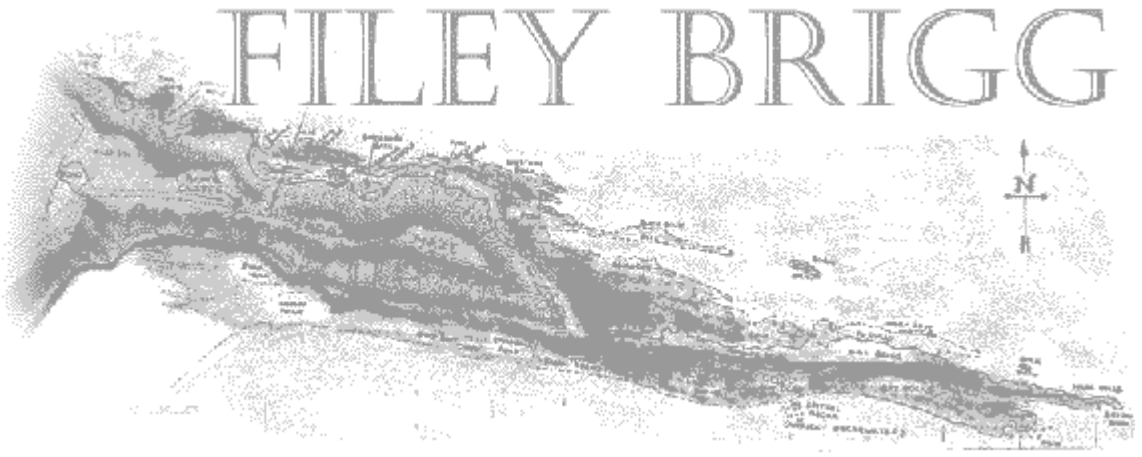
THE UNDERWATER BIOLOGY OF



Text of Report 1995

Summary

The rock pier structure known as Filey Brigg is situated on the North Sea Coast of Yorkshire. In July and August 1995 a group of local divers and members of the Marine Conservation Society, carried out a sublittoral survey of three sites around Filey Brigg. Identification of preserved material was made by Dr Sue Hull of the University College of Scarborough. A species list was prepared and comparisons were made with Sublittoral areas around Flamborough Head. The report includes a brief review of research work in the area and concludes with a discussion of Filey Brigg's claims as a prospective Heritage Coast site.

The Environmental Overview

Geology (Dr Sue Hull)

The geology of Filey Bay is obscured by boulder clay which overlies the bedrock, which only becomes visible at Carr Naze. The glacial boulder clay forms spectacular gullies due to the run-off of rainwater.

The underlying rocks are of Upper Jurassic origin, and the first rocks that become visible belong to the Middle Calcareous Grit which comprises predominantly sandy beds interspersed with lime-rich bands. Within the lime-rich beds comprising of white shelly limestone, fossil ammonites, bivalves and gastropods can be found. This bedrock also forms the intertidal rock platform.

At the point at which the path from the Carr Naze carpark joins the shoreline, a band of shelly limestone approximately 80cm thick appears directly above the Middle Calcareous Grit. This layer forms part of the Osmington Oolite, which has become very shattered and broken at this locality due to mechanical abrasion during the glacial period. Fossil echinoids are abundant within this bed whilst bivalves are common on the surface of the Middle Calcareous Grit.

The Brigg is an extended rock platform of Middle Calcareous Grit which runs out into the sea from the end of Carr Naze. The reefs on the northern side of the Brigg beyond the large pool are of Hambleton Oolite. The Hambleton Oolite is a yellow and grey banded rock in which fossil bivalves, gastropods, brachiopods and worm burrows can be found. The outermost reefs and the base of the cliffs on the northern side of Carr Naze are composed of Lower Calcareous Grit.

Source: Young, S. (1978). Geology of the Yorkshire Coast Whitby to Bridlington. Dalesman Books.

Topography

The rock structure forming the Brigg projects some 1.6km from the shoreline in an almost Easterly direction into the North Sea. Some 650 metres of its length is capped with a boulder clay cliff known as **Carr Naze** , rising to a height of about 50metres. On the Filey Bay side an ancient breakwater known as the **Spittals** projects about 500 metres into the bay in a South Easterly direction. The rest of this Southerly aspect of the Brigg is scattered with large boulders . The Spittals is generally not visible other than at a low spring tide when part of the structure appears.

The portion of the Brigg not capped by clay continues seawards as a thin ridge of rocks and associated wave washed platforms projecting just above Chart Datum. The part of this ridge nearest to the shore is known as Washer Brigg, whilst the seaward portion has been named **High Brigg**. The ridge with its associated wave washed platforms ends at a position known as **Brigg End**. To the North of Brigg End is an area known as **Yate Hills**.

To the North of Carr Naze is a narrow area of rock platforms which are accessible on foot at most states of the tide. Weathering of the cliffside has resulted in a number of indentations (known as noodles) and cliff overhangs with associated pools. This area is of a particularly attractive and unspoilt nature. Access from the shore becomes impractical Eastward of an area known as **Black Hole.**

The intertidal structure and habitats of the Brigg have been discussed extensively in The locally published monograph Filey Brigg - its plants and animals (1983), (Supervised by Dr D. Lewis).

Bathymetry

The Southern (Filey Bay) side of the Brigg shelves off gently from the rocks to a sand bottom at about 5 metres below Chart Datum (**CD**). To the East of the Spittals is a depression in the sea bed descending to about 15 metres below Chart Datum and known locally as Crab Hole.

Towards the Brigg End the depth is about 10 metres and the seabed is formed largely of flattened boulders and cobbles.

The Northern side of the Brigg is far more exposed and consists partly of partially submerged wave cut rock platforms running roughly parallel with the body of the Brigg. In place surge gullies have formed between areas of rock platform forming channels, known locally as ‘binks’.

In the surge gullies are submerged rock outcrops, boulders and aggregated pebbles. The bottom of these gullies averages 3 to 4 metres below chart datum.

