

Section 3

Survey Methods – Considerations, Constraints & Techniques

3. Survey Methods – Considerations, Constraints & Techniques

3.1. Spatial Considerations

3.1.1. Hydrodynamics

Tidal Currents

The spatial extent of the regional assessment has been determined on the basis of hydrodynamic conditions in the area. **Figure 4** illustrates the likely extents (full tidal cycle on a spring tide) of the secondary impact areas based on tidal data. These have been calculated using tidal diamond data (U) from Admiralty Chart 2675 with a consideration of the projections provided in the REA (Posford Haskoning, 2003).

The tidal extents data indicates that dispersion is largely linear in character with little rotational component. The extents calculated exceed 15km in both an East North East direction and a West South West direction.

These extents are the likely current limits of effect of the dredging activities and should therefore form the focus of the monitoring activity. However it is recognised that the area needs to be placed into a wider context, hence regional reference sites will be required outside of these limits as well as a consideration of data from comparable studies in the English Channel. Examples of the latter are the current ALSF funded projects.

Wave Climate

Wave climate across the ECR is described briefly in the REA (Posford Haskoning, 2003). The dominant wave direction is from the West South West. Wave heights of greater than 4m are experienced only 1.8% of time annually.

The Environmental Statement for Area 473 (Emu, 2002) – considered because the area has been proposed as the type site for regional physical monitoring studies (see later) – states that large waves travelling over Area 473 with a period of 7s or more (wavelength approx 76m) will not have any influence on the seabed. It is also stated that current understanding of wave influences on the seabed of the UK shows that in water depths of greater than 14m there is little alteration of wave characteristics due to dredging.

Therefore, considering the depth of water in the region, it has been assumed that waves in the ECR have very little influence on the physical processes operating at the seabed. Notwithstanding this, the ECA Regional Monitoring Programme will seek to improve knowledge of wave effects on physical processes where practicable.

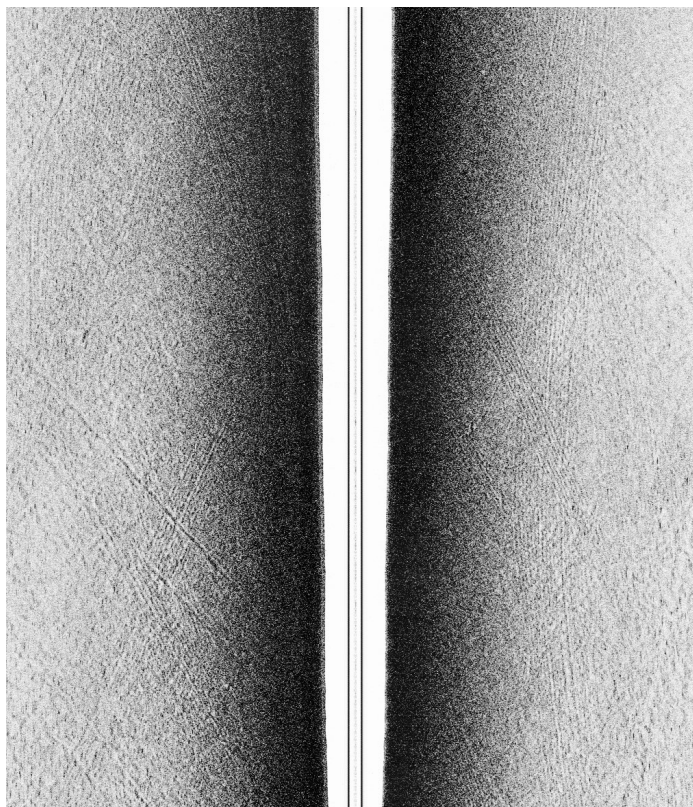
3.1.2. Sedimentary Environment

The sedimentary environment has been described in the Regional Environmental Assessment document (Posford Haskoning, 2003), which indicates three principal sediment types (**Figure 2**). These are:

- **Sandy gravel**
- **Gravelly sand**
- **Muddy sandy gravel**

In general the North and East of the regional area is comprised of more gravelly sand and the Western area more muddy sand gravel. The central and southern areas are primarily sandy gravel. Only area 477 is exclusively of one sediment type (sandy gravel), all other areas comprising a mixture of the different sediments types. These regions agree with those determined by Gardline (2003) in a survey of herring spawning potential, with additional data provided on the occurrence of a seabed which was both coarse and exhibited bedforms, in a relatively discrete area to the south west of the region.

In addition to the above sediment composition, JNCC/EN have provided data pertaining to shallow water sand bank areas and hard ground or “reef” areas (**Figure 5**). These have been augmented with data provided by the dredging industry with respect to potential hard ground areas where rock outcrop or sub-crop occurs. These have all been considered in the development of the survey arrays.



Sidescan sonar image acquired during the regional ecological monitoring survey, 2005. Trawl and scallop dredge marks are clearly evident on the seabed.

