

UKMMAS: A Strategy for UK Marine Monitoring and Assessment

Report of the Marine Monitoring Co-ordination Group (amended), now a working document of the Marine Assessment and Reporting Group.

Adopted by the Marine Assessment Policy Committee in May 2006.

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Executive Summary

1. **The overall aim of the United Kingdom Marine Monitoring and Assessment Strategy (UKMMAS) is 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.**
2. The ultimate goal is to have an efficient monitoring programme which shows our seas are clean, safe, healthy, productive and diverse and that management activities have succeeded.
3. Intended as a working document, this paper sets out a new structure to rationalize and simplify existing structures to meet new and emerging requirements; the elements of which include:
 - the formation of a policy group (Marine Assessment Policy Committee (MAPC)) to facilitate change, strengthen rationale and ownership of monitoring activities in both UK waters and the open oceans.
 - a technical committee (Marine Assessment and Reporting Group (MARG)) to direct the delivery of monitoring and assessment activities in both UK waters and the open oceans.
 - monitoring clusters to ensure greater integration of evidence collection and to provide regular assessments demonstrating progress towards our vision of :
 - clean and safe seas
 - healthy and biologically diverse seas
 - productive seas (sustainable consumption and production)
 - the facilitation and sharing of knowledge and data is central to the strategy. There will be a strong interaction with the Marine Data and Information Partnership and Marine Environmental Data – Action Group (<http://www.oceannet.org>) to provide data stewardship to the UK marine monitoring needs.
 - the monitoring will be underpinned by best available science standards for collection analysis, storage and sharing of data and information. These protocols will be documented in a Marine Monitoring Manual.
 - the strategy seeks to provide a mechanism to work in partnership across government and the devolved administrations and agencies to make best use of UK expertise and resources.

- the assumption is that monitoring and assessment will be driven by operational requirements, objectives and appropriate indicators and be undertaken on a risk basis.
4. This document sets out a structure of how to deliver this. It aims to define the process and then identify a cost-neutral management framework capable of delivering the key elements of the process. Given the wide range of interests involved, no attempt has been made to identify all the issues relevant to all parties that may be affected. Until the end of 2007, the focus will be on the identification of a workable way forward to achieve a greater integration of marine monitoring across the UK after which the strategy should be part of our core business. It was found to be broadly acceptable to government departments and the devolved administrations and relevant Agencies at MAPC in December 2005, and effort expended to add greater detail of exactly what changes are needed to establish this framework.
 5. This document is, however, a working document which will be updated as the structure and process is refined.

1. Background

- 1.1 It was recognised in *Safeguarding Our Seas* (Defra, 2002) that the best available scientific evidence must inform the stewardship of the marine environment. The report went on to outline the need for greater integration of government marine monitoring programmes, particularly in the light of the desire to move towards an ecosystem-based approach to management of the marine environment. Subsequent work on the production of the state of the seas report *Charting Progress* (Defra, 2005) has served to highlight this need for greater integration and has led to the conclusion that a significant restructuring of the system by which marine monitoring data are collected, collated, and interpreted is now required.

Action 2 of Charting Progress stated: ‘Evaluating and revising our current Marine Monitoring programmes’

‘Current marine monitoring programmes, which are designed to demonstrate compliance with the requirements of current national and international regulations, are sector-based. As this report has shown, they do not provide sufficient evidence to provide a robust assessment of the overall state of the marine ecosystem.’

A Defra led Marine Monitoring Coordination Group is taking forward work to redesign the collection, co-ordination and reporting of marine data. The Group is drafting an action plan with proposals for monitoring how the ecosystem is changing in response to both long-term and immediate human induced disturbances. The Government departments and agencies concerned are committed to working closely with this process to ensure that the various marine monitoring activities undertaken in UK waters are co-ordinated and fit for purpose. The Group will assess the gaps and explore how to move towards a more pragmatic risk-based approach to monitoring. It will need to consider the resource implications of its proposals and will aim to work internationally (for example in the context of the WFD, which sets ecological quality targets) to ensure that scarce resources are targeted efficiently.’

- 1.2. This paper also encompasses work towards Charting Progress actions:

- Action 1: Ecosystem Objectives and Indicators Development
- Action 4: Capturing Knowledge for evidence based policy
- Action 5: MDIP – Marine Data and Information Partnership
- Action 6: MCCIP – Marine Climate Change Impacts Partnership

- 1.3. The work started under the Defra led Marine Monitoring Coordination Group (MMCG). The Government departments and agencies concerned committed to working closely with this process to ensure that the various marine monitoring activities undertaken in UK waters are co-ordinated and fit for purpose. The MMCG assessed the gaps and explored how to move towards a more pragmatic risk-based approach to monitoring. The result was the first version of the UKMMAS Strategy paper. (This paper has been updated as the strategy has evolved and the associated committees and activities have taken shape.

- 1.4 In addition to monitoring activities in UK waters there are ocean monitoring obligations carried out in support of internationally agreed programmes. These include observations that are commitments to the Global Ocean Observing

System (GOOS), Global Climate Observing System (GCOS) and the Global Earth Observation System of Systems (GEOSS) (See IACMST, 2006).

- 1.5 The current systems of marine monitoring and data collation vary in their transparency and are managed and conducted by many disparate groups (see Annex 1). To some extent this is in the nature of trying to manage a complex and dynamic environment, of which we have only limited understanding. However, the fact that measurements are taken in ways that limit their ability to be combined, or where the basis of the results is obscure, means that combining and/or rationalising these results into meaningful conclusions is simply not possible in some instances. This makes attempts to assess the state of the ecosystem and its rate of change particularly problematic and can result in conflicting conclusions and advice to government from the various agencies responsible for monitoring.
- 1.6 The current difficulties are partly the result of the *ad hoc* way committees and groups have been set up over the years to fulfil a particular need or requirement; such as one of the various directives or legislation. There is now a need to rationalise this structure, from a management point of view, in order to improve the overall scope of delivery from the monitoring programmes
- 1.7 This paper proposes a revised structure through which policy aims, statutory requirements and operational needs are translated to field work, data are managed and assessed in a form that meets those aims and requirements for assessment of the marine environment and the best use is made of available resources. The new structure encompasses the lessons learnt from the production of the State of the Seas report *Charting Progress* (Defra, 2005) and allows for assessment and rationalisation of the programme at regular intervals.

2. Monitoring and Assessment Requirements

Aims of the UKMMAS

2.1 The ultimate aims of the UK Marine Monitoring and Assessment Strategy (UKMMAS) is 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.

2.2 It will achieve this by:

- a) 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;
- b) Maximising efficiency and effectiveness of UK resources devoted to marine monitoring and assessments;
- c) Providing a cross departmental forum for clearance of integrated marine assessments before publication; and
- d) 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.

2.3 The key issues are: the definition of the various roles and responsibilities, from a policy level through to the operational monitoring groups; an improved method by which results are integrated and reported; and improving the management of the quality and access to the data.

Goals

2.4 Monitoring is an essential component of an environmental management framework and is undertaken for a variety of reasons (see Annex 1). The UKMMAS is designed to provide robust evidence of the state and variability of our oceans and seas for all goals.

2.5 This aim will be achieved through implementation of Marine Monitoring Programmes with a series of goals including:

- (i) ensuring compliance with international and national monitoring obligations and commitments; for long term documentation of the status and trends of ecosystem quality, understanding and assessment of the role of oceans in the Earth's climate system, and to provide indicators of state;

- (ii) meeting the need for monitoring to provide operational forecasts of the marine and ocean environment;
- (iii) improved scientific knowledge across disciplines and at a range of scales, to underpin management of the marine environment;
- (iv) cross-departmental (marine community) co-ordination of monitoring activities;
- (v) establishing a range of marine objectives and indicators, to complement existing management commitments;
- (vi) ensuring that data are properly disseminated, archived and accessible for reuse;
- (vii) encouraging contributions from all stakeholders (scientific and technical community, NGOs, industry); and
- (viii) ensuring that long term time series are maintained.

