UK Dolphin and Porpoise Conservation Strategy

Technical Report

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Riaghaltas na h-Alba
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UK Dolphin and Porpoise Conservation Strategy

Technical Report

Contents

Section 1 – Introduction to the Technical Report

1. This is the Technical Report to the UK Dolphin and Porpoise Conservation Strategy.

2. This document describes the process used to assess the vulnerability of the populations of the nine named species of cetaceans (Table 1, High Level Strategy) to current pressures in UK waters and the extent to which these pressures are already being managed.

3. A key objective of this strategy is:

- To identify the pressures that pose the greatest risk to the species covered by the strategy and to present proposals for new actions where necessary to maintain or improve their conservations status.

4. This has been approached through assessing the vulnerability of each species to a range of pressures in the marine environment, each pressure arising from several activities. The vulnerability assessments were then qualified by the scientific information available to inform the assessment (Annex 1). In some cases published information was available that supported the assessments; resulting in a high level of confidence in the outcome. In other cases, the information was sparse, or the information tended not to support the vulnerability assessments. In both these cases, this resulted in reduced levels of confidence in the outcome.

5. Species/pressure combinations with high or medium vulnerability scores, and supporting evidence demonstrating impacts, were taken forward for additional new/wider measures to be considered.

Section 2 – Vulnerability Assessment and Scores

Vulnerability Assessment

6. The vulnerability assessment adopted in this strategy consists of two components: sensitivity to pressure and exposure to the pressure. Together (Figure 1) they indicate the vulnerability of the species to impact at the population scale. The assessment is made at the UK scale but, where applicable, issues that might be locally/regionally significant are presented in more detail in Table 4.

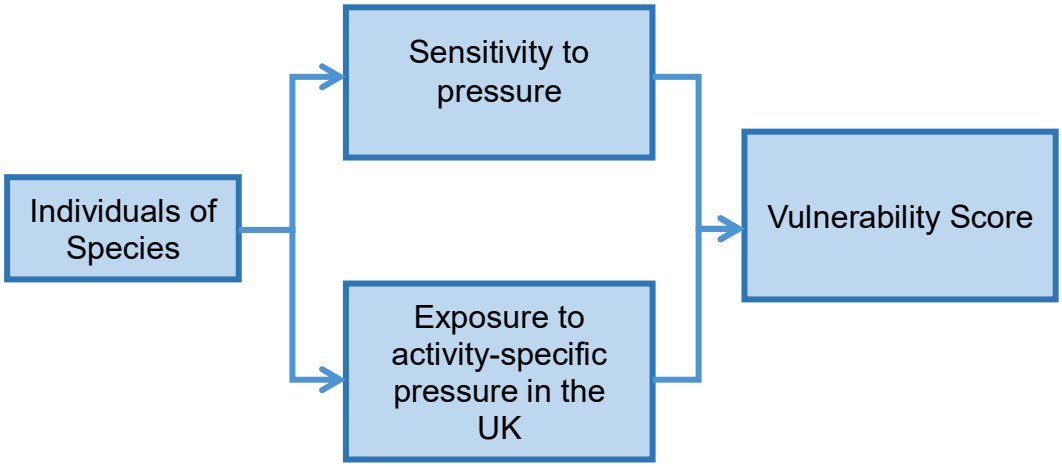

Figure 1: Determining the vulnerability of the named species to pressures

7. Table 1 (below) gives a summary of vulnerability scores by species for UK waters and the confidence in that score. This is split by the type of pressure and the activities which give rise to these pressures. The various combinations of species, pressures and activities presented in Table 1 have been assessed and vulnerability scored using the following system:

- L = shows species and pressure-activity combinations for which vulnerability was assessed to be low
- M = shows species and pressure-activity combinations for which vulnerability was assessed to be medium
- H = shows species and pressure-activity combinations for which vulnerability was assessed to be high

8. Superscripts denote a ‘low’ confidence in the vulnerability score and are explained in more detail below the table.

Confidence

9. The confidence in the resulting vulnerability score has been assessed, and scored, using the confidence decision tree (Figure 2).

10. The confidence in the vulnerability assessment is fundamentally based on the available evidence; against which we judge whether or not the UK population of a species is impacted by a pressure.

11. The scoring is derived from a consideration of the available evidence demonstrating a species vulnerability to a pressure. Confidence has been scored as:

- L* = low because of contradictory evidence
- L = low
- M = moderate
- H = high

12. More detail on the confidence decision tree, sources of evidence and a table including the evidence used for this strategy is in Section 4 and Table 4 of this document.

13. Confidence in the vulnerability has been considered with regards to the actual impact of each pressure/activity on a species, driven by the available evidence (literature and monitoring data).

14. In the absence of evidence about the impact, the confidence in the vulnerability outcome would not necessarily be low if there is good evidence of the exposure. The level of confidence in the exposure is an important consideration if the pressure/species vulnerability outcomes are to be appropriately prioritised for action.

Table 1: Summary of UK vulnerability scores by species

	Pressure: Removal of non-target species (i.e. bycatch or entanglement)															
	Creeling and Potting				Drift net fishing				Trawling and purse seine				Set (fixed) net			
Species	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score
Harbour porpoise	H	M	**M**∞	L*	H	L	**L**	M	H	M	**M**$	L*	H	M	**M**	H
Common dolphin	H	M	**M**∞	L*	H	L	**L**	M	H	M	**M**	H	H	M	**M**	H
Atlantic white-sided dolphin	H	L	**L**	H	H	L	**L**	H	H	M	**M**	M	H	M	**M**†	L
White-beaked dolphin	H	M	**M**∞	L*	H	L	**L**	M	H	M	**M**	M	H	M	**M**	M
Bottlenose dolphin (offshore)	H	L	**L**	H	H	L	**L**	H	H	M	**M**$	L*	H	M	**M**	M
Bottlenose dolphin (coastal)	H	M	**M**∞	L*	H	L	**L**	M	H	M	**M**	M	H	M	**M**	M
Risso's dolphin	H	M	**M**∞	L*	H	L	**L**	M	H	M	**M**	M	H	M	**M**	M
Long-finned pilot whale	H	L	**L**	H	H	L	**L**	H	H	M	**M**	M	H	M	**M**	M
Killer whale	H	M	**M**	M	H	L	**L**	H	H	L	**L**	H	H	L	**L**	H
Minke whale	H	M	**M**	M	H	L	**L**	H	H	L	**L**	H	H	L	**L**	H

Monitoring of bycatch has focused on set nets and until recently, pelagic trawls. There is limited monitoring of drift nets in the current UK monitoring scheme and there has been limited targeted at-sea monitoring of creels

∞ Bycatch events in creels and pots are very rare, which suggests that individuals may be able to avoid them.

$ Monitoring bycatch of harbour porpoises and offshore bottlenose dolphins, in pelagic trawls, has shown this gear to be low risk to these species.

†Monitoring of set nets tends to focus on waters off southwest England, therefore evidence of bycatch in more northern species and gear is unknown.

	Pressure: Acoustic disturbance															
	Cumulative impacts of acoustic disturbance				Seismic/geophysical surveys				Underwater explosions				Pile driving			
Species	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score
Harbour porpoise	M	H	**M∞**	L	M	L	**L**	M	M	L	**L**	M	M	L	**L**	M
Common dolphin	M	H	**M∞**	L	M	L	**L**	M	M	L	**L**	M	M	L	**L**	H
Atlantic white-sided dolphin	M	H	**M∞**	L	M	L	**L**	M	M	L	**L**	H	M	L	**M**	H
White-beaked dolphin	M	H	**M∞**	L	M	L	**L**	M	M	L	**L**	H	M	L	**L**	M
Bottlenose dolphin (offshore)	M	H	**M∞**	L	M	L	**L**	M	M	L	**L**	H	M	L	**L**	H
Bottlenose dolphin (coastal)	M	H	**M∞**	L	M	L	**L**	M	M	L	**L**	H	M	L	**L**	M
Risso's dolphin	M	H	**M∞**	L	M	L	**L**	M	M	L	**L**	H	M	L	**L**	M
Long-finned pilot whale	M	H	**M∞**	L	M	L	**L**	M	M	L	**L**	M	M	L	**L**	H
Killer whale	M	H	**M∞**	L	M	L	**L**	M	M	L	**L**	H	M	L	**L**	H
Minke whale	M	H	**M∞**	L	M	L	**L**	M	M	L	**L**	M	M	L	**L**	M

Sound introduced in the marine environment by human activities is one of the key areas of concern with regards to potential detrimental effects. Whilst the vulnerability to an activity may be low, when multiple operations and/or different activities occur at the same time, or over an extended period, the impact is likely to be greater.

∞The impact of this sound on fecundity and survival is not well understood and there is a lack of evidence, particularly when multiple sound sources act cumulatively.

	Pressure: Acoustic disturbance															
	Operational offshore windfarms				Operational oil and gas platforms				Acoustic Deterrent Devices[$]				Fish finders and depth sounders†			
Species	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score
Harbour porpoise	L	L	**L**∞	M	L	L	**L**∞	M	M	L	**L**	M	L	H	**L**	M
Common dolphin	L	L	**L**∞	H	L	L	**L**∞	H	M	L	**L**	M	L	H	**L**	M
Atlantic white-sided dolphin	L	L	**L**∞	H	L	L	**L**∞	M	M	L	**L**	H	L	H	**L**	M
White-beaked dolphin	L	L	**L**∞	M	L	L	**L**∞	M	M	L	**L**	M	L	H	**L**	M
Bottlenose dolphin (offshore)	L	L	**L**∞	H	L	L	**L**∞	M	M	L	**L**	H	L	H	**L**	M
Bottlenose dolphin (coastal)	L	L	**L**∞	M	L	L	**L**∞	M	M	L	**L**	M	L	H	**L**	M
Risso's dolphin	L	L	**L**∞	M	L	L	**L**∞	M	M	M	**M**	M	L	H	**L**	M
Long-finned pilot whale	L	L	**L**∞	H	L	L	**L**∞	M	M	L	**L**	H	L	L	**L**	M
Killer whale	L	L	**L**∞	H	L	L	**L**∞	M	M	L	**L**	M	L	H	**L**	M
Minke whale	L	L	**L**∞	M	L	L	**L**∞	M	M	L	**L**	M	L	H	**L**	M

∞Noise from operational platforms is not thought to be a significant concern.

[$]Evidence for the effect of permanently placed ADDs associated with aquaculture is limited but has the potential to affect movement patterns and may be locally significant. Disturbance impacts have been demonstrated for some species. ADDs are also used as mitigation prior to offshore construction and for ordnance detonation.

†Fish finders and depth sounders occur on almost all vessels.

	Pressure: Acoustic disturbance															
	Pingers				**Mining and dredging activities**				**Vessel noise**				**Military activity and sonar**			
Species	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score
Harbour porpoise	M	L	**L**∞	H	M	L	**L**$	M	M	M	**M**†	M	M	L	**L**^	M
Common dolphin	M	L	**L**∞	H	M	L	**L**$	M	M	M	**M**†	M	M	L	**L**^	M
Atlantic white-sided dolphin	M	L	**L**∞	H	M	L	**L**$	H	M	L	**L**	H	M	L	**L**^	M
White-beaked dolphin	M	L	**L**∞	H	M	L	**L**$	M	M	M	**M**†	M	M	L	**L**^	M
Bottlenose dolphin (offshore)	M	L	**L**∞	H	M	L	**L**$	H	M	L	**L**	M	M	L	**L**^	M
Bottlenose dolphin (coastal)	M	L	**L**∞	M	M	L	**L**$	M	M	M	**M**†	M	M	L	**L**^	M
Risso's dolphin	M	L	**L**∞	H	M	L	**L**$	M	M	M	**M**†	M	M	L	**L**^	M
Long-finned pilot whale	M	L	**L**∞	H	M	L	**L**$	H	M	L	**L**	H	M	L	**L**^	M
Killer whale	M	L	**L**∞	H	M	L	**L**$	M	M	M	**M**†	M	M	L	**L**^	M
Minke whale	M	L	**L**∞	H	M	L	**L**$	M	M	M	**M**†	M	M	L	**L**^	M

∞Pingers are used to alert animals to the presence of nets to reduce bycatch risk. Evidence shows they can be effective for some species. Pingers are currently used only on gillnet vessels >12m in length, which is a small proportion of the UK gillnet fleet.

$Noise emitted during dredging operations is broadband and unlikely to cause damage to marine mammal auditory systems, but masking and behavioural changes are possible.

†Behavioural reactions have been observed in response to vessels. Vulnerability is highest in areas of busy shipping lanes.

^Overall low vulnerability across UK but locally/regionally high at certain times when operations are occurring.

	Pressure: Physical Disturbance							
	Scientific studies (e.g. tagging, photo ID, biopsy)				Recreation and wildlife tourism[$]			
Species	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score
Harbour porpoise	M	L	**L**∞	H	M	L	**L**	H
Common dolphin	M	L	**L**∞	H	M	L	**L**	M
Atlantic white-sided dolphin	M	L	**L**∞	H	M	L	**L**	H
White-beaked dolphin	M	L	**L**∞	H	M	L	**L**	H
Bottlenose dolphin (offshore)	M	L	**L**∞	H	M	L	**L**	H
Bottlenose dolphin (coastal)	M	L	**L**∞	H	M	M	**M**	H
Risso's dolphin	M	L	**L**∞	H	M	L	**L**	H
Long-finned pilot whale	M	L	**L**∞	H	M	L	**L**	H
Killer whale	M	L	**L**∞	H	M	M	**M**	M
Minke whale	M	L	**L**∞	H	M	L	**L**	M

∞Limited in UK waters, with certain activities requiring licensing. Some work is taking place in UK waters, which is predominantly photo ID. Disturbance from research vessels is a small component of all vessel traffic.

[$]There are multiple studies indicating behavioural impacts concerning tourist boat interactions with cetacean species. This may be locally significant.

	Pressure: Change to habitat															
	Barrier to movement				Change/removal of supporting habitat				Reduction in availability of prey				Localised temperature change			
Species	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score
Harbour porpoise	M	L	**L**∞	H	M	L	**L**$	M	M	M	**M**	H	L	L	**L**^	H
Common dolphin	M	L	**L**∞	H	M	L	**L**$	M	M	M	**M**	H	L	L	**L**^	H
Atlantic white-sided dolphin	M	L	**L**∞	H	M	L	**L**$	H	M	M	**M**	M	L	L	**L**^	H
White-beaked dolphin	M	L	**L**∞	H	M	L	**L**$	M	M	M	**M**	M	L	L	**L**^	H
Bottlenose dolphin (offshore)	M	L	**L**∞	H	M	L	**L**$	H	M	M	**M**	M	L	L	**L**^	H
Bottlenose dolphin (coastal)	M	L	**L**∞	H	M	L	**L**$	M	M	M	**M**	M	L	L	**L**^	H
Risso's dolphin	M	L	**L**∞	H	M	L	**L**$	H	H	M	**M**	M	L	L	**L**^	H
Long-finned pilot whale	M	L	**L**∞	H	M	L	**L**$	H	M	M	**M**†	L*	L	L	**L**^	H
Killer whale	M	L	**L**∞	H	M	L	**L**$	H	M	M	**M**	M	L	L	**L**^	H
Minke whale	M	L	**L**∞	H	M	L	**L**$	M	M	M	**M**	M	L	L	**L**^	H

∞Evidence of barrier to movement it very limited but may be locally significant.

$Very little evidence of changes to or removal of supporting habitat, but may be locally significant.

†Changes in prey availability due to competition with other marine predators, fishing or climate change, may have an impact. Post mortem examinations can provide some evidence of the occurrence of starvation, but not cause and effect. For some species, starvation has never been recorded as a cause of death in post mortem examinations.

^Local water temperature changes, for example cooling water discharges from power stations, is unlikely to have population level effects due to its localised nature.

