

1. Humber Estuary Port Development

1.1. Overview

Area of sea in relation to coastline, 12nm and continental shelf, estuaries etc

Lying on the east coast of England, the Humber estuary is joined inland by the Rivers Trent and Ouse and feeds into the North Sea approximately 5 miles east of Grimsby. It is the largest coastal plain estuary in the east coast of the UK. The estuary has been described as a highly dynamic macro tidal estuary with high levels of suspended sediment which are rapidly transported leading to high levels of accretion and erosion of the intertidal and subtidal habitats.

Industry this case study focuses on

The port sector is the principal marine industry on the Humber Estuary and it is home to the largest port complex in England.

1.1.1. Generic Current Status of Industry Sector

Overview of sector development and status

The UK port industry is the largest in Europe, handling over 500 million tonnes of freight in 2010 (Department for Transport, 2011). There are other 100 ports in the UK, with ABP owning and operating a total of 21 ports.

In order to construct a new port or develop an existing one, a harbour empowerment order (HEO) or harbour revision order (HRO) must be sought under The Harbours Act, 1964. As of 2010, the MMO took over the handling of applications for harbour revision and empowerment orders from the Department of Transport (MMO, 2011).

The applicant must provide the MMO with notice of their intent to submit an application, and the MMO will then advise if an environmental impact assessment will be necessary. This will be determined according to Annex 1 and 2 of the EIA Directive (85/337/EEC).

There is considerable consented and planned port-related development on the Humber estuary, as outlined below:

- Able Marine Energy Park: The Infrastructure Planning Commission (IPC) is currently reviewing the EIA associated with this development.
- Quay 2005: The original Quay 2005 proposals have not been implemented, but in December 2011, amended proposals were submitted to Hull City Council and the Marine Management Organisation (MMO) for permission to construct a development to be known as Green Port Hull (GPH).

Potential for joined up marine monitoring and data collection between SNCBs and industry

- Grimsby Roll on-Roll off (RO-RO) Berth: Owner ABP plans to construct a Ro-RO berth outside the existing entrance to the Grimsby Docks to accommodate larger vessels, construction is expected to be completed in late 2013.
- Humber Sea Terminal phase IV: This is an ABP development and there is currently no known timescale for development.
- Deepening Access to the Immingham Oil terminal: This ABP development is on hold.
- Maintenance of Access to Spurn Head: ABP and Humber Estuary Services (HES) have the responsibility to maintain this roadway, with maintenance on going as necessary.

History and forecast (where known) of requirements to conform to legislation in environmental monitoring

The type and intensity of monitoring on estuaries in relation to port developments, is driven by relevant legislation and guidelines. These include:

- The EIA (England and Wales) regulations (2011)
- Marine Works EIA (Amendments) Regulations 2011
- The Harbour Work (Environmental Impact Assessment) (Amendment) (England and Wales) Regulations 2009
- The Conservation of Habitats and Species Regulations (2010)
- The Water Framework Directive (2000)
- Marine licensing system under the Marine and Coastal Access Act 2009 (MCAA).

In terms of statutory bodies, Natural England (NE) has a duty to monitor and report on the condition of the Natura 2000 sites on a 6 year rolling cycle. The Environment Agency (EA) is also tasked with monitoring the quality of the marine and estuarine environment of the Humber Estuary under the Water Framework Directive (2000).

As legislation has evolved and conservation sites have been designated, the amount of marine monitoring on the Humber Estuary has increased. If the ports continue to expand and develop into the future, it is likely that additional monitoring will be required (depending upon the requirements for impact verification) to assess the success of mitigation and compensation targets.

Development of monitoring requirements through different stages of sector development, e.g. licensing rounds

The industry is required to conduct monitoring pre, during and post development:

Potential for joined up marine monitoring and data collection between SNCBs and industry

- **Baseline**-Monitoring is done before any development takes place in order to collect information on the baseline conditions of an area to help inform any EIA which may be required. This process will also highlight what features need to be monitored throughout the development phase and during operation of that development.
- **Construction and post construction**-Monitoring of the marine environment is required in accordance with consent and license requirements to assess the impact of the development on the environment.

