# Direct impacts of oil and gas development – Impacts on the integrity of Marine Protected Areas

# Summary of main findings

* Offshore oil and gas developments are commonly located in offshore Marine Protected Areas (MPAs) in the UK and new oil and gas projects are still being proposed and approved inside Marine Protected Areas.
* Internationally accepted MPA management guidance clearly states that oil and gas activity is incompatible with good MPA management.
* Direct habitat loss from construction is a serious impact of offshore oil and gas within MPAs but there are many more issues which are less difficult to quantify.
* There is direct evidence of oil and gas impact on designated features in MPAs – for example sponge aggregations in the Faroe-Shetland Channel Nature Conservation Marine Protected Area.
* Many other oil and gas developments are directly or indirectly impacting on the designated features of the MPAs, limiting the benefits of protection.
* The diverse and cumulative impacts of oil and gas developments have impacts at every level in MPA ecosystems.
* The pollution and disturbance caused by offshore oil and gas could also be impacting on connectivity between MPAs which is an important part of their function.
* The increasing depth at which oil drilling is taking place, coupled with locating oil developments in MPAs is putting whole sites at risk from a major deep sea blow out.
* Multiple impacts of oil and gas are threatening the blue carbon storing capacity and ecosystem health of the UK’s MPA network which are both key in tackling climate change.
* Climate change, largely driven by fossil fuels, is also impacting on the capacity for MPAs to protect ecosystems and will require new approaches to MPA management in future to adapt to changing conditions such as the range of marine species and seasonality of key marine processes.

# Introduction

Marine Protected Areas (MPAs) are places in the sea that are protected from damaging activities for the primary benefit of biodiversity and are increasingly seen as an essential part of UK and global marine conservation efforts1. Evidence from the UK and worldwide has shown how highly protected and effectively managed marine areas can boost biodiversity over a much larger area, support sustainable fisheries2, enhance community well-being3, offer improved resilience to climate change4 and deliver other important services which benefit people and the wider environment. An effective MPA can also provide a safe haven for breeding and feeding fish and shellfish, which can boost catches in adjacent areas and ensure the long-term sustainability of fisheries5. A well-protected MPA also safeguards the capacity for marine habitats to store carbon, contributing to curbing climate change6. Importantly, they also provide reference sites which help scientists understand how a healthy ecosystem works7.

Marine protected areas are recognised as a key tool in helping to

(a) Protect highly diverse or otherwise valuable sites

(b) Allow previously valuable but now degraded sites to recover

(c) Boost biodiversity inside protected areas, and replenishing surrounding areas over distances of metres thousands of metres

(d) Protect spawning grounds and populations, and boosting adjacent and more distant fisheries

(e) Creating more resilient ecosystems that are able to adapt to climate impacts, including extreme events4

(f) Improving ecosystem services to communities, including recreation, tourism, health and well-being3.

# Global Marine Protected Area policy

The Convention on Biological Diversity had a long-standing Marine Protected Area target for 10% of marine areas to be effectively protected by 2020. This was very recently replaced by a target to effectively protect 30% of seas by 2030, enshrined in the 2022 Kunming-Montreal agreement8.

It is not enough to simply designate areas as protected to meet targets. These areas must be carefully selected and designed in consultation with stakeholders and informed by good scientific information and they need to be effectively protected to yield benefits9.

There has been a lot of focus in international science and policy on the impacts of fishing on Marine Protected Areas and the concept of banning fishing, particularly habitat-damaging methods such as trawling and dredging, is now widely accepted. Less consideration has been given to the impacts of other activities, particularly those that are more difficult to manage and restrict within a protected area like pollution and noise10.

However, there is very clear international good practice advice and guidance on not co-locating offshore oil and gas with MPAs. The International Council for the Conservation of Nature (IUCN) have set down a series of categories of Marine Protected Areas and clear guidelines on the levels of protection that should be offered for each level of protection11. The official guidelines for the implementation of those MPA categories clearly set out that exploration or extraction of oil and gas are not compatible with any of the protected categories11:

“In accordance with IUCN policy on mining in protected areas, agreed by Resolution at the 2016 World Conservation Congress, these activities should not be permitted in any category of MPAs.”

