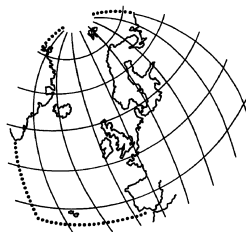


**Assessment and Monitoring Series**

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**Marine Biodiversity Monitoring and  
Assessment: Activities to improve  
synergies between EU directives and  
international conventions**

**Activities in all OSPAR Contracting Parties**



**OSPAR Commission**

**2008**

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. It has been ratified by Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom and approved by the European Community and Spain.

*La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. La Convention a été ratifiée par l'Allemagne, la Belgique, le Danemark, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède et la Suisse et approuvée par la Communauté européenne et l'Espagne.*

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## Preface

Monitoring and assessment of marine ecosystems are required to determine whether goals and objectives identified in different European directives and international conventions are being met. The most notable directives with relevance for marine ecosystems are the Water Framework Directive (WFD), the Birds- and Habitats Directives (BHD) and the Marine Strategy Framework Directive (MSFD). Examples of international agreements include the OSPAR Convention, the Trilateral Wadden Sea Cooperation (TWSC) and the Helsinki Convention (HELCOM). At the global level the Convention on Biological Diversity (CBD) and the UN World Summit on Sustainable Development (WSSD) are relevant.

Harmonisation of monitoring and assessment activities and improvement of synergies between different directives and conventions provide opportunities to meet these monitoring requirements in a cost-effective and efficient way. Harmonisation can be used to avoid repetition and improve comparability both at a national and international level.

Many countries have recognised the need for harmonisation and have initiated (or are involved in) national and international activities. In order to stimulate exchange of experiences and lessons learnt, the OSPAR Intersessional Correspondence Group – Synergies In Assessment and Monitoring (ICG-SIAM) together with the Dutch Working Group on Ecological Monitoring of Marine Waters (WEMOZ in Dutch) commissioned Bureau Waardenburg in July 2007 to carry out an inventory of activities in Belgium, Denmark, Germany, Ireland, The Netherlands and the United Kingdom. This inventory was carried out between August and October 2007 and the results were presented at a meeting of the OSPAR Working Group on Marine Protected Areas, Species and Habitats (MASH 2007) in November 2007 (document MASH 07/7/4).

MASH welcomed the document and agreed that the document should be further developed to cover activities in all OSPAR Contracting Parties. To enable this ICG-SIAM and WEMOZ commissioned Bureau Waardenburg in December 2007 to carry out an inventory of activities in the remaining OSPAR Contracting Parties: France, Iceland, Norway, Portugal, Spain and Sweden, and to expand the section on initiatives of the European Commission. This inventory was carried out between the 10<sup>th</sup> of December 2007 and the 31<sup>st</sup> of January 2008.

This report contains the results of both inventories. Both inventories were commissioned and supervised by L. Enserink (convenor of ICG-SIAM) and S. Kabuta (both Rijkswaterstaat, Centre for Water Management, former RIKZ). The authors thank them for their valuable assistance with data collection and comments on previous versions of this report.

Moreover, the authors thank the contact persons in Belgium (Geert Raeymaekers, Jan Haelters, Gert Verreet), Denmark (Jens Brøgger Jensen), France (Patrick le Mao), Germany (Harold Marencic), Iceland (Karl Gunnarson), Ireland (Francis O'Beirn), Norway (Anne Britt Storeng), Portugal (Teresa Vinhas), Spain (Javier Pantoja, Javier Cachon), Sweden (Cecilia Lindblad), The Netherlands (Lisette Enserink, Saa Kabuta, Lies van Nieuwerburg), the United Kingdom (Jamie Rendell, Amanda Prior and Jane Hawkrige) and the European Commission (Gert Verreet) for their valuable contribution to this project.

## Préface

Il y a lieu de réaliser une surveillance et une évaluation des écosystèmes marins afin de déterminer si les buts et les objectifs identifiés dans les diverses directives européennes et conventions internationales sont satisfaits. Les directives les plus notables, en ce qui concerne les écosystèmes marins, sont la Directive cadre relative à l'eau (WFD), les Directives relatives aux oiseaux et aux habitats (BHD) et la Directive cadre pour une stratégie marine (MSFD). On compte notamment parmi les exemples d'accords internationaux, la Convention OSPAR, la Coopération trilatérale pour la protection de la mer des Wadden (TWSC) et la Convention d'Helsinki (HELCOM). La Convention sur la diversité biologique (CBD) et le Sommet mondial pour le développement durable des Nations Unies (WSSD) sont pertinents au niveau global.

L'harmonisation des activités de surveillance et d'évaluation et l'amélioration des synergies entre les diverses directives et conventions permettent de satisfaire ces exigences de surveillance d'une manière économique et efficace. L'harmonisation permet d'éviter les répétitions et d'améliorer la comparabilité aussi bien sur le plan national qu'international.

De nombreux pays reconnaissent qu'une harmonisation est nécessaire. Ils ont lancé (ou sont impliqués dans le lancement) des activités nationales et internationales. Le Groupe intersessionnel par correspondance OSPAR sur les synergies dans l'évaluation et la surveillance (ICG-SIAM) et le Groupe de

travail néerlandais sur la surveillance écologique des eaux marines (WEMOZ) ont chargé, ensemble, le Bureau Waardenburg en juillet 2007, de réaliser un inventaire des activités qui ont lieu en Belgique, au Danemark, en Allemagne, en Irlande, aux Pays-Bas et au Royaume-Uni. Cet inventaire a été réalisé en août et en octobre 2007 et les résultats ont été présentés à la réunion du Groupe de travail sur les zones marines protégées, espèces et habitats (MASH 2007) en novembre (document MASH 07/7/4).

Le MASH a accueilli favorablement le document et est convenu qu'il devra être élaboré plus avant pour couvrir les activités dans toutes les Parties contractantes OSPAR. A cette fin l'ICG-SIAM et le WEMOZ ont chargé le Bureau Waardenburg, en décembre 2007, de réaliser un inventaire des activités des Parties contractantes OSPAR restantes, à savoir la France, l'Islande, la Norvège, le Portugal, l'Espagne et la Suède, et de développer la section sur les initiatives de la Commission européenne. Cet inventaire a été réalisé entre le 10 décembre 2007 et le 31 janvier 2008.

Le présent rapport comporte les résultats des deux inventaires. L. Enserink (présidente de l'ICG-SIAM) et S. Kabuta (tous deux du Rijkswaterstaat, Centre de gestion pour l'eau, anciennement le RIKZ) ont chargé le Bureau de ces deux inventaires et ont supervisé ces travaux. Les auteurs les remercient de leur aide précieuse quant au recueil des données et de leurs commentaires sur les versions précédentes de ce rapport.

De plus, les auteurs remercient les points de contact suivants pour leur contribution précieuse à ce projet: Belgique (Geert Raeymaekers, Jan Haelters, Gert Verreet), Danemark (Jens Brøgger Jensen), France (Patrick le Mao), Allemagne (Harold Marencic), Islande (Karl Gunnarson), Irlande (Francis O'Beirn), Norvège (Anne Britt Storeng), Portugal (Teresa Vinhas), Espagne (Javier Pantoja, Javier Cachon), Suède (Cecilia Lindblad), Pays-Bas (Lisette Enserink, Saa Kabuta, Lies van Nieuwerburg), Royaume-Uni (Jamie Rendell, Amanda Prior et Jane Hawkrige) et Commission européenne (Gert Verreet).

# 1 Introduction

## 1.1 Background

To determine whether the ecological goals and objectives identified in European directives and international conventions are being met, monitoring and assessments of marine ecosystems are needed. The main European directives with relevance for marine ecosystems are the Water Framework Directive (WFD), the Birds- and Habitats Directives (BHD) and the Marine Strategy Framework Directive (MSFD). Examples of international agreements include the OSPAR Convention, the Trilateral Wadden Sea Cooperation (TWSC) and the Helsinki Convention (HELCOM). At the global level the Convention on Biological Diversity (CBD) and the UN World Summit on Sustainable Development (WSSD) are relevant.

These directives and conventions aim at obtaining healthy marine ecosystems. They use different tools, definitions and geographical borders to reach this aim, but objectives are similar and monitoring guidelines and assessments are comparable. These similarities provide opportunities to develop biological monitoring programmes that are able to address monitoring requirements from the various directives and conventions in a cost-effective and efficient way. To prepare such programmes harmonisation and improvement of synergies in monitoring and assessment between different directives and conventions is needed. Hence, repetition can be avoided and comparability improved both at a national and international level. Harmonisation is not about doing things exactly the same, but about comparability of results.

Several initiatives have already been undertaken. For instance, the OSPAR Commission, through the establishment of an Intersessional Correspondence Group – Synergies In Assessment and Monitoring (ICG-SIAM), is seeking synergies in marine monitoring and assessment between OSPAR and the European Union and has published two inventories on this subject: one on synergies in assessment and monitoring of hazardous substances, eutrophication, radioactive substances and offshore industry (OSPAR Publication 2005/230) and one on synergies in assessment and monitoring of biodiversity (OSPAR Publication 2006/294). ICG-SIAM identified many areas to seek harmonisation in marine biodiversity monitoring and assessment and improve synergies between OSPAR and the European Union. However, they recognised that it was too early to make a full analysis, including an inventory of indicators and parameters monitored, as many monitoring programmes related to different directives are still under development, especially in the field of biodiversity.

Many countries have recognised the need for harmonisation and have initiated (or are involved in) national and international activities. In order to stimulate exchange of experiences and lessons learnt, ICG-SIAM together with the Dutch Working Group on Ecological Monitoring of Marine Waters (WEMOZ in Dutch) commissioned Bureau Waardenburg (Consultants for environment & ecology) in July 2007 to carry out an inventory of activities in Belgium, Denmark, Germany, Ireland, The Netherlands and the United Kingdom. This inventory was carried out between August and October 2007 and results were presented at a meeting of the OSPAR Working Group on Marine Protected Areas, Species and Habitats (MASH 2007) in November 2007 (document MASH 07/7/4).

MASH welcomed the document and agreed that the document should be further developed to cover activities in all OSPAR Contracting Parties. To enable this ICG-SIAM and WEMOZ commissioned Bureau Waardenburg in December 2007 to carry out an inventory of activities in the remaining OSPAR Contracting Parties: France, Iceland, Norway, Portugal, Spain, Sweden and the European Commission. This inventory was carried out between the 10<sup>th</sup> of December 2007 and the 31<sup>st</sup> of January 2008.

The results of both inventories are presented in this report and will be tabled at the next meeting of the OSPAR Biodiversity Committee scheduled between 25 and 29 of February 2008 (BDC 2008).

## 1.2 Purpose

This study aims to:

- a. investigate national and international efforts to harmonise marine monitoring and assessment activities and improve synergies between different directives and international conventions in all OSPAR Contracting Parties;
- b. produce recommendations to organise national and international synergies.

### 1.3 Information collection

Telephone interviews were conducted with a total of 16 contact persons who are involved in the implementation of different European directives and international conventions with relevance for marine ecosystems in Belgium, Denmark, France, Germany, Iceland, Ireland, Norway, Portugal, Spain, Sweden, The Netherlands, the United Kingdom and the European Commission. Contact details are provided in Appendix 1. At the start of the project these persons were contacted by ICG-SIAM to ask for their cooperation.

As an introduction to the project and to prepare the contact persons for the interviews background information and a list of interview questions were sent to them by e-mail (see Appendix 2). In this email a request was made to provide documents and/or links to websites that contain information about initiatives to harmonise monitoring and assessment activities in these countries both at a national and international level. Based on the information provided by the contact persons and additional information collected by Bureau Waardenburg on the Internet a draft summary was prepared of existing initiatives to harmonise monitoring and assessment activities in all OSPAR Contracting Parties. Most of these summaries were reviewed by the contact persons before finalisation.

### 1.4 Guidance to the reader

The results of both inventories are presented in this report. National activities in Belgium, Denmark, France, Germany, Iceland, Ireland, Norway, Portugal, Spain, Sweden, The Netherlands and the United Kingdom are presented in chapter 2 and international activities, including activities of the European Commission (EC) in chapter 3. In chapter 4 a comparison is made between activities in all OSPAR Contracting Parties. Chapter 5 contains recommendations to improve synergies in marine monitoring and assessment between European directives and international conventions. Chapter 6 lists references.

In the appendices a list of contact persons (Appendix 1), background information and interview questions sent to the contact persons (Appendix 2), information used (Appendix 3) and a list with abbreviations (Appendix 4) are presented.

## 2 National activities to improve synergies

### 2.1 Belgium

#### *Description of responsibilities*

The three regions (Flanders, Wallonia and Brussels Capital Region) are each competent for the environmental policy (including water management) within their regions and hence implement European directives and international conventions in their regions. The Belgian Federal government is responsible for the management of the marine area under Belgian jurisdiction and the protection and management of its marine biodiversity. Note that the Flemish region is competent for the implementation of the European Common Fisheries Policy.

An inter-governmental consultative forum (Coordination Committee International Environmental Policy or CCIEP) has been established to prepare the 'Belgian position' at international forums (e.g. EU, OSPAR, UN). The various regional and federal competent authorities are represented in this Commission. Marine environmental issues are prepared by the working group 'North Sea and Oceans' of the CCIEP. See below for further description of the CCIEP.

The 'Marine Unit' of the Federal Public Service Environment is since 2004 the marine policy branch of the Federal government. Its role is diverse and includes amongst others:

- a. follow-up of national and international legislation concerning the marine environment and preparation and coordination of Belgian standpoints;
- b. represents Belgium wherever marine issues are discussed at international forums e.g. European Institutions, OSPAR, UN, Scheldt Commission);
- c. marine pollution abatement and prevention of marine pollution;

- d. participates in advice commissions concerning sand/gravel extraction, nature reserves, integrated coastal management, coast guard infrastructure, marine scientific projects.
- e. follow-up the international marine and maritime policy beyond the BCP (High Seas).

The North Sea department of the Royal Belgian Institute of Natural Sciences (MUMM) delivers scientific background information to the federal administrations, for their preparations of the points of view. MUMM is a department of the Royal Belgian Institute of Natural Sciences (RBINS), a federal scientific establishment that comes under the Federal Science Policy. The MUMM comprises a team of about sixty people. It also represents Belgium in a number of scientific working groups of inter-governmental conventions dealing with the protection of the marine environment, including the preparation of Belgian positions (see CCIEP above) to be upheld and the implementation of decisions taken, under the authority of the Minister responsible for marine environmental policy. During the Belgian EU Presidency (second half of 2001), MUMM piloted a draft recommendation on the implementation of a system of integrated management of the coastal areas in Europe.

### **Description of monitoring activities**

The Management Unit of the North Sea Mathematical Models (MUMM) is in charge of many of the marine monitoring programmes and advises the competent authorities in relation to marine matters.

In terms of monitoring, the MUMM's monitoring and modelling currently deal with physical parameters (water levels, currents, waves, temperature, salinity), chemical substances and biological elements (confined to the first links in the food chain, but also marine mammals).

Monitoring is undertaken to comply with the commitments made pursuant to international conventions (in particular the OSPAR convention) and for the purposes of research, mainly to validate and improve models and more generally to reduce the level of uncertainty about the processes of the marine ecosystem.

The 'Belgica', an oceanographic research ship belonging to the Belgian State, monitors the quality of the North Sea by constantly collecting all sorts of data on the biological, chemical, physical, geological and hydrodynamic processes which take place there. In addition to this, the ship is a floating laboratory for researchers from the universities and scientific institutes of Belgium in their quest for a better understanding of the structure and working of the ecosystem of the North Sea. The 'Belgica' spends about 200 days a year at sea. Another vessel, the Zeeleeuw (managed by the VLIZ), is available for scientists by the Flemish government.

Other institutes and organisations involved in the monitoring of marine biodiversity include the Institute for Agriculture and Fisheries Research of the Flemish Region (ILVO) (fisheries data and macrobenthos), the Institute for Nature and Forest Research (INBO) (marine birds), the Université Libre de Bruxelles (microalgae), the University of Antwerp (organic pollution) and Ghent University (macrobenthos).

### **Description of data storage activities**

National monitoring data collected by the MUMM are gathered by the Belgian Marine Data Centre (BMDC), a group within the MUMM whose expertise is oriented towards the management and the analysis of marine environmental data. Its major tasks are:

- to continuously assess and diagnose the state of the North Sea;
- to evaluate and improve the monitoring programmes;
- to gather, validate, archive and manage marine and oceanographic data collected by Belgian scientists in the framework of research projects and national and international monitoring programmes.

These data are stored in the MUMM database and include mainly data on physical and chemical parameters (e.g. data for up to 200 physical and chemical parameters collected through the real-time data acquisition system 'ODAS' (Oceanographic Data Acquisition System) and data on concentrations of numerous substances in the air, water, sediment and biota collected through measurements in situ and analyses carried out in laboratories (Integrated Dynamical Oceanographic Data Management (IDOD) database). The MUMM database contains limited ecological data (mainly birds and marine mammals).

National data collected by other institutes and organisations are stored in the MUMM database and/or VLIZ (Flanders Marine Institute)-database.

At an international level data from the MUMM database and/or VLIZ-database are sent directly to international organisations (e.g. the International Council for the Exploration of the Sea (ICES), European



Commission (EC) and the OSPAR Commission). In this context data are subject to joint international evaluations resulting in synopses such as the OSPAR Quality Status Reports.

In view of the obligations of the Birds- and Habitats Directives (BHD) there is a need to develop specific monitoring programmes to be able to identify whether management activities result in a 'Favourable Conservation Status'. Marine programmes are prepared by the Flanders administrative region as part of the preparation of the management plans under the Birds- and Habitats Directives (BHD).

Monitoring of the environmental and ecological status of the territorial North Sea as part of the Water Framework Directive (WFD) is presently being prepared. As far as feasible sampling techniques and reporting procedures have been agreed within the relevant member states.

### **Preparation of national Belgian positions at international forums**

Through the ICCIEP network (Coordination Committee for International Environmental Policy) the three regions and the federal state prepare common positions towards European directives and OSPAR decisions and report environmental monitoring data to international forums. The ICCIEP is made up of representatives of the ministers and administrations concerned. The main tasks of the CCIEP are:

- to prepare the positions to be adopted by Belgian delegations to meetings of international bodies;
- to organise the consultation between federal and regional levels to ensure coordinated application of the recommendations and decisions of international bodies;
- to supervise the collection of data required for responding to requests for information from international bodies;
- to appoint delegations to represent Belgium in international institutions;
- to propose international environmental policy issues for the agenda of the Interministerial Conference on the Environment (ICE)<sup>1</sup>.

Also 'pilotes' are indicated to follow up specific policies. The Federal Public Service and the MUMM are for example 'pilotes' for OSPAR related policies.

The Belgian Federal Government co-finances a United Nations Environment Programme (UNEP) initiative to develop an issue-based module for the implementation duties of international biodiversity conventions<sup>2</sup>. This module will consist of a set of web-based documents providing a structured overview of how biodiversity is treated across several international conventions by identifying and grouping implementation requirements under different conventions.

## **2.2 Denmark**

### **Description of monitoring activities**

NOVANA is the Nationwide Monitoring and Assessment Programme for the Aquatic and Terrestrial Environment in Denmark. The programme was launched in January 2004 and runs over the period 2004 - 2009. It is used to fulfil many of Denmark's national and international monitoring and reporting obligations resulting from different European directives, international agreements and national legislations. NOVANA is adjusted when new directives (e.g. the future Marine Strategy Directive) are to be implemented.

NOVANA is an integrated monitoring programme of nature and the environment including groundwater, aquatic and terrestrial habitats, species, air quality and point sources. The programme is subdivided into nine sub-programmes including two sub-programmes relevant for monitoring and assessing marine ecosystems: 'Marine Waters' and 'Species and Terrestrial Natural Habitats'. Relevant monitoring obligations for marine waters fulfilled by NOVANA are presented in table 1.

<sup>1</sup> ICE brings together the federal and regional ministers in charge of the environment and covers both national and international environmental policies. Recently the Marine Environment Unit was created and made responsible for coordinating, preparing, participating in and following up on international activities relating to the marine environment; managing and making available equipment to combat marine pollution (fuel pollution); and participating in the coast watch. The Marine Environment Unit also covers the international obligations like obligations resulting from the OSPAR convention.

<sup>2</sup> Pilot countries are Belgium, Hungary, Morocco, Norway, Russia, Senegal, Seychelles and Uganda.

**Table 1 Monitoring obligations for marine waters in Denmark fulfilled by NOVANA (NERI, 2005; Report No. 537)**

European Union	Regulation establishing the European Environment Agency and the European Environment Information and Observation Network (EIONET)
	Birds Directive
	Habitats Directive
	Nitrates Directive
	Water Framework Directive
Marine agreements	Helsinki Convention (HELCOM)
	OSPAR Convention (OSPAR)
	Trilateral Wadden Sea Cooperation (TWSC)
National	Environmental Protection Act
	Action Plan on the Aquatic Environment I

The sub-programme 'Marine Waters' encompasses a number of activities that can be subdivided into three main groups:

- Eutrophication and physical conditions, including modelling of water and nutrient transport;
- Biodiversity and habitats;
- Hazardous substances and biological effects.

Generally these monitoring activities are carried out in both coastal waters and in the open marine waters. Until 2006 the monitoring in the open marine waters was largely performed by the State, whereas monitoring of coastal waters was carried out by the regional authorities. Since 2006 the State has also taken over monitoring of coastal waters due to a general restructuring of the Danish administrative organisation.

With regard to monitoring marine 'Biodiversity and habitats' NOVANA provides information on the most important groups of organisms:

- Phytoplankton (species composition, abundance and biomass);
- Zooplankton (micro- and mesozooplankton – species composition, abundance and biomass);
- Submerged aquatic vegetation (macroalgae on hard substrate and rooted angiosperms (eelgrass) – species composition and coverage);
- Fauna on soft bottom (species composition, abundance and biomass);
- Fauna on hard substrate (semi-quantitative studies of species composition and abundance);
- Fish (species composition and size distribution).

