

The necessity of Management Options for effective harbour porpoise conservation in the UK

Case studies of emerging Areas of Concern
2015



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A WDC report

2015

ISBN 978-1-901386-43-1

Cover photograph A porpoise caught in an illegal trammel net in Cornwall © Nicholas Davison

Suggested reference Dolman, S.J., Tetley, M.J., Eisfeld-Pierantonio, S.M., Green, M., Read, F., Ritter, F. and Evans, P.G.H. 2015. *The necessity of Management Options for effective harbour porpoise conservation in the UK: Case studies of emerging Areas of Concern. A WDC Report.*

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WDC is the leading global charity dedicated to the conservation and protection of whales and dolphins. We defend these remarkable creatures against the many threats they face through campaigns, lobbying, advising governments, conservation projects, field research and rescue.

EXECUTIVE SUMMARY

*Despite numerous relevant international, European and national legislative and political obligations, meaningful and effective conservation measures for the harbour porpoise (*Phocoena phocoena*) remain tenuous. Based on existing evidence, additional management options, beyond existing measures, are required for harbour porpoise to alleviate the existing and unprecedented scale of pressures they face.*

As our seas become busier, the pressures faced by harbour porpoises will intensify. Existing pressures are broad ranging and vary from acute and often fatal consequences, such as bycatch and collision risk (from maritime traffic or underwater turbines), to chronic and/or cumulative impacts, for example through limiting feeding opportunity and displacement from preferred habitats. Current management measures undoubtedly provide some safe guards to these pressures. However they fall short of delivering a meaningful, consistent and adaptive long-term conservation plan that covers the range of sensitivities and coherently brings together the threats from cumulative activities.

The review of harbour porpoise management options in this report, combined with the assessment to identify geographically discrete Areas of Concern (AoC) provides a useful insight into the current gaps, challenges and spatial scope of issues. The role of the AoC is to identify the range of pressures relevant to the Area to allow for management options to be tailored where pressure is highest, moving towards a best practice approach. A number of recommendations are put forward for each sector and for each of the case study AoCs to illustrate potential areas for further discussion, research and delivery. Recommendations can be generic or cover issues pertinent to a number of sectors and they can be relevant at a national level or specific to a sector or geographic location.

This report builds on previous work by WDC to promote harbour porpoise conservation in the UK, focusing on requirements of the EU Habitats Directive¹, for site designation of Special Areas of Conservation (SACs)² and strict protection throughout their range³.

The overarching aim of this report is to produce Management Options to effectively protect harbour porpoises, including in possible SACs designated to protect harbour porpoises. Towards this aim, we provide an assessment of the effectiveness of the range of management strategies, as well as sectoral and spatial measures that are pertinent to the conservation of harbour porpoise. WDC have overlaid the suspected highly sensitive harbour porpoise hotspots against the spatial distribution and cumulative overlap of human activities.

By focusing this assessment within these identified harbour porpoise AoCs, the aim is to target conservation effort and resources for delivery in areas where they can be considered most effective. This document is two tiered to reflect (i) management protocols that are relevant and apply at a UK wide level (taking into account devolved responsibilities) and (ii) measures that are area specific and reflect

¹ Council Directive 92/43/EEC of 21 May on the conservation of natural habitats and of wild fauna and flora.

² Article 4(1) requires designation of SACs for harbor porpoises 'where there is a clearly identifiable area representing the physical and biological factors essential to their life and reproduction.

³ Article 12(1) of the Habitats Directive obliges Member States to set up a system of strict species protection for harbor porpoises.

regional and local measures and players. In addition the report provides UK wide and, where appropriate, region specific recommendations on future direction and priorities.

*The AoC introduced in this report complement the WDC work on critical habitat for harbour porpoise (Clark *et al.*, 2010; Dolman *et al.*, 2013). The two concepts are complementary in the delivery of international and national harbour porpoise conservation goals, including designating SACs to protect harbour porpoises. AoC represent the components of critical habitat that are assessed to be under the greatest pressure from human activities, and therefore, will require the greatest and more urgent need for action in management measures.*

Baseline surveys and continuing monitoring surveillance, alongside the development of broad-scale management measures, rather than piecemeal and largely untested mitigation measures, must be seen as an integral and essential part of harbour porpoise conservation.

(i) Pressures

Four groups of pressures were chosen for further assessment that are relevant to harbour porpoises within the UK EEZ:

- Barriers to Movement e.g. barriers to species movement (including physical and sound barriers).*
- Physical Trauma e.g. damage caused to porpoises from collision or noise, which may either directly result in mortality or significant physical harm leading to mortality.*
- Disturbance e.g. from physical and acoustic sources which impact or alter porpoise habitat and or behaviour such as resting, feeding, breeding and socialising.*
- Ecosystem Effects e.g. sufficient alteration of habitat that may interrupt or displace necessary ecosystem systems of critical importance such as prey or prey habitat.*

The sensitivity information presents our general understanding of relationships between porpoises and the effects associated with certain activities. It does not take full account of the frequency or intensity of all activities which occur within the area of assessment and will form an important part of future discussions with stakeholders.

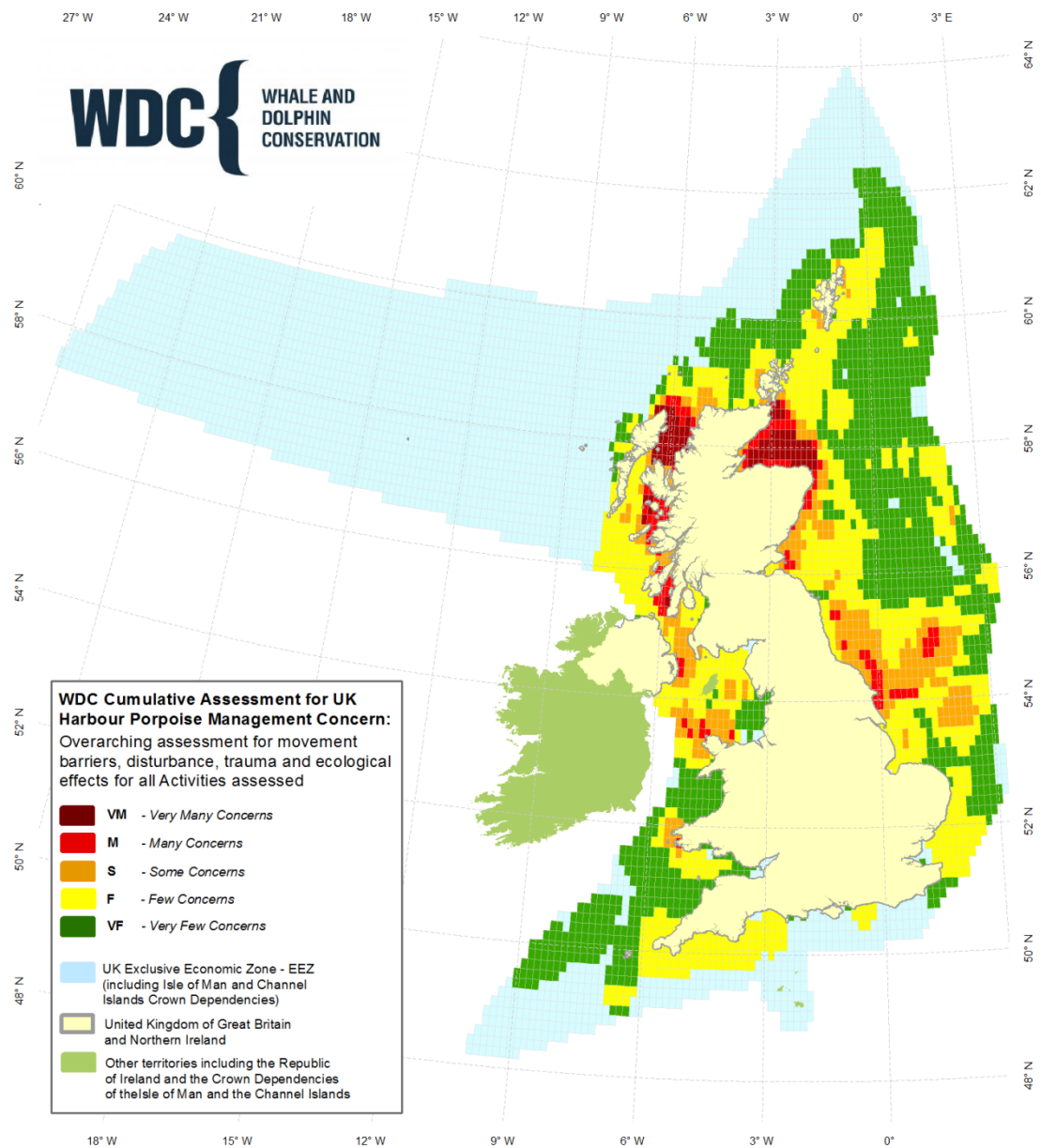


Fig.i. Preliminary WDC Cumulative Assessment for UK Harbour Porpoise Management Concern; Sensitivities to movement barriers, disturbance, trauma and ecosystem effects for all activities assessed

The boundaries for the Areas of Concern (AoC) are meant to be illustrative for the purpose of this report only i.e. relative to the broad areas as outlined (Fig. i). It is too early in the evolving process of evaluating spatial management options at a UK scale to be overly prescriptive, and more work will be needed to define and refine boundaries in their own right should these be necessary for future conservation planning and management. However these recommended AoC provide an invaluable contribution for taking forward areas of search and further assessment with the view to designating SACs and other MPAs and emerging ecologically coherent MPA Networks.

(ii) Areas of Concern

A total of eight AoC, where there are many cumulative concerns resulting from sector pressures overlapping with porpoise sensitivity thresholds (based on high average density), were identified; three to the west of Scotland; two to the east of Scotland, one in Wales; and two to the east of England.

West of Scotland:

1. **Minch** - the proposed Minch AoC stretches from the north of Lewis (Butt of Lewis) across to the Scottish mainland (Cape Wrath) in the north, and the south east of Lewis (including the Sound of Harris) across the north of Skye, to the mainland (Kyle of Lochalsh covering the Sound of Raasay).
2. **Small Isles** - the proposed Small Isles harbour porpoise AoC stretches from the south west coast of Skye (encompassing Loch Bracadale) to the south of Mull (encompassing the west coast of Mull) and the Isles of Rum, Eigg, Muck, Coll and Tiree.
3. **Sound of Jura** – the proposed Sound of Jura AoC stretches from the mainland to the south west tip of Kintyre across to the south west tip of Jura (encompassing Port Ellen).

East of Scotland:

4. **North East Scotland (including the Moray Firth)** – the proposed AoC covers the outer Firth stretching from John o' Groats in the north to Fraserburgh in the south, and the stretch of coast between Fraserburgh south to Aberdeen. In the inner Firth the proposed boundary stretches from Brora in the north and to Nairn in the south.
5. **Firth of Forth** – the proposed Firth of Forth AoC covers the outer Firth from St Andrews in the north to Dunbar in the south. In the inner Firth from Buck Haven in the north to Musselburgh in the south.

Wales:

6. **North Wales and Anglesey** – the proposed North Wales and Anglesey AoC stretches from Great Orme's Head, to the west end of the Menai Strait, encompassing Anglesey.

East of England:

7. **Dogger Bank** – the proposed Dogger Bank AoC overlaps with an existing SAC currently designated for sandbank habitat under the Habitats Directive. Although there is some overlap with the existing SAC boundaries and the harbour porpoise density estimates, further work is needed to ascertain the extent and location of any overlap in the management options investigated for the SAC and this AoC.
8. **North Yorkshire** – the proposed North Yorkshire AoC extends north to south (approximately Hartlepool to Withernsea respectively).

Furthermore another two precautionary AoCs (pAoC) were identified which, with further finer scale investigation and additional datasets available, could also be classified as AoCs for the development of appropriate Management Options. These were: (9) **SW Wales and the Outer Bristol Channel** in England and (10) **Pentland Firth and Scapa Flow** in Scotland.

(iii) Overarching Management Options

Previous WDC reports contain recommendations towards better protection of harbour porpoises (for example, Clark *et al.*, 2010; Dolman *et al.*, 2013; James, 2013; Green *et al.*, 2013) as does Evans and Prior (2013). The following are specific to development of effective management measures.

Should SNCBs wish to develop the Management Options recommended here, we recommend these are done nationally, but also at a more regional/AoC appropriate scale and using collated datasets that are not publicly available at this time.

Baseline surveillance

There are shortcomings and gaps in the existing baseline data available. There is a need to establish better baseline data collection including both large-scale national surveys and more localised and detailed surveys over the long term, as well as to address monitoring requirements throughout the UK.

Under the principle of ‘polluter pays’, funding from marine users should be made available to resolve key gaps. The polluter pays principle is a fundamental principle of EU environmental law that is set out in Article 191(2) of the Treaty on the Functioning of the European Union. In accordance with this principle, the polluter (in this case the sea user or developer) should bear the expense of carrying out the measures decided by public authorities to ensure that harbour porpoises are maintained in an acceptable state. The application of this principle could be applied to develop a strategic fund paid for by sea users.

To this end, the development of a research strategy that outlines data gaps and priority research needs is required. This should be developed in conjunction with those collecting data, including NGOs. Strandings data plays a valuable role in monitoring existing and emerging impacts and adequate funding for CSIP and collaborative work should continue.

Efforts should continue towards adequate assessment of cumulative impacts on the conservation status of the harbour porpoise. In the absence of full and adequate scientific data, it is paramount that conservation decisions and actions that are based on the combination of best available information and expert opinion reflect the precautionary approach and are ground truthed with in-field data.

Regional commitments

Definition of Favourable Conservation Status (FCS) and guidance and implementation of adequate ways to measure FCS are required to develop robust conservation measures.

Adequate ongoing financial and human resources should be applied to the range of ASCOBANS work programmes and actions.

Allowable ‘takes’ or limits

WDC does not support allowing any human caused mortality of marine mammals. We believe ‘catch limits’, ‘takes’ or Potential Biological Removal/Catch Limit Algorithms for harbour porpoises by any sector is inappropriate and against the principles of the Habitats Directive and the wishes of the public at large. Every effort should be made to introduce appropriate tools (both mitigation and spatial management) to reduce impacts, including from bycatch, towards zero.

Management Units

Sizes and areas of Management Units should reflect current knowledge. Where ranges are uncertain, and where differences between ‘populations’ have been observed but their boundaries are unclear, the precautionary approach needs to be taken and these Management Units should be split, for example, in the North Sea.

Cumulative assessment of levels of disturbance and injury should be calculated for each harbour porpoise Management Unit, and should include all sources of disturbance, injury and death. These models should be region appropriate and not restricted to UK waters.

Legislation necessitates that the harbour porpoise, as an EPS, requires management to avoid deliberate or reckless disturbance. The issuing of EPS licences is not done coherently or transparently, with both direct (see for example the use of ADDs at aquaculture facilities) and indirect (i.e. base line criteria) gaps. Agency guidance on cumulative assessment of EPS licensing is required.

Marine planning

We should maximise the opportunity that marine planning processes across the UK present in harbour porpoise conservation including the siting, zoning and managing of activities.

Cumulative Impacts

As part of wider measures and within designated sites, a focus should be placed on appropriately assessing and managing cross-sectoral cumulative impacts for harbour porpoises in a consistent and holistic way.

MPA designation

A suite of dedicated harbour porpoise SACs, reflecting the range of precautionary Management Units relevant to the UK, should be designated at the earliest opportunity.

Robust and appropriate management measures should be implemented, monitored and enforced. Coherence with the development of measures for existing SACs in neighbouring countries is paramount.

(iv) Sector specific Management Options

1) Fisheries and Aquaculture Management Options

Strandings data suggest that bycatch is an important threat to harbour porpoises in some areas, and bycatch rates of particular fisheries may be having population level impacts (see, for example, ICES, 2014). Yet bycatch monitoring is insufficient and there are limited mitigation measures in place to deal with bycatch.

Fisheries

*Action is required to ensure that **all** EU Member States provide comprehensive annual reports on bycatch to the European Commission.*

We recommend that the European Commission provide guidance to obtain regional and national commitment to reduce levels of harbour porpoise bycatch. An enforceable strategy that aims to ensure reductions in bycatch towards zero is required.

There is a need to ascertain a greater understanding of the bycatch risk to harbour porpoise in all forms of fishing gear. Bycatch monitoring should be increased to enable better targeting in the right areas and fisheries.

The strategic use of Remote Electronic Monitoring (REM) on vessels with gear types that cause bycatch, combined with an agreed protocol for reporting and incentivisation, would provide a more widespread (in terms of vessel size and area) and cost effective means of gathering bycatch information.

In inshore areas, the proportion of the fleet comprising smaller vessels (<12m) increases, resulting in a sector of the fleet falling below the requirements for monitoring, mitigation and regulation of cetacean bycatch. It is still possible for smaller vessels to contribute to bycatch and therefore if the UK is to tackle bycatch adequately, this needs to be addressed.

Informed decision making on the most appropriate use of gear modifications (i.e. pingers) and wider management measures (e.g. closed fishing areas) in space and time is required. Rather than focus on limited implementation of pingers on nets to deter porpoises and other marine mammals, understanding porpoise distribution and reducing fishing impacts in important habitats should be prioritised.

Management measures to restrict fisheries, which have an impact on the species, should be considered in relation to future SACs. Since protected harbour porpoise populations are mobile, in addition to fisheries management measures within SACs designated to protect harbour porpoises, fisheries restrictions may also be necessary outside of SACs.

It is essential that Member States continue to work to better implement Article 6 of the Habitats Directive with respect to fisheries so as to prevent risk of infraction proceedings. In order to assist this process, the Commission must provide clear and conclusive guidance in relation to questions that are being raised by Member States.

In addition and irrespective of designated SACs, under the Habitats Directive strict species protection requirements and other EU fisheries laws, fisheries restrictions should also be considered in known AoC to prevent bycatch.

Additional guidance on how Article 12 of the Habitats Directive should be implemented across all European waters (i.e. not just in SACs) in respect to the disturbance caused by fisheries activities on cetaceans is also required.

Bycatch rates of harbour porpoises should not be calculated at the North Sea scale (ICES, 2014) but should be calculated at the most precautionary Management Unit scale.

Aquaculture

The siting of aquaculture facilities away from important sites for seals and harbour porpoises would reduce local impacts and associated requirement for other management measures.

There is a need for clear aquaculture policy guidance from SNCBs.

The mandatory use of anti-predator devices, such as tensioned nets and seal blinds, is a preferred method of reducing seal predation that would not have an acoustic displacement impact on harbour porpoise and other wildlife. Where aquaculture activities also lead to measures to manage seal predation, strict licensing is required to oversee and assess the appropriate use of such measures in harbour porpoise AoC and to ensure wider monitoring into the effectiveness for seal deterrence as well as impacts on harbour porpoise.

2) Marine Renewable Energy Development Management Options

Renewable developments should be appropriately sited, away from areas critical for the harbour porpoise, to avoid or reduce potentially significant disturbance, and until the impacts of renewable developments can be fully assessed and mitigated.

Where developments and/or operations currently exist, a stringent set of transparent mitigation measures should be committed to, with appropriate levels of monitoring, before consent is given.

Only tested and effective mitigation measures should be relied upon in licensing conditions to protect harbour porpoise, and appropriate enforcement should be put in place to ensure licence conditions and mitigation measures are adequately adhered to.

Wind

Strategic investment in alternative techniques relating to pile driving is urgently required. Greater emphasis and consideration should be applied to noise pollution from marine renewable energy constructions.

JNCC advice on minimising risk of injury and disturbance to marine mammals from noise producing activities (including pile driving) is inadequate to effectively manage disturbance and should be reviewed and updated, to include robust guidance on cumulative issues.

Tidal

Collision and encounter prediction models used in assessments need to be ground-truthed in two ways. Firstly, effective near field monitoring techniques are required to record collision rates accurately; developments should be phased, and phases should not be progressed until collisions are ruled out.

Dedicated strandings monitoring should be required in the vicinity of developments, until collisions can be discounted.

Investigation of the impacts of displacement of porpoises from high energy areas that are used as important foraging grounds is required.

3) Offshore Oil and Gas Development, Operation and Decommissioning Management Options

The standard and rigour of SEA and EIA should be improved to be more in line with the level expected in the terrestrial environment, and any uncertainties in data relating to the marine environment acknowledged, with appropriate use of the precautionary principle. To this end, there should be a requirement for developers to collect baseline and impact data.

Public funds should be applied, with contributions from industry, to fill data gaps (as occurred within the vicinity of the Moray Firth bottlenose dolphin SAC).

JNCC advice on minimising risk of injury and disturbance to marine mammals from noise producing activities (including seismic surveys and explosives use) is inadequate to effectively manage disturbance and should be reviewed and updated, including robust assessment of cumulative impacts.

4) Military and Live Exercise Activity Management Options

JNCC advice on minimising risk of injury and disturbance to marine mammals from noise producing activities should be updated to manage injury and disturbance from military use of explosives (including, but not limited to Cape Wrath).

The MoD should undertake full and transparent SEA of all activities conducted on its two offshore exercise areas, to include realistic impacts, appropriate precautionary measures and more effective mitigation over the range of impacts such as spatial restrictions. Temporal planning is required so as to avoid cumulative effects with other military and anthropogenic activities.

5) Maritime Traffic and Shipping Management Options

Centralised databasing and licensing of marine wildlife watching operators should be undertaken by government or SNCBs to enable oversight of the scale of the industry and to provide a strategic approach to management.

To minimise disturbance there should be a requirement that the commercial watching industry be trained to implement national wildlife watching codes of conduct.

More focus should be paid to educating recreational vessel users (speedboats, power boats, jet skis) who interact with porpoises.

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1. Introduction

Despite numerous relevant international, European and national legislative and political obligations, meaningful and effective conservation measures for the harbour porpoise (*Phocoena phocoena*) remain tenuous.

This report builds on previous work by WDC to promote harbour porpoise conservation in the UK, focusing on requirements of the EU Habitats Directive⁴, for site designation of Special Areas of Conservation (SACs)⁵ and strict protection throughout their range⁶. Whilst both elements of harbour porpoise conservation are important, in developing this work, WDC have focused on the need to deliver on site designations (Clarke *et al.*, 2010; Dolman *et al.*, 2013; ClientEarth, 2013). We have outlined and highlighted the importance of 'critical habitat' (for example, Clark *et al.*, 2010; Hoyt, 2011; Dolman *et al.*, 2013), which are areas that represent crucial factors for their lifecycle (European Commission, 2001).

In its recent assessments of the SAC network, the European Commission has considered that the UK is 'insufficient'⁷ in their coverage of the harbour porpoise under site protection provisions of the Habitats Directive⁸. The European Commission and Defra have subsequently been in correspondence and work is in progress to determine potential sites that could be designated as possible SACs. Robust and enforceable management measures are required alongside designation of sites to achieve an ecologically coherent network of well managed marine protected areas (MPAs), as is required under the EU Marine Strategy Framework Directive.

The overarching aim of this report is to produce Management Options to effectively protect harbour porpoises, including in possible SACs designated to protect harbour porpoises. Towards this aim, we provide an assessment of the effectiveness of the range of management strategies, as well as sectoral and spatial measures that are pertinent to the conservation of harbour porpoise. WDC have overlaid the suspected highly sensitive harbour porpoise hotspots against the spatial distribution and cumulative overlap of human activities.

By focusing this assessment within these identified harbour porpoise Areas of Concern (AoC), the aim is to target conservation effort and resources for delivery in areas where they can be considered most effective. This document is two tiered to reflect (i) management protocols that are relevant and apply at a UK wide level (taking into account devolved responsibilities) and (ii) measures that are area specific and reflect regional and local measures and players. In addition the report provides UK wide and, where appropriate, region specific recommendations on future direction and priorities.

⁴ Council Directive 92/43/EEC of 21 May on the conservation of natural habitats and of wild fauna and flora.

⁵ Article 4(1) requires designation of SACs for harbor porpoises 'where there is a clearly identifiable area representing the physical and biological factors essential to their life and reproduction.

⁶ Article 12(1) of the Habitats Directive obliges Member States to set up a system of strict species protection for harbor porpoises.

⁷ European Commission Atlantic Bio-Geographic Moderation Seminar, Galway, March 2013.

⁸ The Skerries and Causeway SAC in Northern Ireland was designated in 2012, and included the harbour porpoise as a category C. To date this remains the only SAC for harbour porpoise requiring management.

*The AoC introduced in this report complement the WDC work on critical habitat for harbour porpoise (Clark *et al.*, 2010; Dolman *et al.*, 2013). The two concepts are complementary in the delivery of international and national harbour porpoise conservation goals, including designating SACs to protect harbour porpoises. AoC represent the components of critical habitat that are assessed to be under the greatest pressure from human activities, and therefore, will require the greatest and more urgent need for action in management measures.*

2. Cross Sectoral International and National Obligations and Measures relevant to Harbour Porpoise Conservation

2.1 The Precautionary Principle

The Precautionary Principle is one of the key elements for policy decisions concerning environmental protection and management. It is applied where there are reasonable grounds for concern that an activity is causing or could cause harm but when there is uncertainty about the probability of the risk and the degree of harm.

The World Charter for Nature, which was adopted by the UN General Assembly in 1982, was the first international endorsement of the Precautionary Principle. The principle was implemented in an international treaty as early as the 1987 Montreal Protocol and has been endorsed internationally on many occasions. At the Earth Summit meeting at Rio in 1992, Agenda 21⁹ was agreed, which advocated the widespread application of the Precautionary Principle: 'In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.'

