LsacX); algal variety is rich at downstream sites. Animal species present reflect the nature of the fine sediment rather than being determined by the presence of shells and pebbles. *M. infundibulum* and the ascidians *Sagartiogeton undatus* and *Metridium senile* are found along with *C. maenas*, sea urchins and *L. conchilega*.

At Passage Cove, east of Helford Passage, and at the entrance to Mawgan Creek, muddy sandy plains with scattered shells and pebbles support a good variety of algae including *Gracilaria gracilis* and *Chorda filum* (LsacX). The fauna is dominated by polychaetes, the anemone *Cereus pedunculatus* and shore crabs. Further upstream of Passage Cove, beyond Frenchman's Pill, the sediments are predominantly estuarine muds (AphTub). Algae colonise the small amounts of hard substratum present. The visible fauna are limited to polychaetes, anthozoans, crabs and shrimps, the butterflyfish *Pholis gunnellus* and bivalve molluscs. On the muddy plain west of Mawgan Creek, lugworm *Arenicola marina* are present.

Nature conservation

Conservation sites			
Site name	Position	Status	Main features
Cornwall	N/A	AONB	High scenic quality
Fal and Helford	SW935495	cSAC	<i>Rumex rupestris</i> (shore dock). Mudflats and sandflats not covered by seawater at low tide. Sandbanks which are slightly covered by sea water all the time.
Falmouth Bay and The Lizard	SW851309- SW662200	SMA	Marine biological
Rosemullion	SW795281	SSSI; GCR	Biological, geological
Merthen Wood	SW730263	SSSI; NCR	Biological
Meneage coastal section	SW777261	SSSI; GCR	Geological
Helford estuary	N/A	VMNR; VMCA	Marine biology
Helford River: many sites	SW7--2--	NT	Headland, farmland, beach, coastal woodland, wooded creek, cliffs

Human influences

The Helford River has a long history of human activity, providing a trade route for surrounding villages and towns. The hinterland is predominantly rural in character; silage and slurry runoff into streams are the main sources of organic pollution within the ria. Sewage inputs are variable, being greatest during the summer when the local population is increased by considerable numbers of tourists. Water quality is classified as grade A (highest quality).

There is a small commercial port at Gweek which is largely given over to recreational craft now. Exploitation of natural resources includes: native oyster *Ostrea edulis* (supplemented by imported stock); mussel *Mytilus edulis* and Pacific oyster *Crassostrea gigas* cultivation occurs off Port Navas;

netting for fish, shrimps and prawns; and crab and lobster *Homarus gammarus* potting. Bait-digging and collecting also occur, and cockle-collecting is a traditional activity. The River Helford is a recognised bass *Dicentrarchus labrax* nursery area and the fish are protected from fishing from May to December.

There has been a dramatic increase in the number of yachts and mooring facilities in recent years. Leisure activities are centred on the lower estuary and include sailing and canoeing, windsurfing, water skiing and beach recreation.

Many recent studies and ongoing monitoring of the marine biology have been carried out in connection with the inlet's status as a Voluntary Marine Conservation Area.

References and further reading

- Barne, J.H., Robson, C.F., Kaznowska, S.S., Doody, J.P., Davidson, N.C., & Buck, A.L. eds. 1996c. *Coasts and seas of the United Kingdom. Region 11 The Western Approaches: Falmouth Bay to Kenfig*. Peterborough, Joint Nature Conservation Committee. (Coastal Directories Series.)
- Jones, S.N. 1993. *A population study of the common cockle (Cerastoderma edule) in the beds at Helford Passage. Preliminary study 1992*. Unpublished report to Helford Voluntary Marine Conservation Area Advisory Group.
- Masters, J. 1994. *The Helford oysterage with notes on the River Fal*. Unpublished report to Helford Voluntary Marine Conservation Area Advisory Group.
- National Rivers Authority South West Region. 1992. *NRA South-west Region estuary data 1990 to 1992*. Unpublished, National Rivers Authority South-west Region.
- Powell, H.T., Holme, N.A., Knight, S.J.T., & Harvey, R. 1978. Survey of the littoral zone of the coast of Great Britain: Report of the shores of Devon and Cornwall. (Contractor: Scottish Marine Biological Association/Marine Biological Association Intertidal Survey Unit.) *Nature Conservancy Council, CSD Report*, No. 209.
- Protz, C. 1995. *Distribution of oysters and other molluscs in the Helford River (Ostrea edulis, Crassostrea gigas/angulata, Crepidula fornicata & Calyptraea chinensis)*. Unpublished report to Helford Voluntary Marine Conservation Area Advisory Group.
- Rostron, D. 1987. Surveys of harbours, rias and estuaries in southern Britain: the Helford River. (Contractor: Field Studies Council Oil Pollution Research Unit, Pembroke.) *Nature Conservancy Council, CSD Report*, No. 850. (FSC Report, No. FSC/OPRU/17/87.)
- Turk, S.M., & Tompsett, P.E. 1993. *A list of invertebrates and fishes recorded from the Helford River*. Unpublished report to Helford Voluntary Marine Conservation Area Advisory Group. (Studies on the marine life of the Helford River, No. 3)
- Turk, S.M., & Tompsett, P.E. 1993. *Trigging. A summary of the knowledge*. Unpublished report to Helford Voluntary Marine Conservation Area Advisory Group. (Studies on the marine life of the Helford River, No. 3)

Sites surveyed

- Survey 247: 1986-87 HRE survey of the Helford River (Rostron 1987).
- Survey 265: 1970-1980 SMBA/MBA Great Britain intertidal survey (Powell *et al.* 1978).
- Survey 436: 1990 NRA SW Region littoral survey of the Helford estuary (NRA 1992).
- Survey 466: 1994 MNCR littoral survey of Lizard Peninsula and Falmouth Bay (MNCR unpublished data).

Littoral sites (listed west to east)

<i>Survey</i>	<i>Site</i>	<i>Place</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotores present</i>
247	27	Bonallack Wood, Helford River.	SW 716 260	50°05.3'N 05°11.6'W	Pel, Fspi, AscX
436	1	Gweek Seal Sanctuary, Helford estuary.	SW 718 267	50°05.7'N 05°11.4'W	HedScr
436	2	Bishop Quay, Mawgans, Helford estuary.	SW 722 255	50°05.1'N 05°11.0'W	Mu
247	28	E of Merthen Wood Quay, Helford River.	SW 732 261	50°05.4'N 05°10.2'W	Pel, AscX
436	6	Polwheveral, Helford estuary.	SW 738 283	50°06.6'N 05°09.8'W	LMX
436	7	Polpenwith, Helford estuary.	SW 741 278	50°06.4'N 05°09.5'W	Mu
247	29	Groyne Point, Helford River.	SW 742 264	50°05.6'N 05°09.4'W	Pel, Fspi, Asc.Asc, Fser.Fser
247	30	Frenchman's Creek, Helford River.	SW 746 262	50°05.5'N 05°09.1'W	Pel, Fspi, BPat.Sem, Asc
436	4	Lower Calamansack, Helford estuary.	SW 746 267	50°05.8'N 05°09.1'W	LMX
436	5	Frenchman's Creek, Helford estuary.	SW 746 263	50°05.6'N 05°09.1'W	HedMac
247	31	Calmansack Point, Helford River.	SW 751 267	50°05.8'N 05°08.7'W	Fspi, Fser.Fser, AscX
436	9	S Porth Navas, Helford estuary.	SW 755 273	50°06.1'N 05°08.3'W	HedMac.Are
247	26	Trenarth Bridge, Porthnams, Helford River.	SW 757 282	50°06.6'N 05°08.2'W	FcerX
247	32	The Bar to Passage Cove, Helford River.	SW 759 268	50°05.9'N 05°08.0'W	FserX, Lan, Lsac.Ldig, Zmar
436	10	The Bar, Helford estuary.	SW 759 268	50°05.9'N 05°08.0'W	Lan
247	37	Treath, Helford River.	SW 761 263	50°05.6'N 05°07.8'W	Lan, Zmar
436	8	E Porth Navas, Helford estuary.	SW 762 279	50°06.5'N 05°07.8'W	HedMac.Are
265	343	Treath, Helford River.	SW 763 263	50°05.6'N 05°07.6'W	LGS
247	33	Between Bosahan Point and The Voose, Helford River.	SW 767 265	50°05.7'N 05°07.3'W	FK, SR, Sac
247	34	Padagarrack Cove, Helford River.	SW 772 263	50°05.6'N 05°06.9'W	Rho, SR
247	35	Durgan Rock Platform, Helford River.	SW 773 272	50°06.1'N 05°06.8'W	SwSed
436	11	Gillan Harbour, Helford estuary.	SW 784 253	50°05.1'N 05°05.8'W	Lan
265	305	Gillian Harbour, Helford River.	SW 785 253	50°05.1'N 05°05.8'W	LGS
247	36	S of Rosemullion Head, Helford River.	SW 792 272	50°06.1'N 05°05.2'W	FK, SwSed, SByAs
265	319	Mén-aver Point, Helford River.	SW 793 253	50°05.1'N 05°05.1'W	Fspi, Fves, Fser.Fser
466	15	Mén-aver Rocks, Helford River.	SW 793 253	50°05.1'N 05°05.1'W	YG, Ver.Ver, Ver.B, BPat.Cht, Fspi, Fves, Fser.R, XR, Cor, Cor.Cys

Sublittoral sites (listed west to east)

<i>Survey</i>	<i>Site</i>	<i>Place</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotores present</i>
247	12	N of Tremayne Quay, Helford River.	SW 734 262	50°05.5'N 05°10.1'W	AphTub
247	13	S of Groyne Point, Helford River.	SW 742 262	50°05.5'N 05°09.4'W	AphTub
247	14	Off Frenchman's Creek, Helford River.	SW 747 265	50°05.7'N 05°09.0'W	EstMx
247	15	Opposite Calmansack House, Helford River.	SW 752 265	50°05.7'N 05°08.6'W	Mrl
247	16	(No) Rock Flat S of Calmansack, Helford River.	SW 753 266	50°05.7'N 05°08.5'W	FaS
247	D8	N of Penarvon Cove, Helford River.	SW 756 266	50°05.8'N 05°08.2'W	FaMx
247	7	S of Passage Cove, Helford River.	SW 764 268	50°05.9'N 05°07.6'W	LsacX, FaMS
247	S1	S of Helford Passage, Helford River.	SW 764 268	50°05.9'N 05°07.6'W	FaMS
247	3	NW of Bosahan Point, Helford River.	SW 765 265	50°05.7'N 05°07.5'W	Lsac.T, FaS, FaMx,
247	D7	NW of Bosahan Point, Helford River.	SW 765 266	50°05.8'N 05°07.5'W	VsenMtru
247	11	Central channel NE of Bosahan Pt, Helford River.	SW 767 266	50°05.8'N 05°07.3'W	Lcor
247	S2	Central channel NE of Bosahan Point, Helford River.	SW 767 266	50°05.8'N 05°07.3'W	Lcor
247	8	Between Bosahan Point and the Voose, Helford River.	SW 769 265	50°05.7'N 05°07.1'W	LsacX, Zmar
247	S3	Between Bosahan Point and The Vooze, Helford River.	SW 769 265	50°05.7'N 05°07.1'W	Zmar
247	6	Polgwidden Cove, Helford River.	SW 770 270	50°06.0'N 05°07.1'W	Lhyp.Ft, XKScrR, FaSwV, EcorEns
247	D5	Off Polgwidden Cove, Helford River.	SW 770 269	50°05.9'N 05°07.1'W	VsenMtru

Sublittoral sites (listed west to east) continued					
<i>Survey</i>	<i>Site</i>	<i>Place</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotores present</i>
247	10	NE of the Voose, Helford River.	SW 774 266	50°05.8'N 05°06.7'W	Sell, LsacX
247	D6	S of Grebe Rock, Helford River.	SW 774 268	50°05.9'N 05°06.7'W	FaMS
247	D9	Off Bosahan Cove, Helford River.	SW 775 265	50°05.7'N 05°06.6'W	Sell
247	20	N of the Gew, Helford River.	SW 781 263	50°05.6'N 05°06.1'W	LhypLsac.Ft, LsacRS.FiR, SedK, Phy, Phy.R, FaG
247	21	S of Toll Point, Helford River.	SW 781 264	50°05.7'N 05°06.1'W	Sell, LsacX
247	D4	S of Mawnan Shear, Helford River.	SW 781 265	50°05.7'N 05°06.1'W	Sell
247	5	S of Mawnan Shear, Helford River.	SW 784 267	50°05.9'N 05°05.9'W	XKScrR, LhypLsac.Ft, FaS, IMX
247	9	Offshore S of Mawnan Shear, Helford River.	SW 786 264	50°05.7'N 05°05.7'W	EphR, FaS
247	D3	N of Dennis Head, Helford River.	SW 787 261	50°05.5'N 05°05.6'W	Sell
247	2	N of Dennis Head, Helford River.	SW 788 258	50°05.4'N 05°05.5'W	XKScrR, Lhyp.Ft, FaSwV, IMX
247	D10	E of Mawnan Shear, Helford River.	SW 788 269	50°06.0'N 05°05.5'W	Phy
247	19	Gillan Harbour entrance, Helford River.	SW 789 253	50°05.1'N 05°05.4'W	Lcon, SedK
247	S4	S of mid-channel, Helford River.	SW 789 264	50°05.7'N 05°05.5'W	FabMag
247	S5	S of Gillan Harbour, Helford River.	SW 789 253	50°05.1'N 05°05.4'W	FaS
247	25	Entrance to Helford River.	SW 793 258	50°05.4'N 05°05.1'W	FaG
247	4	NW of Helford Point, Helford River.	SW 795 265	50°05.8'N 05°05.0'W	CuSH, FaMx
247	17	S of August Rock, Helford River.	SW 795 270	50°06.0'N 05°05.0'W	SCAs.ByH, XKScrR, Lhyp.Ft, Phy, EphR
247	18	S of Prisk Cove, Helford River.	SW 795 275	50°06.3'N 05°05.0'W	XKScrR, FaSwV, LsacX
247	D2	N of Parbean Cove, Helford River.	SW 795 256	50°05.3'N 05°04.9'W	Sell
247	23	Parbean Cove, Helford River.	SW 797 253	50°05.1'N 05°04.8'W	LhypLsac.Ft, Lsac.Ldig, SedK
247	1	N of Nare Point, Helford River.	SW 798 253	50°05.1'N 05°04.7'W	Sac, XKScrR, Lhyp.Ft, FaSwV
247	22	Offshore N of Parbean Cove, Helford River.	SW 799 263	50°05.7'N 05°04.6'W	Lhyp.Ft, XKScrR, FaSwV,
247	24	Offshore E of Dennis Head, Helford River.	SW 799 258	50°05.4'N 05°04.6'W	Phy.R, IMX
247	D1	Outer entrance, Helford River.	SW 799 265	50°05.8'N 05°04.6'W	Phy

Compiled by: Jan Smith, Jon Moore and Kate Northen

Appendix A

Biotopes classification

A hierarchical classification of the biotopes recorded in the marine inlets of MNCR Sector 8 (western English Channel) during the surveys given in Table 1, together with their higher types, is given below. Records of biotopes noted in the text but not shown here come from additional published sources noted in the individual area summaries. The biotopes listed are derived from the MNCR national biotope classification (Connor *et al.* 1997a, b).

Higher code	Biotope code	Biotope
LR		LITTORAL ROCK (and other hard substrata)
LR.L		Lichens or algal crusts
LR.L	YG	Yellow and grey lichens on supralittoral rock
LR.L	Ver	<i>Verrucaria maura</i> on littoral fringe rock
LR.L	Ver.Por	<i>Verrucaria maura</i> and <i>Porphyra umbilicalis</i> on very exposed littoral fringe rock
LR.L	Ver.B	<i>Verrucaria maura</i> and sparse barnacles on exposed littoral fringe rock
LR.L	Ver.Ver	<i>Verrucaria maura</i> on moderately exposed to very sheltered upper littoral fringe rock
ELR		Exposed littoral rock (mussel/barnacle shores)
ELR.MB		<i>Mytilus</i> (mussels) and barnacles
ELR.MB	MytB	<i>Mytilus edulis</i> and barnacles on very exposed eulittoral rock
ELR.MB	BPat	Barnacles and <i>Patella</i> spp. on exposed or moderately exposed, or vertical sheltered, eulittoral rock
ELR.MB	BPat.Cht	<i>Chthamalus</i> spp. on exposed upper eulittoral rock
ELR.MB	BPat.Lic	Barnacles and <i>Lichina pygmaea</i> on steep exposed upper eulittoral rock
ELR.MB	BPat.Cat	<i>Catenella caespitosa</i> on overhanging, or shaded vertical, upper eulittoral rock
ELR.MB	BPat.Fvesl	Barnacles, <i>Patella</i> spp. and <i>Fucus vesiculosus</i> f. <i>linearis</i> on exposed eulittoral rock
ELR.MB	BPat.Sem	<i>Semibalanus balanoides</i> on exposed or moderately exposed, or vertical sheltered, eulittoral rock
ELR.FR		Robust fucoids or red seaweeds
ELR.FR	Coff	<i>Corallina officinalis</i> on very exposed lower eulittoral rock
ELR.FR	Him	<i>Himantalia elongata</i> and red seaweeds on exposed lower eulittoral rock

Higher code	Biotope code	Biotope
MLR		Moderately exposed littoral rock (barnacle/furoid shores)
MLR.BF		Barnacles and furoids (moderately exposed shores)
MLR.BF	PelB	<i>Pelvetia canaliculata</i> and barnacles on moderately exposed littoral fringe rock
MLR.BF	FvesB	<i>Fucus vesiculosus</i> and barnacle mosaics on moderately exposed mid-eulittoral rock
MLR.BF	Fser	<i>Fucus serratus</i> on moderately exposed lower eulittoral rock
MLR.BF	Fser.R	<i>Fucus serratus</i> and red seaweeds on moderately exposed lower eulittoral rock
MLR.BF	Fser.Fser	Dense <i>Fucus serratus</i> on moderately exposed to very sheltered lower eulittoral rock
MLR.BF	Fser.Fser.Bo	<i>Fucus serratus</i> and under-boulder fauna on lower eulittoral boulders
MLR.BF	Fser.Pid	<i>Fucus serratus</i> and piddocks on lower eulittoral soft rock
MLR.R		Red seaweeds (moderately exposed shores)
MLR.R	XR	Mixed red seaweeds on moderately exposed lower eulittoral rock
MLR.R	Osm	<i>Osmundea (Laurencia) pinnatifida</i> and <i>Gelidium pusillum</i> on moderately exposed mid-eulittoral rock
MLR.Eph		Ephemeral green or red seaweeds (freshwater or sand-influenced)
MLR.Eph	Ent	<i>Enteromorpha</i> spp. on freshwater-influenced or unstable upper eulittoral rock
MLR.Eph	EntPor	<i>Porphyra purpurea</i> or <i>Enteromorpha</i> spp. on sand-scoured mid-or lower eulittoral rock
MLR.Eph	Rho	<i>Rhodothamniella floridula</i> on sand-scoured lower eulittoral rock
SLR		Sheltered littoral rock (furoid shores)
SLR.F		Dense furoids (stable rock)
SLR.F	Pel	<i>Pelvetia canaliculata</i> on sheltered littoral fringe rock
SLR.F	Fspi	<i>Fucus spiralis</i> on moderately exposed to very sheltered upper eulittoral rock
SLR.F	Fves	<i>Fucus vesiculosus</i> on sheltered mid-eulittoral rock
SLR.F	Asc	<i>Ascophyllum nodosum</i> on very sheltered mid-eulittoral rock
SLR.F	Asc.Asc	<i>Ascophyllum nodosum</i> on full salinity mid-eulittoral rock
SLR.F	Asc.T	<i>Ascophyllum nodosum</i> , sponges and ascidians on tide-swept mid-eulittoral rock
SLR.F	Asc.VS	<i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid-eulittoral rock

