The economic implications of changing regulations for deep sea fishing: UK case study

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Background

- Deep sea fish stocks are generally slow-growing and long-lived, which makes them particularly vulnerable to fishing

- Their habitats and ecosystems are largely unknown and this fragile environment is regarded as slow to recover once damaged

- Fishing by use of bottom trawls has the greatest chance of damaging vulnerable marine ecosystems (VMEs)

- The EC has proposed new measures to regulate fishing for deep sea species in the North-East Atlantic
  - to ensure that deep sea species are fished sustainably
  - unwanted by-catches are minimised
  - impact on fragile deep sea habitats is reduced

The EC proposal (2012/0179 (COD))

- Establishes specific conditions relating to fishing for deep-sea stocks
- Repeals EC Regulation (EC) No 2347/2002

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Main aspects of the EC Proposal

- **Permit limitation: The introduction of target species and by-catch species permits which would restrict the number of vessels allowed to catch deep sea species**

- **Ban on towed gears: A prohibition on bottom trawling and fishing by bottom set gillnets on deep sea stocks two years after the new regulation enters into force**

- **Species defined as deep sea species: Several species (ling, tusk and conger eel) are listed as deep sea species in the proposal**

<u>Objective</u>

Conduct an economic impact assessment of the EC policy proposal

- **to inform decisions on how best to manage deep sea fisheries**
- **to protect VMEs and sensitive by-catch species**
- **whilst minimising the economic impact on fisheries operating in these areas**

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Approach

- **Describe recent status quo in terms of structural, operational and economic performance of all UK vessels that have landed deep sea species as defined in the proposal**

- **Economic impact assessment of permit limitation and gear ban (bottom trawling and bottom set gill nets)**

- **Even with improved licensing or effort controls, sustaining deep sea stocks will be challenging because they can be depleted or destroyed much too rapidly for these mechanisms to work**

- **An appraisal of alternative options**
  - **Setting a depth limit to define fisheries targeting deep sea species**
  - **Spatial criteria to protect sea floor vulnerable marine ecosystems (VMEs)**

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Evidence base I

- IFISH database
- Satellite based vessel monitoring system (VMS) data
- Seafish fleet costs and earnings database
- Scottish discards observer data
- English discards observer data
- Scottish trawl survey data

- Created a master dataset with only vessels landing deep sea species, as defined by the list of species in the EC proposal

- Based on the fishing authorisations detailed in Chapter II of the EC proposal (EC COM 371 Final 2012)
  - Annual landings of deep sea species ≥ 10 tonnes define the capacity ceiling
  - Landings thresholds set at ≥ 100 kg and/or ≥ 10% of the overall catch weight of deep sea species per trip
  - Define the number of vessels that would require a permit to target deep sea species

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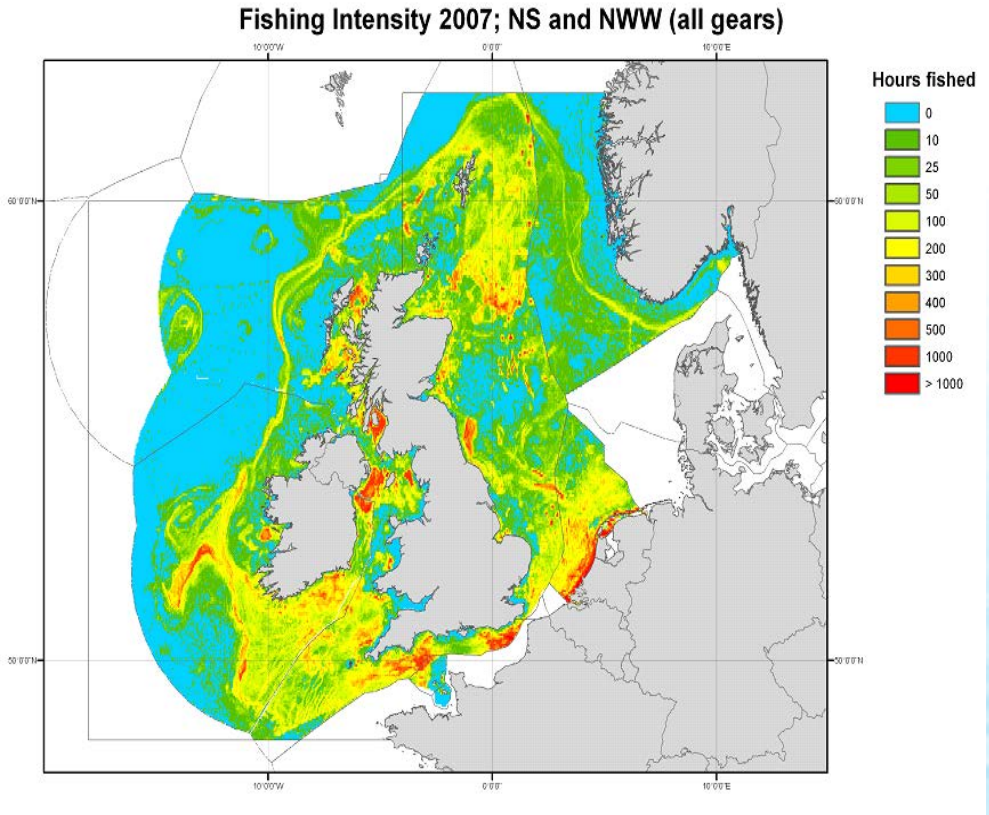
Evidence base II