The European Commission issued a Communication¹⁰ on the precautionary principle in 2000, in which it adopted a procedure for the application of this concept, but without giving a detailed definition of it. Paragraph 2 of article 191 of the Lisbon treaty¹¹ states that "Union policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Union. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay."

After the adoption of the European Commission's Communication on the Precautionary Principle, the principle has come to inform much EU policy, including areas beyond environmental policy.

The complexities and challenges associated with data gathering in our seas and oceans have been well documented¹². Given the paucity of environmental data relating to the marine environment, especially information relating to cetaceans, the setting of conservation objectives and the process of decision making in relation to management actions must be done in the absence of long-term data sets. This necessitates the use of best available evidence and a precautionary approach.

2.2 Key Regional and National Legislation and Policy

*An analysis of national and international policy and legislation has previously been conducted (see Green *et al.*, 2012), so a detailed overview is not provided in this report. However, given the relevance to*

⁹ www.un.org/documents/ga/conf151/aconf15126-1annex1.htm (Principle 15)

¹⁰ ec.europa.eu/dgs/health_consumer/library/pub/pub07_en.pdf

¹¹ www.lisbon-treaty.org

¹² [http://sustainabledevelopment.un.org/content/documents/31500WG%20statistical%20note%20-%20Oceans%20and%20seas%20\(as%20of%2031%20Jan\).pdf](http://sustainabledevelopment.un.org/content/documents/31500WG%20statistical%20note%20-%20Oceans%20and%20seas%20(as%20of%2031%20Jan).pdf)

cetacean conservation, an overview of the Habitats Directive and the Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) is given below.

2.2.1 EU Habitats Directive

The European Council Directive 92/43/EEC (1992) on the conservation of natural habitats and wild fauna and flora (Habitats Directive) is the key EU law protecting biodiversity. In the UK, this has been transposed in each of the devolved administrations into domestic law and is the primary law governing nature conservation in the UK, including for the conservation of harbour porpoises.

2.2.1.1 Principles

(i) Strict protection – Articles 12-16 of the Habitats Directive provide for strict protection of a range of species listed in Annex IV, including all cetaceans. This refers to the prohibition of all forms of deliberate capture or killing; deliberate disturbance particularly during breeding, rearing, hibernation and migration; and deterioration or destruction of breeding sites or resting places. There is also a requirement to monitor incidental capture and kill of Annex IV species.

*(ii) Site protection – Articles 3-6 provide for site protection across a range of habitats and species listed in Annexes I and II to the Directive, including harbour porpoise. WDC has articulated the rationale, beyond the legal obligation, as to why harbour porpoise Special Areas of Conservation (SACs) are required (Dolman *et al.*, 2013), as have others (Evans and Prior, 2012).*

(iii) Monitoring of conservation status – Article 11 explicitly requires implementation of surveillance of habitats and species of Community Interest.

(iv) Favourable Conservation Status – Article 2 requires that measures taken by Member States must be designed to maintain or restore natural habitats and species at ‘favourable conservation status’ (FCS) i.e. ‘the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations’ within the European territory of Member States.

Article 17 requires six yearly reporting on implementation of the Habitats Directive. In the last Article 17 reporting round, the UK assessed the harbour porpoise as having favourable FCS. The European Environment Agency’s assessment at a European level, however, was unfavourable – inadequate for all Atlantic biogeographic regions including UK waters. This was on the basis of the earlier population decline in the south-eastern distribution range and the combined pressures of gillnet fishery bycatch mortality (Evans and Prior, 2012).

2.2.1.2 Baseline Surveillance and Monitoring

Whilst best available evidence and a precautionary approach are currently necessary, surveillance of the harbour porpoise conservation status is also required under the Habitats Directive.

In Charting Progress 2 (Defra, 2010) and Scotland’s Marine Atlas (Marine Scotland, 2011) the conservation status of the five most abundant cetacean species, including the harbour porpoise, was assessed as favourable. However, the report continues that, as a group, cetaceans can only be considered to be in good condition in the northern and southern North Sea and admits that even this assessment does not have a high degree of certainty. In the eastern English Channel they were

considered to be in poor condition; and in moderate condition in the Western Channel, Celtic Sea, Irish Sea, the Minches and Western Scotland. Their condition in offshore waters around Scotland was considered unknown.

To appropriately inform management, needs include integrated and comprehensive data collection, including in relation to abundance and density at sub-population level and identification of regional and local hotspots associated with critical habitat; overarching harbour porpoise conservation strategy; health of population and ascertaining probable cause of death; and, regional and local fisheries data (such as fleet composition (size and number), gear type and catch data (review of log books), use of REM).

Adequate assessment of cumulative impacts is also limited by existing data gaps.

*Meeting the requirements of the Habitats Directive, as well as the achievement of long-term goals such as those in the ASCOBANS Conservation Plan for the harbour porpoise in the North Sea (see section 2.2.5), will be difficult to demonstrate. Uncertainty is widely recognised as a constraint (e.g. Reijnders *et al.*, 2009) that must be incorporated into conservation rationale and implementation (see section 2.1 on precautionary principle).*

Survey approaches for baseline surveillance of harbour porpoise have been presented to the UK government (Evans and Thomas, 2011). Baseline surveillance monitoring, alongside the development of broad-scale management measures, rather than piecemeal and largely untested mitigation measures, must be seen as an integral and essential part of harbour porpoise conservation.

2.2.1.3 UK Cetacean Strandings Investigation Programme

The UK Cetacean Strandings Investigation Programme (CSIP) has been running since 1990 and is funded by Defra and the Devolved Administrations. CSIP coordinates the investigation of cetaceans, marine turtles and basking sharks that strand around the UK coastline. Strandings data support baseline surveillance but can also have a role in impact monitoring.

Each stranding is documented to build a picture of general population health. All recently dead stranded cetaceans are collected in Scotland. In England and Wales a proportion of dead stranded cetaceans are collected for investigation at post-mortem to ascertain a range of data, including potential cause of death, diseases, contaminant levels, diet and life history parameters¹³. The data and samples collected enable further conservation aims and towards this end, facilitate a large number of national and international collaborations across a range of issues including natural causes of death and human-induced trauma due to sources such as ship strike, pollution and bycatch.

Ongoing postmortem analysis combined with other diagnostic investigation provides vital information on cause or probable cause of death. This information represents a valuable source of evidence of impacts to individual animals. It also enables identification of trends over time and novel causes of death. For example, analysis of post-mortem examination conducted between 1991 and 2010 showed a

¹³ www.ukstrandings.org

*slight decline in the proportion of bycatch in UK stranded harbour porpoise and a relative increase in the proportion of infectious disease and starvation. Interactions with bottlenose dolphins (*Tursiops truncatus*) also represent a slight increasing trend during the project period (Deaville and Jepson, 2010).*

*CSIP works collaboratively with neighbouring European stranding networks to provide useful comparison and collaboration. ASCOBANS represent one of the key bodies utilising this information in its work programme (see section 2.2.5) as well as the International Council for Exploration of the Sea (ICES) Working Group on Bycatch of Protected Species. The collection of incidental bycatch data through stranding networks represents an important additional source of information, including to bycatch observer schemes, and is highlighted as an action under the ASCOBANS North Sea Conservation Plan (Reijnders *et al.*, 2009). In particular, the assessment of trends is likely to be informative, but needs good coverage and a standardised methodology (OSPAR BDC 13/4/2 Add.1 Rev. 1-E).*

2.2.1.4 Habitat Regulation Assessment

Article 6 of the Habitats Directive is the key article that sets out the provisions governing the conservation and management of SACs. Firstly, Member States shall establish 'necessary conservation measures involving, if need be, appropriate management plans' (Article 6(1)). Secondly, under Article 6(2), appropriate steps must be taken to avoid deterioration of the habitats and species for which the areas have been designated.

Finally, Articles 6(3) and (4) stipulate the process that Member States must undertake when allowing activities to take place that could affect SACs. That is, any plan or project 'likely to have a significant effect' on the site must be evaluated, by way of an Appropriate Assessment (AA), to determine its implications on the site integrity.

Activities not considered to affect the integrity of the site can continue, whilst those that are assessed to impact on the site will not be allowed to proceed unless restrictions, modifications and/or mitigations can be put in place so that there will be no adverse effects on site integrity. Where activities are still found to have an adverse impact to site integrity (i.e. impact an SAC and its protected features), but are considered necessary for imperative reasons of overriding public interest (IROPI), and provided that there is no alternative option available, activities may still be permitted on the grounds of IROPI. In such cases, Member States must take all compensatory measures necessary to ensure that the overall coherence of the network is protected.

The decision as to whether a proposed development is likely to have a significant effect on an SAC, and hence will require an AA - the initial screening stage or test of likely significant effect - should be made on a precautionary basis and in light of the best scientific knowledge in the field. That is, an AA is required where there is a probability or risk that a plan or project will have significant effects on a site, either on its own or in combination with other plans or projects. This is in line with the ruling of the European Court of Justice in Case C-127/02 (the Waddenzee Judgement).

In circumstances where an AA is required, the relevant authorities have to be satisfied that the AA shows, beyond a reasonable doubt, that the activity will not adversely affect the site integrity. In other

words, an AA is specifically required where a plan or project may have an effect on an SAC and in which case it must be proven beyond reasonable doubt that the project will not have an adverse impact before it can be allowed to proceed.

Under UK domestic legislation, this process takes the form of a Habitat Regulations Assessment (HRA). In accordance with Article 6, an HRA incorporates a four stage process including screening (or a 'test of likely significant effect'), Appropriate Assessment (AA), assessment of alternative solutions and Imperative Reasons of Overriding Public Interest (IROPI).

2.2.1.5 Fisheries Measures under the Habitats Directive

In relation to how Article 6 (3) applies to fishery activities in SACs, the Waddenzee judgement makes it clear that commercial fishing should be subject to an AA by a competent authority, where such fishing is likely to have a significant effect on an SAC. Moreover, the Waddenzee case, which related to Dutch cockle fisheries, has removed any doubt that annual licensing of an established fishery could amount to a plan or project within the meaning of Article 6(3).

Irrespective of whether fishing is considered to be a plan or project, as stated above, Article 6(2) requires prevention. In official guidance, applying relevant case law, the European Commission highlights that 'the words 'avoid' and 'could be significant' stress the anticipatory nature of the measure to be taken. It is not acceptable to wait until deterioration or disturbances occur before taking measures' (European Commission, 2000).

Despite the above, in practice, Article 6 of the Habitats Directive has been poorly implemented by Member States in respect to fisheries management.

Since 2012, Defra has been developing a revised approach to managing fisheries activities in EMS in England and offshore waters. Delivery will be via a 'Fisheries in European Marine Sites Implementation Group' chaired by Defra and with representatives from the Marine Management Organisation, Inshore Fisheries and Conservation Agencies, Statutory Nature Conservation Bodies (SNCBs; Joint Nature Conservation Committee (JNCC), Natural England (NE), Scottish Natural Heritage (SNH), Natural Resources for Wales (NRW) and Northern Ireland Environment Agency (NIEA)), environmental organisations and the fishing industry. A risk-based approach to ascertaining the sensitivity of gear types on EMS features is in progress. It is on course to implement radical changes to the management of fisheries in all such sites by the end of 2016, and measures for the most damaging fishery operations within SACs being implemented first (WCL, 2013). In Scottish waters, the process has been less formal and is still underway. It is unclear how Wales will proceed at present. Current management proposals as described above include restricting fishing activities to or away from particular areas or to set time periods, catch limits and modifications of using particular types of fishing gear. Measures could be implemented throughout a site, or zones within a larger site.

In the offshore environment, this process has been further complicated by differing interpretations amongst Member States as to how the Common Fisheries Policy (CFP) interacts with the requirements of the Habitats Directive. This has led to an area of uncertainty, and arguably misinterpretation, as well

as a failure to comply with and apply EU environmental laws to fishing activities. The reformed CFP provides some clarity on the correct process to be followed (under Article 11). However, uncertainty remains, particularly regarding implementation of fisheries management measures to protect mobile species. Several Member States have requested further interpretation of the Habitats Directive in relation to fisheries, as well as clarification of the process by which management of fishing activities in SACs link to the CFP. The Commission is currently preparing a further clarification note using existing jurisprudence and case law (The N2K Group: European Economic Interest Group, 2012).

It is essential that Member States continue to work to better implement Article 6 of the Habitats Directive with respect to fisheries so as to prevent risk of infraction proceedings. In order to assist this process, the Commission must provide clear and conclusive guidance in relation to questions that are being raised by Member States.

Additional guidance on how Article 12 of the Habitats Directive should be implemented across all European waters (i.e. not just in SACs) in respect to the disturbance caused by fisheries activities on cetaceans is also required.

2.2.1.6 Case study: SAC Fisheries Measures in Germany

The EU funded project Environmentally Sound Fisheries Management in Protected Areas (EMPAS) project was a collaboration between ICES and Germany, to assess fisheries management in SACs¹⁴. This project considered:

- (i) Closing of set net fisheries in all sites, either permanently or temporally.*

Whilst reducing bycatch to zero within sites, however, the resulting benefit at a population level would depend on bycatch outside the site, particularly if fishing effort is displaced rather than removed. Currently there are insufficient data to estimate any ecological benefit at the population level. However, the EMPAS project concluded that the likelihood of little or no benefit is high enough to be of concern given social and economic consequences to the fisheries. The risk of effort displacement needs to be carefully considered in all closure schemes, and done in collaboration with neighbouring Member States. This is particularly relevant for the North Sea.

- (ii) Mandatory use of acoustic deterrent devices on all set nets and all vessel sizes, combined with an effective observer scheme.*
- (iii) Gear modification; however, most modifications remain experimental. Consequently, further experimental work on ecological benefits and economic cost is considered in the scientific community as an important way forward, and a governmental funded project has been established to test different types of alternative gear in German waters.*

An output from the EMPAS project was the proposal of a set of management measures for SACs in Germany. Interestingly, there is a strong difference of opinion over fisheries mitigation measures for the harbour porpoise. The view of BMELV (the Ministry responsible for fisheries) was for year round use of

¹⁴http://www.panache.eu.com/home_panache/related_initiatives/projects_and_initiatives/22_196/empas

*pingers on all gillnets and entangling nets and / or seasonal exclusion, whereas the BMUB (the Ministry responsible for nature conservation) took a stronger line calling for year round exclusion of these gears in larger parts of the sites (Sell *et al.*, 2011). WWF Germany's (2011) view on fisheries measures in these SACs is for a minimum of 50% of sites to be no-take with respect to reef habitat, and they called for year round exclusion of fisheries with gillnets and entangling nets in those sites, and a ban on pinger use. They further called for a ban on industrial sandeel fisheries to secure food resources in some sites, including the German section of the Dogger Bank. If sandeel fisheries occur within protected sites for harbour porpoises (for example in the Dogger Bank) then they must only be allowed to proceed if they pass the tests of Article 6 (i.e. the fishing industry must demonstrate that the sandeel fishery won't adversely affect the harbour porpoise population). Robust baseline data are needed to detect change resulting from fisheries interactions.*

WDC opposes the use of pingers as a general measure, and especially within MPAs. If pingers are to be used as a mitigation measure, this has to be considered an interim solution. Their effectiveness has to be demonstrated. Deterring or even excluding cetaceans from areas of critical habitat is not appropriate.

German NGOs generally support the measures proposed by WWF. Furthermore, WDC together with partner NGOs have elaborated a "wish list" catalogue of measures, including for fisheries and noise pollution, to provide harbour porpoise protection in German SACs. The measures relating to fisheries were:

- Through zoning, operational and technical measures, by-catch in gillnets has to be reduced to achieve a long-time goal of zero by-catch
- At least 50% of Natura 2000 sites shall be set aside from any human use
- When management measures are to be developed, it has to be taken into account that those threats can have both cumulative as well as synergistic effects on harbour porpoises
- Gillnets need to be replaced by more environmentally friendly fishing methods. A transitional period of 3 to 5 years is advised and should extend beyond SACs
- Pingers may be only be used during the transitional period to keep porpoises away from nets. Pingers are not an appropriate method to permanently avoid by-catch
- All bottom fishing activities need to be excluded from SACs, especially those protecting habitat types "reef" and "sand bank"
- Research into alternative fishing methods and their promotion has to be encouraged and appropriate incentives required
- All fisheries within SACs need to undergo an environmental assessment under the Habitats Directive

However, it is as yet unknown how the German Government will decide about the fisheries measures to be implemented for SACs in EEZ waters. Currently, management plans are being prepared, including general measures. However, they will probably not include measures affecting fisheries as measures will need to go through the processes included in Article 11 of the CFP.

On a more regional level, the federal state of Schleswig-Holstein (responsible for its coastal waters) has recently established temporal and spatial exclusion of set nets for specific small-scale coastal areas. These came into existence on the basis of a voluntary agreement with local fishermen (hence their

effectiveness is hard to assess) and this can only be considered as a first step in the direction of sufficient legislative measures in the future.

Whilst case study projects are useful in assessing and analysing a range of relevant issues and in developing joint stakeholder collaboration, there is a clear need for effective political steer to ensure that an appropriate and realistic suite of measures are available to deliver meaningful conservation. In that sense, Germany is a good example of how different political interests and subsequent lobbying can significantly hinder the development of conservation-oriented legislation.

Preliminary work is likely to be required to fill data gaps in advance of pursuing incentives and accreditation schemes. Local, regional, national and European funding opportunities could provide a means of achieving this aim. Given the human resources often required to develop project proposals, particularly when following EU funding streams (for example, the European Fisheries Areas Network, FARNET¹⁵), some thought would need to be given to collaboration between stakeholders for multi-faceted projects with multiple but complementary aims and outputs.

2.2.2 Environmental Assessment

Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) have previously been reviewed in detail (Green *et al.*, 2012). In addition to HRA (Habitats Regulations Appraisal) under the Habitats Directive, national devolved Strategic Environmental Assessment (SEA) Regulations (2004) transpose European Directive 2001/42/EC 'on the assessment of the effects of certain plans and programmes on the environment' that fall within the scope of the Strategic Environmental Assessment Directive. Government guidance outlines the scope, criteria and requirements for the preparation of SEA reports. SEA and HRA are generally applied at a policy level whereas AA is applied at the plan/ project level.

The disparity between the detail of information required for a terrestrial and marine EIA for an oil and gas or wind farm development, for example, can be stark. For instance, terrestrial wind farms are routinely required to undertake surveys for all EPS that may be present on site. These surveys are usually required to last at least 12 months and must be undertaken to the highest level of guidance in survey quality. For offshore developments this is not such a routinely applied requirement and many developments have submitted environmental statements based on the synthesis (often very incomplete) of existing data, sometimes at an inappropriate scale.

2.2.3 EU Common Fisheries Policy Reform

With respect to fisheries management at an EU level, the recent reform of the Common Fisheries Policy (CFP) in 2015 will have implications, including for how fisheries are managed in EMS and for EPS.

The preamble to the revised CFP draws on a number of environmental principles including the need to take an ecosystem-based approach to contribute to the protection of the marine environment and the achievement of Good Environmental Status by 2020. The introduction of multi-annual plans should establish a framework for the sustainable exploitation of stocks and the ecosystems concerned.

¹⁵ <https://webgate.ec.europa.eu/fpfis/cms/farnet/>

Notably, the revised CFP embraces the principle of regionalised decision making and it is the intention that this will extend to mitigation measures for protected species. Monitoring of cetaceans will potentially be covered under the data collection framework (DCF) repealing Regulation EC 812/2004 (ICES WGBYC, 2014), although DCF is inadequate for monitoring cetacean bycatch.

Regional Advisory Councils' (RACs) primary responsibility is to engage stakeholders and to advise on fisheries management issues. However, they also provide advice on the impact of fisheries in the wider marine environment and ways of mitigating impacts.

Importantly, the European Marine Fisheries Fund (EMFF) provides funding to enable testing and implementation of alternative fishing gear.

2.2.4 EU Proposal for prohibition on driftnet fisheries

A recent development is the Proposal for a Regulation of the European Parliament and of the Council laying down a prohibition on driftnet fisheries, amending Council regulations (EC) No 850/98, (EC) No 812/2004, (EC) No 2187/2005, and (EC) No 1967/2006 and repealing Council Regulation (EC) No 894/97/*COM/2014/0265final – 2114/01138 (COD). This Proposal has been developed to recognise the ongoing serious environmental and conservation concern linked to the use of these fishing gears and, on the basis of the precautionary principle, this Regulation stipulates a full prohibition to take on board or use any kind of driftnet as of January 2015 in all EU waters. It also suggests a revised and more comprehensive definition of this fishing gear to close any possible existing loophole.

We understand that the fate of the new driftnet proposal is uncertain and it has generally been met with resistance from Member States and the fishing industry. In particular, the UK has not supported the Proposal on the basis that the smaller scale driftnet fisheries used in UK waters are thought to be unlikely to cause bycatch and that it is ongoing non-compliance with existing bans in areas such as the Mediterranean that need to be addressed.¹⁶ Whilst the environmental issues of large-scale driftnet fishing are well known, the case against smaller scale fishing of this type is unknown and harder to prove (Masters, 2014). However, in order to justify the position taken by the UK and other Member States in the negotiation of the Proposal, further work is required across Europe, including the UK, to show that the use of smaller driftnets are not detrimental to harbour porpoises.

2.2.5 ASCOBANS

Work carried out under the auspices of the Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) represents a valuable example of collaborative working between neighbouring countries. In particular, a Conservation Plan for harbour porpoise in the North Sea (Reijnders *et al.*, 2009) has been developed, the aim of which is to "...restore and/or maintain North Sea harbour porpoises in a favourable conservation status whereby:

- Population dynamics data suggest that they are maintaining themselves at a level enabling their long-term survival as a viable component of the marine ecosystem;

¹⁶ Explanatory Memorandum on a European Union Document, Document 9934-14, submitted by the Department for Environment Food and Rural Affairs 1 June 2014.

- The range of the species is neither reduced nor is likely to be reduced in the foreseeable future;
- Habitat of favourable quality is and will be available to maintain the species on a long-term basis; and,
- Their distribution and abundance in the North Sea are returned to historical coverage and levels wherever biological feasible.”

These objectives incorporate the ASCOBANS goal of restoring and/or maintaining populations at 80% or more of carrying capacity (ASCOBANS, 1997, in Reijnders *et al.*, 2009). The figure is based on the fact that the maximum net productivity level of toothed whales and seals is estimated to range between 50–85%, and is likely somewhere between 58–73% as found for fur seals, for the carrying capacity of the habitat they occupy (Taylor and DeMaster, 1993). Because seals and odontocetes differed by less than 1% in the modelling, it was assumed that the latter range holds true also for small cetaceans. Since ASCOBANS is an organisation which does not strive to achieve maximum net productivity as a resource management body would, but to a more natural regulation, the value of 80% or more was chosen (Reijnders, 1997).

In 2000, ASCOBANS defined a total anthropogenic removal above 1.7% of the estimated harbour porpoise abundance as unacceptable and adopted the intermediate precautionary objective to reduce bycatch to less than 1% of the best available population estimate (ASCOBANS, 2000). The figure of 1%, chosen as a reasonable and precautionary level beyond which one should be concerned about the sustainability of anthropogenic removals, is based on the assumption that the maximum net production of a harbour porpoise population could be lower than 4% per year (Woodley and Read, 1991; Palka, 1996), and that bycatch and abundance estimates are associated with uncertainties (IWC, 1996).

The Conservation Plan sets out that the primary focus is on those threats that affect the status of the population, but notes legitimate concerns that there may also be threats on the welfare of individual animals. A plan also exists for the Recovery of Baltic harbour porpoises (Jastarnia Plan; ASCOBANS, 2009) and a third plan covers the genetically distinct harbour porpoise population in inner Danish waters (the Kattegat, the Belt Seas, the Sound and the Western Baltic).

Most recently, the ASCOBANS North Sea Group (NSG) has produced a summary of progress in the implementation of the Conservation Plan based on the 2013 Regulation 812 report to the EU for 2012, as well as current progress agreed by the NSG (ASCOBANS, 2014a). The NSG identified the need for better dissemination and implementation of the Conservation Plan.

2.2.6 National Inshore Fisheries Management

In the UK, fisheries management measures are the responsibility of national governments within territorial waters, and by Defra and Marine Scotland for waters out to 200nm.

The implementation of management measures in 0-6nm is the responsibility of the Inshore Fisheries and Conservation Associations (IFCAs) in England. IFCAs have a statutory remit with core duty roles and responsibilities to manage sea fisheries in a sustainable way, and to protect and promote recovery of the marine environment. Statutory measures include byelaws, permits and licence conditions, whilst non-statutory measures include codes of conduct and voluntary measures. The Marine Management Organisation (MMO) is responsible for introducing measures within 6-12nm and for seeking implementation through European fisheries legislation under the CFP in the offshore area.

In Scotland, Inshore Fisheries Groups (IFG) are non-statutory organisations and thus do not have statutory roles, powers or responsibilities. Their principal purpose is to develop management plans for the inshore fisheries in their area. IFGs could develop proposals for marketing initiatives, MSC accreditation and other quality assurance schemes and proposals for funding priorities for the fisheries and local communities (McLellan, 2011). More recently, IFGs have conducted SEA of management proposals and invited stakeholder input. However, more could be done to improve environmental requirements. Further iterations of environmental assessment of inshore management plans should be initiated at the earliest opportunity (Scottish Environment Link, 2014).