Higher code	Biotope code	Biotope
SLR.F	Fserr	<i>Fucus serratus</i> on sheltered lower eulittoral rock
SLR.F	Fserr.T	<i>Fucus serratus</i> , sponges and ascidians on tide-swept lower eulittoral rock
SLR.F	Fserr.VS	<i>Fucus serratus</i> and large <i>Mytilus edulis</i> on variable salinity lower eulittoral rock
SLR.F	Fcer	<i>Fucus ceranoides</i> on reduced salinity eulittoral rock
SLR.FX		Fucoids, barnacles or ephemeral seaweeds (mixed substrata)
SLR.FX	BLit	Barnacles and <i>Littorina littorea</i> on unstable eulittoral mixed substrata
SLR.FX	FvesX	<i>Fucus vesiculosus</i> on mid-eulittoral mixed substrata
SLR.FX	AscX	<i>Ascophyllum nodosum</i> on mid-eulittoral mixed substrata
SLR.FX	FserX	<i>Fucus serratus</i> on lower eulittoral mixed substrata
SLR.FX	FserX.T	<i>Fucus serratus</i> with sponges, ascidians and red seaweeds on tide-swept lower eulittoral mixed substrata
SLR.FX	EphX	Ephemeral green and red seaweeds on variable salinity or disturbed eulittoral mixed substrata
SLR.FX	FcerX	<i>Fucus ceranoides</i> on reduced salinity eulittoral mixed substrata
SLR.MX		<i>Mytilus</i> (mussel) beds (mixed substrata)
SLR.MX	MytX	<i>Mytilus edulis</i> beds on eulittoral mixed substrata
		Littoral rock (other)
LR.Rkp		Rockpools
LR.Rkp	G	Green seaweeds (<i>Enteromorpha</i> spp. and <i>Cladophora</i> spp.) in upper shore rockpools
LR.Rkp	Cor	<i>Corallina officinalis</i> and coralline crusts in shallow eulittoral rockpools
LR.Rkp	Cor.Bif	<i>Bifurcaria bifurcata</i> in shallow eulittoral rockpools
LR.Rkp	Cor.Cys	<i>Cystoseira</i> spp. in shallow eulittoral rockpools
LR.Rkp	FK	Fucoids and kelps in deep eulittoral rockpools
LR.Rkp	FK.Sar	<i>Sargassum muticum</i> in eulittoral rockpools
LR.Rkp	SwSed	Seaweeds in sediment (sand or gravel)-floored eulittoral rockpools
LR.Rkp	H	Hydroids, ephemeral seaweeds and <i>Littorina littorea</i> in shallow eulittoral mixed substrata pools
LR.Ov		Overhangs and caves
LR.Ov	SR	Sponges and shade-tolerant red seaweeds on overhanging lower eulittoral bedrock

Higher code	Biotope code	Biotope
LR.Ov	SByAs	Sponges, bryozoans and ascidians on deeply overhanging lower shore bedrock
LS		LITTORAL SEDIMENTS
LGS		Littoral gravels and sands
LGS.Sh		Shingle (pebble) and gravel shores
LGS.Sh	BarSh	Barren shingle or gravel shores
LGS.S		Sand shores
LGS.S	BarSnd	Barren coarse sand shores
LGS.S	AEur	Burrowing amphipods and <i>Eurydice pulchra</i> in well-drained clean sand shores
LGS.S	AP	Burrowing amphipods and polychaetes in clean sand shores
LGS.S	AP.P	Burrowing amphipods and polychaetes (often with <i>Arenicola marina</i>) in clean sand shores
LGS.S	AP.Pon	Burrowing amphipods <i>Pontocrates</i> spp. and <i>Bathyporeia</i> spp. in lower shore clean sand
LGS.S	Lan	Dense <i>Lanice conchilega</i> in tide-swept lower shore sand
LGS.Est		Estuarine coarse sediment shores
LGS.Est	OI	Oligochaetes in reduced or low salinity gravel or coarse sand shores
LMS		Littoral muddy sands
LMS.MS		Muddy sand shores
LMS.MS	PCer	Polychaetes and <i>Cerastoderma edule</i> in fine sand and muddy sand shores
LMS.MS	MacAre	<i>Macoma balthica</i> and <i>Arenicola marina</i> in muddy sand shores
LMS.Zos		Littoral <i>Zostera</i> (seagrass) beds
LMS.Zos	Znol	<i>Zostera noltii</i> beds in upper to mid-shore muddy sand
LMU		Littoral muds
LMU.Sm		Saltmarsh
LMU.Sm	NVC SM8	<i>Salicornia</i> spp.
LMU.SMu		Sandy mud shores
LMU.SMu	HedMac	<i>Hediste diversicolor</i> and <i>Macoma balthica</i> in sandy mud shores
LMU.SMu	HedMac.Are	<i>Hediste diversicolor</i> , <i>Macoma balthica</i> and <i>Arenicola marina</i> in muddy sand or sandy mud shores
LMU.SMu	HedMac.Pyg	<i>Hediste diversicolor</i> , <i>Macoma balthica</i> and <i>Pygospio elegans</i> in sandy mud shores

Higher code	Biotope code	Biotope
LMU.SMu	HedMac.Mare	<i>Hediste diversicolor</i> , <i>Macoma balthica</i> and <i>Mya arenaria</i> in sandy mud shores
LMU.Mu		Soft mud shores
LMU.Mu	HedScr	<i>Hediste diversicolor</i> and <i>Scrobicularia plana</i> in reduced salinity mud shores
LMU.Mu	HedStr	<i>Hediste diversicolor</i> and <i>Streblospio shrubsolii</i> in sandy mud or soft mud shores
LMU.Mu	HedOl	<i>Hediste diversicolor</i> and oligochaetes in low salinity mud shores
LMX		Littoral mixed sediments
LMX	Mare	<i>Mya arenaria</i> and polychaetes in muddy gravel shores
IR		INFRALITTORAL ROCK (and other hard substrata)
EIR		Exposed infralittoral rock
EIR.KFaR		Kelp with cushion fauna, foliose red seaweeds or coralline crusts (exposed rock)
EIR.KFaR	LhypR	<i>Laminaria hyperborea</i> with dense foliose red seaweeds on exposed infralittoral rock
EIR.KFaR	LhypR.Ft	<i>Laminaria hyperborea</i> forest with dense foliose red seaweeds on exposed upper infralittoral rock
EIR.KFaR	LhypR.Pk	<i>Laminaria hyperborea</i> park with dense foliose red seaweeds on exposed lower infralittoral rock
EIR.SG		Robust faunal cushions and crusts (surge gullies & caves)
EIR.SG	SCAn	Sponge crusts and anemones on wave-surged vertical infralittoral rock
EIR.SG	SCAn.Tub	Sponge crusts, anemones and <i>Tubularia indivisa</i> in shallow infralittoral surge gullies
EIR.SG	SCAs	Sponge crusts and colonial ascidians on wave-surged vertical infralittoral rock
EIR.SG	SCAs.DenCla	<i>Dendrodoa grossularia</i> and <i>Clathrina coriacea</i> on wave-surged vertical infralittoral rock
EIR.SG	SCAs.ByH	Sponge crusts, colonial (polyclinal) ascidians and a bryozoan/hydroid turf on wave-surged vertical or overhanging infralittoral rock
EIR.SG	CC	<i>Balanus crenatus</i> and/or <i>Pomatoceros triqueter</i> with spirorbid worms and coralline crusts on severely scoured infralittoral rock (No description at this level)
EIR.SG	CC.BalPom	<i>Balanus crenatus</i> and/or <i>Pomatoceros triqueter</i> with spirorbid worms and coralline crusts on severely scoured vertical infralittoral rock

Higher code	Biotope code	Biotope
MIR		Moderately exposed infralittoral rock
MIR.KR		Kelp with red seaweeds (moderately exposed rock)
MIR.KR	Ldig	<i>Laminaria digitata</i> on moderately exposed or tide-swept sublittoral fringe rock
MIR.KR	Ldig.Ldig	<i>Laminaria digitata</i> on moderately exposed sublittoral fringe rock
MIR.KR	Ldig.Ldig.Bo	<i>Laminaria digitata</i> and under-boulder fauna on sublittoral fringe boulders
MIR.KR	Ldig.T	<i>Laminaria digitata</i> , ascidians and bryozoans on tide-swept sublittoral fringe rock
MIR.KR	Ldig.Pid	<i>Laminaria digitata</i> and piddocks on sublittoral fringe soft rock
MIR.KR	Lhyp	<i>Laminaria hyperborea</i> and foliose red seaweeds on moderately exposed infralittoral rock
MIR.KR	Lhyp.Ft	<i>Laminaria hyperborea</i> forest and foliose red seaweeds on moderately exposed upper infralittoral rock
MIR.KR	Lhyp.Pk	<i>Laminaria hyperborea</i> park and foliose red seaweeds on moderately exposed lower infralittoral rock
MIR.KR	Lhyp.TFt	<i>Laminaria hyperborea</i> forest, foliose red seaweeds and a diverse fauna on tide-swept upper infralittoral rock
MIR.KR	Lhyp.TPk	<i>Laminaria hyperborea</i> park with hydroids, bryozoans and sponges on tide-swept lower infralittoral rock
MIR.KR	Lhyp.Loeh	Mixed <i>Laminaria hyperborea</i> and <i>Laminaria ochroleuca</i> forest on moderately exposed or sheltered infralittoral rock
MIR.SedK		Sand or gravel-affected or disturbed kelp and seaweed communities
MIR.SedK	Sac	<i>Saccorhiza polyschides</i> and other opportunistic kelps on disturbed upper infralittoral rock
MIR.SedK	XKScrR	Mixed kelps with scour-tolerant and opportunistic foliose red seaweeds on scoured or sand-covered infralittoral rock
MIR.SedK	EphR	Ephemeral red seaweeds and kelps on tide-swept mobile infralittoral cobbles
SIR		Sheltered infralittoral rock
SIR.K		Silted kelp (stable rock)
SIR.K	LhypLsac	Mixed <i>Laminaria hyperborea</i> and <i>Laminaria saccharina</i> on sheltered infralittoral rock
SIR.K	LhypLsac.Ft	Mixed <i>Laminaria hyperborea</i> and <i>Laminaria saccharina</i> forest on sheltered upper infralittoral rock
SIR.K	LhypLsac.Pk	Mixed <i>Laminaria hyperborea</i> and <i>Laminaria saccharina</i> park on sheltered lower infralittoral rock
SIR.K	Lsac	<i>Laminaria saccharina</i> on very sheltered infralittoral rock
SIR.K	Lsac.Ldig	<i>Laminaria saccharina</i> and <i>Laminaria digitata</i> on sheltered sublittoral fringe rock
SIR.K	Lsac.Ft	<i>Laminaria saccharina</i> forest on very sheltered upper infralittoral rock

Higher code	Biotope code	Biotope
SIR.K	Lsac.Pk	<i>Laminaria saccharina</i> park on very sheltered lower infralittoral rock
SIR.K	Lsac.T	<i>Laminaria saccharina</i> , foliose red seaweeds, sponges & ascidians on tide-swept infralittoral rock
SIR.K	Lsac.Cod	Sparse <i>Laminaria saccharina</i> with <i>Codium</i> spp. and sparse red seaweeds on heavily silted very sheltered infralittoral rock
SIR.K	LsacRS	<i>Laminaria saccharina</i> on reduced or low salinity infralittoral rock
SIR.K	LsacRS.FiR	Sparse <i>Laminaria saccharina</i> with dense filamentous red seaweeds, sponges and <i>Balanus crenatus</i> on tide-swept variable salinity infralittoral rock
SIR.EstFa		Estuarine faunal communities (shallow rock/mixed substrata)
SIR.EstFa	CorEle	<i>Cordylophora caspia</i> and <i>Electra crustulenta</i> on reduced salinity infralittoral rock
SIR.EstFa	HarCon	<i>Hartlaubella gelatinosa</i> and <i>Conopeum reticulum</i> on low salinity infralittoral mixed substrata
		Infralittoral rock (other)
IR.FaSwV		Fauna and seaweeds (shallow vertical rock)
IR.FaSwV	CorMetAlc	<i>Corynactis viridis</i> , <i>Metridium senile</i> and <i>Alcyonium digitatum</i> on exposed or moderately exposed vertical infralittoral rock
IR.FaSwV	AlcByH	<i>Alcyonium digitatum</i> and a bryozoan, hydroid and ascidian turf on moderately exposed vertical infralittoral rock
IR.FaSwV	AlcByH.Hia	<i>Hiatella arctica</i> , bryozoans and ascidians on vertical infralittoral soft rock
CR		CIRCALITTORAL ROCK (and other hard substrata)
ECR		Exposed circalittoral rock
ECR.EFa		Faunal crusts or short turfs (wave-exposed rock)
ECR.EFa	PomByC	<i>Pomatoceros triqueter</i> , <i>Balanus crenatus</i> and bryozoan crusts on mobile circalittoral cobbles and pebbles
ECR.Alc		<i>Alcyonium</i>-dominated communities (tide-swept/vertical)
ECR.Alc	AlcMaS	<i>Alcyonium digitatum</i> with massive sponges (<i>Cliona celata</i> and <i>Pachymatisma johnstonia</i>) and <i>Nemertesia antennina</i> on moderately tide-swept exposed circalittoral rock
ECR.BS		Barnacle, cushion sponge and <i>Tubularia</i> communities (very tide-swept/wave-sheltered)
ECR.BS	CuSH	Cushion sponges, hydroids and ascidians on very tide-swept sheltered circalittoral rock

Higher code	Biotope code	Biotope
MCR		Moderately exposed circalittoral rock
MCR.XFa		Mixed faunal turfs (moderately exposed rock)
MCR.XFa	ErSPbolSH	Cushion sponges (<i>Polymastia boletiformis</i> , <i>Tethya</i>), stalked sponges, <i>Nemertesia</i> spp. and <i>Pentapora foliacea</i> on moderately exposed circalittoral rock
MCR.ByH		Bryozoan/hydroid turfs (sand-influenced)
MCR.ByH	SNemAdia	Sparse sponges, <i>Nemertesia</i> spp., <i>Alcyonidium diaphanum</i> and <i>Bowerbankia</i> spp. on circalittoral mixed substrata
MCR.ByH	Flu	<i>Flustra foliacea</i> and other hydroid/bryozoan turf species on slightly scoured circalittoral rock or mixed substrata
MCR.ByH	Flu.HByS	<i>Flustra foliacea</i> with hydroids, bryozoans and sponges on slightly tide-swept circalittoral mixed substrata
MCR.ByH	Flu.SerHyd	<i>Sertularia argentea</i> , <i>S. cupressina</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral cobbles and pebbles
MCR.ByH	Flu.Hocu	<i>Haliclona oculata</i> and <i>Flustra foliacea</i> with a rich faunal turf on tide-swept sheltered circalittoral boulders or cobbles
MCR.ByH	Urt	<i>Urticina felina</i> on sand-affected circalittoral rock
MCR.ByH	Urt.Cio	<i>Urticina felina</i> and <i>Ciocalypta penicillus</i> on sand-covered circalittoral rock
MCR.M		Mussel beds (open coast circalittoral rock/mixed substrata)
MCR.M	MytHAs	<i>Mytilus edulis</i> beds with hydroids and ascidians on tide-swept moderately exposed circalittoral rock
MCR.As		Ascidian communities (silt-influenced)
MCR.As	StoPaur	<i>Stolonica socialis</i> and/or <i>Polyclinum aurantium</i> with <i>Flustra foliacea</i> on slightly sand-scoured tide-swept moderately exposed circalittoral rock
MCR.As	MolPol	<i>Molgula manhattensis</i> and <i>Polycarpa</i> spp. with erect sponges on tide-swept moderately exposed circalittoral rock
MCR.SfR		Soft rock communities
MCR.SfR	Pid	Piddocks with a sparse associated fauna in upward-facing circalittoral very soft chalk or clay
SCR		Sheltered circalittoral rock
SCR.BrAs		Brachiopod and solitary ascidian communities (sheltered rock)
SCR.BrAs	SubSoAs	<i>Suberites</i> spp. and other sponges with solitary ascidians on very sheltered circalittoral rock
SCR.BrAs	Aasp	<i>Asciodiella aspersa</i> on sheltered circalittoral rocks on muddy sediment