	Pressure: Physical injuries/mortality											
	Vessel strikes				Collision with renewable energy devices				High energy acoustic events (e.g. removal of unexploded ordnance)			
Species	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score
Harbour porpoise	H	M	**M**∞	H	H	L	**L**$	H	H	L	**L**†	H
Common dolphin	H	M	**M**∞	H	H	L	**L**$	H	H	L	**L**†	H
Atlantic white-sided dolphin	H	L	**L**	M	H	L	**L**$	H	H	L	**L**†	H
White-beaked dolphin	H	M	**M**∞	M	H	L	**L**$	H	H	L	**L**†	H
Bottlenose dolphin (offshore)	H	M	**M**∞	M	H	L	**L**$	H	H	L	**L**†	H
Bottlenose dolphin (coastal)	H	M	**M**∞	M	H	L	**L**$	H	H	L	**L**†	H
Risso's dolphin	H	M	**M**∞	M	H	L	**L**$	H	H	L	**L**†	H
Long-finned pilot whale	H	L	**L**	M	H	L	**L**$	H	H	L	**L**†	H
Killer whale	H	M	**M**∞	M	H	L	**L**$	H	H	L	**L**†	H
Minke whale	H	M	**M**∞	M	H	L	**L**$	H	H	L	**L**†	H

∞Vessel strike is recorded as a cause of death from some species, although it is not of high concern. There is no requirement for vessels to report strikes occurring at sea and carcasses may not wash up on land.

$Limited wet renewable devices in place and limited understanding or evidence of impact, but potentially may be locally significant.

†Loud noises can result in injury to cetaceans, particularly to their hearing, although there is very little evidence.

	Pressure: Marine pollution															
	Oil pollution				Chemical pollution (e.g. PCBs Butyl tins, PAHs, Radionuclides, heavy metals)				Plastic pollution (ingestion)				Entanglements in marine litter and ghost nets			
Species	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score
Harbour porpoise	M	L	**L**∞	H	H	H	**H**$	H	H	L	**L**†	H	H	L	**L**^	H
Common dolphin	M	L	**L**∞	H	H	H	**H**$	H	H	L	**L**†	H	H	L	**L**^	H
Atlantic white-sided dolphin	M	L	**L**∞	H	H	M	**M**	M	H	L	**L**†	M	H	L	**L**^	M
White-beaked dolphin	M	L	**L**∞	H	H	H	**H**$	M	H	L	**L**†	M	H	L	**L**^	M
Bottlenose dolphin (offshore)	M	L	**L**∞	H	H	M	**M**	M	H	L	**L**†	M	H	L	**L**^	M
Bottlenose dolphin (coastal)	M	L	**L**∞	H	H	H	**H**$	H	H	L	**L**†	M	H	L	**L**^	M
Risso's dolphin	M	L	**L**∞	H	H	H	**H**$	M	H	L	**L**†	M	H	L	**L**^	M
Long-finned pilot whale	M	L	**L**∞	H	H	M	**M**	M	H	L	**L**†	M	H	L	**L**^	M
Killer whale	M	L	**L**∞	H	H	H	**H**$	H	H	L	**L**†	M	H	L	**L**^	M
Minke whale	M	L	**L**∞	H	H	H	**H**$	M	H	L	**L**†	M	H	L	**L**^	M

∞No records of any spills in which a cetacean was affected in the UK. Globally there are few examples of oil spills having direct negative effects on cetaceans.

$Impacts of contaminants on cetaceans is well documented for some species, including impacts on immune system and reproduction. Limited or no data for some species.

†Plastic ingestion is monitored through post-mortem examination of stranded animals. There have been post-mortems of all species within this strategy, but for some the sample sizes are too small.

^Very little evidence of impacts in UK waters from strandings data.

	Pressure: Marine pollution			
	Eutrophication, sewage pathogens			
Species	Sensitivity	Exposure	**UK vulnerability score**	Confidence in score
Harbour porpoise	M	L	**L**∞	H
Common dolphin	M	L	**L**∞	H
Atlantic white-sided dolphin	M	L	**L**∞	M
White-beaked dolphin	M	L	**L**∞	M
Bottlenose dolphin (offshore)	M	L	**L**∞	M
Bottlenose dolphin (coastal)	M	L	**L**∞	M
Risso's dolphin	M	L	**L**∞	M
Long-finned pilot whale	M	L	**L**∞	M
Killer whale	M	L	**L**∞	M
Minke whale	M	L	**L**∞	M

∞Nutrient enrichment in areas of agriculture, aquaculture or sewage may pose a threat to an individual cetacean, but the consequence of exposure to the population is unlikely to be a concern

Section 3 - Existing management

15. This section identifies the existing legislation, measures and monitoring of the pressures and activities which are identified in the species vulnerability assessments. It provides an assessment of effectiveness by species by using the following scoring system:

- 1 = current measures considered adequate/no measures required;
- 2 = further research required;
- 3 = additional/new wider-measures to be considered for medium vulnerability;
- 4 = additional/new wider-measures to be considered for high vulnerability.

16. In some circumstances there are combined scores which can be explained as follows:

- 1 / 2 = both descriptions for 1 and 2 apply. This combination arises where the existing evidence is contrary to the vulnerability score or where there is no evidence of impact but there is known, although limited, overlap of species and pressure. Both may elicit further research.
- 2 / 3 or 2 / 4 = further research is required to determine if measures are necessary.

17. Table 4 summarises the management measures and monitoring programmes that are already in place. Annex 2 describes in more detail the current national and international legal framework for dolphins, porpoises and minke whale conservation.

Table 2: Existing management measures and nature of further measures to be considered

18. Recommendations are based on the assessment of the species vulnerability and confidence (Table 4).

Pressure	Activity	Key Legislation & Existing Measures	Harbour porpoise	Common dolphin	Atlantic white-sided dolphin	White-beaked dolphin	Bottlenose dolphin	Coastal bottlenose dolphin	Risso's dolphin	Long-finned pilot whale	Killer whale	Minke whale
Removal of non-target species (i.e. bycatch or entanglement)	Creeling and potting	Deck cards distributed through Scottish Creel Fishing Federation (Best practice for setting and in the event of an entanglement)	1/2	1/2	1	1/2	1	1/2	1/2	1	2/3	2/3
	Drift net fishing	(EU) 2019/1241 Technical Conservation Measures Regulation[1] Monitoring on ≥15m UK Article 12 EU Habitats Directive and transposed UK legislation ASCOBANS OSPAR	2	2	1	2	1	2	2	1	1	1

[1] Conservation of fisheries resources and the protection of marine ecosystems – EU Reg 2019/1241

Pressure	Activity	Key Legislation & Existing Measures	Harbour porpoise	Common dolphin	Atlantic white-sided dolphin	White-beaked dolphin	Bottlenose dolphin	Coastal bottlenose dolphin	Risso's dolphin	Long-finned pilot whale	Killer whale	Minke whale
	Trawling and purse seining	(EU) 2019/1241 Technical Conservation Measures Regulation Monitoring on ≥15m vessels west of UK Article 12 EU Habitats Directive and transposed UK legislation ASCOBANS OSPAR MSFD UK Marine Strategy	1/2	3	2/3	2/3	1/2	2/3	2/3	2/3	1	1

Pressure	Activity	Key Legislation & Existing Measures	Harbour porpoise	Common dolphin	Atlantic white-sided dolphin	White-beaked dolphin	Bottlenose dolphin	Coastal bottlenose dolphin	Risso's dolphin	Long-finned pilot whale	Killer whale	Minke whale
	Set (fixed) nets	(EU) 2019/1241 Technical Conservation Measures Regulation Pingers ≥12m gillnetters South West & North Sea Monitoring on ≥15m vessels west of Scotland and enforcement of pinger use through Royal Navy and Fisheries Protection inspections. Article 12 EU Habitats Directive ASCOBANS OSPAR	3	3	2	2/3	2/3	2/3	2/3	2/3	1	1
Acoustic disturbance	Cumulative impacts of acoustic disturbance	Strategic Environmental Impact Assessment Development of assessment tools (DEPONS/iPCOD) Licensing may include data submission to Marine Noise Registry for impulsive noise	2	2	2	2	2	2	2	2	2	2

Pressure	Activity	Key Legislation & Existing Measures	Harbour porpoise	Common dolphin	Atlantic white-sided dolphin	White-beaked dolphin	Bottlenose dolphin	Coastal bottlenose dolphin	Risso's dolphin	Long-finned pilot whale	Killer whale	Minke whale
	Seismic or geophysical surveys	EPS licensing; Environmental Impact Assessments and Habitat Regulations Assessment[2] JNCC Guidelines for minimising the risk of injury and disturbance to marine mammals from seismic surveys[3]	2	2	2	2	2	2	2	2	2	2
	Underwater explosions	EPS licensing; Environmental Impact Assessments and Habitat Regulations Assessment; JNCC guidance on minimising risk to marine mammals from explosion[4]	2	1	1	2	1	1	1	2	1	2

[2] In summary: 1) Geophysical surveys for oil & gas are licensed by BEIS throughout UK waters and therefore will require EIA, HRA and EPS assessment; 2) All geophysical surveys require EIA, HRA and EPS assessment in Scottish waters; 3) Non-oil & gas sub-bottom profiler surveys outside Scotland are exempt from requiring a licence, but a voluntary notification system exists for EPS assessment.

[3] JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys

[4] JNCC guidelines for minimising the risk of injury to marine mammals from using explosives

Pressure	Activity	Key Legislation & Existing Measures	Harbour porpoise	Common dolphin	Atlantic white-sided dolphin	White-beaked dolphin	Bottlenose dolphin	Coastal bottlenose dolphin	Risso's dolphin	Long-finned pilot whale	Killer whale	Minke whale
	Pile driving	EPS licensing; Environmental Impact Assessments and Habitat Regulations Assessment, JNCC "Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise"	2	1	1	2	1	2	2	1	1	2
	Operational offshore wind farms	Marine Licence, Environmental Impact Assessments and Habitat Regulations Assessment	2	1	1	2	1	2	2	1	1	1/2
	Operational oil and gas platforms	Environmental Impact Assessments and Habitat Regulations Assessment	1/2	1	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
	Acoustic deterrent devices (ADDs)	May require an EPS licence if there is a risk of significant disturbance or injury	2	2	1	2	1	2	2/3	1	2	2

Pressure	Activity	Key Legislation & Existing Measures	Harbour porpoise	Common dolphin	Atlantic white-sided dolphin	White-beaked dolphin	Bottlenose dolphin	Coastal bottlenose dolphin	Risso's dolphin	Long-finned pilot whale	Killer whale	Minke whale
	Fish finders and depth sounders		1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
	Pingers	(EU) 2019/1241 Technical Conservation Measures Regulation	1	1	1	1	1	1	1	1	1	1
	Mining and dredging activities	Marine Licence and Crown Estate lease.	1/2	1/2	1	1/2	1	1/2	1/2	1	1/2	1/2
	Vessel noise	If part of a development may be subject to: Marine Licence, Environmental Impact Assessments and Habitat Regulations Assessment	2/3	2/3	1	2/3	2	2/3	2/3	1	2/3	2
	Military activity and sonar	Marine Environment and Sustainability Assessment Tool (MESAT). Alert system	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2

Pressure	Activity	Key Legislation & Existing Measures	Harbour porpoise	Common dolphin	Atlantic white-sided dolphin	White-beaked dolphin	Bottlenose dolphin	Coastal bottlenose dolphin	Risso's dolphin	Long-finned pilot whale	Killer whale	Minke whale
Physical disturbance	Scientific studies (e.g. tagging, photo ID, biopsy)	Certain activities require licensing	1	1	1	1	1	1	1	1	1	1
	Recreational and Wildlife Tourism	Voluntary wildlife watching codes in some regions; Scottish Marine Wildlife Watching Code; Ceredigion County Council boat patrols to monitor activity with regard to code of conduct in Cardigan Bay	1	2	1	1	1	3	1	1	2/3	2
Change to habitat	Barrier to movement	EPS licensing, Environmental Impact and Habitat Regulations Assessment	1	1	1	1	1	1	1	1	1	1
	Change / removal of supporting habitat	EPS licensing, Environmental Impact and Habitat Regulations Assessment	1/2	1/2	1	1/2	1	1/2	1	1	1	1/2

Pressure	Activity	Key Legislation & Existing Measures	Harbour porpoise	Common dolphin	Atlantic white-sided dolphin	White-beaked dolphin	Bottlenose dolphin	Coastal bottlenose dolphin	Risso's dolphin	Long-finned pilot whale	Killer whale	Minke whale
	Reduction in availability of prey	Fisheries quotas manage EU stocks of commercial species UK Cetacean Strandings Investigation Programme (UKCSIP)[5] Scottish Marine Animal Strandings Scheme (SMASS)[6]	3	3	2/3	23	2	2	2	1/2	2	2
	Localised temperature change	The process leading to the change (e.g. cooling water discharge) would require licence from relevant authority	1	1	1	1	1	1	1	1	1	1
Physical injury	Vessel strikes	Recorded through UK Cetacean Strandings Investigation Programme and Scottish Marine Animal Strandings Scheme. Internal Whaling Commission (IWC) ship strike register[7].	3	3	1/2	2/3	2/3	2/3	2/3	1	2/3	2

[5] The UK Cetacean Strandings Investigation Programme
[6] The Scottish Marine Animal Stranding Scheme
[7] Ship Strikes: collisions between whales and vessels

Pressure	Activity	Key Legislation & Existing Measures	Harbour porpoise	Common dolphin	Atlantic white-sided dolphin	White-beaked dolphin	Bottlenose dolphin	Coastal bottlenose dolphin	Risso's dolphin	Long-finned pilot whale	Killer whale	Minke whale
	Collision with renewable energy devices	Environmental Impact and Habitat Regulations Assessments [EPS licences may be required]	1	1	1	1	1	1	1	1	1	1
	High energy, acoustic events, for example removal of unexploded ordnance	JNCC Protocol for Minimising the risk of injury to marine mammals from explosives use[8] Statutory Nature Conservation Bodies (SNCB) protocol for minimising the risk of injury to marine mammals from piling noise [9] Environmental Impact and Habitat Regulations Assessments [EPS licences may be required]	1	1	1	1	1	1	1	1	1	1

[8] JNCC guidelines for minimising the risk of injury to marine mammals from using explosives
[9] Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise

Pressure	Activity	Key Legislation & Existing Measures	Harbour porpoise	Common dolphin	Atlantic white-sided dolphin	White-beaked dolphin	Bottlenose dolphin	Coastal bottlenose dolphin	Risso's dolphin	Long-finned pilot whale	Killer whale	Minke whale
Marine pollution	Oil pollution	Various industry standards and measures to prevent & respond to spills	1	1	1	1	1	1	1	1	1	1
	Chemical pollution (e.g. PCBs, butyltins, PAHs, Radionuclides)	UK and EU legislation that limits/prohibits disposal of chemicals (Annex 1) Stockholm Convention	4	4	2/3	2,4	2/3	4	2/3	2/3	4	2
	Plastic pollution (ingestion)	OSPAR Regional Action Plan for prevention and management of marine litter in the North-East Atlantic	1	1	2	2	2	2	2	2	2	2
	Entanglements in marine litter & ghost nets	OSPAR Regional Action Plan for prevention and management of marine litter in the North-East Atlantic	1	1	2	2	2	2	2	2	2	2

Pressure	Activity	Key Legislation & Existing Measures	Harbour porpoise	Common dolphin	Atlantic white-sided dolphin	White-beaked dolphin	Bottlenose dolphin	Coastal bottlenose dolphin	Risso's dolphin	Long-finned pilot whale	Killer whale	Minke whale
	Eutrophication, sewage pathogens	The EU Water Framework Directive - integrated river basin management for Europe (WFD)[10]	1	1	2	2	2	2	2	2	2	2

[10] Introduction to the EU Water Framework Directive

Section 4: Approach to Assessing Vulnerability to Pressures.

Vulnerability

19. The vulnerability of a species is a measure of the risk of impact to the UK population of each of the named species from a pressure to which it is sensitive.

The assessment process

20. Each species covered by this strategy has been assessed for vulnerability to pressures in UK waters, on a UK scale. These vulnerability assessments support the identification of priorities and consequent development of actions with a view to conserving UK cetacean populations.

21. The vulnerability of a species to a pressure within UK waters is a combination of its sensitivity and exposure to the pressure.

22. The components of vulnerability are defined as:

1) Sensitivity: the likelihood of change when a pressure is applied to an individual animal in terms of its ability to:

1. tolerate or resist change (resistance) and;

2. recover (resilience).