Emphasis on particular biological (and biophysical) parameters and reason for this

The Humber is part of the Natura 2000 network of European marine sites and therefore has an important role to play on the UK's Marine Protected Area (MPA) network. As such it is designated as a Special Protection Area (SPA), Special Area of Conservation (SAC) and a Ramsar site. The key features that are monitored include:

- **waterbirds** the Humber is one the 10 most important estuaries in Europe for waterbirds. It supports internationally important populations of waterfowl that are listed in Annex I of the Bird Directive
- **benthic habitats** - benthic habitats support important prey items for fish and birds and several benthic habitats in the Humber are also Annex I interest features
- **saltmarsh** - the habitat is listed as an Annex 1 feature and is important for breeding, feeding and roosting waterbirds. On the Humber Estuary the feature is also under threat from Coastal Squeeze
- **fish species** - the area is an important nursery and spawning area for a range of fish species as well as supporting river and sea lamprey interest features.

In addition to the interest features listed above, ABP monitors the bathymetry of the area to ensure safe navigation through the estuary. This information is also used to better understand the distribution and condition of subtidal habitat features and help inform impact assessment work related to these features.

Approach to data standardisation (especially qualitative assessments) within sector

Historically data collection and analysis has not been standardised across sectors, however, with new legislation this is improving. Developers have their own standards that sub contractors have to work to, along with many companies having their own standard operating procedures.

1.1.2. Overview of Case Study Industry Activities

Characteristics of main industry in case study including status of development and development round

Potential for joined up marine monitoring and data collection between SNCBs and industry

The main industry present on the Humber Estuary is the port sector. The Humber is the UK's busiest trading estuary and the 4th largest in Europe, handling 16% of the country's seaborne trade and employing 47,000 people both directly and indirectly.

The port sector is changing in that larger ships are needed as fuel prices rise and companies need to reduce their carbon emissions. Therefore there is need for bigger and deeper docks and berths. In addition to deepening and widening of the berths, the docks are being developed in relation to a change in industry and cargo at the ports. The offshore wind turbine industry is growing and as such there is a need to develop/store and transport these turbines across the country and abroad. A number of docks on the Humber are seeking/have sought planning permission to develop manufacturing and supply bases to support OWF development

Characteristics of other industries in area

Other industries include: shipping, which is very closely related to the port sector, there are also a number of power stations located on the banks of the Humber; flood defence is also a key activity; a diverse range of Industry from pharmaceuticals to carbon fibres and logistics.

Specific local / national drivers for monitoring

National drivers for monitoring:

- The Conservation of Habitats and Species Regulations 2010 and previous Conservation (Natural Habitats, &c.) Regulations 1994.
- The EIA (England and Wales) regulations (2011)- These regulations apply to all planning applications for "EIA development" as defined by the Act.
- Marine Works (Environmental Impact Assessment) Regulations 2011; Incorporates the European EIA directive stating that an assessment of a project's likely significant environmental effects must be done to help to ensure that the predicted effects, and the scope for reducing them, are understood by the public and the relevant authority before it makes its decision.
- The Harbour Works (Environmental Impact Assessment) (Amendment) (England and Wales) Regulations 2009; - Implement the EIA Directive stating that any Harbour works likely to have an impact upon the environment must have a EIA done.
- The Water Framework Directive (2000); states that all water bodies must reach at least good status by 2015 which should be achieved through the establishment of environmental objectives and ecological targets for those water bodies
- Marine licensing system under the Marine and Coastal Access Act 2009 (MCAA). The MCAA creates the legal mechanism to ensure clean, safe, healthy, productive and biological diverse ocean and seas by improving management and protection of the marine areas.

Local drivers for monitoring:

- The Humber Local Nature Partnership (LNP), running from January to June 2012, is a government initiative to bring together a range of stakeholders with the overall aim to contribute to the sustainable development of the local area, and engage existing and new stakeholders to the Humber Management Scheme (HMS).
- Humber Industry Nature Conservation Association (HINCA) was formed to address the challenge and opportunities of natural conservation within an industrial environment. This organisation serves as a forum for industry, regulators, planner and conservation organisations to develop business and nature in a sustainable manner that will benefit the region's economy and environment.
- The ABP HES, the Competent Harbour Authority for the Humber Estuary, has the responsibility of maintaining safe navigation (under Humber Conservancy Acts). Harbour Authorities have a general duty to exercise their functions with regard to nature conservation and other related environmental considerations. They also have an obligation, where a Special Protection Area for Birds or a Special Area of Conservation has been designated, to have regard to the requirements of the Habitats Directive so far as they may be affected by the exercise of those functions.

