



SUT/MASTS Workshop Agenda

Heriot Watt Conference Centre, Edinburgh
4th (pm) & 5th (am) September 2014



Decommissioning & Wreck Removal: **Why? What? How?**

EXECUTIVE SUMMARY

The very well attended 2014 SUT and MASTS Decommissioning & Wreck Removal workshop brought together many stakeholders (with a number of differing opinions), from scientists, operators, trade organisations, engineers and salvors, to regulators, NGOs, insurers and a classification society, for two half days of stimulating discussion on the fundamental challenges of technology and methodology, taking a function-based approach for the ecosystem.

Consensus from our previous 2013 MASTS Decommissioning workshop was that costs for decommissioning are rising year on year, legislation for the O&G and salvage sectors is very different, any change of legislation would have to be evidence based and, robust science should underpin the decision making process - there was however disagreement as to the extent and usefulness of data collected to date.

Outcomes of this year's 2014 workshop included determining of the research/data gaps and data sharing opportunities (e.g. through Oil & Gas UK, Marine Recorder); identification of collaborative opportunities between industry and marine science (e.g. through MASTS, Living North Sea); and identification of routes to source funding (e.g. use of the trade organisations to lobby funding councils and, use of the new Heriot Watt O&G Innovation Centre, whose collaborators have access to funding).

The SUT's Salvage and Decommissioning Committee agreed to take this topic/challenge forward.

Thank you to our chairs, speakers, hosts, sponsors and delegates for making this workshop an excellent event!

INTRODUCTION

Welcome and Open: Callum Falconer, Marathon Oil/Decom North Sea

- Summary of decommissioning workshop 2013
 - Legislative misalignment between the salvage industry and O&G decommissioning.
 - Discussion of data – large amounts available, but difficult to access and problematic to draw conclusions from the data.
 - Solutions and strategies for decommissioning must be evidence –based and scientific standards must prevail
 - Launch of INSITE funding initiative.
- Aims of 2014 workshop
 - Stimulate an evidence-based discussion to find optimal solutions to decommissioning.
 - Identify knowledge gaps and requirements to stimulate technology to drive down costs?





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- Identify strategy to join disparate stake-holders
- Identify funding sources
- Comparison of industry legislation
- The original intent of the OSPAR regulations was to balance cost, environment and safety, but there is emerging evidence that removal may not be the best safety or environmental option, leaving a large financial burden on the industry and tax payer. If we are to reduce the costs of decommissioning through a reduction in scope, it must be based on sound scientific evidence.

Setting the Scene: Moya Crawford, Society for Underwater Technology

- Introduction to the SUT
- Introduction to International salvage and decommissioning committee
 - A specialist interest group of the SUT
 - Three sub-groups: salvage assurance, safety and environmental stewardship.
 - Promotes an integrated approach to decommissioning solutions
 - Facilitates scientific-evidence base on decommissioning options reaching decision makers.
- Misalignment of regulations between industries
 - Salvage and O&G operate under two different philosophies in the same environment
 - Regulations should not be based on the type of structure, but the effect on the marine environment regardless of which industry.

Overview of Decommissioning: Nigel Jenkins, Decom North Sea

- Introduction to DECOM North Sea
 - State of play
 - Current investment in CAPEX and future investment
 - State of production in the UK
 - State of decommissioning in the UK and predicted costs.
- Overview of the Wood Review
 - Strategic importance of a decommissioning strategy
 - Interrelationship between asset integrity and economic extension
- Market Observations
 - Associated costs.
 - Current operator position
 - Potential for batch production in some aspects of decommissioning
- DECOM North Sea Leadership
 - Overview of activities undertaken by DECOM NS and collaborative partners
 - Core aims and drive



- Lesson learned.
- Identified a need to learn from different industries e.g. Nuclear.