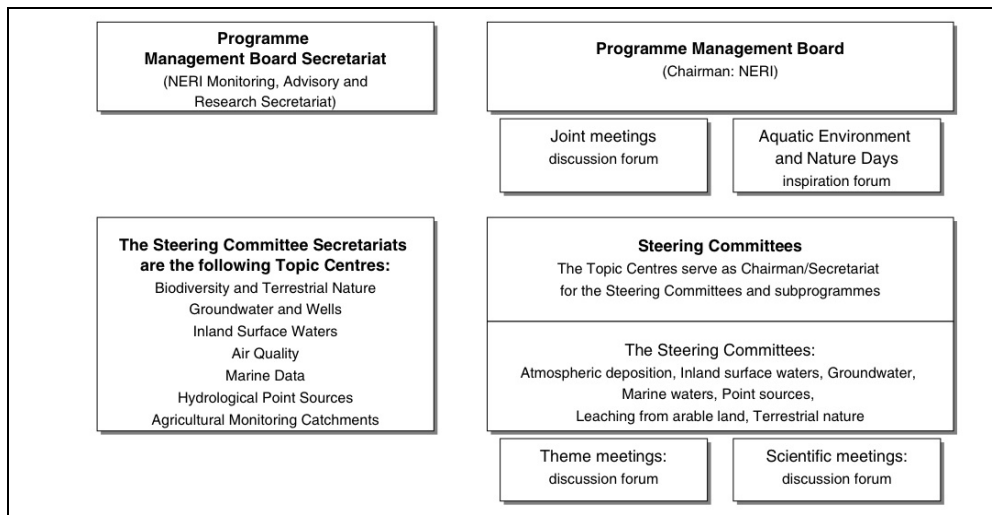
Monitoring of sea birds and marine mammals is not included in the sub-programme 'Marine Waters', but in the sub-programme 'Species and Terrestrial Natural Habitats'. Species monitoring comprises either determination of population or more frequently of distribution and include:

- Birds and effects of birds in TØnder Marsh;
- Birds in the Wadden Sea;
- Seals in the Wadden Sea and the inner Danish marine waters;
- Breeding populations of cormorants;
- Selected species on the Danish Red List;
- Status and trend for selected Danish plant and animal species on Annex 2 and IV of the Habitats Directive;
- Birds pursuant to the Birds Directive.

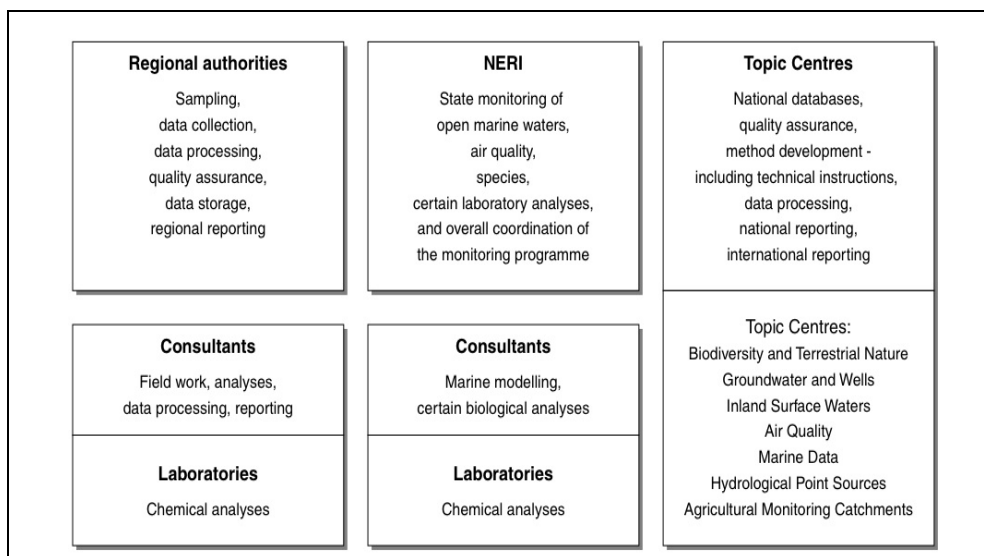
**Description of responsibilities and organisational structure**

NOVANA is carried out cooperatively by the Danish Environment Protection Agency (EPA), the National Environmental Research Institute (NERI), the Geological Survey of Denmark and Greenland (GEUS), the Danish Forest and Nature Agency (DFNA) and the regional authorities in Denmark. Until 2006 NERI, part of the Ministry of the Environment, was responsible for the overall coordinating of the programme. Since 2006 this responsibility lies with the University of Aarhus.

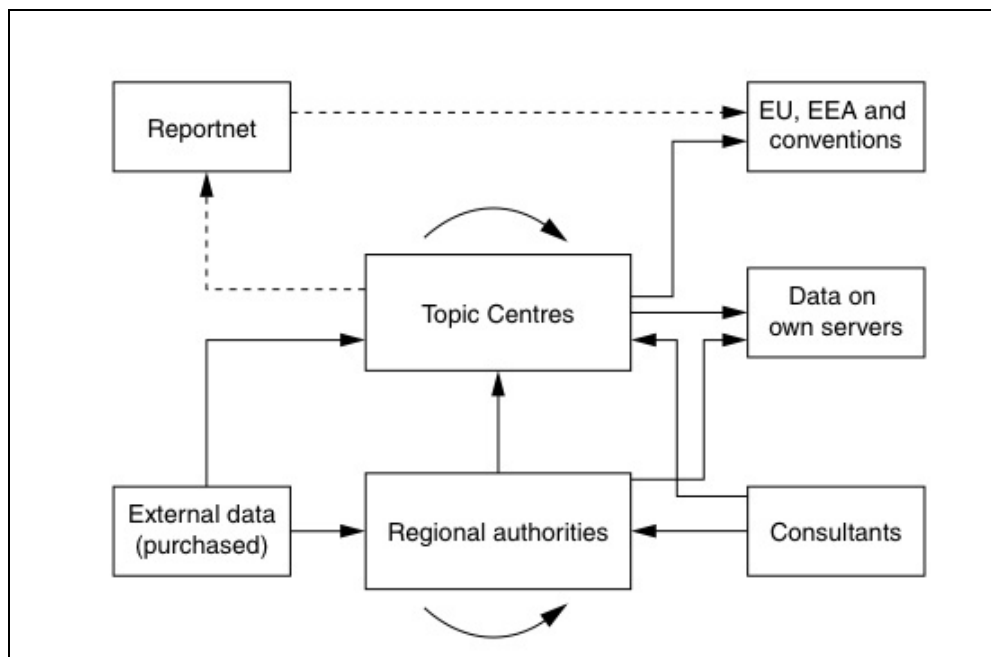
The decision-making structure, roles of the parties carrying out the programme and data flow in NOVANA are shown in figures 1, 2 and 3.



**Figure 1 Decision-making structure in NOVANA**



**Figure 2 Roles of the parties carrying out NOVANA**



**Figure 3** Data flow in NOVANA. The broken lines indicate that it is presently only the Topic Centres in NERI that report to the European Union. The curved arrows indicate that data are exchanged internally, for example between Topic Centres.

To manage and coordinate NOVANA, a three-tiered organisational structure has been established consisting of a Programme Management Board, Steering Committees and Scientific and Theme meetings (see figure 1).

The Programme Management Board is responsible for:

- Ensuring implementation of the programme;
- Deciding on all major changes upon the recommendation of the Steering Committees or the Programme Management Secretariat;
- Approving all proposals for and adjustments to the paradigms for data transfer and reporting, including the time schedules;
- Discussing and approving annual evaluations of monitoring activities, data transfer and reporting, including ensuring that the evaluations are carried out uniformly;
- Discussing and approving all aspects of the programme that have economic consequences;
- Making decisions about crosscutting regional activities and about NOVANA-financed research and development projects related to monitoring in the Topic Centres;
- Preparing and undertaking evaluations and revisions of the overall programme;
- Disseminating information on the monitoring programme.

The composition of the 'Programme Management Board' is as follows (the number of representatives is given in parenthesis):

- Danish Environment Protection Agency (DEPA)(1);
- National Forest and Nature Agency (DFNA)(2);
- Geological Survey of Denmark and Greenland (GEUS)(1);
- National Environmental Research Institute (3); serves as chairman and secretariat;
- Regional authorities (4);
- Association of County Councils in Denmark (2);
- Copenhagen and Frederiksberg Municipalities (1).

The Programme Management Board can establish subgroups to deal with crosscutting technical matters. The subgroups report to the Programme Management Board and in principle consists of representatives from the regional authorities, the Topic Centres and the Programme Management Secretariat. Three permanent subgroups have been established, namely the subgroup on analysis and quality assurance (AVA subgroup), the subgroup on hazardous substances and the subgroup on crosscutting data.

Steering Committees are established to:

- ensure implementation of the nine sub-programmes;
- take the initiative to hold scientific meetings arranged by the Topic Centres;
- consider all proposals for changes to the sub-programme, both scientific and economic;
- submit proposals for changes to the Programme Management Board with a recommendation. If the recommendation is unanimous, the opinions of the minority must be provided;
- approve minor changes to sub-programmes if they are cost-neutral and provided that prior delegation of responsibility from the Programme Management Board has been obtained;
- consider and recommend paradigms for theme reporting and other reporting to the Programme Management Board;
- carry out uniform annual evaluations of sampling, analysis, quality assurance and submission of data from the regional authorities to the Topic Centres;
- propose crosscutting regional initiatives;
- participate in the process regarding adjustment and revision of the programme, including the scientific prioritization and economic assumptions.

The Steering Group for the sub-programme 'Marine Waters' consists of representatives of NERI (2), DEPA (1), DFNA (1), Association of County Councils in Denmark (3) and Copenhagen and Frederiksberg Municipalities (1).

The purpose of Scientific and Theme meetings is to comprise a forum for scientific discussions of the programme's structure, results, time schedule and paradigms and to discuss and evaluate proposals for changes to the programme, including the scientific and economic considerations.

The scientific meetings are held at the initiative of the Steering Committees and are arranged by Topic Centres. Topic Centres are responsible for the annual scientific reports for relevant sub-programmes and also for the collection, storage and quality assurance of the monitoring data at a national level. Participants in the scientific meetings are the Topic Centres, the regional authorities, DEPA, DFNA, GEUS and NERI. External parties participate as required.

The Topic Centre for Marine Data and the Topic Centre for Biodiversity and Terrestrial Nature (both under supervision of NERI) are responsible for marine monitoring and assessments. These Topic Centres carried out the following activities to improve synergies in marine monitoring and assessment between the different European directives and international conventions:

- The Danish EPA and the Danish Forest and Nature Agency carried out an inventory of monitoring requirements listing Denmark's international and national monitoring and reporting obligations (Danish EPA, 2001).
- Participated in the 'Aquatic Environment and Nature Days'. These days are held once a year as a joint scientific meeting with the NERI Monitoring, Advisory and Research Secretariat as the arranger in collaboration with the Topic Centres and the regional authorities. The main issues for the meetings are the annual reporting of results of the monitoring programme of the previous year, reporting of themes on specific issues which have been in focus in that monitoring programme, and discussion of the monitoring programme for the next year.

Theme meetings, arranged by the Topic Centres, are held to allow discussion of special issues among the parties involved. Theme meetings with relevance for marine monitoring and assessment activities include *inter alia* diversity of benthic fauna, fishes in coastal waters, effects of monitoring by fish and mussels, issues related to European directives and marine conventions (OSPAR and HELCOM), ecological modelling, climate change and issues regarding combination of traditional marine monitoring and assessment of biodiversity.

Meetings between the Programme Management Board, Topic Centres, Steering Committees and the regional authorities are arranged at intervals by the NERI Monitoring, Advisory and Research Secretariat to allow discussion of special issues among the parties involved.

Outside the monitoring framework the Ministry for the Environment contracted DHI (consultants in Areas relevant to Water, Environment and Health) to analyse coherence and overlap between the principles of the Habitats directive for achieving favourable conservation status and the Water Framework Directive's normative definitions for ecological status, in particular with regard to good status (report in Danish).

## 2.3 France

### **Description of responsibilities and organisational structure**

The Ministry of Ecology and Sustainable development is primarily responsible for the implementation of the European directives and international conventions. However, it delegates (part of) this work to research institutes such as IFREMER (French Research Institute for Exploitation of the Sea) and the national Natural History museum. For example, IFREMER leads the implementation of the WFD in marine areas, and the Natural History museum is responsible for the implementation of the Birds- and Habitats Directives (BHD). Both institutes also deliver experts for the work of the OSPAR and Barcelona<sup>3</sup> conventions. Although not confirmed yet, it is expected that IFREMER will be strongly involved in the implementation of the MSFD.

### **Description of monitoring activities**

IFREMER heads several marine monitoring programmes, including ecological programmes and programmes that monitor pollution/hazardous substances. The monitoring work is carried out in collaboration with universities, the Natural History museum, the National Centre for Scientific Research (CNRS) and several coastal marine laboratories. One of the main monitoring programmes is especially implemented for the WFD. This monitoring programme comprises several previously existing monitoring programmes, which are adapted to fit specific WFD requirements. The data obtained in this programme are also used for OSPAR requirements, such as monitoring agreements based on the work of MASH (OSPAR working group on Marine Protected Areas, Species and Habitats). The Natural History Museum is in charge of monitoring programmes carried out for the Birds- and Habitats Directives (BHD). The Agency for Marine Protected Areas (MPAs) of the Ministry of Ecology and Sustainable development is tasked with establishing and maintaining MPAs ([www.ecologie.gouv.fr/L-Agence-des-aieres-marines.html](http://www.ecologie.gouv.fr/L-Agence-des-aieres-marines.html)).

#### *French Research Institute for Exploitation of the Sea (IFREMER)*

IFREMER's work is organised in six broad topics, divided into multi-field programmes:

1. Major facilities for oceanography;
2. Monitoring, use and enhancement of coastal seas;
3. Monitoring and optimising aquaculture yields;
4. Fishery resources, sustainable use and commercial transfer;
5. Exploration, exploitation of ocean floors and their biodiversity;
6. Ocean circulation and ecosystems, mechanisms, trends and forecasts.

Marine monitoring activities are mainly organised within topic 2, 'Monitoring, use and enhancement of coastal seas'. The aims of this topic will be the implementation of the Water Framework Directive (WFD) and the need for integrated management of coastal zones and the environment.

Attached programmes that relate to marine monitoring of biodiversity and ecosystems are:

- *Dynamics and health of coastal and estuarine ecosystems*

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<sup>3</sup> The Barcelona convention (The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean) was adopted 1976 and entered into force in February 1978. This Convention was amended in 1995 and the amendments entered into force in 2004. Nowadays it has 7 protocols, but only four of them have entered into force. Contracting parties: Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, European Community, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Morocco, Serbia and Montenegro, Slovenia, Spain, Syria, Tunisia, and Turkey.

The objective of this programme relates to the study of the functioning of disturbed coastal ecosystems.

- *Monitoring and evaluation of coastal water state (under the WFD)*

Ensure the monitoring and evaluation programmes are carried out according to national and European regulations.

- *Sustainable development and integrated management of the coastal zones*

This programme connects to objectives of the Birds- and Habitats Directives (BHD), and is carried out in collaboration with the Natural History museum.

#### *Natural History museum*

The natural History museum serves as both a scientific establishment and a public service. The Museum has, unlike IFREMER, no specific aim for the marine environment. However, marine monitoring is carried out as part of the implementation of Birds- and Habitats Directives (BHD) in coastal areas and through any individual cases where assessment of marine habitats is needed.

#### *The agency for marine protected areas*

The agency for marine protected areas exists since December 2006 and is tasked with establishing and maintaining marine protected areas (MPAs). It is responsible for the establishment and monitoring of MPAs. This agency has expressed interest in synergies between monitoring requirements that result from different directives and conventions.

### **Harmonisation of monitoring and assessment activities**

#### *Harmonisation at the national level*

The Ministry of Ecology and Sustainable development is mainly responsible for national harmonisation of monitoring programmes that are implemented to meet requirements of different European directives. The ministry is supported by specialised delegations from IFREMER and the Natural History museum. This is accomplished through working groups, which meet on an annual basis. The working groups are organised by topic, e.g. one working group for marine benthos (Réseau benthique, network for benthos monitoring and data storage (REBENT)), one group for fish etc.

IFREMER is in rapid progress to elaborate an overview for monitoring programmes for the WFD. This overview can serve as part of a national overview of monitoring activities, a first requirement for national harmonisation. All data obtained through WFD monitoring is stored in a new central database (see below), which is available for other institutes and purposes as well, providing scope for harmonisation.

For OSPAR requirements, IFREMER has no separate monitoring programme, but uses the data obtained through the WFD monitoring programme.

#### *Harmonisation at the international level*

Harmonisation at the international level is mainly achieved by IFREMER's participation in the EU WFD intercalibration groups (see §3.1 for overview and further explanation of the intercalibration groups). IFREMER represents France in the Geographical Intercalibration Groups 'North-East Atlantic' and 'Mediterranean'.

### **Description of data storage activities**

IFREMER is in charge of all biological monitoring for the WFD, and stores all data in a new central database named Quadriges 2, which is linked to the 'French National base of data on water'. Quadriges 2 will be fully operational in April 2008. A national database for marine ecosystems and biodiversity does not exist yet, but the government has approached IFREMER for assistance to build such a database. In this future database, Quadriges 2 and various local databases for marine mammals and birds (ACCESS-type databases at universities and institutes) will be combined.

## **2.4 Germany**

### **Description of monitoring activities**

The 'Bund Länder-Messprogramm (BLMP)' for the North Sea and Baltic Sea is produced by the 'Bundesamt für Seeschifffahrt und Hydrographie (BSH)' to fulfil marine monitoring requirements resulting from different European directives and international agreements. Until 2006 the BLMP was used in particular to give effect

to the OSPAR Joint Monitoring and Assessment Programme (JAMP; OSPAR, 2005) for the North Sea and the HELCOM Cooperative Monitoring in the Baltic Marine Environment (COMBINE; HELCOM, 1992) and had a strong focus on monitoring chemical pollutants.

Marine ecological monitoring requirements of different directives and conventions were mainly addressed through targeted (short term) research projects and/or long term monitoring projects carried out by various research institutes and included monitoring of phytoplankton, macrophytes, macrozoobenthos, fish, birds, marine mammals, habitats and substrates, contaminants, hydrology and bathymetry.

Most relevant for marine monitoring are:

- Monitoring programmes carried out as part of the Trilateral Monitoring and Assessment Programme for the Wadden Sea (TMAP) (see chapter 3).
- Risk analyses carried out by the Central Command for Maritime Emergencies (CCME) (in German: Havariekommando). The CCME is a joint institution of the German federal government and the federal coastal states and was established to set up and carry out a mutual maritime emergency management in the North Sea and in the Baltic Sea.
- Monitoring activities with relevance for the Water Framework Directive (WFD) and the Birds- and Habitats Directives (BHD). For example the marine warm-blooded animals in the North and Baltic Seas project (MINOS project) that examines whether large-scale offshore wind farms within the German parts of North and Baltic Seas affect or endanger harbour porpoises, common seals and sea birds.
- Groundwork to develop marine assessment procedures (e.g. 'Praxistests').

### **Harmonisation of monitoring activities**

Most of these programmes can be used to fulfil marine monitoring requirements defined in the new directives with relevance to the marine environment (e.g. WFD, BHD and the future MSFD). To harmonise these different programmes the national cooperation for marine monitoring in Germany (ARGE BLMP: working group BLMP) funded a project to develop a concept for a harmonised Monitoring Programme for German Marine Waters (the BLMP+ project). The challenge was to integrate the existing BLMP programme with the ecological monitoring programmes and monitoring requirements mentioned above. The project was undertaken by Brockmann Consult in 2006.

The work built on existing WFD monitoring concepts already under development by the Environment Agencies of Hamburg, Lower Saxony, Schleswig-Holstein and Mecklenburg-Pomeranian and initial concepts for the implementation of a monitoring programme for the Birds- and Habitats Directives (BHD) developed by the respective agencies.

The project was accompanied by an *ad hoc* steering group (UAG BLMP+: sub working group BLMP+) consisting of members of the federal environmental agencies of Lower Saxony, Schleswig-Holstein, Hamburg and Mecklenburg-Pomeranian as well as delegates from the national agencies responsible for fulfilling European directive requirements. Scientific experts and specialists from all relevant institutions and administrations concerned with marine monitoring were involved in the project through a series of workshops. The steering group was chaired by the coastal state Schleswig-Holstein.

In order to establish a reference baseline (what is done and what should be done), current monitoring activities carried out in the German parts of the North and Baltic Seas and concept monitoring programmes for the implementation of the WFD and BHD were assessed against monitoring requirements of the following directives and programmes:

- Water Framework Directive (WFD)
- Birds- and Habitats- Directives (BHD)
- Conventions for the protection of the marine environment (e.g. OSPAR and HELCOM)
- Trilateral Monitoring and Assessment Programme (TMAP)

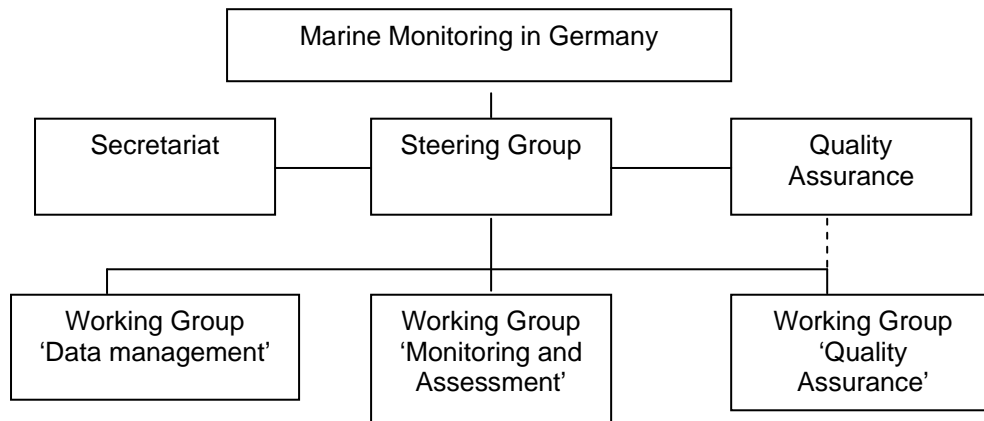
Using this reference baseline concept summary sheets (in German: 'Kennblätter') for monitoring different ecological groups were produced by several working groups through a series of expert workshops. For each ecological group these summary sheets contained information about goals and monitoring requirements resulting from different directives and conventions, existing and proposed monitoring programmes (including methods and organisations involved), assessments and data management. Concept versions of the



summary sheets were consolidated and validated in collaboration with the project steering group and used to produce the proposed BLMP+ programme.

### **Organisational structure**

The organisational structure of the proposed Marine Monitoring in Germany is shown in figure 4.