Balancing industrial uses of the sea and effective protection is challenging and is often undermined by political and economic prioritization of profit over protection12, however some countries have shown leadership in prioritizing marine environmental protection. Some countries have specific policies relating to protection of MPAs from offshore oil and gas impacts, for example in 2019 Canada banned oil and gas development in all of its Marine Protected Areas when the decision was taken to adopt the highest standards set out in the IUCN Guidelines11,13. Most of the USA’s National Marine Sanctuaries are protected from oil and gas development14. For example, Papahānaumokuākea Marine National Monument in Hawai’i is the largest contiguous fully protected conservation area under American jurisdiction and one of the largest marine protected areas in the world with an area of 1,508,870 km2, throughout which all exploring for developing, or producing oil, gas, or minerals is prohibited15. In Australia, the Great Barrier Reef marine park covers a very large area (344,400 km2) and is completely protected from offshore oil and gas developments16.

# UK Marine Protected Area policy

The UK now has an extensive network of Marine Protected Areas protecting features of national and international importance. As of February 2022 there were 374 Marine Protected Areas in UK waters, 328 of those inshore and 76 offshore, protecting a total of 38% of total marine area17. However, the evidence for environmental benefits of these areas is limited, partly due to inadequate monitoring which in itself is a concern. For example, in the recently published Office of Environmental Protection assessment of the delivery of DEFRA’s 25 year plan, there was insufficient data to assessment the performance indicator on the condition of offshore MPAs. The OEP highlighted that accessible condition monitoring survey data was only available for 30% of offshore MPAs18.

The main types of Marine Protected Areas (MPAs) in UK waters are:

**(a) Special Areas of Conservation**

These were originally designated to protect species and habitats listed on Annex 1 and Annex 2 of the European Habitats Directive, which includes species like harbour porpoise and habitats like horse mussel reefs and maerl beds. There are 116 SACS covering 14% of UK waters17. At least 25 of these sites are offshore and many are already impacted by oil and gas developments. For example, the Dogger Bank SAC was designated to protect the feature “Sandbanks which are slightly covered by seawater at all times.” and has many well-established offshore gas installations and more at various stages of development. Since the UK’s exit of the European Union, there is still a mechanism to designate new SACs19 .

**(b) Marine Conservation Zones – Marine Conservation Zones**

**Marine Conservation Zones can be designated in English, Welsh and Northern Irish territorial and offshore waters to protect a range of nationally important species and habitats**20**. The process to identify and consult on the MCZ sites began in 2008**20 **and sites have been protected in a number of tranches in 2013, 2016 and 2019**21**.**

**Features protected include cold water coral reefs, ocean quahog and horse mussel reefs and the designation process was informed by the Ecological Network Guidance**22 **which identified the full list of Features Of Conservation Interest (FOCI) and the approach to be taken to build an effective network, closely based on the OSPAR MPA network guidance**23**.**

The main challenge regarding the MCZ network has been around the level of protection afforded the conservation features and the lack of highly protected sites. The wording of management plans for MCZs usually refers to existing licensing and regulation of offshore industry and additional protection from oil and gas impacts does not seem to be offered.

An example of a Marine Conservation Zone at risk from offshore oil and gas activity is the North East of Farnes Deep MPA24. It was designated to protect benthic habitats including sand, mud and coarse sediment and the ocean quahog. It is home to diverse species of sponges, crustaceans and fish25.

**(c) Special Protection Areas**

# Special Protection Areas are designated to protect birds. Designation began in the 1980s and new sites are still being identified25. The selection criteria focus on the importance of sites for birds, For example sites that are used regularly by more than 1% of the UK population of a protected bird species or over 20,000 seabirds would be selected.

A good example of an SPA at risk from offshore oil and gas activity is the Seas off Foula SPA26. This site is incredibly important for seabirds, including important feeding grounds for great skuas, fulmars, gulls and auks. The island of Foula is one of the largest seabird colonies in Britain and hosts more than 190,000 breeding seabirds. Over 5% of the British great skua population feeds in this area.