Higher code	Biotope code	Biotope
		Circalittoral rock (other)
CR.FaV		Faunal turfs (deep vertical rock)
CR.FaV	Bug	<i>Bugula</i> spp. and other bryozoans on vertical moderately exposed circalittoral rock
SS		
		SUBLITTORAL SEDIMENTS
IGS		Infralittoral gravels and sands
IGS.Mrl		Maerl beds (open coast/clean sediments)
IGS.Mrl	Phy	<i>Phymatolithon calcareum</i> maerl beds in infralittoral clean gravel or coarse sand
IGS.Mrl	Phy.R	<i>Phymatolithon calcareum</i> maerl beds with red seaweeds in shallow infralittoral clean gravel or coarse sand
IGS.FaG		Shallow gravel faunal communities
IGS.FaG	Sell	<i>Spisula elliptica</i> and venerid bivalves in infralittoral clean sand or shell gravel
IGS.FaS		Shallow sand faunal communities
IGS.FaS	Mob	Sparse fauna in marine infralittoral mobile clean sand
IGS.FaS	NcirBat	<i>Nephtys cirrosa</i> and <i>Bathyporeia</i> spp. in infralittoral sand
IGS.FaS	ScupHyd	<i>Sertularia cupressina</i> and <i>Hydrallmania falcata</i> on tide-swept sublittoral cobbles or pebbles in coarse sand
IGS.FaS	Lcon	Dense <i>Lanice conchilega</i> and other polychaetes in tide-swept infralittoral sand
IGS.FaS	FabMag	<i>Fabulina fabula</i> and <i>Magelona mirabilis</i> with venerid bivalves in infralittoral compacted fine sand
IGS.EstGS		Estuarine sublittoral gravels and sands
CGS		Circalittoral gravels and sands
CGS	Ven	Venerid bivalves in circalittoral coarse sand or gravel
IMS		Infralittoral muddy sands
IMS.Sgr		Seagrass beds (sublittoral/lower shore)
IMS.Sgr	Zmar	<i>Zostera marina/angustifolia</i> beds in lower shore or infralittoral clean or muddy sand
IMS.FaMS		Shallow muddy sand faunal communities
IMS.FaMS	EcorEns	<i>Echinocardium cordatum</i> and <i>Ensis</i> sp. in lower shore or shallow sublittoral muddy fine sand
CMS		Circalittoral muddy sands
CMS	AbrNucCor	<i>Abra alba</i> , <i>Nucula nitida</i> and <i>Corbula gibba</i> in circalittoral muddy sand or slightly mixed sediment

Higher code	Biotope code	Biotope
IMU		Infralittoral muds
IMU.MarMu		Shallow marine mud communities
IMU.MarMu	PhiVir	<i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud
IMU.EstMu		Estuarine sublittoral muds
IMU.EstMu	AphTub	<i>Aphelochaeta marioni</i> and <i>Tubificoides</i> spp. in variable salinity infralittoral mud
IMU.EstMu	NhomTub	<i>Nephtys hombergii</i> and <i>Tubificoides</i> spp. in variable salinity infralittoral soft mud
CMU		Circalittoral muds
CMU	SpMeg	Seapens and burrowing megafauna in circalittoral soft mud
IMX		Infralittoral mixed sediments
IMX.KSwMx		<i>Laminaria saccharina</i> (sugar kelp) and filamentous seaweeds (mixed sediment)
IMX.KSwMx	LsacX	<i>Laminaria saccharina</i> , <i>Chorda filum</i> and filamentous red seaweeds on sheltered infralittoral sediment
IMX.MrlMx		Maerl beds (muddy mixed sediments)
IMX.MrlMx	Lcor	<i>Lithothamnion corallioides</i> maerl beds on infralittoral muddy gravel
IMX.Oy		Oyster beds
IMX.Oy	Ost	<i>Ostrea edulis</i> beds on shallow sublittoral muddy sediment
IMX.FaMx		Shallow mixed sediment faunal communities
IMX.FaMx	VsenMtru	<i>Venerupis senegalensis</i> and <i>Mya truncata</i> in lower shore or infralittoral muddy gravel
IMX.EstMx		Estuarine sublittoral mixed sediments
IMX.EstMx	CreAph	<i>Crepidula fornicata</i> and <i>Aphelochaeta marioni</i> in variable salinity infralittoral mixed sediment
IMX.EstMx	MytV	<i>Mytilus edulis</i> beds in variable salinity infralittoral mixed sediment
IMX.EstMx	PolMtru	<i>Polydora ciliata</i> , <i>Mya truncata</i> and solitary ascidians in variable salinity infralittoral mixed sediment
CMX		Circalittoral mixed sediments

References

- Connor, D.W., Brazier, D.P., Hill, T.O., & Northen, K.O. 1997a. Marine Nature Conservation Review: marine biotope classification for Britain and Ireland. Volume 1. Littoral biotopes. Version 97.06. *JNCC Report*, No. 229.
- Connor, D.W., Dalkin, M.J., Hill, T.O., Holt, R.H.F., & Sanderson, W.G. 1997b. Marine Nature Conservation Review: marine biotope classification for Britain and Ireland. Volume 2. Sublittoral biotopes. Version 97.06. *JNCC Report*, No. 230.

Appendix B

Biotopes present in each area

The biotopes recorded in each area, using the data listed in Table 1, are summarised below. Biotope codes are given according to MNCR classification version 97.06 (Connor *et al.* 1997a, b), except SalvMx (see Appendix A).

Numbers refer to the area summaries as follows:

- | | |
|---|-------------------------------------|
| 1. Weymouth Harbour | 9. River Avon |
| 2. Portland Harbour | 10. River Erme |
| 3. River Axe | 11. River Yealm |
| 4. River Otter | 12. Plymouth Sound |
| 5. River Exe | 13. East and West River Looe |
| 6. River Teign | 14. River Fowey |
| 7. River Dart | 15. Carrick Roads and the River Fal |
| 8. Salcombe Harbour and Kingsbridge estuary | 16. Helford River |

	Area	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<i>Littoral rock</i>																	
YG						•		•	•			•	•	•	•	•	•
Ver													•				•
Ver.Por									•						•		
Ver.B								•					•				•
Ver.Ver						•		•	•			•	•	•	•	•	•
MytB									•					•			
BPat								•	•			•	•	•	•	•	•
BPat.Cht									•				•	•		•	•
BPat.Lic								•	•				•				•
BPat.Cat												•					•
BPat.Fvesl													•			•	
BPat.Sem								•	•				•		•	•	•
Coff																•	
Him								•	•				•				•
PelB									•			•	•		•		
FvesB									•			•	•		•	•	
Fser								•					•				•
Fser.R								•			•	•	•		•	•	•
Fser.Fser			•				•	•	•	•		•	•		•	•	•
Fser.Fser.Bo				•					•				•		•	•	
Fser.Pid								•					•				
XR								•					•		•	•	•
Osm								•	•								
Ent				•	•	•			•	•			•		•		
EntPor				•		•							•				
Rho								•	•		•						•
Pel								•	•		•	•	•	•	•	•	•
Fspi						•	•	•	•		•	•	•	•	•	•	•
Fves						•	•	•	•		•	•	•	•	•	•	•
Asc								•								•	•
Asc.Asc								•	•	•		•	•	•	•	•	•
Asc.T													•				
Asc.VS						•	•	•	•		•	•	•		•	•	
Fserr.T								•					•		•	•	

	Area	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Fserr.VS							•	•					•		•		
Fcer							•		•					•	•		
BLlit							•	•				•	•				
FvesX						•	•	•	•			•	•	•	•	•	
AscX							•	•	•			•	•				•
FserX							•	•	•			•	•			•	•
FserX.T												•					•
EphX						•	•	•									•
FcerX						•	•	•			•			•	•		•
MytX						•	•						•				
G									•				•				•
Cor						•		•	•		•		•	•	•	•	•
Cor.Bif									•				•				
Cor.Cys								•									•
FK								•	•		•		•		•	•	•
FK.Sar												•	•				
SwSed										•			•				•
H							•										
SR								•	•		•	•	•	•	•	•	•
SByAs								•	•			•	•		•	•	•
<i>Littoral sediment</i>																	
BarSh															•	•	
BarSnd											•		•		•		
AEur						•					•		•		•		
AP						•			•								
AP.P			•			•	•	•	•	•	•		•		•		
AP.Pon						•											
Lan						•	•		•			•	•		•	•	•
Ol							•						•		•		
PCer															•		
MacAre						•	•					•	•				•
Znol						•											•
NVC SM8						•	•										
HedMac						•	•						•		•	•	•
HedMac.Are						•	•						•		•	•	•
HedMac.Pyg						•	•		•					•	•	•	
HedMac.Mare													•		•		
Mu								•	•				•				
HedScr			•	•	•	•	•	•	•	•		•	•		•	•	
HedStr					•			•	•			•	•		•	•	
HedOl			•	•		•	•	•	•	•	•		•	•	•	•	
LMX			•			•			•								
Mare								•							•	•	
LhypR.Ft													•				
LhypR.Pk													•				
SG													•				
SCAn								•									
SCAn.Tub									•				•				
SCAs.DenCla													•				
SCAs.ByH			•					•	•			•			•	•	•
CC.BalPom								•					•				
Ldig																	
Ldig.Ldig								•	•				•		•	•	
Ldig.Ldig.Bo								•					•				
<i>Sublittoral rock</i>																	
Ldig.T													•				
Ldig.Pid													•				
Lhyp.Ft								•	•				•		•	•	•

	Area	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Lhyp.Pk								•	•				•				
Lhyp.TFt													•				
Lhyp.TPk													•				
Lhyp.Loeh													•			•	
Sac			•						•			•	•			•	•
XKScrR									•			•	•		•	•	•
EphR													•				•
LhypLsac.Ft								•							•		•
LhypLsac.Pk													•				
Lsac												•					
Lsac.Ldig		•	•					•	•				•		•	•	•
Lsac.Ft								•	•				•		•	•	
Lsac.Pk			•					•					•				
Lsac.T		•						•	•			•	•		•	•	•
Lsac.Cod			•						•				•				
LsacRS.FiR								•				•	•		•	•	•
CorEle													•				
HarCon													•				
CorMetAlc												•	•				
AlcByH								•					•				
AlcByH.Hia			•														
PomByC			•				•	•					•			•	
AlcMaS									•				•		•	•	•
CuSH								•	•				•			•	•
ErSPbolSH								•									
ByH						•	•	•									
SNemAdia									•				•				
Flu.HByS								•									
Flu.SerHyd								•					•				
Flu.Hocu			•					•	•				•			•	
Urt													•				
Urt.Cio											•						
MytHAs								•								•	
StoPaur			•					•									
MolPol			•										•				
Pid								•									
SubSoAs			•					•	•			•	•		•	•	
Aasp			•						•							•	
Bug			•												•		
Sublittoral sediment																	
Mrl																	•
Phy																•	•
Phy.R																•	•
FaG						•	•		•				•		•	•	•
Sell									•				•				•
FaS									•				•			•	•
Mob						•											
NcirBat						•											
ScupHyd													•				
Lcon						•			•						•	•	•
FabMag									•								•
Ven													•				
Zmar									•			•	•		•	•	•
FaMS								•	•			•	•		•	•	•
EcorEns												•					•
AbrNucCor								•	•				•		•		
MarMu		•							•				•		•	•	
PhiVir			•														

	Area	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
EstMu						•	•	•	•				•		•	•	
AphTub								•	•			•	•			•	•
NhomTub												•			•	•	
SpMeg													•				
LsacX		•						•	•			•	•		•		•
MrlMx																	•
Lcor																	•
Ost						•		•									•
FaMx		•						•	•			•	•		•	•	•
VsenMtru						•			•			•					•
EstMx						•		•	•				•		•	•	•
CreAph		•															
MytV													•				
PolMtru						•									•	•	
CMX		•						•					•		•	•	

References

- Connor, D.W., Brazier, D.P., Hill, T.O., & Northen, K.O. 1997a. Marine Nature Conservation Review: marine biotope classification for Britain and Ireland. Volume 1. Littoral biotopes. Version 97.06. *JNCC Report*, No. 229.
- Connor, D.W., Dalkin, M.J., Hill, T.O., Holt, R.H.F., & Sanderson, W.G. 1997b. Marine Nature Conservation Review: marine biotope classification for Britain and Ireland. Volume 2. Sublittoral biotopes. Version 97.06. *JNCC Report*, No. 230.

Appendix C

Species recorded

All taxa recorded during the surveys given in Table 1 are listed below; records of species noted in the text but not shown here come from additional published sources noted in the individual area summaries. Marine species nomenclature follows Howson & Picton (1996); that for higher plants follows Stace (1991), and that for lichens follows Purvis *et al.* (1992).

Numbers refer to the *area summaries* as follows:

- | | |
|---|-------------------------------------|
| 1. Weymouth Harbour | 9. River Avon |
| 2. Portland Harbour | 10. River Erme |
| 3. River Axe | 11. River Yealm |
| 4. River Otter | 12. Plymouth Sound |
| 5. River Exe | 13. East and West River Looe |
| 6. River Teign | 14. River Fowey |
| 7. River Dart | 15. Carrick Roads and the River Fal |
| 8. Salcombe Harbour and Kingsbridge estuary | 16. Helford River |

Protozoa

Haliphysema tumanowiczii 8

Porifera

Porifera indet. 7, 8, 12, 14, 15
 Calcarea indet. 12
Clathrina coriacea 7, 8, 11, 12, 14, 16
Leucosolenia 12, 15
Leucosolenia botryoides 2, 7, 8, 11, 12, 13, 14, 15, 16
Leucosolenia complicata 12
Leucosolenia variabilis 6
Scypha sp. 15
Scypha ciliata 1, 2, 7, 8, 11, 12, 14, 15, 16
Leuconia sp. 7, 12, 16
Leuconia caminus 7, 8
Leuconia nivea 7, 12, 16
Grantia compressa 7, 8, 11, 12, 14, 15, 16
 Demospongiae indet. 2, 7, 8, 16
Oscarella lobularis 2, 12, 15, 16
Dercitus bucklandi 12
Pachymatisma johnstonia 7, 8, 12, 14, 15, 16
 Spirophorida indet. 12
Tethya aurantium 8, 12, 14, 16
Suberites sp. 2, 7, 8, 11, 12, 14, 15
Suberites carnosus 2, 7, 12, 15, 16
Suberites ficus 7, 8, 11, 12, 14, 15, 16
Terpios fugax 7, 12, 16
Prosuberites epiphytum 12
Polymastia boletiformis 12
Polymastia mamillaris 7, 8, 12, 16
Cliona sp. 2, 7, 8, 11, 12, 15, 16
Cliona celata 6, 7, 8, 12, 15, 16
Axinella damicornis 12
Stelligera sp. 12
Stelligera stuposa 2, 7, 8, 12
Raspailia hispida 7, 12, 16
Raspailia ramosa 7, 8, 12, 16
Halichondria sp. 5, 7, 11, 15

Halichondria bowerbanki 2, 6, 7, 8, 10, 12, 14, 15, 16
Halichondria panicea 1, 2, 3, 5, 7, 8, 11, 12, 13, 14, 15, 16
Ciocalypa penicillus 7, 8, 12, 14, 16
Hymeniacion sp. 8, 11, 15, 16
Hymeniacion perleve 1, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
Hymeniacion sanguinea 12
Mycale rotalis 7
Esperiopsis fucorum 2, 7, 8, 12, 14, 15, 16
Myxilla sp. 7, 8, 11, 12, 15, 16
Myxilla incrustans 2, 7, 8, 11, 12, 14, 15, 16
Myxilla rosacea 7
Iophon sp. 7, 12, 16
Hymedesmia brondstedii 7
Phorbis fictitius 14, 16
Hemimycale columella 2, 7, 8, 12, 14, 15, 16
Ophlitaspongia seriata 7, 8, 12, 15, 16
Microcion sp. 1, 7, 8, 15
Microcion atrasanguinea 7, 8, 12, 15, 16
Microcion spinarcus 12
Antho involvens 7
Haliclona sp. 7, 8, 12, 14, 15, 16
Haliclona angulata 16
Haliclona fistulosa 6, 8, 12
Haliclona oculata 2, 7, 12
Haliclona rosea 15
Haliclona simulans 7, 8, 12
Haliclona viscosa 12
Dysidea fragilis 1, 2, 7, 8, 12, 15, 16
Aplysilla rosea 2, 8, 12, 16
Aplysilla sulfurea 7
Halisarca dujardini 7, 12, 16
 Porifera indet. (crusts) 7, 8, 12, 14, 15

