Environment Description for the EMEC Wave Test Site Billia Croo, Orkney

Author	Date	Approved	Date	Revision
Aurora Environmental	December 2004	Jennifer Norris	January 2005	0
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EMEC ORKNEY
The European Marine Energy Centre Ltd

AURORA environmental

1 Purpose and Scope

The function of this environmental description is to inform potential developers to the European Marine Energy Test Centre (EMEC) of the environment within which the wave development test site, Billia Croo is located. The description covers the character of the physical environment, the biological environment, the human environment and also conservation areas around Billia Croo. Meteorological and hydrographical information will be supplied by EMEC.

The following sections provide a detailed description of each important environmental characteristic. A summary figure of the environmental sensitivities of the area is provided in Figure 2.7 on page 12 and seasonal sensitivities summarised in Figure 2.8 on page 15.

2 Environmental Description of Billia Croo

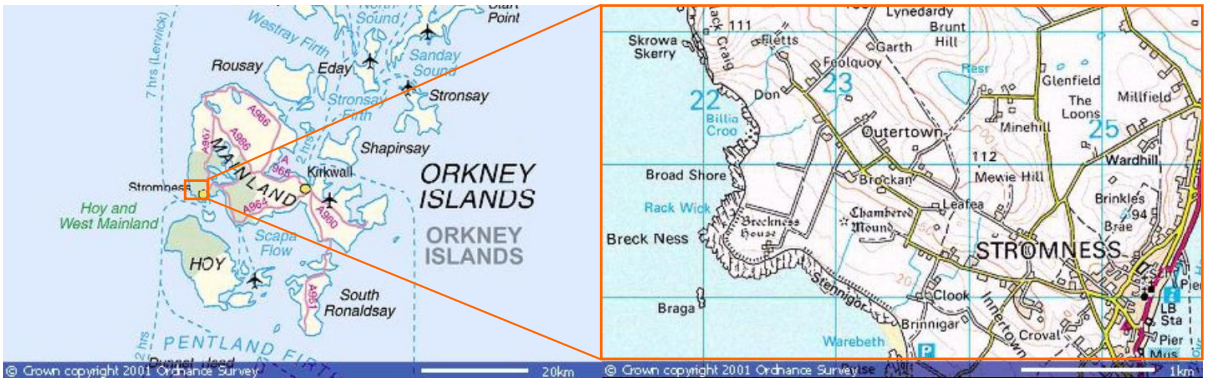
2.1 Seascape

Most of the Orkney Islands are composed of sedimentary rocks of Devonian age (410-360 million years ago), predominantly Middle and Upper Old Red Sandstone. There are older metamorphic rocks and younger dykes in a few places. The nature of the rock and the glacial features help to determine the present day landscape of the coast (Doody, 1997).

The geomorphology of the coastline is determined by the energy of the wave system. The west coast of Orkney is regarded as one of the best examples of a high energy coastal environment in the UK. The seascape of this area is an integral part of the National Scenic Area designation. The Billia Croo shoreline as described in Section 2.2 is composed of a cobble beach above a bedrock shore. The shore area is flanked to the north by the seacliffs of Black Craig and to the south by small cliffs and shelving bedrock.

The location of Billia Croo within the Orkney context is shown below in Figure 2.1.

Figure 2.1 Location of Billia Croo



2.2 Coastal habitats (littoral)

The shores along the western Orkney coastline comprise predominantly very wave exposed bedrock, with some areas of extremely large boulders (Murray *et al*, 1999). The littoral zone of Billia Croo has been the subject of a number of littoral surveys (OIC, unpublished data; Murray *et al*, 1999). A more recent survey has been undertaken in 2002, the results of which are summarised in the Marine Energy Test Centre Environment Statement (Carl Bro, 2002).

The littoral[1] zone in the region of Billia Croo comprises a boulder beach, flanked to the south by a rocky promontory and to the north by steeply shelving bedrock leading to a cliff coastline. The coastal habitats of the Billia Croo site, starting at the top of the shore, are characterised by very exposed littoral rock with mussels (*Mytilus edulis*) and barnacles. The algae *Fucus distichus* Subsp *anceps* and *Fucus spiralis* f *nana* can be found on the extremely exposed upper eulittoral rock, with *Corallina officinalis* on very exposed lower

[1] The word or suffix 'littoral' is used to describe a shore or seabed area. When 'littoral' is prefixed by another word e.g. circa-, sub-, infra-,etc, then this refers to the nature of the zone as defined by the habitat, community type and a number of physical factors e.g. water depth and light amongst others (JNCC, 2004).

eulittoral rock. The alga *Alaria esculenta*, mussels and coralline crusts can be found on very exposed sublittoral fringe bedrock i.e. at the ELWS (extreme low water springs) mark. The algae species *Fucus distichus* Subsp *anceps* and *Fucus spiralis* f *nana* found during the littoral survey (Carl Bro, 2002) are rare species whose distribution is restricted to the far north and west coasts of Scotland (HIE, 2001; Carl Bro, 2002).

A summary of shore habitats in the region of Billia Croo is shown in Table 2.1 (page 9) along with photographs of the area in Figure 2.2 and a cross section of the shore and seabed areas shown in Figure 2.6 (page 8).

Figure 2.2 Photographs to show the nature of the shoreline at Billia Croo

Plate 1 Looking northwest with Black Craig in the background.

Plate 2 Looking southwest showing boulder shore and shelving bedrock.

Plate 3 Photo taken on the low shore shelving bedrock looking northwest.

2.3 Seabed habitats (sublittoral)

2.3.1 Surveys undertaken

The subsea benthic sediments and communities have been investigated following 2 main studies. These are a cable route survey (ICIT, 2002a) which covered an E -W transect distance of 350 m and a sublittoral survey (ICIT, 2002b) which focused on gathering baseline biological community data and assessing the nature of the seabed sediments at the test site location. Analysis of core samples taken from the sediment area has also been undertaken as part of an MPhil student project (unpublished data). These reports including photographs and video stills of the area are available from EMEC (see Section 5). The nature of the shore and seabed areas are summarised in Figure 2.6 on page 8.