SESSION 1: WHY? THE CASES

Safety: Kevin Campbell, Skuld

- Introduction to Skuld offshore.
- Introduction to P&I clubs and relevance to North Sea decommissioning
 - P&I history
 - Extent of cover
 - Other covers relevant to the O&G industry.
- Overview of major claims
- Planned versus unplanned removal
 - Difference in costs and methodology
 - Examples of planned and unplanned removal
- Overview of drivers
 - Drivers of recovery
 - Drivers to limit recovery

Stewardship: Alex Kinninmonth, Scottish Wildlife Trust

- Introduction to Scottish Wildlife Trust
- State of Marine Environment.
 - Current pressures.
 - Impacts
 - Policy response
- Case-study of man-made structures in marine ecosystem
- Legal position on decommissioning
 - Consideration of whether a 'blanket' approach is the optimal environmental, economic or social outcome in all cases
- Comparison to offshore wind industry
 - DECC regulations.
 - Difference between O&G and wind industry decommissioning requirements, highlights inconsistency in the approach to man-made structures in the sea.

- SWT policy position
- Overview of Living North Sea

Business: Malcolm Morrison, Scottish Fisherman's Association

- History of UK fishing fleet.
 - Change in vessel number
 - Changes in safety requirements
- Use of North Sea as fishing grounds.
 - Co-exists along with other industry.
 - Overview of the activities of the Fishermen's federation
- Activities of the SFF
 - Resource development
 - Data collection
- Potential hazards to fishing vessels and crew
- Fishing activities in relation to O&G infrastructure.
- Ability to coexist in a very harsh environment.
- Expectation that after decommissioning, fishing industry will be able to use historical areas again.

SESSION 1 DISCUSSION

Well plug and abandonment is approx. 40 % of the cost. How can this be minimised?

- There is scope for a batch-process approach to P&A. Often issues of increasing cost-effectiveness are a result of operators/industries not working together.
- Economies of scales
- Complexities are often driven by the age of the well with issues concerning corrosion and integrity driving up costs.
- In the Gulf of Mexico, wells must be plugged if there has been no extraction for five years.
- Data on well integrity is often out of date or missing
- There are lessons to be learnt from different industries – for example the nuclear industry have novel methods for establishing asset integrity.
- Some wells have been temporarily abandoned and with improved technology, extraction may recommence. For example with subsea pumps and gas lifts it may be possible to extract from suspended/abandoned wells.
- Collaboration between operators likely to reduce costs.

Maximising extraction and late life asset management

- Decommissioning must be considered in light of the Wood Review and maximising extraction
- There are high costs associated with ageing, low efficiency platforms. For example, if regulators want efficiency driven up from 50% to 90%, there would be a very small increase in absolute oil, a substantial investment from the operator would be required
- Comparison of the Scottish Government report on total oil and gas and Wood Review.
- Small operators are moving into the NS to extend asset life and are able to do this cost effectively. However all assets will have to eventually be decommissioned
- Extending extraction often means going beyond the life-time that structures were designed for, raising the issue of potential integrity issues.
- There is a balance of choosing to decommission early, which is cheaper and cleaner, and trying to produce for longer, which is potentially a more expensive decommissioning process and it may be necessary to reinstate integrity.
- There are very stringent safety regulations and operators specialising in late life asset management do invest in integrity. Safety standards are not allowed to deteriorate with age.

Fishing

- Consideration of whether options, other than a completely structure-free seabed, are acceptable to the fishing community?
- Structures can act as fish aggregating devices and therefore may be beneficial to fishermen, but only if they can be fished safely. The main driver in the fishing industry must be safety.
- It is currently hard to put a figure on the balance between structures acting as fish aggregating devices and posing a risk to safety. The Fishermen's Federation works closely with installers and operators to ensure that information on location of pipes and whether pipes are exposed or buried is available.
- There is a difference in the risk posed between moveable debris, which has the potential to be very dangerous, and fixed structures in a known location for which the risk can be planned for and mitigated e.g. according to weather conditions.
- There is an issue that the risk of fixed structures increases if they are not maintained. There is a legal obligation that if pipelines are degrading and posing a risk that they are removed.
- It would be useful to know the number and nature of incidents/accidents resulting from fisheries interaction with O&G infrastructure. One known fatality.