Cnidaria

Cnidaria indet. 8
Haliclystus auricula 12, 14, 16

<i>Lucernariopsis campanulata</i>	8, 11	<i>Laomedea flexuosa</i>	2, 5, 6, 7, 8, 11, 12, 14, 15, 16
<i>Cyanea capillata</i>	13	<i>Obelia</i> sp.	7, 8, 12, 13, 14, 15
<i>Cyanea lamarckii</i>	7	<i>Obelia dichotoma</i>	1, 6, 7, 8, 11, 12, 14, 15, 16
<i>Aurelia aurita</i>	14, 15	<i>Obelia geniculata</i>	1, 2, 5, 7, 8, 11, 12, 13, 14, 15, 16
<i>Rhizostoma octopus</i>	16	<i>Obelia longissima</i>	2, 15
Hydrozoa indet.	6, 7, 12, 14, 15, 16	<i>Obelia plicata</i>	1, 2
<i>Corymorpha nutans</i>	15	<i>Rhizocaulus verticillatus</i>	7
<i>Euphysa aurata</i>	16	<i>Vogtia spinosa</i>	7
<i>Tubularia</i> sp.	8, 12	Anthozoa indet.	6, 7, 8, 12, 15, 16
<i>Tubularia indivisa</i>	2, 6, 7, 8, 12, 14, 15	<i>Alcyonium digitatum</i>	2, 7, 8, 12, 14, 15
<i>Tubularia larynx</i>	2, 6, 7, 8, 14, 15, 16	<i>Virgularia mirabilis</i>	2, 12
Corynidae indet.	7	<i>Pennatula phosphorea</i>	8
<i>Coryne</i> sp.	7, 12, 15	<i>Cerianthus lloydii</i>	1, 7, 8, 12, 14, 15, 16
<i>Coryne muscoides</i>	7	<i>Epizoanthus couchii</i>	7, 8, 12, 15
<i>Sarsia eximia</i>	15	<i>Isozoanthus sulcatus</i>	7, 15
<i>Eudendrium</i> sp.	7, 14, 15, 16	Actiniaria indet.	7, 11, 12, 14
<i>Eudendrium capillare</i>	8, 12	<i>Actinia equina</i>	5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
<i>Bougainvillia ramosa</i>	8, 12	<i>Actinia fragacea</i>	11, 12, 14, 16
<i>Hydractinia echinata</i>	7, 8, 11, 12, 14, 15, 16	<i>Anemonia viridis</i>	2, 8, 11, 12, 14, 15, 16
<i>Clava</i> sp.	12, 15	<i>Urticina</i> sp.	12
<i>Clava multicornis</i>	7, 8, 11, 12, 14, 15	<i>Urticina felina</i>	2, 5, 7, 8, 11, 12, 14, 15, 16
<i>Cordylophora caspia</i>	6, 12	<i>Urticina eques</i>	12
<i>Calycella syringa</i>	12, 14	<i>Aulactinia verrucosa</i>	7, 8, 12, 14
<i>Opercularella lacerata</i>	8, 15, 16	<i>Anthopleura ballii</i>	1, 16
<i>Lafoea</i> sp.	15	<i>Aureliania heterocera</i>	8
<i>Lafoea dumosa</i>	8, 12, 15	<i>Aiptasia mutabilis</i>	8, 12, 15, 16
<i>Halecium</i> sp.	7, 15	<i>Diadumene cincta</i>	7, 12
<i>Halecium articulatum</i>	15	<i>Haliplanella lineata</i>	15
<i>Halecium beanii</i>	2, 7, 12, 15, 16	<i>Metridium senile</i>	6, 7, 8, 11, 12, 14, 15, 16
<i>Halecium halecinum</i>	2, 7, 8, 12, 15, 16	<i>Sagartia</i> sp.	8, 12, 14, 15
<i>Aglaophenia</i> sp.	7, 8, 15	<i>Sagartia elegans</i>	2, 6, 7, 8, 12, 14, 15, 16
<i>Aglaophenia pluma</i>	7, 8, 12, 14, 15, 16	<i>Sagartia troglodytes</i>	5, 7, 8, 11, 12, 14, 15
<i>Aglaophenia tubulifera</i>	7, 15, 16	<i>Cereus pedunculatus</i>	2, 7, 8, 11, 12, 14, 15, 16
<i>Antennella secundaria</i>	15	<i>Actinothoe sphyrodeta</i>	2, 7, 8, 12, 14, 15
<i>Halopteris catharina</i>	7, 12, 15, 16	<i>Sagartiogeton</i> sp.	12, 15, 16
<i>Kirchenpaueria pinnata</i>	7, 8, 11, 12, 15, 16	<i>Sagartiogeton laceratus</i>	2, 7, 8, 12, 15
<i>Kirchenpaueria similis</i>	8, 11, 14, 15, 16	<i>Sagartiogeton undatus</i>	2, 7, 8, 11, 12, 14, 15, 16
<i>Nemertesia</i> sp.	8	<i>Hormathia coronata</i>	2
<i>Nemertesia antennina</i>	7, 8, 11, 12, 14, 15	<i>Cataphellia brodricii</i>	14, 15
<i>Nemertesia ramosa</i>	7, 8, 12, 14, 15	<i>Calliactis parasitica</i>	2, 7, 8, 14, 15, 16
<i>Plumularia</i> sp.	7, 8, 12, 15	<i>Adamsia carciniopados</i>	2, 8, 12, 15, 16
<i>Plumularia setacea</i>	2, 7, 8, 11, 12, 14, 15, 16	<i>Peachia cylindrica</i>	16
<i>Abietinaria abietina</i>	8, 15	<i>Halcampa chrysanthellum</i>	12
<i>Diphasia</i> sp.	2	<i>Edwardsiella carnea</i>	2
<i>Diphasia attenuata</i>	14	<i>Edwardsia</i> sp.	2, 15
<i>Diphasia rosacea</i>	7	<i>Edwardsia claparedii</i>	2, 7, 12, 15
<i>Dynamena pumila</i>	3, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	<i>Scolanthus callimorphus</i>	2
<i>Hydrallmania falcata</i>	7, 8, 11, 12, 15	<i>Corynactis viridis</i>	2, 7, 8, 12, 14, 15, 16
<i>Sertularella</i> sp.	12	<i>Caryophyllia smithii</i>	2, 7, 8, 12, 14, 15, 16
<i>Sertularella polyzonias</i>	7, 8, 12, 14, 15, 16	<i>Balanophyllia regia</i>	7
<i>Sertularia</i> sp.	7, 8, 12	Platyhelminthes	
<i>Sertularia argentea</i>	2, 5, 7, 8, 11, 12, 14, 15	Platyhelminthes indet.	12
<i>Sertularia cupressina</i>	2, 5, 11, 12, 15	Turbellaria indet.	5, 8, 12, 15
Campanulariidae indet.	2	<i>Procerodes</i> sp.	12
<i>Campanularia</i> sp.	7, 15	<i>Procerodes littoralis</i>	16
<i>Campanularia hincksii</i>	16	<i>Prostheceraeus</i> sp.	12
<i>Clytia</i> sp.	15		
<i>Clytia gracilis</i>	12		
<i>Clytia hemisphaerica</i>	7, 12, 15		
<i>Gonothyraea loveni</i>	7, 12, 14		
<i>Hartlaubella gelatinosa</i>	11, 12		
<i>Laomedea angulata</i>	8		

<i>Prostheceraeus argus</i>	7	<i>Harmothoe marphysae</i>	7, 15
<i>Prostheceraeus vittatus</i>	7, 11, 12, 14, 15	<i>Lepidonotus clava</i>	12
<i>Oligocladus sanguinolentus</i>	14	<i>Lepidonotus squamatus</i>	7, 15, 16
Nemertea		<i>Pholoe inornata</i>	2, 5, 7, 8, 12, 14, 15, 16
Nemertea indet.	1, 2, 3, 5, 6, 7, 8, 10, 11, 12, 14, 15, 16	<i>Pholoe pallida</i>	12, 15
Anopla indet.	6	<i>Pholoe synophthalmica</i>	14
<i>Tubulanus</i> sp.	7, 11, 12	<i>Sigalion mathildae</i>	7, 11, 12, 15
<i>Tubulanus annulatus</i>	7, 8	<i>Sthenelais</i> sp.	15
<i>Tubulanus polymorphus</i>	8, 15	<i>Sthenelais boa</i>	2, 7, 8, 12, 14, 15, 16
<i>Cerebratulus</i> sp.	7, 11, 12, 15	<i>Sthenelais limicola</i>	7, 8, 12
<i>Lineus</i> sp.	15	Phyllodocidae indet.	5, 15
<i>Lineus bilineatus</i>	8	<i>Eteone flava</i>	6, 15
<i>Lineus longissimus</i>	8, 12, 16	<i>Eteone longa</i>	3, 4, 5, 7, 8, 11, 12, 13, 14, 15, 16
<i>Amphiporus lactifloreus</i>	16	<i>Hesionura elongata</i>	8
<i>Oerstedia dorsalis</i>	16	<i>Mysta picta</i>	7, 8
<i>Tetrastemma</i> sp.	14, 15	<i>Pseudomystides limbata</i>	5, 15
<i>Tetrastemma candidum</i>	9, 14	<i>Anaitides</i> sp.	7
<i>Tetrastemma flavidum</i>	14	<i>Anaitides groenlandica</i>	6, 7
<i>Tetrastemma longissimum</i>	8, 11, 12, 14, 15	<i>Anaitides maculata</i>	7, 11, 12, 15
<i>Tetrastemma melanocephalum</i>	7, 11, 14	<i>Anaitides mucosa</i>	5, 7, 8, 11, 14, 15, 16
Nematoda		<i>Anaitides rosea</i>	5
Nematoda indet.	1, 3, 4, 5, 6, 7, 8, 11, 12, 14, 15, 16	<i>Eulalia viridis</i>	5, 7, 10, 11, 12, 13, 14, 15, 16
Entoprocta		<i>Eumida</i> sp.	8, 14, 15
<i>Pedicellina</i> sp.	11, 16	<i>Eumida bahusiensis</i>	5, 14
<i>Pedicellina cernua</i>	15, 16	<i>Eumida sanguinea</i>	2, 5, 7, 8, 11, 12, 14, 15, 16
Sipuncula		<i>Nereiphylla rubiginosa</i>	15
Sipuncula indet.	8, 16	<i>Paranaitis</i> sp.	15
Sipunculidae indet.	2, 14	<i>Phyllodoce</i> sp.	9, 14
<i>Golfingia</i> sp.	5, 7, 8, 15	<i>Phyllodoce lamelligera</i>	8, 12
<i>Golfingia elongata</i>	16	<i>Phyllodoce laminosa</i>	8
<i>Golfingia vulgaris vulgaris</i>	16	<i>Pirakia</i> sp.	16
<i>Nephasoma rimicola</i>	5	<i>Pterocirrus limbata</i>	8
<i>Thysanocardia procerca</i>	8	Glyceridae indet.	11, 14
<i>Phascolion strombus strombus</i>	7, 8	<i>Glycera</i> sp.	5, 8, 14, 15
Echiura		<i>Glycera alba</i>	6, 16
<i>Thalassema</i> sp.	7	<i>Glycera gigantea</i>	6, 16
<i>Thalassema thalasseum</i>	8, 12, 16	<i>Glycera lapidum</i>	7, 8, 12, 15, 16
Annelida		<i>Glycera rouxii</i>	15
Annelida indet.	5, 15	<i>Glycera tridactyla</i>	5, 7, 12, 14, 15, 16
Polychaeta indet.	8, 11, 12, 14, 15	<i>Goniada maculata</i>	8, 12, 16
<i>Pisione</i> sp.	14	<i>Sphaerodoropsis minuta</i>	8, 15
<i>Pisione remota</i>	8, 12, 15, 16	<i>Sphaerodorum</i> sp.	8
Aphroditidae indet.	8, 12, 16	<i>Sphaerodorum gracilis</i>	8, 15
Polynoidae indet.	2, 7, 8, 12, 15	Hesionidae indet.	2, 15, 16
<i>Adyte pellucida</i>	15	<i>Gyptis</i> sp.	8, 12
<i>Alentia gelatinosa</i>	12, 15, 16	<i>Podarkeopsis capensis</i>	8, 15
<i>Eunoe nodosa</i>	2, 14	<i>Hesiospina similis</i>	15
<i>Gattyana cirrosa</i>	7, 8, 11, 12, 14, 16	<i>Kefersteinia cirrata</i>	7, 8, 11, 12, 15, 16
<i>Harmothoe</i> sp.	7, 8, 12, 15, 16	<i>Nereimyra punctata</i>	8, 15
<i>Harmothoe extenuata</i>	7	<i>Ophiodromus flexuosus</i>	2, 7, 12, 16
<i>Harmothoe fragilis</i>	11	<i>Podarke pallida</i>	11
<i>Harmothoe fraserthomsoni</i>	14	<i>Syllidia armata</i>	5, 8, 12, 14, 15, 16
<i>Harmothoe imbricata</i>	15, 16	<i>Microphthalmus szcelkowi</i>	9
<i>Harmothoe impar</i>	5, 7, 8, 12, 14, 15, 16	<i>Microphthalmus similis</i>	8
<i>Harmothoe spinifera</i>	2, 7, 8, 12, 15	Syllidae indet.	7, 8, 12, 14, 15
<i>Harmothoe andreapolis</i>	7	<i>Eurysyllis</i> sp.	8
<i>Harmothoe castanea</i>	12, 16	<i>Eurysyllis tuberculata</i>	15
<i>Harmothoe glabra</i>	11, 12, 16	<i>Haplosyllis spongicola</i>	15
<i>Harmothoe lunulata</i>	8, 14, 15, 16	<i>Ehlersia cornuta</i>	8, 11, 12, 16
		<i>Syllis</i> sp.	5, 15, 16
		<i>Syllis amica</i>	5, 15

<i>Syllis gracilis</i>	5, 11	<i>Nephtys kersivalensis</i>	5, 15
<i>Trypanosyllis</i> sp.	5	<i>Nephtys hystricis</i>	2, 12
<i>Trypanosyllis coeliaca</i>	8, 12, 15	<i>Nephtys incisa</i>	15
<i>Trypanosyllis zebra</i>	15	<i>Euphrosine foliosa</i>	15
<i>Typosyllis</i> sp.	8, 12, 15, 16	<i>Nothria britannica</i>	15
<i>Typosyllis armillaris</i>	15	<i>Eunice harassii</i>	15, 16
<i>Typosyllis brevipennis</i>	12	<i>Lysidice ninetta</i>	2, 12
<i>Typosyllis hyalina</i>	8	<i>Marphysa bellii</i>	11, 12, 16
<i>Typosyllis krohnii</i>	15	<i>Marphysa sanguinea</i>	8, 15, 16
<i>Typosyllis variegata</i>	15, 16	<i>Nematonereis unicornis</i>	2, 8, 12, 14, 15, 16
<i>Eusyllinae</i> indet.	15	<i>Lumbrineris</i> sp.	8, 15
<i>Amblyosyllis formosa</i>	8, 15	<i>Lumbrineris gracilis</i>	7, 14, 15, 16
<i>Eusyllis blomstrandii</i>	15	<i>Lumbrineris latreilli</i>	11, 12
<i>Odontosyllis ctenostoma</i>	8	<i>Lumbrineris tetraura</i>	2
<i>Odontosyllis gibba</i>	8, 15	<i>Dorvilleidae</i> indet.	8, 15
<i>Opisthodonta pterochaeta</i>	8	<i>Ophryotrocha</i> sp.	14
<i>Pionosyllis</i> sp.	5, 8, 15	<i>Ophryotrocha dubia</i>	8
<i>Pionosyllis compacta</i>	14	<i>Ophryotrocha gracilis</i>	8, 15
<i>Streptosyllis</i> sp.	9	<i>Ophryotrocha hartmanni</i>	12, 14
<i>Streptosyllis bidentata</i>	8, 15	<i>Protodorvillea kefersteini</i>	5, 7, 8, 11, 12, 14, 15, 16
<i>Streptosyllis websteri</i>	5, 8, 15	<i>Schistomeringos</i> sp.	12, 15
<i>Syllides</i> sp.	8, 15	<i>Schistomeringos rudolphi</i>	14
<i>Syllides longocirrata</i>	14	<i>Orbinia sertulata</i>	8
<i>Brania</i> sp.	8, 15	<i>Scoloplos armiger</i>	5, 6, 7, 8, 11, 12, 14, 15
<i>Brania clavata</i>	15	<i>Paraonidae</i> indet.	14, 16
<i>Brania limbata</i>	5, 14	<i>Aricidea minuta</i>	5, 8, 9, 11, 14, 15
<i>Exogone</i> sp.	7	<i>Poecilochaetus</i> sp.	14
<i>Exogone hebes</i>	5, 8, 11, 12, 14, 15, 16	<i>Poecilochaetus serpens</i>	7, 8, 12, 14, 15
<i>Exogone naidina</i>	7, 8, 12, 14, 15	<i>Spionidae</i> indet.	12, 14
<i>Exogone verugera</i>	5	<i>Aonides oxycephala</i>	5, 6, 8, 11, 12, 14, 15, 16
<i>Sphaerosyllis</i>	8, 12, 15, 16	<i>Aonides paucibranchiata</i>	8, 11, 14, 16
<i>Sphaerosyllis bulbosa</i>	7, 8, 15, 16	<i>Laonice bahusiensis</i>	8
<i>Sphaerosyllis erinaceus</i>	8	<i>Laonice cirrata</i>	12, 16
<i>Sphaerosyllis hystrix</i>	15	<i>Malacoceros</i> sp.	5, 7, 9
<i>Sphaerosyllis ovigera</i>	14	<i>Malacoceros fuliginosus</i>	5, 7, 8, 9, 12, 13, 14, 16
<i>Sphaerosyllis tetralix</i>	12	<i>Malacoceros tetracerus</i>	15
<i>Autolytus</i> sp.	11, 15	<i>Polydora</i> sp.	2, 5, 6, 7, 8, 11, 12, 15, 16
<i>Autolytus alexandri</i>	15	<i>Polydora caeca</i>	8, 15
<i>Autolytus brachycephalus</i>	15	<i>Polydora caulleryi</i>	2
<i>Autolytus langerhansi</i>	5, 14	<i>Polydora ciliata</i>	2, 8, 11, 14, 15
<i>Autolytus prolifera</i>	8, 15	<i>Polydora flava</i>	8, 12, 15
<i>Myrianida pinnigera</i>	15	<i>Polydora cornuta</i>	4, 5, 8, 12, 14, 15
<i>Proceraea cornuta</i>	7, 8, 12, 15	<i>Polydora socialis</i>	15
<i>Nereididae</i> indet.	2, 5, 7, 8, 9, 12, 14, 15, 16	<i>Prionospio</i> sp.	15
<i>Hediste diversicolor</i>	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	<i>Prionospio fallax</i>	7, 8, 12, 14, 16
<i>Neanthes fucata</i>	16	<i>Prionospio steenstrupi</i>	15
<i>Neanthes irrorata</i>	11	<i>Prionospio ehlersi</i>	5, 8, 15
<i>Neanthes virens</i>	7, 12, 15, 16	<i>Prionospio caspersi</i>	12
<i>Nereis</i> sp.	5, 7, 8, 11, 15	<i>Pseudopolydora antennata</i>	2, 7, 15, 16
<i>Nereis longissima</i>	5, 7, 8, 11, 12, 15	<i>Pseudopolydora</i> cf. <i>paucibranchiata</i>	15
<i>Nereis pelagica</i>	11, 12, 16	<i>Pseudopolydora pulchra</i>	5, 7, 8, 12, 14, 15
<i>Nereis zonata</i>	15	<i>Pygospio</i> sp.	7
<i>Perinereis cultrifera</i>	2, 8, 15, 16	<i>Pygospio elegans</i>	4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15
<i>Platynereis coccinea</i>	8	<i>Scolelepis</i> sp.	7, 8, 15
<i>Platynereis dumerilii</i>	8, 11, 12, 14, 15, 16	<i>Scolelepis squamata</i>	6, 7, 8, 9, 10, 12, 14
<i>Websterinereis glauca</i>	8, 12, 14, 15	<i>Scolelepis tridentata</i>	9, 12, 14
<i>Nephtys</i> sp.	2, 5, 8, 11, 12, 14, 15, 16	<i>Spio</i> sp.	9, 14, 15
<i>Nephtys caeca</i>	2, 5, 7, 8, 11, 12, 15, 16	<i>Spio decorata</i>	8, 9, 14, 15
<i>Nephtys cirrosa</i>	5, 7, 8, 9, 14	<i>Spio filicornis</i>	5, 8, 11, 12, 14, 15, 16
<i>Nephtys hombergii</i>	5, 6, 7, 8, 11, 12, 14, 15, 16		

