atlas

UNDERSTANDING DEEP ATLANTIC ECOSYSTEMS

Expert assessment of risks to ecosystem services from diverse human drivers in the Atlantic deep sea

ATLAS 3rd General Assembly

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Introduction

- Marine Ecosystem Services (MES) and human welfare.

- Multiple EU strategies seek to reduce negative effects of human activities on MES.
  - Ecosystem-based management (MSFD 2008)
  - Blue Growth Strategy

Introduction

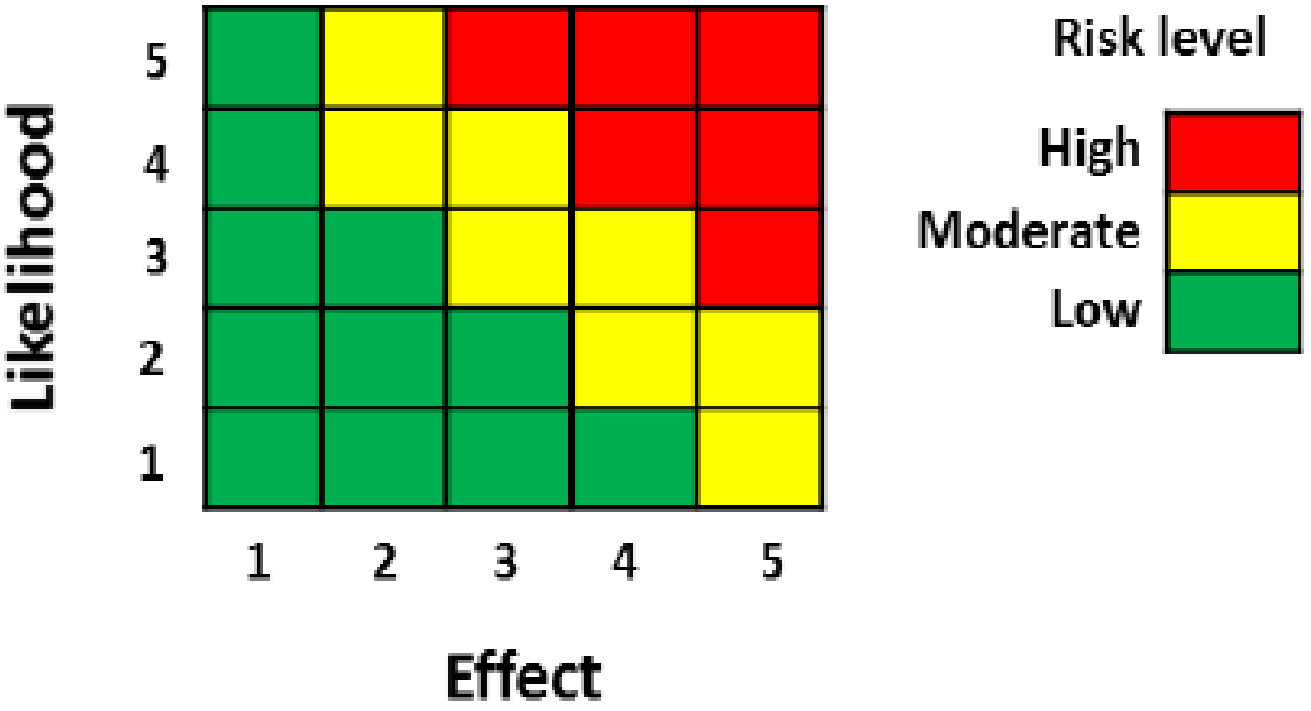
- Poor understanding of deep ocean ecosystems:
  - Assess risks that human activities pose to MES of Atlantic deep sea.
  - Focus on MES but not ecological functions/processes.

Methodology

- Delphi method:
  - Iterative expert –based consensus based on information from previous survey(s).
  - Multiple rounds of surveys.

- Risk assessment of effects of human activities on MES:
  - Indicate whether effects are positive, negative or both.
  - How big is the effect: (1 – 5 ordinal scale).
  - Likelihood (1 – 5 ordinal scale).

