Common challenges and opportunities for post-spill monitoring across multiple ecosystem receptors

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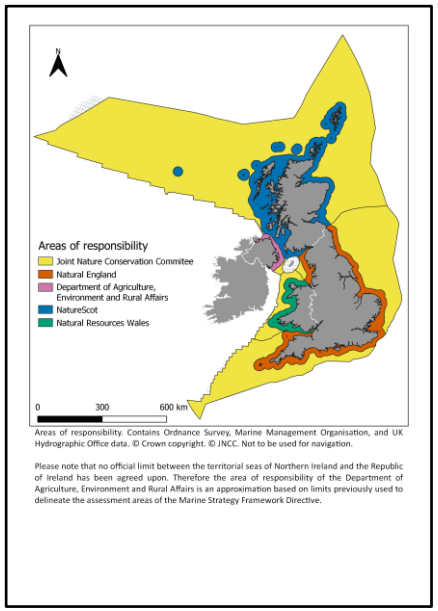
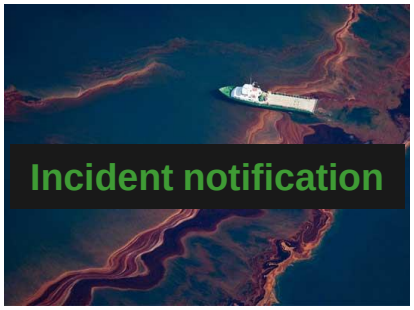
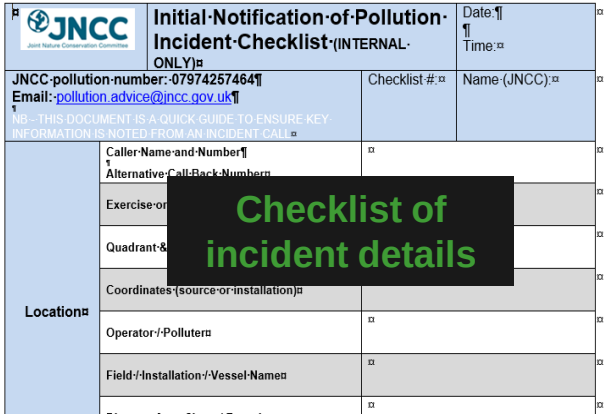
JNCC role in event of a pollution incident

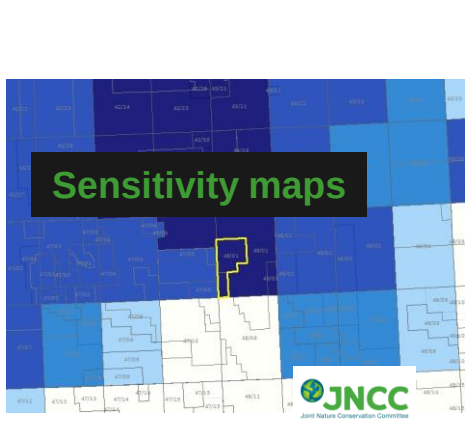
- JNCC advises the UK Government on nature conservation in the event of an offshore incident
- JNCC has a team of trained Duty Officers, on-call 24/7
- Core members of the Environment Group
- Support from range of specialists: benthic and marine mammal experts, ornithologists, MPA specialists
- Members of SERG and PREMIAM

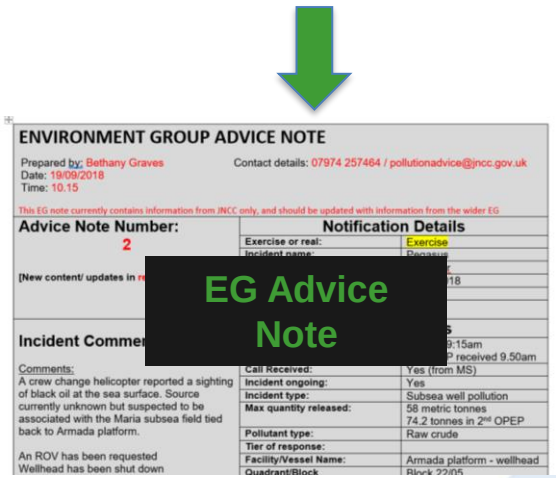


JNCC's role in oil spill response









Live updates

Environment Group

Objective:

Present an overview of common challenges and opportunities for post-spill monitoring across multiple ecosystem receptors

- Benthos
- Seabirds
- Marine mammals

© JNCC

© Danni Thompson

© Sonia Mendes

Aim:

- ➢ Share good practice and successful examples
- ➢ Increase the impact of efforts in post-spill monitoring
- ➢ Support sustainable management in the marine environment

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Challenge 1:
Setting robust baselines in offshore ecosystems

- Remote areas / difficult to access
- Limited resources
- Relatively high financial cost of exploration

Data challenges and opportunities for environmental management of North Sea oil and gas decommissioning in an era of blue growth

Murray et al. 2018, *Marine Policy* 97: 130-138

- Patchiness of data (across space / time / ecosystem components)
- Limited knowledge on ecosystem functioning
- Data from 'reference' areas/MPAs – comparable with impacted sites?
- Setting key research questions for post-spill monitoring is vital

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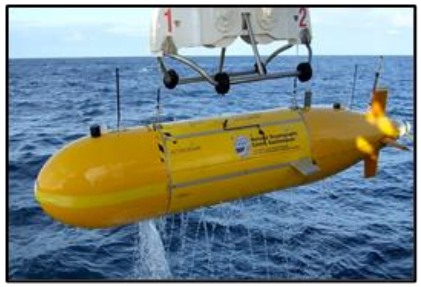
Opportunities / Good examples:

- Improve knowledge through:
- Mapping species distribution using modern technology

Launching a conservation drone for monitoring seabirds © Jarrod Hodgson

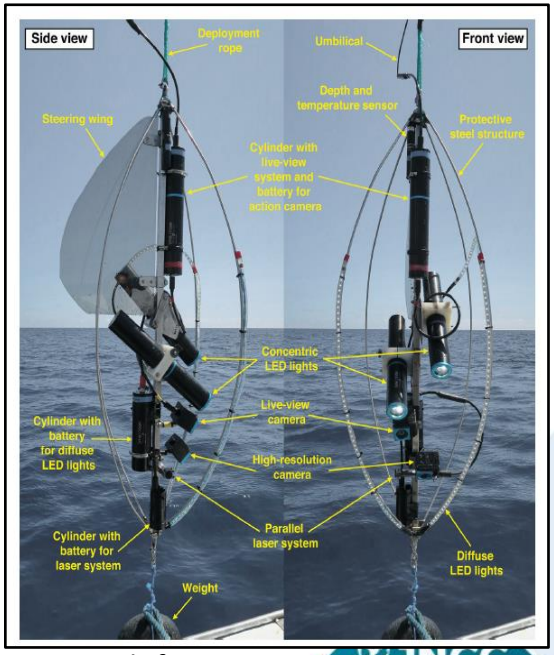


Autonomous Underwater Vehicle © NOC

- Low-cost reliable tools for data collection

A cost-effective video system for a rapid appraisal of deep-sea benthic habitats: The Azor drift-cam

Carrio et al. 2020, *Methods in Ecology and Evolution*



Azores drift-cam

Opportunities / Good examples:

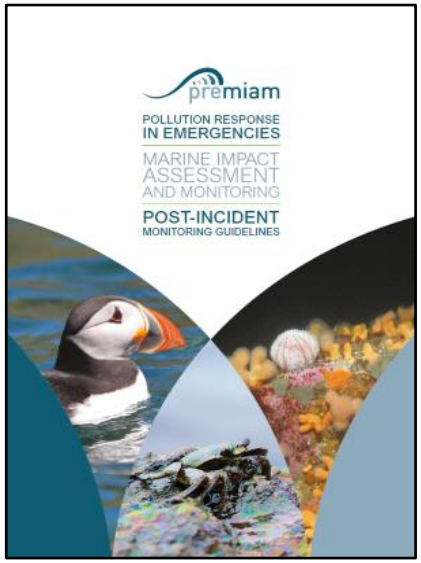
- Advanced data-processing systems

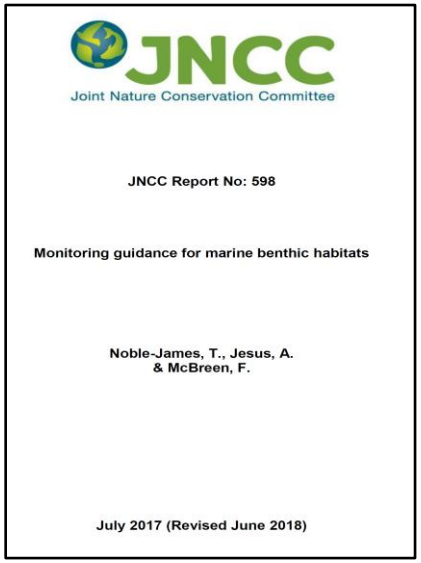
Review

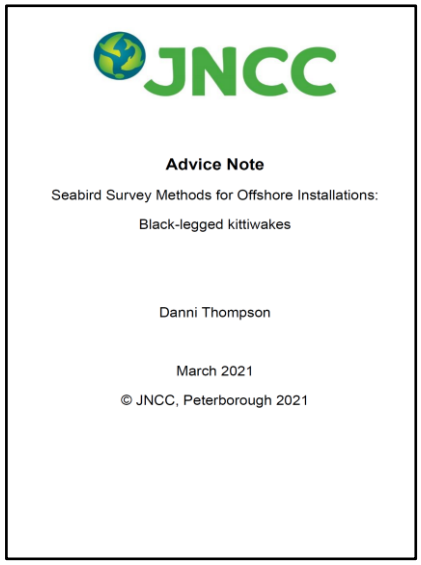
Sensors, Features, and Machine Learning for Oil Spill Detection and Monitoring: A Review

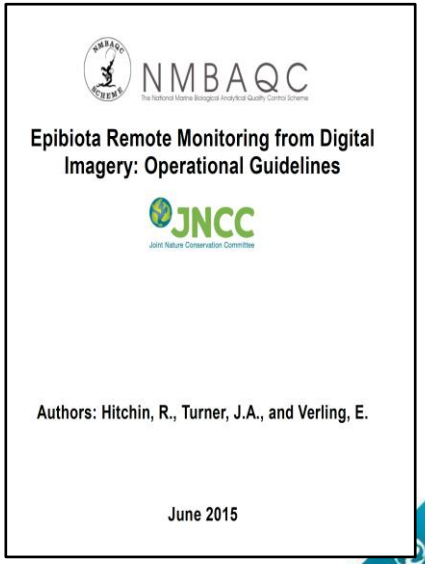
Al-Ruzouq et al. 2020, *Remote sensing*

- Establishment of data collection protocols / monitoring guidelines









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Opportunities / Good examples:

- UK cetacean strandings investigation programme (CSIP)

- Running since 1990. Funded by DEFRA and Devolved Administrations
- Standard protocols for collecting samples
- Post-mortem examination (causes of death, disease, contaminants)
- Baseline data to help detect disease outbreaks or unusual mortality
- CSIP depends on the publics help in the reporting of strandings in UK

Stranded sperm whale near Kings Lynn, Norfolk © CSIP ZSL

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Opportunities / Good examples:

- ICES Vulnerable Marine Ecosystems Database

- Set up by the joint ICES/NAFO Working Group in Deep-Water Ecology (WGDEC)

- Annual data calls
- Standardised template
- Quality check by WGDEC experts
- Annual WGDEC meetings / Publication of Reports

