UNDER THE Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 (the Act)

IN THE MATTER OF A Decision-making Committee appointed to consider a marine consent application by Chatham Rock Phosphate Limited to undertake mining of phosphorite nodules on the Chatham Rise

SUPPLEMENTARY STATEMENT OF EVIDENCE OF ELIZABETH ANN FULTON FOR THE CROWN – ADDITIONAL COMMENTS ON EXTRA EVIDENCE BY PINKERTON

24 October 2014

CROWN LAW
Te Tari Ture o te Karauna
PO Box 2858
WELLINGTON 6140
Tel: 04 472 1719
Fax: 04 473 3482

Counsel acting:
Jeremy Prebble
Email: jeremy.prebble@crownlaw.govt.nz
Telephone: 04 494 5545

Eleanor Jamieson
Email: ejamieson@doc.govt.nz
Telephone: 04 496 1915
Introduction

This supplementary evidence responds to the “Food-web modelling of the Chatham Rise: Additional work requested by the expert conference on ecosystem effects” (October 2014) prepared by Dr Matt Pinkerton. The extra work undertaken by Dr Pinkerton covered 3 topic areas:

A. **Sensitivity analyses**: How sensitive are the conclusions of Pinkerton (2013) to parameter uncertainty?

B. **Detritus**: How important is organic detritus in the Chatham Rise food-web (i.e. expand the reporting of the trophic importance analysis to include detritus)?

C. **Habitat mediated effects**: Look at how/whether the trophic model (Pinkerton, 2013) can be used to investigate the potential habitat mediated effects of mining on the Chatham Rise food-web.

The work done was extensive for the time available, fully covering off points 1A and 1B and giving some thought to 1C. There was insufficient available information (or time) for a quantitative handling of 1C so Dr Pinkerton undertook a qualitative assessment as a first step. Each of these is commented on in more detail below.

A **Sensitivity analyses**

Two forms of uncertainty analysis were undertaken by Dr Pinkerton, the first looked at the influence of relative uncertainty across parameters on the final form of the model and the trophic importance ranking; and the second looked at the robustness of model findings in relation to uncertainty in the initial biomasses used in the models. Both of these analyses were done based on varying the uncertain model aspect – spanning from a fivefold decrease in the property to a fivefold increase.

The trophic model (Pinkerton, 2013) was within the typical range of potential model forms found in both forms of the sensitivity analysis. I concur with Dr Pinkerton that the trophic model is a robust representation of the trophic system.

Similarly I agree that the trophic importance ranking of Pinkerton (2013) is also robust. While there is some variation across the alternative parameterisations it is...
not substantially different to that reported in Pinkerton (2013). Only small demersal fish had a trophic importance falling beyond the 95th percentile of the trophic importance reported during the sensitivity analysis, showing the Pinkerton (2013) model can be interpreted as being conservative for that group (because any rankings significantly different to the Pinkerton (2013) results saw this group down in ranking (i.e. marked as less important trophically)).

While the potential importance of some groups (e.g. ling) in the broader analysis is shown to be much higher under some parameterisations than indicated in the baseline case, other demersal fish (such as hoki and small demersal fish) are shown to be potentially lower in importance in some instances than suggested by Pinkerton (2013). Moreover I reiterate these are in the tails of the distribution, the trophic model is largely close to the median result. Consequently, it is my judgement that the presentation of trophic importance in Pinkerton (2013) is representative of the overall model results and is reliable in terms of conclusions drawn about the relative importance of different groups in terms of transmitting trophically mediated effects of mining.

B Detritus

As hinted at in Pinkerton (2013) the extra work by Dr Pinkerton shows that detritus is second only to primary production in supporting the Chatham Rise ecosystem. This indicates that in areas where detritus is directly disturbed by the mining process (i.e. the mined area and the area affected by the plume) it is likely that there will be a trophically mediated effect of mining until the detritus pool stabilises. The form of this effect is dependent on the way in which detritus is disturbed. If the pool is diminished by mining activities then a food source is lost. If the pool is increased (e.g. by the remains of animals caught up in the mining), then there could be extra bacterial and other feeding activity. This in turn could influence the food-web and local nutrient dynamics and chemical properties (e.g. spikes in bacterial activity could draw down oxygen).

C Habitat mediated effects

In thinking over the representation of habitat mediated effects Dr Pinkerton considered:

a. Direct effects – mortality of the benthos as a result of direct disturbance or mining associated plumes.
b. The spatial distribution of species and life history stages.

c. The role of benthos as habitat for other species (acknowledging that this is not always well known) and how some behaviour (such as spawning) is reliant on the presence of that habitat.

Dr Pinkerton provided a qualitative analysis of the potential vulnerability of the different modelled groups to mining across trophic, habitat and behaviourally mediated ecosystem impact pathways. In doing this, in the absence of specific information Dr Pinkerton chose a conservative assumption (e.g. that all removed biota are killed by the sediment processing). This choice of assumption is not unreasonable given available information and results in a precautionary assessment. The approach taken is similar to the level 1 assessment in the hierarchical Ecological Risk Assessment approach of Hobday et al (2011) – which was initially developed for fisheries but can be adapted to any form of stressor.

The analysis in Table 2 of Dr Pinkerton’s new material found that the majority of those groups most highly ranked in terms of trophic importance (i.e. 10 of the top 11 groups) likely had low risk of direct or habitat mediated impacts of mining at the scale of the Chatham Rise (small demersal fish were the exception). Higher potential risks were found for macrobenthos, hake guild and ling guild, with the highest risks found for small demersal fish, hard-bodied macrozooplankton (krill), cephalopods, and rattails and ghost sharks.

A lack of information mean a group was marked as being at higher potential risk as there was no information to rule out the possibility that a key species in the group spawn in/close to the mining area. This is a standard precautionary approach and is in line with the method of Hobday et al (2011). Dr Pinkerton has left this work as standing in its own right. If the protocol of Hobday et al (2011) were followed all those groups marked above a low risk would be considered for a level 2 assessment, where more quantitative methods are employed to help resolve understanding. As pointed out by Dr Pinkerton in his summary of evidence and his verbal evidence, this would likely require new samples (with some relevant work proposed for future cruises), which could not be obtained in short order.

Conclusions

The extra work by Dr Pinkerton shows that conclusions drawn based on the trophic modelling and importance ranking are reasonably robust (as the model and method are robust). Table 2 also highlights that there is the potential for some
habitat mediated effects, particularly on certain species such as small demersal fish. Models (qualitative and quantitative) could be used to further explore “what-if” scenarios around potential impact pathways, with potential additional insights possible. However, uncertainty would remain around the veracity of these outcomes because, as Dr Pinkerton states in this new work, there is insufficient currently available information to further reduce uncertainty on these issues at this time for the more poorly resolved, more poorly known, fish and benthic groups.

Dated: 24 October 2014

_________________________
Elizabeth A. Fulton

References