1.1.3. Overview of Case Study MPA Designations

The Humber Estuary is a designated SAC and SPA, and is therefore part of the Natura 2000 network, and is also designated as a Ramsar site. Together, these designations form the Humber Estuary European Marine Site (EMS).

In addition to these sites, there may be future protection designations under the Marine Conservation Zone (MCZ) projects. The Humber Estuary itself has not been identified as a recommended MCZ (rMCZ), but there are two proposed rMCZs on the East Riding Yorkshire coast (NG8, Holderness Inshore), and Lincolnshire coast (NG5 – Lincs Belt). The NG 8 features recommended for designation are intertidal mixed sediments, subtidal coarse sediments, subtidal sand, peat and clay exposures, subtidal chalk, subtidal sands and gravels and Ross worm (*Sabellaria spinulosa*) reefs. The NG5 features recommended for designation are subtidal coarse sediment, subtidal sand, subtidal mixed sediments, peat and clay exposures and subtidal sands and gravels.

1.2. Industry Monitoring Programme

1.2.1. Survey Characteristics

Development of monitoring through different stages of sector development

Prior to consent for development/construction a baseline survey is often required. The scope of the baseline survey will be dependent on the outcome of an EIA scoping report, consultation and subsequent agreement of an approach with the respective regulators and competent authority (CA) statutory bodies. This data will help inform the impact predictions which will in turn determine what needs to be monitored during the construction phases of a development.

Potential for joined up marine monitoring and data collection between SNCBs and industry

Hydrographical and bathymetric surveys are also undertaken by ABP continuously to monitor the seabed topography within the Port Limits, and to bring any changes to the attention of all mariners using the port.

Biological (and biophysical) features monitored

Biological monitoring by industry on the Humber Estuary is generally either required as part of a baseline survey to inform an EIA or as part of impact verification. There may also be additional monitoring requirements for any associated mitigation or compensation to avoid adverse effects on the Humber EMS.

A comprehensive monitoring scheme has been put into place as part of the Environmental Management and Monitoring Plan (EMMP) for two port projects, Immingham Outer Harbour (IOH) and Quay 2005. In addition, there are the habitat enhancement project at Doig's Creek and the associated habitat creation schemes at Welwick and Chowder Ness.

The biological features monitored as part of this scheme include:

- intertidal invertebrates
- waterbirds
- saltmarsh
- grassland
- saline lagoons.

Temporal characteristics, including period of survey (e.g. seasonal control), interannual requirements, also frequency of measurements for data logging (e.g. every minute, hour or day)

The EMMP has been in place since 2004, the scheme has been monitoring Immingham Outer Harbour, Hull Riverside Container Terminal, Welwick, Chowder Ness and Doigs Creek for the features listed above. The frequency of this ongoing monitoring has remained consistent as stated in the EMMP. As part of this work, baseline surveys were carried out prior to construction of developments which included;

- **Welwick:** Saltmarsh composition and intertidal invertebrates which were monitored the summer before construction began. Overwintering waterfowl in the existing intertidal area and adjacent fields were also monitored during the winter season prior to construction.
- **Chowder Ness:** Intertidal Invertebrates were monitored the summer before construction began. Waterfowl usage of intertidal and adjacent fields was monitored during the overwinter season before construction.

- **Quay 2005:** Bathymetric surveys will be done a week before construction. Intertidal invertebrates will be monitored a month prior to the start of construction and bird usage of the area will be surveyed during the winter before construction.

