3rd Premiam Conference

Premiam – Post Spill Monitoring Conference

Effective post-spill monitoring – Sharing best practice and experience

22nd June 2016, SOAS, London

Delegate Notes

The aim *of the Premiam conference is to provide a forum for* ***scientists, regulators, environmental advisors and other professionals*** *working in the field of marine oil/chemical spill monitoring and impact assessment to* ***share experience, best practice and knowledge*** *with the wider marine emergency response community. This event will cover the importance of preparedness, coordination and the use of best practice science and technology in marine environmental monitoring and will pose important questions regarding the status of existing arrangements.*

Thanks to our sponsors:

Centre for Environment Fisheries and Aquaculture Science

Department for Environment Food & Rural Affairs

Environment Agency

ITOPF

JNCC Joint Nature Conservation Committee

MRAG

Oil Spill Response

SOTEAG Shetland Oil Terminal Environmental Advisory Group

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Welcome to the conference

This information gives the answers to some of the most frequently raised questions that arise at the conferences we organise.

Wi-Fi: There is no free Wi-Fi in the Brunei Gallery and Lecture Theatre but BT Openzone cards can be purchased for £10.00 at **http://www.btwifi.co.uk/** or from the Conference Office.

Questions – Bookings – Receipts – In house information: If you have any questions during the event about bookings, finances, or logistics please see Diana or Jayne at the registration desk; they will be pleased to help.

Timing: We will try to ensure that the conference runs on time to allow the allocated time for speakers and as importantly for discussion. An announcement will be made 5 minutes before the start of sessions.

Refreshment Breaks: There are two main refreshment breaks during the day that enable us to split the sessions and breaks more evenly; a sandwich buffet is available in the first break and sweet course during the second.

Food: There is always ample food at the events and you can come back for more. Once you have collected your food ***could you move away*** from the serving table. Catering staff are on hand if you need anything, including extra drinks.

Delegate list: A list of the delegates to June 13th is at the end of the delegate notes.

Evaluation form: There is an evaluation form at the end of these delegate notes and your views will help us improve future events and the feedback to you after this. Please leave these at the registration desk along with your badge when you leave.

Conference Outputs: The Power Point presentations and delegate notes will be available shortly after the event. We will notify you by email when these have been uploaded.

NB Valuables: If you have anything you value keep it with you i.e. do not leave laptops unattended.

Before you leave: Check you haven't left anything in the conference hall.

Please also take any leaflets or reports.

Introduction

Spills of oils and chemicals in the marine environment remain a significant threat. Therefore, the requirement for response capability, improved preparedness and effective post-incident monitoring and assessment remains undiminished. PREMIAM is an initiative aimed at improving post-spill environmental monitoring practices through the application of sound science and effective management and coordination. Premiam is co-ordinated by emergency response and impact assessment experts from Cefas (Centre for Environment, Fisheries and Aquaculture Science) and is now in its 9th year. It has wide support from all relevant UK government stakeholders and fully engages the scientific, industry and emergency response communities in delivering its aims.

The conduct of effective environmental monitoring in the event of marine spills of oil or chemicals is essential in order to understand environmental damage, the effectiveness of response and mitigation activities and the hazards to response workers and the general public.

The 1st Premiam conference (2012) explored the relevance and importance of an effective monitoring programme and the 2nd conference (2014) focussed on preparedness. This 3rd conference will provide an opportunity for stakeholders to understand and debate the key issues around an integrated approach and sharing best practice and experience. Are we working effectively together? How can we ensure that the effort is well coordinated and managed? And how can we ensure the best available technology and approaches are considered?

The aim of the Premiam conference is to provide a forum for scientists, regulators, environmental advisors and other professionals working in the field of marine oil/chemical spill monitoring and impact assessment to share experience, best practice and knowledge with the wider marine emergency response community. This event will cover the importance of preparedness, coordination and the use of best practice science and technology in marine environmental monitoring and will pose important questions regarding the status of existing arrangements.

Objectives

- To reflect on the level of **preparedness** for monitoring in the UK and internationally.
- To consider the roles of all stakeholders in **integration and collective responsibility**.
- To share best practice in the **planning, management, coordination and conduct** of marine monitoring activities following marine incidents and to learn from the experiences of emergency response professionals.
- To consider best practice in the use **science and technology** in an emergency response context.
- To consider efficient and effective ways of achieving monitoring aims including **data sharing and availability.**
- To understand the importance of the issues raised at the conference and to develop a set of outcomes from the conference presentations and discussions that help improve the way we deal with future incidents.

