



FISHY

FALSEHOODS

A series of papers debunking myths about our industry

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A white line-art illustration of a fishing boat on the water, with a fisherman on deck. A large fish is shown below the waterline, with a line connecting it to the text below.

Is 80% of Shetland's Seafloor in 'Poor Condition' Due to Fishing?

The Claim

According to Ariane Burgess MSP: **"Scottish Government data shows 80 per cent of Shetland's seafloor is in 'poor condition' due to towed, bottom-contacting fishing."**¹

A witness to a Scottish Parliament Committee also recently stated that: **"58 per cent of our [Scotland's] seabed is highly disturbed."**²

Similar claims have been repeated on social media by various organisations.

FACT

We do not **know** how much of the seafloor around Scotland is affected by fishing because most of it has not been surveyed.

FACT

These figures appear to be derived from a relatively crude theoretical study based on unsubstantiated assumptions and subjective judgements.

FACT

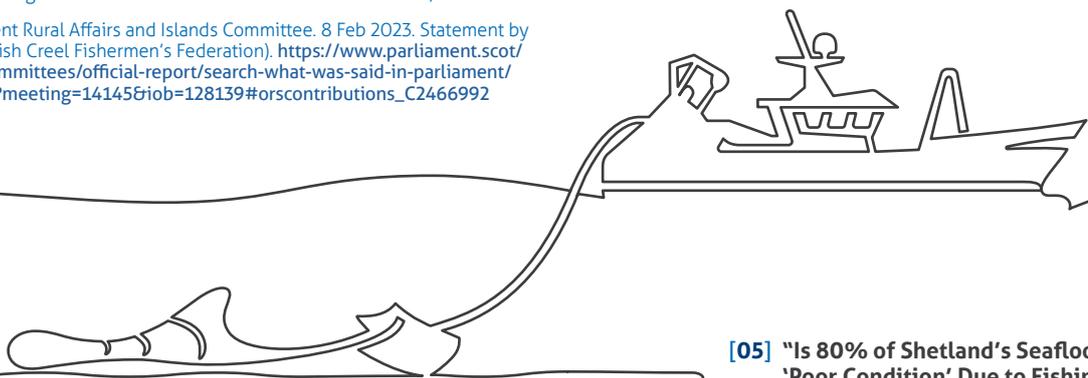
A more detailed and sophisticated assessment published in 2022 in a prestigious peer-reviewed scientific journal indicated that most of the seabed around the UK was relatively **undisturbed** by fishing.

FACT

Any effects that fishing has on the environment are less than those of most other means of producing food (by farming the land, for example).

¹ Ariane Burgess: A Regional Outlook: Your MSPs' Views. Shetland Times, 10 Feb 2023.

² Scottish Parliament Rural Affairs and Islands Committee. 8 Feb 2023. Statement by Bally Philp (Scottish Creel Fishermen's Federation). https://www.parliament.scot/chamber-and-committees/official-report/search-what-was-said-in-parliament/RAI-08-02-2023?meeting=14145&iob=128139#orscontributions_C2466992



Source of the Claim

Although no sources were cited for the claims quoted above, they appear to be based on an assessment published online by Marine Scotland in 2020.³

This assessment is not based on any actual examination of Scotland's seafloor. Rather, the assessment attempts to **predict** the extent of seafloor disturbance on a **theoretical** basis, based on apparently unsubstantiated **assumptions**, and on a relatively crude scale. The assessment then makes subjective judgements about the results.

An alternative and more detailed assessment published in a scientific journal in 2022 reached very different conclusions about the magnitude and extent of seabed disturbance by fishing around Scotland.