<i>Spio martinensis</i>	5, 8, 11, 12, 14, 15	<i>Scalibregma inflatum</i>	7, 8, 12, 14, 16
<i>Microspio mecznikowianus</i>	8, 14, 15	<i>Polygordius lacteus</i>	11, 12
<i>Spiophanes bombyx</i>	7, 8, 12, 14, 15, 16	<i>Protodrilus</i> sp.	8
<i>Spiophanes kroyeri</i>	15	<i>Saccocirrus papillocercus</i>	8, 12
<i>Streblospio</i> sp.	7	<i>Myriochele</i> sp.	7, 12, 14
<i>Streblospio shrubsolii</i>	3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15	<i>Galathowenia oculata</i>	7, 8, 14, 15, 16
<i>Magelona</i> sp.	2, 5, 7, 8, 15	<i>Owenia fusiformis</i>	7, 8, 11, 12, 14, 15, 16
<i>Magelona alleni</i>	7, 8, 12, 14, 15, 16	<i>Terebellida</i> indet.	8
<i>Magelona filiformis</i>	5, 7, 8, 12, 14, 15, 16	<i>Amphictene auricoma</i>	7, 8, 15
<i>Magelona minuta</i>	7, 12, 15	<i>Lagis koreni</i>	7, 8, 11, 12, 14, 15, 16
<i>Magelona mirabilis</i>	7, 8, 9, 11, 12, 14, 16	<i>Pectinaria</i> sp.	8, 12
<i>Chaetopterus variopedatus</i>	7, 8, 12, 14, 15, 16	<i>Sabellaria alveolata</i>	12
Cirratulidae indet.	5, 7, 8, 12, 14, 15, 16	<i>Sabellaria spinulosa</i>	7, 8, 12
<i>Caulleriella</i> sp.	2, 7, 12, 14	Ampharetidae indet.	8, 14
<i>Caulleriella alata</i>	15, 16	<i>Melinna cristata</i>	8
<i>Caulleriella bioculata</i>	8, 15	<i>Melinna palmata</i>	2, 7, 8, 11, 12, 14, 15, 16,
<i>Caulleriella caputesocis</i>	7	Ampharetinae indet.	15
<i>Caulleriella zetlandica</i>	5, 8, 12, 15	<i>Alkmaria romijni</i>	5, 8, 9, 11, 15
<i>Chaetozone</i> sp.	14	<i>Ampharete</i> sp.	5, 6, 8, 11, 12, 14
<i>Chaetozone setosa</i>	7, 8, 11, 12, 14, 15, 16	<i>Ampharete baltica</i>	8
<i>Cirratulus cirratus</i>	8, 11, 12, 14, 16	<i>Ampharete grubei</i>	5, 7, 8, 9, 14, 15
<i>Cirriformia</i> sp.	5, 15	<i>Ampharete lindstroemi</i>	8, 12, 15
<i>Cirriformia tentaculata</i>	2, 5, 6, 7, 8, 12, 15, 16,	<i>Amphicteis gunneri</i>	12
<i>Dodecaceria caulleryi</i>	7	<i>Amphicteis midas</i>	7
<i>Tharyx</i> sp.	2, 5, 7, 8, 11, 12, 14, 15, 16	<i>Octobranchus</i> sp.	15
<i>Tharyx killariensis</i>	15	<i>Terebellides stroemi</i>	7
<i>Aphelochaeta marioni</i>	8, 11, 12, 15, 16	<i>Trichobranchus glacialis</i>	15
<i>Aphelochaeta multibranchiis</i>	2, 15	<i>Trichobranchus roseus</i>	12
<i>Aphelochaeta vivipara</i>	8	Terebellidae indet.	1, 2, 7, 8, 11, 12, 14, 15, 16
Ctenodrilidae indet.	7	Amphitritinae indet.	14
<i>Cossura</i> sp.	12, 14, 15	<i>Amphitrite</i> sp.	15
<i>Cossura longocirrata</i>	7, 8, 15	<i>Amphitrite edwardsi</i>	7, 8, 16
<i>Diplocirrus glaucus</i>	7, 8	<i>Eupolymnia nebulosa</i>	2, 8, 12, 15, 16
<i>Flabelligera affinis</i>	15	<i>Eupolymnia nesidensis</i>	15
<i>Macrochaeta</i> sp.	8	<i>Lanice conchilega</i>	1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16
<i>Macrochaeta helgolandica</i>	6	<i>Loimia medusa</i>	12
<i>Sternaspis scutata</i>	2	<i>Neoamphitrite figulus</i>	7, 8, 11, 14
Capitellidae indet.	5	<i>Nicolea venustula</i>	7
<i>Capitella</i> sp.	4, 5, 8, 9, 11, 12, 14, 15	<i>Nicolea zostericola</i>	12
<i>Capitella capitata</i>	3, 5, 7, 8, 11, 12, 14, 15, 16	<i>Pista cristata</i>	7, 8, 12, 16
<i>Capitomastus minimus</i>	5, 12, 14	<i>Polycirrus</i> sp.	7, 8, 11, 12, 15, 16
<i>Heteromastus filiformis</i>	5, 8, 11, 12, 14, 15, 16	<i>Polycirrus norvegicus</i>	8, 15
<i>Mediomastus fragilis</i>	2, 5, 7, 8, 12, 14, 15, 16	Sabellidae indet.	7, 8, 12, 15, 16
<i>Notomastus latericeus</i>	2, 6, 7, 8, 11, 12, 14, 15, 16	<i>Amphiglena mediterranea</i>	8
<i>Arenicola</i> sp.	14	<i>Bispira volutacornis</i>	1, 2, 7, 8, 12, 16
<i>Arenicola marina</i>	1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	<i>Branchiomma bombyx</i>	2, 8, 15, 16
<i>Arenicolides branchialis</i>	16	<i>Chone duneri</i>	16
<i>Arenicolides ecaudata</i>	12, 16	<i>Fabricia sabella</i>	15
Maldanidae indet.	7, 8, 11, 14	<i>Jasmineira caudata</i>	16
Euclymeninae indet.	8, 11, 12, 15	<i>Jasmineira elegans</i>	7, 12, 15
<i>Clymenura clypeata</i>	2, 7, 12	<i>Manayunkia aestuarina</i>	3, 4, 5, 8, 9, 11, 12, 14, 15
<i>Euclymene</i> sp.	2, 12, 14	<i>Megalomma vesiculosum</i>	8, 11, 12, 15
<i>Euclymene oerstedii</i>	7, 8, 12, 15, 16	<i>Myxicola</i> sp.	7, 8, 15
<i>Praxillella affinis</i>	8, 15	<i>Myxicola aesthetica</i>	12, 15
<i>Ophelia</i> sp.	12	<i>Myxicola infundibulum</i>	2, 7, 8, 12, 15, 16
<i>Ophelia bicornis</i>	5	<i>Pseudopotamilla reniformis</i>	12
<i>Ophelia rathkei</i>	5, 6, 14	<i>Sabella</i> sp.	7, 8, 12, 15, 16
<i>Ophelina acuminata</i>	7, 12	<i>Sabella flabellata</i>	8, 12
		<i>Sabella pavonina</i>	2, 7, 8, 11, 12, 15, 16
		<i>Sabella sarsi</i>	5

Serpulidae indet.	8, 11, 12, 15, 16	<i>Verruca stroemia</i>	5, 7, 8, 12, 14, 15, 16
<i>Hydroides</i> sp.	8, 12, 14	<i>Chthamalus</i> sp.	11, 12, 16
<i>Hydroides elegans</i>	15	<i>Chthamalus montagui</i>	5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
<i>Hydroides norvegica</i>	7, 12, 15, 16	<i>Chthamalus stellatus</i>	7, 8, 9, 10, 11, 12, 13, 14, 15, 16
<i>Ficopomatus enigmaticus</i>	7	<i>Acasta spongites</i>	16
<i>Pomatoceros</i> sp.	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	<i>Semibalanus balanoides</i>	3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
<i>Pomatoceros lamarcki</i>	2, 7, 8, 14, 15, 16	<i>Balanus</i> sp.	7, 12
<i>Pomatoceros triqueter</i>	5, 6, 8, 12, 15, 16	<i>Balanus balanus</i>	5, 6, 7, 12, 15, 16
<i>Serpula vermicularis</i>	2, 8, 12, 15, 16	<i>Balanus crenatus</i>	1, 2, 5, 6, 7, 8, 11, 12, 14, 15, 16
<i>Filograna implexa</i>	12, 15	<i>Balanus improvisus</i>	7, 15
<i>Protula tubularia</i>	7, 11, 12, 14	<i>Balanus perforatus</i>	3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
<i>Salmacina dysteri</i>	12, 15	<i>Elminius modestus</i>	5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
Spirorbidae indet.	5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16	<i>Boscia anglica</i>	7, 12, 15
<i>Janua pagenstecheri</i>	12, 16	<i>Sacculina</i> sp.	15
<i>Spirorbis</i> sp.	8, 12, 15	Copepoda indet.	5
<i>Spirorbis corallinae</i>	12, 16	Harpacticoida indet.	7, 12, 14, 15
<i>Spirorbis rupestris</i>	15, 16	<i>Tigriopus fulvus</i>	12, 15
<i>Spirorbis spirorbis</i>	6, 8, 12, 16	Ostracoda indet.	4, 7, 8, 14
<i>Spirorbis tridentatus</i>	12, 15, 16	<i>Asterope</i> sp.	7, 8, 11, 12, 14
Oligochaeta indet.	5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16,	<i>Philomedes</i> sp.	7
Naididae indet.	4, 11, 15	<i>Euphilomedes interpuncta</i>	12
<i>Paranais litoralis</i>	5, 14	<i>Leptocythere castanea</i>	14
<i>Nais</i> sp.	14	Cyprididae indet.	15
Tubificidae indet.	3, 4, 5, 7, 14, 15	<i>Nebalia bipes</i>	14
<i>Clitellio arenarius</i>	5, 9, 11, 14	Mysidae indet.	5, 6, 7, 11, 12, 13, 14, 15, 16
<i>Heterochaeta costata</i>	3, 4, 5, 8, 9, 11, 12, 14, 15	<i>Siriella jaltensis</i>	11, 12
<i>Tubificoides</i> sp.	7	<i>Gastrosaccus normani</i>	12
<i>Tubificoides amplivasatus</i>	14, 15	<i>Neomysis integer</i>	6, 7
<i>Tubificoides benedii</i>	2, 3, 4, 5, 7, 8, 9, 11, 12, 14, 15, 16	Amphipoda indet.	2, 5, 6, 7, 8, 9, 12, 13, 14, 15, 16
<i>Tubificoides insularis</i>	11, 12, 14	Gammaridea indet.	5, 12, 14, 15
<i>Tubificoides pseudogaster</i>	3, 4, 5, 8, 9, 11, 12, 14, 15	<i>Apherusa bispinosa</i>	16
<i>Tubificoides swirencoides</i>	8, 15	<i>Apherusa clevei</i>	16
<i>Monopylephorus irroratus</i>	3	<i>Apherusa jurinei</i>	7, 8, 10, 12
Enchytraeidae indet.	3, 4, 5, 8, 12, 14	<i>Apherusa ovalipes</i>	8, 11, 16
<i>Grania</i> sp.	8	<i>Gammarellus</i> sp.	12
Hirudinea indet.	8	<i>Monoculodes subnudus</i>	15
Piscicolidae indet.	8	<i>Periculodes longimanus</i>	7, 8, 12, 14, 15, 16
Chelicerata		<i>Pontocrates altamarinus</i>	8, 11
Pycnogonida indet.	12, 15	<i>Pontocrates arenarius</i>	8, 12, 14, 15
<i>Nymphon brevistrofe</i>	7, 14	<i>Synchelidium maculatum</i>	8, 12, 16
<i>Nymphon gracile</i>	8, 16	<i>Amphilocheus</i> sp.	16
<i>Achelia</i> sp.	15	<i>Amphilocheus neapolitanus</i>	8, 12, 15
<i>Achelia echinata</i>	8, 15, 16	<i>Leucothoe</i> sp.	15
<i>Achelia longipes</i>	15	<i>Leucothoe incisa</i>	5, 7, 15
<i>Endeis</i> sp.	15	<i>Leucothoe lilljeborgi</i>	11, 12
<i>Endeis charybdaea</i>	8	<i>Leucothoe procerca</i>	8, 16
<i>Endeis spinosa</i>	8, 12	<i>Leucothoe spinicarpa</i>	7, 8, 15
<i>Callipallene brevistrotris</i>	8, 15, 16	<i>Colomastix pusilla</i>	15
<i>Callipallene phantoma</i>	8	Stenothoidae indet.	7
<i>Anoplodactylus petiolatus</i>	7, 8, 14, 15	<i>Metopa</i> sp.	8
Pycnogonidae indet.	15	<i>Metopa bruzelii</i>	8, 15
<i>Pycnogonum littorale</i>	14	<i>Stenothoe marina</i>	12
Arachnida indet.	4, 12, 14, 15	<i>Stenothoe monoculoides</i>	15
Halacaridae indet.	7, 12, 14, 16	<i>Stenothoe tergestinum</i>	8
Crustacea		<i>Hyale</i> sp.	8, 15
Cirripedia indet.	2, 7, 12, 14, 15, 16	<i>Hyale prevostii</i>	5, 7, 8, 11, 12, 14, 15
<i>Scalpellum scalpellum</i>	8		

<i>Orchestia gammarellus</i>	12, 16	<i>Gammarus tigrinus</i>	7
<i>Orchestia mediterranea</i>	7, 12, 16	<i>Gammarus zaddachi</i>	7
<i>Talitrus saltator</i>	16	<i>Megaluropus agilis</i>	14
<i>Talorchestia deshayesii</i>	16	Melitidae indet.	4, 11, 12, 15
<i>Urothoe</i> sp.	15	<i>Abludomelita gladiosa</i>	8, 15, 16
<i>Urothoe brevicornis</i>	5, 8, 12	<i>Abludomelita obtusata</i>	8
<i>Urothoe elegans</i>	8, 11	<i>Ceradocus semiserratus</i>	15
<i>Urothoe marina</i>	12	<i>Cheirocratus intermedius</i>	8, 15
<i>Urothoe poseidonis</i>	5, 8, 11, 12, 15, 16	<i>Cheirocratus sundevallii</i>	8, 15, 16
<i>Harpinia</i> sp.	8, 12	<i>Gammarella fucicola</i>	8, 11, 15, 16
<i>Harpinia antennaria</i>	7, 12	<i>Maera grossimana</i>	8, 11, 14, 15, 16
<i>Harpinia crenulata</i>	7, 8, 15, 16	<i>Maera othonis</i>	12
<i>Harpinia laevis</i>	11	<i>Melita</i> sp.	8, 11, 12
<i>Parametaphoxus fultoni</i>	15, 16	<i>Melita dentata</i>	16
<i>Metaphoxus pectinatus</i>	12, 15	<i>Melita palmata</i>	4, 5, 8, 12, 13, 14, 15
Lysianassidae indet.	8, 15	<i>Ampithoe ramondi</i>	11, 15
<i>Acidostoma obesum</i>	12	<i>Ampithoe rubricata</i>	8, 15, 16
<i>Euonyx chelatus</i>	15	<i>Ampithoe (Pleonexes)</i> sp.	8
<i>Lepidepcreum longicorne</i>	16	Isaeidae indet.	8, 15
<i>Lysianassa</i> sp.	16	<i>Gammaropsis</i> sp.	15
<i>Lysianassa ceratina</i>	8, 11, 12, 16	<i>Microprotopus maculatus</i>	8
<i>Nannonyx goesii</i>	15, 16	<i>Photis longicaudata</i>	7, 8, 14, 15
<i>Orchomene humilis</i>	8, 11	<i>Photis reinhardi</i>	15
<i>Orchomene nanus</i>	7, 8, 11, 15, 16	Ischyroceridae indet.	8, 15
<i>Perrierella audouiniana</i>	12	<i>Erichthonius</i> sp.	15
<i>Socarnes erythrophthalmus</i>	8, 11	<i>Erichthonius difformis</i>	11
<i>Argissa hamatipes</i>	12	<i>Erichthonius punctatus</i>	8, 12, 14, 15, 16
<i>Iphimedia minuta</i>	8, 15, 16	<i>Jassa</i> sp.	5, 15, 16
<i>Pereionotus testudo</i>	8, 14, 15	<i>Jassa falcata</i>	8, 11, 14, 15
Atylidae indet.	15	<i>Microjassa cumbrensis</i>	8
<i>Atylus falcatus</i>	8, 14, 16	<i>Parajassa pelagica</i>	8
<i>Atylus guttatus</i>	15	Aoridae indet.	8, 14, 15
<i>Atylus swammerdamei</i>	5, 8, 15, 16	<i>Aora</i> sp.	15
<i>Atylus vedlomensis</i>	12, 15, 16	<i>Aora gracilis</i>	7, 8, 11, 12, 14, 15, 16
<i>Dexamine spinosa</i>	2, 5, 8, 11, 14, 15, 16	<i>Leptocheirus</i>	11, 15
<i>Dexamine thea</i>	14, 15	<i>Leptocheirus hirsutimanus</i>	8, 11, 12, 15, 16
<i>Guernea coalita</i>	8, 15	<i>Leptocheirus pectinatus</i>	8, 12
<i>Tritaeta gibbosa</i>	12	<i>Leptocheirus pilosus</i>	15
<i>Ampelisca</i> sp.	8, 12, 15	<i>Leptocheirus tricristatus</i>	8
<i>Ampelisca brevicornis</i>	7, 8, 11, 12, 14, 15, 16	<i>Microdeutopus</i> sp.	8
<i>Ampelisca diadema</i>	7, 8, 11	<i>Microdeutopus anomalus</i>	2, 8, 15
<i>Ampelisca spinipes</i>	8, 14	<i>Microdeutopus stationis</i>	11, 15
<i>Ampelisca tenuicornis</i>	7, 8, 11, 14, 15, 16	<i>Microdeutopus versiculatus</i>	15, 16
<i>Ampelisca typica</i>	7, 12	<i>Corophium</i> sp.	5, 7, 11, 12, 14, 15, 16
<i>Bathyporeia</i> sp.	7	<i>Corophium acherusicum</i>	14, 15
<i>Bathyporeia elegans</i>	7, 12	<i>Corophium arenarium</i>	6
<i>Bathyporeia pelagica</i>	5, 8, 9, 12, 15	<i>Corophium bonnellii</i>	12, 14, 15
<i>Bathyporeia pilosa</i>	5, 7, 8, 10, 12	<i>Corophium crassicorne</i>	6, 11, 12, 14, 15
<i>Bathyporeia sarsi</i>	5, 8, 12	<i>Corophium insidiosum</i>	15
<i>Bathyporeia tenuipes</i>	8	<i>Corophium sextonae</i>	7, 8, 11, 12, 15, 16
<i>Haustorius arenarius</i>	7, 10	<i>Corophium volutator</i>	3, 4, 5, 7, 8, 9, 11, 12, 13, 14, 15
Gammaridae indet.	3, 5, 6, 7, 8, 11, 12, 13, 14, 16	<i>Siphonoecetes</i> sp.	15
<i>Echinogammarus</i> sp.	7, 12	<i>Siphonoecetes kroyeranus</i>	8, 15
<i>Echinogammarus marinus</i>	5, 7, 11, 12, 16	<i>Unciola crenatipalma</i>	7, 8, 12
<i>Echinogammarus obtusatus</i>	5, 6	<i>Xenodice</i> sp.	15
<i>Echinogammarus stoerensis</i>	7, 8, 15	Caprellidae indet.	7, 8, 12, 14, 15, 16
<i>Gammarus</i> sp.	5, 7, 14, 15	<i>Caprella</i> sp.	8
<i>Gammarus chevreuxi</i>	6, 14	<i>Caprella acanthifera</i>	8, 11, 12, 15, 16
<i>Gammarus duebeni</i>	6, 11	<i>Caprella equilibra</i>	7
<i>Gammarus finmarchicus</i>	5, 15	<i>Caprella fretensis</i>	8
<i>Gammarus locusta</i>	5, 6, 8, 11, 14, 15	<i>Caprella linearis</i>	8
<i>Gammarus oceanicus</i>	5, 6, 15	<i>Pariambus typicus</i>	8, 12, 14, 15, 16
<i>Gammarus salinus</i>	6, 14, 15	<i>Phtisica marina</i>	2, 8, 11, 14, 15, 16