Programme

9.00 **Registration and refreshments**

9.45 – 9.50 **Welcome to the conference**
Gemma Harper – Deputy Director (Marine), Defra

Session 1: Preparedness
Chairperson: **Mark Kirby, Premiam Coordinator, Cefas**

9.50 - 10.00 **The PREMIAM Initiative – the story so far**
Mark Kirby, Cefas

10.00 – 10.20 ***Oil Spill Response Forum: Update on projects by Oil & Gas UK***
Louise O'Hara Murray, Environment Manager, Oil & Gas UK

10.20 – 10:40 ***Preparedness for Oil Spill Environmental Monitoring: An International Perspective***
Nicky Cariglia, International Tanker Owners Pollution Federation

10:40 – 11:00 **National emergency preparedness and management – the role of science and data**
Paul McCloghrie - Deputy Director (National Risks and Infrastructure), Cabinet Office

11:00 – 11:15 **Prepared for the worst? Environment Agency preparedness for PREMIAM**
Roger Proudfoot, Environment Agency

11:15 – 11:30 **Shoreline Assessments – Good practice for being prepared for spill impacts**
Rob Holland, Oil Spill Response Ltd

11.30 – 11:45 **Preparedness: Panel Q&A and session summary**

11:45 – 12.35 **First break: food and refreshments**

Session 2: Data and Technology
Chairperson: ***Stuart Rogers – Chief Scientist, Cefas and Marine Management Organisation***

12.35 – 12:55 **AUVs and their use in post spill environmental monitoring – BP's experience**
Peter Collinson, BP

12:55 – 13:15 **Environmental data access and sharing in the event of marine spills to facilitate monitoring programmes**
Kevan Cook & Ian Saunders, Natural England

13:15 – 13:35 **Post spill monitoring: the data we already have and the new data we need**
Brett Lyons, PMCC Chair England and Cefas

13:35 – 13:50 **Application of molecular techniques (DNA) to the processing of benthic macrofaunal samples**
Keith Cooper, Cefas

13:50 – 14:05 **Data Quality, Management and Access**
Sean Gaffney, MEDIN data manager, BODC

14:05 – 14:20 **Data & Technology: Panel Q&A and session summary**

14.20 – 15:00 **Second Refreshment break**

Session 3: **Best Practice and Working Together**
Chairperson: ***Colin Mulvana, - Deputy SOSREP***

15:00 - 15:20 **Promoting Working Together – The NCP & National Exercises'**
Kevin Colcomb, Maritime and Coastguard Agency

15.20 – 15.40 **SOTEAG: 39 years of monitoring and working together - how it has evolved**
Lorraine Gray, Marine Atlas Consultants & Rebecca Kinnear, Shetland Oil Terminal Environmental Advisory Group

15.40 – 16:00 **Working together: innovative thinking in OSR best practice**
Rob Cox, IPIECA

16:00 - 16:20 **Impact Studies Here and There – a P&I Club Perspective**
Tonje Castberg, GARD P&I

16:20 – 16:40 **Best Practice & Working Together: Panel Q&A and session summary**

16:40 – 16:45 **Summing up**
Prof. Stuart Rogers, Chief Scientist, Cefas

16.45 **Close and refreshments**

Welcome to the conference

Gemma Harper
Deputy Director (Marine), Defra
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Gemma will welcome delegates to this "PREMIAM" conference on marine emergencies and pollution response. She will highlight the importance of the project and its partnerships in the context of marine policy. Gemma will outline the practical benefits of PREMIAM and encourage best practice and knowledge to continue to be shared.

Dr Gemma Harper is Deputy Director for Marine Policy and Evidence and Chief Social Scientist in the Department for Environment, Food and Rural Affairs (Defra). She is responsible for delivering the UK Government's vision of 'clean, healthy, safe, productive and biologically diverse oceans and seas'. She is also responsible for ensuring social science – which aims to put people at the heart of Defra's policy making – is of high quality and underpins strategy, policy and delivery.

Gemma studied social psychology at London School of Economics and Political Science. During her post-doctoral research in the Department of Agricultural and Food Economics, University of Reading, she contributed to a range of national and international research projects. After eight years in criminal justice research at the Home Office and the Ministry of Justice, Gemma joined Defra in 2010. At Defra she led Strategic Evidence and Analysis, followed by the Strategy Unit, Animal and Plant Health Evidence and Analysis, and Plants, Bees and Seeds policy and evidence.

Gemma is a member of the Government Social Research Leadership Board, the Cross Government Evaluation Group, the Social Research Association Strategy Group and the Public Policy Committee of the British Academy. She is currently a Policy Fellow at the Centre for Science and Policy, University of Cambridge.

The PREMIAM initiative – The story so far

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The PREMIAM (Pollution Response in Emergencies: Marine Impact Assessment and Monitoring) initiative started life in 2009 as a 3 year Cefas (Centre for Environment, Fisheries and Aquaculture Science) lead project funded by Defra (Department for Environment, Food and Rural Affairs). The initial aim of the project was:

To develop procedures and processes to ensure a fast, appropriate and pre-considered response to the impact assessment and ongoing monitoring during marine emergencies involving actual and potential spills of oil or chemicals to the marine environment.