The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 sets the framework for the regulation of activities in association with salmon, including the use of set nets. It is an offence to fish for salmon in the sea by this means and is the responsibility of the Association of Salmon Fishery Board (ASFB). Illegal gill netting in Scottish marine waters is a significant problem, representing a bycatch risk to harbour porpoise. In 2012, 129 illegal gill nets were seized on behalf of the ASFB¹⁷. The only fish that can legally reach market are those caught by legally operated commercial nets. In Scotland, as opposed to the rest of UK and Ireland, such fish are not usually required to be tagged, thereby allowing customers to identify them as being legally taken. The Aquaculture and Fisheries Act (Scotland) 2013 now gives Scottish Ministers the powers to introduce such a system. However, unless such a system uses individually numbered and recorded tags, the wider impacts of illegal and indiscriminate netting will not be reduced.

The Welsh Government Fisheries Unit is responsible for management and enforcement in Wales (WEL, 2014). There are no dedicated inshore fisheries management group in Northern Ireland (AFBI, 2013).

2.2.7 Existing Licensing Regimes

The MMO is responsible for most marine licensing in English inshore and offshore waters, and for Wales and Northern Ireland offshore waters. In Welsh inshore waters the responsibility is that of the Marine Licensing team of Natural Resources Wales (NRW) and in Scotland, the Marine Scotland Licensing Operation Team (MS-LOT). A marine licence is required for a range of activities, notably to construct new works or to alter or improve existing works, the deposit or removal of a substance or object in or from the sea, use of vessel, and floating marine structures.

*Licensing regimes are covered by guidance documents, and as is often the case for the licensing of marine developments, subject to a set of license conditions e.g. linked to monitoring, and mitigation measures such as adherence to SNCBs advice and guidance. Under the Habitats Regulations, a license may be granted for an activity affecting an SAC or EPS if it has been through the HRA process (more information provided in Green *et al.*, 2012).*

2.2.8 Other forms of Management

Other forms of management include spatial and temporal measures such as zoning, including within MPAs, either permanently or seasonally to manage or restrict individual human use and the introduction

¹⁷ <http://www.asfb.org.uk/porpoise-caught-in-illegal-salmon-net-died-slow-painful-death/>

of byelaws for example, in managing recreation in the coastal area and inshore fisheries activities or regulatory orders. Specific legislation can be implemented by the responsible authority e.g. local authorities or Ministers, to restrict or prohibit specific activities. Whilst this is a useful statutory mechanism, implementation, however, usually requires clear evidence of impact and is often implemented subsequent to impact having taken place. Adequate resources are needed for enforcement to be effective.

Technical measures include the use of mitigation measures to prevent injury from intense noise close to a seismic source, or to reduce noise pollution from pile driving (for example by use of a bubble curtain). Acoustic deterrent devices (ADDs) (anti-predator devices) are used at finfish aquaculture installations to deter seals, although these may have unintended negative impacts on harbour porpoises, including permanent hearing damage (Lepper *et al.*, 2014).

The Ministry of Defence self-regulates its impacts and sets its own management and mitigation strategies. Navy Command Headquarters have developed Environmental Protection Guidelines (Maritime) (EPG(M)) and a Maritime Environment Sustainability Appraisal Tool (MESAT) which will enhance consideration of the impact of military activities on the marine environment during planning of military exercises and as such minimise any resulting impact from military activities. Part of this tool is a suite of operational guidance associated with MPAs (Royal Navy and JNCC, 2013).

The European Fisheries Area Network (FARNET: <https://webgate.ec.europa.eu/fpfis/cms/farnet/>) explores alternative approaches towards sustainable fisheries. The core of the network is made up of over 300 Fisheries Local Action Groups (FLAGs). These public-private partnerships, set up at local level, work towards the sustainable development of their areas. Based in 21 Member States, these FLAGs each manage a budget to support a range of projects proposed and carried out by a wide variety of local stakeholders.

Voluntary measures include codes of conduct, such as for marine wildlife watching.

Management Units are recognised across the territory of the European Community and the North East Atlantic (Evans and Teilmann, 2009; ICES WGMME, 2013). It is imperative that the Management Units are the appropriate size to adequately reflect results that suggest genetically differentiated sub populations around the UK and wider North Sea region (ASCOBANS, 2014b).

2.2.9 Site Protection in Addition to Wider Measures

The UK and devolved administrations have obligations to the designation of an ecologically coherent network of MPAs as embedded under OSPAR¹⁸, and to achieving Good Environmental Status (GES) under the EU Marine Strategy Framework Directive (MSFD)¹⁹. One of the criteria for ecological coherence is the inclusion of the full range of habitats and species, including mobile species.

¹⁸ The Convention for the Protection of the Marine Environment of the North-east Atlantic (1992). Biodiversity Committee

¹⁹ EC Directive 2008/56/EC of June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

National work to develop MPAs required under recent domestic legislation²⁰ has made limited progress on mobile species. In Scottish territorial waters, three cetaceans are listed as MPA search features, with a wider list of 'Priority Marine Features' including the harbour porpoise. In England, the harbour porpoise is not included in the work to develop a network of Marine Conservation Zones (MCZs), nor is it included in the Scottish MPA list of species, on the basis that the species is covered under the Habitats Directive. This is despite there currently being no existing harbour porpoise SACs in English, Welsh or Scottish waters.

*UK policy on harbour porpoise conservation has historically concentrated on wider measures, such as bycatch reduction. The legal and policy obligations and conservation benefits that site protection can add to the toolkit of measures that combine to create an integrated and holistic conservation strategy for the harbour porpoise have been articulated (such as Evans and Prior, 2012; Dolman *et al*, 2013; ClientEarth, 2013). These reports also highlight the work that other member states (e.g. Germany, the Netherlands and Denmark) have conducted to determine harbour porpoise SACs and the philosophy (best available information combined with expert opinion) on which to designate them.*

In addition to providing clarity about areas of critical habitat, focusing attention on potential pressures and management options, site protection offers an important framework for stakeholder dialogue and education as well as an opportunity to secure funding, for example, for population monitoring or developing certified products (for example, fisheries, tourism).

Areas of Concern (AoC), where we have overlaid high density harbour porpoise hotspots against the spatial distribution and intensity of human activities, should provide a useful basis on which to determine appropriate boundaries for site protection, and consider the full range of existing and proposed human activities that are likely to impact on the harbour porpoise. In this way, informed decisions on management measures can be taken that consider cumulative impacts.

The benefit of site protection for cetaceans has been demonstrated for bottlenose dolphin in UK SACs for this species, where a comprehensive SAC management scheme for all qualifying features has been established. For example, the Moray Firth SAC management scheme (Moray Firth SAC Management Group, 2009) considered impacts and actions required for long term conservation of the bottlenose dolphin population in that site, recognising both the biodiversity and economic value with respect to tourism, of the species to the area. Following plan implementation, recent concerns for the protected bottlenose dolphin population due to increased regional coastal development led to a cumulative assessment of port developments alongside offshore wind farms and associated vessel traffic (Lusseau, 2013).

*Spatial protection, including zoning, can assist with the consideration and management of multiple threats. As an example, a study of tagged harbour porpoise to look at the effects of noise exposure and behaviour in the highly trafficked Danish Straits suggested strong implications for foraging efficiency, energy expenditure and stress impacts (Teilmann *et al.*, 2014). The authors also suggested noise*

²⁰ *Marine and Coastal Access Act, 2009, Marine (Scotland) Act, 2010 and Marine Act (Northern Ireland), 2013*

pollution may increase susceptibility to bycatch by distraction, masking and reduced detection of fishermen's nets.

2.3 Statutory Nature Conservation Bodies (SNCBs)

Delivery of European Directives falls to each Member State to interpret based on guidance documents and action as they see appropriate. As the Bodies responsible for advising Governments on matters relating to the marine environment, the SNCBs have a valuable and influential policy role.

Implementing international and regional obligations and legislative commitments requires collaborative action between Governments and a host of stakeholders. The SNCBs have provided a series of advice and guidance documents that are relevant to the conservation of the harbour porpoise, on a range of issues from Management Units to minimising injury from intense noise pollution.

With respect to harbour porpoise conservation, the current UK approach continues to focus on individual threat and impact reduction, coupled with wider surveillance. Existing Agency guidance on a range of sectoral issues requires updating and these have been identified in the relevant areas below. Agency guidance is also required on some other issues, including cumulative assessment of EPS licensing and the appropriate use of ADDs, including at aquaculture facilities.

Analyses are currently underway to determine whether discrete and persistent areas of relatively high densities of harbour porpoises and bottlenose dolphins exist in the UK marine area. Subject to the findings of that work, advice will be provided to Ministers late in 2014 on possible areas to consider for designation as SACs (JNCC, 2014).

2.4 Developing Management Options for Harbour Porpoise in the UK

In response to requirements under the Habitats Directive and other national and regional legislation, there currently is a drive, led by the SNCBs, to develop management options for MPAs. The goal to implement effective management in MPAs by 2016 represents a key step in the goal to achieve GES under the MSFD. Consequently, in recent years there has been progress as demonstrated through the development of SNCB guidance documents (Marine Scotland and others, undated), and the development of site-specific management schemes (for example, Moray Firth SAC Management Group, 2009; Cardigan Bay SAC Management Scheme, 2008). A management plan or scheme should be a requirement to support the conservation objectives of each site. Such a document should ensure a role for all relevant stakeholders and clearly set out all marine uses and management measures. It should be flexible enough to be periodically revised to account for new sectors or measures. As examples, management schemes are in place for bottlenose dolphin SACs in UK waters, and both Denmark and Germany are currently developing management plans for each of the SACs in their EEZ waters.

Conservation objectives will need to be set for each site. Conservation objectives set for the bottlenose dolphins in the Moray Firth and Cardigan Bay SACs highlight key criteria that could also be considered relevant for the harbour porpoise, i.e. to avoid deterioration of the habitats of qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving Favourable Conservation Status (FCS) for each of the qualifying features (Evans, 2008).

Further, to ensure that the following are established and then maintained in the long term for the qualifying species:

- Stable population of the species (including range of genetic types where relevant) as a viable component of the site*
- Distribution of the species within site*
- Distribution and extent of habitats supporting the species*
- Structure, function and supporting processes of habitats supporting the species*
- No significant disturbance of the species*

SNH and JNCC have produced a Management Options Paper for each MPA designated in July 2014. Each Management Options Paper outlines the conservation objectives for the protected features and the known activities that take place within the proposed MPA. Through the application of this approach, management options have been identified for relevant activities based on whether (i) no additional management is required (existing measures only), (ii) management is introduced to reduce pressure, or limit future pressure, (iii) management is introduced to remove or avoid pressure.

Implementation of management options for harbour porpoise areas of concern (AoC) will provide a strategic framework to allow key stakeholders (government, SNCBs and responsible authorities) and wider stakeholders (such as non-governmental organisations (NGOs), industry, scientific community and the wider public) to identify what and why activities need management and options for a way forward. Thus allowing responsibility for transparent implementation, delivery and monitoring of management actions against a set of pre-determined conservation objectives and timescales within which such actions are required to take place.

Management options have rarely dealt with cumulative impacts to date, but this is beginning to change (for example, Lusseau, 2013).

Baseline surveillance (section 2.2.1.2) should ensure that the conservation objectives are being met and compliance with management measures set out in the management plan. In order to define and establish adequate and feasible conservation measures, a sound information base on the existing condition of the site, on the species and habitat status, and the main pressures and threats, are all required (European Commission, 2013).

Monitoring activities in SACs should have two purposes:

- to assess implementation of the planned conservation measures and their effectiveness in meeting the conservation objectives of the site*
- to assess the impact of the measures on the degree of conservation of target species in the site (European Commission, 2013).*

An overall objective when preparing the conservation measures should be to achieve integrated management of the sites (European Commission, 2013).

2.5 Effective Management Options for Harbour Porpoise across the EU

Implementing international and regional obligations and legislative commitments requires collaborative action between national Governments and a host of stakeholders across the EU. Cohesion between member countries in fact is a requirement of the Habitats Directive and increasingly of the MSFD. Measures and recommendations made at a regional level, whether through the CFP, ASCOBANS, ICES, OSPAR or other fora, will only be effective if implemented transparently by all regional parties.

*As an example, the Dogger Bank adjoins four neighbouring European countries, and transboundary cooperation is paramount for all aspects of research and management so as to achieve coherence (for example, Dolman *et al.*, 2013).*

3. Sensitivity Assessment of Harbour Porpoise in UK Waters

The collation and analysis of thematic data layers used to determine potential harbour porpoise Areas of Concern (AoC) requiring the necessary development of management options included (i) species range and population density (ii) sensitivity assessment of differing density areas to identified pressures (iii) assessment of sectoral activities which may exert pressure, and (iv) the assessment of potential areas of cumulative pressures indicating management concern for the harbour porpoise. Other measures that could potentially be incorporated into sensitivity assessment include ecological, population & life history parameters (viz. Evans and Baines, 2013).

3.1 Overview of Methods for Sensitivity Assessment

The following section will describe the available evidence used to illustrate the distribution and potential sensitivity of porpoises to certain pressures within the UK Exclusive Economic Zone (EEZ).

3.1.1 Harbour Porpoise broad scale distribution and density

*To adequately represent the potential distribution of harbour porpoises within the area of assessment (Fig.1), effort-corrected spatial distribution information (design and modelled based abundance estimates, distance effort related sightings rates, etc.) were digitised from a broad range of published papers and reports, including from many sources including those summarised in Clark *et al.* (2010) and Dolman *et al.* (2013), and were combined in a broad meta-analysis comparable to that described in Clark *et al.* (2010). To reduce potential error associated with cells of unreliably low effort, only those areas with more than 10 km of search effort were used to determine porpoise distribution. These estimates of density were then extracted to all spatially explicit presence records available for the species distribution in the UK EEZ (from EMODnet, Clark *et al.*, 2010; Dolman *et al.*, 2013 and references contained therein) and re-analysed using a Kernel Density Estimator (ArcTool Box, ESRI ArcMap 10.2.1) to interpret all varying data sources equally (based on analysis by Teilmann *et al.* (2008)). The resulting Kernel Density percentiles were then binned into four categories of intensity including High (0-30), Medium (40-60), Low (70-90) and a background category relating to the potential range presence based on sightings (90-100).*

Box 1

Caveats and Assumptions

The distribution of harbour porpoise based on generalised kernel density is not meant to reflect a thorough distribution of the species density or absolute abundance in UK waters. It is meant to reflect the overall knowledge on the areas of higher than average distribution based on sightings information of the species presence. This has been adjusted to reflect basic knowledge of the species variation in population concentration throughout the region assessed as a means to provide preliminary assessments of likely sensitivities against key pressures identified.

Furthermore, this assessment provides a meta-analysis overview of the species spatio-temporal distribution in UK waters across a time series from 20 years of research and monitoring (1994-2010). Therefore, the assessment comes with overarching caveats that any resulting distribution of kernel density does not account for any variation or changes in the annual or seasonal distribution of the species and is considered a broad static assessment specifically for undertaking preliminary assessments of likely sensitivities against key pressures identified.

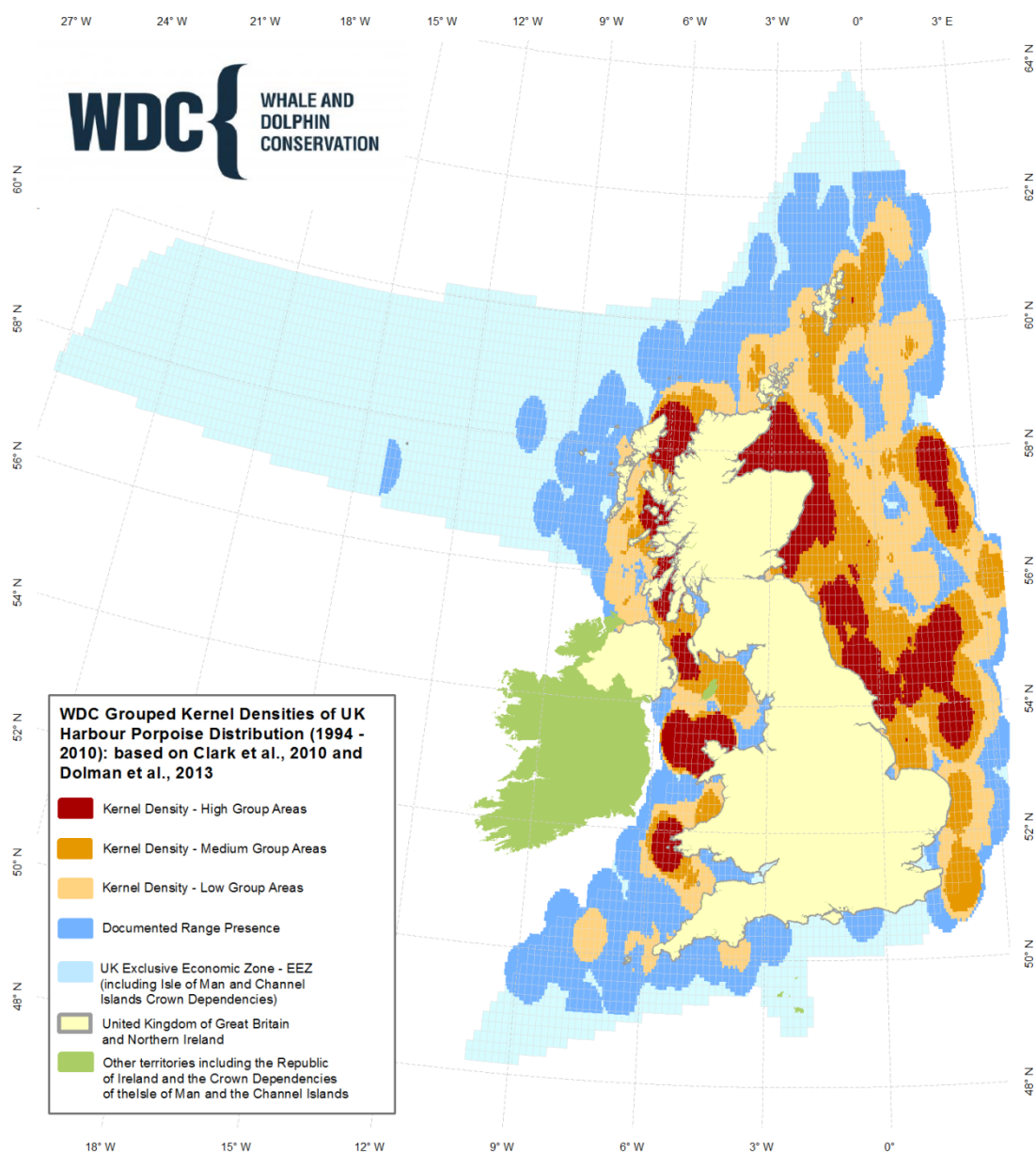


Fig. 1. WDC preliminary assessment of harbour porpoise population density concentrations and distribution in the UK

3.1.2 Assessments of Sensitivity to sectoral activity

Four groups of pressures were chosen for further assessment that are relevant to harbour porpoises within the UK EEZ:

- Barriers to Movement e.g. barriers to species movement (including physical and sound barriers).*
- Physical Trauma e.g. damage caused to porpoises from collision or noise, which may either directly result in mortality or significant physical harm leading to mortality.*
- Disturbance e.g. from physical and acoustic sources which impact or alter porpoise habitat and or behaviour such as resting, feeding, breeding and socialising.*
- Ecosystem Effects e.g. sufficient alteration of habitat that may interrupt or displace necessary ecosystem systems of critical importance such as prey or prey habitat.*

These four main groups of effects upon harbour porpoises were assessed (adapted from protocols and examplesⁱ developed by SNH and Marine Scotland, and used by WDC) for relative sensitivity in each of the sections below for the distribution of porpoises (based on kernel densities corrected using published population estimates) in three categories depending on known sensitivities to the different pressure groups (Low, Medium and High). The sensitivity information presents our general understanding of relationships between porpoises and the effects associated with certain activities. It does not take full account of the frequency or intensity of all activities which occur within the area of assessment, and will form an important part of future discussions with stakeholders.

A. Barriers to movement (Fig. 2)

Porpoises were assessed as Low-Moderately Sensitive to the effects of barriers to their movement. However, variation of pressure from different fixed installations and noise was not assessed, due to a paucity of information of porpoise interactions with different sources deployed in the area. Therefore, should a further assessment be made, it is considered that sensitivities could be regionally increased (Moderately - High) depending upon available evidence.

B. Physical trauma (Fig. 3)

Porpoises were assessed as Low-Moderately Sensitive to the effects of physical trauma leading to mortality or injury from physical or acoustic interactions with sources such as maritime vessels (e.g. large shipping cargo/tankers/passenger ferries, recreational boats and fishing vessels), entanglement in fishing gears and aquaculture installations, collisions with tidal turbines, point source noises, live fire and explosives. These assessments were made at a mean likely level of sensitivity, and do not take into consideration the variation of impact from different types of sources. Therefore, should a further assessment be made, it is considered that sensitivities could be regionally increased (Moderate-High) depending upon available evidence.

C. Disturbance (Fig. 4)

Harbour porpoises were assessed as Moderately-Highly Sensitive to the pressure of disturbance to critical behaviour, mainly foraging and resting, from the physical and acoustic presence of sectoral activities (see B. Physical Trauma). In particular, they were assessed as Highly Sensitive to most effects of disturbance to critical behaviour from point and ambient source acoustic activity, such as seismic / naval operations, shipping noise, pile driving and operational phases of marine renewable installations.

D. Ecosystem effects (Fig. 5)

Porpoises were assessed as Low-Moderately Sensitive to ecosystem effects leading to damage, loss or displacement of habitat or the habitat of significant prey items that are connected to important life history phases for the species. However, many of these ecological connections are dynamic, regionally variable or not fully understood. Therefore, should a further assessment be made it is considered those sensitivities, to the loss of habitat or prey species, could be regionally increased (Moderately - High), depending upon available evidence.