2) Exposure: the action of a pressure with regards to the area over which the pressure extends, the intensity and duration of the pressure and the proportion of the population experiencing the pressure as indicated by the spatial distribution of individuals within that population.

23. It is only those changes that have consequences for fecundity (reproductive ability) or survival of the individual that are considered in this assessment of sensitivity.

Assessing vulnerability

24. To assess vulnerability to a population, the matrix below uses the combination of sensitivity at the individual level and exposure at the population level to score how vulnerable the species is to each pressure:

Exposure of population	Sensitivity of Individuals			
		L	M	H
	L	L	L	L
	M	L	M	M
	H	L	M	H

Assessing sensitivity

25. To assess sensitivity, the potential for mortality or impact on fecundity or survival of an individual when exposed to a pressure was assessed. For example, if an individual of a species were to encounter a pressure, is it likely that the result would be mortality or a direct impact on reproductive capabilities?

26. Sensitivity for a species is graded as below, considering the available evidence on individual responses to pressures:

- *High sensitivity to a pressure:* the pressure impacts the individual of a species directly and it would be unable to resist change and could not recover (e.g. direct mortality as a result of bycatch) OR the pressure acts indirectly (e.g. through prey consumption) but the consequence directly impacts survival/fecundity and it would be unable to resist change and could not recover (e.g., bioaccumulation of contaminants).

- *Medium sensitivity to a pressure*: the pressure may impact the fecundity/fitness of an individual of a species indirectly e.g. the pressure elicits behavioural/physiological change that may have consequences on fecundity/fitness Individuals may tolerate and/or recover (e.g., noise disturbance).

- *Low sensitivity to a pressure*: the pressure does not impact survival or fecundity, directly or indirectly, of the individual of a species. Individuals are resistant to the pressure.

Assessing exposure

27. To assess exposure, the distribution of individuals of each species was compared to the distribution of each pressure at the UK scale. Any spatial overlap was graded High, Medium or Low. These gradings were then adjusted to take account of the persistence and intensity of the pressure at a UK scale. For example, a very wide-ranging pressure with a high overlap with species distribution, but infrequent and of short duration, would be expressed as Medium or Low exposure.

28. This latter stage is largely based on expert opinion of how often the pressure tends to occur and its magnitude/intensity. Where exposure to a pressure is locally or regionally different from the overall UK picture, this is noted in Table 4 and the UK level scorings would not necessarily apply.

29. Exposure is entirely based on an assessment of the pressure and did **not** consider how the behaviour or ecology of a species may mediate exposure. Such

information was not used because there is insufficient evidence to consistently apply such considerations across all species.

Section 5 – Confidence Scores and Supporting Evidence

Confidence

30. The confidence in the resulting vulnerability score has been assessed with the aid of a confidence decision tree (Figure 2). The confidence in the vulnerability assessment is based on the available evidence, as to whether the UK population of a species is impacted, or not, by a pressure.

31. There are two main sources of evidence:

- the published literature and, specific to the UK,
- through UK monitoring of pressures impacting cetaceans.

Evidence

32. At the UK scale, the main sources of evidence regarding the impacts of pressures arise from the Cetacean Strandings and Investigation Programme (CSIP) and associated partners, the Bycatch Monitoring Programme, published and “grey” scientific literature.

33. The level of evidence that these sources provide varies by species; for example, the UK CSIP provides robust evidence for harbour porpoises and common dolphins, and less robust evidence for some other species due to the lower numbers of strandings. A summary of the evidence provided by CSIP is given in Table 3. The evidence is considered robust if there have been more than 100 post mortem examinations (PMEs) over a five-year period for a single species.

34. The bycatch monitoring scheme targets fisheries and areas where the bycatch risk posed to harbour porpoises and common dolphins is highest; therefore, sampling for these species is likely to be much more adequate than for some other species.

35. Table 3 sets out the number of PMEs carried out between 2007 – 2016, inclusive, by CSIP and the Scottish Marine Animal Strandings Scheme (SMASS). Numbers are split by species and the cause of death (where one could be attributed) is provided as a percentage of all PMEs for that species.

Table 3: Summary of evidence from the PME work of the CSIP and SMASS

	Harbour porpoise	Common dolphin	White-beaked dolphin	Atlantic white-sided dolphin	Risso's dolphin	Bottlenose dolphin	Long-finned pilot whale	Killer whale	Minke Whale
Number of PMEs	691	227	53	27	17	31	68*	4	30
Percentage (%) of PME identifying the particular cause of death									
Physical trauma due to vessel collision	2	4	0	0	6	0	0	0	1
Entanglement	0	0	0	0	0	0	0	25	5
Starvation	23	10	20	11	17	10	1	50	0
Bycatch	14	23	2	0	6	10	0	0	0

Note the percentages do not sum to 100; the remainder are causes of death that could not be attributed.

* the high number is the result of three mass stranding events in Scotland involving long-finned pilot whales - Kyle of Durness (2011), Pittenweem (2012) and Western Isles (2015).

Assessing confidence

36. Confidence in the vulnerability assessment has been derived from consideration of the actual impact of a pressure on a species driven by the identified activities, as evidenced by the available literature and monitoring data. In the absence of evidence about the impact, the confidence in the vulnerability score would not necessarily be low, if we have good evidence of the exposure. Evidence of exposure is clearly an important consideration if the pressure/species vulnerability scores are to be appropriately prioritised for action.

Confidence Decision Tree

37. Figure 2 details the Confidence Decision Tree and how the scoring is derived from it. The scoring for confidence is:

- H= High;
- M= Moderate;
- L= Low; and
- L* = Low because of contradictory evidence.

38. The bottom row of the decision tree (Figure 2) indicates the nature of the measure that will be considered for each vulnerability/confidence combination. These outcomes were then considered in the context of current research and the measures already in place to identify where the gaps remain and how best these can be addressed. The nature of the measures refers to:

- 1 = current measures considered adequate/no measures required;
- 2 = Further research required;
- 3 = Additional/new wider-measures to be considered for medium vulnerability;
- 4 = Additional/new wider-measures to be considered for high vulnerability.
- 1/2 – indicates that no measures are likely needed but some research may be required to verify that current measures are adequate.

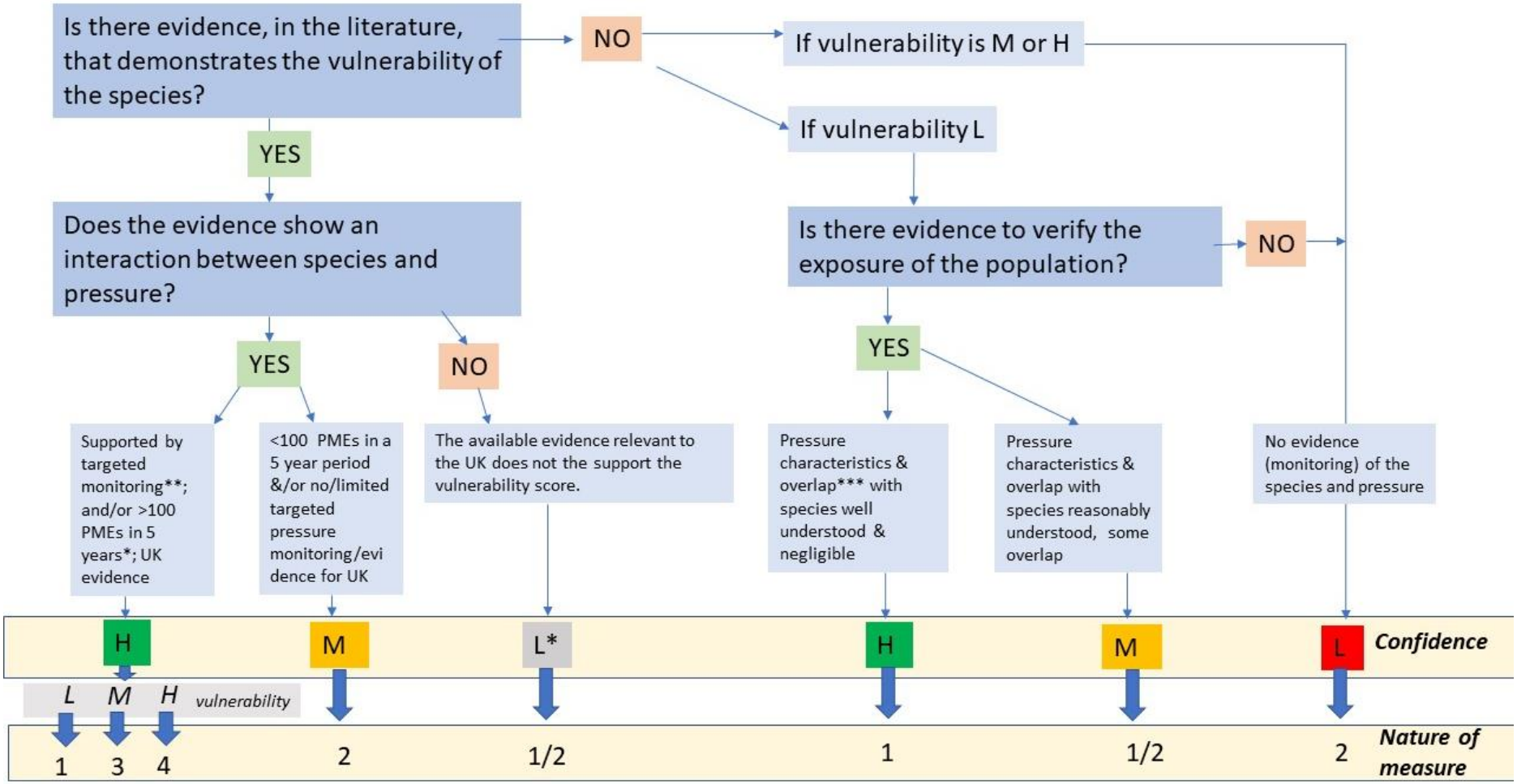

Figure 2: Decision tree used to grade confidence in the vulnerability assessment outcomes.

Table 4: UK Vulnerability assessments and supporting evidence for each species covered by the strategy

<table>
<tr><td colspan="4">Harbour porpoise</td></tr>
<tr><td colspan="2">Pressures and activities</td><td>Evidence supporting the UK assessment</td><td>Regional/Local variations where vulnerability likely higher than UK assessment due to increased exposure</td></tr>
<tr><td rowspan="3">Removal of non-target species (i.e. bycatch or entanglement)</td><td>Creeling and potting</td><td rowspan="3">Bycatch in fishing gear (particularly bottom set gillnets) is recognised as the greatest anthropogenic pressure in UK and adjacent waters (Read et al, 2006; ICES 2015a; Northridge et al. 2016), but this varies by region, with the South West being of greatest concern, followed by the North Sea (Northridge et al., 2016). Monitoring of bycatch (Northridge et al., 2016) has focused on set nets and until recently, pelagic trawls. There has been no targeted monitoring of creeling/pots through the current monitoring scheme but evidence from the strandings scheme and of anecdotal records suggest bycatch events in creels and pots are very rare</td><td></td></tr>
<tr><td>Drift net fishing</td><td>Driftnet fishing is highest in the southern part of the North Sea</td></tr>
<tr><td>Trawling and purse seining</td><td></td></tr>
</table>

	Set (fixed) net fishing	(Northridge, 1988); porpoises may be able to avoid them and therefore this activity is not considered a high risk. There has been some monitoring of drift net fisheries and interactions recorded. No harbour porpoises have been recorded as bycatch in pelagic trawls, despite considerable monitoring. Bycatch is greatest in set nets and these are the focus of the UK bycatch monitoring scheme. There are some regional variations from the UK assessment (Table 4) where exposure and vulnerability are likely higher.	Set net fishing is highest in the southwest approaches of the Celtic and Irish Seas.
Acoustic disturbance	**Cumulative impacts of acoustic disturbance**	Sound introduced in the marine environment by human activities is one of the key areas of concern with regards to potential detrimental effects. Whilst the vulnerability to a particular activity may be low, when multiple operations and/or different activities occur at the same time or over an extended time period, the impact is likely to be greater. However, evidence on the population level impacts of cumulative noise (across industry sources) in lacking.	West Scotland
	Seismic or geophysical surveys	Behavioural response of harbour porpoises to noise (pile driving: Carstensen *et al*., 2006; Brandt *et al*., 2011; Teilmann and Carstensen, 2012; seismic surveys: Stone & Tasker, 2006; Stone, 2015; Thompson *et al*., 2013: Deaville and Jepson, 2011; ICES, 2012; Shipping: Heinänen and Skov, 2015). The density of harbour porpoises tends to recover in an area when the disturbance has ceased (Thompson *et al*., 2013; Brandt *et al*., 2011). However, the impact of disturbance on fecundity and survival of the species is not well understood.	North Sea
	Underwater explosions		Southern North Sea
	Pile driving		Southern/central North Sea

	Operational offshore wind farms	Noise from operational wind farms is produced at frequencies that are not thought to be a significant concern (Marmo *et al*.,2013) to marine mammals. Installations may create foraging opportunities (Scheidat *et al*., 2011) and return post-construction can be quick; however, there is a single example from long term monitoring of Nysted Offshore windfarm where porpoises had not returned to 'baseline densities' 10 years on from construction (Tougaard *et al*., 2005; Teilmann *et al*., 2012).	
	Operational oil and gas platforms	Whilst the impact of drilling is potentially high (Boyd, 2008), there have been no studies that have investigated negative impacts from operational oil and gas platforms. However, the exposure to the pressure is limited.	
	Acoustic deterrent devices (ADDs)	Evidence for the effect of permanently placed ADDs associated with aquaculture can show impacts on movement patterns, local density and may cause habitat exclusion (Götz & Janik, 2013; ICES, 2015b). The extent of the impact varies with device (e.g. see Northridge et al. 2013b) with some having greater potential to impact than others. ADDs are also used as mitigation prior to offshore construction and for ordnance detonation; they are used to exclude animals from the area as a means of mitigating against injury.	
	Fish finders and depth sounders	Fish finders and depth sounders occur on almost all vessels. However, the noise produced from currently used devices, although audible, is at frequencies that are not a significant concern (DeRuiter & Lurton, 2011; Deng *et al*., 2014) in the context of causing impacts to marine mammals However, new devices are being introduced and the sensitivity to such and potential impacts should be regularly reviewed.	

