

4th Premium Conference

Post Spill Monitoring & Impact Assessment Conference

Looking Back and Moving Forward

21st June 2018, Flett Theatre, Natural History Museum, London

Delegate Notes



The aim of the Premium conference is to provide a forum for **scientists, regulators, environmental advisors, academics 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. In line with theme of 'looking back and moving forward' this event will provide a unique opportunity to reflect what has been achieved so far and to investigate through expert presentations and discussion what are the key areas for development moving forward.

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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: The code to access the open network is **NHM-Free-wifi**.

Twitter: If you're tweeting please use [@Premiam_Spill](https://twitter.com/Premiam_Spill).

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 **11th June** is at the end of the delegate notes.

Feedback Forms: 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.

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 oil 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. The Premiam initiative aims to improve 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 10th 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. The 2nd conference (2014) focussed on preparedness and the 3rd (2016) on the importance of an integrated approach and sharing best-practice. This 4th Premiam Conference comes, therefore, at an opportune time for the emergency response and marine monitoring communities to reflect on progress so far and to establish the key areas that need attention to drive innovation and efficiency for the coming decade and beyond.

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 and what further development is needed.

Objectives

- To reflect on the way **best practice science and management** have contributed to improvements in post-spill monitoring and preparedness.
- 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 the use of **emerging science and technology** in an emergency response context.
- To consider efficient and effective ways of achieving monitoring aims, including **data sharing and availability**.
- To look forward to **future challenges** and to establish where effort needs to be focussed to **achieve better implementation** of post-spill monitoring in the future.

Programme

- 9:00 - 9:40 **Registration and refreshments**
- 9:40 – 9:50 **Welcome to the conference**
Sonia Phippard, Director General for Environment, Rural and Marine, DEFRA
- Session 1: From Science to Decision-making**
Chairperson: *Mark Kirby, Science Services Director, Cefas*
- 09:55 – 10:05 **Premiam and the Post-Spill Monitoring Guidelines**
Mark Kirby, Science Services Director, Cefas
- 10:05 – 10:35 **Keynote talk: Seasons in the Field: Some Reflections on a Career of Studying the Consequences of Catastrophe**
Gary Shigenaka, Marine Biologist, NOAA, USA
- 10:35 – 10:55 **Incident Response in Scotland – Managing the Response with Scientific Support**
Daniel Pendrey, Acting Chair of Scotland's Environment Group, Marine Scotland
- 10:55 – 11:15 **Post-Spill Impact Assessment in France: Preparedness Status and Perspectives**
Ivan Calvez, Biological Oceanographer, CEDRE, France
- 11:15 – 11:35 **Scientific Data Sharing and Availability – How it is essential in Environmental Monitoring Responses**
Suzanne Ware, PMCC Chair (England), Cefas
- 11:35 – 11:55 **Rapid Response and Long-Term Monitoring for Marine Birds - The Role of Science**
Julie Black, Marine Ornithologist, JNCC
- 11:55 -12:40 **First break: food and refreshments**
- Session 2: Case Studies**
Chairperson: *Rob Holland, Technical Lead, OSRL*
- 12:40 – 13:10 **Keynote Talk: The Legacy of Spills: Remembering and Forgetting Environmental Impacts**
Tim Cooper, Social Historian, Exeter University
- 13:10 – 13:30 **50 Years of Case Studies from Around the World – What have we Learned about Measuring the Environmental Impact of Oil-Spills?**
Nicky Cariglia, Senior Technical Advisor, ITOPF
- 13:30 – 13:50 **National Response Exercises – Environment Groups – Learning from Response and Exercise**
Stuart Hankey, Emergency Planning Officer, Environment Agency
- 13:50 – 14:10 **The Importance of Time Series to understand Long-Term Impacts**
Rebecca Kinnear, Executive Officer, SOTEAG) & Jon Moore, Director, CALM
- 14:10 – 14:50 **Second Refreshment break**
- Session 3: Future Premiam**
Chairperson: *Richard Johnson, Technical Director, ITOPF*
- 14:50 – 15:10 **Recent Development and Future Challenges for the Compensation Regime**
Kensuke Kobayashi, Legal Counsel, IOPC Funds
- 15:10 – 15:30 **An Integrated Approach to Post-Spill Monitoring – Space to Seabed**
David Hamersley, Remote Sensing Lead, CGG & Peter Collinson, Global Environmental Response Expert, BP