Sea Conditions

Tides and Currents

In Oceanographic terms Flamborough Head is regarded as the dividing line between two distinct bodies of water in the North Sea. To the North of the Head the North Sea is deeper and the tidal currents are weaker. This means that this water mass becomes stratified during the Summer months, with warmer water at the surface and a deeper cooler layer below.

In the Southern part of the North Sea the water body is shallower and is mixed by stronger tidal currents.

The boundary line between these two distinct areas is known as the Flamborough Front. Much Hydrographical research has been directed to the Current flows connected with this phenomenon. (Lee and Ramster 1981), (IECS, 1991).

The Stratification effects caused as a result of the Flamborough Front has resulted in a distinct difference in the Fauna and Flora found in the South and North parts of the North Sea.

Current flows

The tidal flow at the end of the Brigg and on its Northern Flank can be considerable. During periods of Spring tides currents can be in excess of 1.5 knots off the Brigg end.

The flood tide provides the strongest current, setting in a Southerly direction. The ebb tide flows in a North Westerly direction. Residual current flows are towards the South.

In Filey Bay a circular movement of water occurs. During the flood period this is in an anticlockwise direction. During the ebb the flow reverses into a clockwise motion.

Turbidity

The extent of turbidity in this area of the North Sea and its relationship to Weather conditions and tidal flow, is one of the main constraints on Sports Diving in this area. Underwater visibility (as measured in a horizontal direction) is seldom more than 5 metres. The extent of this turbidity has a major impact on the growth of light dependent Kelp Plants which are found up to an average depth of 4 metres below Chart Datum . In contrast Kelp is found at depths of up to 8 metres in less turbid sites in the North Sea such as the Farne Islands and St Abbs in Scotland.

In a study at North Landing, Flamborough Head, Moore (1972) recorded a level of 32.7 mg/l of suspended solids in July 1969. The sediment tends to be kept in suspension by a combination of strong currents and wind/wave conditions.

Visibility on some days of the study period was exceptional, approaching 7 to 8 metres on one occasion. It was also noticed that after periods of severe weather visibility rapidly improved within a day or two. It is suspected that an exceptionally dry summer resulted in less sediment in the study area than would be normal.

Previous Studies

During Victorian times Filey Brigg would have captured the imagination of many amateur naturalists including the Seaweed expert Margaret Gatty. Enquiries at the Natural History Museum, Scarborough Library and York Library have so far failed to unearth much in the way of sound information about animals and plants in the Filey Brigg area. The Rev George Shaw in his book - Filey and its Fishermen (1867), lists over 200 species of seaweed to be found on the Yorkshire Coast, but fails to refer to a source. Conchology (the study of shells) was a particularly popular pastime at the time. Given the competitiveness of many of the collectors, such records tend to be unreliable. It is probable that many of the allegedly local records were of shells dredged up in the course of the Dogger Bank fishing industry!

Older texts describing seashells in the area have included:

Hey W.C. 1884. The Marine Shells of Yorkshire

Saunders,T.W., Local Marine Fauna. *Transactions of Cleveland Naturalists Club.*

Bean's list of Marine Molluscs of Scarborough in *Theakston's Guide to Scarborough*

Victoria History of Yorkshire. Account of Marine Mollusca.

Hargreaves,J.A., The Marine Mollusca of the Yorkshire Coast and the Dogger bank. *The Journal of Conchology Vol. XIII Jul/Oct, 1910.*

The Natural History of the Scarborough District published in 1953 (editors G.B. Walsh F.C Rimington) includes a species list of Intertidal Marine life in the area, provided by a variety of collectors.

The Conchologist Adrian Norris visited the Filey area in 1972 and provided a species list of many of the local molluscs, with notes on habitat. His results were added to a checklist of the Marine Molluscs of Britain and Ireland published by the Nature Conservancy Council (NCC).

The locally published monograph Filey Brigg - its plants and animals (1983) is a detailed work, well illustrated with photographs and extensively describing the habitats of intertidal plants and animals on the Brigg. It was prepared by Students of The Adult education department of the University of Hull, supervised by Dr David Lewis.

Much of the recent subtidal work in the area has concentrated on the area of Flamborough Head, which is of great biological significance because of its chalk substratum and oceanographic position on the Flamborough Front. A draft technical report prepared by Rachael Bayliss (1985) of the Flamborough Head Sensitive Marine area provides a review of such studies which include:

1971 - a general description of the kelp related fauna along the North East Coast by P.G. Moore; this included extensive statistical analysis.

1972 - Lockwood studied Filey Bay in relationship to Juvenile plaice.

1972 - Norris visits Filey Brigg and prepares mollusc species list.

1988 - Wood surveyed the subtidal areas of Flamborough Head.

1988 - Tittley, Price and Fincham prepared an NCC report on the macrobenthos of Flamborough and Norfolk

1991- the Institute of Estuarine and Coastal Studies (IECS) prepared a study of the soft substratum of Filey Bay on behalf of Filey against dredging.

1992 - Bird and Morris surveyed the intertidal invertebrates of designated Yorkshire bathing beaches on behalf of the National Rivers Authority.

1993 - The Marine Nature Conservation Review Team of English Nature surveyed the intertidal and subtidal area of Flamborough.

1994 - A team from the Biomar project surveyed the general habitats off Flamborough on behalf of English Nature.

The Brigg is still visited regularly by parties of Students and school pupils. There is no doubt that work done by these bodies exists, but is in an unpublished state.

The Present Study

Methods

The greatest difficulty encountered in a study of this kind is the combined effects of wind, tidal currents and sea state. The Filey Brigg site is such that underwater visibility rarely exceeds 5 metres. If the wind is in the wrong quarter diving may be impossible for months at a time.

The diving team consisted of a core group with two underwater photographers, a boat handler, dive marshal and project coordinator. Other trained divers from the Filey Sub Aqua Club and other organisations assisted when available.

Dr Sue Hull of the Scarborough University College assisted with species identification and provided most of the identifications for the attached species list.