- Once the trips of vessels meeting these criteria were selected, the corresponding vessel costs and earnings data were used to compute
  - Change in landings
  - Employment
  - Gross value added
- Based on the EC proposal set against the status quo



• Ongoing discussions to refine the EC proposal during the course of this study suggested the removal of ling and conger eel from the species list

- Scenario which excludes ling and conger eel

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Results I: Structure of vessels that would be impacted

	EC Regulation 2347/2002	EC Proposal	Proposal excluding ling and conger eel
Number of vessels	18	99	19
Length, m	36	25	35
Power, kW	1077	636	1250
Tonnage, GT	674	290	683
Days at sea, #	267	219	270
Number of crew	9	7	10
Total landings, tonnes	1657	740	1748
Deep sea species, tonnes	52	58	75
Proportion of deep sea species, %	7	10	6

- Removing ling and conger eel from the species list reduces the number of vessels meeting the criteria to 19 (similar to the original number)
- Inclusion of ling and conger eel has a disproportionate effect on the total number of fishing permits required

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Results II: Economic impact of EC proposal

Based on 2011 data	Proposal	Proposal excluding ling and Conger eel
a) Direct impacts		
Number of vessels	695	85
Landings of deep sea species, tonnes	6,536	1,526
Landings of deep sea species as a proportion of total landings, %	5	4
Number of crew	159	26
Reduction in gross value added, £ million	3.3	0.5
b) Scale of impacts		
Crew share per vessel, £	125686	277675
Number of crew per vessel	5	8
Annual wage per crew, £	27399	35895
Reduction in wages, %	13	7
Reduction in wages, £	3458	2494
Annual wages after DSS are lost, £	23941	33401

- 695 active UK vessels would be directly affected
- 85 if ling and conger eel were removed from the species list