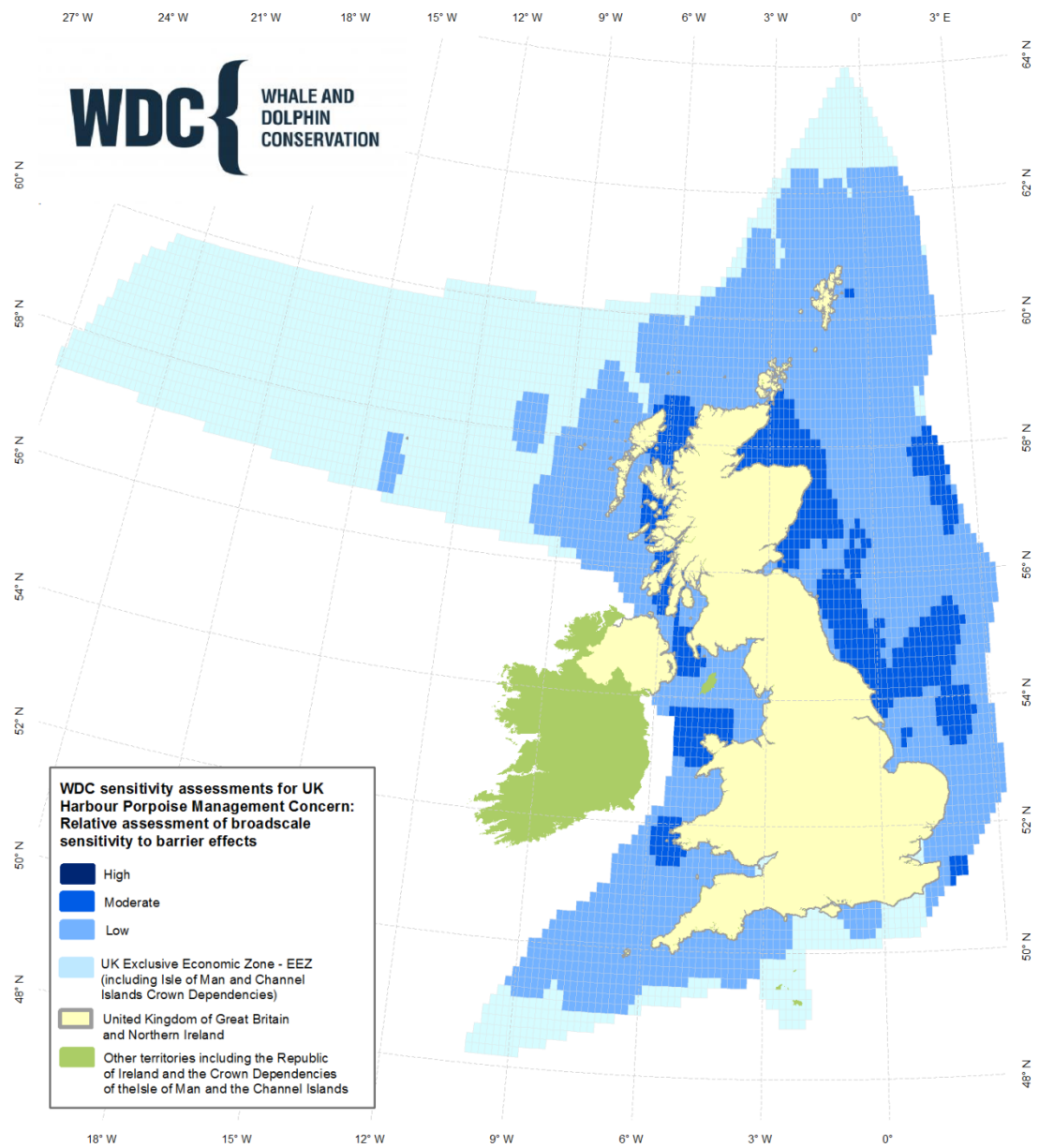


Fig. 2. WDC preliminary sensitivity assessment for UK harbour porpoise management concern: barrier effects

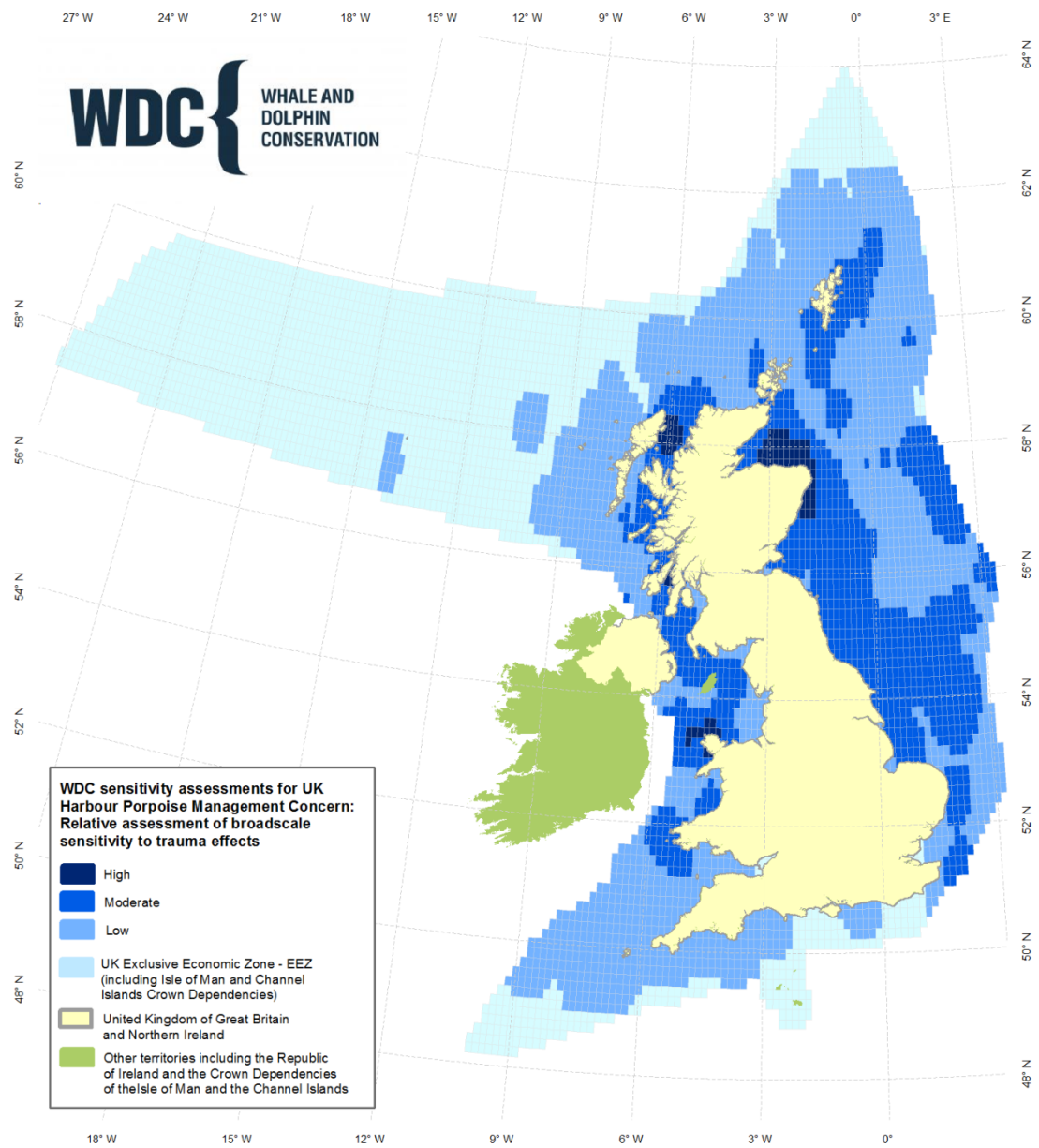


Fig. 3. WDC preliminary sensitivity assessment for UK harbour porpoise management concern: trauma effects

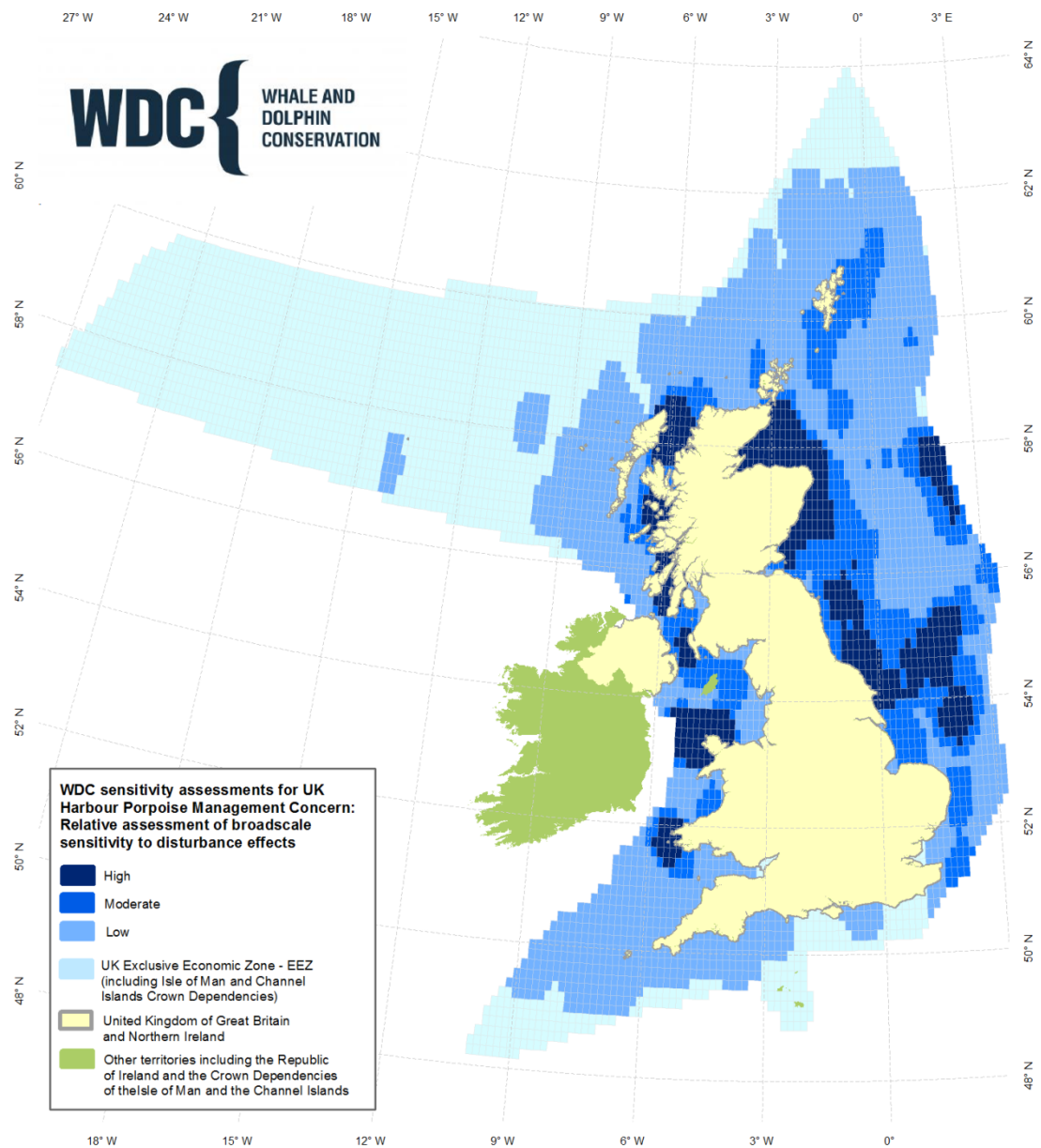


Fig. 4. WDC preliminary assessment for UK harbour porpoise management concern: disturbance effects

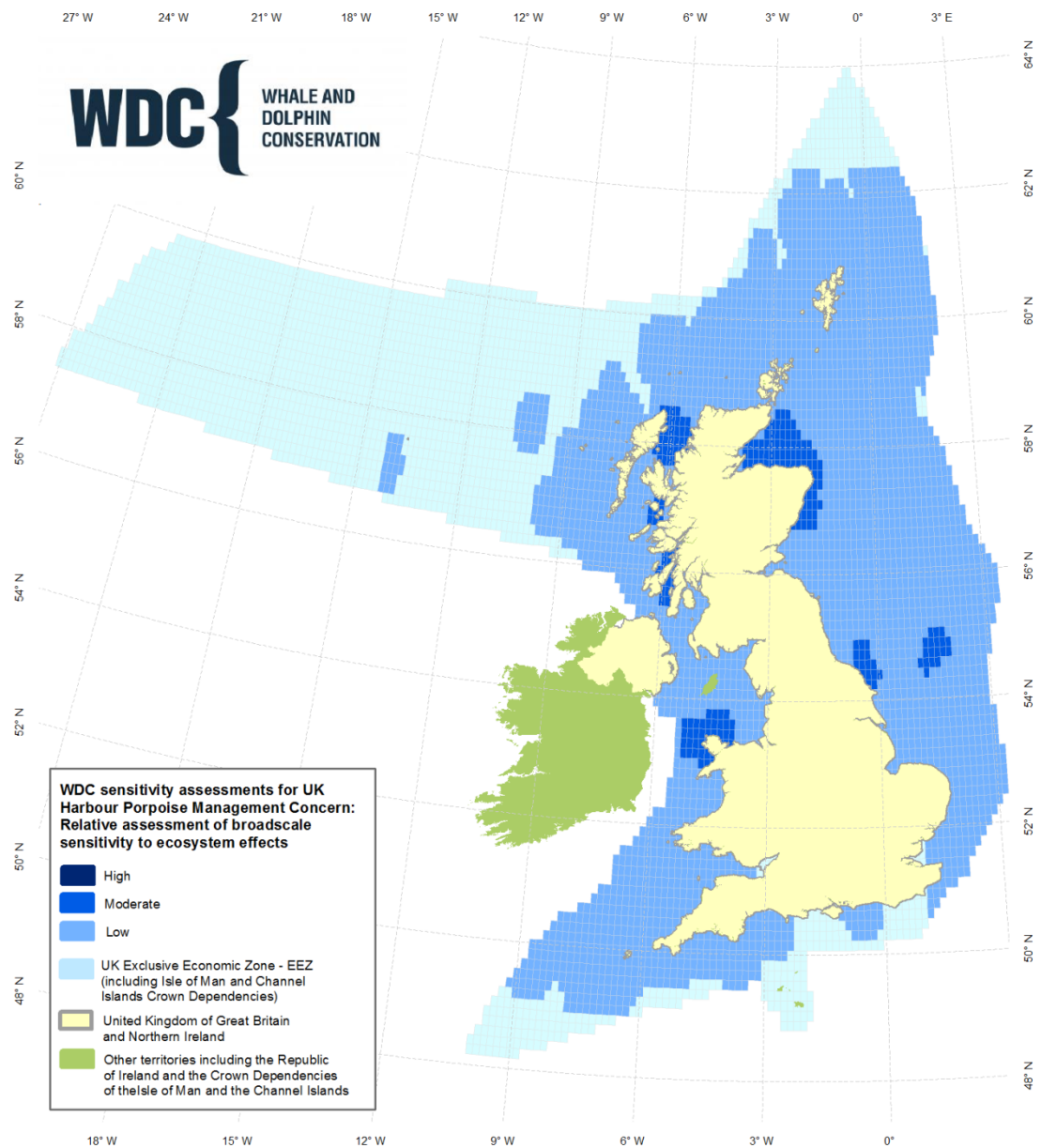


Fig. 5. WDC preliminary assessment of UK harbour porpoise management concern: ecosystem effects

4. Overview of Relevant Sectoral Activities

4.1 Overarching Assessment of Pressures requiring management

There are a wide range of activities and developments occurring and planned within the UK Exclusive Economic Zone (EEZ). For the purpose of investigation of possible management options for areas of potential concern, the following types of activities have been considered:

Fishing - a range of fishing activities take place. Data on these activities have been derived from VMS and catch data from 2001-2010, including limited information on <15m vessels in UK inshore waters. Examples of activities include creeling and potting (static), demersal seine netting and beam trawling (demersal) and otter trawling and set netting (pelagic). These were assessed using a standardised ranking of fishing intensity (based on trawl duration/soak time and weight of catch) at a UK scale in combination of their respective static, demersal and pelagic gear types (see Appendix).

Aquaculture - the UK marine aquaculture industry is varied in type and polarised towards Scottish waters, including those which employ static installations (cages, pens and hold lines) and others using ranching and seeding methods (open beds and estuaries). Here we assessed only those with types utilising sufficient amounts of installation or seed trawling to maintain aquaculture stocks (excluding hand seeded or natural inter-tidal seeded sites).

Renewable Energy - renewable energy options occur within the areas of search, for offshore wind and tidal energy. Wave power was not included due to lack of spatial data on the industry. In particular, extensive areas are considered to be Medium Term options for future wind energy development (though no licences are currently available) and there are a number of smaller locations considered suitable for tidal developments. These have both been considered from operational and construction phases.

Oil and Gas – there are substantial areas of seabed allocated for petro-chemical prospecting and extraction throughout the UK EEZ. This assessment uses data regarding those sites under lease for the 28th round of development that include all UK waters. However, the assessment uses a precautionary approach by making the assumption that all blocks leased have equal intensity of prospecting and development.

Military and Live Exercise – a large proportion of UK territorial and offshore waters are labelled as naval exercise areas for training, drills and testing of navy ships and military hardware (sonar and ammunition). It is understood that live fire exercises are currently limited to a fewer number of these areas but can take place in all those sites labelled for exercise should the need arise. Therefore, the assessment uses a precautionary approach by making the assumption that all exercise areas have equal intensity of military sonar and live fire testing.

Maritime Traffic and Shipping - there are a range of shipping types of various intensity and size classes that occur within the areas of search. Examples of shipping types include vessel routing (AIS) of dry cargo/tanker vessels, passenger ferries and cruise ships, fishing vessels (excluding <15m) and recreational boats (RYA). Due to limited information on the specific intensity of traffic, an assessment using a subset of global intensity of cumulative vessel routing was used.

*For further information, sources and maps for the separate layers used in the following assessments of sectoral and cumulative concern, please see **Appendix I** (available as a separate digital document from WDC).*

The sensitivity matrix (Fig. 6), adapted from work developed by SNH and JNCC, shows the relationships between different features of management concern to the four groups of pressures and activities to which they are linked.

Source	Effect							
	Barrier to Movement	Rank	Disturbance	Rank	Physical Trauma	Rank	Ecosystem Effects	Rank
Seismic Survey	Moderate	3	High	5	Moderate	3	Low	1
Drilling	Low	1	Moderate	3	Low	1	Low	1
Pile Driving	High	5	High	5	High	5	Moderate	3
Wind Turbine (operational)	Moderate	3	Low	1	Low	1	Low	1
Tidal Turbine (operational)	High	5	Moderate	3	Moderate	3	Moderate	3
Ship Traffic - Large	Low	1	Low	1	Low	1	Low	1
Ship Traffic - Small	Low	1	Moderate	3	Low	1	Low	1
Ecostourism	Low	1	Moderate	3	Low	1	Low	1
Research	Low	1	Moderate	3	Low	1	Low	1
Fishing - Demersal Trawl	Low	1	High	5	Moderate	3	High	5
Fishing - Pelagic Trawl	Low	1	High	5	Moderate	3	Moderate	3
Fishing - Static Gear	Moderate	3	Low	1	Low	1	Low	1
Aquaculture	Moderate	3	Moderate	3	High	5	High	5
Active Acoustic Devices	Moderate	3	High	5	Moderate	3	Low	1
Active sonar	Moderate	3	High	5	High	5	Moderate	3
Explosion	High	5	High	5	High	5	High	5
Mean Sensitivity	Low-Moderate	40	Moderate-High	56	Low-Moderate	42	Low-Moderate	36
Min		16		16		16		16
Max		80		80		80		80
St. Dev		1.549		1.549		1.668		1.612

Grey Sources not assessed due to lack of data at UK spatial scales

Fig. 6. UK Harbour Porpoise Sensitivity Matrix compiled for named pressures with data available at a UK wide spatial resolution for assessment

These four pressure groups have been used to provide the basis for assessing sensitivity and concern. This is not an exhaustive list of potential pressures arising from activities taking place in the UK.

Additionally, no assessment was made of the potential impacting pressure or disturbance arising from the development phase of renewable energy sites, besides pile driving, as limited information regarding the planned scale of which for each development, including vessel traffic increases, was unavailable (conditions pertaining to future EIAs which may be necessary should be sought on a case study scale).

4.2 Fisheries and Aquaculture Management Options

At present, management objectives for all protected species are unclear at the EU level. While broad commitments have been made to GES under the MSFD, and to FCS under the Habitats Directive, how these objectives may be translated into bycatch reductions towards zero is as yet unspecified by the

European Union. It is to be hoped that the ongoing development of the MSFD will help address this concern (ICES WGBYC, 2013).

4.2.1 Sectoral pressure assessment

A range of fishing activities (metiers and gear types) were analysed including static gear (such as creeling and potting), demersal gear (such as demersal seine netting and beam trawling), and pelagic gears (such as otter trawling and set netting). The assessment of management options for the purpose of this report, however, will include a focus on those gear types known to represent a threat to the harbour porpoise, notably bottom set gillnets and tangle nets. Therefore, the risk sensitivity ascertained for AoCs can be considered precautionary, and highlights a need to ascertain a greater understanding of the bycatch risk to harbour porpoise in each AoC.

4.2.2 Bycatch and Entanglement

Incidental catch or bycatch is considered to be the single most important threat to porpoise (e.g. ICES, 2014). This is as a result of these fishing gears overlapping with favoured harbour porpoise habitat, including shallow inshore waters. Levels of bycatch depend on a number of factors including the type of gear used, fishing area, soak time, time of year and day and water depth as well as behaviour, habitat use and health status of the porpoises. All factors need to be considered when considering conservation risk and management options.

ICES (2014) notes that preliminary assessment of overall harbour porpoise bycatch rates in the North Sea has been carried out since 1995. This indicated that **bycatch rates of some fisheries may be above any proposed reference limits, but uncertainty is large, and there also may be biases in the choice of fisheries to monitor towards those with known higher bycatch.**

Strandings data provides vital information on cause or probable cause of death (see section 2.2.1.3). Collaborative work between bycatch (SMRU) and strandings (CSIP) projects allows for a more in depth analysis. For the reporting period 2005 to 2010, bycatch was found to be a consistent cause of death for harbour porpoise, although numbers and relative annual proportion appear to have declined slightly in recent years (Deaville and Jepson, 2010). Complementary work to obtain whole bycaught specimens for detailed analysis ashore commenced in 2012, one aim being to assess external signs of bycatch that may help improve the diagnosis of bycatch from stranded animals. Bycaught carcasses may provide additional biological material that may be more representative of the population than samples obtained purely from stranded (and potentially sick) animals (Northridge *et al.*, 2013).

4.2.2.1 Current management: Bycatch

The UK Government acknowledged the bycatch problem and published the UK Small Cetacean Bycatch Response Strategy in 2003 as a step towards finding a solution. Three approaches taken forward in Europe and the UK are the use of acoustic deterrent devices ((ADDs) or pingers) attached to nets, fishing gear modifications and area restrictions (Defra, 2003). So far, efforts have focused on the use of ADDs. **Consequently, in the UK there are limited mitigation measures in place to deal with bycatch, a key conservation issue for the harbour porpoise.**

The UK Government Strategy highlights the need for management measures for sites identified for harbour porpoise, and consideration to be given to introducing measures to restrict fisheries which have an impact on the species, whether the impact occurs inside or outside the SAC.

*European Council Regulation EC No. 812/2004 of 26 April 2004 lays down measures concerning incidental catches of cetaceans in fisheries amending Regulation EC No 88/98 (OJ L 150, 30.4.2004). This Regulation introduces measures aimed at reducing bycatch of small cetaceans in fishing nets by stipulating that Member States implement an at-sea observer scheme on various fishing fleets with vessels over 15m in length and the use of pingers on certain fleets (various bottom-set gillnets and entangling nets) with vessel over 12m. Member States are required to provide comprehensive annual reports on the above provisions (for example, Northridge *et al.*, 2014). However, this requirement has rarely been realised to date.*

ICES carried out an assessment of cetacean bycatch based on all available data including an indication of problematic fisheries and areas. Work is now proposed to determine if the level of coverage is at a sufficient resolution to allow assessment of the problem (ICES WGBYC, 2014).

*Harbour porpoise bycatch rates have been calculated from data collected annually since 2005. Estimates for 2012 from static net fisheries in the Irish Sea, Western English Channel and Celtic Shelf area (ICES divisions VIIaefghj) were 821 harbour porpoise (95% CI 510-1338), although caveats apply to this estimate (Northridge *et al.*, 2013). The 2013 UK bycatch estimate (1600-1900 porpoises) was higher than in previous years (ASCOBANS, 2014a). The UK states that this may be due to more extensive monitoring and that bycatches have been observed in some fisheries (e.g. drift nets and light gillnets for flat fish) that had not been monitored before, or at least to a reliable level (ASCOBANS, 2014a). This demonstrates our poor level of understanding of the true level of the impact of bycatch.*

4.2.2.1.1 Further management required to reduce pressure

*The introduction of this Regulation represented important progress in terms of acknowledging the threat to harbour porpoises and a need to tackle the problem. Unfortunately since its introduction significant limitations have become apparent and it is widely acknowledged that the Regulation is not fully serving its purpose and that a more flexible implementation would be more beneficial to harbour porpoise conservation (e.g. Reijnders *et al.*, 2009, ICES WGBYC, 2014).*

Determining bycatch rate estimates relies on population data. Accurate estimates of the porpoise population and abundance numbers are required for all areas in which they occur (OSPAR QSR, 2010). Given the fragmented and unclear status of this information, and that the quality of monitoring and reporting between Member States is variable, the true impact of fisheries is uncertain. Consequently, more monitoring and greater flexibility and coordination in allocating monitoring effort is required (ICES WGBYC, 2014).

Action is required to ensure that all EU Member States provide comprehensive annual reports on bycatch to the European Commission.

Measures are required to reduce bycatch pressure, with the aim of reducing bycatch to zero.

There is a need to ascertain a greater understanding of the bycatch risk to harbour porpoise in all forms of fishing gear. Bycatch monitoring should be increased to enable better targeting in the right areas and fisheries.

4.2.2.2 Current management: Marine Mammal Observer (MMO) scheme (vessels >15m)

*The monitoring of protected species bycatch in UK fisheries is funded by Defra and overseen by the Sea Mammal Research Unit (SMRU), and it is done in collaboration with the fishing industry. In particular the observer scheme relies on good collaborative links with industry, in order to back up legal obligations (Northridge *et al.*, 2013). One of the key criticisms of the observed effort to effectively evaluate harbour porpoise bycatch is that it is costly in terms of both time and resources and targeting and prioritising these resources to the right fisheries is key.*

In the UK, reporting on Regulation EC 812/2004 (fleet and observer bycatch and effort data) is presented by major gear class, ICES division and by target group. In some ICES divisions, little or no sampling is carried out for some métiers and no bycatch reported even though it may have been observed in previous years. Consequently, observations of bycatch rates have been used to generate more precise estimates of bycatch by métier.

*The UK has identified those fisheries that are thought to have the highest bycatch rates for cetaceans and has refocused a portion of observer effort into these segments e.g. the Celtic and North Sea, as this is where gillnetting is most prevalent; there is very little effort in the Irish Sea and currently none in the area to the west of Scotland (ICES block VIa). General monitoring continued in 2012 in various static net fisheries in ICES subareas IV (North Sea) and VII (Celtic sea). No sampling was achieved in VIa (West of Scotland) but monitoring levels are steadily increasing in division VIId (Eastern Channel), an area lightly covered previously (Northridge *et al.*, 2013).*

*The disparate nature of many of the UK's small vessels makes interpretation of logbooks and landing data to plan sampling levels challenging, as does extrapolating observed bycatch estimated rates to the fleet level (Northridge *et al.*, 2013). Current UK advice on setting bycatch monitoring goals is to limit the amount of sampling in any one fishery to a level that is sufficient to determine whether or not bycatch levels exceed a pre-specified threshold or reference limit. As outlined below such limits remain undefined and would need to be set at an EU level (Northridge *et al.*, 2013).*

4.2.2.2.1 Further management required to reduce pressure

UK advice on setting bycatch monitoring goals should not limit the amount of sampling in any one fishery to a level that is sufficient to determine whether or not bycatch levels exceed a pre-specified threshold or reference limit.

Most Member States, including the UK, report the unit of fishing and observer effort as 'days at sea' but this does not correspond closely to fishing effort, which would be better measured as number of hauls per day, and ideally incorporate the length of netting hauled. ICES (2014) recommends 'net metre per immersion day' as a more precise unit for reporting static gear effort and this information should be a requirement.

Alternative means of observation such as the use of Remote Electronic Monitoring (REM) have been put forward as a cost-effective part of the solution (e.g. ASCOBANS, 2013). Its wider use shall be explored through a dedicated workshop in 2015 (ASCOBANS, 2014b). In addition to the targeted deployment of MMOs, the use of REM on an adequate sample of vessels with gear types that cause bycatch combined with an agreed protocol for reporting would provide a more widespread (in terms of vessel size and area) and cost-effective means of gathering bycatch information. In order to achieve compliance, it may be necessary to offer some incentive to fishermen as has been provided in Denmark. There will also need to be consideration for how the cameras are placed so as to ensure some privacy for crew aboard vessels.