**Figure 4 Organisation structure for marine monitoring in Germany**

The steering group, secretariat and quality assurance group would be responsible for the coordination of all monitoring activities under the BLMP+ programme, data management, quality assurance and reporting.

The steering group will give direction to three working groups:

- Monitoring and assessment
- Data management
- Quality assurance

The 'Monitoring and Assessment' working group would be responsible for the contents of the monitoring programmes, up-date and further development of the summary sheets, scientific discussion about marine assessments and development of templates for graphs and text for reporting and assessments. The working group will be supported by the following sub working groups already established for the development of the BLMP+ programme:

- Phytoplankton;
- Zooplankton;
- Macrophytes & macrozoobenthos;
- Fish;
- Birds;
- Marine mammals;
- Hydrology & morphology;
- Hydrography & Hydrochemie;
- Organic and inorganic pollutants;
- Biological effects;
- Habitats.

The 'Data Management' working group will be responsible for data interchange between Germany's national marine database MUDAB (Meeresumwelt-Datenbank) for data collected under the BLMP programme and databases related to other marine monitoring programmes (for example TMAP Data-Unit).

The 'Quality Assurance' working group will be responsible for quality assurance under DIN (Deutsches Institut für Normung) and ISO/IEC 17025 (International Institute for Standardization) guidelines. The quality assurance working group builds on work already carried out by an existing working group under UBA (Umweltbundesamt) which is responsible for quality assurance of data collected under the existing BLMP programme. The 'Quality Assurance' working group will consist of at least four scientific persons (two for biology, one for quality management and one for chemistry) and two assistants.

The steering group will be supported by a secretariat consisting of at least two scientific persons and one assistant. The main tasks of the secretariat will be:

- to support the steering group with management of all monitoring activities;
- to promote information exchange between the different working groups through the development of an Internet portal 'Marine Monitoring in Germany';
- to commission monitoring projects;
- to coordinate reporting activities;
- to coordinate the use of research vessels and laboratories;
- to plan, organise and evaluate workshops with experts.

## 2.5 Iceland

### **Description of monitoring activities**

#### *Ecological monitoring activities*

Most of the ecological marine monitoring and assessment activities in Iceland are carried out by the Marine Research Institute (MRI). Seabird populations are monitored by the Natural History Research Institute.

MRI's activities are organised into three main sections: the Marine Environment Section, the Marine Resources Section and the Fisheries Advisory Section.

A large part of the work of the Marine Environment Section deals with environmental conditions (nutrients, temperature, salinity) in the sea, marine geology, and the ecology of algae, zooplankton, fish larvae, fish juveniles, and benthos<sup>4</sup>. Amongst the larger projects undertaken within the Marine Environmental Section are investigations on surface currents using satellite monitored drifters, assessment of primary productivity, overwintering and spring spawning of zooplankton, and studies on spawning of the most important exploited fish stocks. The Marine Environment Section prepares an overview of environmental monitoring carried out in pelagic waters around Iceland annually. The overview of the year 2006 can be found on the Internet ([www.hafro.is/Bokasafn/Greinar/vist2006.pdf](http://www.hafro.is/Bokasafn/Greinar/vist2006.pdf)) and includes a series of short notes on:

- ecosystem based fisheries management;
- evaluation of the ecological position of the capelin stock including results for hydrography, nutrients, phytoplankton, zooplankton and capelin from a survey carried out in July 2006;
- tidal behaviour of cod as evaluated by tagging with data storage tags;
- juvenile plaice distribution off the coasts of Iceland;
- trophic interactions of the pelagic ecosystem over the Reykjanes Ridge;
- the use of satellite data to estimate phytoplankton productivity in Icelandic waters;
- the results from surface carbon dioxide measurements in Icelandic waters in 2006 and its use in estimating the sea-air flux of carbon.

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<sup>4</sup> A very extensive research programme on marine benthic fauna around Iceland (Benthic Invertebrates Of Icelandic Waters (BIOICE)) was carried out between 1991 and 2002. Institutes and universities in Iceland and other Nordic countries were the main contributors to BIOICE, together with many taxonomists around the world. In seventeen BIOICE cruises (1991-2002) more than 1290 samples on 528 stations were collected from 20 to 3100 meters water depth. Around 70 scientists and students from ten different countries have participated in the cruises (see <http://www.hi.is/pub/smc/bioice.htm>).

The Marine Resources Section undertakes investigations on the exploited stocks of fish, crustaceans, molluscs and marine mammals. The major part of the work involves estimating stock sizes and the total allowable catch (TAC) for each stock. Examples of some large projects within the Marine Resources Section are annual ground fish surveys covering the shelf area around Iceland and surveys for assessing inshore and deep-water shrimp, lobster, and scallop stocks<sup>5</sup>. The pelagic stocks of capelin and herring are also monitored annually in extensive research surveys using acoustic methods. Further, in recent years an extensive program concentrating on multi-species interactions of exploited stocks in Icelandic waters has also been carried out. The Marine Resources Section prepares an overview of all monitoring results regarding the status of all commercial and non-commercial fish stocks annually. The Fisheries Advisory Section prepares the formal advice on TAC's and sustainable fishing strategies for the government.

Although overviews of the results of environmental monitoring programmes carried out in pelagic waters around Iceland and results of assessments of all commercial and non-commercial fish stocks are prepared annually Iceland does not have a written overview of all existing marine ecological monitoring programmes (including benthic – and seabird monitoring) carried out in Iceland and has not planned to produce such an overview yet.

#### *Monitoring pollutants and hazardous substances*

Marine monitoring programmes focusing on pollutants in the ocean are being developed in accordance with the international programmes and agreements in which Iceland participates. Iceland joined the Arctic Monitoring and Assessment Programme (AMAP) in 1991 and also puts great emphasis on taking part in the OSPAR Joint Monitoring Programme (JAMP) (§3.2). Institutes involved in monitoring hazardous substances and pollutants include the Marine Research Institute (MRI), the Department of Pharmacology of the University of Iceland, the Directorate of Shipping and the Environmental and Food Agency. An example is the monitoring of pollutants in marine biota managed by the Environmental Agency (EA) and carried out by a number of organisations engaged in sampling, analysing and reporting ([http://ust.is/media/skyrslur2002/AMSUM\\_k08\\_Lifrikid.pdf](http://ust.is/media/skyrslur2002/AMSUM_k08_Lifrikid.pdf); report only in Icelandic!)

#### **Description of responsibilities and organisational structure**

The responsibility of implementing the different ecological monitoring obligations resulting from different European directives and international agreements lies with the EA working under the aegis of the Ministry of the Environment. In some cases this responsibility has been delegated by the EA to the Ministry of Fisheries and Agriculture and the Marine Research Institute (e.g. the participation in OSPAR work).

Iceland will not implement the Birds- and Habitats Directives (BHD) will implement the Water Framework Directive (WFD) 7 years later compared to other European Member States. Iceland has not made any decisions yet about the MSFD.

#### **Harmonisation of monitoring and assessment activities**

The Environmental Agency (EA) is responsible for the coordination and harmonisation of marine monitoring and assessment activities required under different EU directives and international conventions. The implementation of different directives and conventions is led by staff working in the same building and only involves a few people. Therefore no specific organisational structure has been set up to achieve harmonisation. The EA makes agreements with research institutions or other relevant organisations to carry out the required environmental monitoring programmes.

Iceland participates in a number of international organisations in coordinating monitoring activities for larger geographic areas such as OSPAR, Arctic Council, ICES and the Bern convention. The Ministry of the Environment and the Ministry of Fisheries and Agriculture and directorates and research institutions under their administration are involved in harmonising marine monitoring activities.

#### **Description of data storage activities**

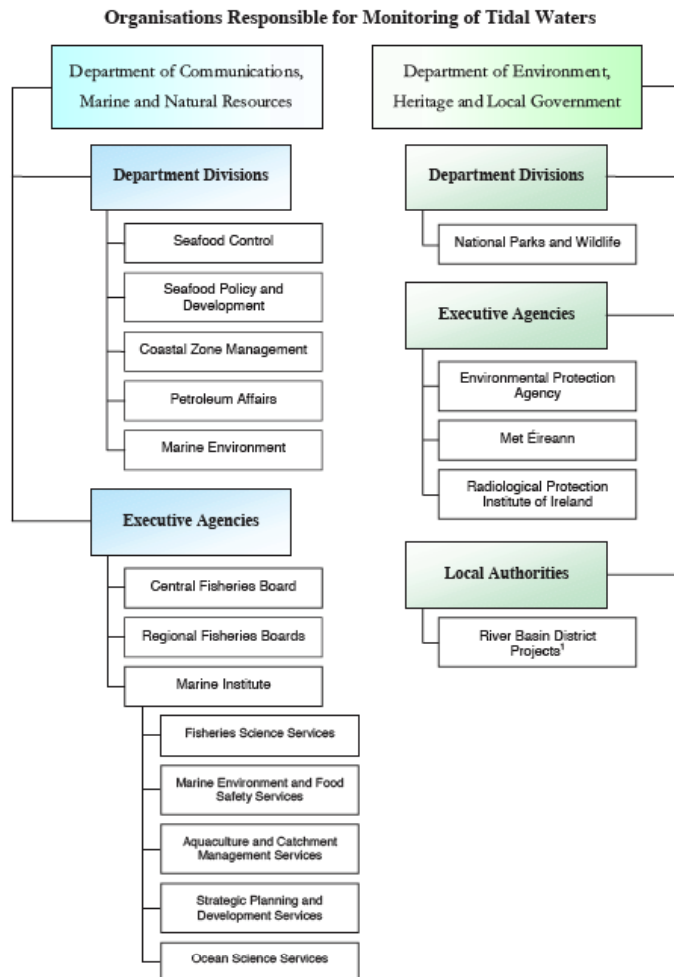
Most of the marine data are stored at the marine database of the MRI. Data on seabird populations are stored at the Natural History Institute and data on pollution are stored at the Environment Agency.

<sup>5</sup> The 'Iceland groundfish survey' (SMB) is carried out annually since March 1985 and the 'Autumn groundfish survey' (SMH) in October to November since 1996 ([www.hafro.is/Bokasafn/Timarit/rall\\_2007.pdf](http://www.hafro.is/Bokasafn/Timarit/rall_2007.pdf)). These projects are based on standardized sampling schemes using bottom trawls, in which the main aim is to gather fishery independent indices on stock sizes of groundfish species together with information on various biological factors.

## 2.6 Ireland

### Description of responsibilities

Responsibilities for monitoring of tidal waters come under the aegis of the Department of Communications, Marine and Natural Resources, the Department of Environment, Heritage and Local Government and their executive agencies (see figure 5).



<sup>1</sup> Note: River Basin District Projects are temporary entities and have no statutory standing. No permanent statutory arrangements are yet in place in this regard.

**Figure 5 Organisations responsible for the monitoring of tidal waters in Ireland (source: Environmental Protection Agency, 2003).**

The Environmental Protection Agency is responsible for the implementation of the Water Framework Directive, the National Parks and Wildlife Service for the implementation of the Birds- and Habitats Directives (BHD) and the Department of Communications, Marine and Natural Resources (DCMNR) for the future Marine Strategy Directive.

The three main agencies responsible for the development of ecological marine monitoring and assessment programmes to fulfil requirements of different European directives and conventions are the Marine Institute (MI), the Environmental Protection Agency (EPA) and the National Parks and Wildlife Service (NPWS).

### Description of monitoring activities

A National Environmental Monitoring Programme (NEMP) was developed by the Environmental Protection Agency (EPA) in collaboration with the Marine Institute (MI), the Radiological Protection Institute of Ireland, Met Éireann and National Parks and Wildlife of the Department of the Environment, Heritage and Local

Government in October 2003. NEMP is intended to encompass all aspects of monitoring of the ambient environment of transitional, coastal and marine waters required under national and European legislation and under international conventions to which Ireland is a contracting party. The NEMP builds on the existing activities of the various authorities with statutory responsibilities relating to monitoring of the transitional, coastal and marine environment.

NEMP is composed of thirty-six separate monitoring programmes that are grouped under six subject areas:

- Physical aspects (physical oceanography and meteorology);
- Ecological integrity and biodiversity;
- Water quality and trophic status;
- Hazardous substances;
- Food safety and human health;
- Radioactive substances.

The section 'Ecological integrity and biodiversity' includes programmes undertaken to assess the impact of identified pressures on the tidal water environment (including commercial fishing, aquaculture, and the introduction of non-indigenous species) and programmes for monitoring of the conservation status of species and habitats as required by the Birds- and Habitats directives (BHD) as well as the ecological status of certain elements of the biota as required by the Water Framework Directive (WFD). The following ten monitoring programmes are included in this section:

1. Conservation Status (Birds- and Habitats Directives)
2. Status of commercial fish stocks
3. Impacts of fishing on non-target organisms
4. Environmental monitoring of waste management sites
5. Environmental monitoring of aquaculture sites
6. Status of phytoplankton in transitional and coastal waters (WFD)
7. Status of macrophytes in transitional and coastal waters (WFD)
8. Status of macrobenthos in transitional and coastal waters (WFD)
9. Status of fish in transitional and coastal waters (WFD)
10. Status of introduced non-indigenous species

### **Description of organisational structure**

The Water Framework Directive ecological quality element monitoring programmes were developed by the Environment Protection Agency (EPA), the Marine Institute (MI) and the Central Fisheries Board (CFB) in close collaboration with colleagues in Northern Ireland and the United Kingdom and prepared according to relevant Common Implementation Strategies (CIS) documents. Because of its geographical location Ireland is obliged under the Water Framework Directive to work in collaboration with the UK. Therefore representatives of the MI, EPA and CFB are involved in technical marine task teams which are under the aegis of the UK Technical Advisory Group (e.g. Technical Advisory Groups (TAGs) of the Department for Environment, Food and Rural Affairs (Defra)) in the UK.

Because of the complexity of NEMP and the need to provide for continual review and modification a Marine Monitoring Forum (MMF)<sup>6</sup> was established in 2001 to oversee the implementation of NEMP on an ongoing basis.

The MMF was supposed to meet at regular intervals to:

- review the progress and performance in relation to established monitoring activities;

<sup>6</sup> The following organisations are represented in this forum: Central and Regional Fisheries boards; Department of Communications, Marine and Natural Resources; Department of Environment, Heritage and Local Government (DEHLG); Environmental Protection Agency; Local authorities; Marine Institute; Met Éireann; National Parks and Wildlife of DEHLG; Radiological Protection Institute of Ireland; River Basin District Projects.

- oversee the development of a national data system for the environmental quality of tidal waters;
- consider (or set up ad hoc committees to consider) proposals for new or revised activities as deemed necessary;
- identify useful monitoring techniques and approaches as they become available, and give consideration to incorporating these into NEMP as appropriate;
- develop links with EPA funding programmes, other sponsors of environmental research and with the academic community for the purpose of identifying and stimulating research;
- develop links agencies responsible for monitoring and control of direct and indirect emissions to the tidal waters;
- prepare and publish regular reports on implementation and related matters;
- review and advise on resource aspects with a view to achieving cost efficiencies;
- arrange for review of NEMP at an agreed frequency.
- further develop the elements of NEMP concerned with the implementation of the Water Framework Directive;
- coordinate data management activities in different organisations with the overall goal to develop an integrated system.

It was envisaged that the Marine Institute and the Environment Protection Agency would co-chair the MMF, but the MMF hasn't met since its establishment because of funding problems (related to the implementation of monitoring of the marine waters under the WFD) and absence of a formal organisational strategy to implement the NEMP.

The monitoring programmes developed under NEMP are currently being carried out by agencies responsible for the implementation of the various directives and they proceed as they see fit. Many working groups can draw on expertise from other agencies and departments if required.

#### ***Description of data storage activities***

Under the development of the NEMP it was proposed to develop a standardised information storage and transfer system that will constitute a Transitional Coastal and Marine Waters database. All participant agencies in NEMP were invited to review their current data management systems.

The Marine Institute has a meta-data service whereby marine data generated within the MI and by MI funding is stored and can be actively searched (see [www.marinedataonline.ie](http://www.marinedataonline.ie)).

#### ***Issues with marine monitoring requirements under different directives and conventions***

Development of the NEMP was a first attempt to harmonise marine monitoring and assessment activities in Ireland, but to date it has not been carried out to fruition. Apart from funding problems and the absence of an organisational strategy to implement the NEMP there are some issues regarding the standards that do apply to monitoring and assessment required under the various directives and the complementarities of these. An obvious example is the designation of 'conservation status' that must be considered under the Water Framework Directive and the definition of 'ecological status'. Ecological status is a quantitative measure that must have defined thresholds and classification is based upon quantitative measurements of biota. It is not clear if 'conservation status' is defined similarly. This means that a fully quantitative measure could be usurped by a qualitative and anecdotal view of quality in the marine environment.

## **2.7 Norway**

#### ***Description of monitoring activities***

Marine monitoring and assessment activities in Norway are carried out by several research institutes and universities including the Norwegian Institute for Water Research (NIVA), the Institute of Marine Research (IMR), the Norwegian Institute of Nature Research (NINA), the University in Bergen (UiB), the University in Trondheim (NTNU) and the University in Tromsø (UiTØ).

No ecological monitoring programmes under the Water Framework Directive (WFD) have started yet. Based on a national monitoring guide (see section harmonisation of activities) Norway will start monitoring under

the WFD in different regions during 2008. Norway has not implemented the Birds- and Habitats Directives (BHD) or made any decisions regarding the implementation of the MSFD.

*The Norwegian Institute of Water Research (NIVA)*

NIVA's work is organised in 13 sections (headed by research managers) including a section 'Biodiversity and eutrophication in marine environments'. This section has a strong research activity in habitat modelling and mapping, effects of environmental strains and habitat disturbance on biodiversity and also conducts basic ecosystem studies in kelp forest, soft bottom fauna and phytoplankton communities.

Important tasks of this section are:

- Monitoring of biodiversity and state of eutrophication of the coastal zone;
- Ecological modelling of the coastal zone;
- Habitat mapping and modelling;
- Development of surveillance and biological classification methods under the Water Framework Directive (WFD);
- Local Agenda 21 and mapping of local biodiversity;
- National and international development and harmonisation of monitoring of biodiversity through participation in national and international working groups;
- To enhance understanding of connections between environmental strains and effects on biota;
- Contributions to interdisciplinary cooperation related to aquaculture;
- Toxic algae monitoring and ecosystem research.

To be able to implement these tasks the section leads a number of national and international projects:

- Coastal monitoring including monitoring and classification of the state of oceanography, water chemistry, phytoplankton, hard bottom flora and fauna, soft bottom fauna;
- Mapping and surveillance of biodiversity in an interdisciplinary project with main focus on mapping natural habitats at a local scale;
- HAMOD and REMOTS - development of survey methods and modelling techniques for mapping and surveying biodiversity;
- Marmodel - habitat mapping modelling;
- Macrofunc - effect of harmful substances in sediment on soft bottom fauna structure;
- Bioklass - development of biological indicators for the Water Framework Directive implementation;
- Standardisation of methods, development of national and international standards for sampling at soft and hard bottom and for sampling and quantification of marine phytoplankton;
- Monitoring of algae for the fish and shell farming industry and for The Norwegian Food Safety Authority monitoring programs;
- Studies of relationship between geophysical factors and the distribution of marine habitats and species.

*Institute of Marine Research (IMR)*

The main task of the IMR is to provide advice to Norwegian authorities on aquaculture and the ecosystems of the Barents Sea, the Norwegian Sea, the North Sea and the Norwegian coastal zone. Monitoring and assessment activities of the IMR have a strong focus on commercial fish stocks and mechanisms that affect the production of fish. For this reason, about fifty percent of IMR's activities are financed by the Ministry of Fisheries and Coastal Affairs. Most of the ecological monitoring programmes carried out by the IMR are related to the open ocean.

IMR's scientific activities are organised in ten research programmes and are carried out by the 19 research groups:

1. The Barents Sea Ecosystem Programme<sup>7</sup>
2. The Norwegian Sea Ecosystem Programme<sup>4</sup>
3. The North Sea Ecosystem Programme<sup>4</sup>
4. The Coastal Zone Ecosystem Programme<sup>4</sup>
5. The Aquaculture Programme<sup>8</sup>
6. The Climate – Fish Programme<sup>9</sup>
7. The Oil – Fish Programme<sup>10</sup>
8. The Ecosystems and Population Dynamics Programme<sup>11</sup>
9. The Biological Mechanisms Programme<sup>12</sup>
10. MAREANO<sup>13</sup>

#### *The Norwegian Institute of Nature Research (NINA)*

NINA offers broad-based ecological expertise covering the genetic, population, species, ecosystem and landscape level, in terrestrial, freshwater, and coastal marine environments. In 2005 a long-term mapping programme for Norwegian seabirds populations (SEAPOPOP) was established. The activities in the initial two years were restricted to the Lofoten and Barents Sea areas (Northern Norway), but the programme is designed for implementation on the full national scale from 2008. The work is organised and carried out by NINA in close collaboration with the Norwegian Polar Institute (NP) and Tromsø University Museum, and is currently financed by the Ministry of Environment, the Ministry of Petroleum and Energy and the Norwegian Oil Industry Association. The data and knowledge are being published online via [www.seapop.no](http://www.seapop.no).

#### *Universities*

The University in Bergen (UiB), the University in Trondheim (NTNU) and the University in Tromsø (UITø) carry out marine monitoring programmes along the Norwegian coast. Most of these programmes have a local character (e.g. University of Trondheim conducts most of its marine monitoring in the Trondheim fjord).

#### **Description of responsibilities and organisational structure**

The Directorate for Nature Management (DN) based in Trondheim is responsible for the implementation of different European directives and international conventions regarding the biological diversity of marine ecosystems. The Ministry of Fisheries and Coastal Affairs is responsible for the management of all commercial fish stocks. The Pollution Control Authority is responsible for all issues related to pollution.

The main focus areas of the DN are the different UN conventions on biological diversity, the implementation of the Water Framework Directive (WFD) and the OSPAR Biodiversity Committee (BDC).

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<sup>7</sup> The overarching objectives of programmes 1-4 are to generate knowledge that will provide a basis for developing advice for the authorities in all areas that concern marine resources and the environment in respectively the Barents Sea, the Norwegian Sea, the North Sea and the Norwegian coastal zone.

<sup>8</sup> The overarching objective of programme 5 is to provide a foundation of knowledge for research-based advice in the field of aquaculture.