The Role of Environmental NGOs in decommissioning options.

- Consideration of Scottish Wildlife's tactic to achieve their desired vision of the decommissioning solutions

- The NGO's role is not necessarily to provide answers, but to stimulate discussion e.g. over whether OSPAR requirements to remove are necessarily the most sound ecologically.
- Consideration of who is to take ownership and turn ecosystem objectives into tangible actions.

General points

- Oil and Gas innovation centre brings together many collaborators who are able to access academic funding. One of the centre's strategic priorities is decommissioning.

SESSION 2: What? The Steel and Concrete Structures

Assurance case approach to cost effective decommissioning: Dag McGeorge, DNV GL

- Defining scope for decommissioning.
 - Definition of scope will dictate solutions and cost
- Choosing the best solution
 - To do something better, it is often best to do it differently
 - Costs are likely to reduce as more decommissioning projects are completed.
- Technology qualifications
- Managing risks
 - Function map
 - Assurance case tool

Marine Renewables: Mike Elliot, University of Hull

- Introduction to marine environmental management
 - Ecological structure and functioning
 - Ecosystem services
- The 10 tenets of marine management
 - Equivalent to PESTLE in business world
- Comparison to offshore wind
 - Cumulative consequences
 - Interaction with trawling
- Legal position
- Overview of the Marine Strategy Framework directive



- Good Environmental status
- Case study: SWOT analysis for offshore wind decommissioning
 - Partial versus full removal.
- Overview of intermediate ecosystem services and impact of removal of structures
 - Balance sheet approach

Shipwrecks: Charles Hume, Shipowners Club

- Introduction to Shipowners' Club
- Wreck removal and environmental concerns
 - Imposes substantial financial burden
 - Risk to P&I clubs.
- Extent of covers.
 - Liabilities covered in connection with wreck removal
 - Legal requirement to remove or recoverable from member
- Practical aspects
 - Disposal
- Case studies
- Triggers for removal
 - Navigation hazards
 - Environmental sensitivity
 - Societal acceptance
 - There is a need for scientific assessment and validation for wreck removal

Liability and Responsibility: Elliot Woodruff, Ince & Co

- Legislative drivers of decommissioning
 - Requirements to change OSPAR regulation
 - Impact of Wood Review
- Managing risk
 - Primary risk on operator. Operators are responsible for everything.
 - There is little room for case by case adaptation of OSPAR regulations
 - 'Knock for knock' mutual hold harmless clauses
- Differences between installation and decommissioning contracts
 - Problems of inaccurate records of repairs/modifications



- Uncertainty over asset integrity and hazardous material
- Uncertainty makes it hard for contractors to tender and provide a fixed price, as is desired by operators.
- Duty to inform
- Contractual options
 - Agree price/scope on the basis of specified options
 - Agree price/scope following survey
- Apportioning environmental risk
 - Potential for pollution emanating from various sources with different parties responsible.
 - Contractual solutions – knock for knock
 - Clauses clarify and delimited where each party is responsible.
- Environmental regulations relevant to decommissioning
 - Some include criminal sanctions which are not covered by knock for knock

SESSION 2 DISCUSSION

What obstacles might prevent the O&G industry from applying innovative decommissioning solutions?

- The manner in which the scope of decommissioning projects is defined often means that it is hard to innovate. The defined scope often opens up complexities if a novel technology does not meet the specified standards laid out in the scope.
- Innovation and new technology is seen as unpredictable and without standards. This creates a barrier to its application
- There is a need to make clear what the barriers are and operators need to facilitate new approaches.
- Early contractor involvement is vital. Often it is SMEs that have a high level of innovation and they need to be engaged early before the scope is set to X, Y, Z
- There is also a need for innovative contracting methodology to apportion the risk in the most suitable way.
- The typical invitation to tender doesn't work. For example, the operator may be able to describe 10% of scope accurately and of that 10%, the contractor, who is then asked to provide a fixed price, may only understand 10%.
- The environmental objectives are much more unclear than the safety/ fishing hazards where clear standards can be set. For example, if a structure is higher than X, cut it to prevent navigation hazard. Much harder to define standards for the environment.