Significant outputs from the project have included:

- The publication of the Premiam post-spill monitoring guidelines (Nov 2011).
- The development of the Premiam website www.cefas.co.uk/premiam.
- The generation of cross-government cooperation regarding post spill monitoring through a steering group comprising of over 20 UK government agencies and departments.
- Wider engagement initiatives such as the biennial Premiam Conference and the Premiam/Industry sub-group.
- The development of monitoring coordination, management and funding guidance including the concept of a Premiam Monitoring Coordination Cell (PMCC). Processes have been implemented in England with equivalent progress made in Scotland, Wales and Northern Ireland.
- Inclusion of the Premiam guidance and PMCC concept in the updated National Contingency Plan and as a core element of the national response exercise programme.
- Publication of approaches for assessing preparedness for post-spill environmental monitoring[1].
- Promotion of best practice at national and international meetings and conferences.

The Premiam initiative has now evolved into a broader group promoting best practice in preparedness and the use of science and management to ensure effective post-spill monitoring can take place. Moving forward the challenge is to maintain the momentum of continuous improvement and to encourage wider engagement.

[1] Mark F. Kirby, Rosalinda Gioia, Robin J. Law (2014). The principles of effective post-spill environmental monitoring in marine environments and their application to preparedness assessment. *Marine Pollution Bulletin, 82: 11–18.*

Mark Kirby is Cefas' Programme Director for Oil & Gas and Emergency Response and is currently responsible for the overall delivery of Cefas' broad portfolio of advisory, research and consultancy work to the Oil and Gas and Emergency Response sectors. His scientific background is in ecotoxicology and in particular its use in the assessment offshore industry and oil spill impacts. With over 25 years of experience of research & development and regulatory advice in this field and over 25 peer reviewed scientific papers, Mr Kirby is a nationally and internationally recognised expert in the regulation and assessment of offshore activities and a key advisor to UK government departments, international and commercial clients. He also chairs the Premiam steering group overseeing a UK wide initiative to promote best practice in science and management of post-spill environmental monitoring (see cefas.co.uk/premiam).

Oil Spill Response Forum: Update on projects by Oil & Gas UK

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The Oil Spill Response Forum was created to continue the work of the Oil Spill Prevention and Response Advisory Group (OSPRAG); a group established to co-ordinate the UK's response to the issues arising from the 2010 Deepwater Horizon incident in the Gulf of Mexico.

The Oil Spill Response Forum has the specific objective to facilitate the development and maintenance of an effective, robust and sustainable oil spill response capability for upstream operations on the UKCS. The Oil Spill Response Forum has representatives from across industry, the response community, regulators and the statutory nature conservation bodies.

Through the Oil Spill Response Forum, Oil & Gas UK has facilitated several collaborative and multi-stakeholder studies in 2015 to continue to improve industry's knowledge of the marine environment. Working in a collaborative manner has the twin benefits of reducing the overall cost of the work and allowing for wider industry and stakeholder input and review of the project outcomes. These studies include:

- **An update to the Seabirds Oil Sensitivity Index (SOSI)** – the index that describes seabird sensitivities to accidental oil releases offshore has been updated to take into account the wealth of new survey data that has been collected and to take the opportunity to review the method and factors used in calculating the SOSI in light of new science. The SOSI has been generated as GIS layers.

- **Coastal Sensitivity Mapping –** the aim of this study was to collate and map the information for coastal areas required for oil spill planning and response in Scotland, including environmental and socioeconomic information. It is a resource for oil spill planning and response professionals and advisors.

- **Monitoring Capability Assessment –** this study gathered information on the capability of the UK industry and wider scientific community to monitor an offshore accidental oil release event on the UKCS. Data has been gathered on the availability of equipment, vessels and people to carry out monitoring in the UK and makes recommendations on where to focus resources in the first 12 – 24 hours of an incident to assess potential impacts and inform operational response decisions.

Louise is the Environment Manager at Oil & Gas UK working in the Health, Safety and Environment Team with members on variety of projects in oil spill preparedness and response, and improved understanding of the environmental impacts of hydrocarbon exploration, production and associated supply chain activities.

Louise joined Oil & Gas UK in 2010 initially as part of the Operations Team focusing on joint industry projects on decommissioning. Louise studied and worked as a Geophysicist and is a Chartered Environmentalist and member of Charter Institute of Water and Environmental Management (CIWEM).

Preparedness for oil spill environmental monitoring: An international perspective

Nicky Cariglia
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Standard procedures for environmental monitoring following oil spills vary hugely worldwide. Globally, most legislative frameworks that underpin post spill environmental monitoring fall in one of three categories: 1) Meets international regime as defined by '92 CLC and Fund Conventions, 2) Meets international regime and in addition national legislation applies, 3) Has not ratified international regime, no specific national legislation and monitoring requirements, environmental monitoring is governed by a patchwork of relevant and irrelevant existing legislation, inconsistently applied.

As a result, the level of general preparedness varies greatly by country and frequently, oil spill specific planning for environmental monitoring is absent. In many cases, there can be little knowledge of how environmental monitoring programmes should be designed in order to obtain meaningful and useful data that guide the ultimate goal of reinstating the environment. This lack of knowledge and experience can lead to some commonly recurring issues.

Amongst the most common issues we encounter across the world are the following:

- Inconsistent methodologies to identify, assess and quantify the damage;
- Sampling analytes that are irrelevant to oil spills;
- The application of abstract models to determine punitive fines.