The ongoing monitoring efforts include:

- Intertidal Invertebrates at IOH were sampled between 1996 and 2009. At Doig's creek, annual benthic surveys were carried out since the closure of the sluice in 2004 for a period of five years post closure (up to 2009). At the Welwick and Chowder Ness sites, invertebrates have been monitored annually since the first summer following inundation (2006). The surveys are undertaken each September. As a condition of consent, it was agreed that monitoring of the mudflats outside of the realignment sites would be undertaken for five years post construction (up to 2011) with monitoring within the sites undertaken for 10 years (up to 2016). If the construction of the Quay 2005 development begins, invertebrates will be monitored 1 month before construction and will continue annually for 5 years post construction.
- Waterbirds: At IOH, bird surveys have been undertaken bi-monthly between October and March since 1998 and are due to end in 2016-18. Bird surveys as part of Quay 2005 have been undertaken bi-monthly between August and May since 2005. Welwick Managed Realignment, Chowder Ness and Doigs Creek, water birds have been surveyed monthly since 2006 (Sept-Mar) and surveys are planned to continue until 2016 (10 years post construction/inundation). Outside of the realigned site, waterfowl were monitored for 5 years post inundation thus this monitoring stopped in 2011. When the proposed construction of the Quay 2005 development begins, waterbirds will be monitored throughout the year on a monthly basis for 5 years post construction.
- Saltmarsh Composition: This has been monitored at Welwick and Chowder Ness Managed Realignment annually since the first summer following inundation, and will continue for 10 years. Change to saltmarsh and saltmarsh composition was monitored at the pre-existing saltmarsh at Welwick in September each year for 5 years post inundation.
- Grasslands: This feature was monitored annually from the first summer following inundation for 5 years at Welwick and Chowder Ness Managed Realignment areas, with surveys ending in 2011. In addition to these features, topographic surveys have been carried out at Welwick and Chowder Ness annually since a week before inundation and will continue for 10 years. At the Immingham Outer Harbour site, bathymetric surveys were done a week before placement and continued monthly for 12 months after. Subtidal invertebrates were also monitored at the site a week before placement and continued annually for 3 years. Additionally, the suspended sediment concentration in the vicinity of the dredging works was monitored a month prior to the works beginning and continued for 12 months. If the construction of the proposed Quay 2005 development begins, water contaminants and bathymetric surveys will start. Water contaminants will start one month before dredging, and occur quarterly for 15- 18 months. The

Potential for joined up marine monitoring and data collection between SNCBs and industry

Bathymetric surveys will commence the week prior to construction, and continue monthly in the year following build completion and quarterly thereafter.

Spatial scale, including distribution or coverage / extent of survey effort and density of focused survey points / lines; also important to account for area of impact as dictated by tidal excursion

Table 1, showing the industry lead monitoring schemes already in place in the Humber estuary

Data Type	Source	Stage	Date	Comments
Bathymetry	ABP	Post Inundation	Ten years post inundation	Forms part of the EMMP.
Ornithological surveys	ABP	Post construction	For 10- 5 years post construction dependent upon development	Part of the EMMP. Monitored monthly for the first year following completion, quarterly thereafter.
Intertidal Invertebrates	ABP	Pre and post construction	5 to 10 years post construction	Part of the EMMP. Monitoring will occur 1 month before construction and continue annually for 5 to 10 years.
Saltmarsh composition (Welwick and Chowder Ness)	ABP	Post Inundation	10 years	Part of the EMMP.
Monitoring of Grasslands (Welwick)	ABP	Post Inundation	5 years	Part of the EMMP. Monitored annually.
Subtidal Invertebrates	EA	Pre and Post construction	20 YEARS	EA have been collected subtidal invertebrate data throughout the whole estuary for 20 years.
Saline Pools (Welwick)	ABP	Post Inundation	10 years	Part of the EMMP. This feature has been monitored annually since the first summer following inundation.

1.2.2. Monitoring methods

Monitoring protocols and survey methods

In terms of EMMP monitoring, the protocols followed include:

- the use of standardised techniques as identified in the JNCC Marine Monitoring Handbook (Davies *et al.*, 2001) e.g. intertidal core sampling
- ornithological surveys undertaken as part the EMMP are undertaken monthly. The survey period is throughout the tide

Potential for joined up marine monitoring and data collection between SNCBs and industry

- saltmarsh habitats surveys follow the 'Common Standards Monitoring Guidance for Saltmarsh Habitats' (JNCC, 2004). Vegetation structure is mapped along transects by assigning it to a National Vegetation Classification (NVC) as described by Rodwell (1992, 1995 & 2000).

1.2.3. Post Survey Data Processing

Type of processing and data products derived, including level of detail provided. Provide detail for different parameters as relevant.