Policy Scope

- 2.6 This strategy and its work programmes seek to deploy the most efficient and effective resources to undertake all this work.
- 2.7 Annex 1 lists the main policy areas that require marine monitoring and which organisation has responsibility for its implementation. In most cases the Department responsible will engage an agency or third party to undertake this work.
- 2.8 The main targets are: to reach Good Environmental Status by 2021 as specified by the proposed European Marine Strategy Directive; to achieve the targets set out under the 5 OSPAR Strategies, e.g. the cessation target for hazardous substances by 2020; to reach Good Ecological Status of Coastal and transitional waters by 2020 according to the Water Framework Directive; and globally to implement the open ocean observing system by 2010, (as part of the Global Climate Observing System (GCOS) endorsed by the UNFCCC. Also to demonstrate a difference from the baseline of Charting Progress in one generation.

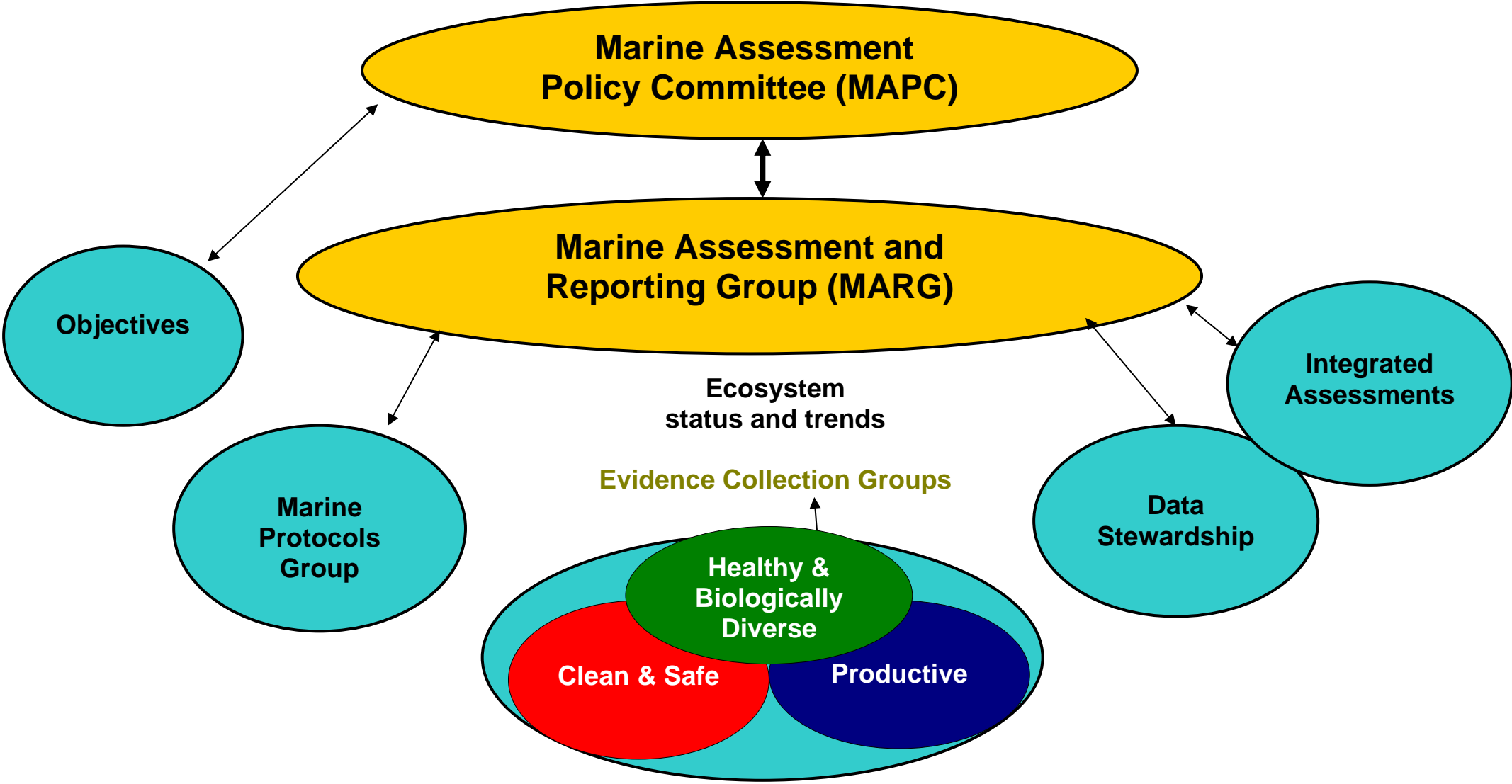
Science Scope

- 2.9 All aspects of marine ecosystem monitoring. Human activities are within this scope.
- 2.10 The UKMMAS must take account, and make best use, of scientific and technological innovations. Therefore, outcomes from research projects can not be separate from the strategy. However, marine research management is complex and the UKMMAS is not seeking to address the coordination of marine research programmes.

Geographic Scope

- 2.11 All aspects of UK marine ecosystem monitoring are included, i.e. that which is undertaken by the UK both within and external to our own water bodies. *[Note at present we assume this is Mean High Water and therefore coastal management of the shoreline is not included here]*
- 2.12 There is a requirement to provide observations/monitoring outside of UK waters and throughout the global oceans to meet international commitments e.g. WFD, EU Marine Strategy Directive, WMO-IOC (GOOS), UNFCCC (GCOS), GEOSS, OSPAR, where there is a significant dependency on other countries' observations/monitoring.

Figure 1- The UK Marine Monitoring and Assessment Structure



3. Proposed UKMMAS Structure

3.1 A new structure (Figure 1) is proposed in order to rationalize and simplify existing structures to meet new and emerging requirements. These elements which make up the UK Marine Monitoring and Assessment Strategy are detailed in later sections.

3.2 Key considerations for this structure were the needs for:

- a clear policy direction based on defined commitments;
- translation of policy requirements into practical monitoring programmes;
- co-ordinated implementation of the monitoring programmes, so that, wherever possible, parameters are measured and shared rather than similar data sets being collected by different agencies, albeit for different purposes;
- recognition of the need to value existing well-founded programmes whilst reprioritising others and filling gaps to ensure a well-balanced overall programme;
- adequate control and co-ordination of standards and protocols for the different types of measurement to be made;
- arrangements to quality control, store and provide access to the data;
- arrangements to ensure that data are contributed to the appropriate international and global data centres;
- mechanisms to interpret, assess and report on the findings derived from the monitoring activities, in order to meet specific commitments, to underpin the ecosystem approach to management and to provide a clearer understanding of the state of our seas;
- development of indicators and objectives to drive the assessments;
- an appropriate flow of information with a Communications Plan, clear line management and the minimum of overlap and duplication; and
- working in partnerships across government, and the devolved administrations and agencies, with the involvement of industry and the Non-Government Organisations (NGOs) as appropriate, to make best use of UK expertise and resources.