How have biosecurity issues been included in the scope of decommissioning projects?

- Structures act as colonisation sites for non-native species. There has been concern that additional hard-structures in the marine environment may act as stepping-stones, aiding

dispersal of non-native species. It is likely, however, that the compared to amount of hard substratum already present in the North Sea, O&G structures make a very small addition.

- If structures, which are already colonised by non-native species, are lifted and moved to other areas, then there must be some consideration of the impact of non-native species.
- There has been recent work by Oil and Gas UK on the problems of removing jackets and treating non-natives.
- The Shipowner's club have considered the impact of removal on the spread of non-native species and for one case in New Zealand, it was deemed that removal of the vessel would be environmentally detrimental because of the presence of non-natives.

What can the offshore renewable industry learn from O&G?

- There are key differences between the two industries and not all aspects will be applicable. Renewables are not a finite resource so we are likely to see 'recommissioning' of sites where monopiles and scour protection are removed and the next generation of devices are installed.
- Many O&G structures were installed before the OSPAR regulations, but renewable structures have had to be designed with future decommissioning in mind and this has been accounted for in renewable EIAs
- If renewable structures are not decommissioned then the EIA associated with the developments are incorrect. If sites are to be permanently designated for renewable energy generation with structures periodically replaced, the EIA must assess permanent, rather than temporary, loss of habitat.

When will we say no to wreck removal?

- It is up to the authorities to remove wrecks if the owner doesn't. Another high cost removal case may push the P&I clubs to refuse.

How long does DECC require operators to maintain monitoring operations over the decommissioning operations?

- In perpetuity.

How will the current environmental status (under the MSFD) of the North Sea be accounted for in decommissioning strategies?

- If the results of monitoring in the NS show that it currently has 'Good Environmental Status' (GES), what is the environmental justification of decommissioning?
- In the Water Framework Directive (WFD), water bodies were classified as natural and heavily modified to account for this issue. If the North Sea meets all the indicators of GES, with the structures currently in place and subsequently following removal of the structures the NS

looses its GES, there could be serious consequences and financial sanctions for the member state

- The WFD and MFSD operate on very different scales, and unless there is a large oil spill, leaving or removing structures is unlikely to change the environmental status on the scale of the North Sea.
- Monitoring under the MFSD is at the whole sea level, so while we may not achieve GES very close to the rigs or at cuttings piles, generally the NS would be likely to have GES as legally required under the MFSD.

Public awareness of the cost of decommissioning

- It is likely that the awareness of the cost and environmental debate of decommissioning by the general public is low.
- To change current OSPAR regulations, it is likely that public support will be needed since operators will not be able to lobby the government.

SESSION 3: How? Identifying the Real Challenges.

The Challenge Posed by Man-Made Structures on the Marine Environment: The Regulator's Perspective: Julie Cook, DECC

- Introduction to DECC
 - Energy development unit
 - Environmental management team
 - Changes with regard to the Wood Review
- International obligations
 - OSPAR review process
- UK obligations
 - Petroleum Act
 - Energy Act
 - Drivers of government policy on decommissioning.
- Environmental perspective and regulatory process
 - Role environmental management team in permits
 - Involvement of offshore development unit
 - Stages of the regulatory process
- Timeline
- EIA
 - Lists impacts according to certain areas.