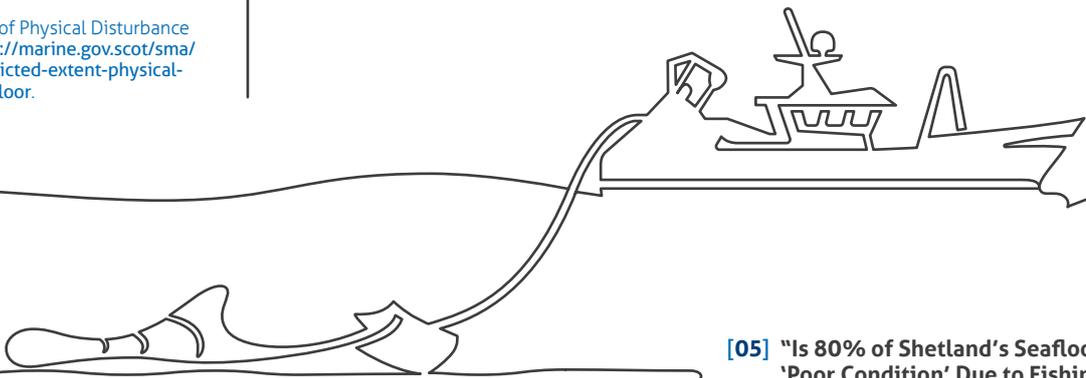
Scottish Government Assessment

The assessment published by Marine Scotland³ attempted to predict the level of disturbance of the seabed around Scotland based on the distribution and sensitivity of seabed habitats (the nature of the seabed and the organisms growing on and in the seabed) and the distribution and intensity of fishing with trawls and other bottom-contacting fishing gear.

Fishing activity was mapped using VMS data on a grid of 0.05° squares (0.05° is about three nautical miles). Fishing activity was assumed to be evenly spread across each grid square.

The degree of disturbance for each 0.05° grid square was predicted by combining the sensitivity of the habitats within that square and the level of fishing activity and assigned a disturbance score on a scale from 0 (no disturbance) to 9 (highest level of disturbance). High disturbance scores could arise either from low levels of fishing activity in areas judged to have 'sensitive' habitats or higher levels of fishing activity in areas with less sensitive habitats.

³ Predicted Extent of Physical Disturbance to Seafloor: <https://marine.gov.scot/sma/assessment/predicted-extent-physical-disturbance-seafloor>.



Disturbance categories 0 to 4 were arbitrarily assumed to represent 'low' levels of disturbance and categories 5 to 9 'high' levels. Areas of seabed assumed to be subject to 'high' levels of disturbance were then arbitrarily assumed to be in 'poor' condition.

This assessment was carried out on a fairly coarse scale – the grid squares across which fishing activity was mapped each covered more than 30 km² (3 x 3 nautical miles or 5.6 x 5.6 km). The entire city of Dundee (60 km²) would be covered by just two of these grid squares.

Further, the assessment assumed that the whole area of a square was affected if any fishing activity happened anywhere within it. (This is equivalent to assuming that if a single footpath runs across a field, then the whole field is equally affected by the trampling of walkers. And in this case the field would cover 30 km².)

An Alternative Assessment

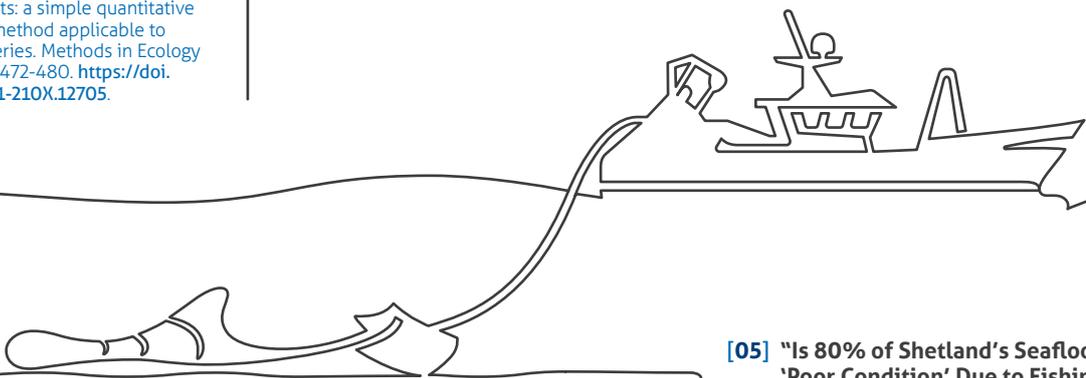
A much more detailed assessment of the effects of trawling on the seabed was published in a prestigious peer-reviewed scientific journal in 2022.^{4,5} The study, carried out by an international team of scientists led by Dr Roland Pitcher, assessed the magnitude and distribution of seabed disturbance by trawling across 24 regions of the world including around the UK and Europe.

