Managing the Impacts of Fishing on Benthic Habitat in New Zealand.

Report prepared for Deepwater Group.

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Understanding, monitoring and managing benthic impacts in deepwater fisheries are substantively challenging elements of fisheries management. Due to the depth and remoteness, the costs and technological demands of providing adequate data are substantive and probably greater than any other component of fisheries management. This has led to a cyclical process of development, application, rejection and improvement in the approaches to monitor and manage benthic impacts, a process that is on-going in New Zealand.

New Zealand, through both government and industry initiatives, has been at the forefront of developing and applying tools and measures to ensure that the deepwater trawl fisheries do not create unsustainable impacts on the benthic environment and ecosystem.

Four key issues lie behind the approach to monitoring and managing fishing impacts on the benthic environment (MPI, (2016):

- habitat modification
- potential loss of biodiversity
- potential loss of benthic productivity
- potential modification of important breeding or juvenile fish habitat leading to reduced fish recruitment

Strategy

The strategy employed by New Zealand with respect to benthic impacts of fishing, and especially demersal trawl fishing, is one of spatial management, with areas closed to demersal fishing so as to provide general benthic protection and/or specific protection to known species or habitat types (Helson, 2010; MPI, 2016).

Implementation of the strategy

The approach to implementation of the spatial management is described in Helson (2010) and MPI (2016), where the network of marine reserves, seamount closures, benthic protection areas are described. This network covers about 31% of New Zealand waters, mainly in the EEZ and mostly in waters deeper than the fisheries (Figure 1).

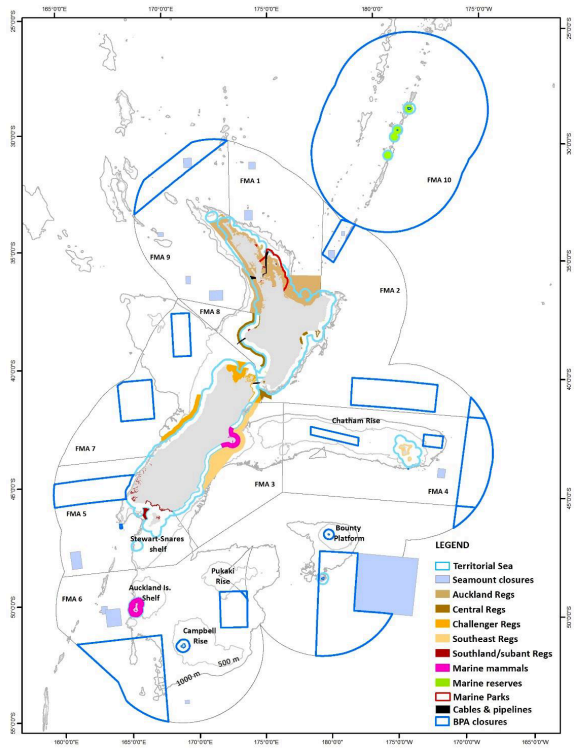

Figure 1. Reproduced from Figure 11.1 of MPI (2016). Map, adapted from Baird & Wood 2010, of the major spatial restrictions to trawling and the Ministry for Primary Industries Fishery Management Areas (FMAs) within the outer boundary of the New Zealand EEZ. Vessels longer than 28 m may not trawl within the TS and additional restrictions are specified in the Fisheries (Auckland Kermadecs Commercial Fishing) Regulations 1986, the Fisheries (Central Area Commercial Fishing) Regulations 1986, the Fisheries (Challenger Area Commercial Fishing) Regulations 1986 the Fisheries (South East Area Commercial Fishing) Regulations 1986, and the Fisheries

(Southland and Sub-Antarctic Areas Commercial Fishing) Regulations 1991. For more details of BPAs see Helson *et al.*, 2010.

Due to their location on the Chatham Rise and around the Sub-Antarctic islands, respectively, some of the closed areas are of specific relevance to the hoki-hake-ling fisheries complex and the southern blue whiting fisheries (see Figure 1).

It is also of note that there is evidence that habitat components (notably many protected coral species) occur in water both deeper than and shallower than the fisheries (Cairns, 1991; 1995).