Methodology – risk assessment matrix



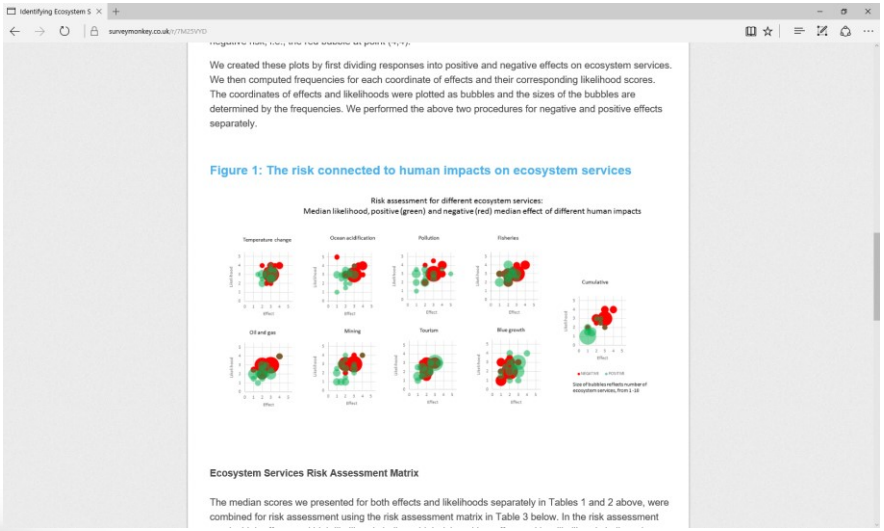
First Delphi survey - ATLAS 2nd General Assembly

Please assess how you think different human aspects impact on ecosystem services:

		Temperature change			
Ecosystem services:		Pos/Neg	Effect	Likelihood	Certainty
Provisioning	Fish/shellfish				
	Oil/gas/energy				
	Minerals				
	Chemicals/pharmaceuticals				
	Waste disposal sites				
	Raw materials				
	Other....				
Regulating	Climate regulation				
	Waste absorption/detoxification				
	Carbon sequestration/absorption				
	Biological control				
	Other....				
Cultural	Recreation				
	Tourism				
	Educational				
	Aesthetic				

Second Delphi survey – Internet survey (SurveyMonkey)

Results from First Delphi



We created these plots by first dividing responses into positive and negative effects on ecosystem services. We then computed frequencies for each coordinate of effects and their corresponding likelihood scores. The coordinates of effects and likelihoods were plotted as bubbles and the sizes of the bubbles are determined by the frequencies. We performed the above two procedures for negative and positive effects separately.

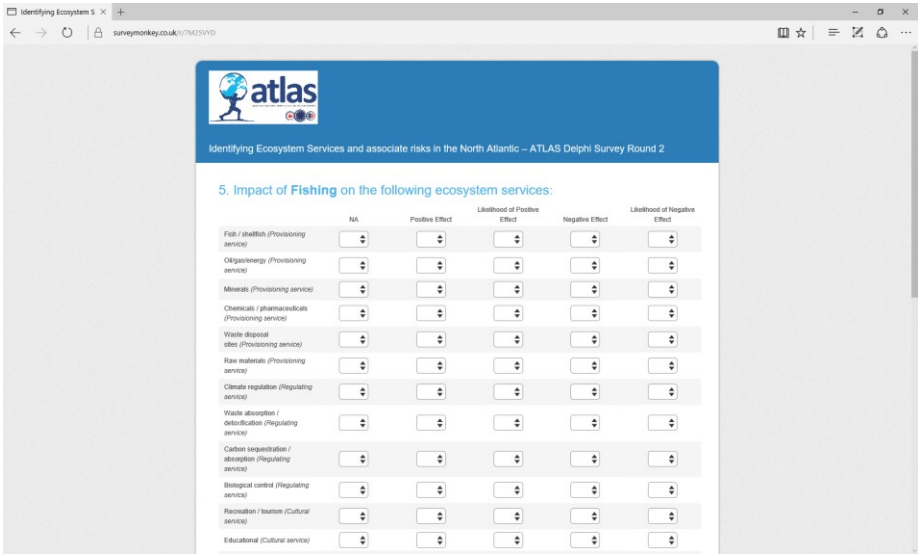
Figure 1: The risk connected to human impacts on ecosystem services