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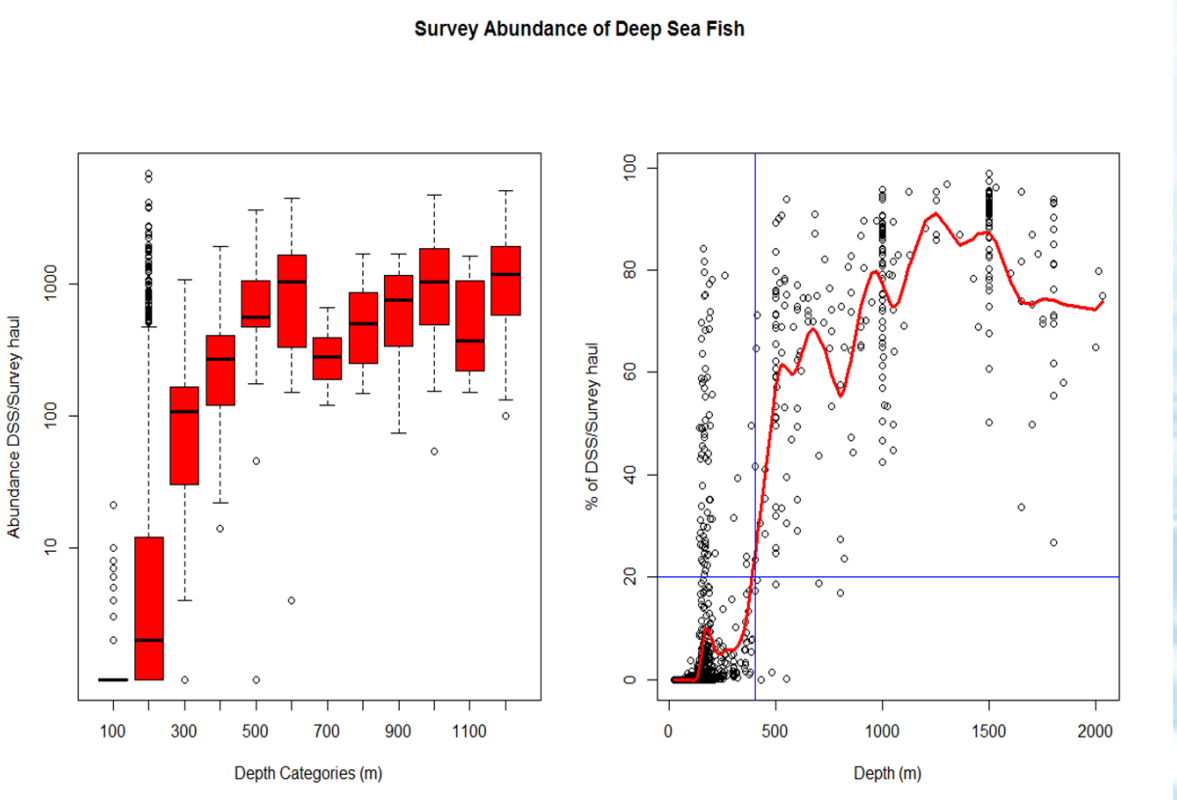
Results III: Economic impact of a gear ban only (bottom trawls and bottom-set gillnets)

	Proposal at 100kg	Proposal at 10%	Combination of 10% and 100kg
a) Direct impacts			
Number of vessels	361	408	584
Landings of deep sea species, tonnes	4807	4269	4837
Landings of deep sea species as a proportion of total landings, %	6	14	10
Number of crew	121	232	277
Decrease in Gross value added, £ million	3.3	2.9	3.4
b) Scale of impacts			
Crew share per vessel, £	169972	108343	132447
Number of crew per vessel	6	4	5
Annual wage per crew, £	30539	26693	27930
Reduction in wages, %	6	14	10
Reduction in wages, £	1983	3711	2829
Annual wages after DSS are lost, £	28556	22982	25101

- Impacted vessels could potentially move to other fishing grounds and continue fishing – Knock-on effects
- Assumed that for trips affected by the proposal, income from catches of deep sea species will be lost

Mitigation measure I: Setting a depth limit to define fisheries targeting deep sea species

- Article 4.2c of the EC proposal stipulate that fishing activities are deemed to target deep-sea species if the "*vessel's master records in the log book show a percentage of deep-sea species equal or superior to 10% of the overall catch in weight in the fishing day concerned*".
- What is the scientific evidence for setting a catch threshold at the 10% level?



- **The most rapid increase in proportion of deep sea species occurs between 300m and 500m**
- **92% of all deep sea species sampled occurring at depths greater than 400 m for the North East Atlantic region**