Impact monitoring

There is an on-going programme encompassing the development of analytical methodologies and appropriate software to analyse the reported fishing activity of gear types that interact with the sea bed. This has provided a long-term understanding of the extent of the fisheries (footprint or swept area) as well as the capacity to consider fishing intensity (Black & Tilney, 2017).

This monitoring permits the scale of the fishery-benthic interactions to be considered for any specified time period for a variety of fisheries or at a variety of spatial resolutions, including individual fisheries, individual management areas, as well as the overall cumulative level across all fisheries. This approach has historically made conservative assumptions within the analyses especially in relation to the area swept by trawl gear (e.g. tow widths have been overestimated).

Management responsiveness & policy development

There is currently no explicit, hard-wired link between monitoring and the development or implementation of management measures i.e. there are no specific actions that managers have identified that would be implemented if adverse effects were observed or suspected, or if risk was perceived to be high. To date, management has been precautionary, being implemented so as to reduce general benthic impact risk rather than in response to specific issues of concern. This approach has, in itself, reduced the need to have pre-specified management responses. Management response to high risk or measurable and high impacts in other areas of environmental fisheries performance (e.g. seabirds, marine mammals) does suggest that management action would be taken with respect to benthic impacts if evidence or risk indicators indicated this was necessary.

There is on-going policy development in the area of benthic impact management that compliments the methodological development of risk-based approaches.

Rejected tools

Industry has argued against restricting fisheries to historic footprints, largely due to concerns about potential changes in fish distribution, driven by both short-term and long-term environmental change. Such changes can be seen or inferred in Sub-Antarctic fish stocks from both fisheries data and fishery-independent fish stock biomass surveys (Bagley, *et al.*, 2014; Ballara & O'Driscoll, 2017).

Habitat classification methods were developed and used for some time but found to lack meaningful descriptive power for habitat types (one habitat classification type could not be distinguished from another given the available data). Thus, the explicit use of these classification approaches (e.g. the Benthic Optimised Marine Environment Classification, BOMEC) has largely been rejected in favour of risk-based methods (Ford *et al.,* 2016), which has proved a more

reliable methodology for understanding and informing management of the wider environmental impacts of fishing, including for seabirds and marine mammals (MPI, 2016). These risk-based methods are currently under development using a test-case of the fisheries on the Chatham Rise.

References

Bagley, N.W.; O'Driscoll, R.L.; Oeffner, J. (2014). Trawl survey of hoki and middle-depth species in the Southland and Sub-Antarctic areas, November–December 2012 (TAN1215). New Zealand Fisheries Assessment Report 2014/12. 69 p.

Ballara, S.L.; O'Driscoll, R.L. (2017). Catches, size, and age structure of the 2015–16 hoki fishery, and a summary of input data used for the 2017 stock assessment. New Zealand Fisheries Assessment Report 2017/31. 119 p.

Black, J. & Tilney, R. (2017). Monitoring New Zealand's trawl footprint for deepwater fisheries: 1989/90 to 2011/12 and 1989/90 to 2012/13. New Zealand Aquatic Environment and Biodiversity Report No. 176. 65 p.

Cairns, S.D. (1991). The Marine Fauna of New Zealand: Stylasteridae (Cnidaria: Hydroida). New Zealand Oceanographic Institute Memoir 98. 179 p.

Cairns, S.D. (1995). The Marine Fauna of New Zealand: Scleractinia (Cnidaria: Anthozoa). New Zealand Oceanographic Institute Memoir 103: 6-210.

Ford, R.B.; Arlidge, W.N.S.; Bowden, D.A.; Clark, M.R.; Cryer, M.; Dunn, A.; Hewitt, J.E.; Leathwick, J.R.; Livingston, M.E.; Pitcher, C.R.; Rowden, A.A.; Thrush, S.F.; Tingley, G.A.; Tuck, I.D. (2016). Assessing the effects of mobile bottom fishing methods on benthic fauna and habitats. New Zealand Fisheries Science Review 2016/2. 47 p.

Helson, J., S. Leslie, G. Clement, R. Wells and R. Wood (2010). "Private rights, public benefits: Industry‐driven seabed protection." Marine Policy 34: 557-566.

MPI (2016). Aquatic Environment and Biodiversity Annual Review 2016. Compiled by the Fisheries Management Science Team, Ministry for Primary Industries, Wellington, New Zealand. 790p.