Serious work started at the beginning of August. Despite the exceptionally dry and hot Summer conditions many of the projected dives had to be cancelled due to adverse wind conditions. In all a total of 6 main dives took place, 3 of them in the area of the Spittals, one on the end of the Brigg (the wreck of the Eglantine) and one on the Seaward side of High Brigg.

On reaching a dive site a number of Compass bearings were taken to fix position. A note was made of the time, weather and sea state. The photographic team then entered the water with a .25 square metre wire transect grid and their cameras. This team took photographs of the seabed habitat.

A second team of divers took polythene sample bags and an underwater slate with them. Their task was to take small samples of the seabed life, relating them as far as possible to the habitat.

On return to the boat samples were placed in separate 5 litre jars and labelled. At the end of the dive these samples were taken to a preparation area where they were sorted with the aid of a binocular microscope and some preliminary identifications made. After sorting and cooling, the marine life was preserved in acrylic pots using 4% formalin in seawater. Some of the more delicate creatures were then preserved in 70% alcohol. Labels showing time, date, location and habitat type were prepared using Indian Ink on cartridge paper. These labels were placed inside each pot. Dr Hull made later identification from the preserved samples.

Dr Hull provided further descriptions of the Intertidal areas as a result of her fieldwork in the area.

The Intertidal Area (Dr Sue Hull)

The Southside of the Brigg

The South side of the Brigg is characterised by flat bedrock with clumps of boulders. Floristically the shore appears quite diverse with dense weed coverage in some areas.

The high shore comprises of cracks in the bedrock colonised by the rough periwinkles *Littorina saxatilis* and *L. arcana*, and the small black winkle *Melarhaphe neritoides*. The upper shore is colonised by *Pelvetia canaliculata* at the high water

mark, below which occurs *Fucus spiralis*. There are dense growths of green algae in this area during the summer especially just below the path, including *Enteromorpha intestinalis* (freshwater tolerant), *Blidingia spp.*, and *Enteromorpha linza*. The shore shows a typical zonation pattern, green algae at the top of the shore, then browns in the mid-shore, and red algae in the low shore region.

The mid-shore is typified by the presence of *Fucus vesiculosus* and *Ascophyllum nodosum* (a species indicative of more sheltered conditions) upon which the epiphytic red alga *Polysiphonia lanosa* is found. Grazing upon the brown algae are the flat periwinkles *Littorina obtusata.* WIthin this area are numerous small pools, the flora of which is typified by *Corallina officinalis, Cladophora rupestris, Mastocarpus stellatus, Laurencia pinnatifida, Chondrus crispus, Ulva lactuca* and *Enteromorpha intestinalis*. The algae support a diverse community of small molluscs (e.g. *Rissoa parva, Rissoella diaphana),* amphipods *(e.g. Hyale nilssoni),* isopods *(e.g. Idotea baltica).* Within the pools, edible winkles *Littorina littorea,* dogwhelk *Nucella lapillus,* juvenile shore crabs *Carcinus maenas,* the hermit crab *Pagurus bernhardus,* common limpet *Patella vulgata,* keel worm *Pomatoceros triqueter* and *Idotea baltica* are commonly found. *Semibalanus balanoides* is also found upon the bedrock along with occassional individuals of *Elminius modestus*.

The low shore region is dominated by *Fucus serratus* interspaced with clumps of the sediment trapping red algae *Rhodochorton* spp. The flat periwinkle *Littorina mariae* is found in this region feeding upon the *Fucus*. Under the boulders in this region
are found *Carcinus maenas, Cancer pagurus*, breadcrumb sponge *Halichondria panicea*, and the tunicate *Botrylloides schlosseri along* with the polychaetes *Eulalia viridis, Harmothoe imbricata and Pomatoceros triqueter.* The common starfish, *Asterias rubens* and the common brittlestar, *Ophiothrix fragilis* are also frequently found within this region and within the sediments at the bootom of some of the pools the ploychaetes *Arenicola martima*,and *Eteone foliosa* are found. In the corner of the Brigg on the South side the low shore becomes dominated by dense *Mytilus edulis* beds.

The Northside of the Brigg

The North side of the Brigg appears at first glance to be less diverse than the more sheltered South side. Floristically this is possibly true but, although there is a general paucity of algal species due to the exposed nature of the shore, certain species occur on the North side of the Brigg that are not found on the South side and the fauna of the North side of the Brigg is equally diverse.

The high shore area comprises of large boulders, colonised by the rough periwinkles *Littorina saxatilis* and *L. arcana.* Within the crevices of the rocks, the isopod *Ligia oceanica,* the marine insect, *Anura maritima* and small amphipods (*Gammarus spp*.) are found. The high intertidal area is also colonised by *Fucus spiralis*, along with the green algae *Enteromorpha intestinalis, Ulva lactuca, Blidingia spp*. Within the high shore pools dense clusters of *Spongomorpha arcta* occur during the summer months, along with the aforementioned species.

The mid-shore region comprises of mostly flat bedrock with occasional boulders which are dominated by the barnacle *Semibalanus balaniodes*, intermingled with which occasional individuals of the antipodean barnacle *Elminius modestus* are found. *Patella vulgata* is also common in crevices and depressions. There are numerous small rock pools in the bedrock, characteristically containing the pink encrusting alga *Lithothamnion* spp., and tufts of *Corallina officinalis*, *Chondrus*

crispus, Cladophora rupestris and *Mastocarpus stellatus*. The algae support a diverse community of small molluscs (e.g. *Rissoa parva, Rissoella diaphana),* amphipods *(e.g. Hyale nilssoni),* isopods *(e.g. Idotea baltica),* Within the pools *Actina equina* is commonly found in a variety of colour forms, along with small patches of juvenile *Mytilus edulis. Patella ulyssoponensis,* another species of limpet with low desiccation tolerance, is also found in the mid and lower shore pools. The more mobile fauna includes the hermit crab, *Pagurus bernhardus*, edible periwinkle, *Littorina littorea*, and the dogwhelk, *Nucella lapillus*.