2.3.2 Seabed sediments

Survey results (ICIT, 2002b) have indicated that the infralittoral zone is dominated by exposed bedrock. There is a transition area at around 20-25 m where the circalittoral zone begins and is characterised by exposed bedrock with an overlying sediment veneer in many places. Particle size of this veneer varies from sand through to large boulders and the term veneer is used to distinguish the bedrock from any overlying material. The transition between the infralittoral zone and the circalittoral zone is often not a distinct boundary.

The precise seaward edge of the exposed bedrock of the infra- and circalittoral zones is difficult to determine, although there appears to be a boundary at around 45 – 47 m water depth, where the exposed bedrock is replaced by fine sand in the sublittoral zone. The fine sand is interspersed with boulders and stones. Bedrock outcrops also occur within this area (HIE, 2001; ICIT, 2002b).

Subsurface sediments have also been investigated via penetration testing and core sampling. Generally, the investigation indicated that the characteristics of the seabed stratigraphy were, sandy deposits to the north of the site, with glacial till overlying suspected shallow bedrock encountered to the south (RJ McLeod (contractors) Limited, 2002). Sediments in the sublittoral zone (≥ 45 m) have been shown to be medium to fine grained (unpublished data).

The survey sites selected during the sublittoral survey (ICIT, 2002b) are shown in Figure 2.3 below, followed by a selection of images illustrating the community type and seabed sediments at each dive site location.

Figure 2.3 The sublittoral survey area showing locations of dive sites and biotope types

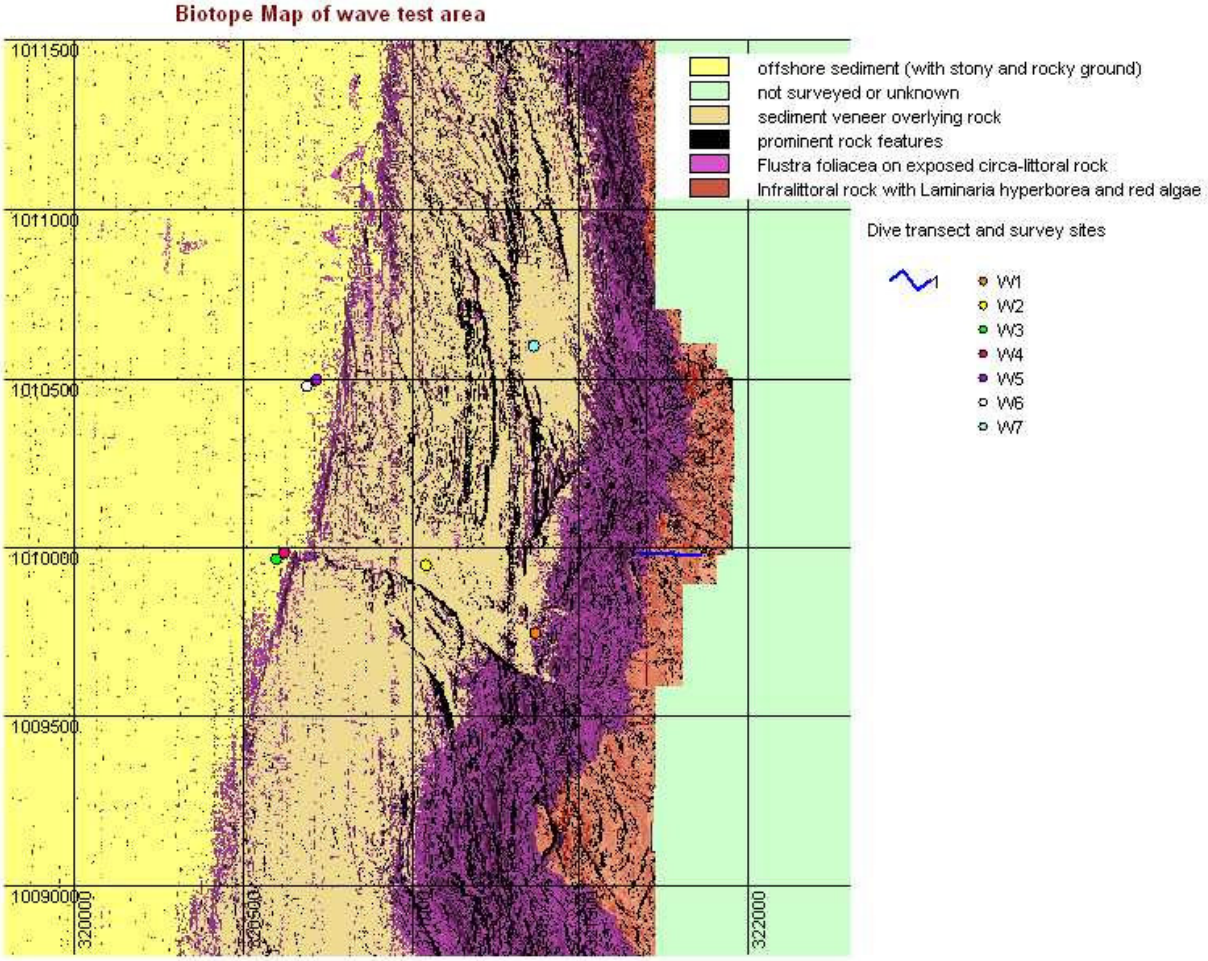


Figure 2.4 Selected images of survey sites (Source: ICIT, 2002b)

Plate 1 Site W1, with *A. digitatum* on bedrock.