The method used in Dr Pitcher's assessment⁶ produces a quantitative measure of disturbance called the Relative Benthic Status (RBS) based on the relationship between the population growth and recovery rates of impacted species on the seabed, the size and frequency of trawls, and other measurables like gear types. Importantly, this measure takes account not just of potential levels of disturbance but also of the ability of seabed organisms to recover.

4 Pitcher et al. 2022. Trawl impacts on the relative status of biotic communities of seabed sedimentary habitats in 24 regions worldwide. *Proceedings of the National Academy of Sciences of the United States of America*, 119: e2109449119. <https://doi.org/10.1073/pnas.2109449119>.

5 The global impact of bottom trawling visualized with data: <https://sustainablefisheries-uw.org/impact-of-bottom-trawling-map/>.

6 Pitcher et al. 2017. Estimating the sustainability of towed fishing-gear impacts on seabed habitats: a simple quantitative risk assessment method applicable to data-limited fisheries. *Methods in Ecology and Evolution*, 8, 472-480. <https://doi.org/10.1111/2041-210X.12705>.



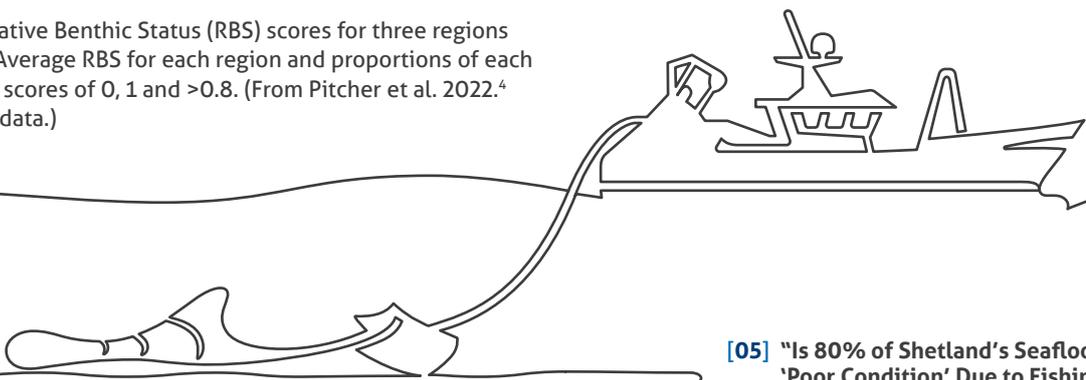
RBS values lie on a scale from 0 to 1, where 0 indicates the seabed is totally depleted by trawling and 1 that it is totally undisturbed. An RBS score of 0.9, for example, can be interpreted as meaning the seafloor habitat is in 90% of its untrawled state (or 10% degraded). The assessment mapped the RBS across a grid of squares that were about 1 km² in size (compared to about 30 km² in the Scottish Government assessment).

This assessment found that 20 of the 24 regions studied across the world had an RBS score above 0.8 (that is, were less than 20% degraded by trawling). The lowest RBS scores (indicating the areas worst affected by trawling) were found in the Adriatic and Mediterranean Seas, in the entrance to the Baltic and off the Atlantic coasts of Spain and Portugal. The waters around the UK had relatively high RBS scores, above 0.8, indicating relatively low levels of disturbance by trawling.

This assessment also found that almost three-quarters of the area of the North Sea had an RBS score of greater than 0.8, indicating the habitat is in more than 80% of its untrawled state, while only 3% of the area had an RBS score of 0 (see Table 1). Almost 90% of the area of the West of Scotland region had an RBS score greater than 0.8 and more than one-third of the area had a score of 1 (indicating no disturbance).

	Regional Average RBS	% of Region		
		RBS > 0.8 (20% depletion)	RBS = 0 (total depletion)	RBS = 1 (no depletion)
North Sea	0.824	72%	3%	11%
Irish Sea	0.836	81%	9%	20%
West of Scotland	0.921	88%	1%	34%

Table 1
Summary of Relative Benthic Status (RBS) scores for three regions around the UK: Average RBS for each region and proportions of each region with RBS scores of 0, 1 and >0.8. (From Pitcher et al. 2022.⁴ Supplementary data.)