The low shore region comprises mainly of flat bedrock with occasional boulders at the edge of a large pool. Red algae predominate in the rock pools including *Corallina officinalis, Rhodymena palmata, Palmaria palmata, Delessaria sanguinea, Anhfeltia plicata*. *Fucus serratus* is also found attached to the boulders and bedrock, and its form differs from that of the plants on the sheltered side of the shore in that the exposed shore plants are longer with less branches than those found on the sheltered shore. *Alaria esculenta* and *Himanthalia elongata* are both found in this region and indicate exposed conditions. The breadcrumb sponge *Halichondria panicea*, and the tunicates *Botrylloides schlosseri, B. leachi* and *Clavelina lepadiformis* are found under the boulders along with a range of bryzoans (e.g. *Crisia ramosa, Bicellariella ciliata*) and hydroids (e.g. *Obelia genticulata, Dynamena pulima*). Larger animals include the polychaetes *Eulalia viridis, Lepidonotus squamatus* and *Harmothoe imbricata* and the arthropods *Porcellana platycheles, Ebalia cranchi* and *Cancer pagurus*. At the low tide mark *Laminaria digitata* and *L. hyperborea* are found, the holdfasts of which support a diverse community (e.g. the barnacle *Verruca stroemia;* the polychaete *Platynereis cultrifera*; the bryzoans *Membranopora membranacea, Electra pilosa*; the molluscs *Anomia epihippum, Rissoa parva, Coryphella pellucida, Helicyon pellucida, Lacuna pallidula*).

Site 1. - The Spittals

On the Southerly side of the Brigg at a point almost equidistant between the end of the Brigg and its Boulderclay capping is a rock pier known as the 'Spittals'. This pier consists of graded boulders and cobbles and juts out from the body of the Brigg to a distance of about 250metres. The width at its top surface was 12 to 15 metres. Three Dives were made at this site.

History

Historically there has been much local speculation about the nature of the Spittals, whether man made or a natural feature. One of the favourite theories is that this pier served as a breakwater for a small Roman Harbour. Despite several attempts to measure and describe the rocks making up the pier no definite conclusion has yet been reached. It is the opinion of the team involved in this study that the structure as seen underwater is too regular and ordered to be of an entirely natural origin.

Top of the Structure

The top part of the Spittals consists of a mass of large flattened boulders, with occasional projecting rounded boulders. Together these rocks form a platform which is exposed at low Spring Tides. The top of this surface is colonised by kelps (***Laminaria hyperborea, Laminaria digitata, Laminaria digitata***) and wracks ***(Fucus serratus and vesiculosus***) . The intervening spaces between the kelps form a habitat for the growth of faunal turf and other seaweed species. Many red seaweeds are epiphytic on the Laminarian growth. The whole of this underwater jungle serves to obscure and cement together the underlying boulders and cobbles.

The Underlying Structure

The sides of the Spittals are at an angle of approximately 45 degrees and descend to a stone and sandy bottom at a depth of about 8 metres below chart datum. The walls of the structure are formed of a jumble of boulders with large spaces in between which form an ideal habitat for numerous crabs (***Cancer pagurus, Liocarcinus puber***) and lobsters (***Homarus gammarus, Galathea strigosa***) . On the top surface of these boulders is a thin layer of silt. Many of the surfaces were covered with the calcareous scars of old barnacle attachments (***Balanus crenatus***).

Sea urchins (***Echinus esculentus***) were common, as were Starfish . The density of the common starfish (***Asterias rubens***) approached 40 to 50 per square metre towards the bottom of the structure (see photograph below) . Laminarian growth on the boulders was sparse and disappeared at a depth of about 3 metres.
There was a noticeable gradation of boulder size with the largest boulders at the top of the structure and a line of smaller boulders at the bottom. These smaller boulders measure 1 to 1.5 metres in diameter and form a loose scree. The siphons of the bivalve *Hiatella arctica* were to be seen protruding between these boulders and the underlying substrate. The scree gradually thins out and gives way to an area of cobbles peripheral to a flattened plain of sand and mud.
Young Plaice fry (***Pleuronectes platessa***) were common on this sandy habitat.
Dragonets (***Callionymus lyra***) were present.

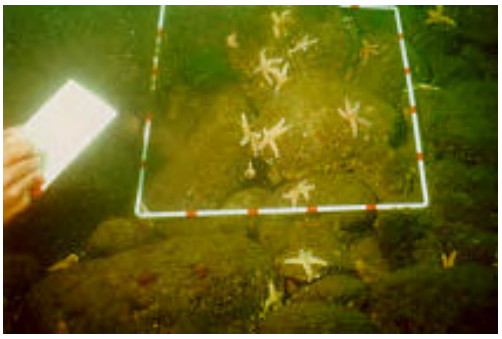


Fig 2. - Bottom part of Spittals showing aggregation of cobbles and 0.25 sq metre grid

Fig 3 - Boulder on Spittals showing barnacle attachment scars

Site 2 - Wreck of the Eglantine

This site is situated at a point almost equidistant between the Brigg End and the bell buoy in an area subject to the full force of tidal currents. The average depth is 10 metres below CD. The benthic fauna found in this area reflects the kind of filter feeders and associated animals associated with more exposed areas of tidal flow.

Overlying the site are the remaining deck plates of the wreck of the steamship Eglantine. The Eglantine was a 1,312 ton Collier bound for Havre which sank on the 16th April 1915 without loss of life (Godfrey and Lassey 1974).

The site consisted of a level area of rocky seabed with patchy areas of sand. It was overlaid by flat topped boulders, varying in size between 1 to 2 metres across and 0.3 metres depth. The boulders and remaining deck plate of the Eglantine formed a habitat for an extensive faunal turf predominated by the bryozoan ***Flustra foliacea*** (

hornwrack). Other bryozoans included ***Cellaria fistulosa***, ***Bugula spp***. and ***Cribrilina punctata***. Between these colonies was an abundance of the anthozoan ***Alcyonium digitatum*** (dead men's' fingers) , interspersed with hydrozoans including ***Plumularia spp. and Sertularia sp.*** (white weed). Occasional specimens of the sea anemone ***Metridium senile*** were present.