Risk assessment for different ecosystem services:
Median likelihood, positive (green) and negative (red) median effect of different human impacts

Ecosystem Services Risk Assessment Matrix

The median scores we presented for both effects and likelihoods separately in Tables 1 and 2 above, were combined for risk assessment using the risk assessment matrix in Table 3 below. In the risk assessment

Re-assess the effects of human drivers on MES.



Identifying Ecosystem Services and associate risks in the North Atlantic – ATLAS Delphi Survey Round 2

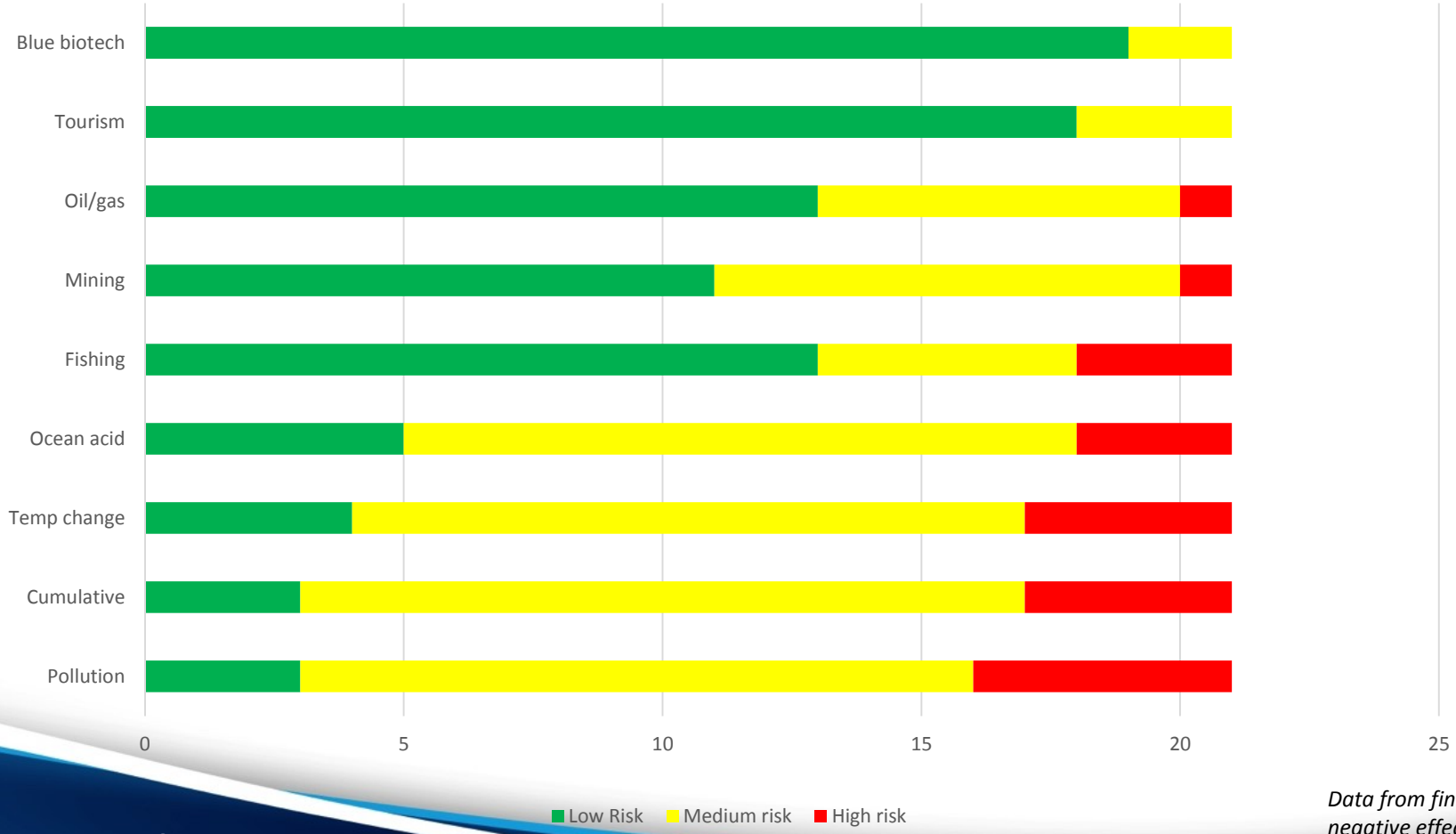
5. Impact of **Fishing** on the following ecosystem services:

	NA	Positive Effect	Likelihood of Positive Effect	Negative Effect	Likelihood of Negative Effect
Fish / shellfish (Provisioning service)					
Oil/gas/energy (Provisioning service)					
Minerals (Provisioning service)					
Chemicals / pharmaceuticals (Provisioning service)					
Waste disposal sites (Provisioning service)					
Raw materials (Provisioning service)					
Climate regulation (Regulating service)					
Waste absorption / detoxification (Regulating service)					
Carbon sequestration / absorption (Regulating service)					
Biological control (Regulating service)					
Recreation / tourism (Cultural service)					
Educational (Cultural service)					

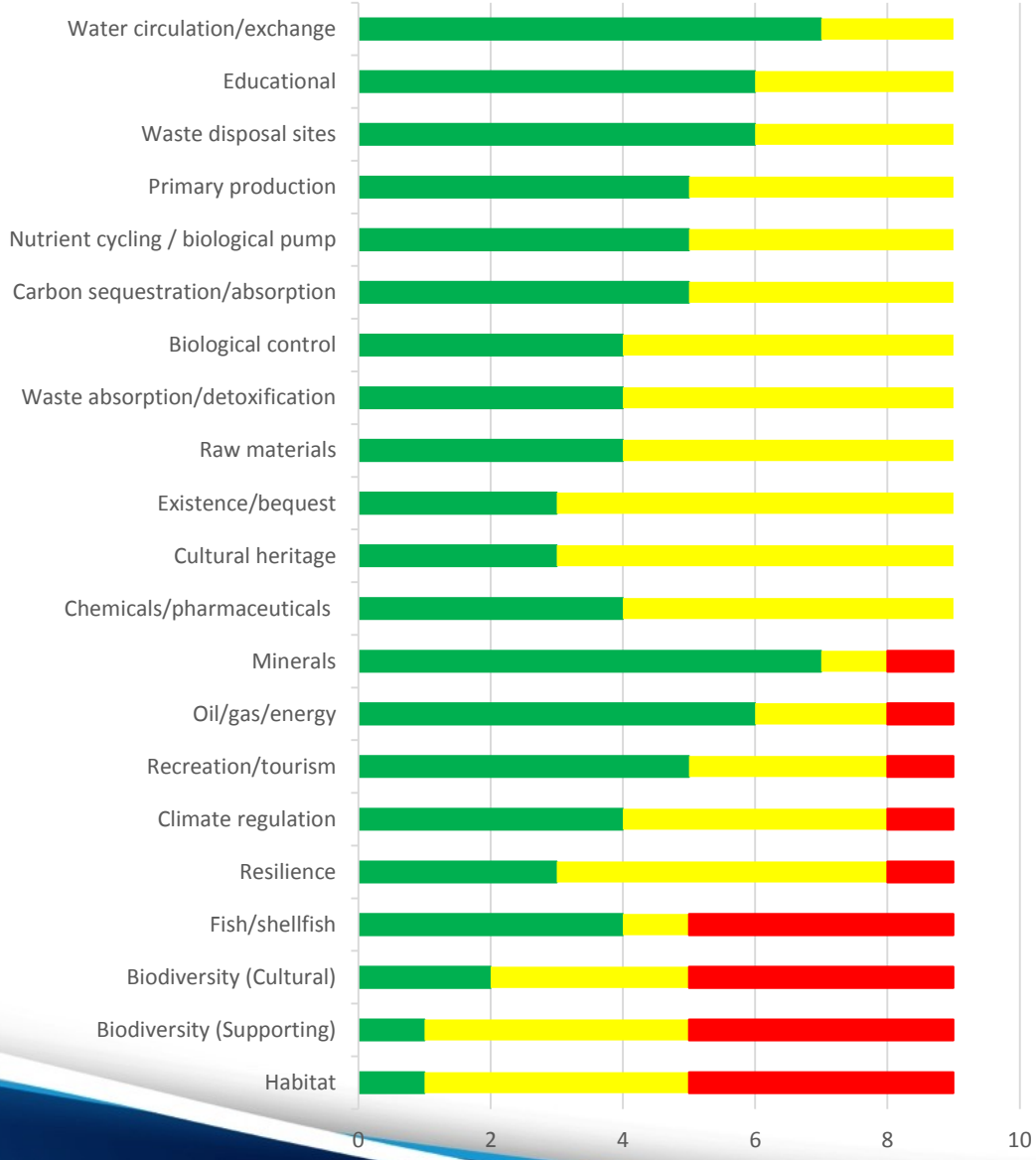
Results

- Number of experts:
  - First round: 30
  - Second round: 20

Human driver risk levels on ecosystem services



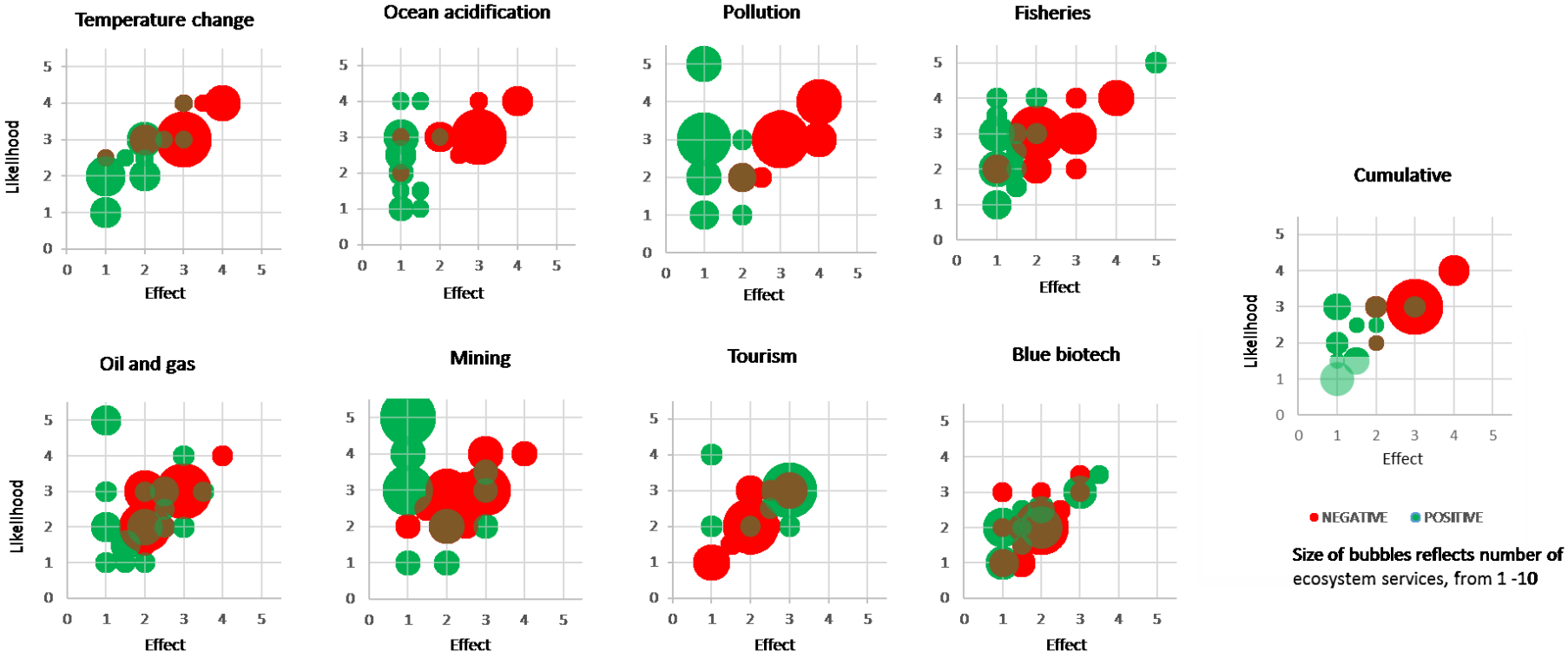
Data from final Delphi, negative effects