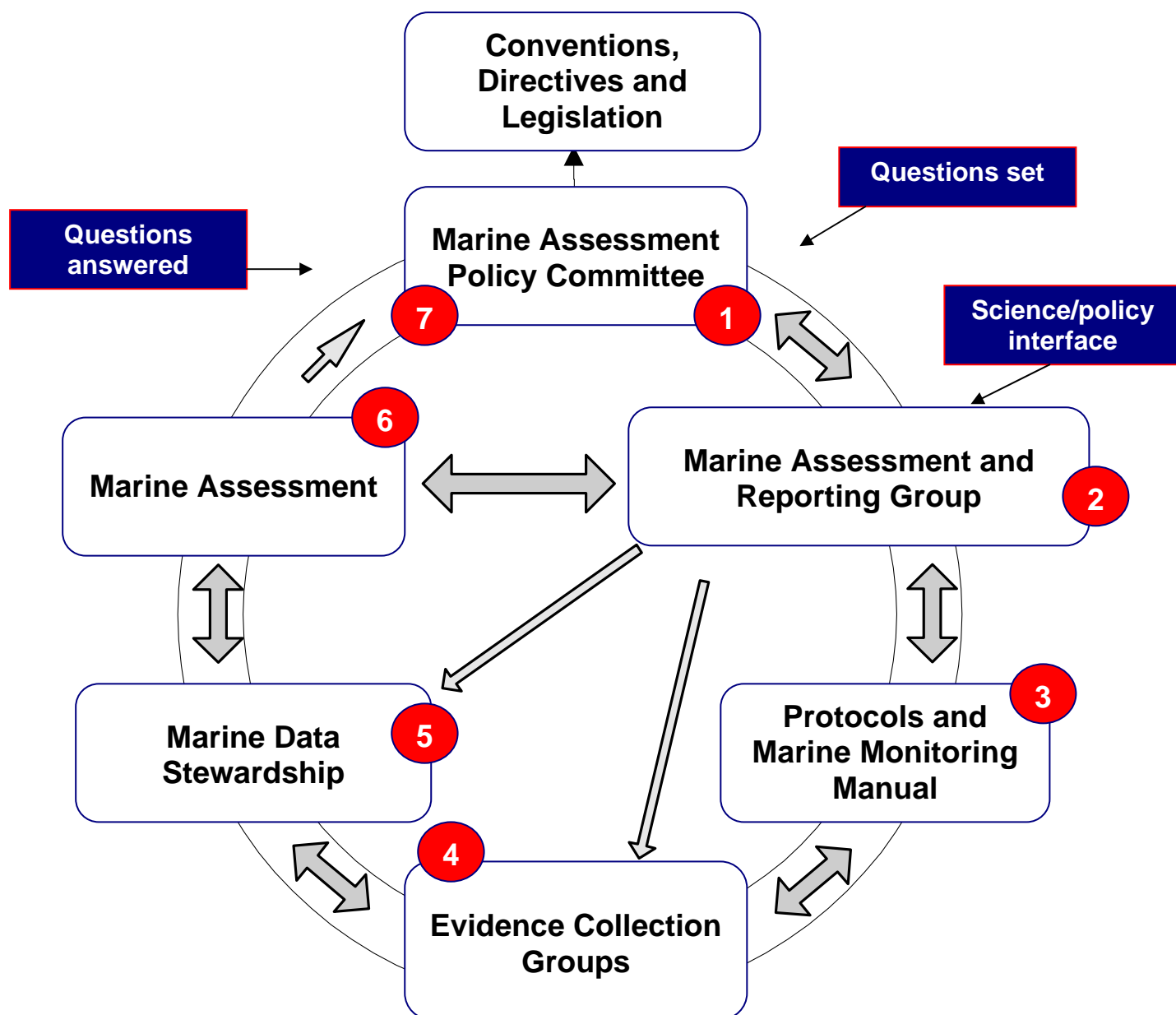
3.3 These requirements suggest the need for the following:

- a Secretariat to act as a central source;

- the formation of a policy group (Marine Assessment Policy Committee (MAPC)) to facilitate change, strengthen rationale and ownership;
- a technical committee to direct the delivery of monitoring and assessment activities (Marine Assessment and Reporting Group (MARG));
- monitoring clusters to ensure greater integration of evidence collection and to provide regular assessments demonstrating progress towards our vision of :
 - clean and safe seas
 - healthy and biologically diverse seas
 - productive seas (sustainable consumption and production)
- the facilitation and sharing of knowledge and data is central to the strategy. There will be a strong interaction with the Marine Data and Information Partnership and Marine Environmental Data – Action Group (<http://www.oceannet.org>) to provide data stewardship to the UK marine monitoring needs;
- the monitoring will be underpinned by best available science standards for collection analysis, storage and sharing of data and information. These protocols will be documented in a Marine Monitoring Manual.
- the strategy seeks to provide a mechanism to work in partnership across government and the devolved administrations and agencies to make best use of UK expertise and resources; and
- the assumption is that monitoring and assessment will be driven by operational requirements, objectives and appropriate indicators and be undertaken on a risk basis.

3.4 An organisational structure that could deliver this is shown in Figure 1 and the way this maps as a management process is illustrated in Figure 2. For more details see the UKMMAS Transition Plan.

Figure 2 - Information flows: Marine Assessment Management Cycle.



A continuous cycle to aid evidence based adaptive management of the marine environment. **(1)** MAPC set the policy scope, **(2)** MARG translates requirements to practical programmes, advising the evidence collection groups. **(4)** which follow protocols **(3)** and transfer the data to a safe 'warehouse' **(5)** Periodic assessments are made of the data as necessary for primary collection purposes and/or integrated assessments. **(6)** in order to answer the questions set by MAPC – (Are our seas safe, clean, healthy, biologically diverse and productive?) Finally MAPC act on the outcomes of the assessments **(7)** for example, if there are problem areas and identify appropriate tools to remedy the situation. The cycle is continuous and therefore demonstrating an adaptive management approach.

4. Marine Assessment Policy Committee (MAPC)

4.1 At the top of the UKMMAS structure is the MAPC who own the strategy and whose members are responsible for the policy and management measures needed to achieve the vision via marine objectives (MOs). More information on MOs can be found in section 6.13.

4.2 The role of MAPC is to **shape the UK's capability to provide, and respond to, the evidence required for sustainable development within a clean, healthy, safe, productive and biologically diverse marine ecosystem.**

It will achieve this by ensuring delivery of the UK's Marine Monitoring and Assessment Strategy, through:

- i) 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;
- ii) Maximising efficiency and effectiveness of UK resources devoted to marine monitoring and assessments;
- iii) Providing a cross departmental forum for clearance of integrated marine assessments before publication;
- iv) Identifying the policy implications resulting from marine assessments and ensuring communication to those able to action; providing where appropriate a proactive lead towards adaptive management.

4.3 The main function of MAPC is to define the policy requirements for UK Marine Monitoring and Assessment and provide direction on these matters to the Marine Assessment and Reporting Group (MARG). The committee would be expected to endorse the monitoring proposals put forward by MARG and ensure appropriate resources are available. The committee would also be expected to maintain a dialogue with the MARG on any changes in either national statutory requirements or EU and other international treaty obligations and the potential implications of any such changes for the future of the monitoring programme. MAPC will also 'own' the integrated assessments and provide, where appropriate, a proactive lead towards adaptive management.

4.4 MAPC is served by a Secretariat that would co-ordinate the exchange of information between that committee and MARG.

Membership of MAPC

4.5 MAPC is a senior policy committee (Grade 5 level) able to make real decisions regarding the outcomes of marine assessments and resources needed. With representatives from Government Departments, (Defra, DTI, , MOD. DCMS, Dft, DCLG) the Devolved Administrations, IACMST, NERC and *relevant Agencies** with a brief over International and National policy drivers that relate

to the marine environment. MARG representative. *ASMO, EMMA, IOC & Marine Objectives representatives.*

* The Agencies (*The Met Office, EA, EHS, EN, FRS, JNCC, SEPA, SNH, CEFAS, FSA, CCW, AFBI*), represented on MAPC will depend on the contribution they might make to the issues to be discussed. Their policy interests should be covered by a representative from the sponsoring Department and the practical implications for the Agencies will be discussed at MARG and its subgroups.

- 4.6 MAPC is chaired by *David Wilson, Head of the Marine Group at the Scottish Executive and Rodney Anderson, Director of Marine and Fisheries at Defra.* The Secretariat to be provided by Defra, Marine Environment Division. Full Terms of Reference can be found in Annex 3.

5. Marine Assessment and Reporting Group (MARG)

- 5.1 The Marine Monitoring and Assessment requirements will be implemented through a number of groups, responsible for specific aspects but with dialogue between groups and subject to overall direction by the Marine Assessment and Reporting Group (MARG). The role and supporting working groups for each of these are outlined in the section 6.
- 5.2 The purpose of MARG will be to decide how best to deliver the policy requirements with existing resource and scientific knowledge, direct the implementation of suitable programmes, review the outcomes and assessments and suggest changes to the programme when necessary.