Nudibranchs including ***Coryphella pelucida***, ***Jorruna tomentosa*** and ***Onchidoris muricata*** were associated with the bryozoan growth.

The star seasquirt ***Botryllus schlosseri*** was to be found on the vertical surfaces of boulders and Colonies of ***Clavelina lepadiformis*** (lightbulb seasquirt) were common in small depressions and cavities in the boulders. An isolated specimen of the sponge ***Dysidea fragilis*** was found attached to one boulder.

Small specimens of the bivalves ***Mytilus edulis*** (common mussel) and Large numbers of Asterias rubens (common starfish) were scattered throughout the site with occasional specimens of the starfish ***Henricia oculata***.

Cavities on the underside of the boulders form a habitat for numbers of ***Liocarcinus holstatus*** and the squat lobster ***Galathea strigosa*** . Other large crustaceans included the ***Hyas araneus*** (the spider crab) . The interface between the bottom edges of boulders and the underlying sediment formed a habitat for specimens of the dahlia anemone ***Urticina felina*** and the polychaete ***Sabellaria spinulosa.***

Fig 4 - Photograph showing habitat around Eglantine

Site 3 - Washer Brigg

This site was situated a few metres to the North of where Washer Brigg becomes High Brigg . The depth here was 3 metres below CD at its deepest part . It consisted of exposed wavecut platforms dissected by surge gullies. These gullies contained scattered large boulders and rock outcrops, in between which were scattered cobbles and pebbles.

Top surfaces of the rock platform

The top surfaces of the rock platforms, rock outcrops and boulders were dominated by an extensive growth of ***Laminaria digitata, Laminaria hyperborea*** and associated epiphytic turf of red seaweeds and fauna. Towards the base of laminarian stipes was the epiphytic red seaweed ***Rhodymenia palmata***, with ***Ceramium sp***. growing near the holdfasts .The sponge ***Halichondria panicea*** was common at the

bottom of kelp holdfasts and formed a habitat for the brittle star ***Ophiothrix fragilis*** . Amhipods including ***Gammarus spp***. lived within this habitat as did ***Caprella spp.***

The walls of the platform

The walls of the rock platforms descended a distance of about 2metres to the gully below. The top of these walls formed an overhang which was shaded from available light and as a result faunal turf predominated .

Patches of the ascidians ***Botryllus schlosseri*** and ***Botryloides leachii*** were common on this overhang . Other ascidians present included patches of ***Clavelina lepadiformis***, ***Sidnyum turbinatum*** and ***Aplidium punctum***. Bryozoans were well represented and included a predominating turf of ***Crisia ramosa*** and ***Bugula spp***. The sponge ***Scypha compressa*** was present.

Base of the wall and the gully

At the base of the wall was a relatively sterile area scoured clean by the movement of cobbles and smaller pebbles and sediment. Crevices had formed in this undercut area which provided a home for ***Cancer pagurus*** (edible crab) and the common lobster ***Homarus gammarus*** and the squat lobster ***Galathea strigosa***.

Flat topped boulders and rock outcrops scattered within the gully area again provided a habitat for the kelp ***Laminaria Hyperborea*** on their top surfaces, with the associated turf of fauna and flora. The Sea Urchin ***Echinus esculentus*** was present on the top of these boulders. Specimens of the starfishes ***Asterias rubens*** and the sun star ***Crossaster papposus*** were on tops of boulders and occasionally within the gully area. Gaps on the underside of the boulders provided crevices for crabs and lobsters.

Discussion

Habitats

The three marine sites examined provide a range of different habitats these could be described as being:

Surfaces and Crevices

1. - Upward facing surface on top of rocks

2. - Vertical surfaces on rocks

3. - Crevices and holes at bottom of rocks

4. - Boundary layer between rock and underlying sediment

5. - Rocky seabed scattered with boulders, cobbles and pebbles

6. - Areas of soft substrate

Degree of Exposure

A. - Sheltered low energy site

B. - Exposed high energy site

Depth of site

I. - Infralittoral - Algae growth prominent: from shore to approx. 5metres below CD.

C. - Circalittoral - Animal dominated area from 5 metres below CD

In a manner similar to that described by Wood (1988) it is then possible to describe combinations of conditions. As an example a habitat on an upward facing rock at Washer Brigg could be described as a combination of:

1. - Upwardly facing rock. .**B**- exposed high energy site and **C**.- Infralittoral algae dominated.

In short it might be described as a **1.B.C.** site. Wood used a different combination of lettering in her report, but the principle remains the same. A more sophisticated colour coded scheme was adopted by Erwin and Picton (1987) in their Photographic guide to inshore Marine Life. In their guide they use 5 degrees of exposure, 5 depth zones and 7 different habitats, describing each animal graphically in terms of these variables.

In personal conversation Dr Bob Earll has described the description of underwater habitats as being similar to the development of a new language. Eskimos have 50 or 60 different words for snow, in the same way we need to develop a vocabulary to describe the habitats of life underwater.

The site at Washer Brigg, when described in the above terms, bears striking similarities to similar sites described by Wood (1988) on the northern side of Flamborough Head. The degree of exposure would certainly be similar, the only differences being those of rock type.

Further Research

More than half the planned dives on Filey Brigg were cancelled due to periods of zero underwater visibility ,caused by inclement wind and tide conditions. During the next diving season it is planned to visit a minimum of a further 6 sites including Brigg end, Crab Hole and the Northern side of the Brigg as far as Black Hole. If time permits other sites might include the reefs at Gristhorpe and at least one wreck site off the Brigg.

Further work needs to be done as regards photographic recording of habitats and marine life for each of these sites.

Plans for 1995 had included the possibility of an underwater video. Unfortunately on the one day when underwater visibility was perfect, the camera operator was unavailable. It is to be hoped that circumstances will be better in 1996.