In ITOPF's work, we find the PREMIAM guidelines to be a scalable and flexible framework, which can be tailored to individual cases. Regardless of the country or situation, we frequently promote the approach of PREMIAM as best practice. These attributes strongly reflect the objectives of the international compensation regimes and the use of the PREMIAM guidelines should continue to be encouraged.

Almost 4 years' experience in oil spill response and related matters. Currently part of the Africa – Middle East – Europe region team at ITOPF. Sits on the Fisheries and environmental damage assessment working groups. Expertise includes environmental and fisheries damage assessments, all aspects of oil spill response including response coordination, environmental and fisheries impact assessments, contingency planning, Research & Development, international regime ruling oil pollution damage compensation, claims assessment. Whilst at ITOPF have attended both tanker and non-tanker spills in Asia, Europe, North and South America.

Previous experience focussed on fisheries and environmental management with considerable experience of designing, implementing and conducting environmental survey protocols in coastal environments for wide ranging objectives such as: environmental impact assessment; ecological monitoring of vulnerable and exploited species and; implementation of community and non-technical environmental monitoring to maximise data on key indicators for national policy and community level planning. Through this work she has formulated and led many training programmes aimed at both high resolution, technical data collection programmes, through those of a lower technical

specification. She has an interest in invertebrate ecology and fisheries, and has worked with tropical holothurian fisheries in both the Seychelles and Maldives. More recently, she has applied her experience of training and managing survey personnel to managing and coordinating large scale RFMO observer programmes, and analysing and producing outputs for these programmes. After joining MRAG, she has taken an interest and lead in assessing and reporting compliance breaches to relevant authorities, which has required an in depth understanding of multiple international agreements and instruments.

National emergency preparedness and management – the role of science and data

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- Central government crisis management follows an established structure with clear roles and responsibilities and predictable objectives. These structures, up to and including the Government's COBR committee and the Ministerial Recovery Group, are used to engage with a wide range of crisis response and recovery scenarios.

- Crisis response structures are an effective tool for working across Government and between Government and local response and recovery organisations and are increasingly being used to engage with and manage situations which previously would have been thought of as in the realm of local co-ordination.

- A clear understanding of these structures and how to interact with them is critically important to getting your message across in an emergency. Almost all the organisations represented here could expect to have a role and interaction with these structures either directly or via intermediaries. Some aspects which government may particularly rely on following a major spill event include the Scientific Advisory Group for Emergencies and the Civil Contingencies Secretariat.

The Civil Contingencies Secretariat is the Government's centre of expertise in risk assessment, civil risk management and emergency response. As well as coordinating risk management across government, the team provide the secretariat for the Government's COBR ministerial emergency response committee and the Ministerial Recovery Group.

Previously Paul has worked in central Government roles ranging from renewable energy policy to improving the use of science by Government. Prior to moving to central government Paul worked at Cefas in the area of marine circulation modelling, including spill modelling.

Prepared for the worst? PREMIAM preparedness.

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Following on from the Defra funded PREMIAM (Pollution Response in Emergencies: Marine Impact Assessment and Monitoring) project and the publication of Post-incident monitoring guidelines, the PREMIAM partners have continued to maintain a network of 22 organisations from across the UK with an interest in marine spill response and the protection of the marine environment. Expert guidance, integrated decision making and co-ordination processes have been developed. In England, in the event of a major marine incident a PREIMAM cell would be formed to support the Environment Group that manages the incident. Cefas are the nominated chair of any cell that would be set up with the Environment Agency (EA) supporting as deputy chair.

In the event of a major incident it would be up to the chair and deputy chair to determine the monitoring response in liaison with the Environment Group. As well as Cefas and the EA, Natural England (NE) and the Food Standards Agency (FSA) would be key primary responders along with the Joint Nature Conservation Committee in offshore situations from a monitoring perspective.

An assessment of readiness will be discussed including the primary responsibilities of the key responders and a perspective on workforce planning and quality standards; important aspects of incident response.

Roger is an experienced manager in estuarine and coastal monitoring and assessment in the nearshore marine environment with over 25 years' experience. The majority of this time has been spent with the Environment Agency with the rest its predecessor, the National Rivers Authority.

During his career Roger has participated in a wide range of marine environmental surveys, conducted numerous environmental impact assessments and now manages a fleet of Coastal Survey Vessels around the coast of England and Wales.

His team is engaged in a wide range of marine monitoring and assessment collaboratively with Defra and others including Marine Conservation Zone verification and baselines surveys. His team also carries out status assessments for the Water Framework Directive and Environment Impact Assessment studies for Flood Defence projects for the EA. He is the chair of the UK Healthy Biologically Diverse Seas Evidence Group and is supporting Defra with its marine review as the lead on Marine Science and Evidence for the EA.

Shoreline Assessments – Good practice for being prepared for spill impacts

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- SCAT (Shoreline Clean-Up Assessment Technique) is a widely accepted protocol for describing, in common terminology, shoreline types and associated oiling conditions.
- Pre-spill SCAT survey data ensures valuable information is available for building the spill response strategy on day 1 – saving valuable time and resources.
- SCAT helps to drive the pace and focus of shoreline clean-up operations by providing the intelligence on heavily oiled and priority protection areas.