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- 15:30 - 15:50 **Molecular Microbial Tools for Future Oil Spill Monitoring**
Terry McGenity & Boyd McKew, *Environmental Microbiologists, University of Essex*
- 15:50 – 16:10 **Connecting Environmental Studies to NEBA/SIMA: Appropriate use of Science and Data**
Alun Lewis, *Oil Spill Consultant*
- 16:10 – 16:30 **Plenary discussion and summary**
- 16:30 Close of conference

Welcome to the conference



Sonia Phippard

Director-General, Environment, Rural and Marine
Defra

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Sonia will welcome delegates to the 4th Premiam conference on post-spill monitoring and impact assessment. Sonia will highlight the relevance of the Premiam initiative and its outputs in the context of marine policy and stewardship, both to Defra and wider UK interests. She will underline the importance of collaborative working, shared best-practice and scientific rigour as well as the need to maintain an awareness of the risks associated with our marine activities and the scientific preparedness to learn from them when they occur.

Sonia was appointed as a Director-General in Defra in April 2015. She has responsibility for the Department's policy portfolio in relation to the environment, flood risk management, rural issues and marine and fisheries, including the implementation of the Government's 25 Year Environment Plan. She is a member of the Departmental Executive Committee, and oversees the Defra group delivery bodies responsible for marine and natural environment.

Sonia joined Defra in 2001, and held three successive Director posts: for Sustainable Agriculture and Livestock Products (2001-2006), EU and International (2006-2010), and Water and Flood Risk Management from 2010-2015. She was Government SRO for the £4bn Thames Tideway Tunnel project, and Defra sponsor for the Flood defence programme, including the Thames Estuary 2100 Strategy.

Before joining Defra, she spent most of her career in the Cabinet Office, with periods of secondment to the Department of Education and Science and to Price Waterhouse Coopers.

Premium and the Post-spill Monitoring Guidelines



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The Premium initiative is now in its 10th year and continues to promote best practice across government and industry in post-spill monitoring activities. This brief introduction covers the achievements of the initiative and introduces the 'Premium Post-incident monitoring guidelines' the 2nd updated edition of which was released in 2018.

The Executive Summary of the Guidelines is reproduced below.

Spillages of oil and chemicals at sea can be high profile events and can result in significant environmental impacts. Effective response to marine spills is essential if risk to the public and the marine environment is to be minimised and effective clean up and recovery options initiated. In general, requirements for key response activities such as the initiation of counter pollution measures, situational awareness, clean up and recovery are established within international conventions and implemented through national contingency plans. However, the key element of environmental monitoring and impact assessment is rarely included and it is to facilitate best scientific practice and management in post-spill monitoring that these guidelines have been developed.

The importance of prompt and effective environmental monitoring is an important part of an integrated spill response as it is only through this that the risks and impacts to the human food chain, the marine ecosystem and commercial marine resources can be ascertained.

Furthermore, it is only through monitoring that we can gather the data necessary to establish the effectiveness of the response operations and any subsequent actions taken to mitigate impacts or promote recovery. It is therefore imperative that scientifically robust approaches, methods, and processes are considered in developing a monitoring plan so that it can be implemented in a prompt and cost-effective manner and to ensure that the results are fit for purpose and adhere to scientific standards. In the United Kingdom, the cross-government Premium (Pollution Response in Emergencies: Marine Impact Assessment and Monitoring) initiative works to promote effective post-spill monitoring and these guidelines, now referred to in the UK National Contingency Plan, form a key deliverable.

The guidelines begin by outlining the key principles of an environmental monitoring programme by establishing the key aims and the fundamental answers to why, where, when, what and how we need to monitor. Understanding these key aims is essential to the planning process outlined in this guide which then proceeds to provide the necessary detail on sample collection and management, key monitoring techniques and strategies for a range of ecological habitats and marine resources. Finally, the guide highlights the importance of data management, communication and reporting in order to enable effective dissemination from the programme.