It is hoped that a monitoring system will be devised in order to assess stresses on the site caused by pollution or other factors.

Crouch et al. (1994) have described the deleterious effects of residual traces of Tributyl Tin anti fouling paint on the local dog whelk population. It is hoped that a

survey may be devised to monitor these animals more closely. Moore (1974) in his survey of North Sea Kelp described Filey as possibly being one of the least polluted areas studied, ranking with Burniston and Staithes.

Other Projects may include a closer examination of kelp holdfasts including monitoring of benthic life at a fixed transected location.

Bullimore (1983) has described a suitable rig for photographic monitoring of subtidal sites, but although described as 'low budget', the cost of this equipment may fall outside available funding.

A case for Heritage Coast Status ?

Underwater Life

At Flamborough Head several species were found at the Southern or Northern limits of their North Sea Range (Wood 1988). In its position just to the North of the Oceanographic feature known as the Flamborough Front, the Brigg is a unique reference site in comparison to the Marine life of Flamborough.

A habitat not found elsewhere in the area is provided by the Spittals . The numbers of edible crabs and lobsters found at this site and other places on the Brigg is well known by local fishermen. An abundance of squat lobsters and swimming crabs was also in evidence.

The Northern part of Filey Bay is known as a nursery ground for young plaice. The large numbers of juvenile plaice seen in the soft substrate areas around the Spittals confirms this .

The deeper sites near the end of the Brigg form a habitat for a large variety of filter feeding animals. These include the exotically coloured Sea slugs, commonly associated with the prolific bryozoan growth found at these depths.

The most beautiful part of the Brigg is the unsheltered Northern side which (during periods of good visibility) can far more colourful and exotic than any Mediterranean underwater scene.

History

Filey Brigg is of great interest historically. There is no doubt that in Roman times the Roman Signal Station on the top of Carr Naze was a substantial structure (possibly as much as 100ft tall). It appears possible that the Romans had a hand in construction of the structure known as the Spittals. During later years the Brigg provided essential shelter for local fishermen, and was used by them for storing bait. In Victorian times the wild nature of its appearance caught the public imagination.

Wrecks

The heritage importance of the Brigg and inshore reefs of Gristhorpe with respect to Wreck sites is without doubt and has been discussed extensively by Godfrey and Lassey (1974).

Landscape

Despite the nearby car park and temporary caravan site situated on cliffs near Carr Naze the Brigg has retained an aura of untamed wildness and beauty which captures the imagination :

'Standing on those rocks what a glorious prospect ! To the right what a magnificent bay ! Sweeping around for miles it terminates at Flamborough '- *Rev. George Shaw 1867*

The Brigg is certainly an inspiring start for the Cleveland Way Long distance footpath.

Ornithology

The value of the Brigg and surrounding areas as a refuge for migrating birds and waders is outside the scope of this report. As a rock pier the Brigg is Unique on the North Sea Coast and provides superb views on all sides. In that respect it is of great value to Local Bird Groups watching Bird Migrations along the coast.

Conclusion

Although none of the Animals and Plants recorded so far is particularly rare or unique, the underwater habitats of the Brigg are of great abundance, interest and beauty.

Perhaps the greatest Biological significance of Sublittoral life on Filey Brigg is in Comparison with similar Sites at Flamborough Head.

In every other respect, whether history, heritage, beauty or bird life, the Brigg has a claim to consideration as a potential Heritage Coast site.

In it's present state it is a great natural asset to nearby Filey Town. With some improvements to landscaping and interpretation of its marine life, it would be even more so. R. Briggs 1995

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1995 Species List

E= Eglantine S= Spittals H= High Brigg

Group	Genus	epithet	E	S	H
PORIFERA					
Porifera	*Dysidea*	*fragilis*	x		
Porifera	*Halichondria*	*bowerbanki*		x	x
Porifera	*Halichondria*	*panicea*		x	x
Porifera	*Haliclona*	*oculata*		x	
Porifera	*Leuconia*	*nivea*		x	
Porifera	*Myxilla*	*incrustans*		x	
Porifera	*Scypha*	*ciliata*			x
Porifera	*Scypha*	*compressa*			x
Porifera	*Stelligara*	*stuposa*			x
CNIDARIA					
Hydrozoa	*Abientinaria*	*abientina*	x		
Hydrozoa	*Campanularia*	*volubis*		x	
Hydrozoa	*Obelia*	*geniculata*		x	x
Hydrozoa	*Plumularia*	*spp.*	x		
Hydrozoa	*Sertularella*	*rugosa*	x		x
Hydrozoa	*Sertularia*	*sp.*		x	
Hydrozoa	*Tamiscaria*	*tamarisca*			x
Anthozoa	*Actinia*	*equina*	x	x	
Anthozoa	*Alcyonium*	*digitatum*	x	x	x
Anthozoa	*Metridium*	*senile*	x	x	
Anthozoa	*Urticina*	*felina*	x	x	
Scyphozoa	*Aurelia*	*aurita*	x		x
Scyphozoa	*Cyanea*	*capillata*	x		x
Scyphozoa	*Cyanea*	*lamarkii*	x		x
ANNELIDA					
Polychaeta	*Arenicola*	*marina*			
Polychaeta	*Capitella*	*capitata*			x
Polychaeta	*Capitomastus*	*giardi*			x
Polychaeta	*Eteone*	*foliosa*			x
Polychaeta	*Eulalia*	*viridis*		x	
Polychaeta	*Eulalia*	*bilineata*		x	
Polychaeta	*Genetyllis*	*rubiginosa*		x	
Polychaeta	*Harmothoe*	*imbricata*		x	
Polychaeta	*Hediste*	*diversicolor*			
Polychaeta	*Janua*	*pagenstecheri*			
Polychaeta	*Lanice*	*conchilega*			
Polychaeta	*Lepidonotus*	*clava*		x	
Polychaeta	*Lepidonotus*	*squamatus*		x	
Polychaeta	*Mystides*	*limbata*			x
Polychaeta	*Nepthys*	*caeca*			x
Polychaeta	*Nepthys*	*incisa*			x
Polychaeta	*Perinereis*	*cultrifera*		x	
Polychaeta	*Pionosyllis*	*lamelligera*		x	