However, current and proposed oil and gas activity west of Shetland threatens this world-class seabird haven and the SPA is only 54km from the proposed Equinor Rosebank oil development27.

**(d) Nature Conservation Marine Protected Areas**

**Nature Conservation Marine Protected Areas (NCMPAs) are a type of marine protected area that can be designated in Scottish territorial and offshore waters They can protect a wide range of features from sandeels to cold-water corals. A good example of a NCMPA at risk from offshore oil and gas is the** East of Gannet and Montrose Fields Nature Conservation MPA28. It was designated to protect ocean quahog aggregations, offshore subtidal sands and gravels but it is already used for oil and gas activities and these are happening in close proximity to the designation features29. These activities are considered a threat to the protected features30.

**(e) Highly Protected Marine Areas**

There are many concerns about how effectively protected UK MPAs are. A review of Scotland’s MPA network acknowledged the positives of Scotland’s conservation feature led approach to building the network but raised concerns about the effectiveness of protection31.

The main criticism of the UK MPA network has been the lack of highly protected areas and no-take zones32,33. Consultations have recently been held about specific sites for Highly Protected Marine Areas in English waters32 and on selection criteria for HPMAs in Scottish waters34. If these sites are designated, they will be highly protected within their boundaries but they will still be subject to many of the impacts associated with oil and gas developments, most notably noise and chemical pollution which can spread long distances from the source:

Their principal purpose is to allow the recovery of biodiversity35. If properly managed, they will enable biodiversity recovery, nurture productive ecosystems and improve the sustainability of surrounding fisheries. However, offshore oil and gas activities would undermine this.

# Impact of oil and gas on MPAs

The 33rd licensing round which opened in October 2022 included areas that if licensed would directly impact on 27 MPAs36. Continuing to license oil and gas developments in UK Marine Protected Areas in the context of the climate and ecological emergencies and our growing understanding of the role of a healthy ocean in climate change mitigation is counter-intuitive to say the least. Unsurprisingly, inappropriate industrial activities within MPAs are seen as a major impediment for their effective function37 All the impacts of oil and gas on the wider marine environment can also occur in MPAs when oil and gas development is allowed, undermining the sites’ protection. MPAs are also at risk from oil and gas activities in adjacent areas. It is widely acknowledged in the MPA literature that for highly protected sites to function effectively it is not enough simply to protect the footprint of the site. Activities in adjacent areas and the wider sea area also need to be appropriately managed. Tools such as buffer zones, where restrictions may not be as extensive, but where major impacts are not allowed, may be necessary to allow MPAs to operate effectively.

In studies of what the wider public understands about MPAs and how they would wish to see them protected, oil and gas industry is generally seen as one of the least acceptable activities to allow38. In the case of offshore oil and gas the best way to ensure the integrity of our existing network of Marine Protected Areas would be to cease offshore oil and gas licensing completely. In the absence of that commitment, the minimum measures that would go some way to protect the ecosystems within these MPAs and the features for which they have been designated would be to:

(a) To ensure that no new oil and gas is permitted within the MPAs, immediately eliminating a whole range of serious impacts that are limiting MPA function.

(b) To implement an evidence-based buffer zone around all designations which would go some way to reducing the transboundary impacts of pollution, noise and disturbance created by adjacent development.

It should be highlighted that the designation of a Marine Protected Area is not a simple process. A whole series of actions are required to deliver an MPA including scientific survey and monitoring, stakeholder engagement and consultation and technical analysis39. Good outcomes for MPAs are often link to good quality stakeholder engagement and participation in management which can be time-consuming and expensive to achieve40. The MPA network represents a significant investment in taxpayers’ money and the time and resources of private sector stakeholders such as fishermen, offshore developers and other marine industries39. Undermining these designations through damaging developments risks jeopardising the effectiveness of these hard-won protective measures. It also limits the wide range of benefits to marine users and the wider environment when MPAs are allowed to function effectively. It is also an increasingly unpopular concept for the public, for example, a recent survey in which members of the public highlighted oil and gas extraction as one the least compatible activities for a Marine Protected Area38 and the outcry in Canada over oil and gas activity in the proposed Laurentian Channel MPA41.