While these guidelines have been developed from a UK perspective the key aims, principles and many of the approaches are applicable to the implementation of marine monitoring plans for any spill. They aim to provide essential guidance in the event of a spill but should also be considered as an important source of reference for pre-planning and preparedness so that appropriate authorities can implement appropriate monitoring as effectively as possible.

Mark entered the role of Science Services Director in 2017 with responsibility for the delivery and development of Cefas' key scientific facilities including laboratories, aquaria, workshops, the research vessel. He has been at Cefas for over 30 years with a scientific background in ecotoxicology and over 30 peer reviewed publications. Mark is a nationally and internationally recognised expert in the field of emergency response and marine impacts and is a key advisor to UK government in the field. He chairs the Premiam steering group overseeing a UK wide initiative to promote best practice in science and management of post-spill environmental monitoring.

Seasons in the Field: Some Reflections on a Career of Studying the Consequences of Catastrophe



Gary Shigenaka

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My career in oil spill response has been bookended by the two largest marine releases in U.S. history. The *Exxon Valdez* spilled roughly 41 million litres into the waters of Prince William Sound, Alaska, in 1989; and the Macondo well, or *Deepwater Horizon* incident, pumped around 510 million litres into the Gulf of Mexico in 2010. The circumstances of these spills were quite different, yet the larger questions of:

- What are the short- and long-term consequences?
- How long will it take for the environment to recover? and,
- What lessons have we learned to improve spill response?

were the same. The answers, of course, have been different. But post-spill monitoring and research provided the means to arrive at those answers.

I managed a long-term monitoring program tracking impact and recovery from the *Exxon Valdez* for more than 20 years, and it was an unprecedented (in the U.S.; we referenced iconic long-term effects studies from *Torrey Canyon* as we conducted our monitoring) opportunity to learn about recovery from both oil and aggressive shoreline cleanup methods. A number of important results emerged from the *Exxon Valdez* monitoring, many with operational response implications. For example:

- Intrusive shoreline cleanup initially caused more harm to intertidal organisms than oil alone;
- However, after 2-3 years, that difference in impact was not discernible;
- Variability conferred by “natural” drivers and conditions greatly complicated recovery studies;
- Physical recovery of habitat was a necessary precursor to biological recovery.

Many of the important findings of environmental impacts from the *Deepwater Horizon* oil spill were determined through the Natural Resource Damage Assessment (NRDA) process. While these were ultimately used in assessing financial penalties on the responsible parties, they also will provide the basis for changing how spill response will be constituted and applied in the future. Some examples include:

- Demonstration of profound short-term effects to cetaceans (dolphins) from prolonged oil exposure, with longer-term implications for population viability;
- The unfortunate overlap among convergence zones that aggregate floating oil, important pelagic habitat (*Sargassum* seaweed), sea turtles, and oil spill response methods (skimming, chemical dispersant application, and in-situ burning);
- The roles of planktonic organisms and indigenous oil-degrading microorganisms in influencing the short- and long-term fate of oil in the water column.

Many, if not most, of the important insights we have gained from major oil spills in the U.S. have resulted from concerted and committed efforts to monitor conditions of both oiled/impacted and unoiled/unimpacted sites in the zone of interest for periods extending beyond immediate response. In addition, during the response phases of both *Exxon Valdez* and the *Deepwater Horizon*, considerable effort was expended in convincing response decision makers of the value of allowing oil to remain unremediated on a handful of sites, which provided key results to quantify treatment impacts. While the focus of this conference is on post-incident monitoring, investments and commitments made during the heat of oil spill response can pay substantial dividends to increase the value of monitoring taking place after the fact.

Gary is the Senior Marine Biologist for NOAA's spill response team, which provides scientific support to the U.S. Coast Guard and other agencies during spills of oil and hazardous chemicals in the U.S. He has responded to countless spills across the U.S. and also in Japan, Spain, and Bangladesh, specializing in biological issues and shoreline assessment activities. Gary has also overseen a number of research projects to better understand such operational response topics as the fate and effects of oil burn residue, effects of oil and dispersants on whale baleen, behaviour and risk from novel new oil products, guidelines for seafood safety and fishery closures, and the state of science for chemical dispersants. He also is part of the instructional team for the many classes that NOAA teaches to spill responders and resource managers.