- Importance of holistic approach
- Importance of baseline data.
- What more can be done?
 - Current legislation is not perfect
 - DECC currently undertaking data collection of chemicals associated with drill cuttings
 - Commitment to data sharing. This could have a big impact in terms of decommissioning option

Preservation of Life and Protection from Harm: Chris Wicks, Marathon Oil

- Safety culture in O&G industry
 - Heavily regulated
 - Difference to other marine industries
 - Piper alpha impact on regulatory framework
 - Risk-based approach
 - Personal responsibility of safety
 - 'Stop the job' expectation
- Safety regulations
 - Must ID all major accident hazards
 - Risk must be reduced to 'as low as reasonably practical (ALARP)'
 - Need for safety cases.
- ALARP
 - Balance of risk vs. cost.
 - Reduce risk to as low as possible without incurring grossly disproportionate cost
 - Decision must be framed within the principle of ALARP
- HSE & DECC
 - Scrutinise risk assessments
- Major accident hazard
 - Reduction in one aspect may increase risk in another area
 - Need to manage risk once technology solutions for decommissioning have been identified.
 - From a safety perspective, the less done, the less risk incurred
 - Shift to including environmental risks in safety regulations.
- Tools and techniques
 - Facilitated review
 - QRA – mathematical assessment of risk exposure
- Drive and decision-making

- Priority is to reduce risk to personnel, but balanced to cost.
- Operator duty of care for entire decommissioning phase and for all contractors

Wrecks and impacts of fisheries: Jan Brant, Cefas

- Introduction to MOD and salvage
 - Extent of responsibility for wrecks
- Overview of Darkdale
 - Location
 - Integrity
 - Hazards posed
- Methodology to decide whether to remove wrecks
 - Desk-based assessment
 - On site surveys
 - Intervention
- CEFAS involvement
 - Overview of surveys of contamination and impact to human health
 - Fish sampling methodology
 - Highlights the need for robust survey, designed to answer very specific questions

Unfettering Technical Thinking and Opening Up Process: Jelle Lanting, Mammoet

- Introduction to Mammoet
- Need for innovation
 - Cost reduction
 - Parameters for decommissioning differ to those of installation
- Contractor selection process
 - Defining criteria
 - Define who matches criteria
 - Define request
- Case study: subsea template
- Assurance type response

SESSION 3: DISCUSSION

How can stakeholders alter, or participate in data and evidence gathering, for OSPAR review?



- DECC have recently made contact with industry to request ideas and scope, and also to ascertain how willing operators would be to submit benthic sediment data and if operators have a preference for data storage.
- The Scottish Government are undertaking a scoping report on how to make data available and determine how this could benefit environmental application for new developments and for decommissioning projects.
- DECC are aware that a lot of data is requested for which is not always available. They recognise that the benefit of pooling data

What is the link between DECC, DEFRA and MMO with regards to OSPAR reviews?

- DECC, DEFRA and MMO sit in different departments and are responsible for the regulation of different areas according to different acts
- DECC feed into OSPAR from an international point of view and send representative to OSPAR meetings
- EU safety legislation is also relevant and will soon include environmental risks

What is needed to develop a case to change the legislative structure?

- The case for changing the legislative structure can be made from many sides
- There is a need to work with stakeholders and engage operators.
- Current derogations from OSPAR are largely based on environmental issues, but should they include safety to contractors and fishermen? The decommissioning programme submitted to DECC does include the safety case.
- Much of the legislation is disjointed and it could be argued that there is a fragmented government operating in a single ecosystem. For example, on the health and safety side, fixed installations are regulated under the HSE, while floating structures are regulated under the MSA and FPSOs.
- Assurance case and safety case are made in the same way. They are not prescriptive, but a claims, argument, evidence approach is taken.
- To change the legislative structures a combination of the assurance case for technology, safety case that is existing in many respects and an environmental stewardship case are needed, but we must specify what environmental standard we are aiming for.
- Important that the case for changing OSPAR regulations is framed so as not to appear to the public as the O&G industries trying to by pass their obligations.

Innovation

- The project-based approach in the O&G industry make innovation hard, with each operator beginning the learning process from scratch each time. There is potential for working with committees e.g. Decom North Sea to co-ordinate strategies between operators.