The role of the MARG is to:

- (i) define and co-ordinate the monitoring programme to meet international and national obligations and commitments for the marine environment, including operational forecasts and other socio-economic objectives;
 - (ii) provide overall direction to the monitoring programme ensuring that the maximum efficiency and effectiveness is made of UK resources devoted to marine monitoring and assessments;
 - (iii) commission, manage and approve periodic integrated assessments for adoption by the MAPC;
 - (iv) identify and highlight to MAPC, emerging understanding which policy and governance should take account of;
 - (v) be proactive, including noting research and developing technologies, changing monitoring programmes or highlighting to MAPC if relevant and required.
- 5.3 It is likely that this will entail:
- producing a comprehensive description of who monitors, observes and surveys what in the seas around the UK and why;
 - developing mechanisms to optimise the way UK marine monitoring meets current and emergent national and international legal requirements and obligations as specified by MAPC;
 - ensuring that all the data collection needed for MO assessments are undertaken within the programme;
 - encouraging a collaborative and co-ordinated approach to data gathering, and the interchange of data, between existing monitoring programmes and assessments;

- ensuring closer integration of marine environmental monitoring, replacing existing groups where appropriate, to deliver on both monitoring commitments and the ecosystem-based approach outlined in the Marine Stewardship Report;
- managing assessments of the state of the marine ecosystem to produce periodic reviews of the current state of the marine ecosystem; e.g. QSR2010, Charting Progress 2;
- advising on the production of annual reports of the results;
- producing an annual review of the group's work programme and definition of future work and resource requirements;
- maintaining a watching brief on technological and scientific innovations that could be applied to the monitoring programme;
- maintaining a watching brief on legislative requirements for changes that need to be applied to the monitoring programme;
- overseeing the process of dissemination and development of awareness of the UKMMAS (aided by the secretariat and website); and
- owning the Monitoring Manual for the UKMMAS.

5.4 MARG will be supported by a number of working groups to undertake certain tasks on behalf of the committee. These will include groups responsible for:

- (i) Marine Monitoring Protocols Co-ordination Group -setting data collection standards and protocols and assimilating these into a Marine Monitoring Manual;
- (ii) The three marine monitoring Evidence Collection Groups - implementing the practical monitoring programmes and ensuring co-ordination between operational programmes as well as producing an initial assessment of the results;
- (iii) Marine Monitoring Data Co-ordination will be achieved via close working with MDIP and MEDAG to disseminate, archive and make the data and metadata available;
- (iv) Full holistic or integrated assessments will be undertaken via cross-sectoral/departmental groups convened as required (this is on the premise that the activities under (ii) will include any assessment required to deliver on specific commitments) e.g. annual report cards and holistic assessments;
- (v) Marine Objectives will be developed in a parallel process and MARG will have input to the MO Steering Group.

Membership of MARG

- 5.5 Scientific, technical and policy representatives (Grade 7 level) drawn from Agencies and Institutes responsible for the resources and practical implementation of marine monitoring programmes. Administrative secretariat is provided by Defra – Marine Environment Division with technical support from members as required.

6. UKMMAS Tier 3 (MARG Sub-groups)

Marine Monitoring Protocols Co-ordination Group

- 6.1 Section 5.4 gives an overview of the sub-groups of MARG, this section gives the detail,
- 6.2 The role of the Marine Monitoring Protocols Co-ordination Group is to co-ordinate the development and implementation of standards, protocols and guidance for use across the programme. In this sense this group will be pivotal to the programme. They link the collection, quality control and data management parts of the programme.
- 6.3 The groups' output will be quality assurance of the collected evidence and the Marine Monitoring Manual. Intensive efforts will be needed to expand this work area but once established, the 'manual' may require only minor updates and should become part of 'steady state' mode. This manual will be modular with chapters 'owned' by the groups responsible for collecting that data type; e.g:
- water and sediment chemistry samples;
 - biological samples;
 - physical samples – water and sediment; and
 - socio-economic.
- 6.4 This is the part of the programme where the science and technological improvements will be taken up across the strategy i.e. new techniques and methodologies. A transparent process, including consideration by the specialists in the ECGs and at MARG, will need to be built for this.
- 6.5 It is envisaged that the Protocols group will be able to sponsor permanent and time-limited working groups, as appropriate, to generate the standards. The work will draw heavily on existing protocols established for various policy drivers and combine these to 'best practise'. The NMMP has very successfully implemented such a system for its part of the OSPAR work. A quality assurance system is in place to ensure interoperability of results across Europe. This is a requirement of the International Council for the Exploration of the Sea (ICES) but it will be essential to maintain and extend this good practise across the new UKMMAS structure.

Membership

- 6.6 Technical specialists for the subject area. Some existing AQC groups require a membership registration fee. Industry and research groups developing new tools and techniques may be part of the groups as appropriate.

Evidence Collection Groups (ECGs)

- 6.7 The operational activity of marine monitoring will be 'championed' and undertaken by three working groups or Evidence Collection Groups (ECGs). The distribution of monitoring responsibilities into these three groups are defined in Table 1. The data collected will be driven by the evolving Marine Objectives (MO) and data needed to comply with all the drivers in Annex 1.

They will be responsible for implementing the monitoring that answers the questions: Are our seas clean and safe? Are our seas healthy and biologically diverse? Are our seas productive?

- 6.8 The requirements cover all temporal scales from the operational forecast data needed in real time to that needed to make the overall assessments of ecosystem state over the longer time.
- 6.9 The ECGs (Terms of Reference – Annex 3) will be asked to deliver via discussion between the key agencies collecting data of similar type:
- an annual work programme defining the co-ordinated monitoring programmes;
 - a thematic assessment of the results and specific assessments (e.g. data reports to ICES, EC, GOOS, assessments for specific Directives and parts of OSPAR, CFP, WFD, etc); and
 - carry out and submit quality control data, following the agreed protocols.
- 6.10 The cohesions between the programmes of work, of these three groups, data and protocols work, will be achieved through an activity of MARG. Each year, each ECG will produce an annual work programme outlining how it will achieve its aims, what will be collected, where and when. The metadata concerning the actual monitoring activities – ‘the who, what, where, when and why’, will be supplied to MEDAG. MEDAG will collate this information and produce a summary. MARG will then seek to identify opportunities to co-ordinate activities across the three working groups and arrange for programmes to be combined or merged wherever possible.

Table 1: Distribution of monitoring responsibilities

Evidence Group	Chair	Secretariat	Drivers/Work Areas
Clean and Safe Seas (CSSEG)	Mike Waldock, (CEFAS)	Judy Dobson (SEPA)	OSPAR – Hazardous Substances Radioactive Substances; WFD – Chemical status; Shellfish Hygiene Directive; Bathing Waters Directive
Healthy and Biologically Diverse Seas (HBDSEG)	Jane Hawkrige (JNCC)	Amanda Prior (EA)	OSPAR – Biodiversity Eutrophication; WFD – Ecological status; Birds Directive; Habitats Directive; Conservation of Seals Act; IOC – GOOS; Climate Change impacts; Fisheries – fish community data; IMO Ballast Waters Strategy; UWWT Directive; Nitrates Directive
Productive Seas (PSEG)	Jim Mckie (FRS)	Bernadette Eldridge (CEFAS)	Socio-economic data

Data Stewardship

6.11 Fundamental to the UKMMAS is the handling of data. There are two types under discussion, a) knowledge of who is doing what, where and why (monitoring metadata), as well as b) the actual results of the monitoring which are used for scientific assessments and reporting against the objectives.

For a) Pre-collection Metadata – this will be: i) produced by the responsible agency; ii) collated for each of the three evidence group and submitted to MARG on an annual basis. MARG will task MEDAG to collate the 3 sets of metadata from the groups.

For b) The collected data – MARG will rely on the working groups of **Marine Data and Information Partnership** (MDIP) to enable more efficient stewardship of marine data. MDIP (see www.oceannet.org) is a UK wide initiative and comprises organisations working in partnership across Government, non-departmental public bodies, research institutes and the private sector to:

- establish an enabling framework for ‘capture once and use many times’;
- establish Data Archiving Centres; and
- provide guidance on managing marine data and information including the development of standard protocols and procedures.

6.12 Within the UKMMAS, there is a need to co-ordinate the collation and archiving of monitored data, a responsibility to develop meta-data standards, and advise on issues related to data access and governance of monitored data. MARG will draw heavily on interactions with MDIP and MEDAG subgroups or sponsor permanent and time-limited working groups, as appropriate, to address specific issues, or to involve the wider community.