<sup>9</sup> The overarching objectives of programme 6 are to warn for changes in the climate, and to understand and quantify the importance of such changes for production, distribution and behaviour in marine organisms.

<sup>10</sup> The overarching objective of programme 7 is to generate new knowledge about the acute and long-term effects on fish and other marine organisms of discharges of oil to the sea, chemicals used in drilling and production, and produced water, as well as to obtain new knowledge about the effects of seismic studies on fish and other marine organisms.

<sup>11</sup> The overarching objective of programme 8 is to develop and apply new methods and tools that will improve our understanding of, and to quantify the variability in, marine ecosystems, with special reference to the dynamics of fish stocks, and to contribute to an ecosystem approach.

<sup>12</sup> The overarching objective of programme 9 is to generate knowledge of biological mechanisms and interactions in key aquaculture species and species in the marine ecosystem, as a long-term basis for sustainable resource utilisation and aquaculture.

<sup>13</sup> The MAREANO Programme is a joint project that is led by the IMR and that also involves the Norwegian Hydrographic Service (SKSK) and the Geological Survey of Norway (NGU). The overarching objectives of this project are to map benthic habitats and to disseminate all available information about Norwegian marine regions via MAREANO's Internet site ([www.mareano.no](http://www.mareano.no)).



### **Harmonisation of monitoring and assessment activities**

#### *National monitoring guidelines for monitoring coastal waters and the open ocean*

In 2005 the Directorate for Nature Management (DN) published a report proposing ecological elements that should be given priority for monitoring ecological biodiversity in Norwegian coastal waters. This report was written by a working group consisting of representatives from management bodies and research institutions and was based on recommendations from previous studies and presentations. The major challenge of the report was to present an integrated national monitoring programme for monitoring biodiversity in Norwegian coastal waters that integrates groups of organisms normally included in already existing environmental programmes, all quality elements listed in the Water Framework Directive (WFD), most of the elements used in municipal habitat mapping and which also carries further ongoing monitoring activities within the frame of the proposed programme.

In 2008 a similar plan will be published for the open ocean. Both plans provide an overview of existing monitoring programmes including the different organisations in charge of these programmes. These plans are not available in English.

#### *Integrated Management Plans for the Barents Sea and the Norwegian Sea*

On the 31<sup>st</sup> of March 2006 the Ministry of Environment presented an integrated management plan for the Barents Sea and the sea areas off the Lofoten Islands. This management plan sets the overall framework for both existing and new activities in these waters and facilitates the co-existence of different industries, particularly the fisheries industry, maritime transport and petroleum industry. Part of this plan is the establishment of a new and more coordinated system for marine monitoring. To achieve this, the Government established an advisory group on the monitoring of the Barents Sea, led by the Norwegian Institute of Marine Research. A forum for cooperation on environmental risks associated with acute oil spills at sea is led by the Norwegian Coast Guard. A scientific forum responsible for the follow-up and coordination of the scientific work is led by the Norwegian Polar Research Institute. In addition a reference group was established to continue work on the ecosystem-based management of the Barents Sea.

A similar management plan will be developed for the Norwegian Sea. The Directorate for Nature Management is leading this work.

Several indicators have been developed in connection with these management plans. Data from existing and new monitoring programmes will be used to describe the status of these indicators.

#### **Description of data storage activities**

The Norwegian Marine Data Centre (NMD) at the Institute of Marine Research was established as a national data centre dedicated to the professional processing and long-term storage of marine environmental and fisheries data and production of data products. NMD maintains the largest collection of marine environmental and fisheries data in Norway. Its most important tasks are to collect, quality-assure and store marine environmental and fisheries data and to make these data available for research. Other national databases include a national algae database (NIVA) and a database containing results from a national coastal marine natural habitat mapping project called 'Naturbasen' (DN) ([www.dirnat.no/content.ap?thisId=500029694](http://www.dirnat.no/content.ap?thisId=500029694)).

## **2.8 Portugal**

### **Description of monitoring activities**

#### *Responsibility*

INAG is the Environmental Ministry agency responsible for the implementation of European directives and other international agreements with relevance for coastal and marine ecosystems in Portugal.

#### *Institutes and regular monitoring activities*

The monitoring of Portuguese transitional and coastal waters involves a number of different institutions. The Fisheries Institute (IPIMAR) and the Hydrographic Institute (HI) are the main government laboratories, which carry out sampling programmes. Additionally a number of universities and research centres, mainly the Institute of Marine Research (IMAR), carry out monitoring work under contract and execute research projects that inform coastal management.

To address national and international legislation or emerging environmental issues a number of ongoing sampling programmes in several thematic areas and more specific programmes that study particular systems and/or environmental issues are carried out. Regular monitoring activities include:

- Hydromorphology: Regular hydromorphological surveys include the production of maritime charts and tide tables; 12 continuous recording tide gauges; wave climate buoys; coastal weather stations that register meteorological data; regular sampling campaigns to determine salinity, temperature and currents along the coast and sediment mapping.
- Marine geology: Sediment sampling surveys in coastal and transitional waters, including the cartography of coastal sediments.
- Water quality: includes seasonal determination of nutrients, photosynthetic pigments, physical parameters, heavy metals and synthetic pollutants in the main estuaries and lagoons.
- Phytoplankton: Determination of the phytoplankton community structure along the coast. Determination of phytoplankton concentration in the main transitional and sheltered coastal waters.
- Shellfish: Bivalve sampling in coastal areas and lagoons includes abundances and physiological studies. Weekly or fortnightly sampling, depending on the time of the year, carried out for examination of biotoxins along the coast between the Minho and Guadiana estuaries.
- Specific pollutants: Include heavy metals, as well as organics such as PCBs, dioxins and PAHs. Sampling stations have been defined in transitional and inshore coastal waters and are sampled twice a year.

#### **Harmonisation of monitoring and assessment activities**

To harmonise monitoring and assessment activities in transitional and coastal waters in Portugal the project 'Monitoring Plan for Water Quality and Ecology of Portuguese transitional and coastal waters (MONAE)' was launched in 2004 and carried out between 2004 and 2006 ([www.monae.org](http://www.monae.org)).

Objectives of the MONAE project were to:

- provide an integrated approach to monitor all Portuguese transitional and coastal waters;
- have the potential to address management issues, i.e. to be hypothesis-driven;
- establish the guidelines for monitoring the water quality and ecology of Portuguese transitional and coastal waters throughout the next decades;
- integrate the monitoring requirements of the Water Framework Directive (WFD) for transitional and coastal waters;
- define and apply a methodology for the definition of water bodies in Portuguese coastal and transitional types;
- possess internal flexibility in order to accommodate new methodologies that may be developed and/or applied over its life-cycle;
- use a hierarchical approach allowing cost-optimisation with respect to information requirements.

MONAE did build on previous work in the Typology and Reference Conditions study (TICOR) carried out in 2002-2003 ([www.ecowin.org/ticor](http://www.ecowin.org/ticor)). The TICOR study aimed to provide a framework for appropriate coastal management in Portugal following the requirements of the Water Framework Directive (WFD).

The 'Monitoring plan for Portuguese coastal waters: Water Quality and Ecology' has primarily been written to meet monitoring requirements of the WFD. As Bureau Waardenburg has not been able to interview the contactperson in Portugal it is unsure whether this monitoring plan is also used to meet monitoring requirements of other directives and conventions or whether separate monitoring programmes have been or are being developed.

#### **Work packages and organisational structure of the MONAE project**

Project MONAE was financed by the Portuguese Water Institute INAG and carried out by an interdisciplinary team drawn from marine science and management experts in the EU, US and South Africa.

The MONAE project team consisted of fifteen team members and four consultants<sup>14</sup> covering a wide range of areas of marine science. The MONAE work plan was divided into three work packages each consisting of a list of specific tasks (see figure 6).

Workpackage	Tasks
<b>WP1</b> Data acquisition and definition of system limits	1.1 Assignment of coastal waters to river basin districts 1.2 GIS implementation 1.3 Incorporation of data into a GIS 1.4 Web implementation of databases and compatibility with SNIRH
<b>WP2</b> Classification and monitoring	2.1 Ranking of coastal systems 2.2 Definition of transitional and coastal water bodies 2.3 Surveillance Monitoring 2.4 Operational Monitoring 2.5 Investigative Monitoring
<b>WP3</b> Definition of MONAE and coordination of activities	3.1 Cost analysis 3.2 Priorities for monitoring 3.3 Public participation 3.4 Production of the MONAE book, journal, papers and website 3.5 Coordination of activities

**Figure 6** *MONAE work packages and tasks (Source: Ferreira et al., 2006)*

MONAE was organised around monthly meetings of this project team, which were roughly split along the three work packages, the first of which dealt with system definitions and data collection, the second with water body definitions and types of monitoring and the last with the development of the written monitoring plan. Presentations and other materials from each of the meetings were made available on the project website [www.monae.org](http://www.monae.org) along with many published articles relevant to the project. Throughout the duration of the project a series of watershed events and milestones were defined at the workshops and were used to reach consensus decisions on a range of concepts, methodologies and practical application issues.

**Description of data storage activities**

Most of the data collected by the various agencies and academic institutions are stored locally in internal databases. The availability of historical data is thus compromised by data fragmentation, which stems from the lack of coordination of monitoring activities both at a system (e.g. estuary or lagoon) and at a national level. In the last few years some of these datasets have been collated and loaded into web-accessible databases (e.g. [snirh.inag.pt](http://snirh.inag.pt) and [www.barcaweb.com](http://www.barcaweb.com)).

**2.9 Spain**

**Description of responsibilities and organisational structure**

Governmental responsibilities can belong either to the national government (Ministry of Environment and Ministry of Development) or to regional governments (e.g. Cataluña, Andalucía, Galicia). The national government is primarily concerned with the overarching coordination of the various European directives (e.g. Water Framework Directive (WFD), Birds- and Habitats Directives (BHD)) and international conventions (e.g. OSPAR, Barcelona convention<sup>3</sup>). The regional governments provide support to the national government and are mostly responsible for the actual implementation of the different directives. The role of regional governments is relatively large in Spain.

The national government is responsible for marine monitoring activities in waters seawards of the territorial baseline (e.g. Marine Strategy Directive); the regional governments are responsible for monitoring coastal waters (e.g. coastal waters identified under the Water Framework Directive (WFD)). The national government is in principle responsible for the implementation of the Birds- and Habitats Directives (BHD), but delegates this responsibility to regional governments when there is ecological continuity with protected areas on land.

<sup>14</sup> A consultant from Northern Europe assisted to provide a more balanced approach to the work from a EU-wide perspective; two consultants from the US assisted to put the work under MONAE in a wider context by taking into account the approaches followed by the EU and in the US; and a consultant from Portugal contributed to the project by taking into account the national perspective and objectives.

### **Description of monitoring activities**

Until now Spain mainly focussed on monitoring marine coastal waters. Regional governments delegated most of these activities to national and regional research institutes involved in marine monitoring including:

CEDEX: Centro de Estudios y Experimentación de Obras Públicas (Centre for Public Works, Studies and Experimentation). An example of a marine monitoring programme carried out by CEDEX's Centre for Harbour and Coastal Studies is the Climate Maritime Programme for the National Port authority.

CSIC: Consejo superior de investigaciones científicas (High Council for Scientific Research). CSIC is a national research institute and carries out marine research and monitoring activities in collaboration with regional departments and collaborators.

IEO: Instituto Español de Oceanografía (Spanish institute for oceanography). IEO carries out monitoring and scientific research that involves fisheries, aquaculture and Marine Protected Areas (MPAs). IEO is specifically tasked with the implementation of monitoring requirements of international conventions (e.g. OSPAR, ICES, MEDPOL).

A monitoring programme for waters seawards of the territorial baseline is currently being developed by the Ministry of Environment and Ministry of Development.

### **Description of harmonisation activities**

#### *National level*

Spain has prepared several manuals to achieve harmonisation at the national level:

1. 'Manual de diseño de los programas de control de las aguas costeras y de transición' (Manual to design monitoring programmes for coastal and transitional waters);
2. "Manual para la recopilación de información sobre presiones en las masas de agua costeras y de transición" (Manual for compiling information of pressures in coastal and transitional waters).
3. "Manual para la elaboración de Informes del programa RID relativo a Emisiones directas al mar" (Reporting Manual for RID programme for direct discharges to the sea).

These manuals provide guidelines to set up marine monitoring programmes for the Atlantic Ocean and the Mediterranean Sea which integrates and harmonises monitoring and information requirements for the WFD and international conventions (e.g. OSPAR, ICES). Monitoring requirements of the Birds- and Habitats Directives (BHD) are not incorporated in these guidelines. These manuals are not available in English.

#### *International level*

International harmonisation is achieved through participation (representatives of the national government with input from regional governments) in meetings of working groups of international conventions (e.g. OSPAR, ICES) and European Directives (e.g. Geographical Intercalibration Groups established under the WFD).

### **Description of data storage activities**

A national data-storage application will be developed in 2008. In this application data from all marine monitoring programmes will be stored centrally and will be accessible for all relevant institutions and governments. In addition a restricted Internet remote database with more than 6.000 records on 'Pressures and Impacts on coastal & transitional waters' exists for registered staff of different institutions.

## **2.10 Sweden**

### **Description of monitoring activities**

The National Monitoring Programme<sup>15</sup> consists of ten programme areas including the programme area 'Seas and coastal areas'. The National Marine Monitoring Programme provides the national overview of the state of coastal and marine waters in Sweden and forms the basis for reporting to international organisations. In

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<sup>15</sup> The National Monitoring Programme consists of ten programme areas: air, mountain areas, forests, agricultural land, landscapes, freshwater, seas and coastal areas, health-related environmental monitoring and toxic substances coordination.

addition to the national programmes, there are regional programmes run by the Counties and private monitoring programmes run by enterprises. For intercomparison and quality assurance reasons, the national and regional programmes use common monitoring guidelines, available on the Internet.

The environmental monitoring programme for 'Seas and coastal areas' provides input for the description of large-scale human impacts, primarily from eutrophication and hazardous substances, and on biodiversity. The programme consists of the following continuously running sub-programmes:

- the free water column;
- soft-bottom macrofauna;
- phytobenthic communities;
- hazardous substances in marine biota;
- top predators;
- coastal fish populations and fish health;
- biological effects measurements in two benthic crustaceans.

These sub-programmes have a frequency of every year or up to 20-24 times a year (pelagic programmes: hydrography, chemistry, phyto- and zooplankton). There are also programmes running less frequently, such as hazardous substances in sediments, which is performed every 6 years.

The national programmes are carried out mainly by contractors to the Swedish Environmental Protection Agency (Swedish EPA). These contractors are often university institutions or institutes (such as the three Marine Sciences Centres of the universities of Umeå, Gothenburg and Stockholm). In other cases they are other national agencies such as SMHI (the Swedish Meteorological and Hydrological Institute) and the National Board of Fisheries, or consultant firms. The programmes cover the main Swedish marine areas including the Gulf of Bothnia, the Baltic Proper and the Sound, the Kattegat and the Skagerrak.

The monitoring programmes are driven by the Swedish environmental objectives, as well as European directives, international marine conventions and bilateral agreements and therefore have a strong international character. An example are the monitoring programmes carried out in the Baltic Sea to give effect to the Baltic Monitoring Programme (BMP) established under the Helsinki Commission (HELCOM)(see § 3.3). The requirements of the BMP are implemented through the National Programme, complemented by regional programmes.

The National Marine Monitoring Programme has been modified to the reporting requirements under the Water Framework Directive (WFD). Most of the monitoring locations in the previous programme were namely offshore locations whether for the WFD coastal areas need to be assessed as well. Modification consisted mainly of the inclusion of the regional (county) programmes into the national programme.

At the moment no activities are undertaken to adapt the national programme to monitoring requirements of the Birds- and Habitats Directives (BHD). For the BHD monitoring and assessment activities need to be carried out at a much smaller scale (site level) than currently done. As for the MSFD, it is anticipated that the current offshore programme will be able to supply a considerable part of the requirements.

### **Description of responsibilities and organisational structure**

The chief responsibility for environmental matters at governmental level is vested in the Ministry of Environment. The Swedish Environmental Protection Agency (Swedish EPA) is the central government agency for coordinating and promoting environmental policy and protection nationally, in the EU and at international level. The Swedish EPA drafts proposals for objectives, action strategies and policy instruments, disseminates information and evaluates the environmental situation and work being undertaken. The Swedish EPA has the overall responsibility for the management of the National Monitoring Programme and provides guidance to County Administrative Boards.

County Administrative Boards provide support and advice to the operational regulatory authority in municipalities in order to coordinate supervisory and regulatory activities in their county. The county administrative boards are in charge of regional environmental monitoring and supervision of the air, ground and water and are responsible for inspections and enforcement, mainly in the case of activities that entail a major environmental impact. They are also engaged in nature conservation aimed at maintaining functional ecosystems and preserving biological diversity.

### **Harmonisation of monitoring and assessment activities**

The National Marine Monitoring Programme is used to integrate existing marine monitoring and assessment activities with monitoring and assessment activities required under the WFD. At this stage no activities are undertaken to adapt the programme to monitoring requirements of the BHD. For the MSFD an investigation is presently carried out regarding the possible inclusion of some variables not currently measured within the programme.

To integrate the National Programmes and regional coastal programmes and to harmonise monitoring activities at all levels within the Swedish administrative structure, the Swedish EPA prepared a monitoring handbook of guidelines for different types of monitoring, including procedures for quality assurance and quality control. The handbook is based on international standards such as guidelines from HELCOM and OSPAR, and it is continuously adjusted for new requirements, such as those under the WFD. The County Administrative Boards are responsible for implementation of this handbook in their regions.

To assess the status of certain marine habitats (e.g. estuaries, lagoons) identified under the BHD a monitoring handbook has been developed. The handbook was prepared by a consultant with input from experts/scientists through a series of workshops led by the Swedish EPA.

### **Description of data storage activities**

Sweden does have several national marine databases. SMHI manages hydrographical, chemical and biological (except fish) data. The National Board of Fisheries manages fish data. There is also a database on hazardous substances in biota (IVL Swedish Environmental Research Institute Ltd.) and on hazardous substances in sediments (Swedish Geological Survey).

## **2.11 Netherlands**

### **Description of monitoring activities**

In the Netherlands two departments are responsible for the main marine monitoring programmes, *i.e.* the Ministry of Transport, Public Works and Water Management (V&W) and the Ministry of Agriculture, Nature and Food Quality (LNV).

Marine monitoring under the aegis of V&W is part of the national MWTL (Monitoring van de Waterstaatkundige Toestand des Lands) monitoring programme. This programme is carried out by Rijkswaterstaat, Centre for Water Management (former RIKZ and RIZA) and includes the collection of physical, chemical, morphological and biological data. Since 1994 all data collected under this programme were stored in the national database DONAR, but since 2004 data are stored in the WADI system that will take over the function of DONAR. The MWTL provides the information needed for OSPAR, the EU Water Framework Directive and part of the information for the Trilateral Monitoring and Assessment Programme (TMAP) for the Wadden Sea and the Birds- and Habitats Directives.

LNV is responsible for the other part of the monitoring under TMAP, *i.e.* seals, birds, shellfish and estuarine vegetation. This monitoring is carried out by the Institute for Marine Resources and Ecosystem Studies (IMARES). IMARES also monitors fish stocks in Dutch marine waters for the assessments under the EU Common Fisheries Policy.

Scientific programmes can also include long-term monitoring. For instance, the Royal Netherlands Institute for Sea Research (NIOZ) gathers valuable time series on phytoplankton, benthic fauna and fish communities.

### **Implementation of monitoring requirements**

In 2006 IMARES prepared an inventory of all monitoring activities in marine waters in order to determine to what extent present monitoring activities can be used to fulfil the requirements of European directives and international conventions. IMARES identified deficiencies in the coverage of the current programmes and made recommendations to improve these.

In the Netherlands, implementation of European directives is prepared by governmental project groups. Information requirements coming from these groups need to be investigated and harmonised by central bodies that are presently under development within both V&W and LNV.

***Harmonisation of monitoring activities***

Two initiatives to improve interdepartmental coordination are the development of Management Plans for areas under the Birds- and Habitats Directives (BHD) and the interdepartmental Working Group on Marine Ecological Monitoring (WEMOZ).

The ministries of V&W and LNV are both responsible for the implementation and management of protected areas under BHD. In the Management Plans the requirements of the Birds- and Habitats Directives and the WFD are combined. Hence, for these areas harmonisation of monitoring needs to be accomplished. Monitoring needs are being identified, but no decision has been taken yet on how to organise additional monitoring.

The main objective of WEMOZ is to stimulate coordination between departments and between project groups working on the implementation of the Water Framework Directive (WFD), Birds- and Habitats Directives (BHD), OSPAR Commission and the MSFD. It also aims to cooperate with similar groups in other North Sea countries. WEMOZ consists of project managers of project groups and experts of national research institutes. It reports to the Interdepartmental Directors Meeting on the North Sea (IDON). The working group was started in 2006. Furthermore, the Netherlands actively participates in HARBASINS, see section 3.5.

**2.12 United Kingdom*****Harmonisation of monitoring activities***

The UK Government, devolved administrations, and agencies have developed and are in the process of implementing the United Kingdom Marine Monitoring and Assessment Strategy (UKMMAS). The Strategy aims to shape the UK's capability, within national and international waters, to:

"provide, and respond, within a changing climate, to, the evidence required for sustainable development within a clean, healthy, safe, productive and biologically diverse marine ecosystem and within one generation to make a real difference".

The Strategy provides the framework for a system of coordinated, integrated and efficient monitoring programmes, which are able to provide the evidence needed to assess

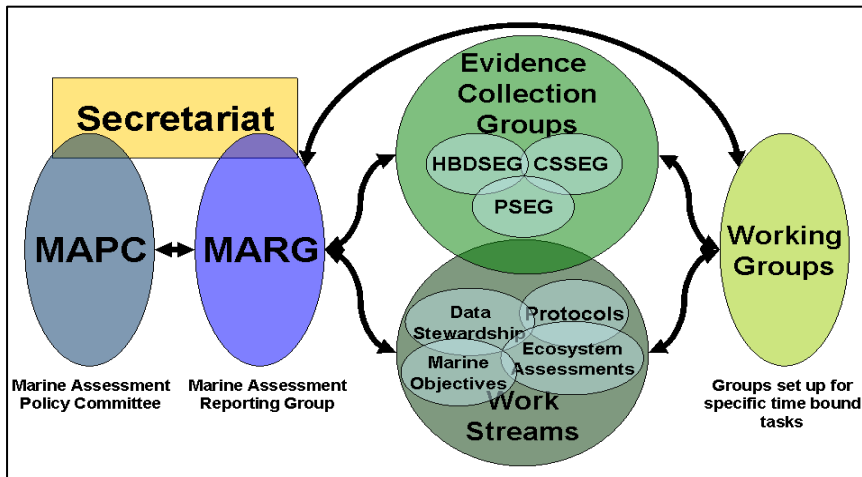
whether UK Seas are clean, safe, healthy, productive and diverse and whether management activities have succeeded.