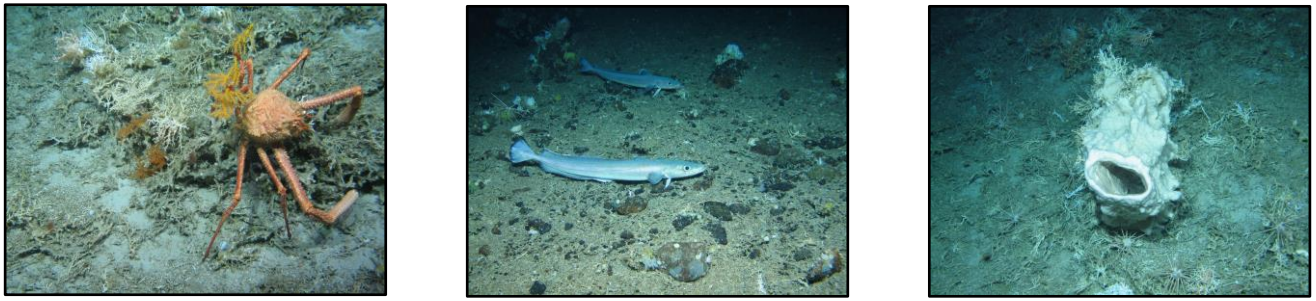
- Technical advice to EU policy makers

Deep-sea sponge aggregations in the Faroe-Shetland Channel © JNCC

Opportunities / Good examples:

- Take advantage of already existing knowledge

  - e.g. which organisms should be used for post-spill monitoring in offshore benthic habitats?



Deep-sea fauna from the northeast Atlantic © University of Edinburgh

- Sponges are ideal biomonitoring organisms in inshore areas
- High potential for offshore benthos

Marine sponges as a powerful tool for trace elements biomonitoring studies in coastal environment

Anna Maria Orani[a,b,*], Aurélie Barats[a], Emilia Vassileva[b], Olivier P. Thomas[c]

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[b] International Atomic Energy Agency, Environment Laboratories, 4 Quai Antoine 1er, 98000, Monaco, Principality of Monaco
[c] Marine Biodiscovery, School of Chemistry and Ryan Institute, National University of Ireland Galway (NUI Galway), University Road, H91 TK33 Galway, Ireland

Orani et al. 2018, *Marine Pollution Bulletin*

Challenge 2:
Establishment of causal links between environmental parameters and species' health status

- ‘Co-existence’ of factors
  - Pollution
  - Climate change
  - Pathogens
  - Fishing, Noise
  - Natural trends
  - Competition for resources

Fishing boat on Alaska’s coast © M. Cornelius/Shutterstock

Grey seal © Sarah Canning

- More complicated in long-term monitoring
- Duration of post-spill monitoring ? / Population-level effects assessment
- Spill can possibly undermine conservation objectives of MPAs

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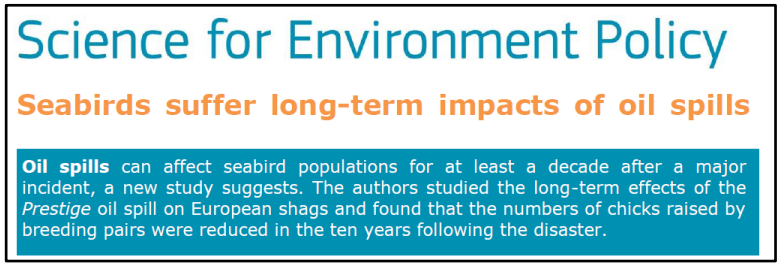
Opportunities / Good examples:

- Experimental work
- Long-term monitoring


Science for Environment Policy

Seabirds suffer long-term impacts of oil spills

Oil spills can affect seabird populations for at least a decade after a major incident, a new study suggests. The authors studied the long-term effects of the *Prestige* oil spill on European shags and found that the numbers of chicks raised by breeding pairs were reduced in the ten years following the disaster.

Barros et al. 2014, *Biology Letters*

- Interdisciplinary collaborations (e.g. toxicologists-ecologists-modellers)
- Intersectoral collaborations INSITE [INTERACTIVE]

https://insitenorthsea.org

Conclusions

- Several common across environmental receptors
- Potential to learn from the best (not need to 're-invent the wheel')
- Interdisciplinary knowledge exchange & communication

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