It will be particularly important that the proposed network of Highly Protected Marine Areas is not adversely impacted by offshore oil and gas as their principle purpose will be to allow the recovery of biodiversity35. They will represent the highest level of UK protection of the marine environment and if properly managed could yield the greatest benefits in terms of enhancing biodiversity, nurturing productive ecosystems and improving the sustainability of surrounding fisheries.

# Some key impacts of oil and gas activity on MPAs

As highlighted elsewhere, as most UK MPAs are not protected from offshore oil and gas, they are subject to the full range of associated impacts which is of grave concern for their integrity and effectiveness. These impacts occur at all stages of development:

**Exploration** – Seismic surveys are the most intrusive and damaging marine industrial noise and can have a big impact on feeding, breeding and other behaviour in protected species such as marine mammals and commercially important fish and shellfish too. Intense and frequent disturbance by seismic surveys within or near to MPAs could reduce the effectiveness of MPAs designated to protect mobile species by changing their behaviour and movement patterns. Harbour porpoise are a good example of a species often protected in an MPA but very vulnerable to noise disturbance. Replenishment of adjacent areas by planktonic larvae is a key function of MPAs and numerous studies have shown impacts of the high intensity seismic sounds used for offshore oil and gas on plankton and larvae42–44.

**Drilling and extraction** – Many MPAs are designated to protect vulnerable and fragile habitats which are often particularly susceptible to sedimentation, smothering and burial, and also to contamination. Drilling for oil and gas creates large quantities of drill spoil and contaminated produced water which can impact large areas of habitat. Examples of habitats at direct risk of oil and gas drilling in the UK MPA network include deep-sea sponge communities, cold water corals and ocean quahog habitat. Pollution is a major issue for MPAs and contamination by persistent pollutants associated with oil and gas (e.g. PAHs) is recognised as undermining MPA effectiveness internationally45 but is not well monitored or managed in many of the UKs more industrial MPAs. Oil and gas related contamination can also impact on plankton and larval stages46,47.

**Decommissioning** – Decommissioning abandoned oil and gas infrastructure within an MPA also poses risks and challenges48. Decommissioning risks releasing long-buried contaminants from surrounding sediments, radioactive substances from pipework and other infrastructure and modifying already modified habitats once more49. It is also a noisy process that can take a long time and can add to the noise pollution and disturbance impacting on mobile species.

To illustrate these impacts, some brief examples of impacts on UK MPAs are given below:

**The Faroe-Shetland Channel Nature Conservation Marine Protected Area was** designated to protect important boreal ostur type sponge accumulations and protected cetaceans in 2014 but the site has continued to be explored and exploited for all and gas. A substantial area of seabed is covered in infrastructure, with multiple projects at different stages and benthic diversity was found to increase with distance away from industrial activity50 and directly impacted areas are known to take decades (if longer)to recover.

**The Dogger Bank Special Area of Conservation** is another example of where the designated feature has been impacted by offshore oil and gas developments. In 2022 new regulations were approved to protect Dogger Bank and three other sites from mobile fishing gear51.

**The Southern North Sea Special Area of Conservation** overlaps with the Dogger Bank SAC and its primary function is to protect harbour porpoise, with the conservation objective to “maintain site integrity”. The impact of new oil and gas licensing on harbour porpoise SACs is really important to highlight. Harbour porpoises are vulnerable to a wide range of the impacts associated with offshore oil and gas and the objectives of the network of harbour porpoise SACs is to protect the areas that have been identified as the most important for the UK’s populations of this species52.

Permitting new offshore developments in or adjacent to these areas put the priority feature of these designations at risk from acute and long-term disturbance, additional risk of catastrophic pollution and long-term additional pressure from the endemic and operation pollution associated with offshore oil and gas. The increased contribution of greenhouse gases and associated sea temperature increases are having impacts on the harbour porpoises’ ecosystems leading to declines in the availability of their preferred prey53 and putting this species under increased risk of starvation, disease and poor reproductive outcomes54.