In terms of EMMP monitoring, post survey data processing includes:

- Benthic Intertidal Invertebrates: Laboratory analysis of benthic invertebrate data collected as part of the EMMP follows standard industry procedures. The laboratory is also a member of the National Marine Biological and Analytical Quality Control scheme (NMBAQC). Particle Size Analysis (PSA) of sediment samples uses a Malvern Mastersizer 2000 using ABPmer Standard Operating Procedures.
- Ornithological Surveys: Excel outputs, results are tabulated. Analysis of data compares abundance to previous years and the targets set in the EMMP (2004). Target species are considered in more detail with analysis of peaks, averages and peak means across a 5 year period, which will be extended to 10 years once the data is available.
- Topography: The EA carry out LiDAR surveys every other year and is compared to GPS data.
- Saltmarsh Habitats: Transect maps are described and compared to historic data and GPS data.
- Grassland Habitats: Species composition is tabulated in the ABP monitoring report.

Quality assurance carried out whether internal / external and if required by regulations or completed anyhow (and confidence of data). Provide detail for different parameters as relevant.

Laboratory quality control procedures follow Rees *et al.* (1990 and 1999), Elliott (1994), Cooper & Rees (2002) & Proudfoot *et al.* (2003). All procedures are based on best laboratory practice, including an independent check-sorting of all samples, regular cross-checking of identified organisms and the external verification of taxonomic identification. In addition, a specimen reference collection is maintained and up-to-date taxonomic literature is stored in the labs. All staff involved in the identification are experienced marine biologists with a wide range of experience in samples taken from around the UK coasts. The laboratory is also a member of the National Marine Biological Analytical Quality Control scheme (NMBAQC). Key members of staff have participated in workshops for faunal identification at Millport (1996), Brancaster (1999), Portaferry (2001), Cullercoats (2003) and Cullercoats (2008).

1.2.4. Dissemination of Data Products

Ultimate owner of data and any restrictions in place

Potential for joined up marine monitoring and data collection between SNCBs and industry

ABP data is published through the EMMP and permission is required to make use of the data outside of these projects. The baseline data is included in the EIA. If data is collected by a government agency such as NE or EA then that data must be made available for public use, however, when requesting data there may be a handling fee.

Any external delivery of data, e.g. into national database or to partnership working

ABP bathymetric data is published locally in the form of charts and plans. These are used by the VTS officers and Pilots to assist in bringing vessels safely into the Port. In addition, all the survey information is sent to the United Kingdom Hydrographic Office, where it is used in the compilation of British Admiralty Charts. Thus the surveys produced by the Humber Estuary Services (HES) are available to anyone who possesses an up to date Admiralty Chart covering the Humber. In addition, some information of a particularly urgent or temporary nature, may be disseminated by means of local and / or Admiralty notices to mariners

There is currently exiting collaborations of monitoring on the Humber. These include the HMS which is made up of two parts; the Humber Advisory Group (HAG) and; the Humber Estuary Relevant Authorities Group (HERAG) which is made up of over 30 organisations with statutory duties for the Humber Estuary EMS, including ABP, NE and the EA.

The Humber Industry Nature Conservation Association (INCA) has the aim to help business develop simultaneously with promoting nature conservation, acting as an advisory body providing guidance on ecological legislation.

The Humber Managed Realignment Review Groups has industry and Statutory Nature Conservation Authorities (SNCAs) members which aims to promote and help communication between organisations undertaking realignment and disseminate progress on the realignment projects to the wider estuary community.

Data is regularly shared between organisations in these groups along with association academic and research organisations such as ICES and ABPmer.

Sensitivity of data, obstructing data sharing

The data in the ABP annual monitoring reports is not available to the public. If data is collected by a government agency such as NE or EA then technically that data is for the public use. However, when requesting data there may be a handling fee.

1.2.5. Internal Survey Management

Internal system adopted / used, protocols

The EMMP is managed in accordance with ABPmer's quality management system (QMS), which is accredited to ISO 9001:2008, for the delivery of Environmental Consultancy and Research Services. The QMS comprises a manual of procedures to ensure standards for company systems and capabilities, products and customer care.

Potential for joined up marine monitoring and data collection between SNCBs and industry

Health and safety and risk management policies / approach

ABPmer have a comprehensive health and safety policy which is followed as part of the EMMP. There are Safe Systems of Work (SSOW) guidelines which must be adhered to and risk assessments are carried out. For example, part of this policy states that it is a requirement that staff do not work alone in intertidal areas and carry appropriate safety equipment - life jackets, mobile, water proof clothing/wet weather gear, appropriate footwear, sun protection and appropriate PPE for the specific survey.