Rob holds BSc and PhD qualifications in Marine Biology with a specialism in ecotoxicology and the effects of oil on shoreline habitats. Rob has worked at OSRL for 12 years mainly in a consultancy activity and attended a number of spills in a technical advisory role for shoreline assessment and treatment. Rob has led OSRL's SCAT training and response capability for its responders working with Dr Ed Owens. Rob has also been instrumental in the partnership with the Sea Alarm Foundation to bolster the oil industry's oiled wildlife response advocacy, training and response services. Rob has recently co-authored the new IOGP-IPIECA Good Practice Guide for NEBA and assisted in the review of other volumes in the series. Rob currently sits in OSRL's global Technical Department and is responsible for the development of new and novel techniques and approaches to spill response such as the application of Unmanned Aerial Vehicles (UAV) for monitoring and surveillance.

Marine Autonomous Systems (MAS) and their use in post spill environmental monitoring – BP's experience

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- BP is assessing the use of Autonomous Maritime Systems (MAS) for environmental monitoring during oil spill events and general environmental applications for operational activity.
- There are many kinds of MAS - and some are more suitable for oil spill response. Specifically, these systems can be applied as 'Rapid Strike' tools, designed and integrated to complement a wider environmental monitoring strategy.
- BP undertook a deployment of a MAS systems for crisis response in 2015, in collaboration with SAMS and Marine Scotland. There were a number of lessons and the demonstration of the system has led to wider acceptance of these new technologies.

Peter Collinson is BP's Global Environmental Response Expert, Central S&OR. His role involves embedding lessons learned from the Deepwater Horizon oil spill incident in 2010 into BP's way of working and sharing lessons with Government Regulators around the world. He is a BP Subject Matter Expert for oil spill dispersants, risk, crisis response and has an interest in Big Data and Analytics and marine autonomous systems. During the Deepwater Horizon incident he was responsible for the rapid strike environmental monitoring of subsea dispersant injection in the deep ocean- a world first. Prior to this role, Peter had worked in Enterprise and Major Project Risk Management and Crisis Management in BP over a period of 9 years, based in London and Malaysia. His background is as a Marine Biologist with a PhD in Coral Reef Ecology and is a Fellow of the Institute of Marine Engineering Science and Technology (IMarEST). Peter is currently focusing on delivering BP's global environmental strategy on marine autonomous systems for operational and environmental user cases.

Environmental data access and sharing in the event of marine spills to facilitate monitoring programmes

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When planning a post spill monitoring programme to a marine pollution incident, the prompt dissemination of relevant data can be crucial in determining the nature, scale and success of that programme. However, in these days of multiple systems and protocols hosting various and sometimes conflicting sources of data, making sure that the data provided is of most use requires some thought.

In order to make the most efficient use of data, the planners of a monitoring programme require data (amongst others) on the various habitats and species likely to be impacted, their sensitivities and likely recovery options. Oil spill predictions and real time spill tracking can help to inform the likely areas to be impacted and help establish baselines. Data is needed to build these baselines and previous marine monitoring surveys are a good source of this information. Data sharing initiatives such as the Marine Environmental Data and Information Network (MEDIN), The European Marine Observation and Data Network (EMODnet) and the National Biodiversity Network (NBN) permit sharing of marine environmental data. These data sharing initiatives publish many datasets in many ways, what do we need and what format do we need it in?

Marine Environmental Data and Information Network http://www.oceannet.org/
The UK Hydrographic Office Bathymetry Data Portal https://www.gov.uk/guidance/inspire-portal-and-medin-bathymetry-data-archive-centre
The Data Archive for Marine Species and Habitats (DASSH) http://www.dassh.ac.uk/
The European Marine Observation and Data Network http://www.emodnet.eu/
The National Biodiversity Network data portal https://data.nbn.org.uk/
The Channel Coastal Observatory Data Portal http://www.channelcoast.org/
The Multi-Agency Geographic Information for the Countryside (MAGIC) http://magic.defra.gov.uk/
The UK Government metadata portal – data.gov.uk https://data.gov.uk/data/search

Ian Saunders' biography
"The first dedicated marine data specialist employed by Natural England, being involved with most projects Natural England run with a marine GIS element from the design and analysis of marine monitoring surveys; Marine Protected Area Designations; collaborative casework studies; and analysis and mapping of habitats and species for the Marine Conservation Zones project and Marine Conservation Advice. Links with MEDIN and data.gov.uk are built and developed, ensuring data

gathered by Natural England's marine monitoring programme is made publically available via a number of portals, www.data.gov.uk; www.magic.defra.gov.uk and http://www.emodnet-seabedhabitats.eu. Ian is also a member of the subtidal diving survey team, a Natural England On Call Duty Officer and a Marine Incidents On Call Duty Officer."