	Pingers	Pingers are used to alert animals to the presence of nets to reduce the risk of bycatch. Their effectiveness in reducing harbour porpoise bycatch, effectively by causing a behavioural response, is well documented (e.g. Larsen *et al*., 2013, Larsen and Eigaard 2014, Northridge *et al*., 2011). Extensive pinger use could have detrimental effects through habitat exclusion. However, pingers are currently used only on gillnet vessels ≥12m in length, which is a very small proportion of the UK gillnet fleet.	
	Mining and dredging activities	Noise emitted during dredging operations is broadband and is unlikely to cause damage to marine mammal auditory systems, but masking and behavioural changes, including disturbance, are possible (Tillin *et al*., 2011; Todd *et al*., 2015).	
	Vessel noise	Behavioural reactions have been observed in response to shipping (Richardson, 1995; Skov *et al*., 2014) and reduced porpoise density around shipping lanes of the UK was shown in Heinänen and Skov (2015). Smaller vessels and recreational craft may produce higher frequency noise than shipping and these may also be expected to lead to area avoidance behaviour (IAMMWG et al. 2015). Regionally, vulnerability is highest in areas of busy shipping lanes, such as the southern North Sea. Vulnerability may be higher locally at certain times of the year.	Southern North Sea
	Military activity and sonar	A single case proposes a link with military activities and harbour porpoise mortality (Wright *et al*., 2013; Siebert *et al*., 2013) although there are numerous cases in other species, particularly beaked whales. Activities are likely to cause behavioural responses such as disturbance, which are	South west approaches Cardigan Bay and South

		energetically costly but whether these lead to long-term population level impacts is poorly understood (Harris et al. 2017). Responses vary between and within individuals and populations (Harris et al. 2017). Overall, there is low vulnerability across the UK but regionally high at certain times when operations are occurring.	Pembrokeshire, Wales West Scotland
Physical disturbance	**Scientific studies (e.g. tagging, photo ID, biopsy)**	Limited in UK waters, with certain activities requiring licensing. The elusive nature of harbour porpoises means it has rarely been subjected to more invasive scientific studies in the UK. Some tagging has taken place in Denmark (e.g. during the DEPONS project, Nabe-Nielsen et al. 2018) and tagging feasibility is being investigated in the Netherlands (Scheidat *et al*., 2016). Disturbance from research vessels is a small component of all vessel traffic.	
	Recreation and Wildlife tourism	There are many studies that indicate behavioural impacts from tourist vessel interaction with other species, e.g. bottlenose dolphin and common dolphin (e.g. Hastie *et al*., 2003; Neumann and Orams, 2006; Bejder *et al*., 2006; Stockin *et al*., 2008; Meissner *et al*., 2015). Harbour porpoises are not typically targeted for tourism, but potentially some local disturbance impacts as a consequence of activities targeting other species.	
Change to habitat	**Barrier to movement**	Evidence of changes in habitat due to barriers to movement (e.g. from placement of structures on the seabed) of cetacean species is very limited (ICES, 2015b). In the UK, there is potential for higher exposure to this pressure on the west coast of Scotland due to its complex coastline and impacts on movement that 'barriers' might cause. ICES (2015b)	

		recognised that barrier effects may be locally significant but at the UK scale, there is negligible overlap of the pressure and the species.	
	Change / removal of supporting habitat	Very few studies of effects on harbour porpoises from changes to or removal of supporting habitat, but may be locally significant. Potential for higher exposure to this pressure and therefore greater vulnerability in the North Sea and Celtic and Irish Seas, where activities such as aggregate extraction and bottom fishing are more concentrated.	North Sea Celtic Sea Irish Sea
	Reduction in availability of prey	Changes in prey availability, due to: competition with other marine predators, fishing or climate change, may have an impact on porpoises (Santos and Pierce, 2003; Santos *et al*., 2004; MacLeod *et al*., 2007a; MacLeod *et al*., 2007b; Thompson *et al*., 2007). Starvation is a commonly recorded cause of death in stranded individuals (see UK CSIP annual reports: https://ukstrandings.org/csip-reports) but there is no understanding of its cause in the population. There is some recent information on prey preferences (Hernandez-Milan 2014; Andreasen *et al*., 2017), but information on the implications of changes in prey availability is lacking.	
	Localised temperature change	Local water temperature changes (e.g. cooling water discharges from power stations), is unlikely to have population level effects due to its localised nature.	
Physical Injury/mortality	**Vessel strikes**	Harbour porpoises tend to avoid vessels (e.g. Heinenan and Skov, 2015) and this may mediate their exposure to the pressure to some degree. However, monitoring of stranded animals shows that vessel strikes are identified as a cause of death for this species (Deaville and Jepson 2011;	

		Deaville, 2016; ICES, 2015b). There is no requirement for vessels to report strikes occurring at sea, and carcasses may not wash up on land and so the true extent of this pressure is likely underestimated.	
	Collision with renewable energy devices	Few wet renewable devices are currently in place, therefore limited efforts to measure impacts and thus little understanding or evidence of impact. Where such projects are implemented, vulnerability will be higher due to increased exposure. The demonstration project at MeyGen is carrying out acoustic monitoring around the turbine, collecting data on cetaceans including harbour porpoise, with further surveys planned. Potentially locally significant.	
	High energy, acoustic events e.g. explosions	Loud noise explosions can result in injury to cetaceans (NOAA, 2018). For example, the clearance of unexploded ordinance has the potential to cause permanent hearing loss to those harbour porpoise within range of the blasts (von Benda-Beckmann et al. 2015).	Southern North Sea Cardigan Bay and South Pembrokeshire, Wales
Marine pollution	**Oil pollution**	There are no published records of any spills in which a harbour porpoise was affected. No measurable effect of the "Erika" oil spill was found (Ridoux et al 2004) or the "Braer" spill (Kingston, 1999).	
	Chemical pollution (e.g. PCBs, butyltins,	Impact of contaminants on cetaceans is well documented (Jepson *et al*., 1999, 2005; 2016; Hall *et al*., 2006; ICES, 2015b). These include impacts on reproductive abilities of harbour porpoises (Murphy *et al*., 2015).	

	PAHs, Radionuclides, heavy metals)		
	Plastic pollution (ingestion)	Plastic ingestion is monitored through post-mortem examination of stranded animals. Its presence has been noted in harbour porpoises but has not been identified as the acute cause of death (Deaville, 2016).	
	Entanglements in marine litter & ghost nets	Little evidence of impacts in UK waters from strandings data (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b).	
	Eutrophication, sewage pathogens	Nutrient enrichment in areas of agriculture, aquaculture or sewage may pose a threat to individuals (Simeone *et al*., 2015), but the consequence of exposure to the population is unlikely to be a concern.	

Common dolphin			
Pressures and activities		**Evidence supporting the assessment**	**Regional variations where vulnerability likely higher than UK assessment due to increased exposure**
Removal of non-target species (i.e. bycatch or entanglement)	**Creeling and potting**	Monitoring of bycatch (Northridge *et al*., 2016) has focused on set nets and until recently, pelagic trawls. Limited monitoring of drift nets and none of creeling/pots in the current bycatch monitoring scheme. Bycatch occurs mainly in trawls, but also in set net fisheries, with the primary area of concern being the south west approaches (Deaville and Jepson, 2011; Deaville and Jepson, in press; Murphy *et al*., 2013; Northridge *et al*., 2016). Evidence from the strandings scheme or anecdotal records suggest bycatch events in creels and pots are very rare and therefore this activity is not considered a high risk.	
	Drift net fishing		
	Trawling and purse seining		
	Set (fixed) net fishing		South west approaches
Acoustic disturbance	**Cumulative impacts of acoustic disturbance**	Sound introduced into the marine environment by human activities is one of the key areas of concern with regards to potential detrimental effects. Whilst the vulnerability to a particular activity may be low, when multiple operations and/or different activities occur at the same time, or over an extended time period, the impact is likely to be greater.	
	Seismic or geophysical surveys	Disturbance is a documented response of cetaceans to noise (Goold, 1996; Stone and Tasker, 2006; ICES, 2012; Stone, 2015). Whilst the impact of disturbance on fecundity and survival of this species is not well	

	Underwater explosions	understood, the distribution of the species means their exposure to the pressure may be less than other species that occur year-round in the industrialised North Sea for example.	
	Pile driving		
	Operational offshore wind farms	Noise from operational wind farms is produced at frequencies that are not thought to be a significant concern (Marmo *et al*., 2013) to marine mammals. There is currently negligible overlap of this species and pressure.	
	Operational oil and gas platforms	Whilst the impact of drilling is potentially high (Boyd, 2008), there is no evidence to suggest operational platforms have a significant impact on this species. Other studies have indicated that offshore installations may create foraging opportunities for some species (Todd *et al*., 2009) but there is little overlap of this species with the UK oil and gas platforms.	
	Acoustic deterrent devices (ADDs)	Evidence for the effect of permanently located ADDs associated with aquaculture shows that they can effect cetacean movement patterns (this data is mainly related to harbour porpoise), local densities and lead to habitat exclusion (ICES, 2015b). ADDs are also used as mitigation prior to offshore construction and for ordnance detonation; they are used to exclude animals from the area as a means of mitigating against injury.	West Scotland
	Fish finders and depth sounders	Fish finders and depth sounders occur on almost all vessels but the noise produced at these frequencies, although audible, are not a significant concern (Deng *et al*., 2014). However, new devices are being introduced and the sensitivity to such and potential impacts should be regularly reviewed.	
	Pingers	Pingers are used to alert animals to the presence of nets to reduce bycatch. Their effectiveness in reducing bycatch of common dolphin is	South west approaches

		less well understood (e.g. Northridge *et al*., 2011) and their success at 'deterring' animals from nets is dependent on the signal type and source level (Berrow et al. 2008). Pingers are currently used only on gillnet vessels >12m in length, which is a very small proportion of the UK gillnet fleet and hence exposure at UK scale is low.	
	Mining and dredging activities	Noise emitted during dredging operations is broadband and is unlikely to cause damage to marine mammal auditory systems, but masking and behavioural changes are possible (Tillin *et al*., 2011; Todd *et al*., 2015).	
	Vessel noise	Disturbance reactions in cetaceans have been observed in response to shipping (Richardson, 1995). Vulnerability is highest in areas of busy shipping lanes. Ansmann *et al*. (2005) reported that common dolphin change the frequency of their whistles in the English Channel, possibly as a response to shipping noise.	
	Military activity and sonar	Links have been drawn between mass stranding events and acoustic activity such as military operations (Jepson *et al*., 2013). Cases of acute and chronic forms of gas embolism, similar to those found in beaked whale strandings associated with sonar exercises, have been recorded, although the cause is unknown (Jepson *et al*., 2003; Deaville & Jepson 2011). Activities are likely to cause behavioural responses such as disturbance, which are energetically costly but whether these lead to long-term population level impacts is poorly understood (Harris et al. 2017). Responses vary between and within individuals and populations (Harris et al. 2017). Overall low vulnerability across the UK but regionally high at certain times when operations are occurring.	South west approaches North west Scotland

Physical disturbance	**Scientific studies (e.g. tagging, photo ID, biopsy)**	Limited in UK waters, with certain activities requiring licensing. Disturbance from research vessels is a small component of all vessel traffic.	
	Recreation and Wildlife tourism	There are multiple studies indicating behavioural impacts concerning tourist boat interaction with common dolphins elsewhere (e.g. Neumann and Orams, 2006; Stockin *et al*., 2008; Meissner *et al*., 2015). However, within the UK the highest risk areas are south-west Wales and south-west England where tourist operations coincide with distribution.	South west
Change to habitat	**Barrier to movement**	Evidence of changes in habitat due to barriers to movement of cetacean species is very limited (ICES, 2015b). In the UK, there is potential for higher exposure to this pressure on the west coast of Scotland due to its complex coastline. ICES (2015b) recognised that barrier effects may be locally significant but at the UK scale, there is negligible overlap of the pressure due to barrier creating activities and the species.	
	Change / removal of supporting habitat	Very little evidence of effects on common dolphin from changes to or removal of supporting habitat, but may be locally significant.	Celtic and Irish Seas
	Reduction in availability of prey	Changes in prey availability due to: competition with other marine predators, fishing or climate change, may have an impact on common dolphins. Starvation is a recorded cause of death in stranded individuals (see http://ukstrandings.org/csip-reports) but there is no understanding of its cause in the population. Common dolphins are opportunistic feeders (Young & Cockcroft 1994) and tend to select prey based on energy	

		densities (Santos et al. 2004, Brophy et al. 2009, and Spitz et al. 2010). They show seasonal changes in prey preferences (Murphy et al. 2013).	
	Localised temperature change	Local water temperature changes from, for example, cooling water discharges from power stations, is unlikely to have population level effects due to its localised nature.	
Physical Injury/mortality	**Vessel strikes**	Common dolphins are often attracted to vessels (Canadas *et al*., 2004). Monitoring of stranded animals suggests that vessel strikes area not a major cause of death for this species (Deaville and Jepson 2011; Deaville 2016; ICES, 2015b). However, there is no requirement for vessels to report strikes occurring at sea, and carcasses may not wash up on land, which means events are likely underreported.	
	Collision with renewable energy devices	Few wet renewable devices in place, limited efforts to measure impacts and thus little understanding or evidence of impact. Where such projects are implemented, vulnerability will be higher due to increased exposure. Potentially locally significant.	
	High energy, acoustic events, for example removal of unexploded ordnance	Loud noise can result in injury to cetaceans, particularly to their hearing (NOAA, 2018).	
Marine pollution	**Oil Pollution**	There are no published records of any spills in which a common dolphin was affected. No measurable effect of the "Erika" oil spill off Brittany was found on common dolphin (Ridoux *et al*., 2004).	

	Chemical pollution (e.g. PCBs, butyltins, PAHs, Radionuclides, heavy metals)	Impact of contaminants on cetaceans is well documented (Jepson *et al*., 1999, 2005; 2016; Hall *et al*., 2006; ICES, 2015b) with high PCB burdens thought to impact upon foetal survival in common dolphins (Murphy *et al*., 2012). The levels recorded in common dolphin are not as high as those recorded in other species in UK waters (Jepson *et al*., 2013).	
	Plastic pollution (ingestion)	Plastic ingestion is monitored through post-mortem examination of stranded animals. No evidence of direct plastic ingestion has been recorded for this species in UK waters (Deaville, 2016).	
	Entanglements in marine litter and ghost nets	Very little evidence of impacts in UK waters from strandings data (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b).	
	Eutrophication, sewage pathogens	Nutrient enrichment in areas of agriculture, aquaculture or sewage may pose a threat to individuals (Simeone *et al*., 2015), but the consequence of exposure to the population is unlikely to be a concern. Offshore distribution of this species limits their exposure.	

Atlantic white sided dolphin			
Pressures and activities		**Evidence supporting the assessment**	**Regional variations where vulnerability likely higher than UK assessment due to increased exposure**
Removal of non-target species (i.e. bycatch or entanglement)	**Creeling and potting**	Monitoring of bycatch (Northridge *et al*., 2016) has focused on set nets and until recently, pelagic trawls. Bycatch occurs in midwater trawls (Ross, 2003) and demersal gill nets (Reeves *et al*., 1999; Morizur *et al*., 1999; Couperus, 1997, Northridge *et al*., 2014) although evidence for significant bycatch in UK waters is limited. Bycatch events of small cetaceans in creels and pots are very rare but there has been limited monitoring of these gears. However, given the predominately offshore distribution of this species and coastal nature of creeling and potting and drift-netting, we are confident that exposure is low and these are not considered a high risk to this species.	
	Drift net fishing		
	Trawling and purse seining		West Scotland
	Set (fixed) net fishing		
Acoustic disturbance	**Cumulative impacts of acoustic disturbance**	Sound introduced in the marine environment by human activities is one of the key areas of concern with regards to potential detrimental effects. Whilst the vulnerability to a particular activity may be low, when multiple operations and/or different activities occur at the same time, or over an extended time period, the impact is likely to be greater.	

	Seismic or geophysical surveys	Disturbance is a documented response of cetaceans to noise (Stone and Tasker, 2006; ICES, 2012; Stone, 2015). Detections of Atlantic white-sided dolphins were significantly lower during large airgun and avoidance of vessels (Stone et al. 2017). However, it is not well understood what the impact of disturbance is on fecundity and survival of this species.	
	Underwater explosions		
	Pile driving		
	Operational offshore wind farms	Noise from operational wind farms is produced at frequencies that are not thought to be a significant concern (Marmo *et al*., 2013). Installations may create foraging opportunities for some species (Scheidat *et al*., 2011). Offshore nature of this species limits their exposure.	
	Operational oil and gas platforms	Whilst the impact of drilling is potentially high (Boyd, 2008), there have been no studies that have investigated negative impacts from operational oil and gas platforms. Other studies have indicated that offshore installations may create foraging opportunities for some species (Todd *et al*., 2009).	
	Acoustic deterrent devices (ADDs)	Evidence for the effect of permanently located ADDs associated with aquaculture is limited (this data is mainly related to harbour porpoise) but has potential to effect cetacean movement patterns (ICES, 2015b). Disturbance impacts have been demonstrated for other species (Risch *et al*., 2017). ADDs are also used as mitigation prior to offshore construction and for ordnance detonation; they are used to exclude animals from the area as a means of mitigating against injury. However, the offshore distribution of Atlantic white sided dolphin limits their exposure.	