- There are some examples of continuity of processes e.g. development of diverless connection technology at Exxon, adopted by BP. BP persevered with technology at Foinaven and documented the detailed planning of each stage and transferred learning to exploitation of Schiehallion
- There is a need to document the process and work structurally.
- Does the development of new technology being of commercial interest cause issues?
- The approach is different according to operators. E.g. BP doesn't like technology to be restrictive and sometimes won't take up technology unless there is more than one supplier. Shell like to take up technology and distribute it to all their assets . Generally within the industry, there is not a culture to hold on to technology for competitive advantages, and the industry does like to see innovation.

Safety arguments in decommissioning solutions

- A strong safety case can be made in favour of particular decommissioning solutions.
- Some of the smaller equipment that is expected to be removed is very dangerous to recover e.g. diver recovery of small-buried concrete mats.
- Some decommissioning requests do push safety to areas that are not necessarily comfortable. There must be a balance between safety of personnel and environmental concerns.
- There is a drive for DECC to work closer with HSE and safety regulations are changing to include environmental risks.
- Consideration of what opportunities there are to challenge the regulations given the time scales
- Must aim to hit the 'sweet spot' of safety, environmental stewardship and cost.

Use of scientific advice on environmental issues.

- Operators and regulators require information on best environmental solution to define environmental scope for contracts and implement the commercial side
- JNCC and other statutory advisors are able to advise on surveys to operators and regulators and have been involved in C&R and Murchison decommissioning discussions

SESSION 4: Scientific Initiatives to Effect Beneficial Change

Marine Renewables: Clear Articulation of the Environmental Goals. Taking an Ecosystem Approach: Ben Wilson, SAMS, University of Highland and Islands

- Introduction to offshore renewables as habitat for wildlife
 - Offshore wind habitats
 - Tidal streams and devices
 - Comparison of structure scale between O&G and renewable arrays



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- Decommissioning of renewables
 - Overview of Wavegen decommissioning
- Environmental differences between renewables and O&G
 - Fouling of devices: costs and benefits
 - Habitat provision
 - Infinite resource supply
- Overview of Mygen
 - Commissioning involved removal of energy from the marine environment (i.e. the resource). Decommissioning would therefore mean reintroduction of that energy with implications for current speeds, mixing and sediment distribution

Seals, offshore wind farms and pipelines: Debbie Russell, SMRU, University of St Andrews

- Seal telemetry tags
 - Information on location and behaviour
- Harbour seal use of pipelines and wind farms
 - Use of an operational wind farm in the North Sea. Behaviour was dictated by the structures
 - Higher levels of foraging at turbines
 - Evidence of seals following pipelines for prolonged periods
 - Data allows foraging and travelled to be distinguished indicating the individuals were using the pipelines for foraging rather than navigation.
- De facto MPAs and reef effects
 - Attraction vs production debate
 - If fish are merely attracted to structures, making it easier for seals to predate, it may not be beneficial to the marine ecosystem as a whole.

The challenges of environmental assessment for offshore O&G decommissioning: Farah Chaudry, Gardline

- Overview of EIA
 - Stages
 - Monitoring
 - Baseline and characterisation of the area of impact
- Regulatory requirements for EIA
- Sampling tools and methods for EIA
 - Sampling methodology
 - Data analysis



- Key challenges
 - Uniqueness of each installation and environment
 - Early engagement
 - Health and safety requirement
 - Data reporting and comparability
- Decommissioning projects
 - Pre-decommissioning project. Shell Brent
 - Cuttings pile investigation

A consistent, spatially aware framework: Andy Blight, MASTS

- Overview of the ecosystem approach
 - Complexities of the industry
 - Complexities of understanding the environment
 - Link between biodiversity and ecosystem function, and redundancy hypothesis
 - Need for pragmatism
- Case study: CBESS
 - Overview of sampling strategy
 - Limitations
 - Comparison to O&G environmental data and point samples.
- Decommissioning context
 - Biodiversity – function curve
 - Importance of considering whole life of structures
- Case study: aggregate dredging
 - Evidence of recovery
- Progress on data and protocol
 - Issues of data quality and access
 - Importance of method standardisation
 - Importance of appropriate statistical design.