Kevan Cook's biography

Providing specialist information on: Oil Spill Response, Emergency Planning, Marine Incidents, Marine Operations, Shipping, Coastal Water Quality.

Post spill monitoring: the data we already have and the new data we need

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- Wide array of data, scientific capacity and knowledge available to support post spill monitoring activities.
- Presentation will review the most successful approaches to both detect and assess accidental releases using chemical as well as biological approaches for spills of either oil or HNS in the marine environment.
- Techniques covered includes aerial surveillance, sampling techniques for water, suspended particles, sediments and biota. Early warning bioassays and biomarkers to assess spills are also presented.
- The availability of existing data (chemical and biological) is examined and outputs from our current monitoring programmes (e.g. Clean Safe Seas Environmental Monitoring Programme), which could support post-spill assessments are presented. Finally, research needs and gaps in knowledge are discussed.

Brett Lyons is an environmental scientist with more than 20 years' experience in planning and implementing monitoring programmes for assessing the impact of chemical contaminants in the marine environment. Brett currently sits on a number of national and international working groups developing and implementing marine monitoring programmes, including chair of the UK's Clean Safe Seas Evidence Group (CSSEG) and representing the UK at various International Council for the Exploration of the Sea (ICES) and OSPAR working groups. He has also published widely in the field of marine environmental monitoring, with over 60 peer-reviewed papers and book chapters.

Application of molecular techniques (DNA) to the processing of benthic macrofaunal samples

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Molecular genetic techniques (i.e., barcoding, metabarcoding) are increasingly being employed in the processing of biological samples for species identification. Such approaches may offer a number of advantages including lower sample processing costs, greater speed and better quality data. Within the marine environment, whilst some work has been done on the use of genetics for benthic meiofaunal sample processing, relatively little attention has yet been given to the potential for these techniques for the processing of macrofauna. The benthic macrofauna are those animals of size >0.5mm/1mm and which live in or on the seabed. Samples of the benthic macrofauna are routinely collected, using a grab/core, for the purposes of seabed characterisation and impact assessment. In the laboratory, fauna are identified and enumerated using a visual (microscopic) approach. The processing of macrofaunal samples is a well-established process, yet not without its problems. For instance, it can be expensive, time consuming, it requires a high level of taxonomic expertise, and there can be issues of comparability between datasets.

Whilst in theory genetic approaches could address some of the above issues, relatively little work has yet been done to fully explore the potential. It is not immediately obvious why this is the case, but possible factors include: (i) concerns about the availability of genetic sequence data, (ii) a perception that genetic techniques cannot be used with samples fixed in formaldehyde (the use of formaldehyde is currently the only practical means of fixing the large sample volumes, but it is known to degrade DNA), (iii) concerns about the data continuity, (iv) contamination issues, and (v) lack of quantification.

In this study we explore the potential for application of genetic techniques in the processing of macrofaunal samples, using both a bioinformatics and experimental approach. The bioinformatics element of the study considers the availability of DNA sequence data for the range of benthic taxa routinely encountered in work carried out in UK waters. In addition, we develop tools to match operation taxonomic units to species. The experimental work compares results from traditional sample processing (microscopy) with techniques using (i) eDNA/metabarcoding, (ii) tissue/barcoding and (iii) tissue/metabarcoding. These three different approaches were designed to generate benthic data which is different (in the case of the eDNA approach), and similar (for the tissue samples), with tissue/barcoding allowing for generation of abundance data, whilst the tissue/metabarcoding approach will only give an inventory of the taxa present (i.e., no abundance).

To our knowledge, this is the first study to document the availability of genetic sequence data for UK waters. It is also the first to consider how genetic approaches could be used to generate data which is comparable to that produced using the traditional (microscopy) sample processing technique. Finally, this is the first time an eDNA approach has been trialled for benthic sample processing. Such a technique has the potential to identify the full species complement of a faunal sample, not simply the macrofauna, and is therefore consistent with the ecosystem approach to environmental assessment.

Keith Cooper's biography

Keith Cooper is a marine benthic ecologist from the Centre for Environment, Fisheries and Aquaculture Science (CEFAS). His research interests are focused on the seabed, and include impact assessment, seabed recovery, seabed restoration, habitat mapping, and offshore monitoring approaches. As part of his role, he regularly provides advice to the UK and oversees governments on benthic ecological aspects of offshore developments.

Data Quality, Management and Access

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- Post spill monitoring is needed to judge the potential environmental impacts of any spills, in both the short and longer terms. For this judgement to be made in an efficient scientific manner, access to usable data is essential.
- However, do all stakeholders agree on what the term 'usable' means in the context of data? A demonstration of a data management scenario where different users have different interpretations of usability is given.
- Adherence to the FAIR data principles are a way to ensure that this confusion does not occur. These are about developing community standards for data provenance, versioning, identity, citation, and dependency.
- FAIR principles have been at the core of BODC developments such as the NVS2 Vocabulary Server and the Published Data Library.
- MEDIN are a marine data network, established in line with the FAIR principles. MEDIN have developed community standards for data re-usability (Data Guidelines) in keeping with the FAIR principles. MEDIN work with the INSPIRE and GEMINI discovery metadata standard communities and have developed a discovery metadata standard and portal to allow stakeholders to locate marine data for their requirements efficiently.