Ecosystem services risk levels from the nine human drivers

Data from final Delphi, negative effects

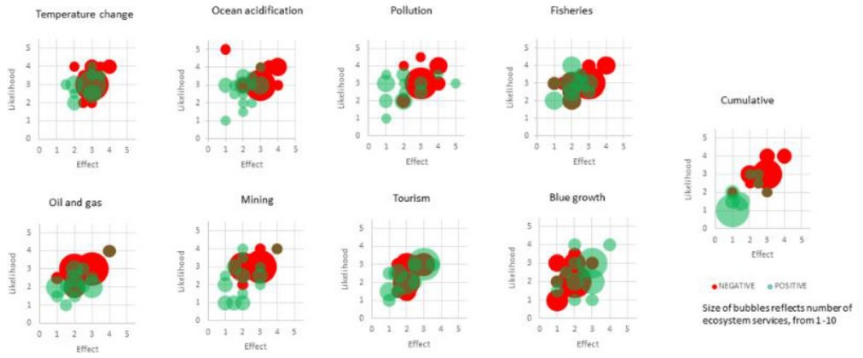
Risk assessment for different ecosystem services



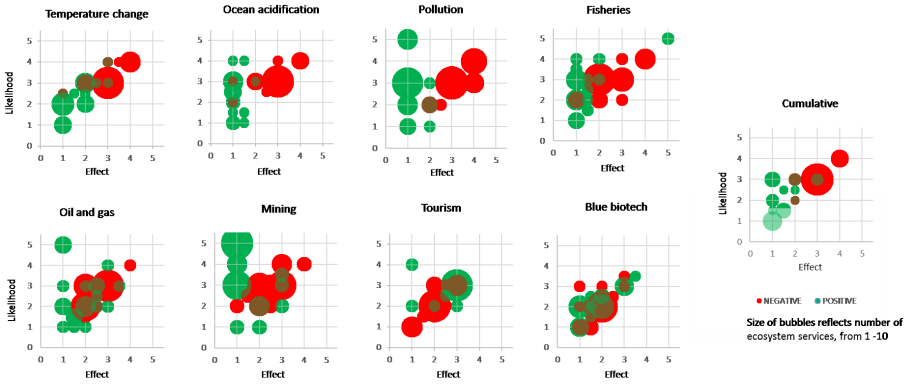
Likelihood, positive (green) and negative (red) effect of different human impacts (medians from Final Delphi round)

Are there any differences in two risk assessments?

First round



Second round



Are there any differences in two assessments?

- More spread of the bubbles in the second round??
- Greater risk perception in the second Delphi survey??
- Caveat: Different number of experts involved in first and second surveys.

Conclusion

Human drivers perceived to pose most risk to ecosystem services in the Atlantic deep sea are ***pollution***, ***temperature change***, ***ocean acidification***, ***fisheries*** and ***cumulative effects***, and the services most impacted are the provisioning services of ***fish and shellfish***, and the ***supporting and cultural services of biodiversity***, as well as the supporting services of ***habitats***.

Thank You!

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Image credit: BGS