Comparison

These two studies both purport to estimate the magnitude and extent of disturbance of seabed habitats by trawling and other types of fishing gear but give very different results.

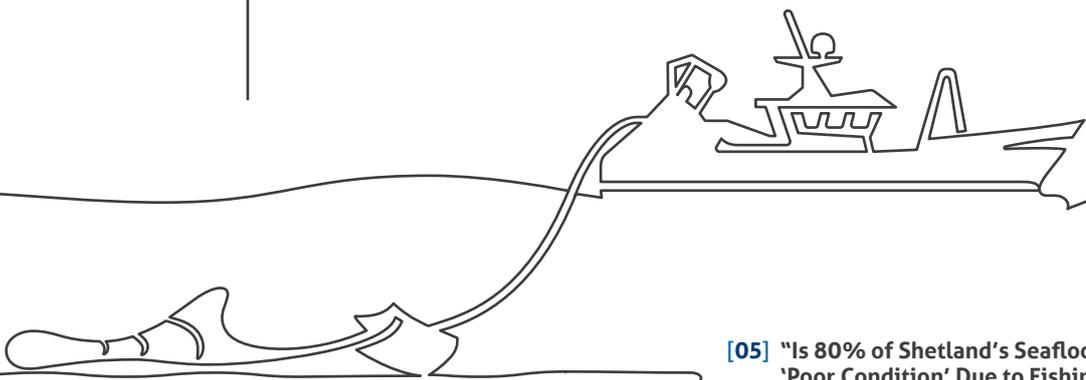
The assessment published by the Scottish Government was relatively crude: Fishing activity was mapped on grid squares that were more than 30 km² in area, compared to only 1 km² in the assessment carried out by Dr Pitcher and his colleagues. Further, while the Scottish Government assessment essentially used only a two-point scale, classifying areas as experiencing either 'low' or 'high' levels of disturbance, Dr Pitcher's assessment used a more detailed numerical scale which allows a more nuanced and detailed interpretation of the results.

While the Scottish Government's assessment concluded that much of the seabed around Scotland was subject to 'high' levels of disturbance, Dr Pitcher's assessment was much less negative, concluding that much of the seabed around Scotland was relatively **unaffected** by trawling.

Discussion

It is important to note that these assessments were both theoretical, involving **predictions** of the effects of trawling and fishing on the seabed based on **assumptions** about the distribution of different habitats and of fishing activity, and of the likely effects of that fishing activity on those habitats.

The actual extent, scale and magnitude of disturbances of the seabed by fishing is largely unknown over most of Scotland's seas since no-one has actually gone out and looked.



The two assessments cited above come to very different conclusions about the magnitude and extent of disturbances of the seabed around Scotland by fishing. The analysis published by Dr Pitcher and his colleagues is more up to date, more detailed, more sophisticated and more nuanced. That published by the Scottish Government is much cruder, both in scale and in the interpretation of the results. It also contains a number of questionable subjective judgements.

The difference between the conclusions reached by these assessments demonstrates the extent to which those conclusions are affected by the assumptions and judgements made in the analysis of the data and the interpretation of the results. Above all, it suggests that the Scottish Government's assessment cannot be accepted unquestioningly as the only possible assessment of the extent to which Scotland's seas are disturbed by fishing.

(It is worth noting also that the Scottish Government itself has also published a figure of about 15% for the area of seabed disturbed by fishing gear around most of Scotland.⁷)