FAIR data principles
http://www.nature.com/articles/sdata201618

NVS2 Vocabulary Server
https://www.bodc.ac.uk/data/codes_and_formats/vocabulary_search/

MEDIN Data Guidelines
http://www.oceannet.org/marine_data_standards/medin_data_guidelines.html

MEDIN Discovery Portal
http://www.oceannet.org/finding_data/search/full/

Work Stream Lead for MEDIN on Data and Metadata Standards, BODC Data Manager for NERC Discovery Science marine research grants. He specialises in management of oceanographic field data from grants and ongoing monitoring programmes, along with development and maintenance of metadata and data standards. He started at BODC in 2005, working as Liaison Officer for the Proudman Oceanographic Laboratory (subsequently National Oceanography Centre, Liverpool). He joined MEDIN in winter 2014 and now leads the work stream on Standards. He sits on the GEMINI Working Group, representing MEDIN.

Promoting working together, The UK NCP and National Exercises

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The MCA see PREMIAM as a working process running in parallel with any maritime pollution incident EG. In simple terms then: the appropriate regional EG will be set up to support all response cells which are initiated. Most EG's are familiar with their territory and its sensitivities as well as the constituent EG members and their range of expertise. It is this NCP function which MCA believes to be a key contribution to the work of any EIA through PREMIAM. Local knowledge has a lot to bring to EIA.

The main issues which MCA would like to see clarification on wrt PREMIAM include how the process will work across the devolved administrations and how cost recovery will be effected at the conclusion of the assessment. Each of the devolved administrations has emergency procedures in place through the extant civil contingencies mechanisms. PREMIAM will presumably be working alongside those other committees set up such as STAC and SAGE. It remains to be seen how closely knit these parallel processes may turn out to be. In the event of a cross boundary clean-up operation – will we encounter differences in the way EIA is promoted and/or carried out? Those differences might arguably be anticipated and solutions developed for a range of scenarios involving a spill affecting more than one administration.

The recovery of costs for environmental monitoring will clearly be a significant element of post incident discussion. Are the costs reasonable? Justifiable? Given that there is likely to be a wide range of methods to establish environmental impact and the level of detail for those assessments, then decisions of what is the appropriate and reasonable methodology may generate some significant discussion. Liaison between the PREMIAM managers and the representatives of the funding organisations may prove to be extremely important and may optimally be arranged at a very early stage.

The MCA are routinely involved in many oil and HNS spill exercises every year with Port Authorities, coastal local authorities, environmental regulators and the Oil Industry. Many of those exercise organisers may lend themselves to incorporating a level of EIA in the exercise scope. The introduction of PREMIAM play across a range of exercise scenarios should be of significant benefit in exploring those issues of cross border working, reasonableness wrt costs incurred and interaction with response cells and the incident EG.

Kevin Colcomb is the Senior Scientist in the Counter Pollution and Salvage Branch of the UK Maritime and Coastguard Agency. He graduated in Environmental Sciences from the University of East Anglia in 1985, after which he worked at Warren Spring Laboratory on a number of research projects in the field of maritime pollution including a wide range of sea and beach trials. In 1993, Kevin joined the Marine Pollution Control Unit, now Counter Pollution and Salvage Branch of the MCA. His current responsibilities are primarily to ensure timely response to marine oil spills in UK waters, and to provide technical and scientific advice for dealing with marine pollution in general. Kevin will be retiring on or just before 23 July 2016.

Shetland Oil Terminal Environmental Advisory Group (SOTEAG): Oil spill response

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For more than 30 years SOTEAG has monitored the environment around Shetland's Sullom Voe Oil terminal and port. SOTEAG's monitoring programme is designed to detect and measure change in the marine and coastal environment providing an accurate baseline should a spill occur.

In the event of an oil spill in Shetland, SOTEAG's Wildlife Response Coordinating Committee (WRCC) will respond to oiled wildlife casualties and corpses resulting from a significant oil spill.

A shoreline response tool in Google Earth was developed that will aid in planning and implementation of WRCC's wildlife response plan, as well as providing an accurate baseline. These oil spill sensitivity maps were collated from the Shetland Marine Spatial Plan as well as bespoke maps created for the project. These were prioritised into five themes: (1) base maps, (2), coastal protection and clean-up priorities, (3) biological resources, (4) human use and activities, and (5) logistical and operational resources. A demonstration of the maps will be given.

Scotland currently undertakes varying procedures to those outlined by PREMIAM guidelines. SOTEAG and the WRCC will make themselves and any data held available to the Scottish Evidence Response Group, who would head up a major response, should a spill occur in Scotland.