Disclosure of survey plans and timing / reason

Survey plan and methodology were agreed at the outset of the EMMP with regulators and the environmental steering committee.

Timescales working to with planning, contracts, survey, data processing etc

The annual monitoring programme is reported at the end of each year containing data from that year, usually back to the September of the previous year. For the IOH survey, data from bird surveyors is provided after each of the monthly surveys. For the remaining developments, Welwick, Chowder Ness, Doigs Creek and Quay 2005, the bird monitoring data is sent at the end of the season. Data from other sub-contractors such as ecologists undertaking the vegetation surveys or laboratory data sent over before the requirement for it to be incorporated into the report (usually 3-6 months before).

Funds available for programme, source and flow of money

ABP is legally obliged to undertake the monitoring work and as such provide all funding for the EMMP.

1.2.6. "Upwards" Contractual Obligations

Contractual limitations in liability of equipment

Work for ABP is under ABPmer terms which state that total liability shall not exceed 110% of the charges paid to the Company by the Client under the relevant contract.

Contractual limitations in liability of infrastructure

As above

1.2.7. "Downwards" Contractual Set Up

Number of tiers sub-contracted survey operation, organisations involved and management / level of interaction or involvement by client

A number of sub contactors are used to supply monitoring data as part of the EMMP including a marine laboratory (for invertebrate identification and enumeration), bird surveyors and saltmarsh/grassland vegetation surveyors. As part of ABPmer's quality management system, ABPmer operate an approved contractors list. Subcontractors can only be used once they have been approved. Contractors are assessed for their competence as part of the quality and health and safety procedures. The project manager maintains close contact with sub-contactors through email and telephone.

Potential for joined up marine monitoring and data collection between SNCBs and industry

Whether contracts are back to back (same as client's) or if terms change between organisations and related impacts / issues

ABPmer issues its standard Terms and Conditions.

Impact of sub-contractors on timescales / flow of money

Sub contractors can invoice on completion of survey/ receipt of data.

1.3. MPA Monitoring Characteristics

1.3.1. Survey Characteristics

Biological (and biophysical) features monitored

The Humber Management Scheme (HMS) has two types of monitoring, condition and compliance, to ensure the success of the management scheme. Condition monitoring is undertaken by SNCAs. Compliance monitoring is undertaken by the relevant authority which is responsible for enforcing the measures that fall within its functions to ensure the management measures are implemented and maintain the Estuary in a favorable condition. Features monitored include sublittoral and littoral benthic habitats (biotope mapping), saltmarsh and fish populations. Water quality and benthic and sediment contaminants are also assessed. Bird surveys are mainly completed by volunteers working for the Wetland Bird Survey (WeBS) and it is used to assess whether the Humber Estuary SSSI is continuing to make Favorable Conservation Status of bird species across Europe.

There is an annual report that assesses the effectiveness of the management scheme and is used to inform next year's management.

Temporal characteristics, including period of survey (e.g. seasonal control), inter-annual requirements, also frequency of measurements for data logging (e.g. every minute, hour or day)

- The EA have been doing benthic surveys for over 20 years and hold the data. As well as benthic data they also undertake LiDAR surveys at intervals which vary in frequency.
- The EA Shellfish Contaminants Programme started in 1990 and annually samples water quality parameters and concentrations of contaminants including PCBs, PAHs, chlorophyll concentrations, alkalinity, pH and many more parameters.
- EA WFD saltmarsh Monitoring began in 2007 and monitoring is done annually.
- EA Fucoid Extent Macroalgae Monitoring as part of the WFD began on the Humber in 2007 and monitoring is done every four years. The monitored parameters are macroalgae and seagrass taxonomy-related counts
- SAC monitoring by Natural England began in 2001 and occurs every six years. The parameters measured are habitat characterisation, habitat extent and zoobenthos taxonomy-related counts.