This collaborative and participatory process aids in improving synergies in ecological monitoring and assessment across different European directives and international conventions. Agencies responsible for the implementation of the different European directives and conventions are represented through the different UKMMAS groups.

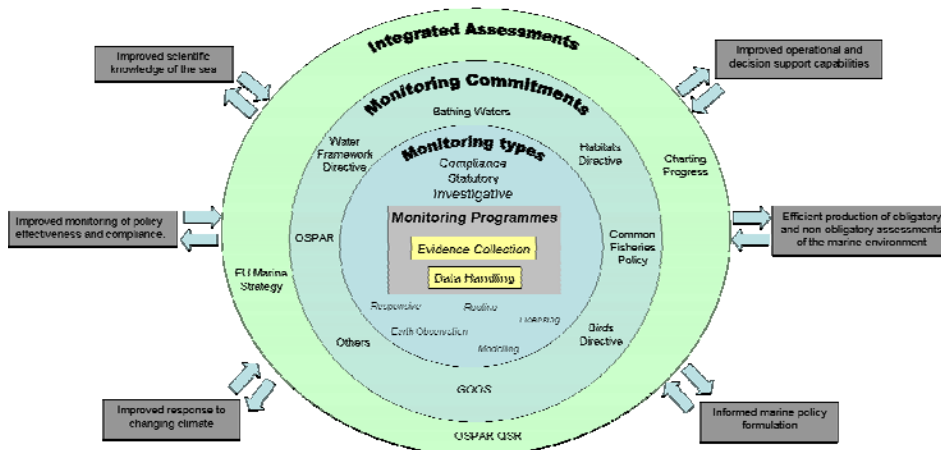
**Organisational structure**

The organisational structure of UKMMAS and conceptual framework are shown in figures 7 and 8.

**Figure 7 Organisational structure of the United Kingdom Marine Monitoring and Assessment Strategy (UKMMAS) (source: [www.defra.gov.uk](http://www.defra.gov.uk))**



**Figure 8 Conceptual Model of the United Kingdom Marine Monitoring and Assessment Strategy (UKMMAS) (source: [www.defra.gov.uk](http://www.defra.gov.uk))**





The UKMMAS institutional framework consists of three tiers. At the highest tier is the Marine Assessment Policy Committee (MAPC), which is comprised of representatives from Government Departments, devolved administrations and relevant agencies. Its role is to shape the UK's capability to provide, and respond to, the evidence required to demonstrate sustainable development within a clean, healthy, safe, productive and biologically diverse marine ecosystem, and to fulfil statutory obligations and international commitments for marine monitoring, particularly those of the MSFD.

It ensures delivery of the UK Marine Monitoring and Assessment Strategy, through:

- Identifying the requirements for marine monitoring and assessment in order to meet international and national obligations and commitments for the marine environment, including operational forecasts and other socio-economic objectives;
- Maximising efficiency and effectiveness of UK resources devoted to marine monitoring and assessments including funding arrangements where appropriate;
- Providing, where necessary, a cross departmental forum for clearance of integrated marine assessments before publication;
- Identifying the policy implications resulting from marine assessments and ensure communication to those able to action; providing where appropriate a proactive lead towards adaptive management.

MAPC is jointly chaired by two Directors from the Department of Environment, Food and Rural Affairs (Defra) and the Scottish Government).

MAPC is supported by a second tier, the Marine Assessment and Reporting Group (MARG). Scientific, technical and policy staff drawn from agencies and institutes responsible for the resources and practical implementation of marine monitoring programmes are represented in this group. The purpose of MARG is to decide how best to carry out assessments to fulfil policy requirements with existing resources and scientific knowledge, direct the implementation of suitable programmes, review the outcomes and assessments and suggest changes to monitoring programmes when necessary. Defra provides the Chair and Secretariat for MARG through its Marine Strategy and Evidence Division.

MARG is supported by a number of tier 3 groups to undertake certain tasks on their behalf:

- *Marine Protocols Coordination Group (MPG)*

This group is responsible for collating, and where necessary setting, data collection standards and protocols and presenting these in a Marine Monitoring Manual. The group consists of technical specialists for different subject areas (e.g. water and sediment chemistry, biological, physical and socio-economic monitoring). Industry and research groups developing new tools and techniques may be part of the relevant groups as appropriate.

- *Evidence Collection Groups (ECGs)*

Three evidence collection groups (Clean and Safe Seas Evidence Group (CSSEG), Healthy and Biologically Diverse Seas Evidence Group (HBDSEG) and Productive Seas Evidence Group (PSEG)) are responsible for implementing practical monitoring programmes and ensuring coordination between operational programmes as well as producing an initial assessment of the results. The distribution of monitoring responsibilities in these three groups is defined in table 2.

**Table 2 Distribution of monitoring responsibilities of the Evidence Collection Groups**

Evidence Group	Examples of drivers/work areas
Clean and Safe Seas (CSSEG)	OSPAR – Hazardous Substances Radioactive Substances WFD – Chemical Status Shellfish Hygiene Directive Bathing Waters Directive
Healthy and Biologically Diverse Seas (HBDSEG)	OSPAR – Biodiversity and Eutrophication WFD – Ecological Status Birds Directive Habitats Directive Conservation of Seals Act IOC – GOOS; Climate Change Impacts; fish community data; IMO Ballast Waters Strategy; UWWT Directive Nitrates Directive
Productive Seas (PSEG)	Socio-economic data Industry data

The Healthy and Biologically Diverse Seas Evidence Group (HBDSEG) is responsible for implementing practical biological monitoring programmes and ensuring coordination between operational programmes as well as producing an initial assessment of the results. Collaborating with a number of agencies and other organisations, this group:

- produces an annual work programme defining the coordinated biological monitoring programmes;
- carries out a thematic assessment of the results and specific assessments (e.g. data reports to ICES (International Council for Exploration of the Sea), EC (Environment Commission), I-GOOS (International-Global Ocean Observing System), assessments for specific directives such as WFD and parts of OSPAR etc.);
- carries out and submits quality controlled data, following agreed protocols.

To produce the annual work programmes HBDSEG collates information about existing biological marine monitoring programmes including the policy and legislative drivers behind the programmes. The information is available as metadata (as part of UKDMOS) on the UKMMAS website (<http://www.defra.gov.uk/environment/water/marine/uk/science/pdf/monitoring-metadata-200707.pdf>) and is updated continuously.

HBDSEG is developing data collection standards and protocols for ecological monitoring programmes as part of development of an overall Marine Monitoring Manual and is working on the development of marine objectives and indicators as part of a framework that captures all existing marine policy commitments and objectives and will translate these into measurable management targets.

The creation of UKDMOS ([ukdmos.org](http://ukdmos.org)) and the web based Marine Protocols Database ([cmsdemo.fcsolns.co.uk/mmpm/index.php](http://cmsdemo.fcsolns.co.uk/mmpm/index.php)) are tools used to help to harmonise ecological monitoring activities. HBDSEG members are feeding the relevant information into these two products alongside other UKMMAS groups.

- *Data stewardship*

Building on work underway within the European project SeaDataNet, the United Kingdom Directory of Marine Observing Systems (UKDMOS) will provide a repository for the collation of UK marine monitoring metadata. Development of the UKDMOS is managed through MARG and the database of UK monitoring metadata will be freely available by Spring 2008. The actual data from the monitoring programmes will be managed within the Marine Environment Data and Information Network (MEDIN) which works in partnership across government, non-departmental public bodies, research institutes and the private sector, to enable more

efficient stewardships of marine data and is responsible for the coordination of accessibility and availability of UK marine environmental data.

- *Marine objectives and indicators*

An initiative is underway to develop a series of Marine Objectives within a framework that captures all existing marine policy commitments and objectives and translates these into measurable management targets.

- *Marine assessment coordination*

Coordination of marine assessments (i.e. OSPAR Quality Status Report by 2010, EU Marine Strategy Characterisation Report by 2012, WFD Assessment of Good Ecological Status by 2020 and EU Marine Strategy Directive Assessment of Good Environmental Status by 2021, as well as production of the Charting Progress II, the Second Integrated Assessment of the State of the UK Seas in 2010) is currently being undertaken through the UKMMAS groups. These groups will manage the production of periodic assessments of the marine environment and ensure that the synthesis of data and research findings are being undertaken by the evidence groups. Technical experts with experience in synthesising information to develop consensus views will be drawn from departments, agencies and the scientific community.

### 3 International activities to improve synergies

#### 3.1 The European Commission (EC)

The European Commission (EC) is the executive branch of the European Union. The body is responsible for proposing legislation, implementing decisions, upholding the Union's treaties and the general day-to-day running of the Union. The EC operates in the method of cabinet government, with 27 "Commissioners" from all member states<sup>16</sup>. These "Commissioners" are bound to represent the interests of the EU as a whole rather than their home state.

##### ***Biodiversity Communication and Action Plan (2006)***

In 2006 the EC adopted a Biodiversity Communication and a detailed Action Plan to halt the loss of biodiversity by 2010. The Action plan proposes concrete measures and outlines the responsibilities of EU institutions and member states. It also specifies indicators to monitor progress including a timetable for these evaluations. The evaluations will be used to determine whether, and to what extent, the 2010 biodiversity commitments have been met and to inform policy decisions by 2010 and beyond.

The indicators to monitor progress are developed through the pan European initiative Streamlining European 2010 Biodiversity Indicators (SEBI 2010) first launched in 2004. The work under SEBI 2010 is performed in collaboration between the European Environment Agency (EEA)<sup>17</sup>, DG Environment of the European Commission, ECNC (European Centre for Nature Conservation), UNEP/PEBLDS (United Nations Environment Programme/Pan-European Biological and Landscape Diversity Strategy) Secretariat with the lead of Czech Republic and UNEP-WCMC (the World Conservation Monitoring Centre) and is led by a Coordination Team.

In 2005 the Coordination Team and six Expert groups involving more than 100 experts nominated by European countries as well as Non Governmental Organisations (NGOs) started working on the compilation of a first European Set of Biodiversity Indicators for assessing the 2010 target for biodiversity. This set of 26 indicators<sup>18</sup> was published in 2007 in an EEA Technical Report (no. 11/2007).

<sup>16</sup> The European Union is composed of 27 independent sovereign countries which are known as member states: Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.

<sup>17</sup> As an agency of the European Union the European Environment Agency (EEA) is devoted to establishing a monitoring network for the monitoring of the European environment. It is governed by a Management Board composed of representatives of the governments of member states, a European Commission representative and two scientists appointed by the European Parliament, assisted by a committee of scientists.

<sup>18</sup> The 26 indicators are: 1. Abundance and distribution of selected species; 2. Red List Index for European species; 3. Species of European interest; 4. Ecosystem coverage; 5. Habitats of European interest; 6. Livestock genetic diversity; 7. Nationally designated protected areas; 8. Sites designated under the EU Habitats and Birds Directives; 9. Critical load exceedance for nitrogen; 10. Invasive alien species in Europe; 11. Occurrence of temperature-sensitive species;

**Intercalibration Exercise under the Water Framework Directive (WFD)**

The Water Framework Directive (WFD) does address ecological elements (e.g. macroinvertebrates, phytoplankton, phytobenthos, macrophytes, macroalgae, angiosperms and fish) in coastal waters and metrics for expressing ecological quality on the basis of such elements are being prepared through an Intercalibration Exercise at European level. This Intercalibration Exercise is a key element in making the general environmental objective of the WFD operational in a harmonised way throughout the EU.

The intercalibration work is led by Working Group A (WG A) on Ecological Status under the WFD Common Implementation Strategy (CIS), and the technical work is coordinated by the European Commission’s Joint Research Centre (JRC) in Ispra, Italy. WG A is responsible for evaluating the results of the intercalibration exercise and making recommendations to the SCG (Strategic Coordinating Group) or the WFD Committee, as and when appropriate. The practical work is carried out in the lakes, rivers and transitional and coastal waters expert groups subdivided into Geographical Intercalibration Groups (GIGs). These GIGs are groups of member states that share ecological types of rivers, lakes and coastal/transitional waters, and can thus compare monitoring results between themselves. GIGs for coastal/transitional waters are shown in table 3.

**Table 3** *List of Geographical Intercalibration Groups of the transitional and coastal waters expert group (GIGs):Source: (circa.europa.eu/Public/irc/jrc/jrc\_eewai/library?l=/intercalibration/intercalibration\_1/EN\_1.0\_&a=d)*

Name of GIG	Member states comprising coastal GIGs
Baltic	Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Sweden.
North-East Atlantic	Belgium, Denmark, France, Germany, Ireland, The Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom.
Mediterranean	Cyprus, France, Greece, Italy, Malta, Slovenia, Spain.
Black Sea	Bulgaria, Romania

An Intercalibration Steering Group consisting of the JRC and representatives of the water category expert groups summarises the results of the different GIGs and water categories and present these to WG A.

**Marine Strategy Framework Directive (MSFD)**

The European Marine Monitoring and Assessment (EMMA) working group (under leadership of the European Environment Agency (EEA) is making preparations for the implementation of the MSFD<sup>19</sup> in the field of monitoring and assessment. The ultimate goal of EMMA is to have a ‘converging’ framework for monitoring and assessment of European marine waters.

As part of these preparations three thematic EMMA workshops focusing on different aspects of marine monitoring and assessment were organised by the EEA together with its European Topic Centre on Water (ETC/WTR) over 2006-2007.

12. Marine Trophic Index of European seas; 13. Fragmentation of natural and semi-natural areas; 14. Fragmentation of river systems; 15. Nutrients in transitional, coastal and marine waters; 16. Freshwater quality; 17. Forest: growing stock, increment and fellings; 18. Forest: deadwood; 19. Agriculture: nitrogen balance; 20. Agriculture: area under management practices potentially supporting biodiversity; 21. Fisheries: European commercial fish stocks; 22. Aquaculture: effluent water quality from finfish farms; 23. Ecological Footprint of European countries; 24. Patent applications based on genetic resources; 25. Financing biodiversity management; and 26. Public awareness.

<sup>19</sup> In December 2007 political agreement was reached between the European Parliament and the Council of the European Union to adopt the MSD ([www.europarl.europa.eu/sides/getDoc.do?type=TA&language=EN&reference=P6-TA-2007-0595](http://www.europarl.europa.eu/sides/getDoc.do?type=TA&language=EN&reference=P6-TA-2007-0595)).

1. Connecting operational oceanography with the European Marine Strategy (EMS) and EEA assessments (October 2006).
2. Requirements and data needs to develop the assessments of ecological processes and biological elements (November 2006).
3. Develop a monitoring and reporting framework for chemical loads and burdens (including focus on hazardous substances) (April 2007).

National experts and experts from European and regional institutions and conventions were invited to these workshops.

The workshop on requirements and data needs to develop the assessments of ecological processes and biological elements recognised and encouraged to use the potential for significant synergies between the implementation of the future MSFD and experiences gained from the implementation of the WFD and other directives that require the assessment of marine ecosystems (e.g. Birds- and Habitats Directives (BHD)). The workshop produced a set of policy and assessment considerations related to the proposed MSFD and its synergies with the WFD and BHD. Its main outcome was a list of existing indicators that address ecological elements relevant to the 'Initial Assessment' under the MSFD (*cf.* Annex III of the MSFD). Indicators relating to pan-European issues and hence potential candidates for pan-European harmonisation were identified. EMMA 2007 invited the EEA to carry out a detailed analysis of present monitoring and quality assurance of these indicators.

Another outcome of the workshop was a preliminary gap identification of existing regional marine indicators or ecological quality objectives in relation to the needs of the 'Initial Assessment'.

### **3.2 The OSPAR Convention (OSPAR)**

#### ***General description***

The convention for the protection of the marine environment of the North-East Atlantic, the OSPAR convention, was signed in 1992 and entered into force in 1998. Work carried out under the convention, is managed by the OSPAR Commission. The OSPAR Commission is made up of representatives of the governments of the 15 contracting parties<sup>20</sup> and the European Commission, representing the European Community. The work under the convention is guided by the ministerial declarations and statements made at the adoption of the convention and at the ministerial meetings of the OSPAR Commission. The work applies the ecosystem approach to the management of human activities and is organised under six strategies:

- Protection and Conservation of Marine Biodiversity and Ecosystems;
- Eutrophication;
- Hazardous Substances;
- Offshore Oil and Gas Industry;
- Radioactive Substances;
- Monitoring and Assessment.

#### ***Harmonisation of monitoring activities***

To harmonise monitoring and assessment activities in the North-East Atlantic the Joint Assessment and Monitoring Programme (JAMP) was developed and implemented in 1995. The JAMP provides the basis for comprehensive quality status reports of the North-Eastern Atlantic. The three main OSPAR monitoring programmes are the Coordinated Environmental Monitoring Programme (CEMP), the Comprehensive Atmospheric Monitoring Programme (CAMP) and the Comprehensive Study on Riverine Inputs and Direct Discharges (RID).

The OSPAR Commission, through the establishment of an Intersessional Correspondence Group – Synergies In Assessment and Monitoring (ICG-SIAM) consisting of representatives of Germany, The

<sup>20</sup> Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Netherlands and the United Kingdom, is seeking synergies in marine monitoring and assessment between OSPAR and the European Union and has published two inventories on this subject: one on synergies in assessment and monitoring of hazardous substances, eutrophication, radioactive substances and offshore industry (OSPAR Publication 2005/230) and one on synergies in assessment and monitoring of biodiversity (OSPAR Publication 2006/294).

As a follow up on the biodiversity report the ICG-SIAM commissioned the production of this report.

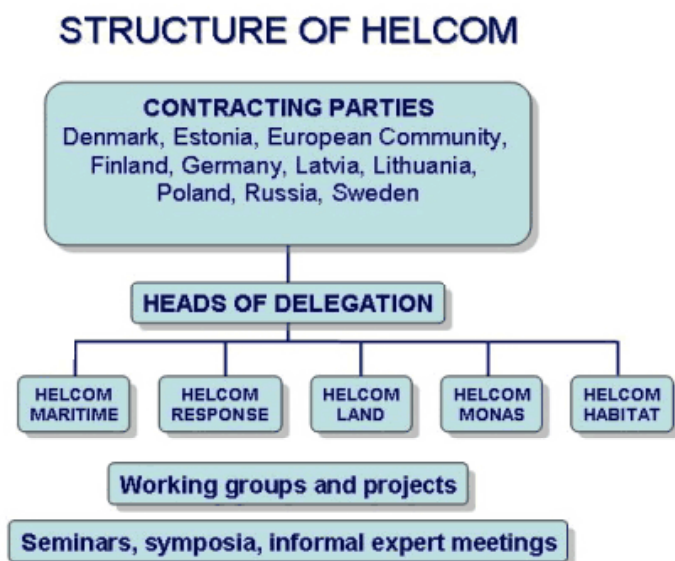
In addition, a discussion has been started by the UK on prioritisation of monitoring related to the biodiversity strands of work within OSPAR, recognizing that this is still in its infancy and that national budgets are limited. Monitoring requirements of EU Directives are also taken into account (cf. Towards a Framework for Biodiversity Assessment and Monitoring, EIHA 07/5/1).

### 3.3 The Helsinki Convention (HELCOM)

#### General description

The Helsinki Commission (HELCOM) is an intergovernmental cooperation between Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden to implement the 1992 Convention on the Protection of the Marine Environment of the Baltic Sea (Helsinki Convention). Participating countries have to deal with similar issues regarding the harmonisation of marine monitoring and assessment as participating countries of OSPAR.

The working structure of HELCOM, supported by the Secretariat, consists of the meetings of the Helsinki Commission, the Heads of Delegation, and five main groups (figure 9).



**Figure 9** Working structure of the Helsinki Commission (HELCOM) (source: [www.helcom.fi](http://www.helcom.fi)).

#### Monitoring activities

The HELCOM Monitoring and Assessment Group (HELCOM MONAS) is responsible for HELCOM's monitoring and assessment programmes:

- the Pollution Load Compilation (PLC-Air and PLC-Water) programmes quantify emissions of nutrients and hazardous substances to the air, discharges and losses to inland surface waters, and the resulting air and waterborne inputs to the sea.
- the COMBINE programme quantifies the impacts of nutrients and hazardous substances in the marine environment, also examining trends in the various compartments of the marine environment (water, biota, sediment).

- monitoring of radioactive substances (MORS) quantifies the sources and inputs of artificial radionuclides, as well as the resulting trends in the various compartments of the marine environment (water, biota, sediment).

### **Harmonisation of monitoring activities**

The HELCOM MONAS aims to ensure that HELCOM's monitoring programmes are efficiently used through horizontal co-ordination between the Commission's five permanent working groups.

In 2003 the HELCOM MONAS started a review of these monitoring programmes taking into account ecological monitoring and assessment requirements of different European directives in the so-called HELCOM MON-PRO project. The overall aims of this project are to have:

- operational, indicator based assessment procedures related to Ecological Quality Objectives (EQOs), including indicator fact sheets, thematic reports and scientific background assessments;
- one combined monitoring programme for the Baltic Sea, which includes emissions-discharges-losses and inputs to, as well as concentrations and effects in the Baltic Sea, to provide information to the Contracting Parties, HELCOM, the EC and for other international forums; and
- harmonised HELCOM monitoring and assessment procedures with the European Water Framework Directive (WFD), the MSFD and other international activities.

The overall objective of the project is to make concrete proposals to adapt the HELCOM monitoring programmes and assessment procedures, by 2006, to be in line with corresponding pan-European activities and scientific and technological development in the field of monitoring.

HELCOM Contracting Parties are developing a Baltic Sea Action Plan (BSAP). The BSAP, which will implement an ecosystems approach and include ecological objectives and derived targets for the HELCOM area, can be regarded as a regional approach to the implementation of European Marine Strategy (EMS). The BSAP includes four segments: 1) eutrophication, 2) biodiversity, 3) hazardous substances, and 4) maritime activities.

Further HELCOM is planning to approve and publish a suite of integrated thematic assessment dealing with eutrophication and biodiversity in the Baltic Sea in November 2008.