	Fish finders and depth sounders	Fish finders and depth sounders occur on almost all vessels but the noise produced at these frequencies, although audible, are not a significant concern (Deng *et al*., 2014). However, new devices are being introduced and the sensitivity to such and potential impacts should be regularly reviewed.	
	Pingers	Pingers are used to alert animals to the presence of nets to reduce bycatch risk. Evidence shows they can be effective for some species (e.g. Larsen *et al*., 2013, Larsen and Eigaard 2014, Northridge *et al*., 2011). Pingers are currently used only on gillnet vessels >12m in length, which is a very small proportion of the UK gillnet fleet. The predominantly offshore distribution of this species means there is limited overlap with pressure.	
	Mining and dredging activities	Noise emitted during dredging operations is broadband and is unlikely to cause damage to marine mammal auditory systems, but masking and behavioural changes are possible (Tillin *et al*., 2011; Todd *et al*., 2015). Dredging and mining are generally a more inshore operation and therefore there is limited overlap with Atlantic white sided dolphin distribution.	
	Vessel noise	Disturbance reactions have been observed in response to shipping (Richardson, 1995). Vulnerability is highest in areas of busy shipping lanes. However, the predominantly offshore distribution of this species means overlap with busy sea areas is low.	
	Military activity and sonar	Activities are likely to cause behavioural responses such as disturbance, which are energetically costly but whether these lead to long-term population level impacts is poorly understood (Harris et al. 2017). Responses vary between and within individuals and populations (Harris et	North west Scotland

		al. 2017). Overall low vulnerability across the UK but regionally high at certain times when operations are occurring.	
Physical disturbance	**Scientific studies (e.g. tagging, photo ID, biopsy)**	Limited in UK waters, with certain activities requiring licensing. The offshore nature of the Atlantic white sided dolphin means it is not normally subject to more invasive scientific studies.	
	Recreation and Wildlife tourism	There are multiple studies indicating behavioural impacts concerning tourist vessel interaction with other species, e.g. bottlenose dolphin and common dolphin (e.g. Hastie *et al*., 2003; Neumann and Orams, 2006; Bejder *et al*., 2006; Stockin *et al*., 2008; Meissner *et al*., 2015). This species is not normally targeted due to the offshore nature of its distribution.	
Change to habitat	**Barrier to movement**	Evidence of barrier to movement is very limited but may be locally significant (ICES, 2015b) although unlikely to occur given offshore nature of the species.	
	Change / removal of supporting habitat	Very little evidence of effects on Atlantic white-sided dolphin from changes to or removal of supporting habitat and are unlikely due to offshore distribution.	
	Reduction in availability of prey	Changes in prey availability due to: competition with other marine predators, fishing or climate change, may have an impact. Starvation has been recorded as a cause of death in stranded individuals (UK Strandings annual reports: http://ukstrandings.org/csip-reports) but there is no understanding of its cause in the population. The species has a varied diet with a preference for gadiformes and they adapt their feeding	

		seasonally depending on movement of prey species (Hernandez-Milian et al, 2016).	
	Localised temperature change	Local water temperature changes from, for example, cooling water discharges from power stations, is unlikely to have population level effects due to its localised nature and the offshore distribution of this species; exposure and vulnerability is therefore low (localised).	
Physical Injury/mortality	**Vessel strikes**	Monitoring of stranded animals shows that vessel strikes rarely are a cause of death for this species (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b). However, there is no requirement for vessels to report strikes occurring at sea, and carcasses may not wash up on land.	
	Collision with renewable energy devices	Few wet renewable devices in place, limited efforts to measure impacts and thus little understanding or evidence of impact. Where such projects are implemented, vulnerability will be higher due to increased exposure. Potentially locally significant. Exposure considered unlikely due to the offshore nature of the species.	
	High energy, acoustic events, for example removal of unexploded ordnance.	Loud noise can result in injury to cetaceans, particularly to their hearing (NOAA, 2018).	
Marine pollution	**Oil pollution**	There are no published records of any spills in which Atlantic white-sided dolphin were affected. Atlantic white-sided dolphins were observed swimming and foraging in the oil slick caused by the Regal Sword	

		(Goodale *et al*., 1981); however, it is noted that this does not exclude the possibility of short- or long-term health impacts.	
	Chemical pollution (e.g. PCBs, butyltins, PAHs, Radionuclides, heavy metals)	Contaminants have been recorded in Atlantic white-sided dolphin (Reeves et al., 2009) although generally in lower concentrations than in more coastal species (Van De Vijver et al., 2003). However, in blubber samples taken around Greenland, Finland, and the Faroe Islands, PDBE levels in Atlantic white-sided dolphins were markedly higher in the males sampled than in some other cetacean species (Rotander et al., 2012), and varied across years with the peaks around 2000 when production levels were at their highest, indicating the species is susceptible to certain contaminants. In other species, immunosuppression has been reported as a consequence of high contaminant burdens.	
	Plastic pollution (ingestion)	Plastic ingestion is monitored through post-mortem examination of stranded animals. No evidence of direct plastic ingestion has been recorded for this species in UK waters.	
	Entanglements in marine litter and ghost nets	Very little evidence of impacts in UK waters from strandings data (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b).	
	Eutrophication, sewage pathogens	Nutrient enrichment in areas of agriculture, aquaculture or sewage may pose a threat to individuals (Simeone *et al*., 2015), however, exposure to the population is unlikely to be a concern due to their offshore distribution.	

White-beaked dolphin			
Pressures and activities		**Evidence supporting the assessment**	**Regional variations where vulnerability likely higher than UK assessment due to increased exposure**
Removal of non-target species (i.e. bycatch or entanglement)	**Creeling and potting**	Monitoring of bycatch (Northridge *et al*., 2016) has focused on set nets and until recently, pelagic trawls. Limited monitoring of drift nets and none of creeling/pots in current monitoring scheme. Evidence from the strandings scheme or anecdotal records suggest bycatch events in creels and pots are very rare which suggests that individuals may be able to avoid them and therefore this activity is not considered a high risk. Bycatch events have been recorded in gillnets and cod traps out with the UK (Reeves *et al*., 1999) and bycatch in pelagic trawl nets in the North Sea has historically been noted as a risk for white-beaked dolphins (Morizur et al., 1999). For the UK, there have been reports of bycatch as a cause of death in stranded animals (Deaville & Jepson, 2011), and a single report of a probable white-beaked dolphin bycaught in a mid-water trawl recorded through the UK bycatch observer programme (Northridge *et al*., 2016).	
	Drift net fishing		
	Trawling and purse seining		
	Set (fixed) net fishing		
Acoustic disturbance	**Cumulative impacts of acoustic disturbance**	Sound introduced in the marine environment by human activities is one of the key areas of concern with regards to potential detrimental effects. Whilst the vulnerability to a particular activity may be low, when multiple	

		operations and/or different activities occur at the same time, or over an extended time period, the impact is likely to be greater.	
	Seismic or geophysical surveys	Disturbance is a documented response of cetaceans to noise (Stone and Tasker, 2006; ICES, 2012; Stone, 2015). Stone et al (2017) document a significant reduction in detection rates and vessel-approaches of the species in response to firing of 'large seismic arrays'. Rasmussen et al. (2016) reports behavioural responses to a range of sounds elicited during playback experiments. However, the impact of these and disturbance on fecundity and survival of this species is not well understood.	North Sea
	Underwater explosions		
	Pile driving		North Sea
	Operational offshore wind farms	Noise from operational wind farms are produced at frequencies that are not thought to be a significant concern (Marmo *et al*., 2013) for marine mammals.	
	Operational oil and gas platforms	Whilst the impact of drilling is potentially high (Boyd, 2008), there have been no studies that have investigated negative impacts from operational oil and gas platforms.	
	Acoustic deterrent devices (ADDs)	Evidence for the effect of permanently located ADDs associated with aquaculture shows that they can affect cetacean movement patterns (this data is mainly related to harbour porpoise), local density and may lead to habitat exclusion (ICES, 2015b). ADDs are also used as mitigation prior to offshore construction and for ordnance detonation; they are used to exclude animals from the area as a means of mitigating against injury.	West Scotland
	Fish finders and depth sounders	Fish finders and depth sounders occur on almost all vessels but the noise produced at these frequencies, although audible, are not a significant concern (Deng *et al*., 2014). However, new devices are being introduced	

		and the sensitivity to such and potential impacts should be regularly reviewed.	
	Pingers	Pingers are used to alert animals to the presence of nets to reduce bycatch risk. Evidence shows they can be effective for some species (e.g. Larsen *et al*., 2013, Larsen and Eigaard 2014, Northridge *et al*., 2011). Pingers are currently used only on gillnet vessels >12m in length, which is a very small proportion of the UK gillnet fleet.	
	Mining and dredging activities	Noise emitted during dredging operations is broadband and is unlikely to cause damage to marine mammal auditory systems, but masking and behavioural changes are possible (Tillin *et al*., 2011; Todd *et al*., 2015)	
	Vessel noise	Disturbance reactions have been observed in response to shipping (Richardson, 1995). Vulnerability is highest in areas of busy shipping lanes.	
	Military activity and sonar	Activities are likely to cause behavioural responses such as disturbance, which are energetically costly but whether these lead to long-term population level impacts is poorly understood (Harris et al. 2017). Responses vary between and within individuals and populations (Harris et al. 2017). Overall low vulnerability across the UK but regionally high at certain times when operations are occurring.	West of Scotland
Physical disturbance	**Scientific studies (e.g. tagging, photo ID, biopsy)**	Limited in UK waters, with certain activities requiring licensing. There is some dedicated photo ID surveying occurring in the English Channel. Disturbance from research vessels is a small component of all vessel traffic.	

	Recreation and Wildlife tourism	There are multiple studies indicating behavioural impacts concerning tourist boat interaction with other species, e.g. bottlenose dolphin and common dolphin (e.g. Hastie *et al*., 2003; Neumann and Orams, 2006; Bejder *et al*., 2006; Stockin *et al*., 2008; Meissner *et al*., 2015). Dedicated tours for white-beaked dolphin occur in Lyme Bay and in Northumberland which coincide with their distribution.	Lyme Bay, south coast England North east England
Change to habitat	**Barrier to movement**	Evidence of barrier to movement is very limited but may be locally significant (ICES, 2015b).	
	Change / removal of supporting habitat	Very little evidence of effects on white-beaked dolphin from changes to or removal of supporting habitat, but may be locally significant.	
	Reduction in availability of prey	Changes in prey availability due to: competition with other marine predators, fishing or climate change, may have an impact. Starvation has been recorded as a cause of death in stranded individuals (see UK Strandings annual reports: http://ukstrandings.org/csip-reports) but there is no understanding of cause in the population. White-beaked dolphins have a varied diet (Fall and Skern-Mauritzen, 2014) and are known to feed on at least 25 different fish species, many of which are commercially targeted by fisheries (e.g. whiting and cod) (Jansen et al, 2010; Jansen, 2013).	
	Localised temperature changes	Local water temperature changes from, for example, cooling water discharges from power stations, is unlikely to have population level effects due to its localised nature.	

Physical Injury/mortality	**Vessel strikes**	Monitoring of stranded animals shows that vessel strikes rarely are a cause of death for this species (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b). However, there is no requirement for vessels to report strikes occurring at sea, and carcasses may not wash up on land.	
	Collision with renewable energy devices	Few wet renewable devices in place, limited efforts to measure impacts and thus little understanding or evidence of impact. Where such projects are implemented, vulnerability will be higher due to increased exposure. Potentially locally significant.	Scotland
	High energy, acoustic events, for example removal of unexploded ordnance.	Loud noise can result in injury to cetaceans, particularly to their hearing (NOAA, 2018).	
Marine pollution	**Oil pollution**	There are no published records of any spills in which white-beaked dolphin were affected.	
	Chemical pollution (e.g. PCBs, butyltins, PAHs, Radionuclides, heavy metals)	Impact of contaminants on cetaceans is well documented (Jepson *et al*., 1999, 2005; 2016; Reeves *et al*., 2009; ICES, 2015b). White-beaked dolphins were found to have one the highest levels of perfluorinated organochemical loads of the marine mammal species stranded along the southern North Sea coast (Van De Vijver *et al*., 2003).	

	Plastic pollution (ingestion)	Plastic ingestion is monitored through post-mortem examination of stranded animals. No evidence of direct plastic ingestion has been recorded for this species in UK waters.	
	Entanglements in marine litter & ghost nets	Very little evidence of impacts in UK waters from strandings data (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b).	
	Eutrophication, sewage pathogens	Nutrient enrichment in areas of agriculture, aquaculture or sewage may pose a threat to individuals (Simeone *et al*., 2015), but the consequence of exposure to the population is unlikely to be a concern.	

Bottlenose dolphins (offshore)			
Pressures and activities		**Evidence supporting the assessment**	**Regional variations where vulnerability likely higher than UK assessment**
Removal of non-target species (i.e. bycatch or entanglement)	**Creeling and potting**	Monitoring of bycatch (Northridge *et al*., 2016) has focused on set nets and until recently, pelagic trawls. Limited monitoring of drift nets and none of creeling/pots in the current monitoring scheme. There have been reports of bycatch of bottlenose dolphins occurring in static nets (Reeves *et al*., 2009; Deaville & Jepson, 2011; Northridge *et al*., 2016). Evidence from the strandings scheme and anecdotal records suggest bycatch events in creels and pots are very rare.	
	Drift net fishing		
	Trawling and purse seining		
	Set (fixed) net fishing		
Acoustic disturbance	**Cumulative impacts of acoustic disturbance**	Sound introduced in the marine environment by human activities is one of the key areas of concern with regards to potential detrimental effects. Whilst the vulnerability to a particular activity may be low, when multiple operations and/or different activities occur at the same time, or over an extended time period, the impact is likely to be greater.	
	Seismic or geophysical surveys	Disturbance is a documented response of cetaceans to noise (Stone and Tasker, 2006; ICES, 2012; Stone, 2015). However, the impact of disturbance on fecundity and survival of this species is not well understood.	
	Underwater explosions		
	Pile driving		

	Operational offshore wind farms	Noise from operational wind farms is produced at frequencies that are not thought to be a significant concern (Marmo *et al*., 2013).	
	Operational oil and gas platforms	Whilst the impact of drilling is potentially high (Boyd, 2008), there have been no studies that have investigated negative impacts from operational oil and gas platforms.	
	Acoustic deterrent devices (ADDs)	Evidence for the effect of permanently located ADDs associated with aquaculture show they can effect cetacean movement patterns (this data is mainly related to harbour porpoise), local density and may lead to habitat exclusion (ICES, 2015b). ADDs are also used as mitigation prior to offshore construction and for ordnance detonation; they are used to exclude animals from the area as a means of mitigating against injury.	
	Fish finders and depth sounders	Fish finders and depth sounders occur on almost all vessels but the noise produced at these frequencies, although audible, are not a significant concern (Deng *et al*, 2014). However, new devices are being introduced and the sensitivity to such and potential impacts should be regularly reviewed.	
	Pingers	Pingers are used to alert animals to the presence of nets to reduce bycatch risk. Evidence shows they can be effective for some species (e.g. Larsen *et al*., 2013, Larsen and Eigaard 2014, Northridge *et al*., 2011). They have proved to be effective in disturbing bottlenose dolphin away from nets (Leeney *et al*., 2007). Pingers are currently used only on gillnet vessels >12m in length, which is a very small proportion of the UK gillnet fleet.	

	Mining and dredging activities	Noise emitted during dredging operations is broadband and is unlikely to cause damage to marine mammal auditory systems, but masking and behavioural changes are possible (Tillin *et al*., 2011; Todd *et al*., 2015).	
	Vessel noise	Disturbance reactions have been observed in response to shipping (Richardson, 1995). Vulnerability is highest in areas of busy shipping lanes.	
	Military activity and sonar	Activities are likely to cause behavioural responses such as disturbance, which are energetically costly but whether these lead to long-term population level impacts is poorly understood (Harris et al. 2017). Responses vary between and within individuals and populations (Harris et al. 2017). Overall low vulnerability across the UK but regionally high at certain times when operations are occurring .	North west Scotland South West Approaches
Physical disturbance	**Scientific studies (e.g. tagging, photo ID, biopsy)**	Overall, limited in UK waters with certain activities requiring licensing. However, the coastal populations of this species are highly targeted by research. Disturbance from research vessels is, however, a small component of all vessel traffic.	
	Recreation and Wildlife tourism	The inshore groups are heavily targeted by wildlife watching boat tour; the offshore bottlenose is not.	
Change to habitat	**Barrier to movement**	Evidence of barrier to movement is very limited but may be locally significant (ICES, 2015b).	
	Change / removal of supporting habitat	Very little evidence of effects on bottlenose dolphin from changes to or removal of supporting habitat, but may be locally significant.	