Potential for joined up marine monitoring and data collection between SNCBs and industry

- EA Opportunistic Macroalgae Monitoring, forms part of the WFD, monitoring has occurred since 2007 and occurs every 1 or 2 years. Macroalgae and seagrass taxonomy-related counts are assessed with the rationale of monitoring for alien species, nutrient enrichment and shoreline reinforcement.
- The EA WFD Transitional Fish Population Monitoring began in 2006 and occurs every 1 or 2 years and monitors fish abundance in water bodies and fish taxonomy-related counts.
- EA WFD TraC Benthic Invertebrate Monitoring Programme began in 2006 with sampling occurring every 3 years. The parameters measured are sediment grain size parameters and zoobenthos taxonomic abundance.
- EA Transitional and Coastal WFD Water Column Monitoring started in 2007 with the aim of monitoring a range of water quality parameters.
- EA Shellfish Waters Monitoring Programme (England and Wales) started in 1999 with a sampling frequency of 30 to 91 days. Parameters measured are alkalinity, acidity, pH and contaminants of the water column.
- Wetland Bird Survey (WeBS) Core Count surveys are undertaken annually and Low Tide counts are undertaken approximately every 5 years.
- Monitoring of benthos, saltmarsh and waterbirds has been undertaken at Paull Holme Strays and Alkborough managed realignment schemes since 2003 and 2007 (created as part of flood risk management schemes by the EA).

Spatial scale, including distribution or coverage / extent of survey effort and density of focused survey points / lines; also account for area of impact as dictated by tidal excursion

Table 2, showing previous and current examples of SNCA monitoring in the Humber Estuary

Data Type	Source	Stage	Date	Comments
E.g. Benthic stations	E.g. BP	E.g. EIA baseline, pre-operational		
Shellfish Contaminants Programme	EA	On going	Started 1990 and occurs annually	Sampling of sustainable mussel populations at CSEMP defined locations. Analysis is for defined metals & organics. Mostly estuarine locations. Programme recently reviewed and Fucus component dropped in 2011.
WFD Saltmarsh Monitoring	EA	On going	Started in 2007 and sampling occurs annually	Surveillance programme defined as part of the Angiosperms Quality Element of the WFD. Limited to Surveillance water bodies with identified areas of saltmarsh. Not an annual programme. Defined as a rolling programme.

Potential for joined up marine monitoring and data collection between SNCBs and industry

Furoid Extent Macroalgae Monitoring	EA	On going, every 4 years	Started in 2007	Monitoring for assessing the upstream extent of Macroalgae Furoids in WFD Surveillance Transitional water bodies. Principal data requirement is for prevailing salinity conditions at the principal identified furoid limits.
Humber Estuary SAC Monitoring	Natural England	On going	2001	Monitors all interest features of the SAC.
Opportunistic Macroalgae Monitoring	EA	On going	2007	Monitoring macroalgae and seagrass taxonomy-related counts.
WFD Transitional Fish Population Monitoring	EA	On going	2006	Fish abundance in water bodies, Fish taxonomy-related counts.
WFD TraC Benthic Invertebrate Monitoring Programme	EA	On going	2006	Surveillance programme defined for the benthic Invertebrate Quality Element of the WFD. Includes sub-tidal & inter-tidal locations. Not an annual programme. Defined as a rolling programme over 3 years. Data is Species ID, Abundance and sediment particle size analysis.
Transitional and Coastal WFD Water Column Monitoring	EA	On going	2007	Surface Water Column monthly sampling for the WFD Surveillance programme. The Quality Elements include Phytoplankton, Nutrients (winter only) and dissolved oxygen. Supporting determinands include chlorophyll, turbidity, salinity & temperature.
Shellfish Waters Monitoring Programme (England and Wales)	EA	On going	1999	The EA monitor the levels of these substances in shellfish waters to make sure they meet the standards set by the Directive.
Wetland Bird Survey (WeBS)- Core and Low Tide Counts	WeBS	On going	1953	The Wetland Bird Survey (WeBS) is the scheme which monitors non-breeding waterbirds in the UK. The principal aims of WeBS are to identify population sizes, determine trends in numbers and distribution and to identify important sites for waterbirds.

(Source: UKDMOS website www.ukdmos.org/v_ukdmos_edios/result.asp)

1.4. Conclusions from desk study

There is already comprehensive monitoring in place for both MPA and industry schemes. Strong co-operation between regulatory and statutory bodies, industry and NGO's is already in place and the strength of the relationship on the Humber Estuary represents an example of good practice.