Marine Objectives and Indicators

6.13 The UK has signed up to the vision of ‘...*clean, healthy, safe, productive and biologically diverse oceans and sea...* and ...*within one generation to make a real difference.*’ We also have 5 strategic goals. To achieve these, there are already many policy instruments and management measures in place.

6.14 An initiative is underway to develop a series of Marine Objectives (MOs) within a framework that captures all existing marine policy commitments and objectives and translates these into measurable management targets. To demonstrate achievement of these objectives, and hence the vision, requires monitoring a series of indicators which, taken as a package, describe the state of our seas. This work will be reported to MAPC during its development and implementation phase to ensure close alignment and uptake within the UKMMAS groups.

Input

- 6.15 Technical specialists input will be drawn from Departments, Agencies and the scientific community, when necessary. An initial research project was managed via Defra project AE1148. An *ad hoc* Working Group of MAPC will develop a paper over the summer of 2006 and further research work will follow.

Marine Assessment Co-ordination

- 6.16 The UK will produce two key strategic assessments – the OSPAR Quality Status Report 2010, and by 2012* (*subject to enactment of the Directive) an assessment of the environmental status of the marine environment to meet the proposed EU Marine Directive. The aim of the UKMMAS is to identify and produce a series of integrated assessments that will provide the information to enable the UK to deliver the Quality Status Report 2010 and environmental status report for the proposed marine directive.
- 6.17 Cycles of reporting will be aligned to existing commitments and obligations plus the increasing need for holistic assessments such as:
- OSPAR – a Quality Status Report by 2010;
 - EU Marine Strategy – Characterisation Report by 2012;
 - WFD – Assessment of Good Ecological Status by 2020; and
 - EU Marine Strategy – Assessment of Good Environmental Status by 2021.
 - National Assessment – Charting Progress 2 by 2010
- 6.18 Marine assessment co-ordination and indicator development will be undertaken via *ad hoc* groups convened by MARG. These *ad hoc* groups will manage the production of periodic assessments of the marine environment and ensure that the necessary synthesis of data and research findings are being undertaken via the tier 3 groups to enable such assessments to be delivered according to need (see Annex 3). To this end it is envisaged that work currently undertaken to meet specific commitments will continue to be carried out by the responsible agency. However, it is recognised that there may be a requirement to sponsor permanent, or time-limited, working groups, partnerships, or networks, as appropriate, to help promote and co-ordinate the required activity between relevant organisations.

Membership

- 6.19 Technical specialists drawn from Departments, Agencies and the scientific community, with experience of synthesising information to develop consensus views.

7. Rationalisation of Existing Groups

- 7.1 This paper focuses on the co-ordination of monitoring programmes. As such it does not address the translation of the existing arrangements onto the proposed framework in any detail. The current situation is complex (for example see Reid and Portmann, 2006) and there are a number of issues that will have to be worked through in order to deliver this major step change.
- 7.2 However, given the substantial costs of measuring the marine environment (approximately £37m); there is likely to be considerable benefit in establishing a more efficient and effective programme. For this to be the case it will be necessary to rationalise some of the existing ways of working. As such, many of the current groups may need to be adapted, or transformed, to carry out modified roles under the new programme, whereas some may simply need to be disbanded. To this end, it is envisaged that MEMG, NMMP, MEDAG, MDIP, GOOSAG, MECN and other such groups will need to be reviewed in the light of this development.
- 7.3 The scope is very broad and will involve the collaborative working of a number of organisations. This is likely to include but may not be limited to Defra, DCLG, DCMS, DfT, DTI, MoD, The Crown Estate, the Devolved Administrations and:
- Agri-Food Biosciences Institute (AFBI)
 - Associated British Ports (ABPMer);
 - British Geological Survey (BGS);
 - British Oceanographic Data Centre (BODC);
 - Centre for Environment, Fisheries and Aquatic Science (CEFAS);
 - Countryside Council for Wales (CCW);
 - Environment Agency (EA);
 - Environment Heritage Service (EHS);
 - English Nature (EN) (Natural England (NE) from October 2006);
 - Fisheries Research Services (FRS);
 - Food Standards Agency (FSA);
 - Inter-Agency Committee on Marine Science and Technology (IACMST);
 - Joint Nature Conservation Committee (JNCC);
 - Marine Biological Association of the UK (MBA);
 - Maritime and Coastguard Agency (MCA);
 - Met Office;
 - National Centre for Ocean Forecasting (NCOF);
 - Natural Environment Research Council (NERC);
 - Scottish Environment Protection Agency (SEPA);
 - Scottish Natural Heritage (SNH);
 - Sea Mammal Research Unit (SMRU);
 - Sir Alistair Hardy Foundation of Ocean Science (SAHFOS);
 - United Kingdom Hydrographic Office (UKHO);
-
- Representatives of industry; and
 - Representatives of marine research institutions.

- 7.4 The working of a range of existing groups and committees may also need to be reviewed and or taken account of such as:
- Marine Environment Monitoring Group (MEMG) – (disbanded December 2005);
 - National Marine Monitoring Programme (NMMP) – (into new Clean and Safe Seas Evidence Group)
 - Group Co-ordinating Sea Disposal Monitoring (GCSDM) – (into new Productive Seas Evidence Group);
 - Marine Environmental Data Action Group (MEDAG) (represented on MARG);
 - Marine Data Information Partnership (MDIP) (represented on MARG);
 - Global Ocean Observing System Action Group (GOOSAG) (in consideration);
 - Marine Environmental Change Network (MECN);
 - Marine Climate Change Impact Partnership (MCCIP);
 - Eutrophication Assessment Steering Group;
 - WFD UK TAG;
 - European Monitoring Marine Assessments (EMMA) (international group);
 - FISH – fulfilling ecosystem effects monitoring;
 - Analytical Quality Control (AQC) Groups – (x 4 as once reported to NMMP will report to Protocols Group);
 - Seabed Habitat Mapping co-ordination (new group to be formed).
- 7.5 In the realisation phase of this new structure, due consideration must be given to the impacts of the creation of any Marine Management Organisation under the Marine Bill proposals.

8. Timetable and Actions

- 8.1 This paper was initially presented to MMCG 11th July 2005. Initial comments from MMCG members were included in Version 3.
- 8.2 Version 3 was discussed at MMCG on 4th November 2005 and by the existing sector groups: MEMG on 4th November; GOOS on 9th November and the Biodiversity group on 17th November. Version 4 was presented to the first MAPC meeting on 12th December 2005. and a decision made to adopt the work programme towards the new strategy. Version 7 was discussed at the 2nd MAPC meeting held on 11th May 2006 and the comment received following that meeting were incorporated into Version 8. This version (Version 9) incorporates comments received at or since the 3rd MAPC meeting held on 7th November 2007.
- 8.3 A parallel initiative to create a spending review bid and clarifying its direction will be decided at MAPC (see Section 9).
- 8.4 It is estimated that there will be a series of steps and a programme of transformation lasting 2 years. January 2006 – December 2007 (see Annex 4). This timeframe is consistent with:
- MDIP fully operational 2006 and a framework for data established by 2008;
 - MCCIP established and annual report card produced (end of 2006 and 2007);
 - MO project developed to August 2007;
 - WFD monitoring defined and co-ordinated with the NMMP programme sampling before 2007; and
 - Marine Monitoring Manual, provided by Autumn 2007.
- 8.5 From January 2008, it is anticipated that this strategy should be part of core business.
- 8.6 The first step, the establishment of MARG, took place in early February 2006 which allowed this group to implement changes to its sub-groups structure, names and responsibilities. MARG held a Workshop in February 2006 to discuss the implementation of its remit. This strategy, particularly Section 6 of this document, has been modified to reflect the agreements made there. The 2nd MAPC meeting, held on 11th May 2006, saw the UKMMAS agreed and work started to implement the strategy.

9. Cost Implications

Existing costs

- 9.1 Current spend on the marine monitoring in the UK is in the order of £37m per annum (see Annex 5).
- 9.2 The proposed changes to the management structures will be cost neutral. However the benefits of re defining responsibilities and scope and the inclusion of senior colleagues support for the process will allow for a step change in the ability of the UK to achieve and to demonstrate achievement of its marine objectives.