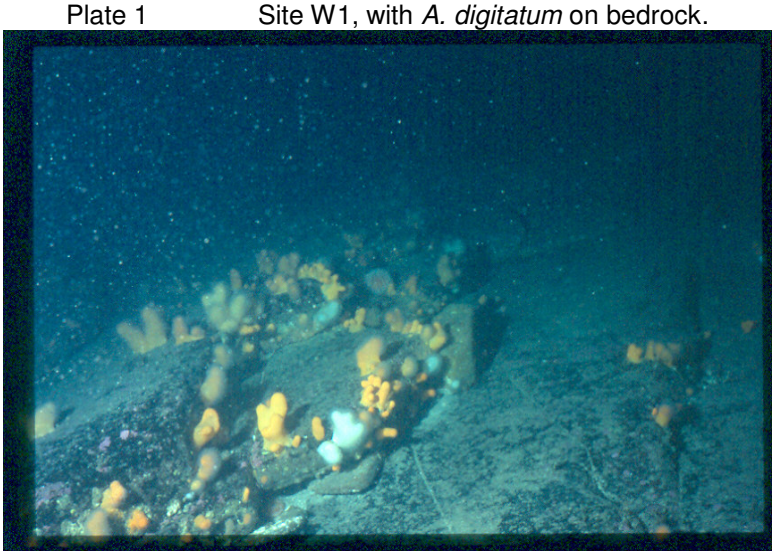


Plate 2 Site W2, with small bryozoans on sand-scoured rock.

Plate 3 Site W3, large boulder on sand. Grazing on rock surfaces by the urchin *Echinus esculentus*.

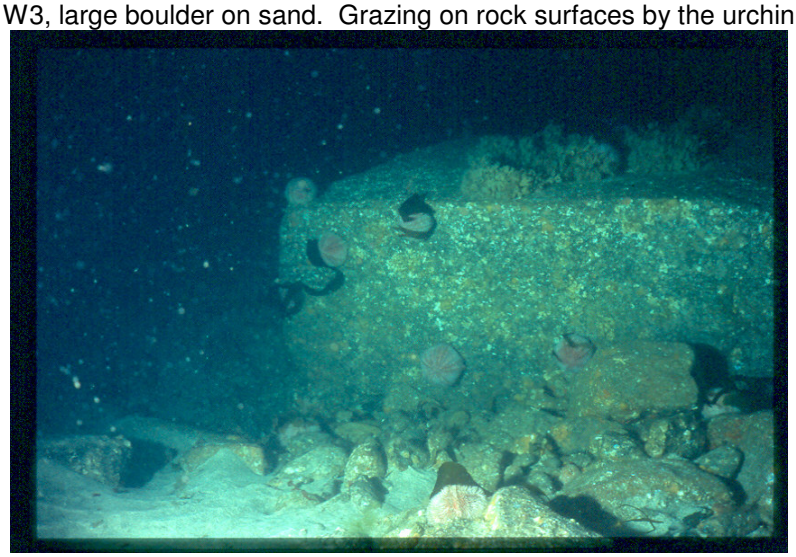
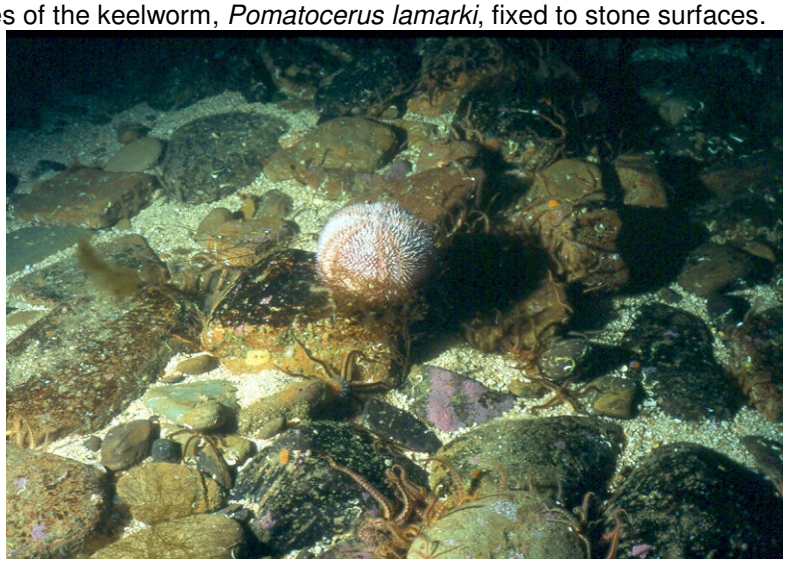


Plate 4 Site W5, still image showing sandy seabed with stone/boulder patches.

Plate 5 Site W6, stone/boulder patch, showing *E. esculentus* with the anemone, *Urticina felinia*, buried in the sand to the back right of the image.

Plate 6 Site W7, showing a dense brittlestar colony among loose stones.

Plate 7 Site W7, area of stones and coarse sediment. Brittlestars and urchins present as well as the white calcareous tubes of the keelworm, *Pomatocerus lamarki*, fixed to stone surfaces.



2.3.3 Seabed communities

The types of benthic communities present in the Billia Croo area will be largely dependant on a number of factors including sediment type, water depth and hydrographic regime. Surveys of the area have indicated that there appears to be a transition from bedrock to a broken boulder/stone seabed to a sediment dominated seabed with increasing depth and distance from shore (ICIT, 2002a & b). Near shore areas of the transect survey undertaken in 2002 indicated that dense kelp forests thinning to kelp park exist between the low water mark and to a depth of approximately 20-25 m (Murray *et al*, 1999; ICIT, 2002a). At the 20-25 m mark kelp exist sparsely and were not observed at all at the shallowest dive site (32 m). Fauna typical of hard substrata and exposure to water movement were common on the bedrock, boulder and stone seabed e.g. *Alcyonium digitatum*, *Echinus esculentus* and *Flustra foliacea*. Sites with broken boulder/stone substrata supported more diverse communities, with *F. foliacea* and brittlestar biotopes.