<i>Pseudoprotella phasma</i>	8, 12, 15, 16	<i>Diastylis bradyi</i>	8, 15
Isopoda indet.	12, 16	<i>Diastylis laevis</i>	7
Gnathiidae indet.	9, 12	<i>Diastylis rugosa</i>	7, 12, 15
<i>Gnathia</i> sp.	8, 12, 15, 16	Euphausiidae indet.	5
<i>Gnathia dentata</i>	8	<i>Thysanoessa</i> sp.	14
<i>Gnathia oxyraea</i>	7, 8, 15	Decapoda indet.	7, 9, 12, 14, 15
<i>Gnathia vorax</i>	16	Caridea indet.	7, 12, 14, 16
<i>Paragnathia formica</i>	14	<i>Palaemon</i> sp.	7, 16
<i>Anthura gracilis</i>	8, 15, 16	<i>Palaemon elegans</i>	12
<i>Cyathura carinata</i>	3, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15	<i>Palaemon serratus</i>	2, 3, 6, 7, 8, 12, 14, 15, 16
<i>Conilera cylindracea</i>	12, 16	<i>Palaemonetes varians</i>	11
<i>Eurydice</i> sp.	16	<i>Athanas nitescens</i>	12, 15, 16
<i>Eurydice pulchra</i>	5, 7, 8, 10, 12, 14	<i>Hippolyte varians</i>	7, 8, 11, 12, 16
<i>Eurydice spinigera</i>	11	<i>Spirontocaris</i> sp.	8
Sphaeromatidae indet.	12, 14, 15	<i>Thoralus cranchii</i>	15, 16
<i>Campecopea hirsuta</i>	7, 12	<i>Processa edulis crassipes</i>	15
<i>Cymodoce truncata</i>	2, 16	Crangonidae indet.	8, 15
<i>Dynamene bidentata</i>	7, 11, 12, 16	<i>Crangon</i> sp.	7, 11, 15
<i>Sphaeroma</i> sp.	4, 16	<i>Crangon crangon</i>	5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16
<i>Sphaeroma monodi</i>	5, 12, 14	<i>Pontophilus norvegicus</i>	7, 9, 10
<i>Sphaeroma rugicauda</i>	5, 6, 7, 12	<i>Philoceras trispinosus</i>	8
<i>Sphaeroma serratum</i>	16	<i>Homarus gammarus</i>	7, 8, 12, 14, 15
<i>Jaera</i> sp.	7, 14	<i>Upogebia</i> sp.	2
<i>Jaera albifrons</i>	12, 16	Paguroidea indet.	8
<i>Jaera nordmanni</i>	7	Paguridae indet.	1, 5, 7, 8, 11, 12, 14, 16
<i>Jaera prae-hirsuta</i>	15	<i>Anapagurus hyndmanni</i>	8, 14, 15, 16
<i>Janira</i> sp.	16	<i>Anapagurus laevis</i>	8
<i>Janira maculosa</i>	8, 11, 12, 15, 16	<i>Pagurus</i> sp.	5, 8, 15
<i>Munna minuta</i>	8	<i>Pagurus bernhardus</i>	1, 2, 5, 6, 7, 8, 11, 12, 14, 15, 16
<i>Idotea</i> sp.	5, 8, 10, 11, 12, 14, 15	<i>Pagurus cuanensis</i>	7, 8, 11, 14, 15
<i>Idotea baltica</i>	7, 8, 15	<i>Pagurus prideaux</i>	8, 12, 15, 16
<i>Idotea chelipes</i>	5	<i>Galathea</i> sp.	8, 12, 15, 16
<i>Idotea granulosa</i>	3, 5, 8, 12	<i>Galathea dispersa</i>	8, 12
<i>Idotea linearis</i>	5	<i>Galathea intermedia</i>	8, 16
<i>Idotea pelagica</i>	12	<i>Galathea squamifera</i>	1, 2, 7, 8, 12, 15, 16
<i>Zenobiana prismatica</i>	8, 14	<i>Galathea strigosa</i>	2, 8, 12, 14, 15, 16
<i>Arcturella damnoniensis</i>	8, 14, 15	<i>Pisidia longicornis</i>	7, 8, 12, 14, 15, 16
<i>Astacilla longicornis</i>	8, 15, 16	<i>Porcellana platycheles</i>	6, 7, 8, 12, 14, 15, 16
Epicaridea indet.	6	<i>Ebalia granulosa</i>	8
<i>Ligia oceanica</i>	5, 7, 11, 12, 13, 14, 15, 16	<i>Maja squinado</i>	2, 6, 7, 8, 12, 15, 16
Tanaidae indet.	15	<i>Hyas araneus</i>	1, 7
<i>Tanais</i> sp.	8	<i>Achaeus cranchii</i>	15
<i>Heterotanais oerstedii</i>	14	<i>Inachus</i> sp.	1, 2, 5, 7, 8, 12, 14, 15, 16
<i>Leptocheilia dubia</i>	8, 15	<i>Inachus dorsettensis</i>	8, 12, 15
<i>Leptognathia</i>	15	<i>Inachus phalangium</i>	7, 8, 12, 15
<i>Leptognathia gracilis</i>	8	<i>Macropodia</i> sp.	8, 15, 16
<i>Tanaopsis graciloides</i>	7, 8, 12, 15	<i>Macropodia deflexa</i>	2
Apseudidae indet.	9	<i>Macropodia linarsi</i>	15
<i>Apseudes latreillii</i>	8, 11, 14, 15, 16	<i>Macropodia rostrata</i>	1, 7, 8, 12, 15, 16
<i>Apseudes talpa</i>	8, 11, 12	<i>Macropodia tenuirostris</i>	8
<i>Cumopsis fagei</i>	8	<i>Eurynome</i> sp.	7
<i>Cumopsis goodsiri</i>	8	<i>Eurynome spinosa</i>	8
<i>Vauntomponia cristata</i>	8, 15, 16	<i>Corystes cassivelaunus</i>	7
<i>Bodotria arenosa arenosa</i>	15, 16	<i>Thia scutellata</i>	8
<i>Bodotria pulchella</i>	5, 8	<i>Pirimela denticulata</i>	8
<i>Bodotria scorpioides</i>	5, 7, 8, 11, 14	<i>Cancer pagurus</i>	1, 2, 5, 6, 7, 8, 11, 12, 14, 15, 16
<i>Iphinoe trispinosa</i>	14, 16	<i>Liocarcinus</i> sp.	2, 5, 7, 12, 14, 15
<i>Eudorella truncatula</i>	7, 8, 12, 14, 15	<i>Liocarcinus arcuatus</i>	8, 15
<i>Cumella pygmaea</i>	8, 15	<i>Liocarcinus depurator</i>	2, 7, 8, 12, 14, 15, 16
<i>Pseudocuma gilsoni</i>	14		
<i>Pseudocuma longicornis</i>	8, 14		
Diastylidae indet.	2		
<i>Diastylis</i> sp.	11, 15, 16		

<i>Liocarcinus holsatus</i>	2	<i>Lacuna parva</i>	16
<i>Liocarcinus marmoreus</i>	8, 15	<i>Lacuna vincta</i>	8, 12, 14, 15, 16
<i>Liocarcinus pusillus</i>	12, 15, 16	<i>Littorina</i> sp.	6, 7, 9, 10, 12
<i>Necora puber</i>	2, 6, 7, 8, 11, 12, 14, 15, 16	<i>Littorina littorea</i>	5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
<i>Carcinus maenas</i>	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	<i>Littorina maria</i>	5, 6, 7, 8, 11, 12, 14, 15, 16
Xanthoidea indet.	12	<i>Littorina neglecta</i>	7, 8, 11, 12, 13, 14, 15
<i>Goneplax rhomboides</i>	2, 12	<i>Littorina nigrolineata</i>	8, 15
<i>Pilumnus hirtellus</i>	2, 7, 12, 15, 16	<i>Littorina obtusata</i>	5, 6, 7, 8, 11, 12, 14, 15, 16
<i>Xantho</i> sp.	16	<i>Littorina obtusatalmariae</i>	3, 7, 8, 11, 12, 14, 15, 16
<i>Xantho incisus</i>	7, 12, 16	<i>Littorina saxatilis</i>	5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16
<i>Xantho pilipes</i>	16	<i>Littorina saxatilis tenebrosa</i>	8
Insecta		<i>Littorina saxatilis</i> var. <i>rudis</i>	5, 15
Insecta indet.	4, 5, 7, 8, 12, 13, 14, 15	<i>Melarhaphe neritoides</i>	7, 8, 9, 10, 12, 13, 14, 15, 16
<i>Chironomida</i> sp.	5, 6, 11, 14, 15	Rissoacea indet.	16
<i>Collembola</i> sp.	4, 5, 11	Hydrobiidae indet.	12, 15
<i>Petrobius maritimus</i>	7, 11, 12, 14	<i>Hydrobia</i> sp.	5, 15
Diptera larva indet.	3, 4, 12, 15	<i>Hydrobia neglecta</i>	7
<i>Anurida maritima</i>	5, 6, 7, 8, 11, 12, 13, 14, 15, 16	<i>Hydrobia ulvae</i>	3, 4, 5, 6, 8, 9, 11, 12, 14, 15
Mollusca		Rissoidae indet.	12, 14, 16
Polyplacophora indet.	5, 7, 8, 10, 12, 13, 14, 15, 16	<i>Rissoa</i> sp.	15
<i>Leptochiton asellus</i>	15	<i>Rissoa lilacina porifera</i>	15
<i>Hanleya hanleyi</i>	15	<i>Rissoa parva</i>	7, 8, 10, 12, 15, 16
<i>Lepidochitona cinerea</i>	5, 6, 8, 11, 12, 14, 15, 16,	<i>Rissoa membranacea</i>	15, 16
<i>Tonicella marmorea</i>	7, 12	<i>Pusillina inconspicua</i>	15
<i>Tonicella rubra</i>	5, 11, 12, 16	<i>Alvania semistriata</i>	15
<i>Callochiton septemvalvis</i>	15	<i>Manzonina crassa</i>	8, 15
<i>Acanthochitona</i> sp.	12	<i>Cingula cingillus</i>	15, 16
<i>Acanthochitona crinita</i>	7, 12, 16	<i>Onoba semicostata</i>	7, 8, 14, 15
Gastropoda indet.	2, 8, 15	<i>Skeneopsis planorbis</i>	16
<i>Emarginula fissura</i>	15	<i>Rissoella diaphana</i>	15
<i>Diodora graeca</i>	7, 12, 16	<i>Caecum glabrum</i>	8, 15
<i>Tectura</i> sp.	15, 16	<i>Caecum trachea</i>	8
<i>Tectura testudinalis</i>	7, 15, 16	<i>Turritella communis</i>	2, 7, 8
<i>Tectura virginea</i>	7, 8, 12, 14, 15, 16	Bittiidae indet.	12
<i>Patella</i> sp.	1, 6, 7, 8, 11, 12, 13, 14, 15, 16	<i>Bittium</i> sp.	11
<i>Patella depressa</i>	8, 11, 12, 15, 16	<i>Bittium reticulatum</i>	15, 16
<i>Patella ulyssiponensis</i>	3, 7, 8, 12, 16	<i>Chrysallida decussata</i>	15
<i>Patella vulgata</i>	3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	<i>Chrysallida interstincta</i>	15
<i>Helcion pellucidum</i>	3, 7, 8, 12, 14, 15, 16	<i>Chrysallida terebellum</i>	15
Trochidae indet.	15	<i>Odostomia</i> sp.	14, 15
<i>Osilinus lineatus</i>	5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	<i>Odostomia acuta</i>	16
<i>Jujubinus montagui</i>	16	<i>Odostomia plicata</i>	8, 14, 15
<i>Jujubinus striatus</i>	15, 16	<i>Brachystomia carrozzai</i>	8
<i>Gibbula</i> sp.	8, 15	<i>Brachystomia eulimoides</i>	14
<i>Gibbula magus</i>	8, 12, 15, 16	<i>Turbonilla</i> sp.	2, 8, 15
<i>Gibbula tumida</i>	7, 8, 12, 15, 16	<i>Turbonilla lactea</i>	15
<i>Gibbula cineraria</i>	5, 6, 7, 8, 11, 12, 14, 15, 16	<i>Epitonium</i> sp.	7
<i>Gibbula umbilicalis</i>	3, 5, 7, 8, 9, 10, 11, 12, 14, 15, 16	<i>Melanella alba</i>	16
<i>Calliostoma zizyphinum</i>	2, 7, 8, 11, 12, 15, 16	<i>Vitreolina philippi</i>	15
<i>Dikoleps cutleriana</i>	8	<i>Aporrhais pespelecani</i>	2, 12
<i>Tricolia pullus</i>	7, 8, 15, 16	<i>Capulus ungaricus</i>	15
<i>Lacuna pallidula</i>	12, 15	<i>Calyptraea chinensis</i>	8, 11, 12, 15, 16
		<i>Crepidula fornicata</i>	1, 2, 5, 6, 7, 8, 11, 12, 14, 15, 16
		<i>Trivia</i> sp.	7, 8, 15
		<i>Trivia arctica</i>	2, 7, 8, 12
		<i>Trivia monacha</i>	7, 8, 12, 15
		<i>Lamellaria latens</i>	16

<i>Naticidae</i> indet.	14	<i>Polycera quadrilineata</i>	7, 11, 12, 15
<i>Polinices</i> sp.	8	<i>Thecacera pennigera</i>	8
<i>Polinices fuscus</i>	15	<i>Cadlina laevis</i>	12
<i>Polinices montagui</i>	15	<i>Rostanga rubra</i>	12, 15, 16
<i>Polinices pulchellus</i>	7, 8, 12, 15, 16	<i>Dorididae</i> indet.	8, 15
<i>Nuccella lapillus</i>	3, 6, 7, 8, 9, 10, 12, 14, 15, 16	<i>Archidoris pseudoargus</i>	2, 6, 7, 8, 11, 12, 14, 15, 16
<i>Ocenebra erinacea</i>	2, 7, 8, 11, 12, 15, 16	<i>Jorunna tomentosa</i>	7, 11, 12, 14
<i>Buccinidae</i> indet.	15	<i>Janolus cristatus</i>	7, 8, 12
<i>Buccinum undatum</i>	2, 5, 6, 7, 8, 11, 12, 15, 16	<i>Coryphella</i> sp.	8, 12, 14
<i>Neptunea despecta</i>	8	<i>Coryphella browni</i>	7
<i>Hinia</i> sp.	12, 15	<i>Coryphella gracilis</i>	15
<i>Hinia incrassata</i>	7, 8, 11, 12, 14, 15, 16	<i>Coryphella lineata</i>	7, 12
<i>Hinia pygmaea</i>	2	<i>Coryphella verrucosa</i>	15
<i>Hinia reticulata</i>	2, 7, 8, 11, 12, 14, 15, 16	<i>Flabellina pedata</i>	7, 12, 15
<i>Turridae</i> indet.	15	<i>Flabellina pellucida</i>	7
<i>Haedropleura septangularis</i>	15	<i>Cuthona amoena</i>	7
<i>Mangelia</i> sp.	15	<i>Tergipes tergipes</i>	12
<i>Mangelia attenuata</i>	15	<i>Eubbranchus</i> sp.	7, 12, 15
<i>Mangelia brachystoma</i>	7	<i>Eubbranchus farrani</i>	7, 12
<i>Mangelia coarctata</i>	15	<i>Eubbranchus tricolor</i>	7
<i>Raphitoma linearis</i>	15	<i>Eubbranchus vittatus</i>	8
<i>Raphitoma purpurea</i>	7, 16	<i>Facelina</i> sp.	12, 15
<i>Opisthobranchia</i> indet.	8, 12	<i>Facelina bostoniensis</i>	11, 12
<i>Scaphander lignarius</i>	15	<i>Aeolidia papillosa</i>	2, 5, 8, 12, 14, 16
<i>Cylichna cylindracea</i>	7, 15	<i>Aeolidiella glauca</i>	7, 8
<i>Philine</i> sp.	7, 8, 15	<i>Auriculinella bidentata</i>	16
<i>Philine aperta</i>	2, 7, 12, 15, 16	<i>Otina ovata</i>	16
<i>Philine catena</i>	8	<i>Pelecypoda</i> indet.	5, 7, 8, 11, 12, 14, 15, 16
<i>Philine scabra</i>	14, 16	<i>Nucula</i> sp.	7, 15
<i>Colpodaspis pusilla</i>	8	<i>Nucula nitidosa</i>	2, 7, 8, 11, 12, 16
<i>Haminoea navicula</i>	15	<i>Nucula nucleus</i>	2, 7, 8, 12, 15
<i>Retusidae</i> indet.	14	<i>Mytilidae</i> indet.	3, 4, 5, 7
<i>Retusa truncatula</i>	7, 15	<i>Mytilus</i> sp.	5
<i>Runcina coronata</i>	12, 14	<i>Mytilus edulis</i>	5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
<i>Elysia viridis</i>	2, 8, 12, 15, 16	<i>Musculus</i> sp.	7, 14
<i>Hermaea bifida</i>	8	<i>Musculus discors</i>	7, 16
<i>Stiliger bellulus</i>	12	<i>Modiolarca tumida</i>	8, 12, 15
<i>Placida dendritica</i>	8	<i>Modiolus</i> sp.	5, 8, 12
<i>Limapontia capitata</i>	16	<i>Modiolus barbatus</i>	16
<i>Aplysia punctata</i>	7, 8, 11, 12, 15, 16	<i>Modiolus modiolus</i>	8, 9, 14, 15, 16
<i>Pleurobranchus membranaceus</i>	15	<i>Modiolula phaseolina</i>	12
<i>Berthella plumula</i>	8	<i>Limatula sulcata</i>	8
<i>Limacina</i> sp.	12	<i>Crassostrea gigas</i>	5, 6, 16
<i>Nudibranchia</i> indet.	7, 15	<i>Ostrea edulis</i>	2, 5, 7, 8, 12, 15, 16
<i>Lomanotus genei</i>	7	<i>Pectinidae</i> indet.	15
<i>Dendronotus frondosus</i>	11	<i>Delectopecten vitreus</i>	16
<i>Doto</i> sp.	7, 8, 14, 15, 16	<i>Chlamys</i> sp.	7
<i>Doto coronata</i>	7, 11, 15	<i>Chlamys distorta</i>	16
<i>Doto fragilis</i>	7, 8, 12, 14, 15	<i>Chlamys varia</i>	8, 12, 15, 16
<i>Doto millbayana</i>	7	<i>Aequipecten opercularis</i>	8, 16
<i>Doto pinnatifida</i>	8, 15	<i>Pecten maximus</i>	2, 8, 12, 15, 16
<i>Doridoidea</i> indet.	8	<i>Anomiidae</i> indet.	7, 8, 11, 12, 14, 15, 16
<i>Goniodoris nodosa</i>	8, 12	<i>Anomia ephippium</i>	7, 8, 12, 15, 16
<i>Okenia elegans</i>	12	<i>Pododesmus patelliformis</i>	11
<i>Acanthodoris pilosa</i>	8, 12, 16	<i>Heteranomia squamula</i>	7, 11, 12, 14, 15, 16
<i>Onchidoris bilamellata</i>	2, 5, 15	<i>Lucinoma borealis</i>	7, 8, 11, 12, 14, 15, 16
<i>Diaphorodoris luteocincta</i>	7	<i>Thyasira</i> sp.	14
<i>Crimora papillata</i>	7, 12, 14	<i>Thyasira flexuosa</i>	2, 7, 8, 12, 14
<i>Aegires punctilucens</i>	16	<i>Thyasira gouldi</i>	2 (unconfirmed record)
<i>Limacia clavigera</i>	12, 14, 15, 16	<i>Diplodonta rotundata</i>	16
<i>Polycera</i> sp.	12, 15	<i>Lasaea adansoni</i>	7, 12, 16
<i>Polycera faeroensis</i>	7, 12	<i>Kellia suborbicularis</i>	12, 16