## **3.4 Trilateral Wadden Sea Cooperation (TWSC)**

### **General description**

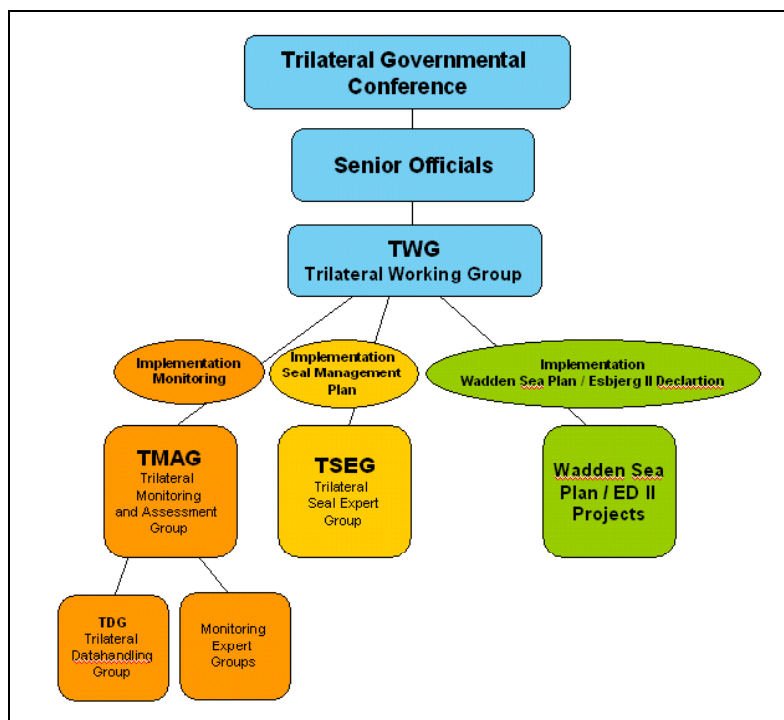
Since 1978 Denmark, Germany and The Netherlands have been working together on the protection and conservation of the Wadden Sea covering management, monitoring and research, as well as political matters. In 1982, a Joint Declaration on the Protection of the Wadden Sea was agreed upon in which the countries declare their intention to coordinate their activities and measures for the protection of the Wadden Sea. In 1997 a Trilateral Wadden Sea Plan was adopted.

### **Organisational structure**

The organisational structure of the Trilateral Wadden Sea Cooperation (TWSC) is presented in figure 10.

The Trilateral Working Group (TWG) meets on average 2-3 times a year. The TWG oversees the implementation of the agreements resulting from the Governmental Conferences including the implementation of a Trilateral Monitoring and Assessment Programme (TMAP), the implementation of a seal management plan and the implementation of the Wadden Sea Plan. The TWG gives direction to various working groups that are responsible for the implementation of these programmes and plans.

The Trilateral Monitoring and Assessment Group (TMAG) (established in 1994) is responsible for the implementation and coordination of the "Trilateral Monitoring and Assessment Program" (TMAP), the development of a trilateral data handling structure and the preparation of assessment reports of the Wadden Sea ecosystem (such as the Wadden Sea Quality Status Report (QSR)). Coordination of these activities is done through the preparation of the TMAP Manual that provides an overview on the structure and contents of the TMAP, draft TMAP guidelines and a description of the TMAP data management system. The TMAG consists of two - three delegates from the national administrations in Denmark, Germany and the Netherlands responsible for the coordination of the national monitoring programmes.



**Figure 10 Organisational structure Trilateral Wadden Sea Cooperation (TWSC) (Source: [www.waddensea-secretariat.org](http://www.waddensea-secretariat.org)).**

The TMAP is carried out by national and regional authorities in charge of monitoring in Denmark, Germany and the Netherlands. In contrast to the OSPAR monitoring programme (JAMP), TMAP has always had a strong focus on ecological monitoring.

The Common Wadden Sea Secretariat (CWSS) is the secretariat for the Trilateral Wadden Sea Cooperation (TWSC). In the framework of the TMAP, the secretariat is responsible for the day-to-day management of the program and the preparation of the meetings of the TMAG and of the technical monitoring groups. Members of the CWSS are hired independently (not staffed by national organisations). The CWSS consists so far of 6 persons: 2 Dutch, 1 Danish, 3 Germans, plus 2 project staff (EU Interreg project).

The TMAP is an integral part of the national monitoring programs of Denmark, Germany and the Netherlands and has to consider ongoing developments on the national levels regarding the refinement of the national programs in these countries. Furthermore, the TMAP has to consider monitoring and assessment requirements resulting from the European Birds- and Habitats Directives (BHD) and the Water Framework Directive (WFD) and other international conventions like the Ramsar Convention, the Bonn Convention, and the OSPAR Convention.

National monitoring programmes in Denmark, Germany and the Netherlands are currently being revised to bring these programmes in line with the requirements of these European directives and international conventions. In order to safeguard that the Wadden Sea is treated as one entity the TMAG carried out a TMAP Revision. During the revision process, the monitoring requirements of various international agreements and European directives were integrated in the TMAP. The parameters of the revised TMAP were adopted in April 2007 by the TWG as a starting point of the further technical and financial elaboration of the TMAP guidelines in a close cooperation with the developments of monitoring on the national and international level.

The revised TMAP will be embedded in the further development of the Wadden Sea Plan (WSP) (which is the strategic management plan for the Wadden Sea Area) by:

- defining specific monitoring objectives for the revised TMAP by combining the requirements of the European directives and the Wadden Sea Plan Targets. General objectives (e.g. favourable status) have been defined by TMAG in 2005, and further work (e.g. defining assessment tools and values) will be carried out as part of the further development of the Wadden Sea Plan.



- deducing monitoring parameters to be measured, and defining frequencies, stations and methods. This work was carried out by the TMAP working groups (birds, seals) and within expert workshops on specific topics (salt marshes, beaches and dunes, fish, sea grass, hazardous substances).
- incorporating results from the running WFD process on the national level, from European WFD workshops and/or TMAP-WFD workshops.

The result of this revision process will be a revised TMAP Manual that will be able to fulfil monitoring requirements of the different European directives and international obligations for the Wadden Sea. The TMAP Revision process is co-financed by the Interreg IIIB Project HARBASINS (see § 3.5).

### 3.5 Harmonised River Basins Strategies North Sea (HARBASINS)

#### **General description**

HARBASINS is a European project, which commenced in 2005 and which aims to enhance the compatibility of management strategies for the North Sea's coastal waters, estuaries and river basins. The focus of HARBASINS is on the implementation of the Water Framework Directive (WFD) in relation to the Birds- and Habitats Directives (BHD) and Integrated Coastal Zone Management (ICZM), but other international agreements are also taken into account. One of the overall objectives of HARBASINS is to match approaches and development of instruments for management, monitoring and assessment needed to meet the requirements of the WFD, and regarding the Bird and Habitat Directives and other international agreements on coastal zone management.

HARBASINS has 7 project partners from the 4 countries:

1. Rijkswaterstaat, Centre for Water Management (RWS/RIKZ), The Netherlands (lead partner);
2. Institute of Estuarine & Coastal Studies, University of Hull, United Kingdom;
3. Research Institute for Nature and Forest (INBO), Belgium;
4. Lower Saxony Water Management, Coastal Defence and Nature Conservation Agency - Coastal Research Station (NLWKN), Germany;
5. Rijkswaterstaat, Directorate Northern Netherlands, The Netherlands;
6. Rijkswaterstaat, Directorate North Sea, The Netherlands
7. The Common Wadden Sea Secretariat (CWSS) in Germany (see § 3.4).

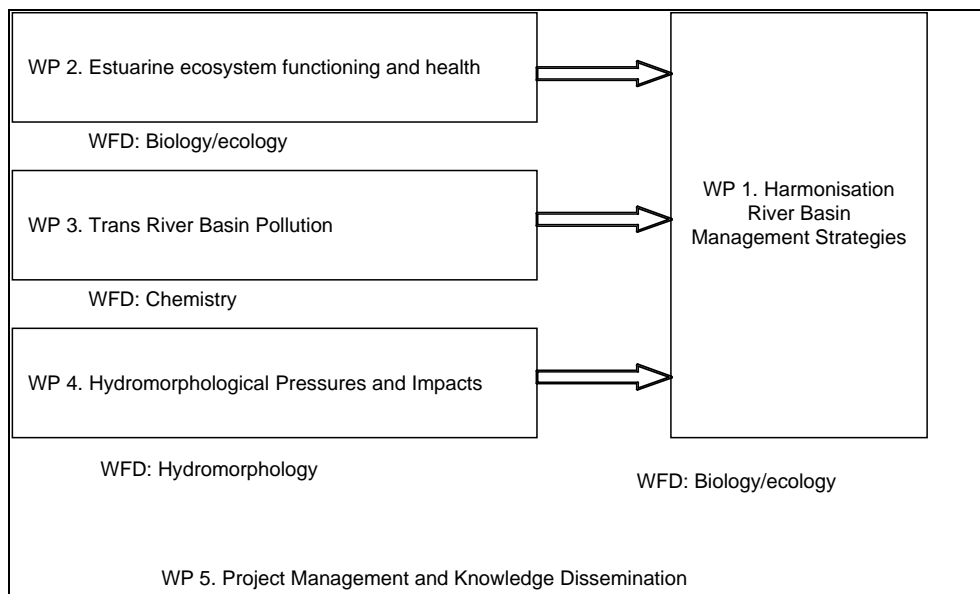
#### **Organisational structure and work packages**

A Project Team is the key decision body of HARBASINS and consists of the Project Manager, one representative of each partner and all Work Package Leaders (in most cases the representative is also a Work Package Leader). The Project Team is supported by an Advisory Group.

The activities of HARBASINS are structured around four central work packages related to the ecological, chemical and hydromorphological quality aspects and the management plans of the Water Framework Directive (WFD), with a fifth work package coordinating the overall project management and knowledge dissemination (see figure 11). Work packages 1 and 2 are relevant for ecological monitoring and assessment programmes and are described in more detail below (source: [www.harbasins.org](http://www.harbasins.org)).

Work package 1 deals with the key objective of HARBASINS to establish a proposal for the overall coordinated management and monitoring of coastal waters and estuaries with respect to integrated coastal zone management. As part of this work package an overview of European legislation and international agreements with respect to the North Sea and regional agreements for specific coastal areas and estuaries was prepared in 2007 (De Graaf *et al.*, 2007). This overview also included an overview of national administrations responsible for implementing these directives and agreements.

The preparation of an integrated monitoring and assessment strategy that takes into account the requirements of the various European directives together with other relevant conventions is currently under development. The Trilateral Monitoring and Assessment Programme (TMAP) of the Wadden Sea will act as a pilot project and will deliver a monitoring handbook, which can be applied to other coastal areas.



**Figure 11 Work packages of HARBASINS (source: www.harbasins.org)**

Work package 2 aims to exchange knowledge and experiences between different regions in estuarine habitat status, use, loss and gain with particular emphasis on restoration practices. The work package will assess the different approaches by regions in Europe with respect to legal implementation of European directives, especially the Habitats and Water Framework Directives together with site-specific management experiences that result in improved estuarine functioning and health. The work aims to improve conceptual knowledge of estuarine habitat function, particularly for fish communities, and provide an assessment of the ecological status of key habitats across Europe.

As part of HARBASINS, a network of public authorities and scientific institutions will be created encouraging the exchange of knowledge and discussions required to establish harmonised management, monitoring and assessment techniques. In addition, HARBASINS will host a number of forums and seminars to further these discussions and will create a website for the dissemination of data and expertise. The first workshop has taken place in Antwerp on 5-7 June 2007 and the second workshop was held in Hull on 12-14 November 2007. Water directors from member countries were invited for the second workshop. The aim of the second workshop was to formulate recommendations for decision makers. The HARBASINS project will finish in June 2008.

### 3.6 The International Scheldt Commission (ISC)

#### **General description**

The International Scheldt Commission (ISC) is a cooperation between Belgium, France and the Netherlands to coordinate coastal and marine management in the Scheldt estuary. The ISC developed and implemented the Scheldt Action Programme between 1998 and 2002 and started the international Scaldit<sup>21</sup> project in 2003 to develop an integrated water management plan for the Scheldt River Basin District before 2008. The following six partners are involved in the Scaldit project:

1. Flemish Region: Belgian Federal Public Service 'Environment' (VMM) (lead partner);
2. Brussels Capital Region: Institut Bruxellois de Gestion de l'Environnement - Brussels Instituut voor Milieubeheer (IBGE - BIM);
3. Walloon Region: Direction Générale des Ressources Naturelles et de l'Environnement (DGRNE);
4. France: Le Préfet Coordonnateur du Bassin Artois Picardie - La Direction Régionale de l'Environnement Nord-Pas de Calais;

<sup>21</sup> The name 'Scaldit' is made up of 'Scaldis' - the Latin name for Scheldt - and Integrated Testing.

5. The Netherlands: Ministry of Transport, Public Works and Water Management, DG Water;
6. The Netherlands: Zeeland Province.

### **The Scaldit programme**

Scaldit is being implemented by three working groups set up within the framework of the International Scheldt Commission: Working group A 'impact on the aquatic environment' and working group B 'quality of the aquatic environment' are dealing with the technical aspects. Working group C is coordinating the project. A number of project groups have been defined within the working groups. Each project partner takes care of one or more project groups (see figure 12).

All the parties represented in the ISC have delegated at least one expert per project in order to ensure international co-operation within each project. Since the Belgian Federal government only has a limited number of areas of competence in the field of water policy, it only takes part in those groups for which it is legally competent. Working groups A, B and C include representatives of the project groups. The chairmen of working groups A and B are in turn members of the coordinating working group C. This promotes the smooth flow of information. In addition, it ensures co-operation between the projects and the working groups between the working groups themselves.

Part of the action Scaldit action programme was the intercalibration of the different biological monitoring systems used by the project partners. A project group (PA4) "Goede toestand zoet oppervlaktewater" consisting of representatives from the Flanders Region, The Netherlands, Brussels Capital Region, Wallonia and France worked on defining 'good conservation status' that has to be considered under the Water Framework Directive. This project group worked under the supervision of the ISC. The intercalibration did not aim at developing a common monitoring programme for the Scheldt estuary.

### **3.7 Other international activities**

Apart from international working groups many international ecological research projects and data management systems have been developed aiming at harmonisation of marine monitoring and assessment activities.

An example for an international research project relevant for the countries investigated in this report is the international marine habitat mapping programme MESH (Mapping European Seabed Habitats) ([www.searchmesh.net](http://www.searchmesh.net)). A consortium of 12 partners across the United Kingdom, Ireland, the Netherlands, Belgium and France draw together scientific and technical habitat mapping skills to produce seabed habitat maps for north-west Europe and develop international standards and protocols for seabed mapping studies. The end products in 2008 will be a meta-database of mapping studies, a web-delivered geographic information system (GIS) showing the habitat maps, guidance for marine habitat mapping including protocols and standards, a report describing case histories of habitat mapping, a stakeholder database and an international conference with published proceedings.

Examples of international marine databases include EDMERP (European Directory of Marine Environmental Research Projects: [www.sea-search.net](http://www.sea-search.net)), EDIOS (European Directory of the Ocean Observing System: [www.edios.org](http://www.edios.org)), INSPIRE ([www.ec-gis.org/inspire](http://www.ec-gis.org/inspire)) and SeaDataNet (a pan-European infrastructure for Ocean & Marine Data Management: [www.seadatanet.org](http://www.seadatanet.org)).

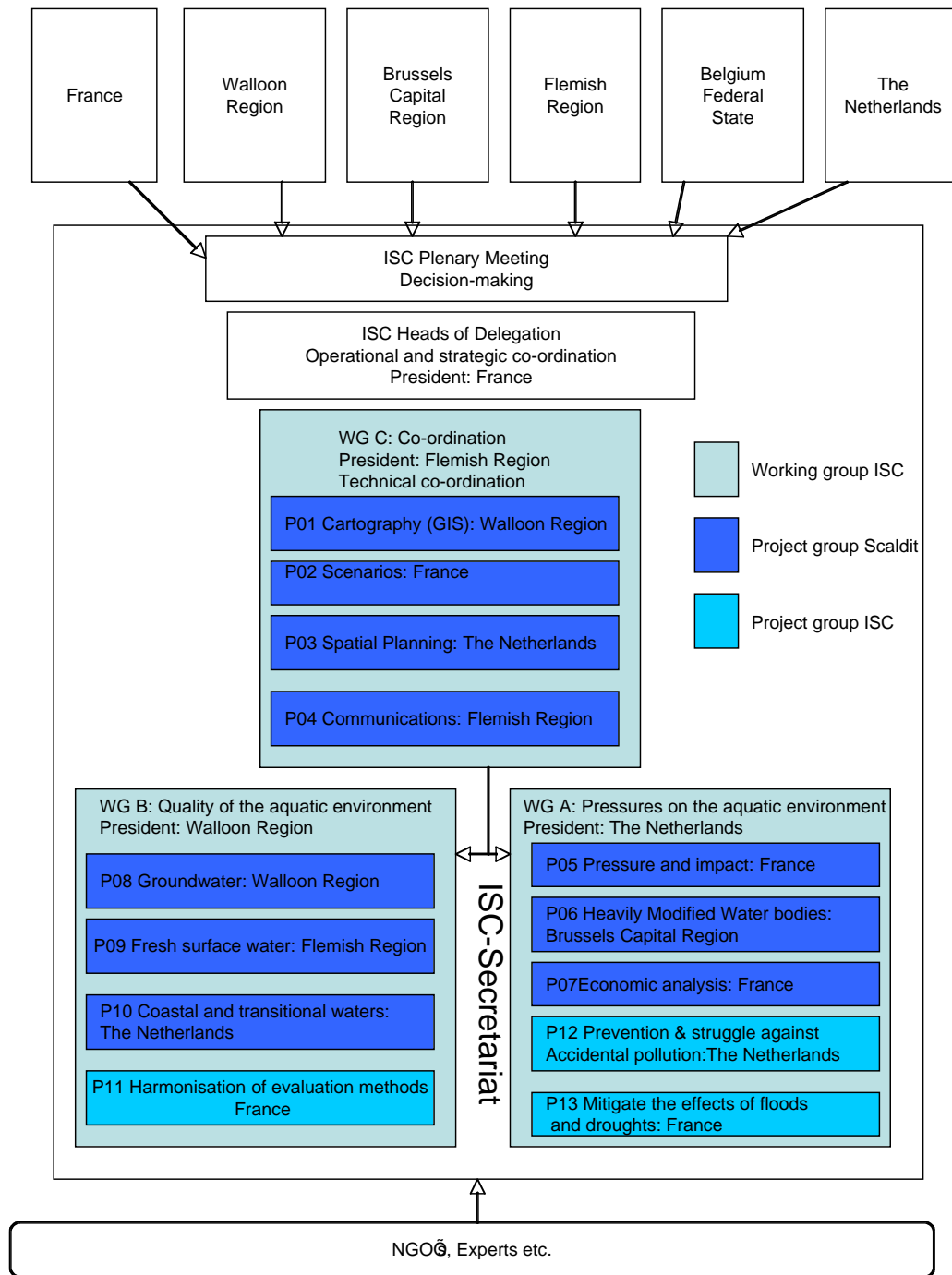


Figure 12 Organisational structure of the Scaldit project (source: [www.scaldit.org](http://www.scaldit.org)).

## 4 Comparison of activities in different countries

### 4.1 National marine monitoring programmes

Most OSPAR countries, except for Iceland, France and Spain, have prepared a national overview of ecological marine monitoring and assessment programmes used to fulfil requirements of different directives and international conventions. Iceland, France and Spain do prepare overviews of different ecological monitoring activities annually (e.g. fish, environmental parameters, seabirds), but have not combined these into one document. Regular monitoring activities in Portuguese coastal and transitional waters were described in the 'Monitoring plan for Portuguese coastal waters', but it is not known whether an overview of all marine monitoring activities exists for Portugal.

Denmark, Germany, Ireland, Sweden and the United Kingdom brought the different ecological programmes carried out in their country together into one overarching national (marine) monitoring and assessment programme called respectively NOVANA, BMLP+, NEMP, the National Marine Monitoring Programme and UKMMAS. Monitoring of e.g. hazardous substances, nutrients, biological effects and physical aspects is also included in these programmes. Each separate programme within these overarching programmes still exists in its own right, but is brought together with other programmes to coordinate and where possible integrate different monitoring and assessment activities.

The implementation status of overarching national programmes in these countries varies:

- In Denmark, Germany, Ireland and the United Kingdom the national programmes have been modified to meet reporting requirements of both the Water Framework Directive (WFD) and the Birds- and Habitats Directives (BHD). The modified programmes in these countries are currently being implemented, except for Ireland where the national programme is only partly implemented<sup>22</sup>.
- In Sweden the national programme has only been modified to meet reporting requirements of the WFD. At this stage no activities are undertaken to adapt the programme to monitoring requirements of the Birds- and Habitats Directives (BHD).

Belgium, Iceland<sup>23</sup>, France, Norway<sup>23</sup>, Portugal, Spain and The Netherlands have not brought together all ecological and/or other marine monitoring and assessment programmes into one overarching programme. These countries currently use several major programmes (generally consisting of numerous sub-programmes) to fulfil requirements of different directives and international conventions. The implementation status of the monitoring and assessment programmes in these countries also varies:

- In Belgium, France and The Netherlands sub-programmes have been adapted or are in the process of being adapted to reporting requirements of the WFD and BHD and in all these countries monitoring activities under the WFD and BHD have already started.
- Norway is currently preparing national monitoring guidelines for coastal waters and the open ocean and will start monitoring under the WFD in different regions in 2008. Norway has not implemented the BHD.
- Iceland is not implementing the BHD either and will implement the WFD 7 years later than other EU Member States.
- Portugal prepared a National Monitoring Plan for coastal waters to meet WFD reporting requirements. It is unclear if this programme is used for reporting requirements under other EU directives and international conventions.
- Spain prepared several manuals with relevance for marine monitoring including a manual to design integrated and harmonised monitoring programmes in coastal and transitional waters. These manuals are to be used by regional governments to design monitoring programmes for their regions.

## **4.2 National activities to harmonise activities and improve synergies**

All OSPAR countries have recognised the need for harmonisation of marine ecological monitoring and assessment activities and improvement of synergies between different European directives and international conventions.

A comparison of national activities in the different countries is summarised in the box below. For detailed information on activities (e.g. specific activities of working groups) refer to the country descriptions provided in chapter 3.