Surveys of the deeper dive sites e.g. 48 – 50 m were found to lie close to the boundary between the predominantly boulder/stone seabed on the landward side and the sedimentary seabed on the seaward side. Although some hard substrata would be available e.g. scattered boulders, the area would predominantly support sedimentary biotopes and those characteristic of sand scoured rock where hard substrata was available. This area was surveyed visually e.g. video and photography and by taking core samples.

Analysis of core samples taken from the offshore sediment area indicate that the sediments are dominated primarily by polychaete worms followed by nematode worms, although in some samples polychaetes accounted for over 80% of sample species composition (unpublished data).

Examples of the communities present are shown in the photos in Figures 2.4 and 2.5. A summary of seabed habitats (littoral and sublittoral) in the region of Billia Croo are also shown in Table 2.1 and Figure 2.6.

Figure 2.5 Photographs taken during the cable route survey

Plate 1 20 m marker (seaward)

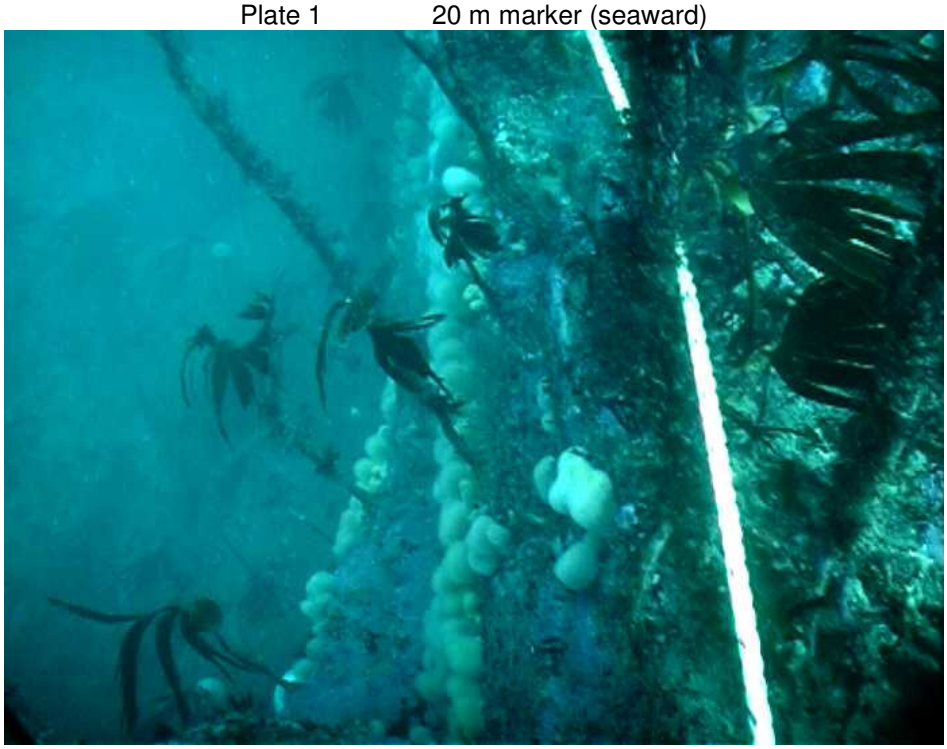
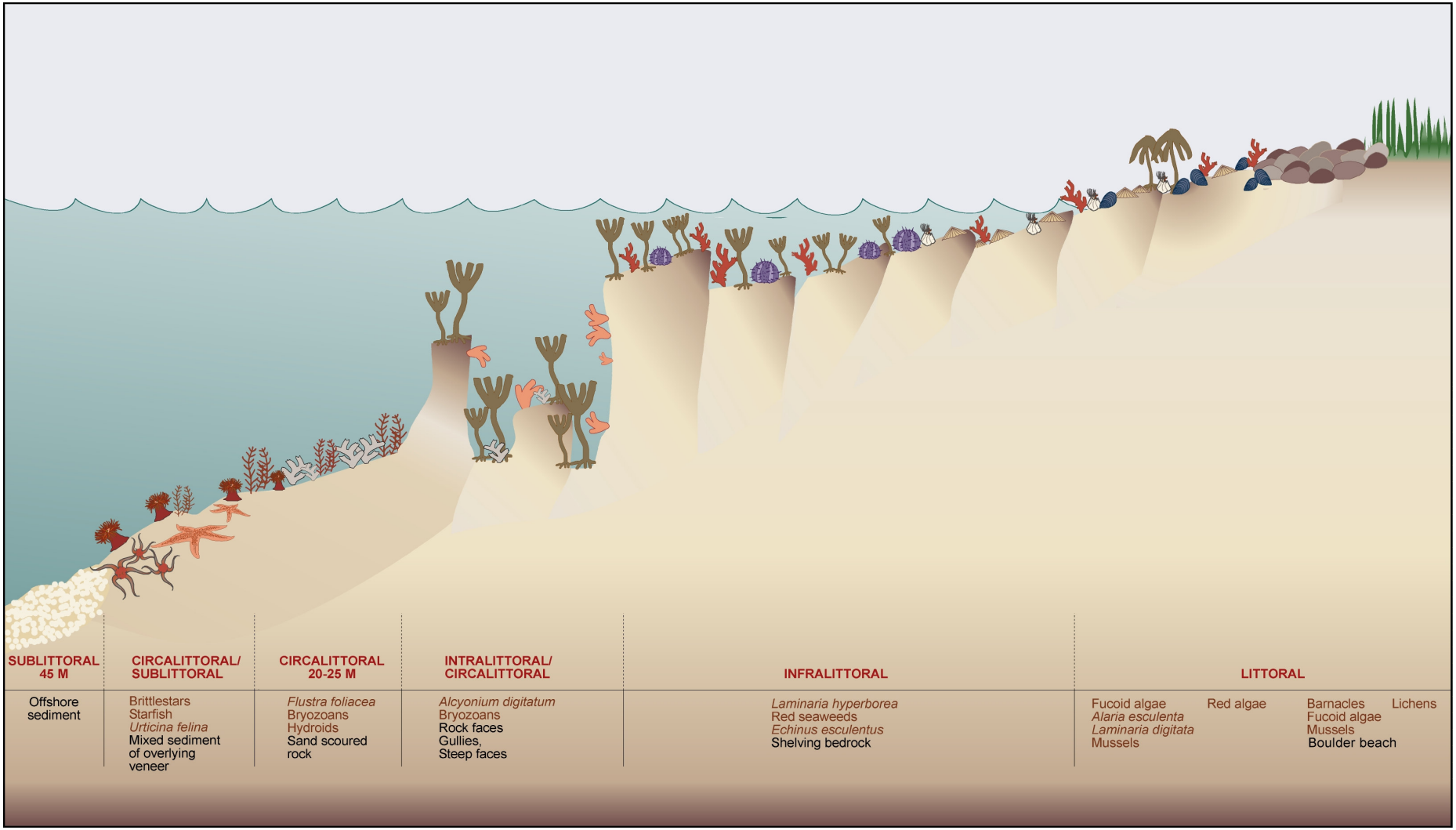