SESSION 4: DISCUSSION

Monitoring objectives

- Given that costs of monitoring are high, it is important to get the procedures right i.e. we must know why the monitoring is being done and what it is trying to show. The number of samples taken must be consistent with the level of change that you are trying to detect, which too

often they are not. It is important not to impose the high cost associated with detection of an unrealistic change.

- Trying to pick up small levels of change would be very costly, given the high inherent variability in the sea. Further, small levels of change may not necessarily be detrimental to the overall environmental status of the sea
- Pragmatism is important in survey design and, critically, this hinges on what level of change it is that monitoring is trying to detect.
- There is a fine balance of what clients allow in terms of sample collection and what data is needed. This is why early engagement with environmental survey contractors is vital and may allow for more regular sampling.
- If all the North Sea environmental survey data was freely available, then there is potential to have a very large data set.

Use of environmental data

- There is some question over how environmental data is used and whether it feeds back into decisions on decommissioning strategies.
- Currently data is fed back from environmental contractors to operators who submit it to DECC. Often environmental consultants are not involved early enough to have useful input on decommissioning options
- It is important to make sure that the data collected is useful for environmental management and forms a useful platform to put pressure on DECC to review legislation
- Example of using environmental survey data in Murchison decommissioning project. Platform was a candidate for derogation to leave cuttings in place. To look at options for removal of jacket had to consider disturbance of drill cuttings pile and data from environmental surveys of cutting pile was used. This fed into a comparative assessment of removal options for jacket and management of drill cuttings pile. Data from habitat assessments around pipelines are frequently used for comparative assessment of decommissioning options.
- All O&G impact survey data is submitted to UK Benthos and is freely available. It is important to make clear what we can do with this data.

Baselines and environmental vision of NS

- Questions over baseline surveys and what baseline data are being compared to.
- Unlikely that any natural or pristine habitat remains. Areas of the North Sea outside of O&G infrastructure are so heavily fished that they may not be a good reference point.
- Since it is unrealistic to return the North Sea to a 'natural' state, we are in a position to specify a desired vision of the North Sea – a 'designer' sea. For example, we can choose whether a highly diverse patchwork of hard artificial substrate is desirable or if we want something else. Both have value, as do grasslands and forests on land.
- This 'vision' for the sea may differ according to different species priorities e.g. structures may benefit marine mammals, but it is hard to say overall whether this is good for the environment.

- Questions over who makes the decision on what the sea should be. There are multiple levels that it can be addressed from
- Important to balance different industries that benefit from the sea.
- The ecosystem approach under MFSD gives one vision of the NS. The UK is legally required to achieve 'Good Environmental Status', where the ecosystem meets the 11 descriptors, criteria and indicators, as laid out under the MFSD, irrelevant of whether structures are removed or left. If we break this directive (of GES), the UK will be fined 600,000 euros per day. The challenge is to achieve GES and still allow economic development in the NS.
- There are parts of the NS that are degraded, but the footprint of many activities e.g. wind turbines is very small and much of the North Sea, outside of the immediate footprint area, is in good condition. Current projects e.g. VECTORS will give a better idea of the current status.

Action for dealing with data

- Discussions of funding sources to pool data.
- MASTS has a role as a conduit for communication to scientific community and can advertise data as it becomes available.
- Oil and Gas UK are working on data sharing with academic community and best practice for different types of survey. Input is required on types of data and best place to store
- Pooling data on NS and carrying out meta-analysis could get idea of big picture of the state of the NS
- Current databases are available e.g. marine recorder. Centralising data is key.
- Lobbying from SUT and Decom NS for funding from research councils could be a powerful political message. The NERC Strategic Programme Advisory Group (SPAG) is one mechanism to do this through.
- Role of Living NS as a forum for all stakeholders to discuss potential to change OSPAR.
- Part of the strategic approach to decommissioning strategies is to make data as freely available as possible.

For further information, please contact:

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Thank you to Sally Rouse, Scottish Association for Marine Science (SAMS), University of Highlands and Islands, for her excellent note taking!