<sup>22</sup> Mainly because of lack of funding and the absence of an organisational strategy to implement the NEMP.

<sup>23</sup> Not an EU member.

**Text Box: Summary of national activities**

**Belgium:**

Monitoring of marine areas is the responsibility of the Federal Government and implementation of international obligations governed by the Flemish region. Monitoring is carried out primarily by a federal institute (MUMM) and some other research institutes and Universities. The marine unit of the Coordination Committee for International Environment Policy (CCIEP) is the linking pin and the proper body for harmonisation.

**Denmark:**

The Nationwide Monitoring and Assessment Programme for the Aquatic and Terrestrial Environment (NOVANA) is the integrated monitoring programme of Denmark. It is attached to the Danish Environmental Protection Agency (EPA) and the participants are national environmental research institutes. The Steering Committee on marine waters organises the harmonisation of marine monitoring activities.

**France:**

The Ministry of Ecology and Sustainable development is responsible for the implementation of the European directives and international conventions and delegates the implementation including monitoring and assessment activities to IFREMER (WFD and OSPAR) and the National History Museum (Birds- and Habitats Directive (BHD)). Harmonisation takes place at the Ministry during annual working group meetings on specific topics (e.g. benthos, fish). International harmonisation is done through participation in international working groups (e.g. EU WFD Intercalibration groups).

**Germany:**

The future Bund Länder-Messprogramm + (BMLP+) will organise an integrated marine monitoring programme. The participants in the BMLP+ include environmental agencies from the federal government and delegates of the national agencies responsible for fulfilling EU directives and scientists. The Steering Group and its Working Groups will organise harmonisation.

**Iceland:**

The Environmental Agency (EA) is responsible for the coordination and harmonisation of marine monitoring and assessment activities and makes agreements with research institutes, mainly the Marine Research Institute (MRI), and/or other relevant organisations to carry out the required monitoring programmes. Iceland is not implementing the Birds- and Habitats Directives (BHD) and the Water Framework Directive (WFD) will be implemented 7 years later than Member States of the EU do. Iceland has not made any decisions yet about the Marine Strategy Directive (MSD).

**Ireland:**

The National Environmental Monitoring Program (NEMP) potentially covers all marine monitoring, and includes a steering structure. The participants are authorities with statutory responsibilities for monitoring coastal, marine and transitional waters. However, implementation is pending.

**The Netherlands:**

Marine monitoring and implementation responsibilities are divided between two Departments. For each of them an institute organises the monitoring. Harmonisation is mainly taken up in projects: Working Group on Marine Ecological Monitoring (WEMOZ), Management Plans for Natura 2000 areas and HARBASINS. There is yet no formal structure for harmonisation at the national level.

**Norway:**

No ecological monitoring programmes under the Water Framework Directive (WFD) have started yet, but based on national monitoring guides for coastal waters and the open ocean Norway will start monitoring under the WFD in different regions during 2008. Norway has not implemented the Birds- and Habitats Directive (BHD) and has not made any decisions yet about the Marine Strategy Directive (MSD).

To harmonise monitoring activities the Directorate for Nature Management (DN) has prepared national monitoring guidelines for monitoring coastal waters and is working on a similar guide for the open ocean. These guidelines are written by a working group consisting of representatives from management bodies and research institutions. In addition to these monitoring guides Integrated Management Plans are being developed for the Barents Sea and the Norwegian Sea. Part of these plans is the development of a new and more coordinated system for marine monitoring using an advisory group led by the Norwegian Institute of Marine Research (IMR).

**Portugal:**

INAG is the Environmental Ministry Agency responsible for the implementation of European directives and other international agreements with relevance for coastal and marine waters in Portugal. Marine monitoring is carried out by governmental institutes (IPIMAR and HI) and research institutes (mainly IMAR). The Monitoring plan for water quality and ecology of Portuguese coastal waters (MONAE) provides an integrated approach to meet monitoring requirements of the WFD in all Portuguese coastal and transitional waters. MONAE was developed by an interdisciplinary international project team and was organised around monthly meetings and three work packages: data acquisition and definition of system limits, classification and monitoring and definition of MONAE and coordination of activities.

**Spain:**

The national government (Ministry of Environment and Ministry of Development) is responsible for marine monitoring activities in waters seawards of the territorial baseline (e.g. MSD, BHD); the regional governments are responsible for coastal waters (e.g. WFD). To achieve harmonisation at the national level the national government prepared several manuals providing guidelines to set up integrated and harmonised monitoring programmes. These manuals are to be implemented in different regions by regional governments. International harmonisation is done through participation in international working groups.

**Sweden:**

The National Marine Monitoring Programme, carried out by contractors to the Swedish Environmental Protection Agency (SEPA) mainly universities and/or national agencies, provides the national overview of the state of coastal and marine waters in Sweden and forms the basis for reporting to international organisations. The programme is used to integrate existing monitoring and assessment activities with activities required under the Water Framework Directive (WFD). At this stage no activities are undertaken to adapt the programme to monitoring requirements of the Natura 2000 Directive. For the Marine Strategy Directive (MSD) an investigation is presently carried out regarding the possible inclusion of some variables not currently measured within the programme. To harmonise monitoring activities at all levels within the Swedish administrative structure, SEPA prepared a monitoring handbook, based on international standards such as guidelines from HELCOM and OSPAR, to perform different types of monitoring including procedures for quality assurance and – control.

**The United Kingdom:**

United Kingdom Marine Monitoring and Assessment Strategy (UKMMAS) is the coordination mechanism for integrated monitoring of the UK seas. The participants are Government departments, devolved administrations and agencies that are responsible for the implementation of the EU directives and conventions and assembling of evidence derived from monitoring initiatives. UKMMAS has a three-tiered structure with a high-level policy committee (MAPC), a technical advisory group (MARG) and a number of Evidence Collection Groups, such as the Healthy and Biologically Diverse Seas Evidence Group (HBDSEG) is responsible for practical implementation and coordination.

A comparison of national activities in OSPAR countries is hampered by differences in:

- administrative structures (e.g. complex administrative structures in Germany, Denmark and the UK compared to the relatively basic administrative structure in Iceland);
- size of sea areas (e.g. Belgium has one relatively small sea area, whereas several different sea areas around Sweden and Norway are much larger);
- obligations to implement EU directives (e.g. Iceland and Norway are not implementing the Birds - and Habitats Directives (BHD) and Iceland will implement the WFD 7 years later compared to EU member states).

Nonetheless the following similarities and differences have been identified:

- Denmark, Germany, Ireland, Sweden and the United Kingdom try to harmonise activities and improve synergies through the implementation of one integrated national marine monitoring and assessment programme.
  - Denmark, Germany and the United Kingdom have developed (or are developing) an organisational structure to implement these programmes consisting of Steering Committees and Working Groups with specific tasks.
  - Ireland established a Marine Monitoring Forum to implement their national programme, but did not develop an organisational strategy or establish specific working groups.
  - In Denmark, Germany, Sweden and the United Kingdom the responsible agencies have committed themselves to the implementation of these integrated national programmes.
- In Belgium, Iceland, France, Norway, Portugal, Spain and the Netherlands marine monitoring and assessment activities are not integrated into one programme.
  - In Belgium harmonisation of activities takes place through an inter-governmental consultative forum (ICCIEP). The three administrative regions and the federal state prepare common positions towards European directives and OSPAR decisions and report environmental monitoring data to international forums.
  - In France, Norway and Spain harmonisation takes place at ministerial level (respectively Ministry of Ecology and Sustainable development and Directorate for Nature Management). Harmonisation is done through annual working groups (France) or the preparation of national monitoring guidelines (Norway, Spain). In Iceland harmonisation will also take place at ministerial level (Environmental Agency), but no specific activities have started yet.
  - In the Netherlands harmonisation is discussed at the level of project groups. No formal structure exists at the national level. The Working Group on Marine Ecological Monitoring (WEMOZ), in which the two departments responsible for monitoring and implementation of EU Directives and international agreements are represented, aims at better integration.
  - In Portugal harmonisation of monitoring activities in coastal and transitional waters is done through the MONAE project. This project was carried out by an interdisciplinary international project team and was organised around several work packages.

### **4.3 International activities to harmonise activities and improve synergies**

Most countries except for Iceland and Norway are member states of the European Union (EU) and are (or have been) involved in activities of the European Commission (EC) to harmonise monitoring activities at international level. However, Norway has participated in harmonisation of monitoring activities under the WFD (e.g. through the North-East Atlantic Intercalibration group).

All countries and the European Commission are Contracting Parties to OSPAR convention. Denmark, the European Commission, Germany and Sweden are also involved in international activities under the Helsinki-Commission.

Several international co-operations have been established between neighbouring countries for transboundary marine and coastal areas. Most notable co-operations for countries included in this report are the Trilateral Wadden Sea Cooperation (TWSC) between Denmark, Germany and The Netherlands and the International Scheldt Commission (ISC) between Belgium, France and The Netherlands.



Activities to harmonise ecological marine monitoring and assessment activities carried out under these co-operations vary:

- Under the TWSC a specific working group 'Monitoring and Assessment' established a monitoring and assessment programme for the entire Wadden Sea and is currently revising this programme in such a way that it will fulfil monitoring requirements of the different European directives and international obligations.
- Under the ISC expert workshops have been organised to harmonise monitoring and assessment activities in the countries of the project partners. No common monitoring and assessment programme for the Scheldt estuary has been developed.

In addition all countries are involved in international projects to harmonise monitoring and assessment activities. These projects could be used to initiate harmonisation of monitoring activities in these countries. Examples include the HARBASINS project (§3.5), the international marine habitat mapping programme MESH (§3.7) and the Benthic Invertebrates Of Icelandic Waters programme BIOICE (§2.5).

For detailed information on international activities (e.g. specific activities of working groups) refer to the descriptions provided in chapter 3.

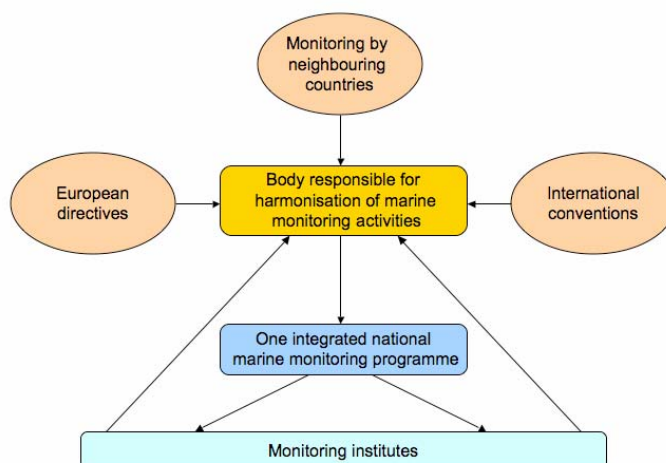
## 5 Recommendations

Considering the immature stage of biodiversity monitoring it is not yet possible to draw firm conclusions on 'Best Practices' or 'Lessons Learnt'. However an attempt is made to draw up a few 'basic steps' including an organisational structure to organise improved harmonisation and synergy at a national level. In addition four recommendations are formulated to achieve harmonisation at the international level.

### **National level:**

**Step 1:** Set up a clear organisational structure to implement monitoring and assessment requirements resulting from different European directives and conventions and establish a national body responsible for harmonisation of marine ecological monitoring and assessment activities (i.e. Topic Centres in Denmark, the working group monitoring and assessment in Germany, WEMOZ in the Netherlands, HBDSEG in the UK, Ministerial working groups in France and Norway).

This organisational structure may be different for each country, but should contain the components shown in figure 13.



**Figure 13 Basic organisational structure to harmonise monitoring and assessment activities at a national level.**

To harmonise ecological monitoring activities with other marine monitoring activities (e.g. physical, chemical, hydromorphological) this body should be directed by a steering group that oversees all marine monitoring

activities in a specific country. An example of such a set up is the organisational structure of UKMMAS (§2.6).

**Step 2:** The body responsible for harmonisation of national marine monitoring activities should carry out the following tasks:

- Prepare an overview of 'what needs to be done and what is already done'
  - prepare an overview of existing marine ecological monitoring and assessment programmes (including methods and organisations involved) and identify the drivers behind these programmes. Identify overlaps and potential areas for harmonisation;
  - prepare an overview of marine monitoring and assessment requirements resulting from different European directives and international conventions and identify overlap;
  - analyse if existing programmes can be used to fulfil the requirements (adjust or develop new programmes if necessary).

An example for the presentation of this information is the summary sheets used in Germany. These summary sheets contain information about goals and monitoring requirements resulting from different directives and conventions, existing and proposed monitoring programmes (including methods and organisations involved), assessments and data management.

- Prepare integrated ecological monitoring and assessment plans for marine waters using already established international forums and/or project groups (e.g. TWSC for the Wadden Sea, ISC for the Scheldt estuarium, Harbasins for the North Sea, Helcom for the Baltic Sea etc.). Leave room for flexibility to implement these programmes in the countries involved. Harmonisation is not about doing things exactly the same, but about comparability of results. A good example of such a programme is the Trilateral Monitoring and Assessment Programme (TMAP) for the Dutch Wadden Sea.
- Make sure there is commitment of the government and agencies involved to carry out monitoring and assessment programmes (including funding).

**International level:**

1. Share information about initiatives to harmonise monitoring and assessment activities and best practices for example by updating this document when new information becomes available.
2. Inform neighbouring countries on the progress in developing and implementing indicators/parameters for biodiversity. Share overviews of existing monitoring programmes and gaps;
3. Where possible and/or cost effective: harmonise at bilateral, regional or European level.
4. Develop common implementation strategies for monitoring ecological parameters under the MSFD.

## 6 References

- Bouma S., 2007. Marine Biodiversity Monitoring and Assessment: Activities to improve synergies between EU directives and international conventions. Activities in Belgium, Denmark, Germany, Ireland, The Netherlands and the United Kingdom. Bureau Waardenburg report nr. 07-184.
- Brockmann Consult, January 2007. Konzept für ein harmonisiertes Überwachungsprogramm für die deutschen Küsten – und Meeresgewässer (BLMP+). Endbericht.
- De Graaf P.J.F., Marencic H., Burdon D., Simoens I. & Knaack H., 2007. HARBASINS report: Water Framework Directive and North Sea coastal areas and estuaries. HARBASINS phase 1: legislation and administration.
- Department for Environment, Food and Rural Affairs (Defra), United Kingdom, May 2006. UKMMAS: A strategy for UK Marine Monitoring and Assessment. A report prepared by the Marine Monitoring Coordination Group and adopted by the Marine Assessment Policy Committee in May 2006.
- Environmental Protection Agency (EPA) Ireland, October 2003. The National Environmental Monitoring Programme (NEMP) for Transitional, coastal & marine waters. A discussion document. Produced by EPA in collaboration with the Marine Institute, the Radiological Protection Institute of Ireland, Met Éireann and National Parks and Wildlife of the Department of the Environment, Heritage and Local Government.
- Ferreira J.G., Abreu P.F., Bettencourt A.M., Bricker S.B., Marques J.C., Melo J.J., Newton A., Nobre A., Patricio J., Rocha F., Rodrigues R., Salas F., Silva M.C., Simas T., Soares C.V., Stacey P.E., Vale C., de Wit M., Wolff W.J., 2006. The Monitoring plan for Portuguese coastal waters: Water Quality and Ecology.
- Institute for Marine Resources & Ecosystem Studies (IMARES), The Netherlands, draft December 2006. Monitoring van biologische en abiotische parameters in zoute wateren in Nederland. De actuele situatie, de verplichtingen voortvloeiend uit Europese regelgeving en aanbevelingen voor de toekomst.
- Ministry of Transport, Public Works and Water Management (V&W), The Netherlands Concept April 2007. Projectplan Zee Nationaal – Beleidsontwikkeling RIKZ – Deelproject WEMOZ (Werkgroep Ecologische Monitoring Zoute Wateren).
- National Environment Protection Agency (Danish EPA), National Environmental Research Institute (NERI), 2005. National Monitoring and Assessment Programme for the Aquatic and Terrestrial Environment (NOVANA). Programme description part 1 NERI Technical Report no. 532.
- National Environment Protection Agency (Danish EPA), National Environmental Research Institute (NERI), 2005. National Monitoring and Assessment Programme for the Aquatic and Terrestrial Environment (NOVANA). Programme description part 2 NERI Technical Report no. 537.
- Ospar Commission, 2006. Synergies in Assessment and Monitoring between OSPAR and the European Union. Volume 2: Biodiversity. Ospar publication 2006/294.
- Ospar Commission, 2005. Synergies in Assessment and Monitoring between OSPAR and the European Union. Volume 1: Analysis of synergies in assessment and monitoring of hazardous substances, eutrophication, radioactive substances and offshore industry in the North-East Atlantic. Ospar publication 2005/230.

## **Appendices**

## Appendix 1 Contact persons

### National activities

#### Belgium

Name: Geert Raeymaekers  
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#### Denmark

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### **International activities**

#### European Commission (EC)

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#### Common Wadden Sea Secretariat (CWSS)

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#### Harmonised River Basins Strategies North Sea (HARBASINS)

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## Appendix 2 Project information and interview questions

### Project: "Inventory of activities to improve synergies in marine assessment and monitoring between EU Directives and international Conventions"

Subject: Inventory through telephone interviews

Dear xxxx,

To determine whether ecological goals and objectives identified in European Directives and international Conventions are being met, monitoring data and assessments of marine ecosystems are needed. The main European Directives with relevance for marine ecosystems are the Water Framework Directive (WFD), Birds- and Habitats Directives (BHD) and the future Marine Strategy Directive (MSFD). Examples of international Conventions established to protect the marine environment are the OSPAR Convention, the Trilateral Wadden Sea Cooperation (TWSC) and the Helsinki Commission (HELCOM).

To meet the different monitoring requirements in a cost-effective and efficient way harmonisation of monitoring activities is needed both at the national and international level. Harmonisation provides opportunities to avoid repetition and to improve comparability.

Several initiatives have been taken to facilitate harmonisation. For instance OSPAR is seeking synergies in assessment and monitoring between OSPAR and the EU (Intersessional Correspondence Group ICG-SIAM) and has published two inventories, the latter on Biodiversity (OSPAR Publication 294/2006).

ICG-SIAM has recognised that biological monitoring and assessment is still developing. Therefore, the best next step would be an exchange of experiences and best practices aiming at establishment of coherent programmes.

For this purpose ICG-SIAM commissioned Bureau Waardenburg BV., consultants for environment & ecology, to carry out an inventory of national and international activities to harmonise monitoring activities in Belgium, Denmark, Germany, Ireland the Netherlands and United Kingdom. The results will be reported at the next meeting of the OSPAR Working Group on Marine Protected Areas, Species and Habitats (MASH) scheduled to take place between 6 – 9 November 2007. We expect that our report will inspire OSPAR contracting parties to efficiently organise harmonisation, learning from each other's experiences.

This inventory depends on input from contact persons in Belgium, Denmark, Germany, Ireland the Netherlands and United Kingdom who are involved in the implementation of the different European Directives and Conventions mentioned above. Your name has been put forward by Jane Hawkridge (UK), Jochen Krause (D) or Lisette Enserink (NL) of ICG-SIAM and you should already have been contacted to ask for your cooperation.

Bureau Waardenburg would like to organise a telephone interview with you before mid-September to discuss the questions attached to this email.

Can you please indicate when (date and time) it would be convenient for you to have this interview?

If you prefer to answer the questions in writing, you are most welcome to do so.

We also welcome **any documents or websites** explaining how biological monitoring and assessment is organised in your country and which harmonisation activities are being developed. This will enable us to properly prepare the interviews.

Thanking you in advance for your cooperation,

Kind regards,  
Sietse Bouma

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**Bureau Waardenburg bv**  
Consultants for environment & ecology

## **“Inventory of activities to improve synergies in marine assessment and monitoring between EU Directives and international Conventions”**

### **Interview questions**

#### **Introduction and responsibilities**

1. Which organisations in your country are responsible for the implementation of the different European directives (i.e. WFD, Natura 2000 and MSFD) and international conventions (i.e. OSPAR, TWSC and HELCOM) with relevance for marine ecosystems?
2. What is your position and role in relation to these directives and conventions both at national and international level?

#### **Knowledge base**

3. Does your country have a national overview of ecological monitoring programmes (including parameters measured) carried out in marine ecosystems?  
If **Yes**: Which organisation is in charge, what methods were used and when was this overview produced? Can you provide documents and/or relevant internet links?  
If **No**: Does your country have the intention to produce such an overview? How would this be organised?
4. Does your country have an overview of monitoring requirements resulting from the different European directives and international conventions?  
If **Yes**: Who produced this overview, what methods were used and when was this overview produced? Can you provide documents and/or relevant internet links?  
If **No**: Does your country have the intention to produce such an overview? How would this be organised?
5. Do the existing monitoring programmes fulfil the requirements resulting from the different European directives and international conventions? How did or would you determine this?

#### **Synergies - national level**

6. Is there any (formal) procedure to harmonise monitoring activities resulting from different European directives and international conventions at a national level?  
If **Yes**: Which organisations are involved and how does this procedure work?  
Can you provide documents and/or relevant internet links?  
If **No**: Does your country have the intention to harmonise monitoring activities at a national level? How could this in your opinion be organised?



**Synergies - international level**

7. Is there any (formal) procedure to harmonise monitoring activities resulting from different European directives and international conventions at an international level?

If **Yes**: Which organisations are involved and how does this procedure work?

Can you provide documents and/or relevant internet links?

If **No**: Does your country have the intention to harmonise monitoring activities at an international level? How should this in your opinion be organised (i.e. inclusion of formal procedures in EU directives, dedicated actions under Regional Sea Conventions, bilateral cooperation, exchange of information, best practices)?

## Appendix 3 Information used per country

The following data sources were used to collect information about initiatives to harmonise monitoring and assessment activities and improve synergies in marine monitoring and assessment between European directives and international conventions.