Incident Response in Scotland – Managing the Response with Scientific Support



Daniel Pendrey

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<http://www.gov.scot/Topics/marine/Licensing/marine>

As part of the UK (under the National Contingency Plan), Scotland's Environment Group provides Environmental and Public Health advice directly to the SOSRep either through an operational control unit, or a salvage control unit. The presentation will cover operational response, including both the response of the operational environment group and the subsequent scientific support provided through the Scottish Evidence Response Group. Case studies will be used to highlight what actually happens.

Relevant websites:

<http://www.gov.scot/Topics/marine/marine-environment/emergency>

<http://www.gov.scot/Topics/marine/Licensing/marine>

Biography – Born and grew up in the Outer Hebrides (Isle of Barra). Studied at The University of Aberdeen. Has worked in both Operational and Policy roles covering aquaculture and marine licensing. Currently Acting Head of Scotland's Environment Group and has led on the provision of Environmental on several significant incidents and recently Chaired the Environment Group at the UK National Exercise. Previously worked in the Private Sector as a fish farm manager working in Skye, the Outer Hebrides and Greece. Is a volunteer that organises marine litter clean-ups in Aberdeen.

Post-Spill Impact Assessment in France: Preparedness Status and Perspectives



Ivan Calvez

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- Past oil spill cases in France (*Amoco Cadiz*, 1978; *Erika*, 1999) motivated the implementation of environmental impact assessment programmes (EIAP). Those incidents highlighted the need, felt by the scientific community as well as by decision-makers and funding organizations, for the development of comprehensive impact assessment response frameworks. Yet, the content, methodologies, selected resources, priorities, etc., may vary from one case to another, according to the context of the spill (e.g. type of oil, vulnerability of resources at risk, etc.), thus suggesting that enhanced preparedness may benefit from EIAP guidance aiming at promoting swift implementation, scientifically sound studies, while being adaptable to the specificity of an accidental situation.
- In the French oil spill response organization, each coastal Department (~county) is responsible to draw its own version (i.e. adapted to its local particularities, sensitivities, shoreline types, etc.) of the National Contingency Planning framework (ORSEC plan). While the implementation of measures to assess the effects of accidental oil spills is duly advocated in the NCP, little detailed guidance is yet provided as regards to structure, coordination, methodologies, etc.
- Amongst its missions, Cedre is involved as an advisor for the authorities (national/local level), as regards to policy development (i.e. contingency planning) as well as to the specifications of an EIAP (e.g. through participation to scientific advisory group, steering committee) in case of a spill. In that context, Cedre carried out activities, over recent years, eventually aiming at developing a framework which could help to swiftly decide about what resources should be monitored, how (i.e. approaches and protocols) and to what end (questions/issues arising after a given oil spill). Those studies include: feedback about the monitoring of the *Amoco Cadiz* spill (through a survey conducted with French scientists involved at the time); bibliographic analysis/lessons learnt from previous cases; workshops/conferences involving participants from academia and oil spill response community; etc. Building on results gathered in the course of those projects, Cedre anticipates to provide input, for example in the form of guidelines, that may contribute to enhanced preparedness as regards to EIAP in local contingency plannings.

With a PhD in Biological Oceanography, Ivan Calvez started his career at the Institut Universitaire Européen de la Mer (IUEM, France), prior to joining Cedre in 2003.

Specialised in marine ecology, he is involved in studies related to spill impact assessment on marine/coastal environments. He also acts as duty officer as well as technical advisor regarding shoreline clean-up techniques and impact assessment. As part of an ongoing technological monitoring approach, he is in charge of studying feedback from spill cases, in France and abroad, including updating a database about main oil and chemical spills occurring worldwide (marine and inland waters).

Scientific Data Sharing and Availability – How it is Essential in Environmental Monitoring Responses



Dr Sue Ware

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Whilst the number of oil spills has decreased in recent decades, there is still the potential for occasional large, high profile incidents. As such, there remains a need for national authorities to continue to maintain and develop effective incident response and clean up capability, including the ability to initiate and conduct scientifically robust post-incident environmental monitoring and post impact assessments. This ensures that: 1) Stakeholders are provided with timely evidence of the potential hazards and risks posed by the incident, 2) Short and longer term impacts are effectively investigated and 3) Information relating to the effectiveness of response and clean-up activities is shared, thereby providing input into evolving response strategies.