<i>Montacuta</i> sp.	7, 8, 12	<i>Chamelea gallina</i>	7, 8, 11, 12, 14, 15, 16
<i>Mysella bidentata</i>	2, 5, 7, 8, 11, 12, 14, 15, 16	<i>Clausinella fasciata</i>	8, 14, 15, 16
<i>Tellimya ferruginosa</i>	8, 15, 16	<i>Timoclea ovata</i>	8, 12, 16
<i>Decipula tenella</i>	15	<i>Petricola pholadiformis</i>	12
<i>Lepton squamosum</i>	2	<i>Mysia undata</i>	16
<i>Epilepton clarkiae</i>	16	<i>Myacea</i> indet.	8
<i>Goodallia triangularis</i>	8	<i>Mya</i> sp.	7, 12
<i>Cardiidae</i> indet.	5, 8, 12, 14, 15	<i>Mya truncata</i>	7, 11, 12, 14, 16
<i>Acanthocardia</i> sp.	7	<i>Mya arenaria</i>	7, 8, 12, 14, 16
<i>Acanthocardia aculeata</i>	8	<i>Sphenia binghami</i>	12
<i>Acanthocardia echinata</i>	12, 14	<i>Corbula gibba</i>	2, 7, 8, 11, 12, 14, 15, 16
<i>Acanthocardia (Rudicardium)</i> sp.	15	<i>Hiatella</i> sp.	12
<i>Parvicardium</i> sp.	16	<i>Hiatella arctica</i>	2, 7, 8, 11, 12, 14, 15, 16
<i>Parvicardium exiguum</i>	8, 11, 12, 14, 15, 16	<i>Pholas dactylus</i>	3, 7, 12
<i>Parvicardium ovale</i>	7, 8, 12, 14, 15, 16	<i>Barnea candida</i>	7
<i>Parvicardium scabrum</i>	8, 15, 16	<i>Thracia phaseolina</i>	8, 14, 16
<i>Laevicardium crassum</i>	16	<i>Thracia pubescens</i>	8
<i>Cerastoderma edule</i>	3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16	<i>Thracia villosiuscula</i>	15
<i>Spisula</i> sp.	14, 15	<i>Sepia officinalis</i>	7, 8, 15
<i>Spisula elliptica</i>	7, 8, 11, 12, 14, 16	<i>Loligo</i> sp.	15
<i>Spisula solida</i>	8, 16	<i>Histioteuthis bonnellii</i>	12
<i>Spisula subtruncata</i>	8	Bryozoa	
<i>Lutraria lutraria</i>	8, 15, 16	<i>Bryozoa</i> indet.	2, 6, 7, 8, 12, 16
<i>Solen marginatus</i>	15, 16	<i>Crisiidae</i> indet.	7, 8, 15
<i>Ensis</i> sp.	8, 11, 12, 16	<i>Crisidia cornuta</i>	7, 16
<i>Ensis arcuatus</i>	8, 15, 16	<i>Crisia</i> sp.	12
<i>Ensis ensis</i>	7, 8, 11, 14, 16	<i>Crisia denticulata</i>	7, 12, 14, 16
<i>Ensis siliqua</i>	8, 15, 16	<i>Stomatoporina</i>	8
<i>Phaxas pellucidus</i>	7, 8, 11, 12, 14, 15, 16	<i>Tubulipora</i> sp.	16
<i>Tellinidae</i> indet.	5, 8, 15	<i>Tubulipora flabellaris</i>	12
<i>Angulus squalidus</i>	8	<i>Tubulipora plumosa</i>	16
<i>Angulus tenuis</i>	5, 7, 8, 14, 15, 16	<i>Alcyonidium</i> sp.	7, 8, 12, 15, 16
<i>Arcopagia crassa</i>	8, 16	<i>Alcyonidium diaphanum</i>	7, 8, 12, 14, 16
<i>Fabulina fabula</i>	7, 8, 12, 14, 15, 16	<i>Alcyonidium gelatinosum</i>	5, 6, 7, 8, 11, 12, 14, 15, 16
<i>Moerella donacina</i>	12, 15, 16	<i>Alcyonidium hirsutum</i>	7, 12, 14, 15
<i>Moerella pygmaea</i>	8, 12, 14, 15	<i>Alcyonidium mytili</i>	5, 7, 12, 14, 16
<i>Macoma</i> sp.	5	<i>Flustrellidra hispida</i>	7, 8, 11, 12, 14, 15, 16
<i>Macoma balthica</i>	5, 6, 8, 11, 12	<i>Nolella</i> sp.	12
<i>Donax vittatus</i>	16	<i>Nolella dilatata</i>	2
<i>Gari fervensis</i>	6, 8, 16	<i>Walkeria uva</i>	10, 14, 15
<i>Gari tellinella</i>	11, 12, 16	<i>Vesicularia spinosa</i>	7
<i>Scrobicularia</i> sp.	5, 14	<i>Amathia lendigera</i>	16
<i>Scrobicularia plana</i>	3, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 16	<i>Bowerbankia</i> sp.	5, 7, 8, 12, 14, 15
<i>Abra</i> sp.	2, 7, 8, 11, 12, 13, 14, 15	<i>Bowerbankia gracilis</i>	12, 16
<i>Abra alba</i>	2, 7, 8, 12, 14, 15, 16	<i>Bowerbankia imbricata</i>	5, 6, 7, 11, 12, 13, 14, 15, 16
<i>Abra nitida</i>	7, 8, 11, 12, 15, 16	<i>Bowerbankia pustulosa</i>	7, 8, 11, 12, 14, 15, 16
<i>Abra prismatica</i>	12, 15, 16,	<i>Umbonula</i> sp.	8
<i>Abra tenuis</i>	8, 12, 14, 15	<i>Umbonula littoralis</i>	7, 8, 9, 10, 12, 13, 14, 15, 16
<i>Arctica islandica</i>	11, 16	<i>Escharoides coccinea</i>	7, 8, 12, 15, 16
<i>Veneridae</i> indet.	8, 15	<i>Cryptosula</i> sp.	12
<i>Venus</i> sp.	8, 14	<i>Cryptosula pallasiana</i>	5, 6, 7, 8, 11, 12, 14, 15, 16
<i>Circomphalus casina</i>	8, 15	<i>Parasmittina trispinosa</i>	7, 8, 12, 16
<i>Callista chione</i>	15, 16	<i>Escharella</i> sp.	12
<i>Dosinia lupinus</i>	8, 12, 15, 16	<i>Schizoporella unicornis</i>	14, 16
<i>Dosinia exoleta</i>	11, 12, 16	<i>Schizomavella auriculata</i>	7, 8, 12, 16
<i>Tapes decussatus</i>	15, 16	<i>Schizomavella linearis</i>	7, 8, 11, 12, 16
<i>Tapes aureus</i>	16	<i>Chorizopora brongniartii</i>	12
<i>Tapes rhomboides</i>	7, 12, 14, 15	<i>Celleporella hyalina</i>	6, 8, 14, 15, 16
<i>Venerupis senegalensis</i>	5, 8, 11, 12, 15, 16		

<i>Cellepora</i> sp.	12, 15	<i>Ophiura ophiura</i>	2, 7, 8, 12, 14, 16
<i>Cellepora pumicosa</i>	7, 8, 12, 14, 15, 16	<i>Psammechinus miliaris</i>	6, 7, 8, 11, 12, 14, 15, 16
<i>Celleporina hassallii</i>	8, 12, 15, 16	<i>Echinus esculentus</i>	8, 12, 15
<i>Inovicellina</i> indet.	6	<i>Echinocyamus pusillus</i>	8, 14, 15, 16
<i>Scruparia chelata</i>	7, 12, 14	<i>Spatangus purpureus</i>	15
<i>Eucratea loricata</i>	7	<i>Echinocardium cordatum</i>	7, 8, 11, 12, 14, 15, 16
<i>Membranipora membranacea</i>	7, 8, 11, 12, 14, 15, 16	<i>Holothurioidea</i> indet.	8
<i>Conopeum</i> sp.	12	<i>Holothuria forskali</i>	12, 15
<i>Conopeum reticulum</i>	11, 12, 15	<i>Cucumariidae</i> indet.	7, 8, 14, 15, 16
<i>Conopeum seurati</i>	5	<i>Leptopentacta elongata</i>	15, 16
<i>Electra crustulenta</i>	12	<i>Pawsonia saxicola</i>	1, 2, 12, 16
<i>Electra pilosa</i>	3, 5, 6, 7, 8, 11, 12, 14, 15, 16	<i>Aslia lefevrei</i>	7, 8, 12, 16
<i>Flustra foliacea</i>	2	<i>Thyone</i> sp.	12
<i>Chartella papyracea</i>	7, 8	<i>Thyone fusus</i>	14
<i>Securiflustra securifrons</i>	2, 7	<i>Neopentadactyla mixta</i>	12, 15, 16
<i>Callopora</i> sp.	16	<i>Leptosynapta inhaerens</i>	8, 16
<i>Callopora lineata</i>	12	<i>Leptosynapta minuta</i>	8
<i>Callopora rylandi</i>	12	<i>Labidoplax digitata</i>	7, 8, 12, 16
<i>Cellaria</i> sp.	12, 15	Tunicata	
<i>Cellaria fistulosa</i>	7, 8	<i>Ascidacea</i> indet.	5, 7, 8, 12, 14, 15, 16
<i>Cellaria sinuosa</i>	7, 12	<i>Clavelina lepadiformis</i>	2, 7, 8, 11, 12, 14, 15, 16
<i>Caberea ellisii</i>	12	<i>Pycnoclavella aurilucens</i>	7, 12, 14
<i>Scrupocellaria</i> sp.	2, 7, 8, 12, 14, 15, 16	<i>Distaplia rosea</i>	7, 8, 12, 15, 16
<i>Scrupocellaria reptans</i>	7, 8, 12, 14, 15, 16	<i>Archidistoma aggregatum</i>	16
<i>Scrupocellaria scrupea</i>	7, 12, 14	<i>Polyclinidae</i> indet.	2, 7, 8, 12, 14, 15, 16
<i>Scrupocellaria scruposa</i>	7, 8, 12, 14, 15	<i>Polyclinum aurantium</i>	1, 2, 8, 12, 14, 15, 16
<i>Bicellariella ciliata</i>	2, 7, 8, 12, 16	<i>Morchellium argus</i>	1, 2, 7, 8, 11, 12, 14, 15, 16
<i>Bugula</i> sp.	2, 7, 8, 12, 15, 16	<i>Sidnyum</i> sp.	7, 14
<i>Bugula flabellata</i>	7, 8, 12, 14, 15	<i>Sidnyum elegans</i>	8, 12, 14, 15, 16
<i>Bugula fulva</i>	6, 15	<i>Sidnyum turbinatum</i>	7, 11, 12, 14, 16
<i>Bugula plumosa</i>	2, 7, 8, 11, 12, 14, 15, 16	<i>Aplidium</i> sp.	7, 8
<i>Bugula stolonifera</i>	15	<i>Aplidium glabrum</i>	7, 16
<i>Bugula turbinata</i>	7, 8, 11, 12, 14, 15, 16	<i>Aplidium nordmanni</i>	16
<i>Bryozoa</i> indet. (crusts)	5, 6, 7, 8, 11, 12, 14, 15, 16	<i>Aplidium pallidum</i>	8, 16
Phoronida		<i>Aplidium proliferum</i>	7, 12
<i>Phoronis</i> sp.	7, 12, 15, 16	<i>Aplidium punctum</i>	2, 7, 8, 12, 16
<i>Phoronis hippocrepia</i>	12, 14, 15	<i>Didemnidae</i> indet.	2, 7, 8, 12, 14, 15, 16
<i>Phoronis muelleri</i>	2, 8, 15	<i>Trididemnum</i> sp.	12
Echinodermata		<i>Trididemnum cereum</i>	8, 12, 16
<i>Antedon bifida</i>	7, 8, 12, 15	<i>Didemnum</i> sp.	12, 15
<i>Astropecten irregularis</i>	14, 15	<i>Didemnum fulgens</i>	16
<i>Luidia ciliaris</i>	15	<i>Didemnum gelatinosum</i>	2, 7, 8
<i>Asterina gibbosa</i>	2, 8, 12, 15, 16	<i>Didemnum lahillei</i>	12
<i>Henricia oculata</i>	12, 15	<i>Didemnum maculosum</i>	1, 2, 8, 11, 12, 16
<i>Asteriidae</i> indet.	6	<i>Diplosoma</i> sp.	8, 12
<i>Asterias rubens</i>	5, 6, 7, 8, 12, 14, 15, 16	<i>Diplosoma listerianum</i>	1, 2, 7, 8, 12, 14, 15, 16
<i>Marthasterias glacialis</i>	7, 8, 11, 12, 14, 15, 16	<i>Diplosoma spongiforme</i>	1, 8, 12, 14, 16
<i>Ophiuroidea</i> indet.	8, 12, 14	<i>Lissoclinum perforatum</i>	7, 8, 12, 14, 16
<i>Ophiothrix fragilis</i>	2, 7, 8, 11, 12, 14, 15, 16	<i>Ciona intestinalis</i>	2, 8, 12, 15
<i>Ophiocomina nigra</i>	8, 12, 16	<i>Corella parallelogramma</i>	12, 15, 16
<i>Ophiopsila aranea</i>	12	<i>Ascidia</i> sp.	7, 8, 12, 15, 16
<i>Ophiopholis aculeata</i>	12	<i>Ascidia aspersa</i>	1, 2, 6, 7, 8, 12, 14, 15, 16
<i>Amphiura</i> sp.	12, 16	<i>Ascidia scabra</i>	7, 12, 16
<i>Amphiura brachiata</i>	7, 8, 12, 14, 15	<i>Ascidia</i> sp.	15
<i>Amphiura chiajei</i>	12, 14	<i>Ascidia conchilega</i>	2, 7, 8
<i>Amphiura filiformis</i>	7, 11, 12	<i>Ascidia mentula</i>	1, 2, 8, 12, 15
<i>Amphipholis squamata</i>	2, 7, 8, 12, 14, 15, 16	<i>Ascidia virginea</i>	7
<i>Ophiura</i> sp.	7, 8, 12, 16	<i>Phallusia mammillata</i>	2, 8
<i>Ophiura affinis</i>	14, 16	<i>Styelidae</i> indet.	7, 8
<i>Ophiura albida</i>	7, 8, 12, 16	<i>Styela</i> sp.	15