Gaps

- 9.3 It is hoped that the new structure will allow the most efficient use of current resource. However, despite this it has been identified that to fully realise the existing national and international commitments, significant new collection activities need to be initiated, particularly for seabed mapping and biodiversity monitoring. The total shortfall is approximately £22m per year i.e. a total of approximately £59m would be needed (Annex 5). A phased approach to this spend could be incorporated.
- 9.4 A spending review bid should be considered. The MAPC, Defra and the Devolved Administrations will decide the direction of the bid and the other Government Departments represented on MAPC will also need to form a view.

10. Definitions

Adaptive Management Adaptive management has the attributes of being flexible, encouraging public input, and monitoring the results of actions for the purpose of adjusting plans and trying new or revised approaches.

Annual Report Cards (ARC)

This is a new concept for presenting headline indicators or issues together to provide a common view to populate Report Cards, set against a brief, targeted and visually powerful framework, designed to fulfil policy advisor and decision makers needs.

Ecosystem-based Approach

This entails taking into consideration all elements that make up the ecosystem (physical, chemical and biological variables) as well as activities taking place there in order to ensure that biodiversity, health and integrity of the marine environment is maintained in the longer term.

Existing Sectors

Marine Processes and Climate, Marine Environmental Quality, Marine Habitats and Species, and Marine Fisheries.

Global Ocean Observing System (GOOS)

GOOS is a global system for observations, modelling and analysis of marine and ocean variables to support operational ocean services worldwide. It provides accurate descriptions of the state of the oceans, including living resources; continuous forecasts of future conditions and the basis for predictions of climate change. GOOS comprises 2 distinct but connected modules, for the open ocean and for coastal waters. GOOS provides the oceanographic component of the Global Earth Observing System of Systems (GEOSS) and its open ocean module provides the oceanic component of the Global Climate Observing System (GCOS). GCOS is the recognised mechanism for systematic observations in support of the United Nations Framework Convention on Climate Change (UNFCCC).

Monitoring

In this context, monitoring is defined as “*the taking, on a reasonably regular basis, of any form of observations relative to the status of the marine environment, regardless of frequency of, or purpose for which, the observations are made*” (Portmann, 2000). Such monitoring is designed to meet a wide range of societal needs by providing a variety of products and services.

- **Compliance monitoring**

Monitoring compliance with statutory programs or against a defined target e.g. reduction of inputs of hazardous substances. Note this is often confused with statutory monitoring but it is the *results* of the compliance monitoring which are key rather than the taking of the measurements themselves.

- **Statutory monitoring**

That monitoring which is required under the various legislative directives and the UK must demonstrate it is undertaking. Not to be confused with compliance monitoring.

- **Investigative**

The investigative monitoring programme is analogous to a scientific investigation where the hypothesis under test is whether the targets have been achieved or a cause of failure is unknown. A monitoring programme could therefore make a series of measurements to test the hypothesis by a discrete data gathering exercise or one that may require several field visits.

'Risk based' – prioritized action (in this case monitoring) on the basis of risk of that water body failing to meet the objectives set for that body such as 'good ecological status'. I.e. the type of activity increasing the risk or causing the failure of meeting the objectives need to be monitored more systematically than those activities which are not occurring in the area or likely to do so. The frequency of monitoring will be determined by the statistical confidence we will need to have in the results to justify action in programmes of measures.

Water Framework Directive Monitoring Definitions

Under the Directive, there are 3 types of monitoring required:

- **Surveillance** – to validate the risk assessments, detect long term trends in natural conditions and long term changes in widespread anthropogenic activity, assess impacts and design the monitoring strategy;
- **Operational** – to classify those water bodies which are at risk of failing good status; to monitor the elements most sensitive to the pressures on the water body and assess the change resulting from the programme of measures; and
- **Investigative** – to ascertain the cause and effects of a failure when either the reason for exceedance is unknown or the magnitude of accidental pollution.

11. References

Defra (2005), *Charting Progress – An Integrated Assessment of the State of UK Seas*, 120pp

Defra (2002), *Safeguarding Our Seas – A Strategy for the Conservation and Sustainable Development of Our Marine Environment*, 80pp, ISBN 0 85521 005 2

Portmann J E, 2000, *Review of Current UK Marine Observation in relation to present and future needs*, IACMST publ. No7.

Reid P C, Portmann, J E, 2006, *Marine Monitoring in the United Kingdom*, GOOS

UK GOOS Strategic Plan, IACMST, 2006

12. Glossary

BGS	British Geological Survey
CBD	United Nations Environment Programme - Convention on Biodiversity
CCW	Countryside Council for Wales
CE	Crown Estate
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
DARDNI	Department of Agriculture and Rural Development (Northern Ireland)
DCLG	Department for Communities and Local Government
DCMS	Department for Culture, Media and Sport
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DOENI	Department of the Environment (Northern Ireland)
DTI	Department of Trade and Industry
EA	Environment Agency
EcoQOs	Ecological Quality Objectives
EHS	Environment and Heritage Service (Northern Ireland)
EMMA	European Marine Monitoring and Assessment
EMS	European Marine Strategy
EN	English Nature
EUT	Eutrophication Steering Group
FEPA	Food and Environment Protection Act 1985
FSA	Food Standard's Agency
GEOSS	Global Earth Observation System of Systems
GMA	Global Marine Assessment
GMES	Global Monitoring for Environment and Security
GOOS-AG	Global Ocean Observing System – Action Group
ICES	International Council for the Exploration of the Sea
JNCC	Joint Nature Conservation Committee
MAPC	Marine Assessment Policy Committee
MARG	Marine Assessment and Reporting Group
MCCIP	Marine Climate Change Impacts Partnership
MDIP	Marine Data and Information Partnership
MECN	Marine Environment Change Network
MEDAG	Marine Environment Data – Action Group
MEMG	Marine Environment Monitoring Group
MMCG	Marine Monitoring Co-ordination Group
MO	Marine Objective
MOD	Ministry of Defence
NERC	Natural Environment Research Council
NGO	Non-Government Organisation
NMMP-WG	National Marine Monitoring Programme – Working Group
OGD	Other Government Department
OSPAR	OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic
OSPAR JAMP	OSPAR Joint Assessment and Monitoring Programme
SAHFOS	Sir Alister Hardy Foundation for Ocean Science
SE	Scottish Executive

SEPA	Scottish Environment Protection Agency
SNH	Scottish Natural Heritage
UKMMAS	United Kingdom Marine Monitoring and Assessment Strategy
UNFCCC	United Nations Framework Convention on Climate Change
WAG	Welsh Assembly Government
WFD	European Union Water Framework Directive
WFD UK TAG	WFD Technical Advisory Group

Annexes

Annex 1: UKMMAS Existing Responsibilities

Annex 2: Timetable of Holistic or Integrated Assessments needed for UK and International Marine Policy (to be added)

Annex 3: TORs for MAPC, MARG and Evidence Groups

Annex 4: UKMMAS Programme Timetable (to be added)

Annex 5: Estimated Costs to the UK of Marine Monitoring

UK Marine Monitoring and Assessment Strategy

Constituent Groups and Sub-Groups

Marine Assessment Policy Committee

Level:	1	Reports to:	Top Tier
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Terms of Reference

The role of MAPC is to shape the UK's capability to provide, and respond to, the evidence required for sustainable development within a clean, healthy, safe, productive and biologically diverse marine ecosystem.

It will achieve this by ensuring delivery of the UK's Marine Monitoring and Assessment Strategy, through:

- I) 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;
- II) Maximising efficiency and effectiveness of UK resources devoted to marine monitoring and assessments;
- III) Providing a cross departmental forum for clearance of integrated marine assessments before publication;
- IV) 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.