Plate 2 120 m marker (landward)

Plate 3 280m marker (landward)

Figure 2.6 The littoral and sublittoral habitats and sediment types at Billia Croo[2]



[2] This simple schematic illustrates community succession at Billia Croo. In reality habitats are more complex than shown and the boundaries between zones less defined.

Table 2.1 Characterisation of the shore and seabed habitats and species at Billia Croo

Shore/seabed area	Zone classification	Character of zone	Species present
Top of the shore – splash zone	Supralittoral	Bedrock promontory and boulder beach	Dominated by the lichen *Verrucaria maura*. Barnacles present.
	Upper littoral	Bedrock promontory and shelf	Rock pools present with dense coralline algal crusts, fucoids and kelp in deeper pools. Green algae in pools higher up the shore. *Enteromorpha* spp. on the upper shore.
Middle of shore	Mid littoral	Boulder beach and bedrock promontory	Dominated by barnacles and fucoid algae. *Fucus vesiculosus* and *Fucus serratus*. Mussels *(Mytilus edulis)* form a band mid way down the shore.
	Eulittoral	Exposed bedrock shelf	Dominated by mussels with barnacles and barnacles with limpets (*Patella* spp.) and *Fucus vesiculosus* f. *linearis*.
	Lower littoral	Boulder beach	Stands of dulse (*Palmaria palmata*) and other red seaweeds where *Osmundea* (*Laurencia*) and /or *Gelidium* always dominate.
Boundary between shore and low water	Littoral/infralittoral	Bedrock promontory and bedrock shelf	Dense *Himanthalia elongata* with fucoid algae *Fucus distichus*. Closer to infralittoral zone dominated by *Alaria esculenta* with *Laminaria digitata* on bedrock promontory. Mussels on the bedrock shelf.
Below low water	Infralittoral	Bedrock	Dominated by dense *Laminaria hyperborea* forest. Thins to kelp park with depth with sparse understorey of red seaweeds. Sparse fauna and algal crusts. *Echinus esculentus* with sparse dead mans fingers and some grazing tolerant fauna.
	Infralittoral/circalittoral	Rock faces, steep exposed rock features and gullies. High energy, tide and wave swept rock faces.	Dominated by dead mans fingers (*Alcyonium digitatum*) and the bryozoan *Securiflustra securifons*.
Begins 20 – 25 m deep	Circalittoral	Soured rock and rock surfaces	Dominated by the bryozoan *Flustra foliacea*. Other bryozoans and hydroids present.
	Circalittoral/sublittoral	Mixed sediments of the overlying veneer and at the boundary of sublittoral sediment.	Brittlestar beds characterised by *Ophiothrix fragilis* and *Ophiocomina nigra* but not limited to these. Associated with the starfish *Luidia ciliaris*. *Urticina felina* present.
From 45 m	Sublittoral	Sand cover of the offshore zone.	Dominated primarily by infaunal polychaete species. Nematodes, amphipods, bivalves and echinoderms also present.

2.4 Plankton

Plankton in the region is characterised by mainly coastal (neritic) and mixed (intermediate) water and is largely influenced by the inflow of Atlantic water (Edwards and John, 1997). The plankton is of fundamental importance in that it is the basis of the entire marine ecosystem, forming a vital link in the food chain of larger organisms such as fish, seabirds and cetaceans (whales and dolphins). The region of Billia Croo is likely to contain a higher proportion of intermediate and northern/boreal species (Adams, 1987), and is fairly typical for north British coastal waters. The spring algal bloom in March – May brings mainly diatoms, followed by dinoflagellates during May – August. A second algal bloom follows during September, thereafter

phytoplankton numbers decline to winter levels. The main zooplankton component appears to be copepods. These increase in numbers slightly after the algae blooms to take advantage of the increase in food resource. Other zooplankton include ctenophores, hydromedusea, amphipods and species which have a planktonic life stage.

2.5 Fish and shellfish

2.5.1 Finfish

Fish fauna studies are poorly represented for this part of Orkney, however general statements can be made considering the exposed locality and bedrock conditions. Fish species likely to be found include saithe (*Pollachius virens*), pollack (*Pollachius pollachius*) and ling (*Molva molva*). Other gadoids appear seasonally and include cod (*Gadus morhua*), which is widely distributed around Orkney during the summer months. Peak spawning for cod occurs in February. Whiting (*Merlangius merlangus*) and haddock (*Melanogrammus aeglefinus*) tend to appear in larger but often variable shoals, during late summer and autumn. Both species are abundant and present throughout the Orkney area (HIE, 2001; Carl Bro, 2002).