3.2. Constraints

Various constraints will be placed on the regional environmental monitoring with respect to timing, area and type of survey. These relate to biological processes as well as timing of licence conditions and potential conservation designations.

3.2.1. Nature Conservation Interests

JNCC and EN have recently formulated advice with respect to existing and possible future nature conservation interests in the area of the Eastern English Channel. Within this advice the features of interest have been defined as follows:

Box 19 Features of Conservation Interest Noted in Statutory Advice

- Reef (stony, bedrock and biogenic reef) as listed at Annex I of the Habitats Directive.
- Sandbanks slightly covered by seawater at all times- Annex I of the Habitats Directive.
- *Sabellaria spinulosa* reefs – HAP from the UK Biodiversity Action Plan (and as reef above).
- Sublittoral sands and gravels - HAP from the UK Biodiversity Action Plan.
- Threatened and/or declining habitats and species from the OSPAR Convention Annex V that are likely to be affected by aggregate extraction.

Notwithstanding the above features, other habitats or species may be included or considered to require a protected status, for example brittlestar beds. All of these features will require consideration in both the survey planning, to avoid adverse effects, and monitoring with respect to the effects of dredging. The conservation strategy is set out in the Biodiversity Action Plan in **Section 2**. The habitat features indicated above have not been identified with certainty over the whole of the area of the EEC, although a range of recent data sources exist, which have been pooled to provide greater definition. JNCC and EN have provided data based on their current level of knowledge for certain of these features.

Figure 5 indicates areas currently considered to be locations of both the “Reef” and “Sandbanks slightly covered by seawater at all times” habitats under Annex 1 of the Habitats Directive. There is some degree of agreement between the hard ground or reef areas and the surface sediment data, with areas to the south west comprising large tracts of potential reef area, which have also have been identified as the hard ground and *Ophiothrix* beds by Gardline (2003).

As part of the monitoring process, which will be targeted towards identifying and measuring seabed features, feedback on the conservation value and classification of habitats and biotopes of importance will be required through discussion with both JNCC and EN.

3.2.2. Timing of Surveys

The timing of surveys is variable depending on the species groups that are to be considered, as well as taking account of practical constraints. Benthic grab surveys are generally considered to be most appropriately sampled to avoid recruitment effects from February to May (Thomas 2001, DTLR/CEFAS, 2002), whereas clearly the optimum weather conditions occur from May to August. Trawl surveys should be undertaken later in the year (third quarter) to take advantage of the maturation of individuals in the target populations.

Another consideration is in relation to visibility in the water, which directly affects the value of seabed habitat data collected using video. Low visibility is created by both weather related conditions and through seasonal plankton production. The periods of lowest visibility are generally through the autumn and winter period, due to weather, and in spring/early summer due to plankton blooms.

The essential feature of timing however, is that repeat sampling should occur at the same time each year. As part of the full programme of study a window, in each year, has been defined within which the ecological/biological studies should be conducted, see **Table 6**.

3.2.3. Timing of Licence Consenting

Although strictly not a constraint it is an issue that will affect the extent of the monitoring programme and should be borne in mind when developing the year to year monitoring extents. It is acknowledged that staggered issuing of consents may result in difficulties when planning regional monitoring surveys.

Currently the timing of the granting of permissions is not clear, but it is anticipated that several substantial areas will be granted together with others in subsequent years. Therefore, all of the areas that will be licensed in the first five years have been included in the baseline assessment.

Specific consideration of the implications of licence consenting can be found in each of the sections describing the component studies of the regional monitoring programme.

3.3. Sampling Techniques and Survey Arrays

Based on the above range of conditions and constraints the following survey strategy is proposed.

The survey techniques summarised below will be described in detail in **Sections 4 and 5** and the available and relevant Specifications and Operating Procedures (v0.3 071005) provided in **Annex 3**.

The following principal survey techniques and equipment are to be employed during the regional monitoring programme:

Box 20 *Ecological Monitoring Techniques*

- For the sampling of infauna and small sessile epifauna – 0.1m² Hamon Grab sampling.
- For sampling small species of sessile and vagile epifauna and small fish species – 2m epibenthic beam trawl.
- For sampling larger vagile and sessile epifauna and adult and juvenile fish species – commercial 4m beam trawl with CEFAS suggested adaptation.
- For scallop post year class 2 – 2m epibenthic beam trawl, commercial 4m beam trawl and a Newhaven design scallop dredge.
- For larger and characteristic sessile invertebrates on hard ground – drop down video system.
- For biotope and habitat definition – drop down video and sidescan sonar.

Box 21 *Physical Process Monitoring Techniques*

- For the characterisation of seabed sediments and features – Sidescan sonar, swathe bathymetry, video, camera and seabed sampling survey.
- For the characterisation of sediment plumes – Screened and overflowed sediment source data and ADCP/ADP field monitoring.
- For the determination of seabed sediment transport processes– Tracer study.