Rebecca Kinnear's biography
SOTEAG Executive Officer SOTEAG (Shetland Oil Terminal Environmental Advisory Group) is a collection of stakeholders who monitor the environmental impact of the Sullom Voe Oil Terminal on the coastal environment. My role is to undertake the day to day management of SOTEAG ensuring that it continues to be in a position to offer independent environmental advice to the Sullom Voe Association Ltd. I oversee the issuing of monitoring contracts and liaise with environmental consultancies and the Monitoring committee and the WRCC. I also raise awareness of the group by developing a range of engagement activities and attending meetings and conferences. Previously I was PDRA and Laboratory Manager for the Sediment Ecology Research Group. I have a PhD in Marine Ecology from the University St Andrews and a BSc in Coastal and Marine Ecology from the University Plymouth.

Lorraine Gray's biography

Lorraine is a specialist in using marine data with Geographical Information Systems (GIS) to inform policy across a range of environmental issues. She has a PhD in ecotoxicology from Napier University (2003). Lorraine worked at the North Atlantic Fisheries College for 6 years where she developed the Shetland Marine Atlas (data) and Marine Spatial Plan (policy), and has published numerous scientific papers on her work in this field. Since establishing as an independent consultant in 2012, Lorraine has taken forward the Shetland Spatial Plan to an oil spill context with SOTEAG and has pioneered the most comprehensive oil spill sensitivity maps in the UK. As an Associate with Xodus Group, Lorraine provides technical leads to impact assessments relating to commercial fisheries and fish ecology. She also does academic work (in the field of marine spatial data and planning) as an associate with the Marine Institute in Galway, and with the University of the Westfjords in Iceland.

Working together: innovative thinking in OSR best practice

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The April 2010 Gulf of Mexico (Macondo) oil spill incident (and the Montara incident in Australia which preceded it) have had far-reaching consequences in prompting the re-examination by industry not only of operational aspects of offshore operations, but also of an operator's ability to respond in the event of an oil spill incident or well blowout. In response to the incident the foregoing, the International Association of Oil and Gas Producers (IOGP) formed the Global Industry Response Group (GIRG), tasked with identifying learning opportunities both on causation and in respect of the response to the incident. The OSR- JIP is managed by IPIECA on behalf of IOGP in recognition of its long-standing experience with Oil Spill Response matters.

Nineteen oil spill response recommendations were identified and these are being addressed via a five-year Joint Industry Project (JIP) funded by nineteen oil industry members. The Oil Spill Response JIP (OSR-JIP) has carried out work to address the nineteen subject areas resulting from the project. A summary of the completed and ongoing work is available at the project website at http://oilspillresponseproject.org ; much of the work is currently being translated into multiple languages for global dissemination.

Amongst the many products and approaches being produced by the JIP, several stand out as innovative products and approaches to Oil Spill Response engendered through working together with different partners:

1. Spill Impact Mitigation Assessment (SIMA – formerly known as NEBA) as the foundation of effective planning and response preparedness is a product developed jointly with the American Petroleum Institute. It is primarily intended for larger or higher consequence spill scenarios but can also be used ahead of an actual spill (e.g. in planning) to develop response strategy maximising mitigation of impacts - across ecological, socio-economic and cultural sensitivities. The process gives guidance on how to assess how much each feasible response option mitigates (or exacerbates) the impact to each key resource compared to no intervention, and in doing so informs strategy on primary, secondary and supplementary response options.

2. The new Tiered Preparedness & Response paradigm is a product developed jointly with the Oil Spill Response Organizations to improve the use of the Tiered Response Concept. It drives users to think in detail about their requirements in the event of a spill in a particular location, not simply in terms of distance and access but also scaled to fifteen key principles/categories of response which must be evaluated to provide an holistic summation of requirements.

3. The offshore regulators have produced guidance on their expectations for international offshore preparedness and response. We have mapped the products we have produced to those regulator expectations to ensure that the tools we have produced help oil and gas industry members in both their compliance and preparedness planning activities.

Rob Cox is Technical Director of IPIECA in London. Rob has over twenty five years of international petroleum industry experience including fifteen years with Caltex/Chevron in Africa, the Middle East and the United States. Rob's background combines field experience in Environment, Health & Safety

aspects of shipping, refining, distribution and retail marketing, as well as Environmental Management System implementation and auditing.

Rob is currently seconded to the position of program manager of the IOGP-IPIECA Joint Industry Project on Oil Spill Response (the OSR – JIP) which was established to understand and implement the oil spill response lessons learned from recent upstream incidents.

Rob holds a Bachelor's degree in Chemistry and Biochemistry from the University of Dundee in Scotland and a Postgraduate Diploma in Environmental Practice from Farnborough College of Technology in England.

Post impact studies here and there, a P&I clubs perspective

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From experience with oil spills all over the world we see very different approaches to post spill impact studies PIA. Examples from Korea, Colombia, an English dependency at Tristan da Cunha and Norway show that the planning and the approach to PIAs to a varying degree produce results that is useful in the claims process. An initial analysis of the spill in question, the location and potential activities and resources affected proves useful for defining the scope of a PIA.

Tonje has been working for Gard for more than 10 years, mostly with environmental claims and has been involved and attended oil spills around the world. She holds a PhD in marine microbiology and has previously worked for the University of Bergen and Institute of Marine research in Norway.