In order to provide an effective post incident response and monitoring capability, the availability of and access to a number of key data types and sources of information is essential. These include the necessary data (type of substance spilled, release rate, prevailing environmental conditions) to input into fate and transport models. In addition, reliable maps of potentially vulnerable resources (e.g., areas of conservation importance, commercial fisheries and shellfish beds) and baseline contaminant data are also required to inform both the post incident impact assessment and the planning of subsequent monitoring activities.

Whilst many of these data and information types are already routinely collected and made publicly available, there are a number of simple steps that can be taken to optimise on data collection and their wider application. For example, through the use of standard operating procedures (SOPs) and agreed QA/QC checks, data collection conforms with the principles of 'collect once, use many times'. This, in turn, allows data from multiple sources to be more readily combined and, perhaps, re-purposed for use as part of a wider, post incident assessment and monitoring programme.

Sue is the Cefas Monitoring Group Manager and is also the current PREMIAM Monitoring Coordination Cell (PMCC) Chair for England. During her 14 year career with Cefas, she has worked on benthic ecological indicator development and has also provided advice to the regulator on Environmental Impact Assessments (EIAs) and Environmental Statements (ES). Sue also leads the Marine Protected Area (MPA) Programme (and is the chair of the Marine Protected Area Group (MPAG)), which contributes to and coordinates data and evidence collection to support MPA designation and monitoring.

Rapid Response and Long-Term Monitoring for Marine Birds – The Role of Science



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During offshore incident response, the Joint Nature Conservation Committee (JNCC) are core members of the Environment Group (as set out under the UK's National Contingency Plan), which provides advice to the SoSREP on environmental and public health aspects of the incident and its potential effects. Oil spills can impact marine birds both in the short and long term, due to the physical and chemical nature of the hydrocarbon. Oiled birds lose abilities to retain heat, fly, swim or forage for prolonged periods. Oil can cause both direct and indirect toxic effects as it passes up the food chain.

JNCC ornithologists use the Seabird Oil Sensitivity Index (SOSI, commissioned by Oil & Gas UK, which replaces the Oil Vulnerability Index OVI) in rapid response, along with additional evidence and knowledge on a case-by-case basis. The application of layers of evidence can build a picture of the scale of potential interactions between marine birds and released oil in a very short time frame and without the need for additional survey. This presentation will run through a short example of the use of evidence in rapid response.

JNCC ornithologists can also aid in designing post-spill monitoring regimes, providing a good overview of existing baseline data and an understanding of what might be achieved by different monitoring approaches and designs for short, medium and long term surveys. This presentation will provide a brief overview of different approaches to marine bird monitoring and what can and can't be achieved with post-spill monitoring.

Julie is a marine ornithologist within the Marine Species Team in JNCC Aberdeen. Julie provides support to the Marine Management Team around marine industry impacts on ornithology, advises on marine SPA management, and works closely with the other UK Country Nature Conservation Bodies (CNCBs) on various projects to improve understanding of marine industry and ornithology interactions. Julie joined JNCC in 2009 initially focussing on SPA design and classification, after a mixed background in marine and terrestrial conservation.

The Legacy of Spills: Remembering and Forgetting Environmental Impacts



Dr Timothy Cooper

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Using oral history evidence this presentation explores what is remembered about the environmental impact of oil spills and why. Drawing on interview material for a project on the Torrey Canyon disaster (1967), I will ask what is remembered of the environmental impact of such disasters and why. This presentation will also reflect on question of time, and the problem of teasing out multiple temporalities from interview data, before concluding with some reflections on the social, economic and cultural contexts in which environmental and ecological change is understood by communities and individuals affected by pollution incidents.

Tim is Senior Lecturer in History and Head of Humanities at the Penryn Campus of the University of Exeter. He is a social historian with particular interests in the relationship between people and nature. He is currently completing a book on the political, cultural and social history of the Torrey Canyon disaster.

50 Years of Case Studies from Around the World – What have we Learned about Measuring the Environmental Impact of Oil-Spills?



