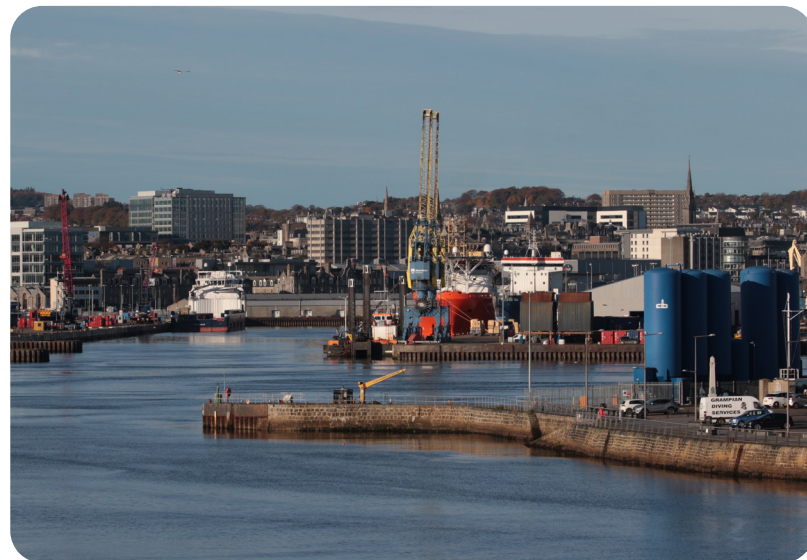


Pressures from activities and their management



Key words

emergence regime
qualitative approach
siltation rate change
expert judgement pressure
barrier Scottish Marine Regions
physical removal
genetic modification
collision contamination
water flow change
salinity change

light or shading
removal of target species
litter Offshore Marine Regions
consensus building human activity
temperature change reduction of prey
wave exposure change visual disturbance
Marine (Scotland) Act 2010 physical change
non-native species electromagnetic change
organic enrichment underwater noise
removal of non-target species surface abrasion
radionuclide contamination water clarity change
physical loss sub-surface abrasion/penetration
deoxygenation nitrogen & phosphorus enrichment
feature activity sensitivity tool (FeAST)
microbial pathogens (disease) viruses parasites

More information on the regions used in the Pressures from activities assessment is available on the Assessment processes and methods page of the SMA2020 portal:
<http://marine.gov.scot/sma/assessment-theme/assessment-processes-and-methods>

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Assessments

What is covered

Many different human activities take place in the seas around Scotland. Fishing, aquaculture, the movement of goods, the removal of hydrocarbons, capturing wind, wave and tidal energy, ecotourism, yachting, surfing, transport of materials through pipelines, transmission of power and communication through submarine cables, military manoeuvres and the development of ports and harbours are some of these activities. In addition, the marine environment is a sink for emissions and discharges from human activities. This can result in nutrients, hazardous substances and (often plastic) litter being discharged from point sources or entering marine ecosystems in a more diffuse manner via rivers and the atmosphere.

Under the Marine (Scotland) Act 2010, Scottish Ministers are required to prepare a summary of significant pressures and the impact of human activity on the area or region. To meet this requirement, a process was put in place to determine the top five human pressures in each of the 11 SMRs and 10 OMRs over the period 1 January 2014 to 31 December 2018. This assessment of pressures only considered those human activities that have a direct impact on the marine environment. Indirect pressures, such as the effects of greenhouse gas emissions, which indirectly influence the marine environment through *climate change* and *ocean acidification*, are dealt with in other parts of SMA2020.

The basis of the assessment

Although assessments of direct human pressures have been attempted in the past by marine managers across the globe, there is no formal process that is internationally recognised for delivering such assessments. In part, this is because the assessment of pressures resulting from individual human activities and then ranking the various pressures is fraught with challenges. To lessen some of these challenges, the process used in SMA2020, which used expert judgement as its basis, also utilised the *Feature Activity Sensitivity Tool (FeAST)* which aims to standardise definitions and linkages relevant to pressures and activities taking place in Scotland's seas.