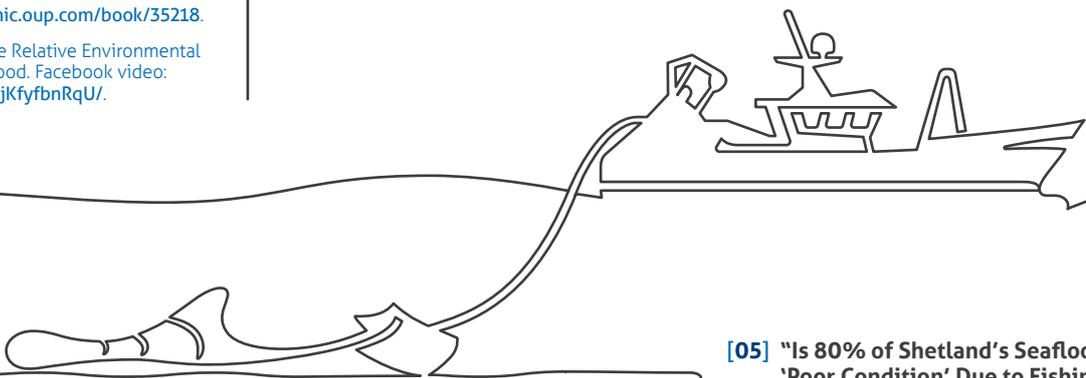
In any case, regardless of the exact area of seabed around Scotland that might be affected by fishing it needs to be remembered that all means of producing food have effects on the environment. Farming, for example, strips the land of its natural vegetation and displaces wildlife, consumes large quantities of fresh water, and uses large quantities of pesticides, herbicides and artificial fertilisers, all of which can have their own environmental effects.

The appropriate comparison is not between the effects of fishing and not fishing, but between the effects of fishing and the effects of producing the same quantity of food of comparable quality by other means. In general, fishing has less impact on the environment than most other ways of producing the same quantity of food.^{8,9}

7 Scottish Government. 2021. Scotland's Marine Assessment 2020: Headline and Next Steps. <https://marine.gov.scot/sma/assessment-theme/headlines-and-next-steps>.

8 Hilborn & Hilborn. 2019. Ocean Recovery: A Sustainable Future for Global Fisheries. Ch. 6. <https://academic.oup.com/book/35218>.

9 Hilborn. 2022. The Relative Environmental Impacts of (Sea)food. Facebook video: <https://fb.watch/jKfybnRqU/>.



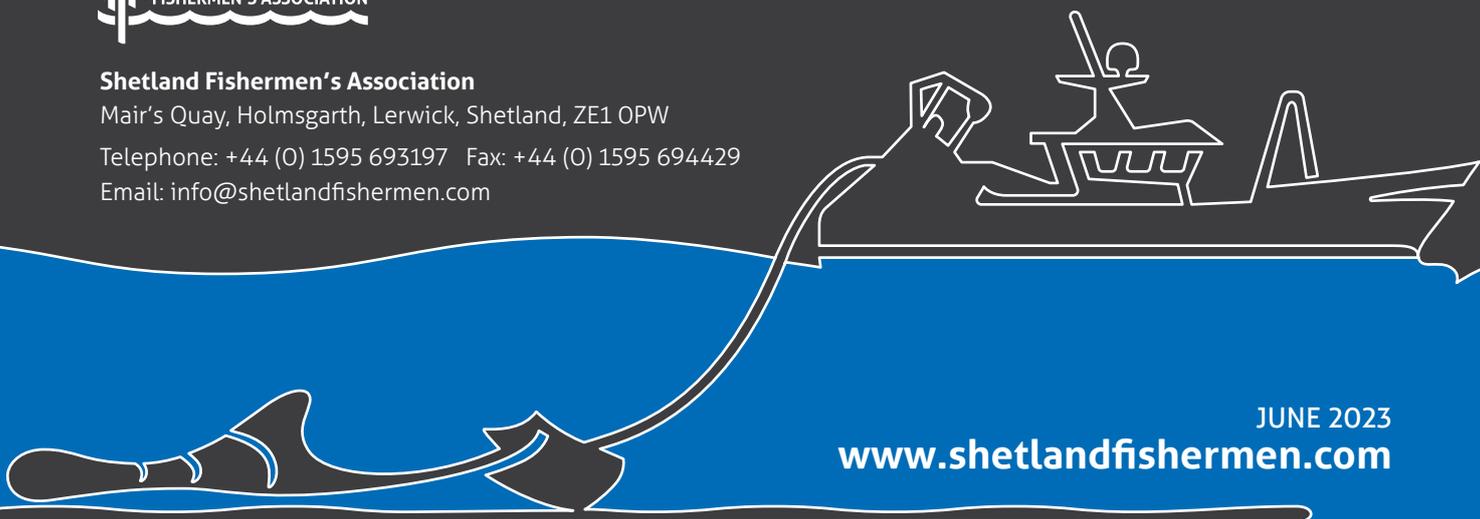


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