Nicky Cariglia

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Over the last fifty years, increased awareness of global environmental issues has led to growing recognition of environmental stewardship as an essential component of economic development. In relation to oil spills, this cultural shift was reflected in the 1992 revisions of the international oil pollution compensation Conventions, which incorporated direct provisions related to the reinstatement of environmental damage under the 'polluter pays' principle. In the United States, the 1990 Oil Pollution Act sought to achieve similar aims.

Since the adoption of these regimes, ITOPF has observed an increase in the proportion of spills following which environmental monitoring is conducted. As PREMIAM has demonstrated, effective post-incident monitoring programme can ensure that 1) key personnel are provided with early and accurate evidence of potential hazards posed by the incident, 2) appropriate and effective means of investigation both short-term and long-term impacts, 3) better coordination and use of resources and 4) continuous evolution of response strategies. However, the tools and methods with which changes in the environment can be detected and measured today have advanced significantly. From ecosystemic function through to physiological responses to stressors at a sub-cellular level and at every scale in between the technology has become highly sophisticated, although our abilities to interpret and make sense of these results can, in some cases lag behind the technology. The broad spectrum applicability of this technology coupled with unclear objectives at the start of a post-incident monitoring project can obstruct effective monitoring.

This paper synthesises 50 years of ITOPF's observations and qualitative data from cases around the world to make recommendations overarching recommendations for the next 50 years of post-spill environmental monitoring.

ITOPF is a not for profit organisation funded by the global shipping community to act as a source of technical expertise in the event of an oil or HNS spill. Nicky is a senior technical adviser and her primary role is to respond to ship-sourced pollution incidents around the world. Our advisory input varies from case to case and ranges from at-sea and shoreline response strategies and techniques, environmental and economic impact mitigation and monitoring through to the assessment of claims following criteria established by the international liability regimes.

Nicky joined ITOPF in 2012 after having spent several years in both the private and intergovernmental sectors working in tropical fisheries and environmental management.

National Response Exercises – Environment Groups – Learning from Response and Exercise



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The purpose of the Environment Group has evolved since the concept was introduced following the Donaldson recommendations in 1999:

- To provide public health and environmental advice and guidance to all response units involved in response to an oil and or chemical marine pollution incident and subsequent clean-up operations
- To advise response units so as to minimise the impact of the incident on the environment in the widest sense, taking account of risks to public health and the natural environment, and potential impacts arising from any response operations, whether salvage or clean-up operations, at sea and on the shoreline.

In the event of an incident the scope of Environment Group (EG) functions will be directly proportional to the scale and nature of the incident, its geographical location, extent, severity, pollutant involved, potential hazard to human health and the environmental sensitivities. The scale of incident and response and their constituent phases are likely to evolve over time and the functions of the EG will need to be graduated to meet changing requirements, escalating or diminishing in the input to each phase over time.

National Exercise reports:

Exercise Dragon

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/423826/2015_04_16-Exercise_Dragon_PXR_v4_2.pdf

Exercise Grey Seal

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/630430/2017-06-05_-_Exercise_GREY_SEAL_Report_-_Revision_1- FINAL.pdf

Stuart is a marine incident response specialist within the Environment Agency with over 25 years' experience, including developing and delivering marine incident response training within the Environment Agency and its predecessors. Stuart has extensive experience in chairing Environment Groups for responses to both shipping and offshore installation incidents.

Stuart evaluated the Environment Groups response during the live exercises Dragon (2014) and Grey Seal (2016), which were testing the United Kingdom's response to a major oil spill and recently exercise Shen which was a regional exercise based in North Sea focusing on a NORBRIT activation

During his career Stuart has participated in a wide range of marine environmental surveys including, Maritime Ireland / Wales INTERREG 1994 – 1999 The fate of Nutrients in Estuarine Plumes.

The Importance of Time Series to understand Long-Term Impacts



Rebecca Kinnear

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SOTEAG is recognised as a pioneering, world-class model of integrated coastal management based on independent scientific monitoring and expert advice. SOTEAG is an independent body with members drawn from academia, the oil and gas industry, central and local government, government environmental agencies and indigenous industries with a maritime focus. SOTEAG is able to provide early warning of environmental change and maintain a reliable baseline of data. This is achieved via a Monitoring Committee, compiled of independent scientific experts, who evaluate and analyse environmental monitoring reports ensuring the good health of the marine and coastal environment around the terminal is maintained. The SOTEAG monitoring programmes have been running since 1974 and provide numerous examples of temporal change, including impacts of contamination (oil spills and tributyltin) and other anthropogenic effects. The presentation uses some of these examples to explain how the various time series data provided important evidence. The value of the time series data will be discussed under four headings:

- Detecting effects against a background of natural variation
- Detecting effects against a background of shifting baselines
- Improving our knowledge of marine species and communities and how they change
- Developing monitoring methodologies by learning their limitations

Rebecca Kinnear's biography

Rebecca is the Executive Officer of the Shetland Oil Terminal Environmental Advisory Group (SOTEAG). SOTEAG is recognised globally as a pioneering, world-class model of integrated coastal management based on its independent scientific monitoring and expert advice. Rebecca began her career as a Marine Ecologist studying biodynamics of coastal ecosystems and now works for SOTEAG managing the day to day running of the organisation, including the monitoring programme and the Wildlife Response Co-ordinating Committee.

Jon Moore's biography

Jon is a freelance marine ecologist and regular contractor to SOTEAG. He has run the SOTEAG rocky shore programme for 27 years. He designs and runs many other monitoring programmes for agencies and industry. He is an author and editor of ecological sections of the PREMIAM guidance document.

Recent Development and Future Challenges for the Compensation Regime



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- The Member States of the IOPC Funds have established the admissible criteria for the claims arising from the oil spill, including claims for environmental damage. The criteria in general and specific criteria for environmental damage claims have sufficient flexibilities for innovative proposal in respect of post-incident studies and reinstatement measures.
- Recently the Member State approved to publish guidelines for presenting environmental damage claims. It is expected that the guidelines will help claimants with submitting their claims, and post-incident studies or reinstatement measures are more properly compensated.
- There have been several ratifications to the International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, 2010 (the 2010 HNS Convention), and the entry into force of the Convention in the near future is likely. The Convention is expected to widen the chance of compensation for environmental damage in a similar manner to the 1992 Civil Liability Convention and the 1992 Fund Convention.

The International Oil Pollution Compensation Funds are two intergovernmental organisations (the 1992 Fund and the Supplementary Fund) which provide compensation for oil pollution damage resulting from spills of persistent oil from tankers. This year marks forty years since the entry into force of the 1971 Fund Convention and the establishment of the original International Oil Pollution Compensation Fund.

Previously Kensuke has worked in the Ministry of Land, Infrastructure, Transport and Tourism since 1996, and has in the past represented the Japanese Government in various international forums including the IMO and the IOPC Funds' governing bodies.

An Integrated Approach to Post-spill Monitoring – Space to Seabed



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Systems for monitoring oil spills exist in all domains from space to the seabed. Lessons learned from offshore incidents have demonstrated the need to evolve the individual technologies and systems. Development over the past decade means that technologies are now maturing to the point of operational use.

BP has been actively assessing the use of Autonomous Maritime Systems (MAS) for environmental monitoring during oil spill events and general environmental applications for operational activity. In 2016, CGG undertook a collaborative exercise west of Shetland with BP to assess the ability of satellites to identify spills.

Traditionally Near-Real-Time (NRT) satellite tasking has been required in the event of a spill, remains a key part of the response effort. However, due to technological developments from both public bodies such as the European Space Agency (ESA), and private enterprises, proactive satellite monitoring programmes are possible. Proactivity offers the opportunity to comprehensively observe incidents from infrastructure and vessels, enhancing the understanding of day-to-day operations and the effectiveness of response.

There remains a need to integrate these individual technologies, such as Earth Observation satellites and Autonomous Maritime Systems, into an operational system, to enhance the understanding of activities around offshore infrastructure.

The BP-CGG collaboration will be discussed including developments, observations and integration opportunities.

Peter Collinson has extensive experience of oil spill response and planning. Peter is currently focusing on delivering BP's global environmental and subsea operations strategy on the use of marine autonomous systems (MAS) for operational and environmental user cases.

David is a Remote Sensing Consultant at NPA Satellite Mapping (CGG). David's work has evolved from the use of satellite data to detect and map natural offshore oil seeps to the exploitation of similar techniques to enhance situational awareness of offshore activities. This includes pollution benchmarking, evidence building, and reporting on daily operations.