Herring (*Clupea harengus*) and mackerel (*Scomber scombrus*) are also present during their migratory passage past Orkney. Herring spawn in areas to the west and north of Orkney during early summer. Mackerel are resent in coastal waters during the summer and autumn months and spawning takes place in summer. Monkfish (*Lophius piscatorius*) spawn in deep water along the edge of the continental shelf, mainly during March and June. However, juveniles and non-spawning adults are present throughout Orkney waters. Conger eels (*Conger conger*) and gurnard (*Triglidae*) would also be expected to be present.

Orkney is located within spawning and nursery areas of a number of commercially important fish species including herring, lemon sole, sandeel and sprat spawning areas and saithe, lemon sole and sandeel nursery areas.

2.5.2 Shellfish

The nature of the seabed in the vicinity of Billia Croo is ideal habitat for lobster (*Homarus gammarus*), brown crab (*Cancer pagurus*) , velvet crab (*Necora puber*) and shrimp (*Nephrops norvegicus*).

2.6 Birds and shore birds

Much of the Orkney coastline is colonised by seabirds, and some sections of coastline have several contiguous colonies. Of the seabird colonies in Orkney, 23 hold numbers of seabirds at or above 1% of the total population of the European total for that species (Tasker, 1997). However, the RSPB have confirmed that there are no populations of nationally or internationally important species in the region of Billia Croo.

Nearby cliff top habitats at Billia Croo provide nesting areas for many species of bird. Presence of birds in the region of Billia Croo is shown in Figure 2.7. The site is locally important for birds, such as a pair of Peregrine falcons which regularly nest on the sea cliffs, and nearby colonies of Guillemots and Kittiwakes at Row Head. The site is also home to breeding numbers of Arctic skuas, Great skuas and a small colony of Arctic Terns (OIC, unpublished data).

Waders likely to be found in the shallow areas of the shore include relatively large numbers of Oystercatchers, Redshank and Curlew, and smaller numbers of Turnstone, Ringed plover and Purple sandpiper. Sightings of various gulls and waterfowl would also be expected in the area (Tay and Orkney Ringing Groups, 1984).

The times of year during which the highest population numbers are expected varies depending on the species. For Orkney the highest numbers of seabirds i.e. Guillemots, Kittiwake, Arctic skuas, Great skuas and Arctic terns, occur between April and September. For the aforementioned seabirds Orkney or parts of Orkney represent a main breeding area (Tasker *et al*., 1987; Thom, 1986). For the waders and wildfowl i.e. Oystercatcher, Redshank, Curlew, Turnstone, Ringed plover, the highest population numbers in Orkney are expected (based on 2000-01 figures) between August and February, and between November and February and April for the Purple sandpiper. Oystercatcher, Redshank, Curlew and Ringed plover are considered widespread in Orkney and for the Turnstone and Purple sandpiper Orkney is a main wintering area (Pollitt *et al*., 2003; Thom, 1986).

Seabird vulnerability to oil pollution in the vicinity of Billia Croo is predicted to be moderate between October and March and high between April and September (EMEC OSCP, 2004).

2.7 Marine mammals

Harbour porpoise are known to regularly feed in the area between April and September (see Figure 2.7). There are also regular sightings of Minke whale and Risso's dolphin and occasional sightings of white beaked dolphin. Records further offshore indicate white sided dolphin, killer whale and pilot whales use the area for passage. There are no known resident populations of cetaceans in the area (C. Booth *pers. comm*.)

Seals are observed in the area with the nearest known haul-out being recorded at Warebeth beach were sightings of up to 50 individuals have been recorded.

2.8 Conservation

The area in the vicinity of Billia Croo has a number of conservation designations, noted for their local, national and international importance. Conservation areas are detailed in Table 2.2 and illustrated in Figure 2.7.

National Scenic Areas (NSAs) are Scotland's only national landscape designation, and are designated by Scottish Natural Heritage (SNH) as the best of Scotland's landscapes, deserving special protection in the nation's interest. They are designated under Section 262c of the Town and Country Planning Act (Scotland) 1972.

Sites of Special Scientific Interest (SSSIs) are notified under the Wildlife and Countryside Act 1981. They are intended to form a national network of areas representing in total the parts of Britain in which the natural features, especially those of greatest value to wildlife and earth science conservation, are most highly concentrated or of highest quality (Plaza & Keddie, 1997).

The designation of Special Areas of Conservation (SAC) is one of the main mechanisms by which the EC Habitats and Species Directive (1992) is implemented. Natura 2000 is the title for the network of areas designated to conserve natural habitats and species of wildlife which are rare, endangered or vulnerable in the European Community. The term Natura 2000 comes from the 1992 EC Habitats Directive. A site cannot be designated an SAC without first being designated a SSSI.

A number of sites have also been identified as being of local importance to wildlife or exhibit features of local natural heritage interest. These sites of local importance, in addition to the sites of national and international importance, are representative of important Orkney nature conservation areas and also represent the diversity of habitats and nature interests in Orkney.