In inshore areas, the proportion of the fleet comprising smaller vessels (<12m) increases, resulting in a sector of the fleet falling below the requirements for monitoring, mitigation and regulation of cetacean bycatch. It is still possible for smaller vessels to contribute to bycatch and therefore if the UK is to tackle bycatch adequately, this needs to be addressed.

4.2.2.3 Current management: Use of acoustic deterrent devices or ‘pingers’ (vessels >12m)

The uptake and use of pingers under the Regulation has been limited (e.g. Reijnders *et al.*, 2009 and ICES WYBYC, 2014)) with concerns relating to:

- long-term effectiveness of devices to reduce bycatch;
- potential impact on harbour porpoise themselves (disturbance and access to feeding habitat);
- cost, reliability and safety aspects relevant to the industry.

WDC opposes the use of pingers as a general measure, and especially within MPAs. If pingers are to be used as a mitigation measure, this has to be considered an interim solution. Deterring or even excluding cetaceans from areas of critical habitat is not appropriate.

Further, the use of pingers also has limitations for practical and economic reasons (see below).

In 2012, the European Commission tabled a proposal to align Regulation (EC) No. 812/2004 with fisheries monitoring and management. The proposal is to allow for a revision of the technical specifications and conditions for use of pingers as defined in Annex II of the Regulation, to allow the Annex to be adapted to take account of technical and scientific progress since the regulation came into force (ICES WKBYC, 2014).

In the UK in 2012, work on pingers continued to focus on developing protocols for implementation and compliance with Regulation 812/2004. Vessels over 12m using gill or entangling nets in ICES area VII e-j (Western Channel and Celtic Shelf) and IV (North Sea; mesh size greater than 220mm) are obliged to use pingers. There is also a requirement for vessels over 12m using fleets of nets less than 400m in length to use pingers (short fleets of nets are typically shot on or near wrecks where porpoise bycatch rates in the North Sea have been relatively high) between the 1st August and 31st October (Northridge *et al.*, 2013). However, information relating to fleet lengths in official logbooks are unreliable and often difficult to interpret, so determining how many boats fit this particular description is limited, but based on the over 12m fleet size and understanding of fishing patterns in the North Sea, it is unlikely to exceed three boats (Northridge *et al.*, 2013).

*Under Annex II of the Regulation, pingers are required to be attached every 100 to 200m along each fleet. As a result of a request from industry, however, the UK trialled an alternative pinger between 2009 and 2011. It was demonstrated that bycatch rates of harbour porpoises can be reduced by up to 95% when a Dolphin Dissuasive Device (DDD)-03L pinger was deployed at each end of a fleet of nets, provided the fleet is less than 4km in length. Longer fleets (4-8km) showed no significant difference in porpoise bycatch rate when compared with unpingered fleets (Northridge *et al.*, 2013). The Commission has subsequently issued a derogation to the UK to allow the use of this device in ICES sub area IV (North Sea) and VII (Celtic Sea) (Northridge *et al.*, 2013).*

*Other work on pinger mitigation in the UK has focused on operational aspects of pinger use including the development of a new sea-going recharging unit (field tested in the Southwest of England) that should enable skippers to recharge multiple pingers (DDD-03L) simultaneously whilst at sea. Initial feedback from the industry is reported to be positive, and ongoing monitoring will allow the efficacy of the device to be monitored over time (Northridge *et al.*, 2013). There is also a need to ensure that fleets deploying pingers have these in working order and at an appropriate spacing. This requires regular monitoring.*

*Marine Scotland Compliance and Enforcement Unit have developed a protocol for assessing vessel compliance through shore side and at sea inspections. Industry has been notified that the pinger requirement will be fully implemented from summer 2013 (Northridge *et al.*, 2013). A collaborative approach involving scientists and the fishing industry has removed many of the original objections to the obligations required of parts of the UK fleet. Uptake in other areas is slower. However, collaborative research effort is underway with UK registered Spanish owned vessels fishing mainly in the North Sea to help develop an appropriate mitigation strategy (Northridge *et al.*, 2013).*

The last decade has seen some work steadily progress, predominantly covering the North Sea through the auspices of ICES and ASCOBANS (as described above). However, challenges remain, and the use of pingers by industry remains limited.

4.2.2.3.1 Further management required to reduce pressure

Where pingers are maintained, regulation should not inhibit the development of more effective devices to deter harbour porpoises and other marine mammals from fishing gear. To allow further development of pingers, ICES recommends that a performance standard should be set. For pingers to become acceptable, it should have a proven ability to reduce bycatch of the relevant species in the setting of a commercial fishery (ICES WGBYC, 2014). Until then, pingers have generally to be considered an interim measure, since the use of pingers represents another source of acoustic pollution into the marine environment. This is particularly pertinent when considering the cumulative impacts of noise pollution combined with other impacts. Full consideration should be given to the combined activities in a location, and informed decisions on where and how mitigation measures are implemented. Further reservations concerning the use of pingers include the risk of habituation, and displacement from important habitat and food sources.

Informed decision making on the most appropriate use of gear modifications (i.e. pingers) and wider management measures (e.g. closed fishing areas) in space and time is required.

Rather than focus upon limited implementation of pingers on nets to deter porpoises and other marine mammals, a better understanding of spatio-temporal patterns in porpoise abundance should be prioritised for more targeted monitoring and mitigation measures to reduce fishing impacts.

4.2.2.4 Current management: Bycatch 'Limits' and Reference Points

Linking bycatch with conservation effort has led to the development of reference limits for harbour porpoise bycatch under a number of different fora. The ASCOBANS limit (for all anthropogenic activities) of 1.7% is the most widely cited reference point for the harbour porpoise. The OSPAR North Sea Ecological Quality Objective (EcoQO) recommends the annual bycatch level of harbour porpoise is reduced to below 1.7% of best population estimate. Other reference points in the North Sea have been derived using a variety of methods including Potential Biological Removal (PBR) and Catch Limit Algorithm (CLA) methods (ICES WGBYC, 2013; ICES, 2014) and state that explicit conservation and management objectives for managing interactions between fisheries and cetacean populations should be adopted at a European level (ICES WGBYC, 2013). In 2009, ICES (OSPAR BDC 13/4/2 Add.1. Rev.1-E) advised the European Commission that the CLA method is the most appropriate one to set limits on bycatch for the harbour porpoise. There is much debate on the setting of bycatch limits and reference points. There is no doubt that uncertainty in baseline populations and in levels of impact are large. Many of the input values are poorly known, not least being how the populations are structured, and how best to incorporate cumulative effects upon reproductive rates and survivorship.

Activities of fishing fleets of other nations have the potential to impact upon cetacean populations that use UK waters. Many of these fleets operate within British fishery limits, including a number that have access to UK territorial waters between 6 and 12 miles, and pursue fisheries implicated in bycatch problems. In addition, cetaceans caught outside British Fishery limits may form part of populations that also occur in UK waters (Defra, 2003). Combined, bycatch rates in some fisheries may be above any proposed reference limits.

4.2.2.4.1 Further management required to reduce pressure

WDC believe that catch limits for harbour porpoise are inappropriate and that every effort should be made to introduce appropriate tools (both mitigation and spatial management) to reduce bycatch towards zero.

WDC does not support allowing any human caused mortality of marine mammals. Potential Biological Removal (PBR) was developed as part of the 1994 reauthorization of the U.S. Marine Mammal Protection Act (MMPA) as a measure to evaluate the extent of human induced injury and mortality which is preventing the 'species or stock' (or population) from reaching their optimal sustainable population level. Mitigation measures may then be developed with the ultimate goal of eliminating the impacts to an insignificant level (i.e. Zero Mortality Rate Goal or ZMRG). As a result, WDC is not supportive of using PBR or similar approaches such as Catch Limit Algorithm (CLA) as a formula which provides an 'acceptable' number of individuals to be removed from a population as the result of human causes.

We acknowledge that determinations must be made to examine population level impacts in order for threats to be understood, measured and reduced. It is in that spirit that WDC urges nations using either PBR or CLA to do so only as a tool to move towards a zero human induced mortality goal (WDC, 2014).

ICES (2014) recommends that a process involving managers and scientists is established to set species specific and, where relevant, population specific reference points. Also, that a bycatch risk-based approach is used to classify fisheries in terms of risk to protected species. ICES advice highlights the need for better quality data on bycatch rates and fishing effort before a more refined assessment can be made.

We recommend that the European Commission provide guidance to obtain regional and national commitment to reduce levels of harbour porpoise bycatch. An enforceable strategy that aims to ensure reductions in bycatch towards zero is required.

An enforceable strategy that aims to ensure reductions in bycatch towards zero is also required.

4.2.2.5 Additional management: Fishery Closures / Gear / Modifications / Monitoring / Incentives / Habitats Directive

The use of a suite of fisheries conservation measures could usefully be applied on a case by case basis to deliver meaningful conservation.

4.2.2.5.1 Fishery closures

The most effective method of bycatch reduction is spatio-temporal restrictions: closure of the fishery/fisheries with highest bycatch rates (based on gear types) either temporarily or permanently. It is, however, important to ensure that fishing effort and cetacean bycatch are not merely displaced elsewhere.

Fisheries management measures can include closures by time or by area, which might be triggered by a particular level of bycatch (Defra, 2003). This would include zoning or the establishment of certain percentages of a given area (i.e. SACs) where certain gear types would be excluded.

Fishery closures as a management option should be further explored to reduce bycatch.

The restriction on using bottom set gillnets or entangling nets in existing and future harbour porpoise SACs (in addition to others) and other key harbour porpoise areas, either permanently or temporarily, or as part of a zoning scheme, should be recognised as part of a suite of conservation measures.

4.2.2.5.2 Gear modifications

*Existing gear modifications include: changes in mesh size, twine thickness, deployment depth, net height and also attempts to enhance the acoustic visibility of nets either through nets with hollow cores or acoustic reflectors (Goodson *et al.*, 1994; Silber *et al.*, 1994; Koschinski and Culik, 1997, in Evans and Hintner, 2013). Nets impregnated with a metal compound such as iron oxide or barium sulphate, so called high-density nets, are also being researched (Larsen *et al.*, 2002; Mooney *et al.*, 2003; Trippel *et al.*, 2003). These modifications to nets have a number of advantages relative to pingers i.e. no*

habituation by porpoises, no noise pollution, and no need for an energy source. However, the results of latest experiments have not been promising (e.g. Northridge *et al.*, 2003; Bordino *et al.*, 2013).

Conversion to alternative gears (substitution and modification) should be encouraged, accompanied by adequate studies to assess practicability and effectiveness from both nature conservation and fisheries perspectives. Incentives such as the European Marine Fisheries Fund are likely to be needed for conversion to alternative gears, as is open and meaningful stakeholder dialogue.

4.2.2.5.3 Monitoring

A number of alternative means of collecting data and assisting mitigation of bycatch include: the use of REM, accreditation schemes such as the Marine Stewardship Council (although the MSC is not without its shortcomings), the use of external platforms either land or sea based (relevant to small vessels), interviewing fisheries stakeholders, the use of voluntary logbooks and a compulsory reporting scheme, use of strandings data, and the monitoring of local populations (ICES WGBYC, 2014).

In addition, reports from stranding studies by CSIP show a distinct increasing trend in the annual proportion of stranded harbour porpoise diagnosed to have died from starvation (Deaville and Jepson, 2010). Sandeel abundance in waters around Scotland has been tentatively linked to starvation cases in stranded harbour porpoises and to the potential effects of climate change, albeit with a very small sample size (MacLeod *et al.*, 2007). However, quantifying competition by simply comparing predator consumption and fisheries catches is likely to be misleading. Furthermore, in the case of highly mobile prey, competition between marine mammals and fisheries does not necessarily require spatial overlap between them (Evans and Hintner, 2013). Understanding ecosystem effects between fisheries interactions and the harbour porpoise is far from clear, and will require ongoing dedicated research in order to provide meaningful insight.

4.2.2.5.4 Incentives

Of relevance to harbour porpoise spatial conservation, the use of incentives for more environmentally friendly fisheries and the use of emergency measures in the event of a serious threat requiring immediate action, still apply.

In order to build on CFP progress the Government must capitalise on the advances made through the CFP reform, creating a legal framework to promote a truly sustainable fishing industry, promoting incentives for the most environmentally friendly fishing activities and working with fisheries to minimise bycatch in hotspot areas. It should also continue to invest in data gathering on fishing activity and fish stocks to ensure appropriate quota and fish stock management (Wildlife and Countryside Link, 2013).

Although not without their shortcomings, the development of certification schemes to enhance the commercial value of fish caught, using techniques that avoid harbour porpoise bycatch (e.g. Reijnders *et al.*, 2009), could be beneficial to the fisheries e.g. MSC Certification. The ASCOBANS North Sea harbour porpoise Conservation Plan (2009) recommended developing new fishing gear/ and or practices that are less likely to result in harbour porpoise bycatch. European funding streams such as LIFE and the Fisheries Funding Scheme represent useful financial mechanisms for the development and delivery of fisheries management including gear modification and incentivisation schemes. Additionally,

the European Maritime and Fisheries Fund (EMFF) provides an opportunity to fund projects testing alternative gear.

4.2.2.5.5 Habitats Directive

Given the lack of SACs for harbour porpoise and lack of data on levels of bycatch in this region, there is currently no precedent for how fishery activities shown to impact harbour porpoise conservation will be managed.

The UK and devolved governments should address the outstanding issue of uncertainty in relation to fisheries management and urge the EU to provide clarification on fisheries management for marine mammals within SACs.

Management measures to restrict fisheries which have an impact on the species, whether the impact occurs inside or outside the SAC, should be considered in relation to future SACs.

Further, the management of fisheries activities should extend beyond SACs and be applied to EPS more widely.

It is essential that Member States continue to work to better implement Article 6 of the Habitats Directive with respect to fisheries so as to prevent risk of infraction proceedings. In order to assist this process, the Commission must provide clear and conclusive guidance in relation to questions that are being raised by Member States.

Additional guidance on how Article 12 of the Habitats Directive should be implemented across all European waters (i.e. not just in SACs) in respect to the disturbance caused by fisheries activities on cetaceans is also required.

4.2.3 Aquaculture Management Options

Scotland is the largest producer of farmed Atlantic salmon in the EU. Under the Scottish Planning Policy (2014)²¹ there is a presumption against the licensing of fish farms in some inshore areas. This non-statutory exclusion, put forward to safeguard migratory fish species, covers the north and east coasts of Scotland, with a Scottish aquaculture zone covering the West Coast, Outer Hebrides, Orkney and Shetland.

Application for fish farm installations in Scotland fall under terrestrial planning under the Town and Country Planning Act (1990) and for navigation purposes a marine licence is issued by Marine Scotland. On the advice of SNH, as required by Marine Scotland, licensed activities are assessed for their impact on protected features through the EIA process. If it is determined that an activity will not have a significant effect on a protected feature, then no further assessment beyond the scoping report is

²¹ <http://www.scotland.gov.uk/Resource/0045/00453827.pdf>

required. If this cannot be determined then the potential impacts on the protected feature and on the conservation objectives are assessed (JNCC, 2014).

The Aquaculture and Fisheries (Scotland) Act 2013 stipulates minimum technical standards for fish farm equipment, the aim of which is to ensure that facilities and equipment are fit for purpose.

Aquaculture regulation in England and Wales falls under the Marine and Coastal Access Act 2009. In addition to a lease from the Crown Estate, all fish farming activities in marine waters around England and Wales may also require a marine licence from the Marine Management Organisation (MMO) in England, and the Welsh Government (WG) in Wales.

4.2.3.1 Current management: Acoustic Deterrent Devices (ADDs)

ADDs are frequently used in fish farms to prevent seals from damaging pens leading to fish escaping or being damaged or removed, rather than more benign and robust solutions such as tension nets.

Direct impacts to harbour porpoise relating to aquaculture include the use of commercially available ADDs that can cause injury, stress, hearing damage and behavioural disturbance (displacement) (Lepper *et al.*, 2014), i.e. to deter non-target species such as porpoises from their natural habitat; and entanglement in anti-predator nets. Modelling of the exposure time to exceed injury criteria for seals and porpoises at given ranges from active ADDs suggest that there is a credible risk of exceeding injury criteria for both seals and porpoises (Lepper *et al.*, 2014).

Northridge *et al.* (2010) noted that acoustic signals from ADDs can be detected at more than 14km from the sound source. However, acoustic propagation losses are site specific and quite variable, and it appears that porpoises can become desensitized or accustomed to ADDs over time (e.g. porpoises appeared to avoid one area where ADDs had recently been installed, but to be less averse to other areas where ADDs had been used for several years). This may be influenced by environmental factors such as the situation of a fish farm in a preferred habitat, i.e. habitat modelling links porpoise distribution most closely to water depth and seabed slope. In addition, the authors noted that it is possible that fish farm sites are in fact attractive to wild porpoises in that they are thought to aggregate wild fish species. The extent to which this degree of exclusion may have significant effects on the foraging success or the conservation status of porpoises remains a question to be answered. Consequently, these risks are increased where fish farms are located in harbour porpoise AoC.

Current commercially available ADDs emit sound at high duty cycles and high source levels, and long-term and large-scale habitat exclusion has been found for odontocetes around operating ADDs at relatively low received levels (e.g. Morton and Symonds 2002; Olesiuk *et al.*, 2002). More recently, research studies (Janik and Gotz, 2013) have utilised a startle ADD prototype²² showing that this was successful at preventing seal predation without affecting the distribution of harbour porpoises in the area. The advantage of these devices is they can be tuned to affect only certain species in the

²² Sounds produced by current ADDs are not based on biological concepts of aversiveness, but aim to transmit loud sound to the target animal, whereas the startle ADD prototype uses an autonomous, acoustic startle reflex (ASR) to induce controlled and sustained flight responses.

environment, and they have significantly less impact on wildlife than other tested devices. The fact that brief, isolated pulses were emitted at only moderate levels means that noise pollution was greatly reduced, and the potential for masking of communication signals or hearing damage is low. Janik and Gotz (2013) recommended the use of this novel technology at fish farms.

Under the Nature Conservation (Scotland) Act of 2004, and under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland), ADDs may be deemed to represent a deliberate or reckless disturbance of cetaceans and could constitute an offence.

To reduce the risk of predator attacks to fish stocks, e.g. seal attacks, recommendations are to use modern tensioned nets for pen construction, where appropriate and effective, plus additional netting or screening systems where they are effective.

In some parts of Scotland, current types of ADD are 'not permitted' as a condition on planning consent because of their potential disturbance to cetaceans. In these areas, farmers are recommended to keep a watching brief on ADD development, and to seek to have the planning condition lifted if an appropriate ADD comes onto the market (Code of Good Practice Management Group, 2010).

The use of ADD in fish farm installations is discretionary, and there is currently no intention by the Scottish government to license them (Letter from Minister, 2013). As outlined above, current AAD represent a potential risk to harbour porpoise conservation, primarily in terms of a potential barrier to movement/exclusion from preferred habitat but they can also cause injury.

4.2.3.1.1 Further management required to reduce pressure

The siting of aquaculture facilities away from important sites for seals and harbour porpoises would reduce local impacts and associated requirement for other management measures.

There should be a presumption against the use of ADDs in favour of more robust and benign solutions. However, should ADDs be maintained, there should be strict adherence to the Code of Conduct for the Good Practice of Aquaculture (fin fish).

*There is the potential for disturbance to EPS so licensing of ADDs should occur, including where the presence of ADD may cause a barrier to passage, e.g. around straits, sounds and embayments, or in favoured porpoise feeding habitat e.g. headlands and tidal upwellings (Northridge *et al.*, 2010).*

*Clear, transparent and precautionary guidance around the use of ADDs should be produced by SNCBs, including in circumstances where ADDs could be used / not used, and if used, what conditions are needed. Monitoring effectiveness and impact should be a condition for use of ADDs. Where ADDs are used, Northridge *et al.* (2010) recommend AAD units be well maintained to ensure the effective operation of all ADDs and to prevent a situation whereby the site is compromised. However, overall acoustic output could continue to have a disruptive effect on porpoise movements.*

Planning for aquaculture facilities is the responsibility of Local Councils; given variation in the level of information and experience that Local Authorities may have in relation to the siting of facilities and

information on harbour porpoise critical habitat/ hotspots, there is an opportunity for better stakeholder engagement. Clarity on the use of mitigation measures and licensing conditions is essential, to ensure consistent case by case assessment of facilities, particularly if they are sited in harbour porpoise hotspots.

Ongoing collaborative research and dissemination between the scientific community, government, NGOs and industry is recommended to:

- (i) develop a coherent, transparent and precautionary Agencies policy;*
- (ii) develop (to a commercial status) promising novel non-acoustic technologies, as a reliable and effective means of reducing acoustic disturbance and associated impacts to porpoise;*
- (iii) to better understand the full range of impacts of ADDs used at aquaculture facilities, and use this knowledge to introduce appropriate and effective mitigation to minimise risk to harbour porpoise; and,*
- (iv) to establish the extent of ADD use at fish farms to help inform management and policy.*

There is a need for clear aquaculture policy guidance from SNCBs.

Licensing would provide a useful mechanism to oversee and assess the appropriate use of such devices in harbour porpoise AoC, and allow wider monitoring into their effectiveness for deterrence of seals as well as impacts on harbour porpoise.

4.2.3.2 Current management: Anti-Predator Devices and entanglement

Entanglement of harbour porpoise in anti-predator perimeter nets has been reported (Code of Good Practice for Scottish Finfish Aquaculture, 2011). Given the negative impacts to wildlife and industry, these devices have not been pursued under the Aquaculture and Fisheries (Scotland) Act 2013. Since a number of additional anti-predator net options exist that appear to have little risk of cetacean entanglement, this aspect of risk to harbour porpoise from fish farming is not considered to be a major one.

4.2.3.2.1 Further management required to reduce pressure

Given that anti-predator nets appear to have little risk of cetacean entanglement, and can be effective at preventing seals getting access to fish contained within cages, policy guidance should consider the use of anti-predator nets over ADDs.

The mandatory use of anti-predator devices, such as tensioned nets and seal blinds, is a preferred method of reducing seal predation that would not have an acoustic displacement impact on harbour porpoise and other wildlife. Where aquaculture activities also lead to measures to manage seal predation, strict licensing is required to oversee and assess the appropriate use of such measures in harbour porpoise AoC and to ensure wider monitoring into the effectiveness for seal deterrence as well as impacts on harbour porpoise.

4.2.4 Cumulative assessment of Fisheries and Aquaculture Pressure

To enable the cumulative assessment of sensitivity concerns to combined pressures resulting from fisheries and aquaculture activities (Fig. 7), this section primarily focuses on thematic information layers available which could assess pressures from trauma (e.g. bycatch) and ecosystem effects (i.e. acoustic pollution is considered under other sectors such as energy exploration and development). However, the assessment and interpretation of cumulative concern of potential effects from fishing and aquaculture, within and between sectors, remains a key consideration and challenge.

For the purpose of this report, sensitivity to pressures associated with fisheries activity was shown to relate to all three main ones, that is, (i) trauma through entanglement or bycatch resulting in injury or mortality; (ii) disturbance of critical behaviour due to physical interaction and/or low level short range acoustic pollution; and (iii) ecosystem effects due to the physical damage of habitat or through unsustainable prey depletion.