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David studied for a BSc in Geography and an MSc in Environmental Dynamics and Climate Change at Swansea University. He began his career at the National Oceanography Centre in Southampton between 2008 and 2010 as a Scientific and Technical Research Assistant in the Ocean Transports group.

Molecular Microbial Tools for Future Oil-Spill Monitoring



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The potential for information about microbes or their genes to be included in the oil-spill monitoring toolbox has developed with the advent of high-throughput sequencing and our improved understanding of the dynamics of hydrocarbon-degrading communities and the underlying molecular biology of biodegradation pathways.

Terry McGenity's research into hydrocarbon cycling is internationally renowned, with ~half of his 84 publications on this topic, including key reviews (McGenity 2014; McGenity et al 2012). He is co-editor of one of the most comprehensive and authoritative books in the field, Handbook of Hydrocarbon and Lipid Microbiology (2010) and Hydrocarbon and Lipid Microbiology Protocols (2016). He has been the Essex lead on international projects that include major field components, such as controlled oil spills in the North Sea and large-scale tidal mudflat mesocosms (Sanni et al 2015; Chronopoulou et al 2015; Chronopoulou et al 2013; Coulon et al 2012).

Boyd McKew has more than 13 years' experience in environmental molecular microbiology including expertise in petroleum microbiology (McKew et al 2007a,b, Coulon et al 2007; McGenity et al 2012). He has highlighted specific roles of marine obligate hydrocarbon-degrading bacteria (McKew et al 2007a), and the effects of different oil-spill intervention strategies on hydrocarbon biodegradation and the development of hydrocarbon-degrading communities (McKew et al 2007b). He is an expert in many advanced molecular techniques including qPCR, shotgun proteomics and Next Generation Sequencing (NGS). He has also developed hydrocarbon degrader qPCR assays (McKew & Smith 2017) and has expertise in GC-MS analysis of crude oil and hydrocarbons.

Boyd and Terry currently have funding from: ITOPF R&D Award to investigate the microbiology of oil slicks subjected to different dispersion mechanisms; NERC to investigate the biodegradation and effects of a marine oil spill; and a NERC-CASE studentship with Cefas to investigate oil spill dispersants in marine ecosystems.

Connecting Environmental Studies to NEBA/SIMA: Appropriate use of Science and Data



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- On a global basis, large oil spills are statistically rare events and are becoming less frequent. Nevertheless, there is a need - and most often a regulatory requirement - to prepare oil spill contingency plans.
- Contingency planners and incident managers have traditionally utilized a Net Environmental Benefit Analysis (NEBA) for selecting the most appropriate response option(s) to minimize spill impacts and promote recovery. IPIECA, API and IOGP collaborated to develop a qualitative NEBA process that was renamed Spill Impact Mitigation Assessment (SIMA).
- In order that oil spill contingency plans are realistic and will be effective if required, there is a need to learn from past experience of oil spills; to look back in order to move forward. Monitoring the impact of previous oil spills provides important information, but this must often be supplemented with experimental evidence obtained in more controlled conditions.
- There is therefore a cycle that commences with contingency planning (including SIMA/NEBA), runs through incidents (real or exercised), post-spill monitoring and possible R&D laboratory studies or mesocosm studies / field trials and back into planning. This cycle can be a virtuous circle and lead to improved preparedness
- However, the use of inappropriate science can produce data that causes confusion and widespread misunderstanding which can, in the worst case, undermine oil spill preparedness. Unfortunately, some experiences stemming from the *Deepwater Horizon* post-spill monitoring and subsequent studies falls into this category and these will be described and discussed.

Alun is a research chemist who has worked on oil spills and oil spill dispersants for nearly 40 years. From 1979 until 1992 this work was for BP Research, then for a brief period at the UK Government's Warren Spring Laboratory, 4 years at SINTEF in Trondheim, Norway and then with AEA Technology at Culham before becoming an independent consultant in 1998. Alun has worked with a variety of organisations including the UK MCA (Maritime and Coastguard Agency), IPIECA and various governments and commercial companies around the world. He has taken part in oil spill sea trials in the North Sea, Norwegian Sea, the Persian Gulf and the Beaufort Sea. He has authored many scientific papers and reports and conducted numerous training courses on matters related to oil spills.

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