

Interactive comment on “Putative fishery-induced changes in biomass and population size structures of demersal deep-sea fishes in ICES Sub-area VII, North East Atlantic Ocean” by J. A. Godbold et al.

Anonymous Referee #2

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Overall assessment: this is a timely, well written, and scientifically sound paper, and it is ready for publication. Responses to the comments below would enhance the quality of the paper, but not critically. The manuscript can hardly be shortened significantly.

Specific comments/corrections:

Abstract, Line 6. The regulations affecting the relevant area are primarily the EU total allowable catch (TAC) regulations for deepwater species. These were introduced in 2003, i.e. after the second sampling period referred to in the paper.

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Section 1, line 6. Benn et al. analysed geographical activity patterns, not impacts. The underlying assumption that impact on e.g. benthic communities reflects activity as measured in that paper is not really tested.

Section 1, Lines 7 & 9. What is meant by ‘significant’ and ‘significantly’? These are imprecise terms. Did the authors of the cited papers define the terms?

p. 10761, lines 5-15. The concerns with regards to deepwater fisheries and declines in apparent abundance of deepwater fishes were first expressed by the International Council for the Exploration of the Sea (ICES) in the mid to late 1990s. The basis was simple analyses of emerging time series of catch per unit of effort in commercial fisheries that for some species showed rapid declines, and in some cases severe depletion of local aggregations. I.e. the warning signals were (luckily) highlighted and documented long before fisheries-independent data emerged, e.g. in the paper by Bailey et al. (2009). ICES advisory statements are publicly available, and summaries of the process in ICES are given in several papers not cited, e.g.

Gordon, J.D.M., Bergstad, O.A., Figueiredo, I. and Menezes, G. 2001. The deep-water fisheries of the ICES Area. NAFO SCR Doc. 01/92.

Large, P.A., C. Hammer, O.A. Bergstad, J.D.M. Gordon, and P. Lorance. 2001. Options for the assessment and management of deep-water species in the ICES Area. NAFO SCR Doc. 01/93.

Gordon, J. D. M., O. A. Bergstad, I. Figueiredo, and G. Menezes. 2003. Deep-water Fisheries of the Northeast Atlantic: I. Description and Current Trends. *J. Northw. Atl. Fish. Sci.* 31: 137-150.

Large, P. A., C. Hammer, O. A. Bergstad, J. D. M. Gordon, and P. Lorance. 2003. Deep-water Fisheries of the Northeast Atlantic: II. Assessment and Management Approaches. *J. Northw. Atl. Fish. Sci.* 31: 151-163.

Lorance P., Bergstad O.A., Large P.A., Gordon J.D.M. 2008. Grenadiers in the North

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East Atlantic - distribution, biology, fisheries and their impacts, and developments in stock assessment and management. American Fisheries Society Symposium 63:365-397.

Large, P.A. and Bergstad, O.A. 2005. Deepwater fish resources in the northeast Atlantic: fisheries, state of knowledge on biology and ecology, and recent developments in stock assessment and management. P. 149-161 in Shotton, R. (Ed.) Deep Sea 2003: Conference on the Governance and Management of Deep-sea Fisheries Part 1. Conference reports. Queenstown, New Zealand, 1-5 December 2003. FAO Fisheries Proceedings. No. 3/1. Rome, FAO. 2005. 718p.

Lorance P., Bergstad O.A., Large P.A., Gordon J.D.M. 2008. Grenadiers in the North East Atlantic - distribution, biology, fisheries and their impacts, and developments in stock assessment and management. American Fisheries Society Symposium 63:365-397.

P10761, Line 19: General references are given to highlight effects of fishing on structure and ecological function of deepwater species, and finally on recruitment rate. Is there any evidence of fisheries-induced recruitment failure in deepwater species? Is it even likely that the sometimes even local reductions in abundance in these widely distributed species will impair recruitment? These introductory comments seem merely to be included to strengthen the 'appeal' of the paper and this seems unnecessary. The paper is important and good, mainly because it uses fisheries-independent standardised input data from two key periods of the exploitation history. It is interesting without the many 'mays' and 'mights' with reference to assumed but not documented wide-ranging effects of (over)exploitation.

Discussion and Conclusions

The main conclusion is that 'major declines' in abundance occurred, and overall the results show a decline by about 30% in biomass. Whether or not this should be regarded as a major decline must be measured against the magnitude of natural variability in

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the biomass of deepwater fish communities, and this is generally not well known. In demersal shelf fishes, however, a 30% reduction in biomass would not be considered very alarming and variability beyond this level happens frequently in species with variable recruitment. In an exploited fish population, a 30% reduction would normally be considered modest and probably acceptable under most agreed management regimes (e.g. the MSY targets). A critical discussion of the results in this context would have enhanced the relevance of the paper.

Fisheries surely affect size and age-distributions and the results provide few surprises in this respect. However, the influence of variable recruitment (essentially cohort abundance) is hardly mentioned as an additional explanatory factor, yet this is a major driver of size-distribution variability in most fish stocks. Very little is known about the temporal variability of recruitment in deepwater species and recruitment is often merely assumed to be less variable in such species than in shallow water species. However, if recruitment is intermittent and strong yearclasses rare, that will affect time series data on size structure, even in long-lived species. At least the influence of natural variability in recruitment on population dynamics should be considered a possibility alongside other possible explanations, including interspecific interactions etc. already mentioned.

Whether or not the fisheries are 'strongly' regulated is a value judgement. The EU managers will be happy by that assessment from science! The TACs introduced in 2003 and licensing have most certainly reduced the landings. But the reduction in activity may also be attributed to the loss of perceived profits due to e.g. rising fuel costs and other socioeconomic factors.

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