Polychaeta	*Platynereis*	*dumerili*		**x**	**x**
Polychaeta	*Pomatoceros*	*triqueter*		**x**	**x**
Polychaeta	*Sabellaria*	*spinulosa*	**x**		
Polychaeta	*Spirorbis*	*spirorbis*		**x**	
Polychaeta	*Spirorbis*	*corallinea*		**x**	
ARTHROPODA					
Cirripedia	*Balanus*	*crenatus*		**x**	
Cirrepedia	*Elminius*	*modestus*			
Cirripedia	*Semibalanus*	*balanoides*			
Cirripedia	*Verruca*	*stroemia*		**x**	
Pycnogonida	*Achelia*	*laevis*		**x**	
Pycnogonida	*Achelia*	*echinata*		**x**	
Pycnogonida	*Callipallene*	*phantoma*		**x**	
Insecta	*Anurida*	*maritima*			
Insecta	*Chironomid*	*sp.*			
Insecta	*Petrobius*	*maritimus*			
Amphipoda	*Atylus*	*swammerdami*		**x**	
Amphipoda	*Gammarus*	*spp.*		**x**	**x**
Amphipoda	*Gitana*	*sarsi*		**x**	**x**
Amphipoda	*Hyale*	*nilssoni*		**x**	**x**
Amphipoda	*Jassa*	*fulcata*		**x**	
Amphipoda	*Sunamphithoe*	*pelagica*		**x**	
Copepoda	*Artotragus*	*sp.*	**x**		
Copepoda	*Metis*	*ignea*		**x**	
Isopoda	*Idotea*	*baltica*		**x**	**x**
Isopoda	*Idotea*	*granularis*			
Isopoda	*Jaera*	*albifrons*			
Isopoda	*Ligia*	*oceanica*			
Caprellids	*Caprella*	*linearis*		**x**	**x**
Caprellids	*Caprella*	*acanthifera*		**x**	**x**
Crustacea	*Cancer*	*pagurus*	**x**	**x**	**x**
Crustacea	*Carcinus*	*maenas*		**x**	
Crustacea	*Ebalia*	*cranchii*		**x**	
Crustacea	*Euryhome*	*aspersa*		**x**	
Crustacea	*Galathea*	*strigosa*	**x**	**x**	**x**
Crustacea	*Homarus*	*gammarus*		**x**	**x**
Crustacea	*Hyas*	*araneus*	**x**		
Crustacea	*Liocarcinus*	*depurator*			
Crustacea	*Liocarcinus*	*holstatus*	**x**	**x**	
Crustacea	*Necora*	*puber*			
Crustacea	*Pagurus*	*bernhardus*			
Crustacea	*Pirimela*	*denticulata*			
Crustacea	*Porcellana*	*platycheles*		**x**	
Crustacea	*Porcellana*	*longicornis*		**x**	
MOLLUSCA					
Polyplacophora	*Lepidochitona*	*cinereus*		**x**	
Polyplacophora	*Acanthochitona*	*crinitus*		**x**	
Bivalvia	*Aequipecten*	*opercularis*			
Bivalvia	*Angulus*	*tenuis*			
Bivalvia	*Anomia*	*epihippum*	**x**	**x**	**x**
Bivalvia	*Cerastoderma*	*edule*			

Bivalvia	*Chlamys*	*distorta*		**x**	**x**
Bivalvia	*Clausinella*	*fasciata*			
Bivalvia	*Ensis*	*arcuatus*			
Bivalvia	*Ensis*	*siliqua*			
Bivalvia	*Hiatella*	*arctica*		**x**	
Bivalvia	*Lasaea*	*rubra*			
Bivalvia	*Lutraria*	*lutraria*			
Bivalvia	*Modiolus*	*demissus*	**x**	**x**	
Bivalvia	*Mya*	*arenaria*			
Bivalvia	*Mytilus*	*edulis*	**x**	**x**	**x**
Bivalvia	*Pharus*	*legumen*		**x**	
Bivalvia	*Tapes*	*aureus*			
Bivalvia	*Tapes*	*rhomboides*			
Opisthobranchia	*Archidoris*	*pseudoargus*		**x**	
Opisthobranchia	*Cadlina*	*laevis*		**x**	
Opisthobranchia	*Coryphella*	*pelucida*	**x**		
Opisthobranchia	*Goniodoris*	*nodosa*			**x**
Opisthobranchia	*Jorruna*	*tormentosa*	**x**		
Opisthobranchia	*Onchidoris*	*muricata*	**x**		
Gastropoda	*Barleeia*	*unifasciata*		**x**	
Gastropoda	*Buccinum*	*undatum*		**x**	
Gastropoda	*Cingulopsis*	*fulgida*		**x**	
Gastropoda	*Gibbula*	*cinearia*		**x**	
Gastropoda	*Lacuna*	*pallidula*			
Gastropoda	*Littorina*	*arcana*			
Gastropoda	*Littorina*	*mariae*			
Gastropoda	*Littorina*	*neglecta*			
Gastropoda	*Littorina*	*obtusata*			
Gastropoda	*Littorina*	*saxatilis*			
Gastropoda	*Littorina*	*littorea*			
Gastropoda	*Meleraphe*	*neritoides*			
Gastropoda	*Nucella*	*lapillus*			**x**
Gastropoda	*Patella*	*vulgata*			
Gastropoda	*Patella*	*ulyssiponensis*			
Gastropoda	*Patina*	*pellucida*		**x**	
Gastropoda	*Rissoa*	*parva*		**x**	
Gastropoda	*Rissoella*	*diaphana*		**x**	
Gastropoda	*Skeneopsis*	*planorbis*			
BRYOZOA					
Bryozoa	*Bicellariella*	*ciliata*	**x**		**x**
Bryozoa	*Bowerbankia*	*gracilis*			**x**
Bryozoa	*Bowerbankia*	*citrina*			**x**
Bryozoa	*Bugula*	*flabellata*	**x**		**x**
Bryozoa	*Bugula*	*turbinata*	**x**		**x**
Bryozoa	*Cauloramphus*	*spiniferum*			**x**
Bryozoa	*Cellaria*	*fistulosa*	**x**		**x**
Bryozoa	*Cellopora*	*pumicosa*			**x**
Bryozoa	*Conoparia*	*reticulum*			**x**
Bryozoa	*Cribrilina*	*punctata*	**x**		**x**
Bryozoa	*Crisia*	*ramosa*			**x**
Bryozoa	*Electra*	*pilosa*			**x**