**Highly Protected Marine Areas**

Of even greater concern for the future of the MPA network is the idea that new Highly Protected Marine Areas, flagship conservation sites and vital for proper marine ecosystem recovery, will not be properly protected from offshore oil and gas activities. For example, the Inner Silver Pit South candidate Highly Protected Marine Area55 proposed to protect blue mussel reefs, ross worm reefs and important foraging areas for seals, cetaceans and seabirds55 is surrounded by new licensing blocks, with a concession to exclude the outline of the marine protected area from any proposal56. To locate one of the UK’s flagship marine protection sites amid the pollution, habitat loss and disturbance of new and existing offshore oil and gas developments, which could be in operation for decades to come, risks undermining the concept of HPMAs completely.

“Inner Silver Pit South was primarily identified for its regionally important biodiversity, which includes a wide range of seabed dwelling organisms as well as nineteen mobile species including commercially important fish species, marine mammals and seabirds…The area is important in the key life cycle stages of a high number of species, including those of commercial importance such as cod, mackerel, herring, plaice, sole and whiting. These species provide foraging for seals, cetaceans and seabirds, therefore protecting and recovering these habitats has the potential to have wider ecosystem benefits.

The proposed conservation objective for all pilot HPMAs, including Inner Silver Pit South is:

*“To achieve full natural recovery of the structure and functions, features, qualities and composition of characteristic biological communities present within HPMAs and prevent further degradation and damage to the marine ecosystem subject to natural change.”*55

Oil and gas developments can have serious impacts on marine mammals and fish species and this, supposedly one of the most highly protected marine areas in the UK could have oil and gas developments directly alongside.

**Impacts on restoration and rewilding projects.**

A related risk is the impact of oil and gas development on marine and coastal habitat restoration projects. Expensive and high-profile projects around the UK coast are seeing biodiverse and potentially carbon-storing habitats like seagrass meadows57 and oyster reefs58 being restored after decades of decline59. Most projects are coastal and are therefore at most risk from oil and gas infrastructure where it comes to shore and from catastrophic oil spills. However, with domestic and international commitments for habitat restoration it is likely that active restoration will become more common in Marine Protected Areas.

**Co-location of Marine Protected Areas and offshore energy**

Whilst co-location of wind farms and marine protected areas has been widely discussed and approaches studied60–63, the idea that offshore oil and gas installations could act as de facto MPAs has many flaws, not least the high levels of chemical and noise pollution they create. The IUCN Guidelines11 state clearly that areas that have incidental conservation benefits (and they mention wind farms and oil platforms as examples) should not automatically be classified as MPAs.

One of the arguments for leaving some elements of oil and gas infrastructure on the seabed is that the infrastructure, along with exclusion zones that will have been in place since their construction can create a de facto Marine Protected Area. The IUCN Guidelines11 state clearly that areas that have incidental conservation benefits (and they mention wind farms and oil platforms as examples) should not automatically be classified as MPAs.

Similar arguments have also been used for the siting of oil and gas infrastructure within an existing MPA but there are a number of arguments against this. The wide range of impacts associated with installing oil and gas infrastructure and going through the process from exploration to production would bring a wide range of impacts into an area.

# Impact on a coherent network of MPAs and effective connectivity

When considering the impact of oil and gas development on UK MPAs it is also important to consider that they are increasingly being designed to work as a network to contribute to the overall protection and restoration of UK seas. The JNCC/Natural England Ecological Network Guidance is key to informing this and the seven key elements of this guidance are as follows22:

**1. Representativity** – the MPA network should represent the range of marine habitats and species through protecting all major habitat types and associated biological communities present in our marine area.

**2. Replication** – all major habitats should be replicated and distributed throughout the network. The amount of replication will depend on the extent and distribution of features within seas.

**3. Viability** – the MPA network should incorporate self-sustaining, geographically dispersed component sites of sufficient size to ensure species and habitats persistence through natural cycles of variation.

**4. Adequacy** – the MPA network should be of adequate size to deliver its ecological objectives and ensure the ecological viability and integrity of populations, species and communities (the proportion of each feature included within the MPA network should be sufficient to enable its long-term protection and/or recovery).