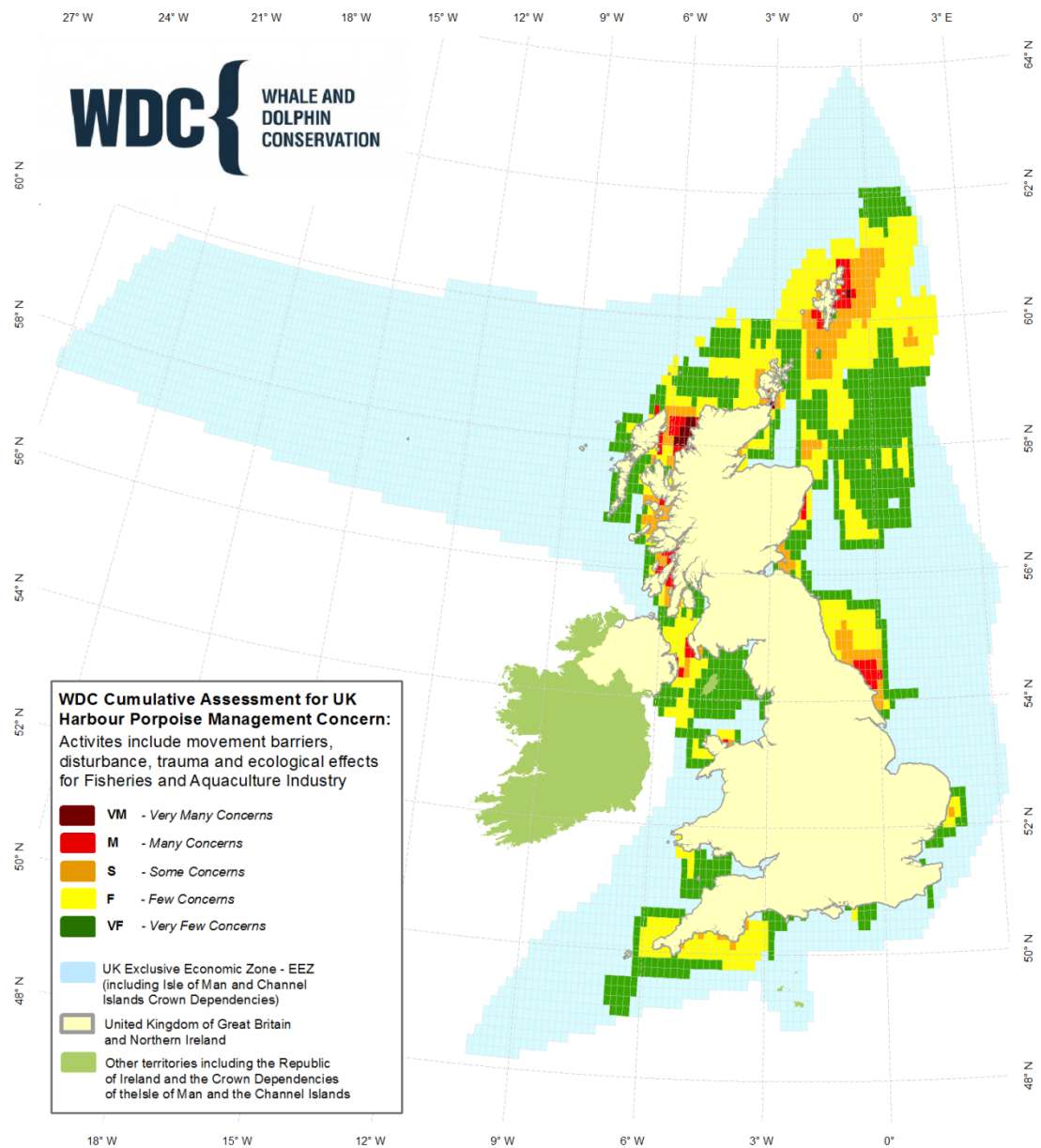


Fig. 7. WDC cumulative assessment for UK harbour porpoise and fisheries and aquaculture management

4.3 Marine Renewable Energy Development Management Options

4.3.1 Sectoral pressure assessment

4.3.1.1 Current management: Wind Turbines and Tidal Stream Power

The marine renewable energy technologies considered are wind turbines and tidal stream power. The former has experienced rapid development in Europe, and England has the largest number of operational sites with 15 sites covering 350 km² (James, 2013). The largest offshore wind farms are in the concept and early planning stages in the North Sea, off England; five sites each cover 4,075 km²; Dogger Bank Tranche C and D each cover 5,162 km² and a further three each cover 4,075 km²; two of the Dogger Bank sites (A and D) are located in the Dogger Bank Licensing Round 3 zone, which overlaps with the UK Dogger Bank SAC and adjoins Dutch and German Dogger Banks SAC sites (James, 2013). This SAC is designated for sandbank habitat in all three countries and for harbour porpoise in the Netherlands and Germany (WDC, 2013). The licensing of this installation illustrates the size and scales of new developments.

Tidal stream power utilises submerged turbines and hydrofoil devices, and represents a relatively new technology. The device foundations can be pile mounted, gravity based or floating. Their development has been concentrated in Europe, particularly in Scotland, with 15 in various stages of development (James, 2013).

Rounds 1 and 2 of development for marine wind power cover England and Wales. Round 3, released in 2010, and for Scottish Territorial Waters launched in 2008, covers the whole of the UK. In Northern Ireland, a 2012 leasing round is now underway. The UK SEA on marine wind, oil and gas licensing and carbon sequestration went out to comment in 2009. In 2013, the Scottish Government set out its consultation draft for sectoral marine plans for offshore wind, wave and tidal energy in Scottish waters, with the view that the final Draft plans are adopted in early 2014. In early 2014, the Crown Estate published a technical report outlining wave and tidal EIA/HRA issues and research priorities, and it is intended that the outputs will guide future research and assist with resolving priority EIA/HRA issues relevant to wave and tidal stream arrays. Key issues relevant to the harbour porpoise that were identified are underwater noise, collision risk, entanglement and entrapment, barrier to movement, displacement, baseline data issues and predator-prey relationships resulting from changes in hydrographic properties.

James (2013) highlights that the impact assessment process is currently based on limited knowledge of both cetacean populations and impacts of renewable energy developments on the marine environment. Consequently, developments are being consented in areas that are critical for cetaceans without adequate consideration being given to the potential wider and longer term impacts. Appropriate research on harbour porpoise critical habitat and populations and impacts of renewable energy developments will allow a more open and reliable decision making process, ruling out key harbour porpoise hotspots and allow the relevant mitigation measures to be identified (James, 2013).

In England and Wales, the MMO is the responsible authority for marine renewable energy projects. Guidance from the MMO is available, and exceptions to its licensing power include 'nationally significant

infrastructures' which includes renewable energy developments over 100MW. Projects over this level are the responsibility of the Planning Inspectorate reporting to the Secretary of State for Energy and Climate Change (James, 2013).

The planning and licensing process in England follows a pre-application or scoping phase of baseline survey with optional consultation at the discretion of the developer. This forms the basis of the EIA or HRA. The Planning Inspectorate is responsible for the three-month examination phase, before submitting their report to the Secretary of State to approve the licence. Licence conditions are then overseen by the SNCBs. In England and Wales, assessment of the harbour porpoise is considered at a population level, and consequently, assessing site-specific impacts against for example the North Sea wide population has limitations. This is also an issue for small scale projects such as tidal and wave projects where establishing precise baseline abundance data at a local level is difficult. The importance of baseline and scoping data for decision-making cannot be underestimated.

On the advice of the SNCBs as required by the MMO and Marine Scotland, licensed activities are assessed for their impact on protected features in an MPA through the EIA process. If it is determined that an activity will not have a significant effect on a protected feature, then no further assessment beyond the scoping report is required. If this cannot be determined, then the potential impacts on the protected feature and on the conservation objectives are assessed (JNCC, 2014).

SNH advice with respect to consent for wind farm development is that an appropriate, detailed and agreed Environmental Mitigation and Monitoring Plan is put in place to minimise any potential impacts. During construction, SNH recommends a sufficiently detailed Construction Method Statement to illustrate the methods that can be used to avoid or, at least, reduce disturbance during construction. SNH consider that if appropriate mitigation measures are undertaken, then the proposal shall not adversely affect the Favourable Conservation Status (FCS) of relevant species (Marine Scotland, 2011). It is becoming increasingly common for mitigation measures to be secured only after consent has been given, which can be problematic.

*The impacts for wind and tidal are varied and have been reviewed in detail elsewhere (Carter *et al.*, 2008; Evans, 2008; Dolman and Simmonds, 2010; ICES WGMME, 2011; James, 2013). The severity of negative impacts of the deployment of renewable energy devices on porpoises is likely to vary depending on the type of device and foundation, the location/habitat, oceanography including topography, the water depth and stratification, type of seabed, species found in the region, value of the site for that species, and the opportunity to move away (James, 2013). Additional risks to harbour porpoise from construction and operation phases include disturbance, acoustic pollution and potential collision from boat traffic. Noise pollution represents an issue at all stages of marine renewable energy projects, but particularly during the construction phase (Brandt *et al.*, 2011; Carstensen *et al.*, 2006; Thomsen *et al.*, 2006).*

However, installation with pile driving associated with the fixing of the foundation structure is of particular concern. With pile driving for individual structures taking several hours or days, often involving thousands of strikes and the likely development of large and potentially adjacent sites being installed over many years, the impact of acoustic pollution in time and space is potentially great (James, 2013). The auditory sensitivity of harbour porpoise to pile driving noise has been demonstrated (Lucke

et al., 2009). In Germany, there is consensus that Temporary Threshold Shifts (TTS), representing potentially recoverable auditory damage, is categorised as injury in legal terms, and developers are required to apply mitigations to specific thresholds and distances from structures (James, 2013) i.e. source levels shall not exceed 160db re 1µPa at a distance of 750m from the sound source (BMUB, 2014).

The use of ADDs has been suggested as a method to minimise injury from pile driving. However, in their current form this introduces an additional noise source into the environment, and effectiveness remains unproven due to the early stage of development of these devices (Dolman and Simmonds, 2010). The startle (ADD) method has been put forward as a potentially useful aid to temporarily deter cetaceans from marine construction sites, and further application could involve guiding marine mammals around tidal turbines to mitigate collision risk or deterring porpoises from gillnets more reliably than can be achieved with current pingers (Janik and Gotz, 2013). Research suggests a means to design startle sounds specifically for dolphins and porpoises. However, further tests to see whether dolphins and porpoises sensitize in the same way as seals are still needed. If they do, the startle method can be used to deter only seals, only dolphins and porpoises, or all of these taxa (Janik and Gotz, 2013).

Collisions are a primary concern with tidal energy (Carter *et al.*, 2008; Evans, 2008; Dolman and Simmonds, 2010). A potential conflict exists as preferred sites are usually restricted passages especially between islands and the mainland, or around headlands and harbours, sites also often favoured by harbour porpoise (James, 2013). A review of tidal stream energy device impacts (construction and operation) on marine mammals, including a series of recommendations was part of the Terms of Reference (ToR) for the ICES Working Group on Marine Mammal Ecology in 2011. Recommendations included monitoring, principally focusing at a population level, to inform at a European level and the need for an appropriate precautionary management framework (for all offshore technologies); research to better understand close range interactions; noise quantification for device perception (and hence potential for disturbance); site choice; and recognition of the challenge of decision making in relation to scaling up to arrays (ICES WGMME, 2011).

JNCC has published 'best practice' guidelines relating to a number of offshore licensed activities, including pile driving (using visual and sometimes acoustic monitoring) (JNCC, 2010). One major flaw of this guidance is that it only deals with injury and not with disturbance. Requirement for shut down only applies during the 'ramp up' phase, making the assumption that porpoises and other species will move away once piling has properly commenced. MMOs can only be used in daylight hours and in good sea conditions.

4.3.1.1.1 Further management required to reduce pressure

A full list of detailed recommendations are made in the WDC report '*Marine Renewable Energy: A Global Review of the Extent of Marine Renewable Energy Developments, the Developing Technologies and Possible Conservation Implications for Cetaceans*' by James (2013).

Given the scale of proposed development of offshore wind farms in the next decade or so, it is difficult to see how porpoises will be afforded 'strict' protection with the level of cumulative impact from all

construction using piling. Levels of disturbance are not being assessed at appropriate population levels, as Management Units are probably too large. We do not know enough about how porpoises use different areas at different times so it is not possible to assess impact at a meta-population level.

The timescales for large developments mean that construction impacts will occur over several porpoise generations. ASCOBANS (2006) calls for action covering further research and covering siting developments, SEA and mitigation.

Only tested and effective mitigation measures should be relied upon in licensing conditions to protect harbour porpoise, and appropriate enforcement should be put in place to ensure licence conditions and mitigation measures are adequately adhered to.

Wind

Renewable developments should be appropriately sited, away from areas critical for the harbour porpoise to avoid or reduce potentially significant disturbance, and until the impacts of renewable developments can be fully assessed and mitigated.

Where developments and/or operations currently exist, a stringent set of transparent mitigation measures should be committed to, with appropriate levels of monitoring, before consent is given.

Effective methods of reducing noise created during pile driving are in use in other countries such as Germany, for example, the use of bubble curtains, piling sleeves, hydro sound dampers, coffer dams and soft starts (BMUB, 2014). Industry and government commitment and funding to prioritise mitigation methods include the development of alternative foundation types, and continued monitoring and development of these techniques should be encouraged. However, in the long term, given that pile driving is a key area of concern, it is important that alternative foundation types are developed, and in a cost efficient manner.

The UK, Welsh and Scottish governments should take steps to prioritise effort at reducing noise during construction; including mitigation methods relating to pile driving and the development of alternative foundation types, taking into consideration the developments taking place in Germany.

Strategic investment in alternative techniques relating to pile driving is urgently required. Greater emphasis and consideration should be applied to noise pollution from marine renewable energy constructions.

The renewables industry is developing quickly. JNCC advice on minimising risk of injury and disturbance to marine mammals from noise producing activities (including pile driving) is inadequate to effectively manage disturbance and should be reviewed and updated, to include robust guidance on cumulative issues.

Tidal

Collision and encounter prediction models used in assessments need to be ground-truthed in two ways. Firstly, effective near field monitoring techniques are required to record collision rates accurately; developments should be phased, and phases should not be progressed until collisions are ruled out.

For coastal developments, strandings data and research should continue to be a priority in order to better detail potential causes of death and therefore link to renewables devices, and serve as a reference point from which any increase in mortality from this source can be monitored and understood. Dedicated strandings monitoring should be required in the vicinity of developments, until collisions can be discounted.

Investigation of the impacts of displacement of porpoises from high energy areas that are used as important foraging grounds is required.

4.3.2 Cumulative assessment of Marine Renewable Energy Pressure

To enable the cumulative assessment of sensitivity concerns to combined pressures resulting from Renewable Energy activities (Fig. 8), this section primarily focuses on thematic information layers available which could assess pressures from barriers to movement (e.g. installations) and disturbance (i.e. from both operational and developments phases including pile driving). However, the assessment and interpretation of cumulative concern of potential effects from renewable developments, within and between the different renewable sectors, remains a key consideration and challenge.

For the purpose of this report the cumulative assessment of concern for harbour porpoise sensitivities, to combined pressures resulting from marine renewable energy activities (Fig. 8; section 3.1.2), covers three main pressures: (i) barrier to movement; (ii) trauma due to possible physical interaction and acoustic sources; and (iii) disturbance of critical behaviour due to acoustic pollution.

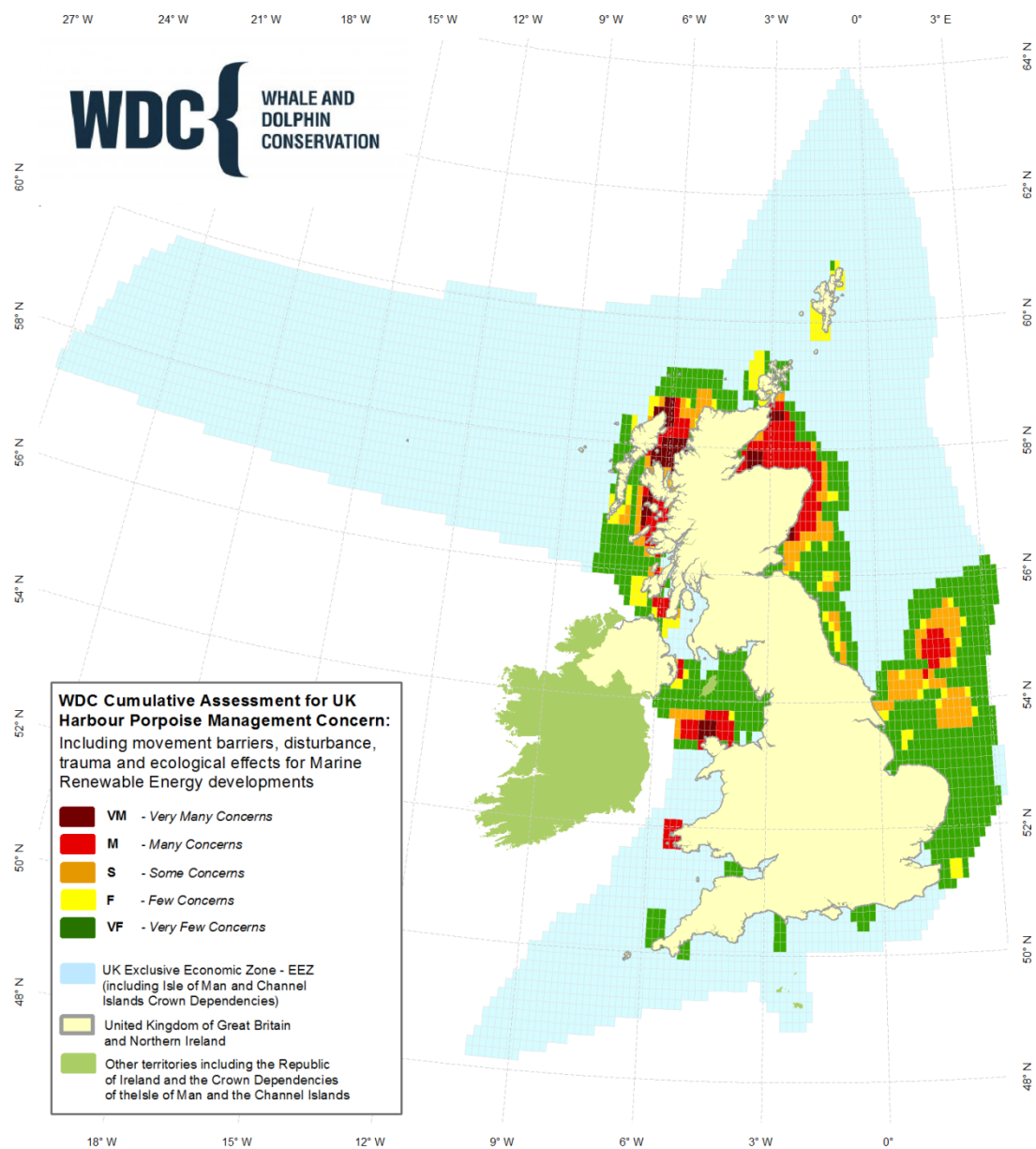


Fig. 8. Preliminary WDC cumulative assessment for UK harbour porpoise and marine renewable energy management

4.4 Offshore Oil and Gas Development, Operation and Decommissioning Management Options

4.4.1 Sectoral pressure assessment

4.4.1.1 Current management: Exploration and Production

Oil and gas reserves are vested with the Crown. However, development as a non-devolved activity is the responsibility of the UK government (formerly Department of Trade and Industry and currently the Department of Energy and Climate Change (DECC)) who oversees the licensing of blocks around the UK.

Oil and gas activities around the UK have been underway for decades. As licensing rounds moved inshore in the 1980s, lack of environmental regulation became apparent. This led to the introduction of the Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001 (as amended) and Strategic Environmental Assessment (SEA) from 2001. SEAs produced by the Department of Energy and Climate Change (DECC) are available online²³. However, Green and Simmonds (2008) highlight that, despite significant data gaps associated with SEA, licensing went ahead with very little regard to existing SACs. In 2008, as part of the 25th licensing round, blocks adjacent to bottlenose dolphin SACs in Cardigan Bay and the Moray Firth were put forward. As a result of lobbying from environmental NGOs the granting of these licences was initially delayed as further SEA work was conducted. Interest in Cardigan Bay has since dwindled (and been excluded from further licensing at present), but in the Moray Firth there has been continued licensing on the boundary of the Moray Firth bottlenose dolphin SAC for oil and gas exploration.

*These activities have had a largely undocumented and unrecognised effect on marine ecosystems and the cumulative activities over the lifetime of a block are difficult to evaluate, and rarely considered (Green and Simmonds, 2008). There are only a few studies that have investigated the impacts of oil and gas exploration on harbour porpoises (for example, Pirotta *et al.*, 2014). Using data collected on-board seismic ships, Stone (2003) found that porpoises showed a strong avoidance response during shooting and remained further away from the source. The primary concern relating to noise pollution takes place at the exploration phase when seismic testing is carried out to ascertain the level of reserves. Oil and gas exploration increases underwater noise levels and disturbance in an area, and may disrupt the foraging and social behaviour of porpoises.*

In conducting the SEA process, DECC is guided by the SEA Steering Committee Group composed of departmental representatives, conservation and other agencies, NGOS, industry representative and independent experts. The role of this group is to act as technical peers and guide the selection of SEA methods and identify the right information sources.

Licensing of oil and gas activities lacks rigour, with limited mitigation (Green and Simmonds, 2008). In 1995, JNCC developed guidelines to minimise injury from seismic sources; these were updated in 2010 (JNCC, 2010). These were the first national guidelines to be developed and have, subsequently, in

²³ <https://www.gov.uk/offshore-energy-strategic-environmental-assessment-sea-an-overview-of-the-sea-process>

various forms become one of the standards globally. Despite the revision of JNCC guidelines, protection is not adequate, including from disturbance, for harbour porpoises and other marine mammals. Dolman and Weir (2008) and Parsons *et al.* (2009) give an in depth review of these inadequacies. Key issues relate to data gaps, shut-down of source only during ramp-up phase, and a need for broader measures to ensure appropriate species protection. Studies conducted at 22 sites in northeast Scotland in 2011 in the vicinity of airgun survey showed that porpoises changed their behaviour during exposure to the noise by reducing their buzzing activity by 15%, compared with that detected before the start of the survey (Pirrotta *et al.*, 2014). The authors suggest that noise impact assessments should investigate subtle behavioural changes affecting porpoise prey capture and social behaviours. Porpoises use energy rapidly and need to feed regularly. Any reduction in feeding rates could potentially lower their survival or reproductive rates, with long-term consequences for porpoise populations (Pirrotta *et al.*, 2014).

4.4.1.1.1 Future management required to reduce pressure

The simplest way to mitigate the effects of seismic survey and other high intensity noise sources is to avoid animals in space and time (Agardy *et al.*, 2007; Dolman, 2007; Parson *et al.*, 2009). This necessitates the importance of up to date distribution and abundance data.

The level of SEA for marine oil and gas activities has at best been patchy. Interestingly, the level of detail required for AA in the marine environment is less than that required of the terrestrial environment, for example in the latter site specific survey data are always required (Green, 2000). The standard and rigour of SEA and EIA should be improved, and any uncertainties in data relating to the marine environment acknowledged, with appropriate use of the precautionary principle.

A key criticism has been evidence gaps and the minimal attention rectifying data gaps. Public funds should be applied, with contributions from industry, to fill data gaps (as occurred within the vicinity of the Moray Firth bottlenose dolphin SAC).

Terrestrial windfarm developments are routinely required to undertake surveys for all European protected species that may be present on site. These surveys are usually required to last at least 12 months and must be undertaken to the highest level of guidance in survey quality. For offshore developments this is not such a routinely applied requirement and many developments have submitted environmental statements based on existing data, sometimes at an inappropriate scale or level of detail. For example, the recently submitted Environmental Statement (ES) for a proposed tidal lagoon in Swansea Bay quoted extensive surveys carried out for an adjacent windfarm but contained no information on the use of the proposed lagoon itself (Mick Green, personal observation). There should be a requirement for developers to collect baseline and impact data.

Best practice for minimising impacts from seismic surveys are provided (Dolman and Weir, 2008; Nowacek *et al.*, 2013). JNCC advice on minimising risk of injury and disturbance to marine mammals from noise producing activities (including seismic surveys) is inadequate to effectively manage disturbance and should be reviewed and updated, including a robust assessment of cumulative impacts.

Governments should encourage and support the development and use of quieter and more benign alternative technologies, such as Marine Vibroseis (Weilgart, 2010).

4.4.1.2 Current management: Decommissioning impacts - the use of explosives

Current UK legislation (Petroleum Act 1998) calls for the complete removal of offshore oil and gas industry structures once production has finished to leave a clear, unimpeded seabed (Nedwell *et al.*, 2001). For this reason, when wellheads are decommissioned, the upper part of the wellhead is explosively cut and recovered to the surface.

The use of underwater explosives prompts concerns about the effects of injury resulting from detonations. Explosions have a fast rise time and can kill marine mammals. JNCC has produced guidance on explosive use, including the use of MMOs, acoustic monitoring and ADDs (JNCC, 2010).

4.4.1.2.1 Future management required to reduce pressure

Clearly it would be preferable not to detonate explosives during periods when harbour porpoises are within ranges at which they might be injured, either through the noise or the shock wave produced by the explosion. Only a dedicated programme of both visual and passive acoustic monitoring for a suitable radius around the source will ensure that the impact zone is free from porpoises and so JNCC guidance (although currently inadequate) should be applied during explosive use at all times.

JNCC advice on minimising risk of injury and disturbance to marine mammals from noise producing activities (including explosives) is inadequate to effectively manage disturbance and should be reviewed and updated, including robust assessment of cumulative impacts.

Further, technologies to avoid open in-water explosions as well as safe transportation of underwater ordnance onto land, are under development and should be taken into consideration²⁴.

4.4.2 Cumulative assessment of Oil and Gas Activities Pressure

To enable the cumulative assessment of sensitivity concerns to combined pressures resulting from Oil and Gas activities (Fig. 9), this section primarily focuses on thematic information layers available which could assess pressures from disturbance and trauma (i.e. from seismic surveys) and ecosystem effects (e.g. drilling and seabed disruption). However, the assessment and interpretation of cumulative concern of potential effects from Oil and Gas activities, within and between the different sectors, remains a key consideration and challenge.

For the purpose of this report, the cumulative assessment of concern for harbour porpoise sensitivities to combined pressures resulting from oil and gas activities (Fig. 9), the analysis covered pressures including (i) trauma resulting from injury or mortality, (ii) disturbance of critical behaviour due to interaction by physical and acoustic pollution, and (ii) ecosystem effects due to physical damage of habitat or through inadvertent prey depletion.