	Reduction in availability of prey	Changes in prey availability, due to: competition with other marine predators, fishing or climate change, may have an impact. Starvation has been recorded as a cause of death in stranded individuals (see UK Strandings annual reports: http://ukstrandings.org/csip-reports) but there is no understanding of its cause in the population or whether the sampled individuals are from the offshore or inshore population. There is some recent information on prey preferences (Millian-Hernandez *et al*., 2015) but information on effects of changes in prey is lacking.	
	Localised temperature changes	Local water temperature changes from, for example, cooling water discharges from power stations, is unlikely to have population level effects due to its localised nature.	
Physical Injury/mortality	**Vessel strikes**	Bottlenose dolphins are often attracted to vessels. Monitoring of stranded animals shows that vessel strikes are rarely a cause of death for this species (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b). However, there is no requirement for vessels to report strikes occurring at sea and carcasses may not wash up on land.	
	Collision with renewable energy devices	Few wet renewable devices in place, limited efforts to measure impacts and thus little understanding or evidence of impact. Where such projects are implemented, vulnerability will be higher due to increased exposure. Potentially locally significant.	
	High energy, acoustic events, for example removal of	Loud noise can result in injury to cetaceans, particularly to their hearing (NOAA, 2018).	

	unexploded ordnance.		
Marine pollution	**Oil pollution**	There are no records of bottlenose dolphin populations being impacted by oil spills in the UK. The Deepwater Horizon oil spill in the Gulf of Mexico in 2010 was linked with unusual mortality events of bottlenose dolphins between 2010 and 2014 (Graham *et al*., 2017).	
	Chemical pollution (e.g. PCBs, butyltins, PAHs, Radionuclides, heavy metals)	Impact of contaminants on cetaceans is well documented (Jepson *et al*., 1999, 2005; 2016; Hall *et al*., 2006; ICES, 2015b) with bottlenose dolphin exhibiting some of the highest levels ever recorded. Such burdens are considered likely to have a significant effect at the population level (Jepson *et al*., 2016).	
	Plastic pollution (ingestion)	Plastic ingestion is monitored through post-mortem examination of stranded animals. No evidence of direct plastic ingestion has been recorded for this species in UK waters.	
	Entanglements in marine litter & ghost nets	Very little evidence of impacts in UK waters from strandings data (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b).	
	Eutrophication, sewage pathogens	Nutrient enrichment in areas of agriculture, aquaculture or sewage may pose a threat to individuals (Simeone *et al*., 2015), but the consequence of exposure to the population is unlikely to be a concern.	

Bottlenose dolphins (inshore)			
Pressures and activities		**Evidence supporting the assessment**	**Regional variations where vulnerability likely higher than UK assessment**
Removal of non-target species (i.e. bycatch or entanglement)	**Creeling and potting**	Monitoring of bycatch (Northridge *et al*., 2016) has focused on set nets and until recently, pelagic trawls. Limited monitoring of drift nets and none of creeling/pots in the current monitoring scheme. There have been reports of bycatch of bottlenose dolphins occurring in static nets (Reeves *et al*., 2009; Deaville & Jepson, 2011, Northridge *et al*., 2016). Evidence from the strandings scheme and anecdotal records suggest bycatch events in creels and pots are very rare which suggests that individuals may be able to avoid them and therefore this activity is not considered a high risk.	
	Drift net fishing		
	Trawling and purse seining		
	Set (fixed) net fishing		
Acoustic disturbance	**Cumulative impacts of acoustic disturbance**	Sound introduced in the marine environment by human activities is one of the key areas of concern with regards to potential detrimental effects. Whilst the vulnerability to a particular activity may be low, when multiple operations and/or different activities occur at the same time, or over an extended time period, the impact is likely to be greater (Heiler et al, 2016). .	East Scotland
	Seismic or geophysical surveys	Disturbance is a documented response of cetaceans to noise (Seismic: Stone and Tasker, 2006; ICES, 2012; Stone, 2015; Pile driving: Bailey *et*	Cardigan Bay, Wales East Scotland

	Underwater explosions	*al*., 2010; Graham *et al*., 2017). However, the impact of disturbance on fecundity and survival of this species is not well understood.	Cardigan Bay, Wales East Scotland
	Pile driving		
	Operational offshore wind farms	Noise from operational wind farms are produced at frequencies that are not thought to be a significant concern (Marmo *et al*., 2013) to marine mammals.	
	Operational oil and gas platforms	Whilst the impact of drilling is potentially high (Boyd, 2008), there have been no studies that have investigated negative impacts from operational oil and gas platforms.	
	Acoustic deterrent devices (ADDs)	Evidence for the effect of permanently located ADDs associated with aquaculture shows they can affect cetacean movement patterns (this data is mainly related to harbour porpoise), local density and may lead to habitat exclusion (ICES, 2015b). Exposure and vulnerability is considered highest on west coast of Scotland. ADDs are sometimes used to exclude animals from an area as a means of mitigating against injury prior to offshore construction and for ordnance detonation.	West of Scotland
	Fish finders and depth sounders	Fish finders and depth sounders occur on almost all vessels but the noise produced at these frequencies, although audible, are not a significant concern (Deng *et al*., 2014). However, new devices are being introduced and the sensitivity to such and potential impacts should be regularly reviewed.	
	Pingers	Pingers are used to alert animals to the presence of nets to reduce bycatch risk. Evidence shows they can be effective for some species (e.g. Larsen *et al*., 2013; Larsen and Eigaard 2014, Northridge *et al*., 2011).	

		They proved effective in disturbing bottlenose dolphin away from nets (Leeney *et al*., 2007). Pingers are currently used only on gillnet vessels >12m in length, which is a very small proportion of the UK gillnet fleet.	
	Mining and dredging activities	Noise emitted during dredging operations is broadband and is unlikely to cause damage to marine mammal auditory systems, but masking and behavioural changes are possible (Tillin *et al*., 2011; Todd *et al*., 2015). Commercial activities such as a dredging have the potential to cause displacement of coastal bottlenose dolphin populations (Pirotta et al., 2013).	
	Vessel noise	Disturbance reactions have been observed in response to shipping (Richardson, 1995). Vulnerability is highest in areas of busy shipping lanes.	
	Military activity and sonar	Activities are likely to cause behavioural responses such as disturbance, which are energetically costly but whether these lead to long-term population level impacts is poorly understood (Harris et al. 2017). Responses vary between and within individuals and populations (Harris et al. 2017). Overall low vulnerability across the UK but regionally high at certain times when operations are occurring.	West of Scotland Cardigan Bay, Wales
Physical disturbance	**Scientific studies (e.g. tagging, photo ID, biopsy)**	Certain activities require licensing. The coastal populations are targeted by research and are subject to long-term monitoring. The species has rarely been subjected to more invasive scientific studies (e.g. tagging) in the UK. Disturbance from research vessels is, however, a small component of all vessel traffic.	East Scotland Cardigan Bay, Wales

	Recreation and Wildlife tourism	There are multiple studies indicating behavioural impacts concerning tourist boat interaction with bottlenose dolphins (e.g. Hastie *et al*., 2003; Bejder *et al*., 2006; Meissner *et al*., 2015). Exposure to this pressure is limited both spatially and temporally, although it may be regionally significant when occurring e.g. for coastal populations (Lohrengel et al 2018). Boat presence is associated with a short-term reduction in foraging activity in bottlenose dolphins (New et al., 2013). Physical boat presence alone, as opposed to noise, is enough to cause short-term disruption (Pirotta et al., 2014) and impacts distribution and communication between bottlenose dolphins (La Manna et al., 2016. Heiler et al., 2016).	East Scotland Cardigan Bay, Wales South west England
Change to habitat	**Barrier to movement**	Evidence of barrier to movement is very limited but may be locally significant (ICES, 2015b).	
	Change / removal of supporting habitat	Very little evidence of effects on bottlenose dolphin from changes to or removal of supporting habitat, but may be locally significant.	
	Reduction in availability of prey	Changes in prey availability, due to: competition with other marine predators, fishing or climate change, may have an impact. Starvation has been recorded as a cause of death in stranded individuals (see UK Strandings annual reports: http://ukstrandings.org/csip-reports) but there is no understanding of its cause in the population. There is some recent information on prey preferences (Millian-Hernandez *et al*., 2015) but information on changes in prey is lacking. Lassalle et al (2012) noted that bottlenose dolphin may be more susceptible to a decline in food source due to the required prey biomass for their survival in comparison to other species.	

	Localised temperature changes	Local water temperature changes from, for example, cooling water discharges from power stations, is unlikely to have population level effects due to its localised nature.	
Physical Injury/mortality	**Vessel strikes**	Bottlenose dolphins are often attracted to vessels but monitoring of stranded animals shows that vessel strikes are not a typical cause of death for this species (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b). However, there is no requirement for vessels to report strikes occurring at sea, and carcasses may not wash up on land.	
	Collision with renewable energy devices	Few wet renewable devices in place, limited efforts to measure impacts and thus little understanding or evidence of impact. Where such projects are implemented, vulnerability will be higher due to increased exposure of small populations. Off Wales, the bottlenose dolphin population would potentially be at risk from collision with sub-surface marine renewable devices such as tidal turbines (Malinka et al, 2018) and these impacts may be locally significant.	Irish Sea
	High energy, acoustic events, for example removal of unexploded ordnance.	Loud noise can result in injury to cetaceans, particularly to their hearing (NOAA, 2018).	
Marine pollution	**Oil pollution**	There are no records of bottlenose dolphin populations being impacted by oil spills in the UK. The Deepwater Horizon oil spill in the Gulf of Mexico in	

		2010 was linked with unusual mortality events of bottlenose dolphins between 2010 and 2014 (Graham *et al*., 2017).	
	Chemical pollution (e.g. PCBs, butyltins, PAHs, Radionuclides, heavy metals)	Impact of contaminants on cetaceans is well documented (Jepson *et al*., 1999, 2005; 2016; Hall *et al*, 2006; ICES, 2015b) with bottlenose dolphin exhibiting some of the highest levels ever recorded. Bottlenose dolphin was one of four species found to have PCB levels significantly higher than other species, which is linked with possible low reproductive capacity consistent with PCB-induced toxicity (Jepson et al, 2016).	East Scotland Cardigan Bay, Wales
	Plastic pollution (ingestion)	Plastic ingestion is monitored through post-mortem examination of stranded animals. No evidence of direct plastic ingestion has been recorded for this species in UK waters.	
	Entanglements in marine litter & ghost nets	Very little evidence of impacts in UK waters from strandings data (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b).	
	Eutrophication, sewage pathogens	Nutrient enrichment in areas of agriculture, aquaculture or sewage may pose a threat to individuals (Simeone *et al*., 2015), but the consequence of exposure to the population is unlikely to be a concern.	

Risso's dolphin			
Pressures and activities		**Evidence supporting the assessment**	**Regional variations where vulnerability likely higher than UK assessment**
Removal of non-target species (i.e. bycatch or entanglement)	**Creeling and potting**	Monitoring of bycatch (Northridge *et al*., 2016) has focused on set nets and until recently, pelagic trawls. Limited monitoring of drift nets and none of creeling/pots in the current monitoring scheme. Evidence from the strandings scheme suggest bycatch events of small cetaceans in creels and pots are very rare which suggests that individuals may be able to avoid them and therefore this activity is not considered a high risk. There have been reports of bycatch for this species through the stranding scheme (Deaville & Jepson, 2011), and a single record of a Risso's dolphin bycaught in static nets through the UK bycatch observer programme (Northridge at al 2013).	
	Drift net fishing		
	Trawling and purse seining		
	Set (fixed) net fishing		
Acoustic disturbance	**Cumulative impacts of acoustic disturbance**	Sound introduced in the marine environment by human activities is one of the key areas of concern with regards to potential detrimental effects. Whilst the vulnerability to a particular activity may be low, when multiple operations and/or different activities occur at the same time, or over an extended time period, the impact is likely to be greater.	
	Seismic or geophysical surveys	Disturbance is a documented response of cetaceans to noise (Stone and Tasker, 2006; ICES, 2012; Stone, 2015). However, it is not well	

	Underwater explosions	understood what the impact of disturbance is on fecundity and survival of this species.	
	Pile driving		
	Operational offshore wind farms	Noise from operational wind farms is produced at frequencies that are not thought to be a significant concern (Marmo *et al*., 2013) to marine mammals.	
	Operational oil and gas platforms	Whilst the impact of drilling is potentially high (Boyd, 2008), there have been no studies that have investigated negative impacts from operational oil and gas platforms.	
	Acoustic deterrent devices (ADDs)	Evidence for the effect of permanently placed ADDs associated with aquaculture shows they can affect movement patterns (this data is mainly related to harbour porpoise), local density and lead to habitat exclusion (ICES, 2015b). ADDs are also used as mitigation prior to offshore construction and for ordnance detonation; they are used to exclude animals from the area as a means of mitigating against injury.	West Scotland
	Fish finders and depth sounders	Fish finders and depth sounders occur on almost all vessels but the noise produced at these frequencies, although audible, are not a significant concern (Deng *et al*., 2014). However, new devices are being introduced and the sensitivity to such and potential impacts should be regularly reviewed.	
	Pingers	Pingers are used to alert animals to the presence of nets to reduce bycatch risk. Evidence shows they can be effective for some species (e.g. Larsen *et al*., 2013, Larsen and Eigaard 2014, Northridge *et al*., 2011). Pingers are currently used only on gillnet vessels >12m in length, which is a small proportion of the UK gillnet fleet.	

	Mining and dredging activities	Noise emitted during dredging operations is broadband and is unlikely to cause damage to marine mammal auditory systems, but masking and behavioural changes are possible (Tillin *et al*., 2011; Todd *et al*., 2015).	
	Vessel noise	Disturbance reactions have been observed in response to shipping (Richardson, 1995). Vulnerability is highest in areas of busy shipping lanes.	
	Military activity and sonar	Activities are likely to cause behavioural responses such as disturbance, which are energetically costly but whether these lead to long-term population level impacts is poorly understood (Harris et al. 2017). Responses vary between and within individuals and populations (Harris et al. 2017). Cases of gas embolism have been identified in this species although it is unclear whether these were associated with particular noise events (Jepson, 2003; Jepson, 2004; Jepson *et al*., 2005; Deaville and Jepson, 2011). Overall low vulnerability across the UK but regionally high at certain times when operations are occurring.	West of Scotland
Physical disturbance	**Scientific studies (e.g. tagging, photo ID, biopsy)**	Limited in UK waters with certain activities requiring licensing. Scientific studies focus on photo ID and genetics. Disturbance from research vessels is a small component of all vessel traffic.	
	Recreation and Wildlife tourism	There are multiple studies indicating behavioural impacts concerning tourist boat interaction with other species, e.g. bottlenose dolphin and common dolphin (e.g. Hastie *et al*., 2003; Neumann and Orams, 2006; Bejder *et al*., 2006; Stockin *et al*., 2008; Meissner *et al*., 2015). This	

		species is not normally targeted but potentially some local disturbance as a consequence of activities targeting other species may occur.	
Change to habitat	**Barrier to movement**	Evidence of barrier to movement is very limited but may be locally significant (ICES, 2015b). Potential for higher exposure to this pressure may be locally significant.	
	Change / removal of supporting habitat	Very little evidence of effects on Risso's dolphin from changes to or removal of supporting habitat, but may be locally significant.	
	Reduction in availability of prey	Changes in prey availability due to: competition with other marine predators, fishing or climate change, may have an impact on individuals. Starvation is a commonly recorded cause of death in stranded individuals (see UK Strandings annual reports: http://ukstrandings.org/csip-reports) but there is no understanding of its cause in the population.	
	Localised temperature changes	Local water temperature changes from, for example, cooling water discharges from power stations, is unlikely to have population level effects due to its localised nature.	
Physical injury/mortality	**Vessel strikes**	Monitoring of stranded animals shows that vessel strikes are a cause of death for this species (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b). There is no requirement for vessels to report strikes occurring at sea, and carcasses may not wash up on land.	
	Collision with renewable energy devices	Few wet renewable devices in place, limited efforts to measure impacts and thus little understanding or evidence of impact. Where such projects are implemented, vulnerability will be higher due to increased exposure. Potentially locally significant.	West Scotland Wales

	High energy, acoustic events, for example removal of unexploded ordnance.	Loud noise can result in injury to cetaceans, particularly to their hearing (NOAA, 2018).	
Marine pollution	**Oil pollution**	There are no published records of any spills in which dolphin Risso's dolphin were affected. Risso's dolphin were observed swimming in oiled waters following the Deepwater Horizon oil spill (NEFCE/NOAA, 2015); however, it is noted that this does not exclude the possibility of short- or long-term health impacts.	
	Chemical pollution (e.g. PCBs, butyltins, PAHs, Radionuclides, heavy metals)	Risso's dolphins accumulate contaminants (Kim *et al*., 1996, Capelli *et al*., 2008). Cadmium, copper and zinc are found in high concentrations in squid, the preferred prey of Risso's dolphin (Storelli *et al*., 1999; Blanco *et al*., 2006; Gaspari, 2004) indicating a potentially higher level of exposure than other species. Although metallothioneins plays an important role in controlling and detoxifying non-essential heavy metals in cetaceans (see Roesijadi, 1992), high levels can lead to renal failure and bone malformity in other species (Lavery *et al*., 2009). However, evidence for contaminant accumulation in the UK population is currently limited.	
	Plastic pollution (ingestion)	Plastic ingestion is monitored through post-mortem examination of stranded animals. As squid are the preferred prey, the risk of plastic ingestion is potentially higher. No evidence of direct plastic ingestion has been recorded in UK waters but there has been in the Mediterranean (Bearzi *et al*., 2010).	