Figure 2.7 The environment and conservation areas of Billia Croo and surrounds

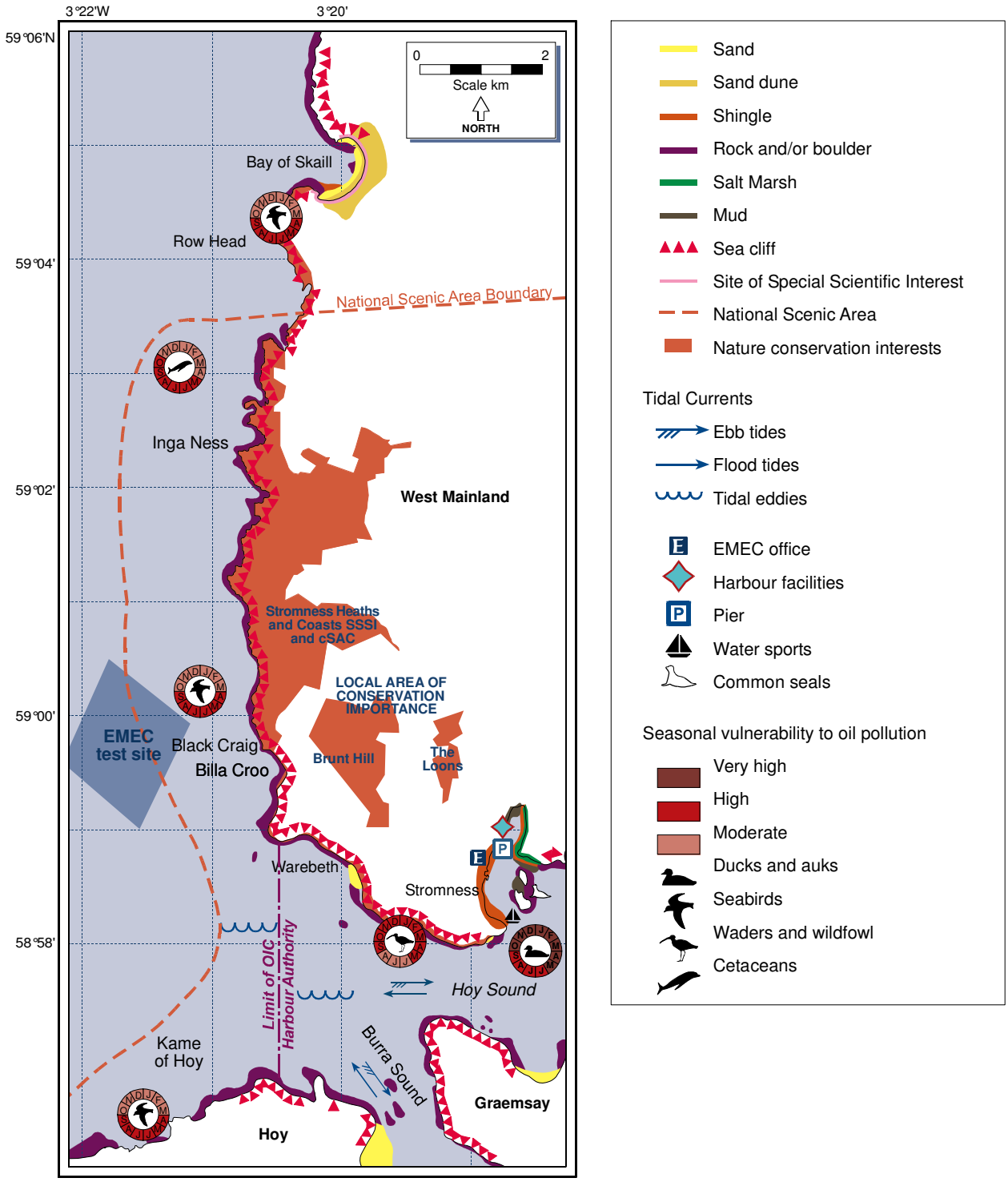


Table 2.2 Conservation areas around Billia Croo

	Name of site	Designation	Features of interest
1	Hoy and West Mainland	National Scenic Area (NSA)	The designation of NSA does not consider any one aspect of an area singly from all other aspects. Rather, it is the enjoyment of the scenery as a whole, which determines how important a site is. With this in mind, the designation of the Hoy and West Mainland NSA recognises the quality of the natural beauty and amenity of the area, in that the area should be safeguarded and enhanced as part of Scotland's natural heritage. It is also recognised that provisions should be made for the socio-economic development of an area without compromising the scenic value of the area.
2	Stromness Heaths and Coast	SSSI/cSAC	Transition of coastal vegetation from typical maritime communities to a heathland community. Several colonies of the nationally scarce Scottish primrose *Primula scotica,* breeding birds, small numbers of Arctic and Great Skuas and a small Artic tern colony. A pair of peregrine, guillemots and kittiwakes. Cliff-top communities strongly influenced by the sea and associated plant species. Landward transition from more maritime plant communities into areas of wind-pruned acidic heath. Geology and geomorphology of sandstone and flagstone cliffs and other rock coast features including cliffs, caves, arches, geos, stacks, shore platforms and cliff-top scouring. Important site for the study of Lower Old Red Sandstone environments and Middle Old Red Sandstone lake sediments.
3	Brunt Hill, Stromness	Local ornithological site	A block of heavily grazed heather with small patches of *Juncus* spp., and primrose in damper areas. Breeding birds in the area include Teal, Oystercatcher, Lapwing, Curlew, Common gull, Skylark, Meadow pipit and Wheatear. Also Arctic skuas nest in some years. Other fauna in the area include the Brown hare.
4	South Stromness Coast	Local geological site	The low coast to the south of Stromness provides one of the most accessible sections through crystalline basement and the overlying Stromness flags. The rocks are seen in cliffs, generally less than 5 m in height, and in a wide wave-cut platform, which is readily accessible at low tide. Between Breckness and Ness the Lower Stromness Flags and the Sandwick Fish Bed are repeated by faulting and are well exposed in the extensive rock platform which fringes the low cliffs. The rocks are a complex of schists, gneisses and granites and throughout their crystalline nature and distinctive colour are easily distinguished. The overlying conglomerate consists of sub-rounded pebbles of gneiss and granite in a fine sandy matrix. Basal conglomerates, algal coatings and sedimentary structures associated with sedimentation of flags are well displayed. The site is also of interest for the occurrence of lead mineralization in the lower Stromness Flags.
5	The Loons, Stromness	Local ornithological site	A large patch of wetland habitat containing rough grassland and in the wetter areas Iris, *Juncus* spp., Meadowsweet, Cotton grass and some Willow scrub can be found. The site has been subjected to drainage in recent years. Breeding birds in the area include Mallard, Teal, Shoveler, Moorhen, Pheasant, Oystercatcher, Lapwing, Snipe, Curlew, Redshank, Common gull, Black headed gull, Skylark, Pied wagtail, Meadow pipit, Wheatear, Linnet and Reed bunting. Hunting birds of prey also use the area. Other fauna in the area include the Brown hare.