NatureScot, JNCC and Marine Scotland developed FeAST in recent years in collaboration with industry, scientific experts and other stakeholders. The tool, through the use of standardised language on pressures and activities, highlights the nature of the pressures exerted by the various human activities taking place in the seas. FeAST was not designed to assess the intensity, frequency or cumulative impacts from activities taking place at specific locations.

Pressures were assessed singly, with multiple activities combining in some instances to affect the intensity and geographic distribution of a single pressure. The cumulative effect of multiple pressures on the marine environment was not considered within the assessment framework due to the complexity of the likely interactions (additive, synergistic and antagonistic) involved.

A bespoke process was developed comprising three key stages:

1. Agreement on what activities actually occur in each SMR or OMR.
2. Pressure experts identified, scoped and ranked the pressures in each SMR or OMR.
3. Translation of these pressures back to the main pressure-causing activities and the production of a commentary on the trends in the pressures over the period 1 January 2014 to 31 December 2018.

Steps 2 and 3 were undertaken in a consensus building workshop held at the MASTS Annual Science meeting in October 2019 attended by 45 delegates.

Main pressures identified as an outcome of the Pressure Assessment Workshop

The SMA2020 portal presents a pressure assessment for each of the 21 SMRs and OMRs. The tables highlight the top five pressures for each of the regions. The effects of climate change are considered elsewhere in SMA2020.

Key:

Removal of target species (including lethal)

Removal of non-target species (including lethal)

Surface abrasion

Sub-surface abrasion/penetration

Sub-surface/surface abrasion/penetration

Underwater noise

Physical change to another sea bed type

Synthetic compound contamination including pesticides, antifoulants, pharmaceuticals

Organic enrichment

Litter

Hydrocarbon contamination

Death or injury by collision below water

Five main pressures identified per Scottish Marine Region - ranked by severity

Region	Pressures ranked by declining severity from left to right				
S1 Forth and Tay					
S2 North East					
S3 Moray Firth					
S4 Orkney Islands					
S5 Shetland Isles					
S6 North Coast					
S7 West Highlands					
S8 Outer Hebrides					
S9 Argyll					
S10 Clyde					
S11 Solway					

Five main pressures identified per Offshore Marine Region - ranked by severity

Region	Pressures ranked by declining severity from left to right				
O1 Long Forties					
O2 Fladen and Moray Firth Offshore					
O3 East Shetland Shelf					
O4 North and West Shetland Shelf					
O5 Faroe Shetland Channel					
O6 North Scotland Shelf					
O7 Hebrides Shelf					*
O8 Bailey					
O9 Rockall					
O10 Hatton					