	Entanglements in marine litter and ghost nets	Very little evidence of impacts in UK waters from strandings data (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b).	
	Eutrophication, sewage pathogens	Nutrient enrichment in areas of agriculture, aquaculture or sewage may pose a threat to individuals (Simeone *et al*., 2015), but the consequence of exposure to the population is unlikely to be a concern.	

Long-finned pilot whale			
Pressures and activities		**Evidence supporting the assessment**	**Regional variations where vulnerability likely higher than UK assessment**
Removal of non-target species (i.e. bycatch or entanglement)	**Creeling and potting**	Monitoring of bycatch (Northridge *et al*., 2016) has focused on set nets and until recently, pelagic trawls. Limited monitoring of drift nets and none of creeling/pots in the current monitoring scheme. Bycatch events of small cetaceans in creels and pots are very rare but there has been limited monitoring of these gears. However, given the predominately offshore distribution of this species and coastal nature of creeling and potting, we are confident that exposure is low and it is not considered a high risk to this species. Bycatch of long-finned pilot whales has been recorded in gillnets, purse seines and in trawl fisheries (Northridge, 1991; Reyes, 1991; Leeney *et al*., 2008; Northridge *et al*., 2017).	
	Drift net fishing		
	Trawling and purse seining		
	Set (fixed) net fishing		
Acoustic disturbance	**Cumulative impacts of acoustic disturbance**	Sound introduced in the marine environment by human activities is one of the key areas of concern with regards to potential detrimental effects. Whilst the vulnerability to a particular activity may be low, when multiple operation and/or different activities occur at the same time, the impact is likely to be greater.	
	Seismic or geophysical surveys	Disturbance is a documented response of cetaceans to noise (Stone and Tasker, 2006; Brownlow *et al*., 2011, 2014; ICES, 2012; Stone, 2015).	

	Underwater explosions	However, it is not well understood what the impact of disturbance is on fecundity and survival of this species.	
	Pile driving		
	Operational offshore wind farms	Noise from operational wind farms is produced at frequencies that are not thought to be a significant concern (Marmo *et al*., 2013) to marine mammals.	
	Operational oil and gas platforms	Whilst the impact of drilling is potentially high (Boyd, 2008), there have been no studies that have investigated negative impacts from operational oil and gas platforms.	
	Acoustic deterrent devices (ADDs)	Evidence for the effect of permanently placed ADDs associated with aquaculture shows they can affect movement patterns (this data is mainly related to harbour porpoise), local density and lead to habitat exclusion (ICES, 2015b). ADDs are also used as mitigation prior to offshore construction and for ordnance detonation; they are used to exclude animals from the area as a means of mitigating against injury. However, the offshore distribution of this species means they have limited exposure.	
	Fish finders and depth sounders	Fish finders and depth sounders occur on almost all vessels but the noise produced at these frequencies, although audible, are not a significant concern (Deng *et al*., 2014). However, new devices are being introduced and the sensitivity to such and potential impacts should be regularly reviewed. The offshore distribution of the species will reduce exposure.	
	Pingers	Pingers are used to alert animals to the presence of nets to reduce bycatch risk. Evidence shows they can be effective for some species (e.g. Larsen *et al*., 2013, Larsen and Eigaard 2014, Northridge *et al*., 2011). Pingers are currently used only on gillnet vessels >12m in length, which is	

		a very small proportion of the UK gillnet fleet. The offshore distribution of this species means there is limited exposure.	
	Mining and dredging activities	Noise emitted during dredging operations is broadband and is unlikely to cause damage to marine mammal auditory systems, but masking and behavioural changes are possible (Tillin *et al*., 2011; Todd *et al*., 2015). Dredging and mining are generally a more inshore operation and therefore there is limited overlap with pilot whale distribution.	
	Vessel noise	Disturbance reactions have been observed in response to shipping (Richardson, 1995). Vulnerability is highest in areas of busy shipping lanes. However, the offshore distribution of this species means overlap with busy sea areas is low.	
	Military activity and sonar	Behavioural impacts have been recorded (Rendell and Gordon, 1999; Antunes *et al*., 2014; Wensveen *et al*., 2015). Activities are likely to cause behavioural responses such as disturbance, which are energetically costly but whether these lead to long-term population level impacts is poorly understood (Harris et al. 2017). Responses vary between and within individuals and populations (Harris et al. 2017). However, overall low vulnerability across the UK but regionally high at certain times when operations are occurring.	West of Scotland
Physical disturbance	**Scientific studies (e.g. tagging, photo ID, biopsy)**	Limited in UK waters, with certain activities requiring licensing. The offshore nature of the pilot whale means it is not normally subject to more invasive scientific studies.	

	Recreation and Wildlife tourism	There are multiple studies indicating behavioural impacts concerning tourist boat interaction with other species, e.g. bottlenose dolphin and common dolphin (e.g. Hastie *et al*., 2003; Neumann and Orams, 2006; Bejder *et al*., 2006; Stockin *et al*., 2008; Meissner *et al*., 2015). Species is not normally targeted due to the offshore nature of its distribution.	
Change to habitat	**Barrier to movement**	Evidence of barrier to movement is very limited but may be locally significant (ICES, 2015b) although unlikely to occur given the offshore nature of the species.	
	Change / removal of supporting habitat	Very little evidence of effects on long-finned pilot whales from changes to or removal of supporting habitat, but may be locally significant.	
	Reduction in availability of prey	Changes in prey availability due to: competition with other marine predators, fishing or climate change, may have an impact. Starvation has not been recorded as a cause of death in stranded individuals.	
	Localised temperature changes	Local water temperature changes from, for example, cooling water discharges from power stations, is unlikely to have population level effects due to its localised nature.	
Physical Injury/mortality	**Vessel strikes**	Vessel strikes have not been recorded as a cause of death in long finned pilot whales in UK waters (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b). However, there is no requirement for vessels to report strikes occurring at sea, and carcasses may not wash up on land.	
	Collision with renewable energy devices	Few wet renewable devices in place, limited efforts to measure impacts and thus little understanding or evidence of impact. Where such projects are implemented, vulnerability will be higher due to increased exposure.	

		Potentially locally significant. Exposure considered unlikely due to the offshore nature of the species.	
	High energy, acoustic events, for example removal of unexploded ordnance/ explosions	Loud noise can result in injury to long finned pilot whales, particularly to their hearing (NOAA, 2018). In 2011, clearance of unexploded ordnance from a practice range was thought to have triggered a mass stranding event of long finned pilot whales (Brownlow *et al*., 2015).	
Marine pollution	**Oil pollution**	There are no published records of any spills in which long-finned pilot whales were affected.	
	Chemical pollution (e.g. CBs, butyltins, PAHs, Radionuclides, heavy metals)	Impact of contaminants on cetaceans is well documented. Levels of PCBs in long finned pilot whales are not as high as those recorded in other species in UK waters (Brownlow *et al*., 2011).	
	Plastic pollution (ingestion)	Plastic ingestion is monitored through post-mortem examination of stranded animals. As squid are the preferred prey, the risk of plastic ingestion is potentially higher. No evidence of direct plastic ingestion has been recorded for this species in UK waters.	
	Entanglements in marine litter and ghost nets	No evidence of impacts in UK waters from strandings data (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b).	

	Eutrophication, sewage pathogens	Nutrient enrichment in areas of agriculture, aquaculture or sewage may pose a threat to individuals (Simeone *et al*., 2015), but the consequence of exposure to the population is unlikely to be a concern.	

Killer whale			
Pressures and activities		**Evidence supporting the assessment**	**Regional variations where vulnerability likely higher than UK assessment**
Removal of non-target species (i.e. bycatch or entanglement)	**Creeling and potting**	Monitoring of bycatch (Northridge *et al*., 2016) has focused on set nets and until recently, pelagic trawls. Limited monitoring of drift nets and none of creeling/pots in current monitoring scheme. Globally there are very few records of this species being bycaught although some cases of entanglement have been reported. It is unclear whether such entanglements are linked specifically to fishing activities. There has been a single case to date of a killer whale caught in a creel off the west coast of Scotland.	
	Drift net fishing		
	Trawling and purse seining		
	Set (fixed) net fishing		
Acoustic disturbance	**Cumulative impacts of acoustic disturbance**	Sound introduced in the marine environment by human activities is one of the key areas of concern with regards to potential detrimental effects. Whilst the vulnerability to a particular activity may be low, when multiple operation and/or different activities occur at the same time, the impact is likely to be greater.	
	Seismic or geophysical surveys	Disturbance is a documented response of cetaceans to noise (e.g. Stone and Tasker, 2006; Stone, 2015). It is not well understood what the impact of disturbance is on fecundity and survival of this species.	
	Underwater explosions		
	Pile driving		

	Operational offshore wind farms	Noise from operational wind farms is produced at frequencies that are not thought to be a significant concern (Marmo *et al*., 2013) for marine mammals.	
	Operational oil and gas platforms	Whilst the impact of drilling is potentially high (Boyd, 2008), there have been no studies that have demonstrated such an impact.	
	Acoustic deterrent devices (ADDs)	Evidence for the effect of permanently placed ADDs associated with aquaculture shows they affect movement patterns (this data is mainly related to harbour porpoise), local density and can lead to habitat exclusion (ICES, 2015b). ADDs are also used as mitigation prior to offshore construction and for ordnance detonation; they are used to exclude animals from the area as a means of mitigating against injury.	
	Fish finders and depth sounders	Fish finders and depth sounders occur on almost all vessels but the noise produced at these frequencies, although audible, are not a significant concern (Deng *et al*., 2014). However, new devices are being introduced and the sensitivity to such and potential impacts should be regularly reviewed.	
	Pingers	Pingers are used to alert animals to the presence of nets to reduce bycatch risk. Evidence shows they can be effective for some species (e.g. Larsen *et al*., 2013, Larsen and Eigaard, 2014, Northridge *et al*., 2011). Pingers are currently used only on gillnet vessels >12m in length, which is a very small proportion of the UK gillnet fleet.	
	Mining and dredging activities	Noise emitted during dredging operations is broadband and is unlikely to cause damage to marine mammal auditory systems, but masking and behavioural changes are possible (Tillin *et al*., 2011; Todd *et al*., 2015).	

	Vessel noise	Disturbance reactions have been observed in response to shipping (Richardson, 1995). Vulnerability is highest in areas of busy shipping lanes. Background noise can interfere with communication between killer whales, possibly affecting activities such as cooperative foraging (Foote *et al*., 2004).	
	Military activity and sonar	Activities are likely to cause behavioural responses such as disturbance, which are energetically costly but whether these lead to long-term population level impacts is poorly understood (Harris et al. 2017). Responses vary between and within individuals and populations (Harris et al. 2017). Overall low vulnerability across the UK but regionally high at certain times when operations are occurring.	West of Scotland
Physical disturbance	**Scientific studies (e.g. tagging, photo ID, biopsy)**	Limited in UK waters, with certain activities requiring licensing. Population identification focuses on photo ID and biopsy work (e.g. Foote *et al*., 2010, 2011). Disturbance from research vessels is a small component of all vessel traffic.	
	Recreation and Wildlife tourism	There are multiple studies indicating behavioural impacts concerning tourist boat interaction with other species, e.g. bottlenose dolphin and common dolphin (e.g. Hastie *et al*., 2003; Neumann and Orams, 2006; Bejder *et al*., 2006; Stockin *et al*., 2008; Meissner *et al*., 2015). Species is targeted in the regions in which they occur, this can have implications for conservation (Jelinski *et al*., 2002).	
Change to habitat	**Barrier to movement**	Evidence of barrier to movement is very limited but may be locally significant (ICES, 2015b). Potential for higher exposure to this pressure in West Scotland.	West of Scotland

	Change / removal of supporting habitat	Very little evidence of effects on killer whale from changes to or removal of supporting habitat, but may be locally significant.	
	Reduction in availability of prey	Changes in prey availability, due to competition with other marine predators, fishing or climate change, may have an impact. Although based on limited data, starvation has been recorded as a cause of death in stranded individuals (Deaville and Jepson, 2011), but there is no understanding of cause in the population.	
	Localised temperature changes	Local water temperature changes from, for example, cooling water discharges from power stations, is unlikely to have population level effects due to its localised nature.	
Physical Injury/mortality	**Vessel strikes**	Monitoring of stranded animals shows that vessel strikes are a cause of death for this species, although there have been very few post mortems (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b). There is no requirement for vessels to report strikes occurring at sea, and carcasses may not wash up on land.	
	Collision with renewable energy devices	Few wet renewable devices in place, limited efforts to measure impacts and thus little understanding or evidence of impact. Where such projects are implemented, vulnerability will be higher due to increased exposure. Potentially locally significant.	
	High energy, acoustic events, for example	Loud noise can result in injury to cetaceans, particularly to their hearing (NOAA, 2018).	

	removal of unexploded ordnance.		
Marine pollution	**Oil pollution**	Although evidence is limited, oil spills have resulted in increased death rates for killer whales out with UK waters (Matkin *et al*., 2008).	
	Chemical pollution (e.g. PCBs, butyltins, PAHs, Radionuclides, heavy metals)	Impact of contaminants on cetaceans is well documented with killer whales having the highest recorded exposure to contaminants such as PCBs (Ross 2000; McHugh *et al*., 2007; Wolkers *et al*., 2007; Law *et al*., 2012; Jepson *et al*., 2016).	
	Plastic pollution (ingestion)	Plastic ingestion is monitored through post-mortem examination of stranded animals. No evidence of direct plastic ingestion has been recorded for this species in UK waters although there have been few post mortem investigations.	
	Entanglements in marine litter and ghost nets	Single case of entanglement in UK waters from strandings data (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b).	
	Eutrophication, sewage pathogens	Nutrient enrichment in areas of agriculture, aquaculture or sewage may pose a threat to individuals (Simeone *et al*., 2015), but the consequence of exposure to the population is unlikely to be a concern.	