2.9 Other sea users

2.9.1 Fisheries

The sea area adjacent to Billia Croo is mainly used by trawlers passing through on the way to their preferred fishing grounds (pers. comm. Alan Coghill). The preferred fishing grounds tend to be further north and west of the test area, although in bad weather there maybe trawling close inshore. Fishing along the west coast of the Orkney mainland takes place in water depths of approximately 58 m (192 ft) (Carl Bro, 2002).

The area along the west coast of Hoy and Mainland Orkney experiences a seasonal closure on the use of mobile fishing gear. The fishing closure is made under the Inshore Fishing (Prohibition of Fishing and Fishing Methods) (Scotland) Order 1989. The ban runs between May and September (inclusive) and is designed to protect recognised fish nursery areas.

Inshore fishing takes place around the wave device test area targeting lobster, edible crab, green crab and velvet crabs. These species are fished in water depths of approximately 33 -38 m (108 – 126 ft), all year round depending on the weather.

2.9.2 Other vessel traffic

The area off Billia Croo is not an important location for recreational angling compared with other areas to the west of Orkney. The area is used for passage of Orkney Islands Sea Angling Association vessels on the way north to Marwick Head (approximately 13 km north of Billia Croo). The area is not a major location for recreational diving, though Orkney Dive Boat Operators Association vessels use the area for passage to diving sites in the north. Sailing vessels are known to pass through the area on passage to and from Stromness marina.

In addition, it should be noted that Scapa Flow experiences vessel traffic movements since the area is important for recreational diving, sailing, fishing and oil terminal traffic.

2.9.3 Others

The wave test site is located within a charted area to be avoided (ATBA), i.e. an area to be avoided by vessels >5,000 grt with oil or other hazardous cargoes in bulk.

Other than the cables associated with the wave test facility, there are no pipelines or other cables charted within the Billia Croo area (Hydrography of the Navy, 1993).

There are no piers or sea access structures at Billia Croo.

3 Key environmental sensitivities summary

Figure 2.8 Seasonal variations of key environmental sensitivities

Birds	*See note*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Birds are present throughout the year at Billia Croo with the spring and summer breeding months considered to be the most sensitive as this is the time when greatest concentrations of birds will be present and may be particularly vulnerable to any pollution. Of the birds present, none are internationally or nationally important aggregations. The key issue to consider is collision risk.													
Fish and shellfish		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
The Billia Croo site (and Orkney as a whole) is located within spawning and nursery areas of a number of fish species, although none of a protective status. There is also commercial fisheries both inshore (shellfish) and further offshore (trawling) from the test site.													
Plankton		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A spring phytoplankton bloom of diatoms and dinoflagellates occurs between March and May. The main components of the zooplankton are copepods, which form an important link in the food chain.													
Coastal & seabed habitats		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
From baseline EIA studies there is no evidence to indicate any particular sensitivity.													
Basking Sharks		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
They are regularly spotted in Orkney waters during the summer and are a UK BAP priority species, although there are no recorded sightings at the wave test site. The key issues to consider are collision risk and construction/operation/decommissioning disturbance.													
Marine mammals		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limited records exist for marine mammal sighting in the area. A few sporadic sightings include Harbour porpoise, Seals, Minke whale, Risso and Orca, which are commonly observed species in Orkney Waters. The nearest Harbour seal haul out is at Warebeth. The key issues to consider are collision risk and construction/operation/decommissioning disturbance.													
Otters		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Where suitable habitat is present along south west Orkney mainland coastline, otter resting sites, feeding areas and potential holts have been identified. Otters normally cub in the winter months in Orkney, although they can breed at any time of the year. Due to lack of evidence it is not possible to identify a seasonal sensitivity for the otter. The key issue to consider is and disruption from shore based works.													
Key:	High	Moderate	Low	Minor interaction	Unclear due to lack of data								

Note: All birds are protected, so any potential effects must be considered, with particular attention given to diving species.

Whilst the sensitivities tables indicate times to be avoided if possible, the tables are a guideline, and are not intended to preclude works *per se*, if there is a good justification for works needing to be carried out during 'high' sensitivity months.

If developers or their contractors do need to carry out operations during these periods of high sensitivity, then developers should ensure full communication with environmental stakeholders (as facilitated by EMEC) in relation to the works. They should also ensure that their documentation includes discussion of the sensitivity in relation to the proposed works, and should give a full explanation of why works proposed during such months need to be carried out at that time.

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5 Data sources

5.1 Data available from EMEC

The following and additional information as it is acquired it will be made available to developers who have signed a Non Disclosure Agreement with EMEC.

(1) European Marine Energy Centre Orkney: Seabed Site Investigation. This is a geotechnical report, Report No. 0518/CPTVC(02) produced by Andrews (Author Adrian Pearce). Gives analysis of the vibrocore samples.

(2) Analysis results of the core samples taken within the offshore sediment area are the subject of a study undertaken as part of an MPhil dissertation report. When the MPhil has been awarded the final report will be available. Presently referenced as unpublished data.

5.2 Other sources of environmental data

Organisation	Information available
British Geological Society	Geological information and publications, hydrogeological information and publications. Seabed sediment reports and maps.
Joint Nature Conservation Committee	Marine Nature Conservation Review – sublittoral and coastal survey data.
Orkney Biodiversity Records Centre	Report from the OBRC wildlife records database.

EMEC has ongoing consultations with the following organisations and appropriate contact details are available:

- Scottish Natural Heritage
- Sea Mammal Research Unit
- Royal Society for the Protection of Birds
- Scottish Environment Protection Agency
- Orkney Islands Council Department of Harbours
- Orkney Fisheries Association
- Orkney Dive Boat Association
- Orkney Sea Angling Association