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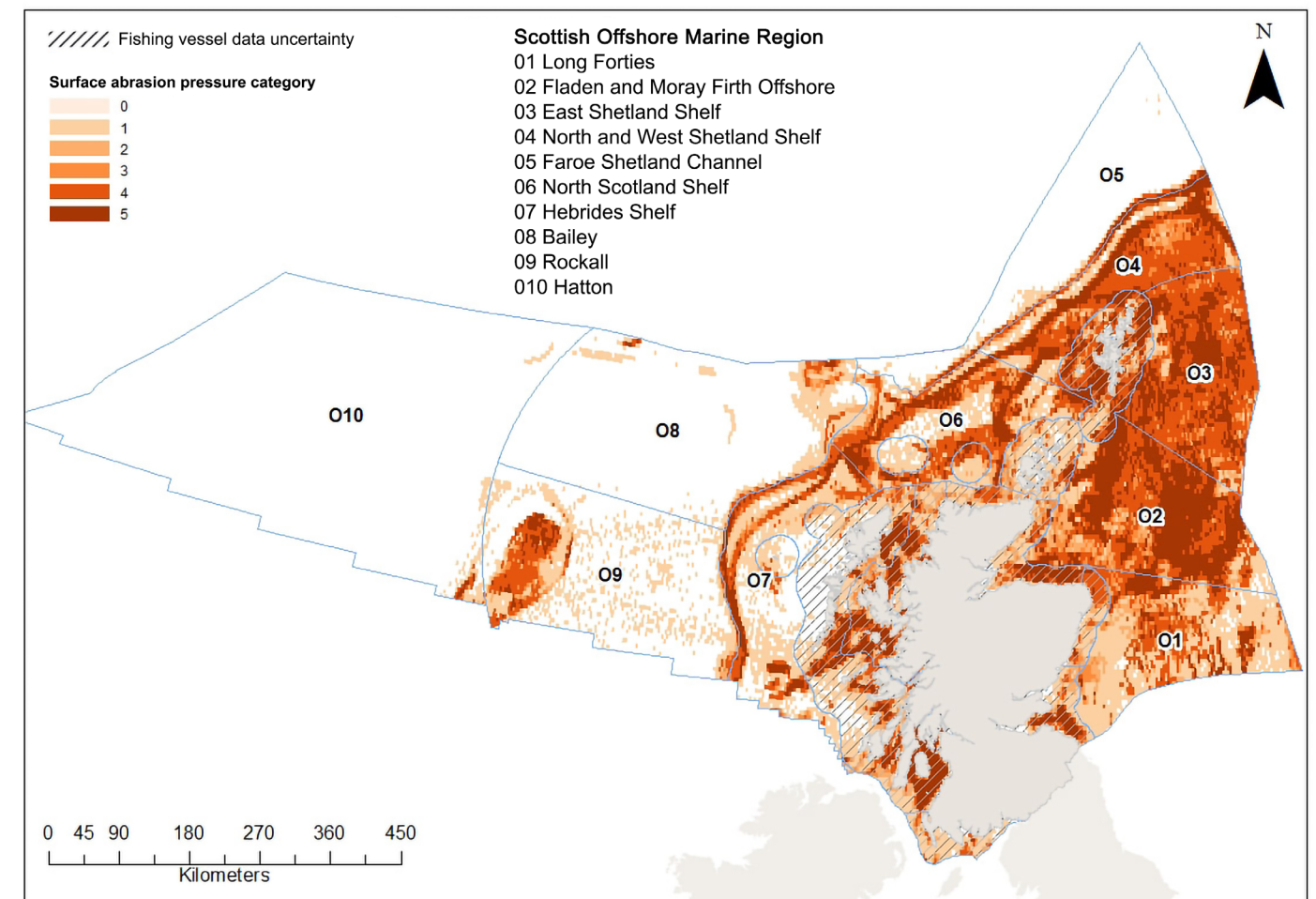
Summary of key messages

- Fishing, especially methods that involve towed, bottom-contacting gear, is regarded as the most geographically widespread direct pressure-causing human activity across all SMRs/OMRs.
- Underwater noise is recognised in some SMRs as a top five pressure, although the measurement of this pressure and the assessment of its effect requires further development.
- The production of a full spatial assessment of pressures and activities is not yet possible due to a lack of data at the correct spatial resolution and the absence of an agreed methodology.



“Fishing, due to the size of its footprint and the nature of the activity, is the dominant pressure-causing activity in the marine environment.”

Philip Boulcott, Topic lead



Aggregated surface abrasion pressure in regions using 2012-2016 data series. Pressure unit is swept area ratio (the proportion of grid cell swept by fishing gear). Hash indicates inshore areas where fishing data are uncertain due to lack of information for small vessels. Figure from the *Predicted extent of physical disturbance to seafloor assessment*.

Summary of knowledge gaps

The following knowledge gaps have been identified:

1. Data are often not presented at the SMR level. Highly resolved spatial data relating to both the status of biological features and pressures/activities are required.
2. Protocols for reporting within SMRs/OMRs for biological features that operate at much larger spatial scales, for example, cetaceans that range over large distances.

3. Lack of comprehensive mapping of some activities. For example fishing vessels below 12 m in length are excluded from Vessel Monitoring System data used to assess fishing activity.
4. The effect of some direct human pressures on the long-term condition of biological features. For example the effect of noise or marine litter on mortality rates across the marine ecosystem.