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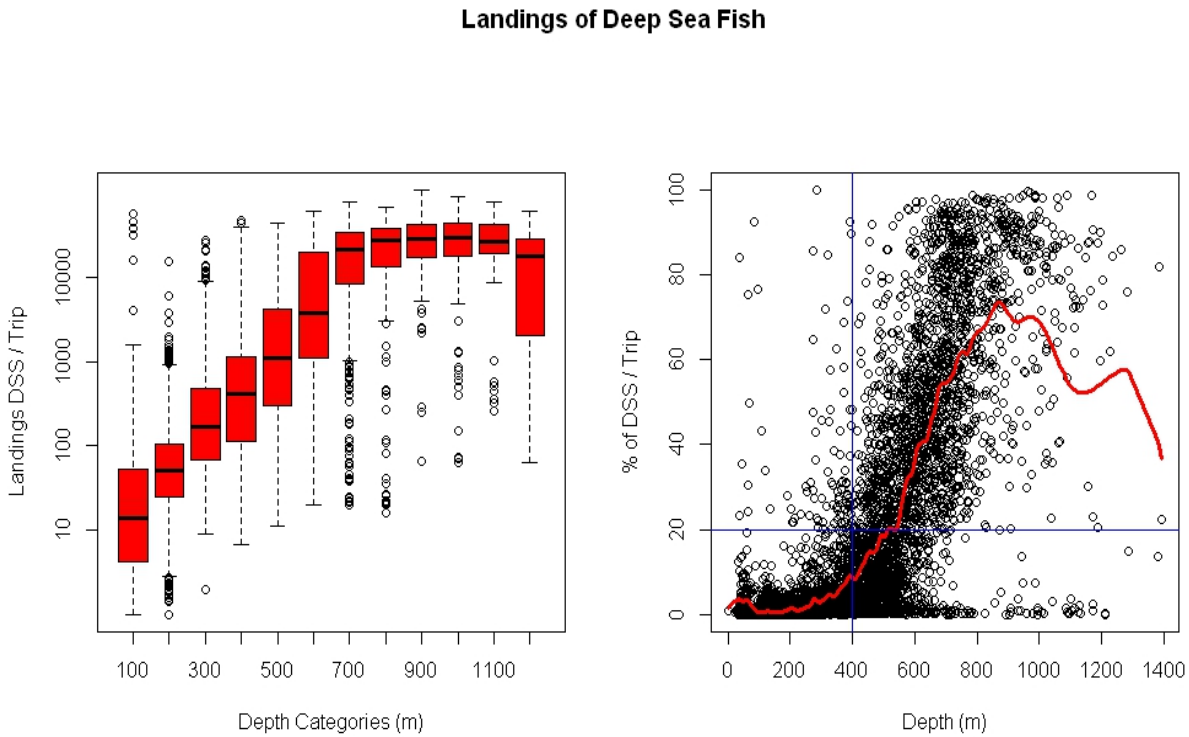
Mitigation measure I: Setting a depth limit to define fisheries targeting deep sea species

- **Landings and catch data from VMS records**
- **Using average depth for the ICES rectangle where fishing took**
- **Increase is most notable between 300m and 500m, similar to observations from the survey data**



- Remarkable consistency in the depth related trends of deep sea species shown by both the fisheries and survey data
- A depth limit of 400m could be considered as the optimal depth separating predominately shelf-based fish from predominantly deep sea populations

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Economic impact of setting a depth limit to define fisheries targeting deep sea species

- **Based on trips classified as targeting deep sea species (according to Article 4.2c and 5 in the EC proposal) at depths < 400 m**

	2011 landings data
Number of vessels impacted by EC proposal without depth rule	685
Number of vessels impacted < 400m depth rule	40
Total landings of deep sea species < 400m depth rule (tonnes)	377
Number of crew < 400m depth rule	9
Gross value added < 400m depth rule (£ million)	0.3

Main result: A 400m depth criterion would protect the interests of smaller vessels fishing at depths of < 400m