**5. Connectivity** – the MPA network should seek to maximise and enhance the linkages among individual MPAs using the best current science. For certain species this will mean that sites should be distributed in a manner to ensure protection at different stages in their life cycles.

**6. Protection** – the MPA network is likely to include a range of protection levels. Ranging from highly protected sites or parts of sites where no extractive, depositional or other damaging activities are allowed, to areas with only minimal restrictions on activities that are needed to protect the features.

**7. Best available evidence** – Network design should be based on the best information currently available. Lack of full scientific certainty should not be a reason for postponing proportionate decisions on site selection.

A high level of offshore oil and gas developments inside and outside the MPA network particularly challenges two of these criteria. **Criteria 6 - Protection** is challenged because so few offshore MPAs are completely without oil and gas developments and so most are subject to the suite of impacts associated with those activities either within their boundaries or nearby. Secondly, **Criteria 5 – Connectivity** is threatened because noise, pollution and other impacts of offshore oil and gas are impacting on very wide areas of sea, changing the way species move and migrate and potentially limiting the all-important connectivity between sites.

# Impact on blue carbon in Marine Protected Areas

Blue carbon is the carbon stored in marine and coastal systems64. Some habitats have a high capacity to store and lock down additional carbon, for example coastal seagrass meadows and offshore sediments65. Degraded marine ecosystems can become a source of carbon as the stored carbon is released from disturbed sediments66. Whilst blue carbon was not a consideration in the early decades of MPA designation, it is now and new MPAs are increasingly being identified for their blue carbon value and their potential to lock down further carbon. For example, the consultation on criteria for new Highly Protected Marine Areas in Scotland highlights blue carbon protection as a key designation feature 34.

All effectively protected MPAs should protect blue carbon to some extent9, and the better protected they are, the more likely they are to protect and enhance carbon storage6. Protecting offshore sediments is likely to be particularly important for blue carbon storage67,68 and in MPAs where mobile fishing is banned, there is a better chance for blue carbon to recover and even more of a need to reduce the other impacts, particularly those associated with oil and gas activity.

Noise and pollution associated with offshore oil and gas may be compromising the blue carbon benefits that could otherwise be realised within MPAs, although as many of these impacts are sublethal it is very difficult to categorically prove impacts. As blue carbon science develops it is likely that MPA management will be reviewed to protect blue carbon sinks from as many impacts as possible and there will be more focus on reducing the prevalence of oil and gas within the UK MPA network.

There is a growing concern that the severity of impacts of climate change on marine ecosystems will undermine MPA protection69. This needs to be considered when establishing new MPAs and managing existing ones, and new MPAs need to be specifically designed to address climate change and promote ocean recovery70.

# Conclusion

The effectiveness of MPAs in biodiversity protection and restoration, supporting fisheries sustainability and bringing long-term benefits to the wider ecosystem services provided by the sea are now widely acknowledged3,6. Marine conservation and specifically established a global network of Marine Protected Areas, protecting 30% of the ocean by 20308 has been explicitly linked to the vital nature-based solutions which must be urgently implemented alongside the dramatic reductions required in greenhouse gas emissions70.

Current proposals for new UK offshore oil and gas could lead to many more oil and gas developments within and close to MPAs71 and a massive increase in the anthropogenic pressures the MPA network is already under32 and seriously undermine the benefits they can be expected to deliver72.

The very least that should be committed to immediately is a ban on new oil and gas in existing MPAs plus a meaningful buffer zone where oil and gas developments are not permitted to minimise the wide range of noise and pollution impacts that extend well beyond the immediate footprint of an oil or gas installation.

The best way to ensure the integrity of our existing network of Marine Protected Areas would be to cease offshore oil and gas licensing completely throughout UK seas and examine the ongoing impacts from existing oil and gas extraction within Marine Protected Areas very carefully. It is crucial that the ecologically coherent network of Marine Protected Areas including Highly Protected Marine Areas (HPMAs)34,35 is not adversely impacted by offshore oil and gas

It should be clear from other work packages that the high level of impacts associated with offshore oil and gas, in addition to the devasting effects of climate change, are not an acceptable use of our seas and definitely not a sustainable use of Marine Protected Areas.

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