²⁴ <http://schleswig-holstein.nabu.de/themen/meeresschutz/miremar/>

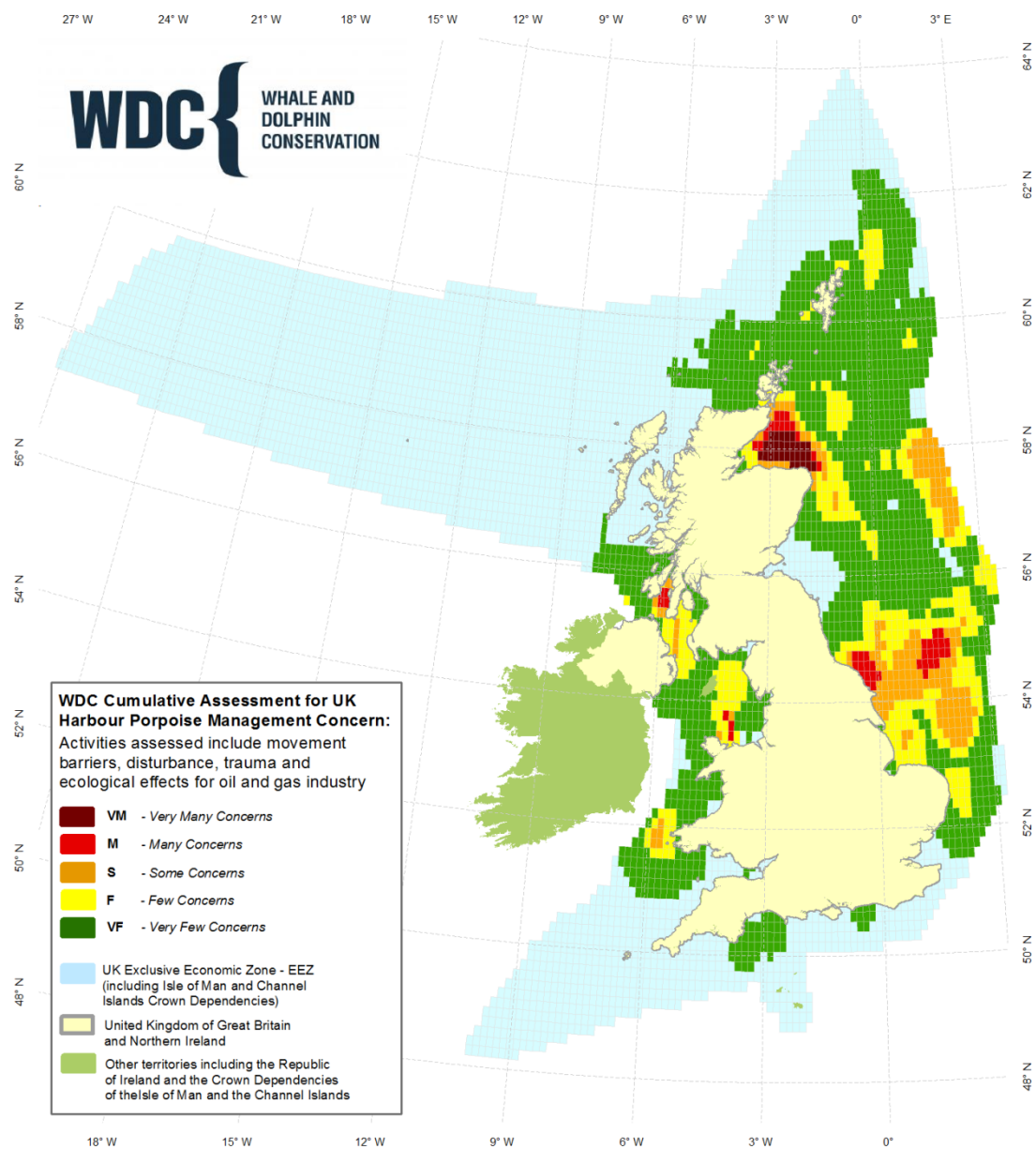


Fig. 9. Preliminary WDC cumulative assessment for UK harbour porpoise and management of oil and gas activities

4.5 Military and Live Exercise Activity Management Options

4.5.1 Sectoral pressure assessment

Navies self-regulate their impacts and set their own management and mitigation strategies. The UK Ministry of Defence (MoD) and SNCBs have signed a Statement of Intent regarding the use and maintenance of the Environmental Protection Guidelines (Maritime) (EPG(M)) and Maritime Environmental and Sustainability Assessment Tool (MESAT). As part of its Marine Environment and Sustainability Assessment Tool (MESAT), the Royal Navy has produced advice on the suitability of military activities in the vicinity of MPAs across the UK's marine area. The advice is available through an interactive military layer used on electronic charts, which provides guidance on the management of activities and controls restrictions applicable to those activities in order to safeguard the environmental status of MPAs on a site by site basis (JNCC, 2014).

4.5.1.1 Further management required to reduce pressure

Recent reviews of mitigation measures to minimise impacts of military activities (Dolman *et al.*, 2009) have been critical of the standard methods (which tend to rely on visual observers) as being inadequate, concluding that they cannot prevent cetaceans from being affected by sound. Increasing scientific evidence demonstrates that the ranges required for successful mitigation based on safety zones are usually larger than is feasible to monitor with current real-time on-board practices.

There continues to be increasing evidence that cetacean strandings linked to military activities are more frequent, less unusual, and include more species than previously supposed (Dolman *et al.*, 2011). Examples include harbour porpoises in Puget Sound stranded during a military sonar exercise (NRDC, 2005) and the NATO military exercise Loyal Mariner was a possible contributing factor of a harbour porpoise mass stranding in Danish waters in 2005 (Wright *et al.*, 2013). Parsons *et al.* (2000) review the potential sources of impacts of military activities in the west coast of Scotland, but these are relevant throughout UK waters.

Additionally, the potential exists for detrimental cumulative impacts arising from multiple exposures to sonar in conjunction with other military activities that include exercises incorporating a range of vessels such as warships, carriers, aircraft (including helicopters), and submarines, and with a variety of events such as missile and ordnance testing and "sinking" exercises as well as with civilian activities (Dolman, 2012).

JNCC advice on minimising risk of injury and disturbance to marine mammals from noise producing activities should be updated to manage injury and disturbance from military use of explosives (including, but not limited to Cape Wrath).

A number of recommendations are made (Dolman *et al.*, 2009; Dolman, 2012) towards effective management of the UK MODs activities, including the adoption of effective, long-term, and meaningful management measures in the planning stage, including SEA as a starting point. An example, Exercise Joint Warrior, a twice yearly event usually occurring for two or three weeks in spring and autumn

*including up to 30 ships, 5 submarines, and 85 aircraft has never been subject to full and transparent EIA (Dolman *et al.*, 2009; Dolman, 2012) despite routinely operating in some of the most sensitive harbour porpoise habitat in northern Europe. The UK Ministry of Defence (MOD) has not conducted a Strategic Environmental Assessment of the range of its activities, apparently with the approval of JNCC.*

Most urgently, the MoD should undertake full and transparent SEA of all activities conducted on its two offshore exercise areas, to include realistic impacts, appropriate precaution and more effective mitigation over the range of impacts such as spatial restrictions. Temporal planning is required so as to avoid cumulative effects with other military and anthropogenic activities.

4.5.2 Cumulative assessment of Military Pressure

To enable the cumulative assessment of sensitivity concerns to combined pressures resulting from Military activities (Fig. 10), this section primarily focuses on thematic information layers available which could assess pressures from disturbance and trauma (i.e. from live fire exercises). However, the assessment and interpretation of cumulative concern of potential effects from Military activities, within and between the different exercise types, remains a key consideration and challenge.

To enable the cumulative assessment of sensitivity to combined pressures resulting from offshore military activities (Fig. 10), covering (i) trauma resulting in injury, (ii) disturbance of critical behaviour due to interaction by physical and acoustic pollution, and (iii) ecosystem effects due to physical damage of habitat or through inadvertent prey depletion.

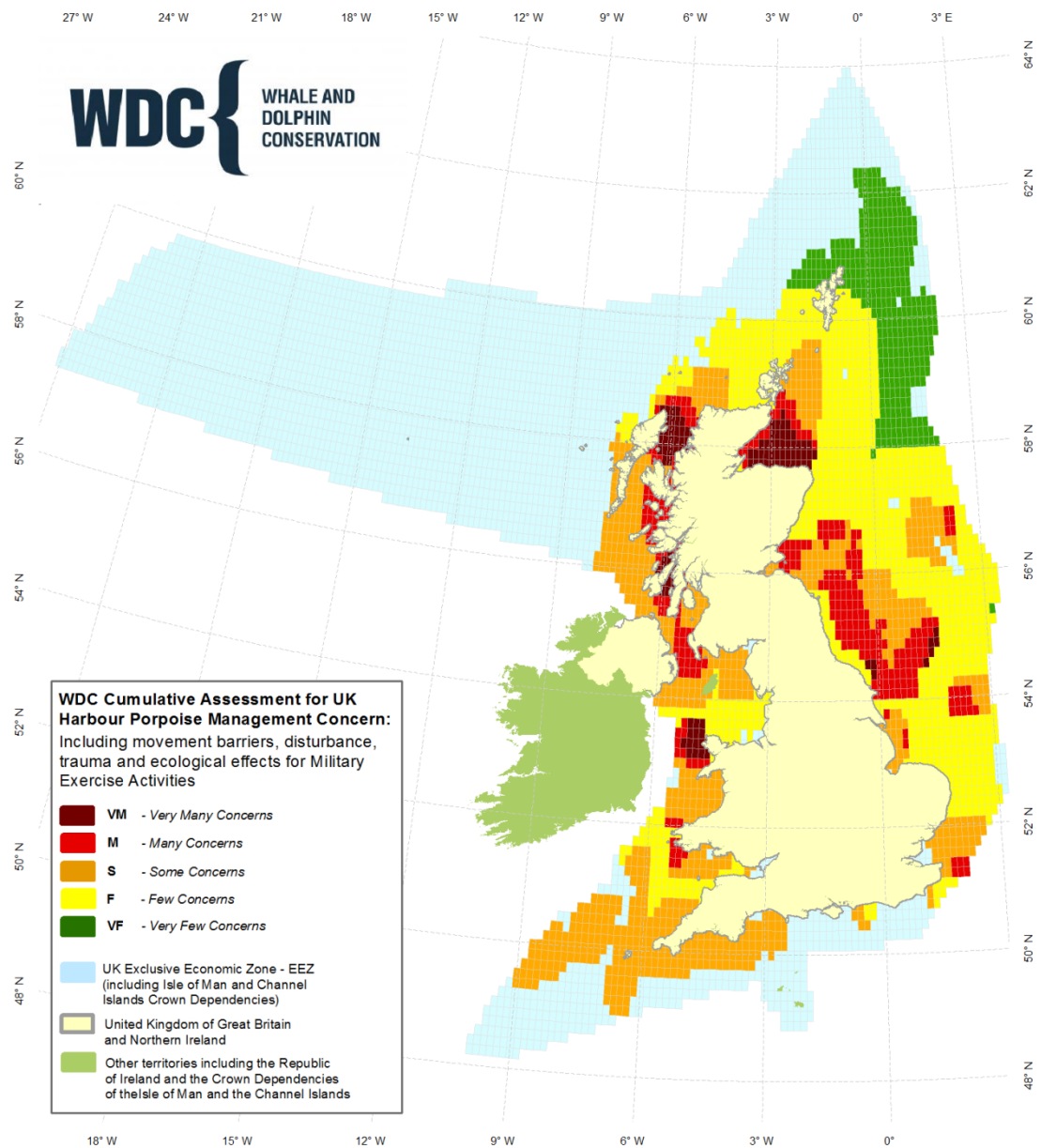


Fig. 10. Preliminary WDC cumulative assessment for UK harbour porpoise and management of offshore military activities

4.6 Maritime Traffic and Shipping Management Options

4.6.1 Sectoral pressure assessment

Many species of cetaceans are vulnerable to collisions with vessels, also known as ship strikes. Collisions with large vessels often either go unnoticed or unreported, particularly for smaller species. As an international problem, the Ship Strike Working Group of the International Whaling Committee²⁵ provides a useful forum to share information via a global online database, and for improving knowledge of behaviour and movements of cetaceans and vessels, and developing mitigation measures.

CSIP represents a valuable source of data for ascertaining cause or potential cause of death. Between 1990 and 2011, of 3044 carcasses necropsied, 19 were diagnosed as ship-strikes, including nine harbour porpoise, whilst a number of cases of physical trauma of unknown origin were also likely to be ship-strike (Deaville *et al.*, 2013). Studies have indicated that the probability of a strike being lethal increases significantly if the vessel is travelling at speeds exceeding 10 knots (Vanderlaan and Taggart, 2007; Evans *et al.*, 2010).

There is no universal solution to the problem of ship strikes. However, there are a number of regulatory and voluntary mitigation measures at local, national and international levels that can be used to reduce and limit risk of environmental and wildlife damage from shipping. At an international level, under the auspices of the International Maritime Organisation (IMO), measures include vessel reporting, relocation of shipping lanes, mandatory shipping routes, reduced vessel speed, designation of Particularly Sensitive Sea Areas and Areas to be Avoided, vessel traffic services, increased pilotage (bridge officers or boat skippers), awareness and crew training, and also the establishment of a voluntary (local) Traffic Management Zone incorporating aspects outlined above. A guidance document on minimising the risk of ship strikes upon cetaceans exists under the Marine Environment Protection Committee of the International Maritime Organisation (IMO, 2009).

Issues associated with the effects of acoustic pollution on harbour porpoise from shipping activity have recently demonstrated hearing range reduction (Hermannsen *et al.*, 2014).

The leisure industry, including commercial wildlife watching tourism, is a fast growing activity (Hoyt, 2011). Harbour porpoises are a species of interest for boat-based wildlife watching around the UK. Disturbance from localised vessel activity, including recreational vessels, may also be problematic, particularly in 'hot spots' where wildlife watching boats are operating multiple trips over summer months.

The management of leisure activities is only covered under voluntary management schemes such as codes of conduct. There are a number of marine wildlife watching codes of conduct that cover specific groups of animals through to generic advice and codes that are relevant to the UK, including the WiSe (Wildlife Safe) scheme²⁶.

²⁵ <http://iwc.int/ship-strikes>

²⁶ www.wisescheme.org

One example is the Scottish Marine Wildlife Watching Code (SMWWC)²⁷ produced by Scottish Natural Heritage, which provides advice on the best ways to engage and view wildlife responsibly. The aim of the code is to provide a means by which to mitigate against disturbance to marine wildlife, thereby reducing the chance of recreational users and commercial wildlife tour operators from incurring legal offences by deliberately or recklessly disturbing EPS. The SMWWC guidance documents are focused at recreational users and advise that often the most appropriate mechanism will depend on local circumstances and will need to be dealt with at a local level.

4.6.1.1 Further management required to reduce pressure

At a local level, the introduction of statutory measures such as permanent or seasonal speed limits could be achieved through the introduction of statutory bylaws. Raising awareness of the risk of disturbance and collisions and working collaboratively with key stakeholders (such as ports, harbours, marinas and the leisure industry) are also key mitigation mechanisms, as are schemes to divert vessels away from sensitive areas and imposing speed restriction at below 10 knots. The use of byelaws or other measures to introduce speed restrictions and adherence to national wildlife watching codes should be considered in shipping/ boating hotspots such as harbours and busy navigation lanes.

Formal designation of harbour porpoise AoC would provide a useful mechanism to raise awareness amongst the relevant stakeholders, including through the use of literature and dialogue to inform stakeholders of sensitive locations and times of the year. This could represent a valuable tool in harbour porpoise conservation. Developing interpretation tools and training courses, or drawing from such tools that already exist, will contribute to raising awareness in the industry. Guidance documents for certain segments of the shipping industry are currently being developed by the IWC (IWC, 2014).

Despite the growth of the commercial watching industry as UK tourism is widely promoted, there is no licensing or oversight of activities nor a central database of the number of commercial vessels operating, to understand vessel numbers (including in sensitive areas) or number of trips undertaken on a daily or seasonal basis. Centralised databasing and licensing of marine wildlife watching operators should be undertaken by government or SNCBs to enable oversight of the scale of the industry and to provide a strategic approach to management. Again, guidance can be sought from, amongst other bodies, IWC, which has dealt with the issue of sustainability of the whale watching industry for many years (see <http://iwc.int/whalewatching>).

To minimise disturbance there should be a requirement that the commercial watching industry be trained to implement national wildlife watching codes of conduct.

More focus should be paid to educating recreational vessel users (speedboats, power boats, jet skis) who interact with porpoises.

4.6.2 Cumulative assessment of Maritime Traffic and Shipping

To enable the cumulative assessment of sensitivity concerns to combined pressures resulting from Maritime Traffic (Fig. 11), this section primarily focuses on thematic information layers available which

²⁷ <http://www.marinecode.org/>

could assess pressures from trauma (e.g. from ship strikes) and disturbance (i.e. from acoustic pollution effects). The principal direct pressure to individual harbour porpoise resulting from maritime traffic is the concern of collision (from ship strike) causing mortality or physical trauma. Disturbance, due to the physical presence and acoustic pollution of vessels further represents a potentially worrying threat, especially to coastal harbour porpoise populations.

The cumulative assessment of sensitivity to combined pressures resulting from maritime shipping activities (Fig. 11), was shown to take the form of: (i) collision often resulting in death or physical trauma, and (ii) disturbance, including acoustic pollution resulting from high volumes of traffic, including repeated interactions of commercial watching.

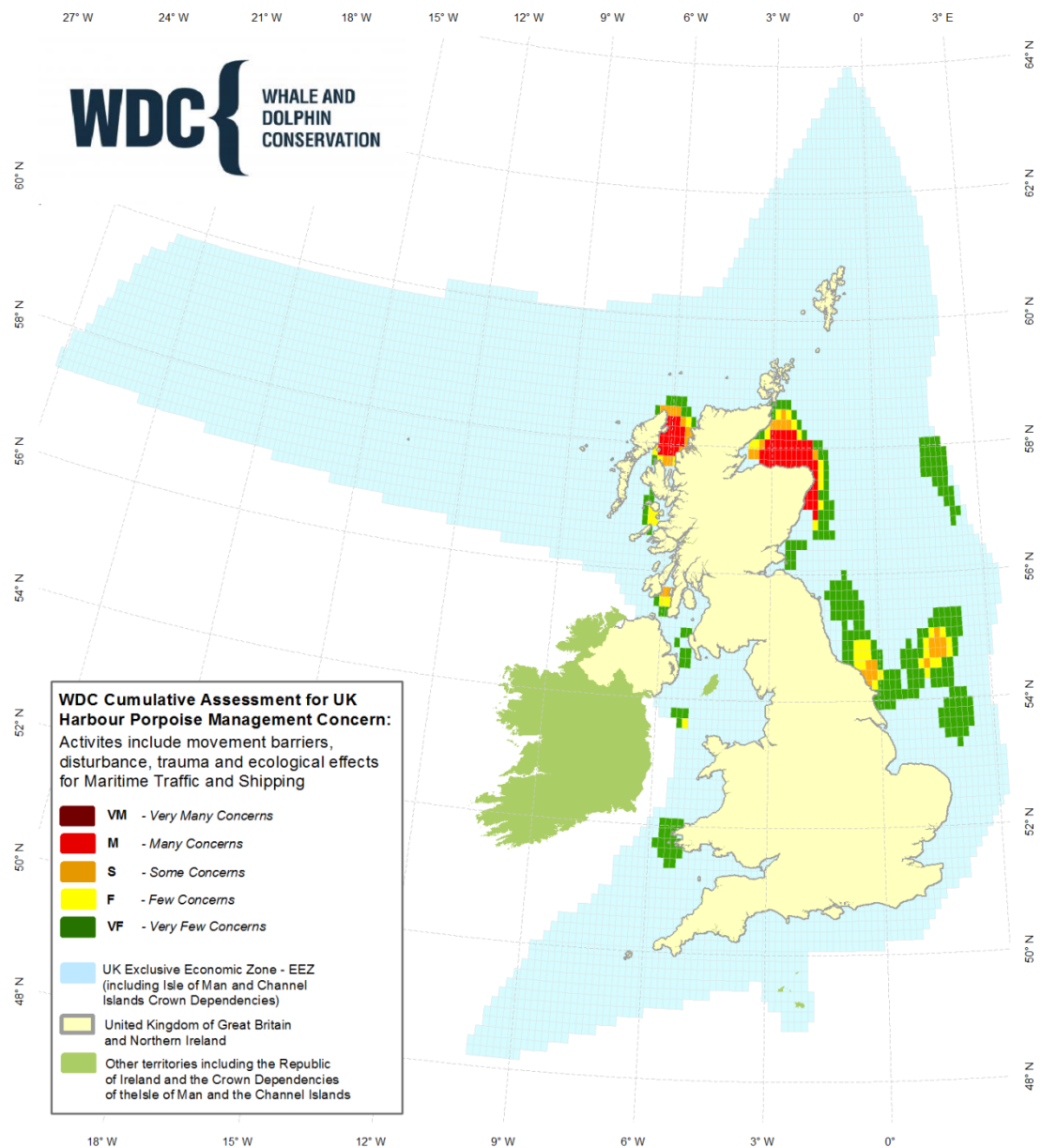


Fig. 11. Preliminary WDC cumulative assessment for UK harbour porpoise and management of maritime traffic and shipping

5. Identification of some Harbour Porpoise Areas of Concern and Recommendations on Management Options development

To provide an overarching indication of those areas of cumulative concern, which form the highest priority for the necessity to develop spatial management options, an assessment of the nationwide population-corrected kernel density combined with the four groups of pressures (section 3.1.2) and sectoral activities (section 4 and Figs. 7-11) resulted in the identification of a number of 'hotspots' of

highest priority from cumulative sectoral pressures, referred to as harbour porpoise Areas of Concern (AoC) (Fig. 12).

The boundaries for the Areas of Concern (AoC) are meant to be illustrative for the purpose of this report only, i.e. relative to the broad areas as outlined (Fig. 12). It is too early in the evolving process of evaluating spatial management options at a UK scale to be overly prescriptive, and more work will be needed to define and refine boundaries in their own right should these be necessary for future conservation planning and management. However, these recommended AoC provide a contribution for taking forward areas of search and further assessment with the view to designating SACs and other MPAs and emerging ecologically coherent MPA Networks.

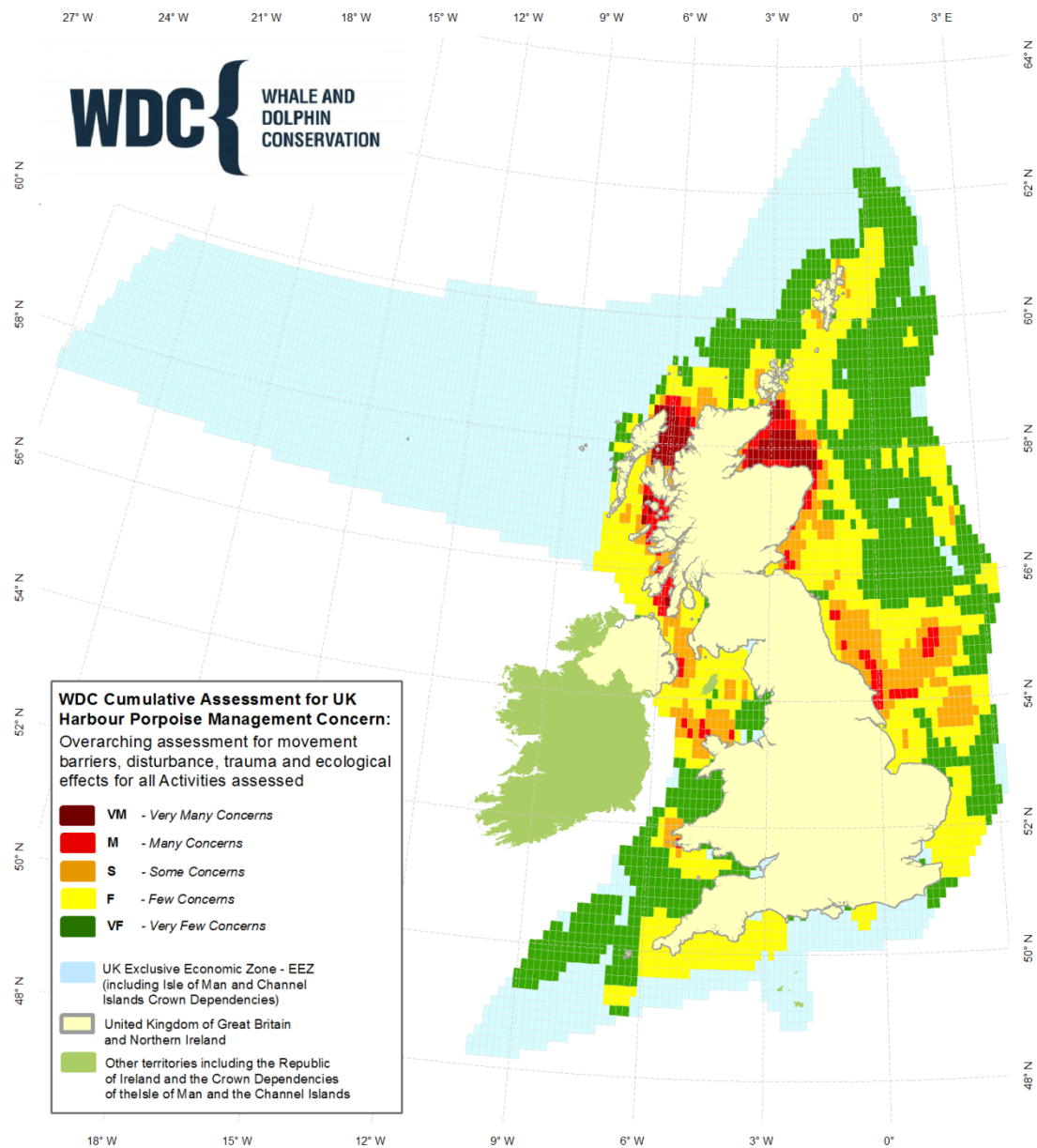


Fig.12. Preliminary WDC Cumulative Assessment for UK Harbour Porpoise Management Concern; Sensitivities to movement barriers, disturbance, trauma and ecosystem effects for all activities assessed

A total of eight AoC were identified; three to the west of Scotland; two to the east of Scotland, one in Wales; and two to the east of England.