Minke whale			
Pressures and activities		**Evidence supporting the assessment**	**Regional variations where vulnerability likely higher than UK assessment**
Removal of non-target species (i.e. bycatch or entanglement)	**Creeling and potting**	Monitoring of bycatch (Northridge *et al*., 2016) has focused on set nets and until recently, pelagic trawls, and minke whales have not been reported as captured in these gear types. Limited monitoring of drift nets and none of creeling/pots in current at-sea bycatch monitoring scheme. However, available information in strandings and reported records suggest that minke whale deaths due to entanglement in fishing gear, principally in creel lines, represent the single most frequently documented cause of anthropogenic mortality in Scottish and UK waters (Northridge et al, 2010; Pierce et al., 2004; Deaville and Jepson, 2011).	West Scotland
	Drift net fishing		
	Trawling and purse seining		
	Set (fixed) net fishing		
Acoustic disturbance	**Cumulative impacts of acoustic disturbance**	Sound introduced in the marine environment by human activities is one of the key areas of concern with regards to potential detrimental effects. Whilst the vulnerability to a particular activity may be low, when multiple operation and/or different activities occur at the same time, the impact is likely to be greater.	
	Seismic or geophysical surveys	Disturbance is a documented response of cetaceans to noise (e.g. Stone and Tasker, 2006; Stone, 2015). Minke whales showed strong behavioural responses to a large, active airgun array in UK waters (Stone, 2015; Stone et al. 2017). Repeated exposure to noise generating activities may therefore have the potential to cause longer term impacts	North Sea
	Underwater explosions		

	Pile driving	on minke whale populations, although it is not well understood what the impact of disturbance is on fecundity and survival of this species. Minke whales are likely to be sensitive to lower frequency noise (Nowacheck et al. 2007). Behavioural disturbance of minke whales from pile driving may be expected up to 40km from the source (Bailey et al. 2010). At the UK scale, exposure of minke whales to pile driving is low although it may be regionally significant in some areas/seasons.	North Sea
	Operational offshore wind farms	Noise from operational wind farms is produced at frequencies that are not thought to be a significant concern (Marmo *et al*., 2013) for marine mammals.	
	Operational oil and gas platforms	Whilst the impact of drilling is potentially high (Boyd, 2008), there have been no studies that have demonstrated such an impact.	
	Acoustic deterrent devices (ADDs)	Evidence for the effect of permanently placed ADDs associated with aquaculture shows they affect movement patterns (this data is mainly related to harbour porpoise), local density and can lead to habitat exclusion (ICES, 2015b). ADDs are also used as mitigation prior to offshore construction and for ordnance detonation; they are used to exclude animals from the area as a means of mitigating against injury. A study on the effects on minke whales, in Iceland, was investigated through controlled exposure experiments of tagged animals. Both speed and the directness of their path increased in relation to exposure to the ADD signal (McGarry et al. 2017). Whilst at the UK scale, exposure is low, it may be regionally/locally significant during summer when minke whale density is greatest around the UK.	West Scotland North Sea

	Fish finders and depth sounders	Fish finders and depth sounders occur on almost all vessels but the noise produced at these frequencies, although audible, are not a significant concern (Deng *et al*., 2014). However, new devices are being introduced and the sensitivity to such and potential impacts should be regularly reviewed.	
	Pingers	Pingers are used to alert animals to the presence of nets to reduce bycatch risk. There is no evidence in the UK as to their impact on minke whales; however, given the limited of use of pingers in the UK gillnet fleet, confidence in low exposure is high.	
	Mining and dredging activities	Noise emitted during dredging operations is broadband and is unlikely to cause damage to marine mammal auditory systems, but masking and behavioural changes are possible (Tillin *et al*., 2011; Todd *et al*., 2015).	
	Vessel noise	Disturbance reactions have been observed in response to shipping (Richardson, 1995). Noise from shipping vessels is thought to affect baleen whales in particular, due to their good hearing at low frequencies (Götz et al., 2009). Increased vessel traffic from marine construction activities was correlated with a decrease in minke whale presence off the northwest coast of Ireland, suggesting they were displaced by the high levels of vessels presence (Anderwald et al., 2013). Vulnerability is highest in areas of busy shipping lanes.	North Sea
	Military activity and sonar	Activities are likely to cause behavioural responses such as disturbance, which are energetically costly but whether these lead to long-term population level impacts is poorly understood (Harris et al. 2017). Responses vary between and within individuals and populations (Harris et al. 2017). Studies out with the UK of tagged minke whales, showed strong	West of Scotland

		avoidance behaviour in response to naval sonar (Sivle et al. 2015; Kvadsheim et al., 2017). Overall low vulnerability across the UK but regionally high at certain times when operations are occurring.	
Physical disturbance	**Scientific studies (e.g. tagging, photo ID, biopsy)**	Focussed on two main areas of their UK distribution in Moray Firth (e.g. Robinson et al. 2009) and west of Scotland (e.g. Macleod et al. 2004). Disturbance from research vessels is a small component of all vessel traffic and exposure in relation to their range is relatively low.	
	Recreation and Wildlife tourism	Reported impacts of whale watching vessels on minke whales include avoidance and disruption of feeding (Christiansen et al. 2013; Christiansen and Lusseau, 2015). However, Christiansen and Lusseau (2015) reported that cumulative exposure to whale watching vessels had no impact on female reproductive success. At the UK scale, exposure is low although may be locally significant where targeted tourism occurs.	West Scotland
Change to habitat	**Barrier to movement**	Evidence of barrier to movement is very limited but may be locally significant (ICES, 2015b). Potential for higher exposure to this pressure in West Scotland.	West of Scotland
	Change / removal of supporting habitat	No evidence of changes to or removal of supporting habitat.	
	Reduction in availability of prey	Changes in prey availability, due to competition with other marine predators, fishing or climate change, may have an impact. Although based on limited data, starvation has been recorded as a cause of death in stranded individuals (Deaville and Jepson, 2011); 11% of all minke whales examined post-mortem between 2000 and 2017 reported to have	

		died due to starvation (CSIP annual reports, http://ukstrandings.org/csip-reports). There is no understanding of the cause of this in the population.	
	Localised temperature changes	Local water temperature changes from, for example, cooling water discharges from power stations, is unlikely to have population level effects due to its localised nature.	
Physical Injury/mortality	**Vessel strikes**	Monitoring of stranded animals shows that vessel strikes are a cause of death for this species (Deaville and Jepson 2011; Deaville, 2016; ICES, 2015b); 7% of minke whales necropsied by CSIP between 2000-2017 had a cause of death of physical trauma due to the ship strike (CSIP annual reports, http://ukstrandings.org/csip-reports). There is no requirement for vessels to report strikes occurring at sea, and carcasses may not wash up on land.	
	Collision with renewable energy devices	Few wet renewable devices in place, limited efforts to measure impacts and thus little understanding or evidence of impact. Where such projects are implemented, vulnerability will be higher due to increased exposure. Potentially locally significant.	
	High energy, acoustic events, for example removal of unexploded ordnance.	Loud noise can result in injury to minke whales, particularly to their hearing (NOAA, 2018). At the UK scale, exposure is low compared to the range of this species.	
Marine pollution	**Oil pollution**	There is no evidence within the UK on the impacts of oil on minke whales; however, exposure is low.	

	Chemical pollution (e.g. PCBs, butyltins, PAHs, Radionuclides, heavy metals)	Impact of contaminants on cetaceans is well documented (Ross 2000; McHugh *et al*., 2007; Wolkers *et al*., 2007; Law *et al*., 2012; Jepson *et al*., 2016). However, whilst evidence of persistent organic pollutants (POPs) has been found in minke whales in the northeast Atlantic (Kleivance and Skaare, 1998; Rotander, Kärrman, et al., 2012; Rotander, van Bavel, et al., 2012), there is minimal information on how pollutants currently affect minke whales in UK waters.	
	Plastic pollution (ingestion)	Plastic ingestion is monitored through post-mortem examination of stranded animals. No evidence of direct plastic ingestion has been recorded for this species in UK waters but there are records elsewhere (e.g. Normandy coast - de Pierrepont et al. 2003)	
	Entanglements in marine litter and ghost nets	Entanglements of this species occur, but it is not always possible to determine whether it ghost gear or fixed gear that has caused the mortality.	
	Eutrophication, sewage pathogens	Nutrient enrichment in areas of agriculture, aquaculture or sewage may pose a threat to cetaceans (Simeone *et al*., 2015), but the consequence of exposure to the population is unlikely to be a concern.	

Section 6 – Legislation and Conventions

Protected Status

39. As discussed in the High Level Strategy document, UK cetaceans are protected from disturbance and harm under a range of national and international legislation.

40. Table 5 sets out the legislation/convention and the purpose of the provisions in terms of the level of protection afforded to the species, as well as where our international obligations come from.

41. Table 2 of the High Level Strategy lists the current conservation status of the nine species and the reporting mechanism the data was gathered under. Table 5 here, explains the obligations under those reporting mechanisms, including the timescales for reporting.

Table 5: Legislation and conventions which support conservation of dolphins, porpoises and minke whales

Legislation/Convention	Purpose
International Whaling Commission (IWC)	To "provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry".
Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR)	Requires the contracting parties to take all possible steps to prevent and eliminate pollution and shall take the necessary measures to protect the maritime area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected.
Convention on the Conservation of Migratory Species of Wild Animals (CMS)	An environmental treaty under the aegis of the United Nations Environment Programme, CMS provides for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the foundation for internationally coordinated conservation measures throughout a migratory range.
Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)	An agreement developed under the auspices of CMS. The aim of the Agreement is to promote close cooperation amongst Parties with a view to achieving and maintaining a favourable conservation status for small cetaceans. A Conservation and Management Plan obliges Parties to engage in minimising human induced mortality, habitat conservation and management, surveys and research, pollution mitigation and public information.
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	An international agreement between governments to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

Legislation/Convention	Purpose
Convention on Biological Diversity (CBD)	CBD has three main objectives: the conservation of biological diversity, the sustainable use of the components of biological diversity and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. Development of Biodiversity Action Plans is a key requirement for cetacean conservation.
Stockholm Convention	Aims to eliminate or restrict the production and use of persistent organic pollutants (POPs) in order to protect human health and the environment.
Habitats Directive (and UK implementing legislation)	Maintain or restore natural habitats and species of Community interest to Favourable Conservation Status (FCS). Establish Natura 2000 network of SACs, including those for harbour porpoises and bottlenose dolphins. It also protects all cetacean species from capture, injury or killing and disturbance. There are differences in how this directive is transposed into each devolved administration. These are explained below in the table.
(EU) 2019/1241 Technical Conservation Measures Regulation	The EU Council Regulation (EU) 2019/1241 have been implemented to afford the strict protection for sensitive marine species such as marine mammals, provided for in Directives 92/43/EEC and 2009/147/EC. Member States should put in place mitigation measures to minimise and where possible eliminate the catching of such species by fishing gear. Although not explicitly stated in the legislation, the ASCOBANS threshold for anthropogenic removals of 1.7% of the best population estimate has been tacitly adopted as the limit below which bycatch needs to kept (SGFEN, 2002).

Legislation/Convention	Purpose
Marine Strategy Framework Directive (MSFD)	The overarching aim is to achieve Good Environmental Status (GES) in marine waters by 2020. To achieve this a series of descriptors have been developed which include the following: 'At the scale of the MSFD sub-regions abundance of cetaceans is not decreasing as a result of human activity: in all of the indicators monitored, there should be no statistically significant decrease in abundance of marine mammals caused by human activities' And 'At the scale of the MSFD sub-regions cetacean populations are in good condition: mortality of cetaceans due to fishing bycatch is sufficiently low so as not to inhibit population targets being met.'
Various regulations relating to persistent organic pollutants	The impact of persistent organic pollutants (POPs) in the environment is well recognised, with legislation in place for many years. Example legislation includes Council Directive 96/59/EC on the disposal of polychlorinated biphenyls and polychlorinated terphenyls; Decision 2001/68/EC establishing two reference methods of measurement for PCBs pursuant to Article 10(a) of Council Directive 96/59/EC on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCBs/PCTs); Council Decision concerning the conclusion, on behalf of the European Community, of the Protocol to the 1979 Convention on Long Range Transboundary Air Pollution on Persistent Organic Pollutants; Commission Regulation (EC) No 323/2007 amending Annex V to Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants and amending Directive 79/117/EEC.
Wildlife and Countryside Act 1981 (England and Wales only)	Protects all cetaceans from intentional or reckless disturbance.

Legislation/Convention	Purpose
Marine and Coastal Access Act 2009	Help ensure clean, healthy, safe, productive and biologically diverse marine and coastal environments that meet the long term needs of people and nature. Puts in place a system for improved management and protection and provides for the establishment of marine conservation zones for important habitats and species, as well as a marine planning and licensing system.
Marine (Scotland) Act 2010 (Scotland only)	Help ensure clean, healthy, safe, productive and biologically diverse marine and coastal environments that meet the long term needs of people and nature. Puts in place a system for improved management and protection and provides for the establishment of marine protected areas for important habitats and species, as well as a marine planning and licensing system.
UK Marine Plans	In the UK, marine planning is the responsibility of the MMO in England, the Welsh Government in Wales, Marine Scotland in Scotland and the Department of Agriculture, Environment and Rural Affairs in Northern Ireland. Marine plans are either at a subnational level, e.g. the East Inshore and East Offshore Marine Plans in England[11] adopted in 2014 or a national level, e.g. Scotland's National Marine Plan[12] adopted in March 2015. Plans covering the rest of the UK will be established by 2021 at the latest, in accordance with the Maritime Spatial Planning Directive. Seven of the species assessed in this strategy are Priority Marine Features in Scotland, and therefore do receive additional general protection from policies in Scotland's National Marine Plan.

[11] East Marine Plans
[12] Scotland's National Marine Plan

Legislation/Convention	Purpose
Natural Environment and Rural Communities (NERC) Act 2006 (England only)	Makes provision for bodies concerned with conserving, enhancing, and managing England's natural environment for the benefit of current and future generations. The Act made amendments to the both the Wildlife and Countryside Act 1981 and the Countryside and Rights of Way (CROW) Act 2000. For example, it extended the CROW biodiversity duty to public bodies and statutory undertakers, and altering enforcement powers in connection with wildlife prosecution.
Environment (Wales) Act 2016 (Wales only)	Part 1 of the Act sets out Wales' approach to planning and managing natural resources at a national and local level in line with the principles of the sustainable management of natural resources. Section 6 of the Act places a duty on public authorities to seek to maintain and enhance biodiversity and promote the resilience of ecosystems.
Wellbeing of Future Generations Act 2015 (Wales only)	The Act aims to improve the social, economic, environmental and cultural well-being of Wales. It sets out seven wellbeing goals for Wales, including a Wales which is globally responsible and resilient.
The Marine Act 2013 (Northern Ireland only)	This Act sets out a framework for Northern Ireland’s seas based on: a system of marine planning that will balance conservation, energy and resource needs; improved management for marine nature conservation and the streamlining of marine licensing for some electricity projects. Part 3 of the Act enables the Department to designate areas as Marine Conservation Zones (MCZ).

Legislation/Convention	Purpose
The Conservation of Habitats and Species Regulations 2017 as amended **And** **The Conservation (Natural Habitats, &c.) Regulations 1994 as amended**	The Regulations provide for the designation and protection of 'European Sites', the protection of 'European Protected Species', and the adaptation of planning and other controls for the protection of European Sites. The Regulations make special provisions for the protection of European marine sites, requiring the country agencies to advise other authorities of the conservation objectives for a site, and also of the operations which may affect its integrity. The Regulations also enable the establishment of management schemes and byelaws by the relevant authorities and country agencies respectively, for the management and protection of European marine sites.
The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995	For the designation of sites and their management schemes including under the Habitats Directive and protection of European Protected Species throughout Northern Irish waters including all cetaceans.
Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 as amended	These regulations fulfil the UK's duty to comply with European law beyond inshore waters and ensure that activities regulated by the UK that have an effect on important species and habitats in the offshore marine environment can be managed. Under the Regulations, competent authorities i.e. any Minister, government department, public body, or person holding public office, have a general duty, in the exercise of any of their functions, to have regard to the EU Habitats and Birds Directives.

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Glossary

A guide to terms and acronyms used across the document

ASCOBANS	Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas.
Bioaccumulation	The accumulation of substances, such as pesticides, or other chemicals in an organism.
Bycatch	Incidental non-target species caught in commercial fishing gear.
Cetacean	Infra-order of marine mammals that includes whales, dolphins and porpoises.
UK CSIP	UK Cetacean Stranding Investigation Programme.
European Protected Species (EPS)	Species listed in Annex IV of the Habitats Directive, which requires protection measures in relation to incidental killing and capture (e.g. fisheries bycatch) and disturbance.
Favourable Conservation Status	This is the overarching aim of the Habitats Directive. The conservation status of a species is considered favourable when the population is maintaining itself on a long-term basis, the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain the populations on a long-term basis.
IWC	International Whaling Commission.
Marine protected area (MPA)	Area of sea protected by legislation.
MSFD	Marine Strategy Framework Directive.
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic.
PCBs	Polychlorinated biphenyls.
PME	Post mortem Examination.
Special Area of Conservation (SAC)	A site designated under the EU Habitats Directive. Often abbreviated to SAC.
SMASS	Scottish Marine Animal Strandings Scheme.
Statutory Nature Conservation Bodies	Body appointed by legislation to advise Governments on nature conservation issues.

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