<p>Policy Interests will include:</p>	<p>International OSPAR, International Maritime Organisation (IMO) Ballast Waters, IOC–Global Ocean Observing System (IOC-GOOS), UN Framework Convention on Climate Change / Global Climate Observing System (UNFCCC/GCOS), Global Marine Assessment. Safety Of Life at Sea (SOLAS), World Summit on Sustainable Development (WSSD), Bergen Declaration, Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS), Bonn Convention Convention on Biological Diversity (CBD), Bern Convention Ramsar Convention, International Convention for the Prevention of Pollution from Ships (MARPOL), The UN Convention on the Law of the Sea (UNCLOS), The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention)</p> <p>EU Shellfish Waters Directive, Shellfish Harvesting Directive, Bathing Waters Directive, Water Framework Directive, European Marine Strategy, Birds Directive, Habitats Directive, ICZM, EU-GMES, SEA Directive, INSPIRE, Nitrates Directive, Dangerous Substances Directive and Titanium Dioxide Directive, Urban Waste Water Directive, Common Fisheries Policy, Veterinary Medicines Directive.</p> <p>National Government vision for Monitoring programmes which show our seas are clean safe healthy productive and diverse. Fisheries Management , Conservation of Seals Act, Consents Licensing, Controlled Activities Regulations (Scotland), Countryside and Rights of Way Act, Environment Act 1995, Marine Ecosystem Objectives, Marine Spatial Planning, Water Order (NI), MDIP, Control of Pollution Act, Coast Protection Act, and Wildlife and Countryside Act.</p>
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UKMMAS Paper – Annex 3 – Revised 12th March 2007

Membership:	<p>A senior policy committee (approx Grade 5 level) able to make real decisions regarding the outcomes of marine assessments and resources needed.</p> <p>Government Departments, (Defra, DTI, , MOD. DCMS, Dft, DCLG) the Devolved Administrations, IACMST, NERC and <i>relevant Agencies*</i> with a brief over International and National policy drivers that relate to the marine environment. MARG representative. <i>ASMO, EMMA, IOC & Marine Objectives representatives.</i></p> <p>Chair: <i>David Wilson SE and Rodney Anderson Defra Director of Marine and Fisheries (MED Defra)</i></p> <p>Secretariat to be provided by Defra, Marine Environment Division</p> <p>* The Agencies (<i>The Met Office, EA, EHS, EN, FRS, JNCC, SEPA, SNH, CEFAS, FSA, CCW, AFBI</i>), to be represented on MAPC may vary according the contribution they might make to the issues to be discussed. Their policy interests should be covered by a representative from the sponsoring Department and the practical implications for the Agencies will be discussed at MARG and its subgroups.</p>
Funding Sources:	Not relevant – policy definition
Sub-Groups:	Marine Assessment and Reporting Group (MARG)

NOTES

- A mechanism to adopt adaptive management of the marine ecosystem across Government
- Meetings twice annually at least for first 2 years (December 05 and May 06, November 2006)
- 2 year work programme Jan 07 to Dec 07 for transition of current arrangements to new vision

Work Programme

- Acting on assessments and advice provided by MARG
- Guides the MARG work programme
- Will take an overview of Marine Objectives
- Resources for fulfilling monitoring requirements are an issue and a coordinated spending review bid may be necessary

UK Marine Monitoring and Assessment Strategy

Constituent Groups and Sub-Groups

Marine Assessment and Reporting Group

Level:	2	Reports to:	Marine Assessment Policy Committee
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Terms of Reference

The role of the MARG is to:

- i) Define monitoring programmes to meet international and national obligations and commitments for the marine environment, including operational forecasts and other socio-economic objectives; ensuring via an audit trail that MOs are measured.
- ii) Provide overall direction to the monitoring programme ensuring that the maximum efficiency and effectiveness is made of UK resources devoted to marine monitoring and assessments;
- iii) Commission, manage, approve and integrate periodic assessments for adoption by the MAPC;
- iv) Be proactive, noting research and developing technologies and emerging understanding, identify and highlight issues relevant to MAPC for policy and governance changes and adjust the monitoring programmes if relevant and required.

	<p>International OSPAR, International Maritime Organisation (IMO) Ballast Waters, IOC–Global Ocean Observing System (IOC-GOOS), UN Framework Convention on Climate Change / Global Climate Observing System (UNFCCC/GCOS), Global Marine Assessment. Safety Of Life at Sea (SOLAS), World Summit on Sustainable Development (WSSD), Bergen Declaration, Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS), Bonn Convention Convention on Biological Diversity (CBD), Bern Convention Ramsar Convention, International Convention for the Prevention of Pollution from Ships (MARPOL), The UN Convention on the Law of the Sea (UNCLOS), Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (London Convention).</p> <p>EU Shellfish Waters Directive, Shellfish Harvesting Directive, Bathing Waters Directive, Water Framework Directive, European Marine Strategy, Birds Directive, Habitats Directive, ICZM, EU-GMES, SEA Directive, INSPIRE, Nitrates Directive, Dangerous Substances Directive and Titanium Dioxide Directive, Urban Waste Water Directive, Common Fisheries Policy, Veterinary Medicines Directive.</p> <p>National Government vision for Monitoring programmes which show our seas are clean safe healthy productive and diverse. Fisheries Management , Conservation of Seals Act, Consents Licensing, Controlled Activities Regulations (Scotland), Countryside and Rights of Way Act, Environment Act 1995, Marine Ecosystem Objectives, Marine Spatial Planning, Water Order (NI), MDIP, Control of Pollution Act, Coast Protection Act, and Wildlife and Countryside Act.</p>
<p>Membership:</p>	<p>Defra and Devolved Administrations, Chairs of sub-groups, representatives drawn from Agencies, Departments and Institutes responsible for the implementation of monitoring programmes, representation from MDIP/MEDAG, Marine Objectives Working Group and experts as necessary.</p> <p>Members to have proactive role in shaping decisions and be a ‘responsible officer’ for a part of the monitoring collection programme.</p> <p>Secretariat to be provided by Defra – MED (initially).</p>
<p>Funding Sources:</p>	<p>Various - No new funds for the committee itself but members will be monitoring budget holders.</p>

UKMMAS Paper – Annex 3 – Revised 12th March 2007

Sub-Groups:	Clean and Safe Seas Evidence Group Healthy and Biologically Diverse Seas Evidence Group Productivity Seas Evidence Group Marine Protocols Group Ad hoc Task Teams as required
Notes	
<ul style="list-style-type: none">• Meetings quarterly.• Agree and approve subgroups and their annual work programme• Members to ensure communication of actions across the marine community and within own organisation• Specify the assessments needed• Maintain, through MEDAG and MDIP, the monitoring 'metadata'• Own the Monitoring Manual• Report to MAPC	

UK Marine Monitoring and Assessment Strategy				
Constituent Groups and Sub-Groups – (Tier 3)				
Group Name:		Marine Evidence Themes		
Subject Type (Please tick)	<input type="checkbox"/>	Policy	<input type="checkbox"/>	Policy/Technical
	<input type="checkbox"/>		<input type="checkbox"/>	Technical
Group Reports to:	MARG			
Terms of Reference	<p>The primary objective for each Thematic Group will be to:</p> <ol style="list-style-type: none"> 1. Translate the policy requirements into practical monitoring effort to ensure that UK marine monitoring is optimised to meet existing and future monitoring and assessment needs. 2. Produce periodic assessments to contribute to the integrated assessments as directed by MARG. 3. Maximise efficiency of resources devoted to monitoring and assessment of ecosystem elements. 4. Ensure monitoring effort and methods of data stewardship are compatible with 'The Marine Monitoring Manual' and MEDAG/MDIP'. <p>The group will also aim to promote and facilitate 'ownership' and buy-in.</p> <p>Ensure the delivery of work programme, as advised by MARG.</p>			
Policy Interests	As MAPC/MARG			
Major Deliverables:	<ol style="list-style-type: none"> 1. A work programme and timetable to meet the objectives of the UK MMAS. 2. Populated score-card/ Thematic assessment report. 3. A strategy for wider engagement to promote and facilitate buy-in and ownership by stakeholders 			
Membership (level – specialism - organisation):	<p>Senior Technical experts Agencies and Institutes responsible for the implementation of marine monitoring programmes and experts as necessary.</p> <p>Each member will be tasked by their organisation/group to represent their views and actively implement change when necessary.</p>			
Funding Sources: (if appropriate)	Via existing mechanisms.			
Sub-Groups:	Fixed-term task teams can be formed at the discretion of the group.			