Bryozoa	*Flustra*	*foliacea*	x	x		
Bryozoa	*Membranipora*	*membranacea*		x		
Bryozoa	*Plagioecia*	*patina*		x		
Bryozoa	*Scruparia*	*chelata*		x		
Bryozoa	*Scrupocellaria*	*reptans*			x	
Bryozoa	*Securiflustra*	*securifrons*			x	
Bryozoa	*Smittina*	*reticulata*			x	
Bryozoa	*Smittina*	*lansborovii*			x	
Bryozoa	*Tricellaria*	*turnata*			x	
ECHINODERMATA						
Echinodermata	*Amphiopholis*	*squamata*		x		
Echinodermata	*Amphiura*	*chiajei*		x		
Echinodermata	*Asterias*	*rubens*	x	x	x	
Echinodermata	*Crossaster*	*papposus*		x	x	
Echinodermata	*Echinus*	*esculentus*		x	x	
Echinodermata	*Henricia*	*oculata*		x		
Echinodermata	*Ophiura*	*affinis*		x		
Echinodermata	*Opthiothrix*	*fragilis*	x		x	
TUNICATA						
Tunicata	*Aplidium*	*punctum*		x	x	
Tunicata	*Ascidiella*	*sp.*			x	
Tunicata	*Botrylloides*	*leachii*			x	
Tunicata	*Botryllus*	*schlosseri*			x	
Tunicata	*Clavelina*	*lepadiformis*		x	x	
Tunicata	*Perophora*	*listeri*			x	
Tunicata	*Polyclinum*	*aurantium*	x		x	
Tunicata	*Sidnyum*	*turbinatum*			x	
PISCES						
Pisces	*Callionymus*	*lyra*		x		
Pisces	*Ctenolabrus*	*rupestris*		x		
Pisces	*Cyclopterus*	*lumpus*		x		
Pisces	*Eutrigla*	*gurnhardus*				
Pisces	*Labrus*	*bergylta*	x			
Pisces	*Lipophrys*	*pholis*				
Pisces	*Myoxocephalus*	*scorpius*		x		
Pisces	*Pholis*	*gunnellus*		x		
Pisces	*Pleuronectes*	*platessa*		x		
Pisces	*Pollachius*	*virens*	x			
Pisces	*Pollachius*	*pollachius*	x			
	Pomatoschistus	*microps*		x		
Pisces	*Pomatoschistus*	*minutus*				x
Pisces	*inutus*					x
Pisces	*Syngnathus*	*sp.*		x		
Pisces	*Trisopterus*	*minutus*		x		
Pisces	*Zeugopterus*	*punctatus*		x		
ALGAE						
Rhodophycota	*Ahnfeltia*	*plicata*				
Rhodophycota	*Ceramium*	*rubrum*		x	x	
Rhodophycota	*Chondrus*	*crispus*				

Rhodophycota	*Corallina*	*officinalis*	**x**	**x**
Rhodophycota	*Delessaria*	*sanguinea*	**x**	**x**
Rhodophycota	*Desmarestia*	*ligulata*	**x**	
Rhodophycota	*Dictyosiphon*	*sp.*		
Rhodophycota	*Dumontia*	*incrassata*		
Rhodophycota	*Laurencia*	*pinnatifida*	**x**	
Rhodophycota	*Lithothamnion*	*sp.*		
Rhodophycota	*Lomentaria*	*articulata*	**x**	**x**
Rhodophycota	*Mastocarpus*	*stellatus*		
Rhodophycota	*Nemalion*	*multifidum*		
Rhodophycota	*Palmaria*	*palmata*	**x**	
Rhodophycota	*Plocamium*	*cartilagineum*	**x**	
Rhodophycota	*Plumaria*	*elegans*	**x**	**x**
Rhodophycota	*Polysiphonia*	*lanosa*		
Rhodophycota	*Porphyra*	*sp.*		
Rhodophycota	*Rhodochorton*	*spp.*		
Rhodophycota	*Rhodymenia*	*palmata*	**x**	**x**
Chromophycota	*Alaria*	*esculenta*	**x**	
Chromophycota	*Ascophyllum*	*nodosum*		
Chromophycota	*Asperococcus*	*turneri*	**x**	
Chromophycota	*Desmarestia*	*ligulata*	**x**	
Chromophycota	*Fucus*	*serratus*	**x**	
Chromophycota	*Fucus*	*spiralis*		
Chromophycota	*Fucus*	*vesiculosus*		
Chromophycota	*Halidrys*	*silquosa*		
Chromophycota	*Himanthalia*	*Elongata*		**x**
Chromophycota	*Laminaria*	*digitata*	**x**	**x**
Chromophycota	*Laminaria*	*hyperborea*	**x**	**x**
Chromophycota	*Laminaria*	*saccharina*	**x**	**x**
Chromophycota	*Pelvetia*	*canaliculata*		
Chlorophycota	*Blidingia*	*sp.*		
Chlorophycota	*Cladophora*	*rupestris*		
Chlorophycota	*Ectocarpus*	*spp.*		
Chlorophycota	*Enteromorpha*	*intestinalis*		
Chlorophycota	*Spongomorpha*	*arcta*		
Chlorophycota	*Ulva*	*lactuca*	**x**	