West of Scotland:

- 1. **Minch** - the proposed Minch AoC stretches from the north of Lewis (Butt of Lewis) across to the Scottish mainland (Cape Wrath) in the north, and the south east of Lewis (including the Sound of Harris) across the north of Skye, to the mainland (Kyle of Lochalsh covering the Sound of Raasay).*
- 2. **Small Isles** - the proposed Small Isles harbour porpoise AoC stretches from the southwest coast of Skye (encompassing Loch Bracadale) to the south of Mull (encompassing the west coast of Mull) and the Isles of Rum, Eigg, Muck, Canna, Coll and Tiree.*
- 3. **Sound of Jura** – the proposed Sound of Jura AoC stretches from the mainland to the southwest tip of Kintyre across to the south west tip of Jura (encompassing Port Ellen).*

East of Scotland:

- 4. **North East Scotland** – the proposed North East Scotland AoC covers the outer Firth stretching from John o' Groats in the north to Fraserburgh in the south, and the stretch of coast between Fraserburgh south to Aberdeen. In the inner Firth, the proposed boundary stretches from Brora in the north and to Nairn in the south.*
- 5. **Firth of Forth** – the proposed Firth of Forth AoC covers the outer Firth from St Andrews in the north to Dunbar in the south. In the inner Firth from Buck Haven in the north to Musselburgh in the south.*

Wales:

- 6. **North Wales and Anglesey** – the proposed North Wales and Anglesey AoC stretches from Great Orme's Head, to the west end of the Menai Strait, encompassing Anglesey.*

East of England:

- 7. **Dogger Bank** – the proposed Dogger Bank AoC overlaps with an existing SAC currently designated for sandbank habitat under the Habitats Directive. Although there is some overlap with the existing SAC boundaries and the harbour porpoise density estimates, further work is needed to ascertain the extent and location of any crossover for this harbour porpoise AoC. Recent international aerial surveys indicate the margins of the Dogger Bank, particularly to the west and north, are most important for the species.*
- 8. **North Yorkshire** – the proposed North Yorkshire AoC extends north to south (approximately Hartlepool to Withernsea respectively).*

Furthermore another two precautionary AoCs (pAoC) were identified which, with further finer scale investigation and additional datasets available, could also be classified as AoCs for the development of appropriate Management Options. These include:

9. **SW Wales and the Outer Bristol Channel** – the proposed pAoC extends from Fishguard to the Gower Peninsula and adjacent Swansea & Newport Bays across the Bristol Channel towards the north Devon coast.
10. **Pentland Firth and Scapa Flow** – the proposed pAoC extends from John o' Groats northwest to the southern shore of mainland Orkney encompassing the Pentland Firth and Scapa Flow.

Four of the above AoC are assessed below as case studies for existing management options and effectiveness, key gaps and proposed additional measures. Key recommendations are made to move towards best practice. The AoC reviewed as case studies are of particular interest as they have previously been nominated or assessed as suitable candidates for UK harbour porpoise SACs (Dolman *et al.*, 2013; see also Evans and Prior, 2012).

In addition, the AoC cover the range of sectoral and national management concerns that are generic and should be considered in combination with the individual AoC sections. An assessment of cumulative and in combination pressures is given some consideration in an attempt to take more holistic and integrated approach to conservation management.

A number of templates for marine nature conservation management options exist (for example, SNH, 2012) and could be used or adapted for proposing management options and best practice for harbour porpoise AoCs. Additional criteria not covered in this report, but typically included in management option documents, are the name of the protected area, site summary, overview of data assessment (confidence), stakeholder roles and responsibilities, overview of protected features, conservation objectives, overview of activities, and an assessment of each activity that may require management measures, covering the options available and proposed way forward.

Earlier sections of this report and wider scientific reports have highlighted significant gaps in information and key concerns relating to pressures from both existing and evolving sectors (for example, ASCOBANS, 2014b). The case studies (below) are presented with this in mind.

Summaries for key sensitivities and cumulative concerns in each harbour porpoise Area of Concern are presented in the following tables with references to management options discussed previously in this report. Furthermore, the tables presented here (in sections 5.1-5.4 below) provide initial recommendations for a proforma tool to be used by practitioners for initial assessment of sensitivities, cumulative concerns, and potential management options in future AoCs and conservation areas.

5.1 Minch Area of Concern

Area of Concern : Minch					
Overview of Sensitivity to Pressures					
Pressures	Low		Med		High
Trauma					√
Barrier to Movement			√		
Disturbance					√
Ecosystem Effects			√		
Overview of Cumulative Concerns					
Activities	VF	Few	Some	Many	VM
Fisheries & Aquaculture					√
Renewable Energy					√
Oil and Gas	√				
Military					√
Maritime Traffic					√
Sector Summaries and Management Options					
Sector	Summary				MOs – See Section
Fisheries and Aquaculture	<p>The region is covered by two Inshore Fisheries Groups (IFGs), the North West IFG and the Outer Hebrides IFG. Shellfish account for virtually all landings by value into the Western Isles ports (McLellan, 2011). In the North West IFG, little is known about fishing activity, the areas which are important to the <10m (inshore) fleet, or the seasonal and spatial distribution of fishing effort. It has been proposed that better information is collated to improve the basis of fisheries management at an IFG level (McLellan, 2011). This in turn would provide better information on possible ecosystem effects (including impacts on harbour porpoise prey species), and data on potential concerns/ hotspots relating to bycatch. The shellfish sector is of significant importance in the Outer Hebrides inshore fleet. Whilst pelagic and white fish fisheries were once of importance within inshore waters, migratory patterns for pelagic species and restrictive catch composition rules coupled with reduced quota allocations for white fish, has now resulted in minimal effort being directed at those fisheries (Inner Hebrides IFG, 2010). The number of active vessels based in the Outer Hebrides has reduced gradually, by nearly a quarter, from 335 in 2004 to 256 in 2009, due to government funded decommissioning schemes. The majority of boats working in the area are under 12m, and therefore not covered under the European regulation applying to bycatch. The illegal use of set nets for salmon fishing in Scotland remains an issue of concern. Aquaculture, in particular salmon farming, is an expanding industry in the northwest of Scotland. Mussel farming is common in the north of the area (McLellan, 2011). A number of finfish sites are located along the coastline of this area.</p>				4.2.2.1.1
					4.2.2.2.1
					4.2.2.3.1
					4.2.2.4.1
					4.2.2.5
					4.2.3.1.1
					4.2.3.2.1

Renewable Energy	<i>A proposed area of search exists for offshore wind (NW7) covering 532km² in the North Minch. This area overlaps with approximately one-third of the northern area of the AoC. A site in the Inner Hebrides is one of ten sites identified as a potential location for a future test site (Potential Deep Water Demonstrator). The project covering 28km² is located 8.5km from shore (most easterly point of Lewis), and the proposed capacity is 100MW with 20 to 30 floating turbines. Sea Generation (Kyle Rhea) Ltd (set up by Marine Current Turbines) is proposing a tidal stream array demonstration project in the vicinity of this AoC. The location of the project is north of the ferry crossing between the Isle of Skye and the mainland, in approximately 30 -35m water depth. The proposed array will consist of four devices and have a total capacity of up to 8MW. Site selection, feasibility assessment and environmental scoping study commenced in 2010. EIA has been conducted covering installation, operation and decommissioning. An application for a marine licence has been made. Consent is pending.</i>	4.3.1.1.1
Oil and Gas	<i>This activity was not currently shown to be a pressure factor in this AoC.</i>	-
Military Activity	<i>The west coast of Scotland contains UK offshore exercise areas for military activities, including routine exercises using active sonar. Exercise Joint Warrior is an example of a multi-national twice-yearly, two week exercise that is conducted throughout the region.</i>	4.5.1.1
Maritime Traffic	<i>The Minches are a relatively heavily used shipping route with commercial and freight activity. An average 2,320 passages occur per month through the Minches, excluding local ferry traffic and fishing vessels. There are no major ports (i.e. handling more than 1 million tonnes of cargo); however, there are approximately 20 ports and harbours which are predominantly smaller jetties, piers and hard standing areas used as a base for fisheries, inter-island transport and recreational facilities. A number of ports include Stornoway (Isle of Lewis), Ullapool (mainland) and Uig (north Skye); these ports also represent the ferry routes between the island and the mainland in the area. Marine based recreational activities, such as sailing, wildlife tourism and diving, are important in the area, with ferries servicing the tourist industry, as well as the local community.</i>	4.6.1.1

5.2 North East Scotland Area of Concern

Area of Concern : North East Scotland					
Overview of Sensitivity to Pressures					
Pressures	Low	Med	High		
Trauma			√		
Barrier to Movement		√			
Disturbance			√		
Ecosystem Effects		√			
Overview of Cumulative Concerns					
Activities	VF	Few	Some	Many	VM
Fisheries & Aquaculture			√		
Renewable Energy					√
Oil and Gas					√
Military					√
Maritime Traffic					√
Sector Summaries and Management Options					
Sector	Summary			MOs – See Section	
Fisheries and Aquaculture	The main fishing ports in the area are Peterhead, Fraserburgh and Aberdeen. There have been reports in the past of harbour porpoise being accidentally killed in set net fisheries for salmon around the Moray Firth and Grampian coasts (Sea Watch Foundation, 2001). Gill netting, pair trawling and seining all take place in the region and result in cetacean bycatch, although details of numbers taken do not exist. The importance of shellfish landings for the inshore fishing sector is emphasised on the basis of the size (length) groups of vessels operating in Scotland. Over 98% of the value of landings by the <10m sector is attributable to shellfish, while for vessels of 15-30m this proportion drops to 40% (and 5% for those >30m) (Moray Firth Inshore Fisheries Group, 2011).			4.2.2.1.1 4.2.2.2.1 4.2.2.3.1 4.2.2.4.1 4.2.2.5	
	The Moray Firth Partnership and SAC Management Group have established a management scheme for the bottlenose dolphin SAC. A number of the objectives of this scheme are also relevant to the conservation of the harbour porpoise, for example raising awareness about the impact of illegal salmon netting (Baxter and Gillham, 2009).				

Renewable Energy	<i>A number of proposed or consented marine renewable projects exist in this area. These include the Beatrice Demonstration site (2 turbines) (operational) with a 10MW capacity; Beatrice Offshore Wind Farm (consented March 2014) with capacity up to 750MW, covering 131Km², and about 13.5km off Caithness coast; Moray Firth Eastern Development Zone consisting of two Areas: Area 1, Stevenson Wind Farm, consented and has capacity of 372MW, and Area 2 Telford Offshore wind farm, consented with a 372MW capacity; and Moray Firth Western Development Zone, capacity 360MW is in concept/early planning phase. In addition, three out of ten deepwater test and demonstration sites for floating turbines, currently in concept stage, are situated in this AoC. The test sites are approximately 30km² with 20-30 turbines or 100MW. They are: (i) Southern Moray Firth (approximately 12 km offshore); (ii) OWNE1 East Aberdeen Development Zone (21 km south west of Peterhead off the north east coast); and (iii) OWNE2 South-east Aberdeen Development Zone.</i>	4.3.1.1.1
Oil and Gas	<i>There are a number of blocks under licence in this AoC, including the Beatrice oil field (the largest in the inner Moray Firth area) that has four operating platforms. Following SEA completed in 2011, the most recent Round (28th) of offshore licensing has seen much of the outer Moray Firth area opened up for licensing. On receipt of applications of licences made under each round, a screening assessment is undertaken by the Department of Energy and Climate Change (DECC) to determine if the award would be likely to have a significant effect on relevant European conservation sites, and EPS. Following this initial screening process, any block identified will require further screening assessment prior to decision on whether to grant licences as subject AA licence awards.</i>	4.4.1.1.1 4.4.1.2.1
Military Activity	<i>Firing and other military exercises, including occasional Joint Warrior exercises, take place in this AoC.</i>	4.5.1.1
Maritime Traffic	<i>Marine wildlife watching is based around the resident bottlenose dolphin population and represents a significant contribution to tourism in the area (Davies <i>et al.</i>, 2010). Ferries operate from Aberdeen north to Kirkwall and Lerwick in the Northern Isles. Also, as described above, there are three big fishing ports in the region. Wildlife tourism and diving are important in the area, with ferries servicing the tourist industry, as well as the local community.</i>	4.6.1.1

5.3 North Wales and Anglesey Area of Concern

Area of Concern : North Wales and Anglesey					
Overview of Sensitivity to Pressures					
Pressures	Low		Med		High
Trauma					√
Barrier to Movement			√		
Disturbance					√
Ecosystem Effects			√		
Overview of Cumulative Concerns					
Activities	VF	Few	Some	Many	VM
Fisheries & Aquaculture				√	
Renewable Energy					√
Oil and Gas				√	
Military					√
Maritime Traffic	√				
Sector Summaries and Management Options					
Sector	Summary			MOs – See Section	
Fisheries and Aquaculture	The use of set nets and tangle netting occurs in places around the Welsh coasts, including north Wales and Anglesey, mainly by small inshore day boats, but in most areas potting is more prevalent. Set nets and beach seining also occur along the coast, mainly either end of the Menai Straits.			4.2.2.1.1	
	Marine aquaculture in the area is predominantly bivalve shellfisheries.			4.2.2.2.1 4.2.2.3.1 4.2.2.4.1 4.2.2.5 4.2.3.1.1 4.2.3.2.1	
Renewable Energy	Current proposed or consented marine renewable projects in this area are the Sea Generation (Wales) Ltd (set up by Marine Current Turbines (MCT)) which is proposing a tidal stream array [demonstration] project in the vicinity of South Stack off the north west coast of Anglesey, less than 1km from the mainland in approximately 20-40m water depth (plus possibly around the Holyhead Deep). The array will consist of up to five devices with a total capacity of 10MW. The Anglesey Skerries Tidal Array project commenced in 2006 (consented in 2013) and installation is planned for summer 2016. A Zone Development Agreement for the Irish Sea Development Area (Round 3) was announced in early 2010. The Area consists of three sites, covering an area of 2,200km ² . The boundaries of the zone are approximately 15km from Anglesey, 20km from the Isle of Man and over 40km from the Cumbrian coast. The combined energy output for the three sites is 4200MW (James, 2013). The three sites consist of (i) Rhiannon Wind Farm, 220MW; (ii) Celtic Array North-east, 100MW; and (iii) Celtic Array South-east, 1000MW. The first of the three projects (Rhiannon) underwent concept and early planning. In July 2014,			4.3.1.1.1	

	<p><i>however, Celtic Array Ltd announced that they have withdrawn plans to develop wind farms in the Irish Sea Zone, on the basis that the ground conditions are such that it is not viable to proceed with the technology that is currently available.</i></p> <p><i>For the time being, the concern to harbour porpoise from human activity will be lessened. However, given the wind resource in the region and possible development in technology, licensing in future rounds cannot be ruled out.</i></p>	
Oil and Gas	<p><i>There are a number of blocks under licence in this AoC; however, these were considered to contribute to only some cumulative concerns in the AoC.</i></p>	<p>4.4.1.1.1 4.4.1.2.1</p>
Military Activity	<p><i>Exercise Joint Warrior coverage in 2010 included a marine area covering west Wales, including Anglesey (RAF website). Little information on military activities is publicly available.</i></p>	4.5.1.1
Maritime Traffic	<p><i>Ferry route between Holyhead and Dublin. In addition, tourism is important to the North Wales economy (Tourism Strategy North Wales 2010-2015) and marine wildlife tours operate in the area.</i></p>	4.6.1.1

5.4 Dogger Bank Area of Concern

Area of Concern : Dogger Bank					
Overview of Sensitivity to Pressures					
Pressures	Low		Med		High
Trauma			√		
Barrier to Movement			√		
Disturbance					√
Ecosystem Effects			√		
Overview of Cumulative Concerns					
Activities	VF	Few	Some	Many	VM
Fisheries & Aquaculture		√			
Renewable Energy					√
Oil and Gas				√	
Military					√
Maritime Traffic			√		
Sector Summaries and Management Options					
Sector	Summary			MOs – See Section	
Fisheries and Aquaculture	<p>Bycatch can be considered a key issue for the harbour porpoise across the North Sea. Yet well over 99% of net fishing in the North Sea is conducted without any marine mammal bycatch monitoring. Without any measure of uncertainty, preliminary results of the bycatch risk approach (BRA) show that North Sea harbour porpoise may be near or above sustainable removal levels (ICES WGBYC, 2014).</p> <p>Around the UK, gill netting is considered most prevalent in the North Sea and Celtic Sea (Northridge <i>et al.</i>, 2013). Sandeel distribution is noted as being localised in the North Sea and abundant in the Dogger Bank region. Nursery sites are also attached to parts of the Dogger Bank (JNCC, 2011). This high degree of site fidelity exhibited by sandeels indicates low re-colonisation potential for areas denuded by fishing (CEFAS, 2007).</p>			4.2.2.1.1	
				4.2.2.2.1	
				4.2.2.3.1	
				4.2.2.4.1	
				4.2.2.5	
Renewable Energy	<p>A currently proposed marine renewable project in and/or adjacent to this AoC is the Forewind development that falls under four tranches. Tranche A comprises two projects each of 1200MW capacity (application submitted); Tranche B comprises two projects each of 1200MW capacity (application submitted); Tranche C, comprising two projects each 1200MW (early planning phase) and Tranche D, with 2200MW capacity have been cancelled. The Dogger Bank represents the largest of the Round 3 zones covering an area 8660km². It has the potential for approximately 4GW development capacity in less than 30m water depths, and 8 GW in less than 35m water depths. The overarching agreed target is an estimated 7.2 GW. The fact that site specific monitoring may not detect population change is an issue.</p>			4.3.1.1.1	

	<p><i>The cumulative effect (over the lifetime of the site development), however, is considered as moderate and requires mitigation measures. A Marine Mammal Mitigation Protocol (MMMP) will be required. Forewind is contributing to a North Sea wide renewable project (DEPONS) to ascertain potential impacts of disturbance to harbour porpoise due to underwater noise of construction piling. The project covers harbour porpoise response to noise, prey distribution, movement patterns, population density, simulation model, dispersal patterns and workshops (Forewind, 2014). The amount of 'additional' monitoring and research that developers undertake is variable. Forewind, however, is funding research into mitigation, for example the suction bucket technique as an alternative to pile driving (Forewind, 2012).</i></p>	
<p>Oil and Gas</p>	<p><i>The southern part of the AoC overlaps with a number of oil and gas fields. Licensing currently consists of blocks on offer under the 28th Round (2014), potential awards under 27th Round and a number currently under licence.</i></p> <p><i>The Cygnus gas field (the largest gas discovery in the UK southern North Sea in the last 25 years) contains blocks 44/11a and 44/12a, approximately 150km from the Lincolnshire coast. It lies south of the boundary line of the Dogger Bank SAC. Discovered in 1988, a number of appraisal wells have been developed. In 2012, the project partners sanctioned investment to develop the field. Production is expected to start in late 2015.</i></p>	<p>4.4.1.1.1 4.4.1.2.1</p>
<p>Military Activity</p>	<p><i>The area to the south and west of the AoC overlap with the UK military firing practice and exercise area, and naval zones at Flamborough Head and Silver Pit.</i></p>	<p>4.5.1.1</p>
<p>Maritime Traffic</p>	<p><i>Maritime traffic in the area includes vessels serving marine renewable installations (relevant for development and operational phases), fishing vessels, tankers and cargo vessels, whilst the level of recreational vessel activity is low.</i></p>	<p>4.6.1.1</p>

6. Overarching Management Recommendations

*Previous WDC reports contain recommendations towards better protection of harbour porpoises (for example, Clark *et al.*, 2010; Dolman *et al.*, 2013; James, 2013; Green *et al.*, 2013). The following are specific to the development of effective management measures.*

Should SCNBs wish to develop the Management Options recommended here, we recommend these are done nationally, but also at a more regional/AoC appropriate scale, and using collated datasets that are not necessarily publicly available at this time.

Baseline surveillance

There are shortcomings and gaps in the existing baseline data available. There is a need to establish better baseline data, including both large-scale national surveys and more localised and detailed surveys over the long term, as well as to address monitoring requirements throughout the UK with emphasis upon year-round coverage. Under the principle of ‘polluter pays’, funding from marine users should be made available to resolve key strategic data gaps.

To this end, the development of a research strategy that outlines data gaps and priority research needs is required. This should be developed in conjunction with those collecting data, including NGOs.

Strandings data also play a valuable role in monitoring existing and emerging impacts, and adequate funding for CSIP and collaborative work should continue.

Efforts should continue towards adequate assessment of cumulative impacts on the conservation status of the harbour porpoise. In the absence of full and adequate scientific data, it is paramount that conservation decisions and actions that are based on the combination of best available information and expert opinion reflect the precautionary approach, and are ground-truthed with in-field data.

Regional commitments

A definition of Favourable Conservation Status (FCS) and guidance and implementation of adequate ways to measure FCS are required to develop robust conservation measures.

Adequate ongoing financial and human resources should be applied to the range of ASCOBANS work programmes and actions.

Allowable ‘takes’ or limits

WDC does not support allowing any human caused mortality of marine mammals. We believe ‘catch limits’, ‘takes’ or Potential Biological Removal/Catch Limit Algorithms for harbour porpoises by any sector is inappropriate and against the principles of the Habitats Directive and the wishes of the public at large. Every effort should be made to introduce appropriate tools (both mitigation and spatial management) to reduce impacts, including from bycatch, towards zero.

Management Units

Sizes and areas of Management Units should reflect current knowledge. Where ranges are uncertain, and where differences between ‘populations’ have been observed but their boundaries are unclear, the precautionary approach needs to be taken and these Management Units should be split, for example, in the North Sea.

Bycatch rates of harbour porpoises should not be calculated at the North Sea scale (ICES, 2014) but should be calculated at the most precautionary Management Unit scale.

Cumulative assessment of levels of disturbance and injury should be calculated for each harbour porpoise Management Unit, and should include all sources of disturbance, injury and death. These models should be region appropriate and not restricted to UK waters.

Legislation necessitates that the harbour porpoise, as an EPS, requires management to avoid deliberate or reckless disturbance. The issuing of EPS licences is not done coherently or transparently, with both direct (see e.g. the use of ADDs at aquaculture facilities) and indirect (i.e. baseline criteria) gaps. Agency guidance on cumulative assessment of EPS licensing is required.

Marine planning

We should maximise the opportunity that marine planning processes across the UK present in harbour porpoise conservation including the siting, zoning and managing of activities.

Cumulative Impacts

As part of wider measures, and within designated sites, a focus should be placed on appropriately assessing and managing cross-sectoral cumulative impacts for harbour porpoises in a consistent and holistic way.

MPA designation

A suite of dedicated harbour porpoise SACs, reflecting the range of Management Units relevant to the UK, should be designated at the earliest opportunity.

Robust and appropriate management measures should be implemented, monitored and enforced. Coherence with the development of measures for existing SACs in neighbouring countries is paramount.

7. Conclusions

*Despite numerous relevant international, European and national legislative and political obligations, meaningful and effective conservation measures for the harbour porpoise (*Phocoena phocoena*) remain weak. Based on available evidence, additional management options, beyond current measures, are required for harbour porpoise to alleviate the existing and unprecedented scale of pressures they face.*

As our seas become busier, the pressures faced by harbour porpoises will intensify. Existing pressures are broad ranging and vary from acute and often fatal consequences, such as bycatch and collision risk (from maritime traffic or underwater turbines), to chronic and/or cumulative impacts, for example through limiting feeding opportunity and displacement from preferred habitats. Present management measures undoubtedly provide some safeguards to these pressures. However, they fall short of delivering a meaningful, consistent and adaptive long-term conservation plan that covers the range of sensitivities and coherently brings together the threats from cumulative activities.

Baseline surveys and continuing monitoring surveillance, alongside the development of broad-scale management measures, rather than piecemeal and largely untested mitigation measures, must be seen as an integral and essential part of harbour porpoise conservation.

The review of harbour porpoise management options in this report, combined with the assessment to identify geographically discrete AoCs, provide a useful insight into the current gaps, challenges and spatial scope of issues. The role of the AoC is to identify the range of pressures relevant to the Area to allow for management options to be tailored where pressure is highest, moving towards a best practice approach. A number of recommendations are put forward for each sector and for each of the case study AoCs to illustrate potential areas for further discussion, research and delivery. Recommendations can be generic or cover issues pertinent to a number of sectors, and they can be relevant at a national level or specific to a sector or geographic location.

8. Acknowledgements

This report is based upon a synthesis of research conducted by Alison Champion and funded by the Marine Protected Areas Fighting Fund.

Kara Brydson (RSPB), Sabine Christiansen (Consultant), Rob Deaville (Cetacean Strandings Investigation Programme), Peter Evans (Sea Watch Foundation), Sarah Gregerson (ClientEarth), Karen Hall (Scottish Natural Heritage), Alex Kinninmonth (Scottish Wildlife Trust), Stephan Lutter (World Wide Fund for Nature Germany), Kirsty McGregor (Department of the Environment, Fisheries and Rural Affairs), Helen McLachlan (World Wide Fund for Nature Scotland), Simon Northridge (Sea Mammal Research Unit), Eleanor Stone (The Wildlife Trusts), and Tom Stringell (Natural Resources Wales) provided helpful input and/or references. Thanks to George Berry who formatted and designed the report.

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