<p>Work programme:</p>	<p>ToR 1: What, where, how:</p> <ul style="list-style-type: none"> ➤ Advise on relevant Marine Objective development needs. ➤ Collate National and International drivers for monitoring theme elements. ➤ Map existing monitoring effort against MAPC policy obligations for monitoring and assessment. ➤ Identify gaps, synergies and opportunities for integration (Year 1 – now; Year 2 – aspiration) in order to ensure that monitoring programmes are cost effective, collaborative and deliver the required data and supporting information. <p>ToR 2: Assessment:</p> <ul style="list-style-type: none"> ➤ Develop the assessment score-card for the theme, taking into account existing statutory commitments, Marine Objectives and the vision of the UK Marine Monitoring and Assessment Strategy. The score-card should add value to existing assessments that are done to meet statutory obligations. ➤ Populate the score-card with relevant available data and identify gaps. ➤ Report score-card assessments to MARG. Evaluate changes and identify possible causes. <p>ToR 3: Resource efficiency:</p> <ul style="list-style-type: none"> ➤ Identify barriers to maximising efficiency and optimising monitoring; make recommendations to MARG to resolve. ➤ Facilitate communication between evidence collectors. ➤ Liase with partner thematic groups, MO, MDIP, Protocols groups to ensure they are operating in a way that is compatible with group and vice versa. <p>ToR 4: Methods etc</p> <ul style="list-style-type: none"> ➤ Liase with Protocols groups to ensure the monitoring manual is appropriate and practical and own relevant chapter(s) of the manual. ➤ Facilitate metadata exchange with MEDAG and others, as necessary, and ensure data is available via the MDIP process. <p>Cross-cutting:</p> <p>Be informed by emerging research and technology. Promote awareness of existing research and development and identify new requirements.</p>
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Annex 5: Estimated Costs to the UK of Marine Monitoring

Estimated UK Marine Monitoring and Assessment Requirements - Annual Costs 2007-2017 - Sources of Information

MARG have identified and costed most of the marine monitoring which is undertaken by the UK.

There is no central source of this information and many lines are still estimates.

Note that these figures are spread over the UK departments and agencies and that the commitments to both programme and administrative resources should be maintained in the short to medium term if the UKMMAS strategy is to be a success.

The cost is estimated as £37m but is likely to be higher once aerial surveys and the true costs of field work and management are included.

There are many new demands and ongoing commitments which should have regular sampling programmes. These include the biological aspects of OSPAR, the need to map our sea floor, etc. MAPC discussed the various demands on current spending in May 2006. MARG has worked with the IACMST and others to rationalise the estimates. The total new resources need to fully comply with marine monitoring requirements is an increase of £22m (£59.6 - £37m).

These monies could be distributed. The breakdown includes, approximately: £8m Mapping and understanding the seafloor; £2m Data coordination, stewardship and integrated assessments; and £12m Provision for smaller increases in numerous other areas.

The immediate focus will be on identifying efficiency savings. The examples we can use include the cost saved by combining the requirements of the Water Directive Monitoring with existing activities – estimated £6m saving per year.

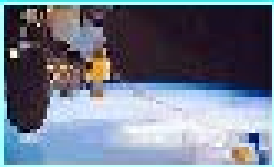
Resolving the issues of data management is essential for the success of the UKMMAS. This will be a vital contribution towards the overall marine data stewardship initiatives on MDIP and MEDAG.

Monitoring and Assessment Component (see Figure 1)	Spend (£m / year)		Figures calculated from:
	Current (2006)	Required	
Litter	0.00	0.40	Proposal to Government from Marine Conservation Society (2005)
Bathing Waters/Shellfish Hygiene	2.30	2.50	England and Wales shellfish and bathing waters - £1.7m guess for shellfish hygiene
Noise	0.00	0.20	IACMST Report: <i>Underwater Sound and Marine Life</i> (2005)
Pollution	5.00	6.50	NMMP costs (UK wide) plus RID includes WFD requirements (EA bid to Defra)
Nutrients	0.40	0.80	Defra research report (2005) includes some needs for plankton assessments
Physical Damage (Windfarms/Dredging)	0.80	2.00	Estimate of increase in activity - wind farms - could be cost-recovered from industry - Hydro morphology measurements for WFD may increase these costs
Seabirds	1.00	1.90	pers comm JNCC (2006)
Plankton	0.30	0.80	CPR - SAHFOS running costs and current contribution - increase for gaps in our seas
General Health of Marine Mammals (incl. By-catch)	1.00	1.50	Estimate SMRU (2006)
Biodiversity Status	0.30	3.60	JNCC bid to Defra WHB 2006
Health of Benthos	0.10	1.30	Estimate
Permanent Stations / lines for Climate Change Studies	0.30	1.50	MECN costs - co-ordination + data collection ME sustained obs of Oceans 2025 plus coastal observatories - (POL Liverpool and Scottish observatory £1 million not currently funded as monitoring) , Ships of Opportunity (Ferry Box)
Temperature & Salinity (incl. ARGO)	1.50	2.00	IACMST bid Guymmer 2005 (3d structure hydro graphic sections and ARGO) - (structure of ocean Argo 850k) - (Hydro graphic sections - much is rand used for some may be offset by NERC oceans 2025 proposal)
CO ₂ budget and acidification	0.00	1.30	Defra research proposal plus IACMST
Waves/Met Ocean and storm surges	3.50	3.50	Met Office figures (not argo) plus POL GLOSS contribution and PSMSL (£0.5k) - 2d aspects drifting buoys and sea level
Modelling	0.10	0.30	NCOF current + estimate needed to redesign and manage monitoring- IACMST report
Satellites inc GMES	3.00	3.00	EU - UK contribution - not all for marine. Does not include AATSR - (GMES - UK ESA Space contribution 7.23m/ 3 yrs plus 0.5 /yr for satellites outside GMES e.g. JASON AATSR)
Seabed Mapping (Habitat Types, Geology & Bathymetry)	0.20	8.00	UKHO/BGS/CEFAS business case (2006) could be spent over different profile. This exercise will cost approx £100m to map the entire sea floor. NB: This cost could be spent over any number of years and sea floor areas prioritised to where there is active management needed.
Productive seas evidence needs	?	?	Socio-economics
Commercial Fisheries	17.00	17.00	EU Data Regulations - Defra + SERRAD spend
Data, Assessment & Project Management and co-ordination	0.20	1.50	MDIP (gateway), Charting Progress 2
Estimated Total:	37.00	59.60	

Figures correct at September 2006
NB: Ariel Surveillance is not included
and Oceans 2025 is not reflected

All UK Marine Monitoring and Assessment Requirements Estimated Annual Costs 2007-2017

Current spend (>£37m), Total required (>£59.6)



Satellites including
GMES
£3m, £3m

Data, Assessment & Project Management
£0.2m, £1.5m



Permanent stations for
cc studies (MECN)
£0.3m, £1.5m

Seabirds
£1m, £1.9m



Litter
£0m, £0.4m



Temperature and
Salinity (including
ARGO)
£1.5m, £2m

Commercial
Fisheries
£17m, £17m



Plankton
£0.3m, £0.8m



Noise
£0m, £0.2m



Bathing Waters/Shellfish
Hygiene etc
£2.3m, £2.5m

CO₂ Acidification
£0m, £1.3m

General health of
Marine Mammals
(including By-catch)
£1m, £1.5m



Pollution
£5m, £6.5m

Waves/Met Ocean and
storm surges
£3.5m, £3.5m

Biodiversity status
£0.3m, £3.6m

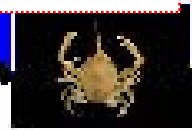
Nutrients
£0.4m, £0.8m

Modelling
£0.1m, £0.3m

Health of Benthos
£0.1m, £1.3m



Seabed Mapping
Habitat types; geology and bathymetry
£0.2m, £8m



Physical Damage,
(Windfarms / Dredging)
£0.8m, £2m