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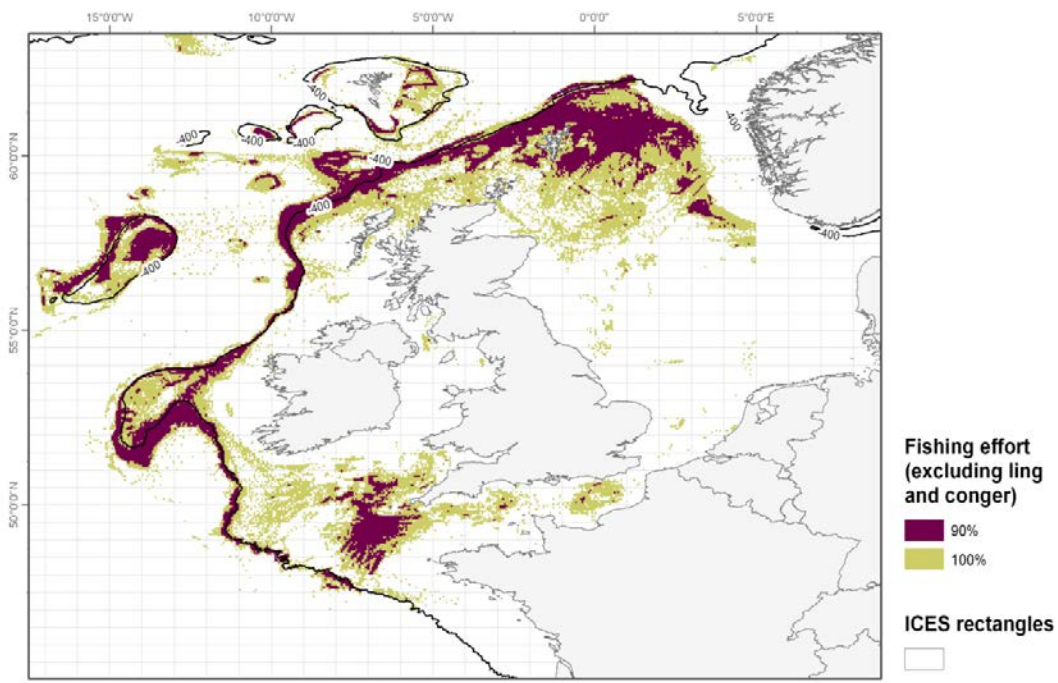
Mitigation measure II: Spatial criteria to protect sea floor vulnerable marine ecosystems

- Two fundamental spatial approaches to consider in relation to protecting known or potential Vulnerable Marine Ecosystems (VME)
  - identify all known and likely areas of VME and close these off to any form of bottom fishing activity
  - define the most active areas of fishing and to restrict fishing within those areas only
- VMS data for mixed demersal fishing fleets has shown the spatial coherence of many fishing fleet



- Bottom 10% of fishing effort (hours trawled per km^2) covers a large area
- Represents low fishing pressure on the sea floor
- This area represents an area of potential high risk in terms of likely encounters with VMEs

- Top 90% of effort is concentrated in a much smaller area
- Fishing pressure is far greater
- Chances of encountering any VMEs are far less

- Makes sense to restrict fishing activity to areas that are already heavily fished, thereby protecting potential VME in less intensively fished areas.

Economic impact of a spatial criterion on the proposed regulation

	2011 ladings data
Total vessels landing deep sea species	45
No. of vessels with trip time >50% in 90% effort (low risk) area	40
No. of trips with trip time >50% in 90% effort (low risk) area	264
No. of vessels with trip time <50% in 90% effort (low risk) area	5
No. of trips with trip time <50% in 90% effort (low risk) area	11
Vessels affected by a 90% core effort region >400 m	3
Deep sea species in 90% effort region > 400m, tonnes	32
Number of crew in 90% effort region > 400m	16
GVA in 90% effort region > 400m , £ million	0.03

- The fishery would benefit from the introduction of a “low risk fishing area”, as fishing within this area would not be impacted by the EC proposal
- Combined effect of applying a 400m depth rule and a 90% ‘core’ fishing effort area (at depths >400m) would reduce the impact of the EC proposal to almost zero, i.e. on average no, or very few, vessels would be impacted

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Summary

- Enforcing the proposal in its current form will have the highest impact on UK vessels as landings would in the short term decrease by ~6,540 tonnes per year
- If ling and conger eel are removed from the species list as has been suggested, then landings would reduce by ~1,530 tonnes per year
- A large proportion of vessels affected are fishing in water depths of less than 400m
- These vessels are catching and landing almost exclusively ling and conger as their only deep water species
- A depth related criterion in combination with a revised species list is preferable to a revised species list alone
- The depth and spatial criteria presented here take a balanced precautionary approach