### **National initiatives**

#### **Belgium**

- A telephone interview was conducted with Mr. Geert Raeymaekers on the 5<sup>th</sup> of September 2007. Mr. Raeymaekers is marine expert for the Belgian Federal Public Service 'Environment' This Directoraat Generaal is the federal competent authority for federal environment policies in Belgium.
- A written response to the interview questions provided by Mr. Geert Raeymaekers with input from Mr. Jan Haelters (Management Unit of the North Sea Mathematical Models: MUMM/RBINS).
- The homepage of the Management Unit of the North Sea Mathematical Models (MUMM), a department of the Royal Belgian Institute of Natural Sciences, a scientific institute in charge of many of the marine monitoring programmes in Belgium: [www.mumm.ac.be/EN/monitoring/index.php](http://www.mumm.ac.be/EN/monitoring/index.php).
- The homepage of the Flanders Marine Institute (VLIZ) ([www.vliz.be](http://www.vliz.be)).
- A website of a United Nations Environment Programme (UNEP) initiative to develop an issue-based module for the implementation duties of international biodiversity conventions ([www.tematea.org](http://www.tematea.org)).

#### **Denmark**

- A telephone interview was conducted with Mr. Jens Brøgger Jensen, Water Director of the Danish Environment Protection Agency (Danish EPA) on the 20<sup>th</sup> of September 2007.
- The homepage of the National Environmental Research Institute (NERI). This homepage provides information about the Danish national monitoring programme NOVANA including two reports (published in 2005) that give an overview and details of NOVANA: [www.dmu.dk/International/Monitoring/NOVANA](http://www.dmu.dk/International/Monitoring/NOVANA).
- Handouts of the presentation 'Requirements and data needs to develop assessments of marine ecological processes and biological elements. Can marine/coastal biological and ecological monitoring and assessments be combined within European context?' given by Jens Brøgger Jensen at a workshop of the Working Group on European Marine Monitoring and Assessment of the European Environment Agency (EEA-EMMA) in November 2006.

#### **France**

- Telephone interviews were conducted with Patrick le Mao, IFREMER's representative in the MASH-OSPAR working group, on the 21<sup>st</sup> of January 2008. Within IFREMER, Patrick le Mao coordinates the WFD monitoring programme for marine benthos.
- A written response to the interview questions was provided by Patrick le Mao.
- The websites of IFREMER ([www.IFREMER.fr](http://www.IFREMER.fr)) and the Natural History museum ([www.mnhm.fr](http://www.mnhm.fr)).
- The website of the French agency responsible for the establishment and monitoring of MPAs ([www.ecologie.gouv.fr/L-Agence-des-aires-marines.html](http://www.ecologie.gouv.fr/L-Agence-des-aires-marines.html)).

#### **Germany**

- A report 'Konzept für ein harmonisiertes Überwachungsprogramm für die deutschen Küsten- und Meeresgewässer (BLMP+)' produced in January 2007 by the environmental consultant Brockmann Consult.

#### **Iceland**

- A telephone interview was conducted with Karl Gunnarson, head of the Marine Environment Section of the Marine Research Institute (MRI), on the 21<sup>st</sup> of January 2008.
- A written response to the interview questions provided by Karl Gunnarson.
- The website of the Marine Research Institute ([www.hafro.is/undir\\_eng.php?REF=1](http://www.hafro.is/undir_eng.php?REF=1)).
- Websites with information on the Icelandic groundfish surveys

([www.hafro.is/Bokasafn/Timarit/rall\\_2007.pdf](http://www.hafro.is/Bokasafn/Timarit/rall_2007.pdf)) and environmental monitoring of pelagic waters ([www.hafro.is/Bokasafn/Greinar/vist2006](http://www.hafro.is/Bokasafn/Greinar/vist2006).)

- A website with information on the extensive one time research programme Benthic Invertebrates Of Icelandic Waters (BIOICE) ([www.hi.is/pub/smc/bioice.htm](http://www.hi.is/pub/smc/bioice.htm)).

### **Ireland**

- A telephone interview was conducted with Dr. Francis O' Beirn, benthic ecologist at the Marine Institute (MI) in Ireland, on the 30<sup>th</sup> of August 2007.
- A written response to the interview questions provided by Dr. O'Beirn.
- The discussion document 'The National Environmental Monitoring Programme (NEMP) for Transitional, coastal & marine waters' produced by the Environmental Protection Agency (EPA) in collaboration with the Marine Institute, the Radiological Protection Institute of Ireland, Met Éireann and National Parks and Wildlife of the Department of the Environment, Heritage and Local Government in October 2003.

### **The Netherlands**

- Input (per telephone and per email) from Lisette Enserink and Saa Kabuta (both employed at the National Institute for Coastal and Marine Management (RIKZ) in the Netherlands including a project proposal for the establishment of an interdepartmental working group WEMOZ.
- An inventory of monitoring programmes carried out in coastal and marine waters in the Netherlands and an assessment to determine if these programmes can meet the monitoring requirements of the Birds- and Habitats Directives (IMARES (Institute for Marine Resources & Ecosystem Studies) report 'Monitoring van biologische en abiotische parameters in zoute wateren in Nederland. De actuele situatie, de verplichtingen voortvloeiend uit Europese regelgeving en aanbevelingen voor de toekomst' 30<sup>th</sup> of December 2006).
- A website with information about data collected under the Dutch national monitoring programme (MWTL): [www.nodc.nl/produkten](http://www.nodc.nl/produkten) including links to other websites relevant for monitoring (marine) water systems in the Netherlands (e.g. [www.actuelewaterdata.nl](http://www.actuelewaterdata.nl), [www.waterplan.nl](http://www.waterplan.nl), [www.watermarkt.nl](http://www.watermarkt.nl)).
- A website for downloading actual data collected under the MWTL programme stored in the national database DONAR (Data Opslag Natte Rijkswateren ([www.donarweb.nl](http://www.donarweb.nl))).

### **Norway**

- Telephone interviews were conducted with Anne Britt Storeng, senior advisor within the marine section of the Directorate for Nature Management (DN) in Trondheim, Norway on the 18<sup>th</sup> of December 2007 and 14<sup>th</sup> of January 2008.
- A written response to interview questions provided by Anne Britt Storeng.
- Websites of the Norwegian Institute of Water Research (NIVA) ([www.niva.no/symfoni/infoportal/portenglish.nsf](http://www.niva.no/symfoni/infoportal/portenglish.nsf)), the Institute of Marine Research (IMR) ([www.imr.no/english](http://www.imr.no/english)), the Norwegian Institute of Nature Research ([ww4.nina.no/ninaeng](http://ww4.nina.no/ninaeng)) and a website of the Ministry of Environment presenting information on the Integrated management plan of the Barents Sea ([www.regjeringen.no/en/dep/md/Selected-topics/Integrated-Management-of-the-Barents-Sea.html?id=457531](http://www.regjeringen.no/en/dep/md/Selected-topics/Integrated-Management-of-the-Barents-Sea.html?id=457531)).

### **Portugal**

- Websites of the MONAE project ([www.monae.org](http://www.monae.org)) and the TICOR project ([www.ecowin.org/ticor](http://www.ecowin.org/ticor)).
- The Monitoring plan for Portuguese coastal waters: Water Quality and Ecology (Ferreira *et al.*, 2006).

### **Spain**

- A telephone interviews were conducted with Javier Pantoja and Javier Cachon of the Directorate General for Biodiversity and the Directorate for Coasts at the Ministry of Environment on the 30<sup>th</sup> of January 2008.
- A written response to the interview questions was provided by Javier Pantoja.
- The websites of CEDEX ([www.cedec.es](http://www.cedec.es)), IEO ([www.io.es](http://www.io.es)) and CSIC ([www.csic.es](http://www.csic.es)).

## Sweden

- Telephone interviews were conducted with Cecilia Lindblad, head of delegation for MASH employed at the Swedish Protection Agency (Swedish EPA) based in Stockholm, Sweden on the 19<sup>th</sup> of December 2007 and 10<sup>th</sup> of January 2008.
- A written response to interview questions and a revised version of a draft summary for Sweden by Cecilia Lindblad.
- Websites of the Swedish Government and its Offices ([www.sweden.gov.se/sb/d/5400](http://www.sweden.gov.se/sb/d/5400)), the Swedish Environmental Protection Agency ([www.internat.naturvardsverket.se/en/In-English](http://www.internat.naturvardsverket.se/en/In-English)).
- A report describing potential implications of the Water Framework Directive in Sweden (Hedelin, 2005).

## United Kingdom

- A telephone interview was conducted with Mr. Jamie Rendell, Marine Science & Monitoring Advisor for the Department for Environment, Food and Rural Affairs (Defra), Marine Environment Division on the 13<sup>th</sup> of August 2007.
- A written response to the first interview question (responsibilities for marine monitoring; see Appendix 1) provided by Mr. Jamie Rendell.
- A written response to the interview questions provided by Amanda Prior, Technical Secretary of the Healthy and Biologically Diverse Seas Evidence Group (HBDSEG).
- The following Internet websites:
  - The website of Defra providing details of the United Kingdom Marine Monitoring and Assessment Strategy (UKMMAS):  
[ww.defra.gov.uk/environment/water/marine/uk/science/monitoring.htm](http://ww.defra.gov.uk/environment/water/marine/uk/science/monitoring.htm)  
including the paper 'UKMMAS: A strategy for UK Marine Monitoring and Assessment. A report prepared by the Marine Monitoring Coordination Group and adopted by the Marine Assessment Policy Committee in May 2006' and several newsletters with updates about the progress implementing this strategy.
  - Metadata of existing biological marine monitoring programmes including the drivers (as part of the United Kingdom Directory of Marine Observing Systems (UKDMOS) available on the Defra website:  
[www.defra.gov.uk/environment/water/marine/uk/science/pdf/monitoring-metadata-2007.pdf](http://www.defra.gov.uk/environment/water/marine/uk/science/pdf/monitoring-metadata-2007.pdf).

## International initiatives

### European Commission

- Information received by e-mail from Gert Verreet of the European Commission, DG Environment on the 8<sup>th</sup> of January 2008.
  - Websites of the European Commission with information on:
    - \* *Communication and Action Plan 2006*  
([ec.europa.eu/environment/nature/knowledge/eu2010\\_indicators/index\\_en.htm](http://ec.europa.eu/environment/nature/knowledge/eu2010_indicators/index_en.htm))
    - \* *SEBI 2010 initiative*  
([biodiversity-chm.eea.europa.eu/information/indicator/F1090245995](http://biodiversity-chm.eea.europa.eu/information/indicator/F1090245995));
    - \* *The Intercalibration Exercise under the WFD*  
([circa.europa.eu/Public/irc/jrc/jrc\\_eewai/library?l=/intercalibration/intercalibration\\_1/\\_EN\\_1.0\\_&a=d](http://circa.europa.eu/Public/irc/jrc/jrc_eewai/library?l=/intercalibration/intercalibration_1/_EN_1.0_&a=d));
    - \* *EMMA working group and the Marine Strategy Directive*
- 1) [www.europarl.europa.eu/sides/getDoc.do?type=TA&language=EN&reference=P6-TA-2007-0595#BKMD-19](http://www.europarl.europa.eu/sides/getDoc.do?type=TA&language=EN&reference=P6-TA-2007-0595#BKMD-19) (agreement MSD European Parliament and the Council of the European Union);
  - 2) [circa.europa.eu/Public/irc/env/marine/library?l=/workingsgroups/europeansmarinesmonitored\\_2006-2007/](http://circa.europa.eu/Public/irc/env/marine/library?l=/workingsgroups/europeansmarinesmonitored_2006-2007/)  
[including\\_inventory&vm=detailed&sb=Title](http://circa.europa.eu/Public/irc/env/marine/library?l=/workingsgroups/europeansmarinesmonitored_2006-2007/including_inventory&vm=detailed&sb=Title) (inventory quality elements proposed MSD);

3) [circa.europa.eu/Public/irc/env/marine/library?l=/workingsgroups/europeansmarinesmonitori/eea-led\\_2006-2007/ecological\\_biological&vm](http://circa.europa.eu/Public/irc/env/marine/library?l=/workingsgroups/europeansmarinesmonitori/eea-led_2006-2007/ecological_biological&vm)

=detailed&sb=Title (workshop on biological elements / ecological processes);

4) [circa.europa.eu/Public/irc/env/marine/library?l=/workingsgroups/europeansmarinesmonitori/emma\\_30-31\\_2007&vm=detailed&sb=Title](http://circa.europa.eu/Public/irc/env/marine/library?l=/workingsgroups/europeansmarinesmonitori/emma_30-31_2007&vm=detailed&sb=Title) (meeting materials of the most recent EMMA plenary meeting).

#### **OSPAR**

- The OSPAR website ([www.ospar.org](http://www.ospar.org)) with information about monitoring and assessment activities carried out under the OSPAR convention and links to two reports analysing synergies in marine monitoring and assessment between OSPAR and the European Union: one on synergies in assessment and monitoring of hazardous substances, eutrophication, radioactive substances and offshore industry (OSPAR Publication 2005/230) and one on synergies in assessment and monitoring of biodiversity (OSPAR Publication 2006/294).

#### **HELCOM**

- The website of the Helsinki Commission HELCOM([www.helcom.fi](http://www.helcom.fi)).

#### **TWSC**

- A telephone interview with Dr. Harald Marencic, Coordinator of the Trilateral Monitoring and Assessment Programme (TMAP) at the Common Wadden Sea Secretariat (CWSS), on the 28th of August 2007.
- The website of the CWSS with information about TMAP ([www.waddensea-secretariat.org/TMAP/Monitoring.html](http://www.waddensea-secretariat.org/TMAP/Monitoring.html)) and information about the revision of TMAP ([www.waddensea-secretariat.org/TMAP/tmap-revision.html](http://www.waddensea-secretariat.org/TMAP/tmap-revision.html)).

#### **HARBASINS**

- A telephone interview with Lies van Nieuwerburg, Royal Haskoning, on the 20<sup>th</sup> of September 2007.
- The HARBASINS website ([www.harbasins.org](http://www.harbasins.org)).

#### **ISC**

- The website of the International Scheldt Commission (ISC) ([www.isc-cie.com](http://www.isc-cie.com)).
- The website of the international Scaldit project ([www.scaldit.org](http://www.scaldit.org)).

## Appendix 4 Abbreviations

### General

BHD	Birds- and Habitats Directives
CBD	Convention on Biological Diversity
EIONET	Environment Information and Observation Network (European Environment Agency)
EcoQOs	Ecological Quality Objectives
GEOSS	Global Earth Observation System of Systems
GCOS	Global Climate Observing System
GOOS	Global Ocean Observing System
ICZM	Integrated Coastal Zone Management
ICES	International Council for the Exploration of the Sea
MSFD	European Marine Strategy Framework Directive
QSR	Quality Status Report
TAG	Technical Advisory Group
TWSC	Trilateral Wadden Sea Cooperation
UNEP	United Nations Environment Programme
WFD	European Water Framework Directive
WSSD	The UN World Summit on Sustainable Development

### Belgium

BMDC	Belgian Marine Data Centre
CCIEP	Coordination Committee International Environmental Policy
DGRNE	Direction Générale des Ressources Naturelles et de l'Environnement
IBGE – BIM	Institut Bruxellois de Gestion de l'Environnement - Brussels Instituut voor Milieubeheer (IBGE - BIM);
ICE	Interministerial Conference on the Environment
IDOD	Integrated Dynamical Oceanographic Data Management
ILVO	Institute for Agriculture and Fisheries Research of the Flemish Region
INBO	Institute for Nature and Forest Research
MUMM	Management Unit of the North Sea Mathematical Models
ODAS	Oceanographic Data Acquisition System
RBINS	Royal Belgian Institute of Natural Sciences
VLIZ	Flanders Marine Institute (Vlaams Instituut voor de Zee)
VMM	Belgian Federal Public service 'Environment' (Federale Overheidsdienst voor Volksgezondheid, Veiligheid van de Voedselketen en Leefmilieu)

### Denmark

DEPA	Danish Environmental Protection Agency
DFNA	Danish Forest and Nature Agency
GEUS	Geological Survey of Denmark and Greenland
NERI	National Environmental Research Institute
NOVANA	Nationwide Monitoring and Assessment Programme for the Aquatic and Terrestrial Environment

### France

IFREMER	French Research Institute for Exploitation of the Sea
MPAs	Marine Protected Areas
REBENT	Réseau benthique, network for benthos monitoring and data storage
CNRS	National Centre for Scientific Research

### Germany

ARGE	Working group (in German: Arbeitsgruppe)
BLMP	Bund Länder-Messprogramm
BSH	Bundesamt für Schifffahrt und Hydrografie
CCME	Central Command for Maritime Emergencies (in German: Havariekommando)
DIN	Deutsches Institut für Normung
MUDAB	Germany's national marine database (in German: Meeresumwelt-Datenbank)

UAG Sub working group (in German: Unter Arbeitsgruppe)  
 UBA Umweltbundesamt

**Iceland**

BIOICE Benthic Invertebrates Of Icelandic Waters  
 MRI Marine Research Institute  
 SMB Iceland groundfish survey  
 SMH Autumn groundfish survey  
 TAC Total Allowable Catch

**Ireland**

CFB Central Fisheries Board  
 DCMNR Department of Communications, Marine and Natural Resources  
 DEHLG Department of Environment, Heritage and Local Government  
 EPA Environmental Protection Agency  
 MI Marine Institute  
 MMF Marine Monitoring Forum  
 NEMP National Environmental Monitoring Programme  
 NPWS National Parks and Wildlife Service

**Norway**

DN Directorate for Nature Management  
 IMR Institute of Marine Research  
 NGU Geological Survey of Norway  
 NINA Norwegian Institute of Nature Research  
 NIVA Norwegian Institute for Water Research  
 NMD Norwegian Marine Data Centre  
 NTNU University in Trondheim  
 SEAPOP Seabird Populations  
 SKSK Norwegian Hydrographic Service  
 UIB University in Bergen  
 UITø University in Tromsø

**Portugal**

BQE biological quality element  
 HI Hydrographic Institute  
 IMAR Institute of Marine Research  
 IPIMAR Portuguese Fisheries Institute  
 MONAE Monitoring Plan for Water Quality and Ecology of Portuguese transitional and coastal waters  
 SQE supporting quality element  
 TRICOR Typology and Reference Conditions Study

**Sweden**

BMP Baltic Monitoring Programme  
 GMF Göteborg University Marine Research Centre  
 SEPA Swedish Environmental Protection Agency  
 SMF Stockholm Marine Research Centre  
 UMF Umeå Marine Sciences Centre

**The Netherlands**

IDON Interdepartementale Directeuren Overleg Noordzee  
 IMARES Institute for Marine Resources and Ecosystem Studies  
 LNV Ministry of Agriculture, Nature Management and Fisheries (in Dutch: Ministerie van Landbouw, Natuurbeheer en Voedselkwaliteit)  
 MWTL Monitoring van de Waterstaatkundige Toestand des Lands  
 RIKZ National Institute for Coastal and Marine Management (in Dutch: Rijksinstituut voor Kust en Zee)  
 RIZA National Institute for Inland Water Management and Waste Water Treatment (in Dutch: Rijksinstituut voor Integraal Zoetwaterbeheer en Afvalwaterbehandeling)

V & W	Ministry of Public Works and Water Management (in Dutch: Ministerie van Verkeer en Waterstaat)
WEMOZ	Working Group Ecological Monitoring Coastal and Marine Waters (in Dutch: Werkgroep Monitoring Zoute Wateren)
WOT project	Project to fulfil obligations of the Ministry of LNV (in Dutch: Wettelijk Opgedragen Taken)

#### **United Kingdom**

CEFAS	Centre for Environment, Fisheries and Aquatic Science
CSSEG	Clean and Save Seas Evidence Group
DEFRA	Department for Environment, Food and Rural Affairs
ECG	Evidence Collection Group
FRS	Fisheries Research Services
HBDSEG	Healthy and Biologically Diverse Seas Evidence Group
JNCC	Joint Nature Conservation Committee
MAPC	Marine Assessment Policy Committee
MARG	Marine Assessment and Reporting Group
MEDIN	Marine Environment and Data Information Network
MPG	Marine Protocols Coordination Group
NERC	Natural Environment Research Council
PSEG	Productive Seas Evidence Group
SEPA	Scottish Environment Protection Agency
UKDMOS	United Kingdom Directory of Marine Observing Systems
UKMMAS	United Kingdom Monitoring and Assessment Strategy

#### **European Commission (EC)**

CIS	Common Implementation Strategy
EC	European Commission
ECNC	European Centre for Nature Conservation
EEA	European Environment Agency
EMMA	European Marine Monitoring and Assessment Working group
ETC/WTR	European Topic Centre on Water
GIG	Geographical Intercalibration Group
JRC	Joint Research Centre (European Commission)
MSFD	Marine Strategy Framework Directive
NGO	Non Governmental Organisation
PEBLDS	Pan-European Biological and Landscape Diversity Strategy
SCG	Strategic Coordinating Group
SEBI 2010	Streamlining European 2010 Biodiversity Indicators
UNEP	United Nations Environment Programme
WCMC	World Conservation Monitoring Centre
WFD	Water Framework Directive
WG A	Working Group A (Ecological Status under EEA)

#### **Oslo-Paris Convention (OSPAR)**

CAMP	Comprehensive Atmospheric Monitoring Programme
CEMP	Coordinated Environmental Monitoring Programme
ICG-SIAM	Intersessional Correspondence Group – Synergies In Assessment and Monitoring (ad hoc OSPAR working group)
JAMP	Joint Monitoring and Assessment Programme
MASH	Marine Protected Areas, Species and Habitats (OSPAR working group)
RID	Riverine Inputs and Direct Discharges (OSPAR monitoring programme)

#### **Helsinki Convention (HELCOM)**

BSAP	Baltic Sea Action Plan
COMBINE	Cooperative Monitoring in the Baltic Marine Environment
MONAS	Monitoring and Assessment Group
MORS	Monitoring Radioactive Substances
PLC	Pollution Load Compilation



**Trilateral Wadden Sea Cooperation (TWSC)**

CWSS	Common Wadden Sea Secretariat
JMBB	Joint Monitoring Programme for Breeding Birds
JMMB	Joint Monitoring Programme for Migratory Birds
TDG	Trilateral Data Handling Group (TWSC)
TMAP	Trilateral Monitoring and Assessment Programme (TWSC)
TMEG	Trilateral Monitoring Expert Group (TWSC)
TWG	Trilateral Working Group (TWSC)
WSP	Wadden Sea Plan

**Harmonised River Basins Strategies North Sea (HARBASINS)**

ERDF	European Regional Development Fund
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**International Scheldt Commission (ISC)**

DGRNE	Direction Générale des Ressources Naturelles et de l'Environnement
ISC	International Scheldt Commission

**Other International activities**

EDIOS	European Directory of the Ocean Observing System
EDMERP	European Directory of Marine Environmental Research Projects
MESH	Mapping European Seabed Habitats