<i>Styela clava</i>	1, 2, 7, 8, 12, 15	<i>Chelon labrosus</i>	8
<i>Styela plicata</i>	8	<i>Centrolabrus exoletus</i>	8, 12, 15, 16
<i>Polycarpa</i> sp.	2, 7, 8, 15	<i>Crenilabrus</i> sp.	8
<i>Polycarpa pomaria</i>	12	<i>Crenilabrus melops</i>	8, 12, 14, 15, 16
<i>Polycarpa scuba</i>	7, 8, 11, 12, 16	<i>Ctenolabrus rupestris</i>	2, 6, 7, 8, 11, 12, 14, 15, 16
<i>Dendrodoa grossularia</i>	2, 7, 8, 11, 12, 16	<i>Labrus bergylta</i>	2, 7, 8, 12, 14, 15, 16
<i>Distomus variolosus</i>	8, 12, 15, 16	<i>Labrus mixtus</i>	6, 12
<i>Stolonica socialis</i>	7, 8, 12	<i>Trachinus draco</i>	16
<i>Botryllus schlosseri</i>	1, 2, 7, 8, 11, 12, 14, 15, 16	<i>Echiichthys vipera</i>	16
<i>Botrylloides leachi</i>	2, 7, 8, 11, 12, 14, 15, 16	<i>Blennius ocellaris</i>	12, 14
<i>Pyura microcosmus</i>	12	<i>Coryphoblennius galerita</i>	12
<i>Pyura tessellata</i>	11, 12	<i>Lipophrys pholis</i>	7, 8, 10, 11, 12, 14, 15, 16
<i>Molgula</i> sp.	7, 15, 16	<i>Parablennius gattorugine</i>	7, 12, 15, 16
<i>Molgula citrina</i>	8	<i>Tripterygion delaisi</i>	2
<i>Molgula complanata</i>	12	<i>Zoarces viviparus</i>	8
<i>Molgula manhattensis</i>	2, 7, 8, 12, 15	<i>Pholis gunnellus</i>	5, 7, 8, 12, 14, 15, 16
<i>Molgula occulta</i>	15	<i>Ammodytes</i> sp.	5, 7, 8, 12, 15, 16
Pisces		<i>Ammodytes marinus</i>	9
<i>Scyliorhinus canicula</i>	12	<i>Ammodytes tobianus</i>	5, 8, 11, 12, 15
<i>Scyliorhinus stellaris</i>	15	<i>Callionymus lyra</i>	2, 7, 8, 11, 12, 14, 15, 16
<i>Mustelus mustelus</i>	12	<i>Callionymus reticulatus</i>	8
Rajidae indet.	16	Gobiidae indet.	2, 6, 7, 8, 12, 13, 14, 15, 16
<i>Raja</i> sp.	8, 15	<i>Gobius</i> sp.	12, 14, 15
<i>Raja batis</i>	7	<i>Gobius couchi</i>	15
<i>Raja brachyura</i>	8	<i>Gobius niger</i>	2, 7, 8, 11, 12, 15, 16
<i>Raja clavata</i>	8, 12, 15	<i>Gobius paganellus</i>	12, 14, 15, 16
<i>Anguilla anguilla</i>	5, 6, 11, 12, 14, 15, 16	<i>Gobiusculus flavescens</i>	2, 7, 8, 12, 14, 15, 16
<i>Conger conger</i>	8, 12, 15, 16	<i>Pomatoschistus</i> sp.	5, 8, 11, 12, 15
<i>Lepadogaster</i> sp.	15	<i>Pomatoschistus microps</i>	8, 15
<i>Lepadogaster lepadogaster</i>	7, 12, 16	<i>Pomatoschistus minutus</i>	1, 2, 5, 7, 8, 12, 14, 15, 16
<i>Lophius piscatorius</i>	16	<i>Pomatoschistus norvegicus</i>	15
Gadidae indet.	7, 8, 12, 16	<i>Pomatoschistus pictus</i>	2, 7, 8, 12, 15, 16
<i>Ciliata</i> sp.	15	<i>Thorogobius ephippiatus</i>	7, 8, 12, 14, 15, 16
<i>Ciliata mustela</i>	7, 12, 15, 16	<i>Psetta maxima</i>	5
<i>Gadus</i> sp.	15	<i>Zeugopterus punctatus</i>	12, 14, 15
<i>Gaidropsarus mediterraneus</i>	12, 16	Pleuronectidae indet.	7, 8, 11, 12, 14, 16
<i>Gaidropsarus vulgaris</i>	8	<i>Limanda limanda</i>	8
<i>Molva molva</i>	15	<i>Platichthys flesus</i>	7, 8, 13, 14, 15
<i>Pollachius pollachius</i>	6, 7, 8, 12, 14, 15	<i>Pleuronectes platessa</i>	2, 5, 7, 8, 12, 14, 15, 16
<i>Trisopterus</i> sp.	8	<i>Solea</i> sp.	8
<i>Trisopterus esmarkii</i>	7	<i>Solea solea</i>	8, 15
<i>Trisopterus luscus</i>	2, 7, 12, 14, 15, 16	Cyanophycota	
<i>Trisopterus minutus</i>	12, 15	Cyanophycota indet.	7, 12, 14, 15
<i>Belone belone</i>	12	<i>Beggiatoa</i> sp.	8
<i>Atherina presbyter</i>	14	Rhodophycota	
<i>Zeus faber</i>	12	Rhodophycota indet.	2, 7, 8, 9, 10, 12, 14, 15, 16
<i>Spinachia spinachia</i>	14, 15, 16	Goniotrichaceae indet.	15
Syngnathidae indet.	12, 15, 16	<i>Porphyropsis coccinea</i>	12, 14, 15
<i>Entelurus aequoreus</i>	11, 15	<i>Bangia</i> sp.	12
<i>Nerophis lumbriciformis</i>	12, 16	<i>Porphyra</i> sp.	1, 2, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15
<i>Syngnathus</i> sp.	5, 15	<i>Porphyra leucosticta</i>	8, 11, 12
<i>Syngnathus acus</i>	5, 7, 8, 11, 12, 14, 15, 16	<i>Porphyra umbilicalis</i>	8, 12, 13, 15, 16
<i>Syngnathus typhle</i>	1	<i>Rhodothamniella floridula</i>	6, 8, 15
<i>Scorpaena scrofa</i>	12	<i>Audouinella</i> sp.	6, 7, 8, 10, 11, 12, 13, 14, 15, 16
Triglidae indet.	8, 15		
<i>Myxocephalus scorpius</i>	1, 2, 8, 12, 15, 16		
<i>Taurulus bubalis</i>	1, 2, 5, 7, 8, 12, 14, 15, 16		
<i>Agonus cataphractus</i>	5, 16		
<i>Cyclopterus lumpus</i>	12		
<i>Cepoia rubescens</i>	2		

<i>Audouinella parvula</i>	7	<i>Lithothamnion sonderi</i>	15
<i>Audouinella purpurea</i>	7, 8	<i>Melobesia</i> sp.	12
<i>Schmitziella endophloea</i>	7, 8, 12	<i>Mesophyllum lichenoides</i>	8, 12, 15, 16
<i>Nemalion helminthoides</i>	16	<i>Phymatolithon calcareum</i>	15, 16
<i>Scinaia</i> sp.	16	<i>Phymatolithon lenormandii</i>	8, 11, 12, 15
<i>Scinaia furcellata</i>	2, 7, 8, 11, 12	<i>Phymatolithon purpureum</i>	7, 8, 12, 14, 15, 16
<i>Scinaia trigona</i>	8, 12, 15, 16	<i>Pneophyllum lobescens</i>	8
<i>Atractophora hypnoides</i>	12	<i>Titanoderma pustulatum</i>	8
<i>Atractophora hypnoides</i> (<i>Rhododiscus</i>)	8	<i>Schizymenia dubyi</i>	8
<i>Naccaria wiggii</i>	12, 14, 15, 16	<i>Gracilaria</i> sp.	8, 11, 12, 15
<i>Asparagopsis armata</i>	8, 11, 12, 16	<i>Gracilaria bursa-pastoris</i>	8, 9, 10, 11, 16
<i>Bonnemaisonia asparagoides</i>	11, 12, 15, 16	<i>Gracilaria multipartita</i>	8, 16
<i>Bonnemaisonia hamifera</i>	8, 12, 15, 16	<i>Gracilaria gracilis</i>	2, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16
<i>Trailliella intricata</i>	12, 15, 16	<i>Calosiphonia vermicularis</i>	16
<i>Gelidium</i> sp.	5, 8, 15, 16	<i>Schmitzia hiscockiana</i>	12, 15
<i>Gelidium latifolium</i>	2, 5, 6, 7, 8, 12, 14, 15, 16	<i>Schmitzia neapolitana</i>	12, 15, 16
<i>Gelidium pusillum</i>	5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16	<i>Ahnfeltia plicata</i>	3, 8, 12, 14, 15, 16
<i>Pterocladia capillacea</i>	8, 12	<i>Ahnfeltia plicata</i> (<i>Porphyrodiscus</i>)	8, 15
<i>Gelidiella calcicola</i>	16	<i>Gymnogongrus</i> sp.	15, 16
<i>Palmaria palmata</i>	1, 2, 3, 7, 8, 11, 12, 14, 15, 16	<i>Gymnogongrus crenulatus</i>	7, 8, 11, 12, 14, 15, 16
<i>Rhodophysema</i> sp.	12	<i>Gymnogongrus griffithsiae</i>	9, 10, 11, 12, 15, 16
<i>Rhodophysema elegans</i>	8, 15	<i>Ahnfeltiopsis devoniensis</i>	8, 11, 12, 15, 16
<i>Rhodophysema georgii</i>	15	<i>Phyllophora</i> sp.	8
<i>Dilsea carnosa</i>	2, 7, 8, 11, 12, 14, 15, 16	<i>Phyllophora crista</i>	1, 2, 7, 8, 12, 14, 15, 16
<i>Dudresnaya verticillata</i>	12, 15, 16	<i>Phyllophora pseudoceranooides</i>	1, 2, 7, 8, 11, 12, 14, 15, 16
<i>Dumontia contorta</i>	2, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	<i>Phyllophora sicula</i>	8, 12, 15
<i>Dermocorynus montagnei</i>	8, 15	<i>Erythrodermis traillii</i>	2, 7, 8, 11, 12, 14, 15, 16
<i>Grateloupia dichotoma</i>	16	<i>Coccotylus truncata</i>	15
<i>Grateloupia doryphora</i>	8	<i>Schottera nicaeensis</i>	7, 8, 12, 14, 15, 16
<i>Grateloupia filicina</i>	7, 8, 11, 12, 14, 15, 16	<i>Stenogramme interrupta</i>	7, 8, 11, 12, 14, 15, 16
<i>Halymenia</i> sp.	16	<i>Mastocarpus stellatus</i>	3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
<i>Callophyllis</i> sp.	12, 15	<i>Chondrus crispus</i>	2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
<i>Callophyllis laciniata</i>	2, 7, 8, 11, 12, 14, 15, 16	<i>Chondracanthus acicularis</i>	7, 8, 12, 16
<i>Kallymenia reniformis</i>	2, 7, 8, 12, 14, 15, 16	<i>Chondracanthus teedei</i>	8
<i>Meredithia microphylla</i>	8, 12, 15, 16	<i>Gigartina</i> sp.	12
<i>Gloiosiphonia</i> sp.	15	<i>Gigartina pistillata</i>	11
<i>Gloiosiphonia capillaris</i>	12	<i>Polyides rotundus</i>	8, 9, 10, 11, 12, 14, 15, 16
<i>Peyssonnelia</i> sp.	11, 12, 14, 16	<i>Plocamium cartilagineum</i>	1, 2, 3, 7, 8, 11, 12, 14, 15, 16
<i>Peyssonnelia atropurpurea</i>	8	<i>Sphaerococcus</i> sp.	16
<i>Peyssonnelia dubyi</i>	8, 15	<i>Sphaerococcus coronopifolius</i>	1, 8, 15, 16
<i>Peyssonnelia harveyana</i>	15	<i>Sphaerococcus coronopifolius</i> (<i>Haematocelis fissurata</i>)	8, 15
<i>Peyssonnelia immersa</i>	8	<i>Furcellaria lumbricalis</i>	8, 11, 12, 14, 15
<i>Hildenbrandia</i> sp.	8, 11, 12, 14, 15, 16	<i>Halarachnion</i> sp.	15
<i>Hildenbrandia crouanii</i>	15	<i>Halarachnion ligulatum</i>	7, 8, 11, 12, 15, 16
<i>Hildenbrandia rubra</i>	7, 12, 16	<i>Halarachnion ligulatum</i> (<i>Cruoria</i>)	8
Corallinaceae indet. (crusts)	1, 2, 3, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	<i>Solieria chordalis</i>	15
<i>Corallina</i> sp.	12	<i>Catenella caespitosa</i>	6, 7, 8, 10, 11, 12, 13, 14, 15, 16
<i>Corallina officinalis</i>	2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	<i>Calliblepharis ciliata</i>	1, 2, 7, 8, 12, 15, 16
<i>Hydrolithon farinosum</i>	12	<i>Calliblepharis jubata</i>	8, 11, 12, 14, 15, 16
<i>Jania</i> sp.	16	<i>Cystoclonium purpureum</i>	7, 8, 10, 11, 12, 14, 15, 16
<i>Jania rubens</i>	15, 16	<i>Rhodophyllis</i> sp.	8, 12, 14, 15, 16
<i>Lithophyllum</i> sp.	8		
<i>Lithophyllum incrustans</i>	8		
<i>Lithothamnion</i> sp.	8, 15		
<i>Lithothamnion corallioides</i>	15, 16		

<i>Rhodophyllis divaricata</i>	1, 2, 7, 8, 11, 12, 15, 16	<i>Ptilota gunneri</i>	15
<i>Cruoria pellita</i>	8, 15	<i>Ptilothamnion pluma</i>	8, 11
<i>Cruoria cruoriaeformis</i>	15	<i>Seirospora seirosperma</i>	15, 16
<i>Haemescharia</i> sp.	12, 15	<i>Spermothamnion</i> sp.	7, 15
<i>Haemescharia hennedyi</i>	8	<i>Spermothamnion irregulare</i>	16
<i>Cordylecladia erecta</i>	7, 8, 12, 14, 15, 16	<i>Spermothamnion repens</i>	8, 15, 16
<i>Rhodymenia</i> sp.	12	<i>Sphondylothamnion multifidum</i>	8, 12, 14, 15, 16
<i>Rhodymenia delicatula</i>	7, 8, 12, 14, 15, 16	<i>Spyridia filamentosa</i>	12, 15, 16
<i>Rhodymenia holmesii</i>	7, 8, 12	<i>Acrosorium reptans</i>	12, 15, 16
<i>Rhodymenia pseudopalmata</i>	2, 6, 7, 8, 12, 15, 16	<i>Acrosorium venulosum</i>	7, 8, 12, 14, 15, 16
<i>Champia parvula</i>	15	<i>Apoglossum ruscifolium</i>	2, 7, 8, 11, 12, 14, 15, 16
<i>Chylocladia verticillata</i>	1, 2, 7, 8, 11, 12, 15, 16	<i>Cryptopleura ramosa</i>	1, 2, 5, 6, 7, 8, 11, 12, 14, 15, 16
<i>Gastroclonium ovatum</i>	2, 7, 8, 11, 12, 14, 15, 16	<i>Delesseria sanguinea</i>	1, 2, 7, 8, 12, 14, 15, 16
<i>Gastroclonium reflexum</i>	8, 11, 15, 16	<i>Drachiella heterocarpa</i>	7, 12, 14
<i>Lomentaria articulata</i>	2, 3, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	<i>Drachiella spectabilis</i>	8, 11, 12
<i>Lomentaria clavellosa</i>	1, 2, 5, 7, 8, 11, 12, 14, 15, 16	<i>Hypoglossum hypoglossoides</i>	5, 6, 7, 8, 10, 11, 12, 14, 15, 16
<i>Lomentaria orcadensis</i>	1, 7, 8, 12, 14, 15, 16	<i>Membranoptera alata</i>	3, 7, 8, 10, 11, 12, 14, 15, 16
Ceramiaceae indet.	11, 12, 14, 15	<i>Haraldiophyllum</i> sp.	7, 12
<i>Anotrichium barbatum</i>	7	<i>Haraldiophyllum bonnemaisonii</i>	1, 8, 12, 15
<i>Antithamnion</i> sp.	7, 11, 14, 15, 16	<i>Nitophyllum punctatum</i>	1, 2, 7, 8, 11, 12, 14, 15, 16
<i>Antithamnion cruciatum</i>	2, 7, 11, 12, 15, 16	<i>Phycodryis rubens</i>	7, 8, 11, 12, 14, 15, 16
<i>Antithamnionella spirographidis</i>	2, 7, 8, 11, 12, 14, 15, 16	<i>Polyneura</i> sp.	12, 15
<i>Bornetia secundiflora</i>	8	<i>Polyneura bonnemaisonii</i>	1, 2, 7, 8, 11, 12, 14, 15, 16
<i>Aglaothamnion byssoides</i>	7, 15, 16	<i>Erythroglossum laciniatum</i>	1, 7, 8, 11, 12, 14, 15, 16
<i>Aglaothamnion hookeri</i>	7, 12, 14, 15	<i>Radicingua thysanorhizans</i>	7, 8, 11, 12, 14, 15
<i>Aglaothamnion roseum</i>	7, 8	<i>Dasya</i> sp.	16
<i>Callithamnion</i> sp.	7, 8, 9, 10, 11, 12, 14, 15, 16	<i>Dasya hutchinsiae</i>	16
<i>Callithamnion granulatam</i>	12	<i>Dasya ocellata</i>	7
<i>Callithamnion tetragonum</i>	2, 7, 8, 12, 15	<i>Heterosiphonia plumosa</i>	2, 7, 8, 12, 14, 15, 16
<i>Callithamnion tetricum</i>	7, 8, 12, 15, 16	<i>Bostrychia scorpioides</i>	6, 7, 11, 12, 13, 14, 15, 16
<i>Callithamnion</i> sp. (spongy)	8, 12	<i>Brongiartella byssoides</i>	1, 2, 5, 7, 8, 11, 12, 14, 15, 16
<i>Ceramium</i> sp.	2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	<i>Chondria coeruleascens</i>	8
<i>Ceramium pallidum</i>	16	<i>Chondria dasyphylla</i>	7, 8, 11, 12, 14, 15, 16
<i>Ceramium ciliatum</i>	7, 8, 12	<i>Chondria tenuissima</i>	1, 2
<i>Ceramium diaphanum</i>	7, 8, 9, 13, 16	<i>Laurencia</i> sp.	12, 16
<i>Ceramium echionotum</i>	2, 7, 8, 11, 12, 14, 15	<i>Laurencia obtusa</i>	8, 15
<i>Ceramium gaditanum</i>	7, 9, 10, 11, 12, 14, 15, 16	<i>Osmundea hybrida</i>	1, 2, 7, 8, 11, 12, 14, 15, 16
<i>Ceramium nodulosum</i>	2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	<i>Osmundea pinnatifida</i>	2, 3, 7, 8, 10, 11, 12, 13, 14, 15, 16
<i>Ceramium shuttleworthianum</i>	7, 8, 10, 11, 12, 14, 15	<i>Osmundea truncata</i>	15, 16
<i>Ceramium strictum</i>	16	<i>Polysiphonia</i> sp.	2, 5, 6, 7, 8, 9, 11, 12, 14, 15, 16
<i>Compsothamnion gracillimum</i>	14	<i>Polysiphonia atlantica</i>	7, 11, 12, 15, 16
<i>Compsothamnion thuyoides</i>	1, 6, 7, 12, 15, 16	<i>Polysiphonia brodiei</i>	5, 7, 8, 14, 15
<i>Crouania attenuata</i>	8	<i>Polysiphonia denudata</i>	5, 7
<i>Griffithsia</i> sp.	8	<i>Polysiphonia elongata</i>	2, 5, 7, 8, 11, 12, 14, 15, 16
<i>Griffithsia corallinoides</i>	1, 2, 8, 11, 12, 15, 16	<i>Polysiphonia elongella</i>	15
<i>Griffithsia devoniensis</i>	12, 16	<i>Polysiphonia ferulacea</i>	15
<i>Halurus flosculosus</i>	2, 7, 8, 12, 15, 16	<i>Polysiphonia fibrata</i>	5, 7, 12, 15
<i>Halurus equisetifolius</i>	8, 12, 15	<i>Boergesenella fruticulosa</i>	7, 15
<i>Microcladia glandulosa</i>	16	<i>Polysiphonia insidiosa</i>	7
<i>Monosporus pedicellatus</i>	15		
<i>Pleonosporium caribbaeum</i>	8		
<i>Plumaria plumosa</i>	7, 8, 9, 10, 11, 12, 14, 15, 16		
<i>Pterothamnion plumula</i>	1, 2, 5, 7, 8, 11, 12, 14, 15, 16		