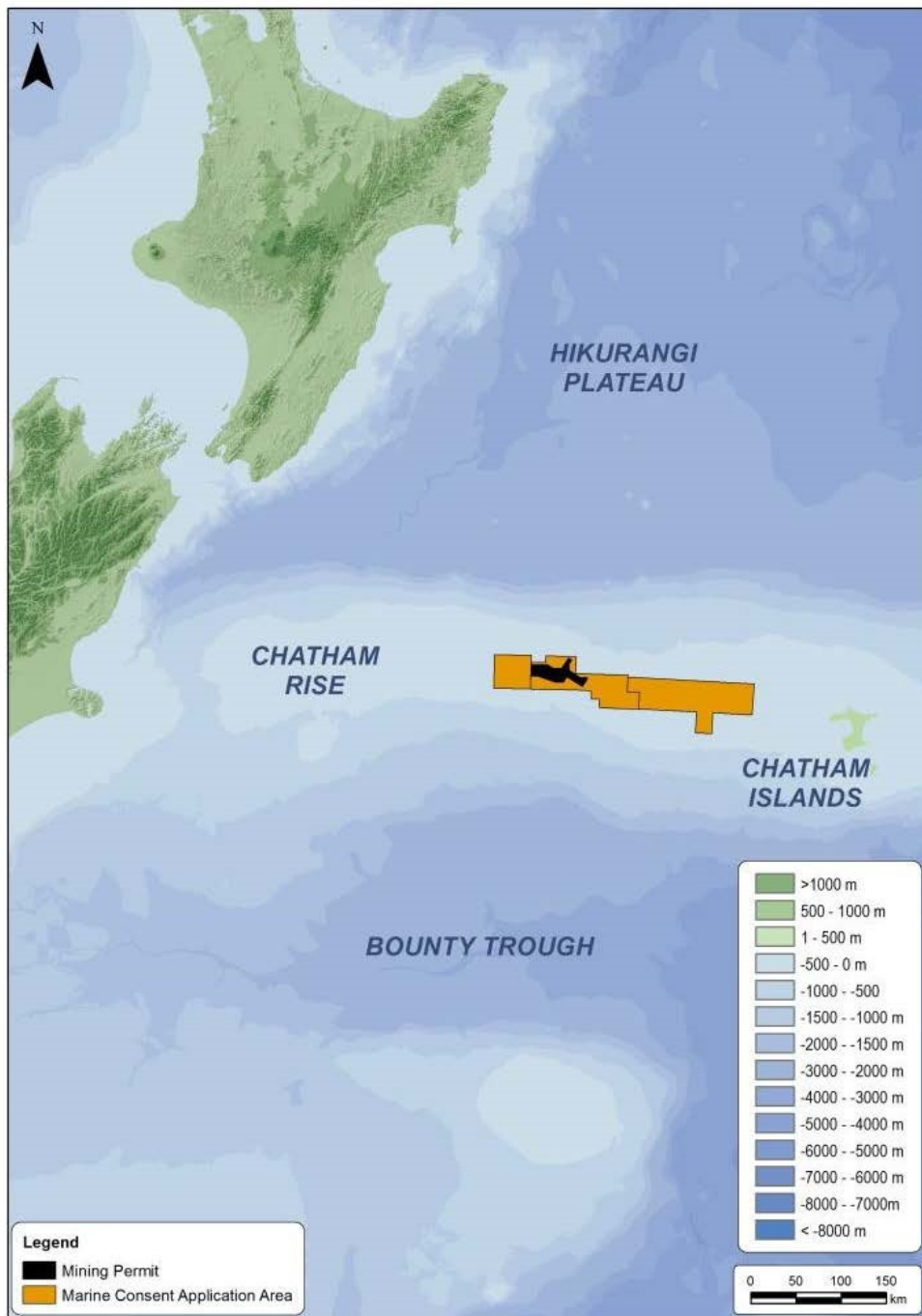


# Summary of the New Zealand Environmental Protection Authority (EPA's) Decision on the Chatham Rock Phosphate Deep Sea Mining Application

Duncan E.J. Currie LL.B. (Hons.) LL.M.



*Summary of CRP Decision*

Contents

The Proposal .....	3
The Process .....	4
Summary of the Decision.....	4
International Law .....	5
The Chatham Rise.....	5
The Mining.....	6
Sediment Dispersion and Sedimentation .....	8
Effects of the Proposal on the Environment .....	8
Adaptive management .....	10
Primary production and marine microbes.....	12
Zooplankton .....	12
Fish and pelagic fauna .....	13
Marine mammals .....	13
Benthic Protected Areas.....	15
Economic Benefit to New Zealand .....	15
Cultural Values .....	16
The Decision Path.....	16
Uncertainty.....	16
Existing Interests.....	19
Effects on human health.....	19
Protecting biological diversity and integrity.....	19
Protecting rare and vulnerable ecosystems .....	19
Economic Benefit to New Zealand .....	20
Nature and effect of other marine management regimes .....	20
Best practice.....	20
Mitigation.....	21
Decision .....	21

## Summary of CRP Decision

*The following represents a summary of a 300 page decision document, where possible using the words of the [decision](#). It is aimed at an international audience interested in the decision.*

*The following extract comprises quotations from the [decision](#) of the Decision Making Committee (DMC), except where in italics. Quotations are used to make clear where text is quoted from the decision, but where non-italic text appears, it is taken verbatim from the decision.*

*The process took place under the [Exclusive Economic Zone and Continental Shelf \(Environmental Effects\) Act 2012](#) which requires a marine consent for seabed mining and associated activities (section 20).*

*The Environmental Protection Authority (EPA) EPA Board appointed a decision-making committee to consider the application by CRP for a marine consent. The five member [committee](#) comprised of experienced decision-makers with collective expertise in ecology, engineering and tikanga Māori.*

*Duncan Currie was counsel representing a coalition of non-governmental organisations comprised of Deep Sea Conservation Coalition, Inc, Kiwis Against Seabed Mining, Inc. (KASM), and Greenpeace New Zealand, Inc.*

## The Proposal

On 14 May 2014 CRP lodged an application with the Environment Protection Authority (EPA) for a marine consent to mine phosphorite nodules from the crest of the Chatham Rise. Initially consent was sought for a 35 year operation over an area of 10,192 km<sup>2</sup>. On 1 August 2014 the area for which consent was sought was reduced to 5,207 km<sup>2</sup> by the withdrawal of the application's eastern mining block. CRP proposed to undertake the mining in stages, restricting the first five years of the operation to the 820 km<sup>2</sup> mining permit area (MPL 55549). Over the full 35 year period for which consent was sought, a total of some 1,050 km<sup>2</sup> was to be mined.

The mining was to be carried out by a specially built or modified vessel using a mining system designed by Royal Boskalis Westminster nv (Boskalis). Phosphorite-bearing material was to be retrieved from the seabed by means of a trailing suction drag-head and mechanically processed on board the vessel. Phosphorite nodules greater than 2 mm would be separated from other material using sieves and logwashers and stored on the vessel. Waste material would then be released close to the seabed, using a discharge (sinker) pipe with a diffuser.

CRP proposed to mine three of its 10 km<sup>2</sup> mining blocks each year, giving an estimated annual production of some 1.5 million tonnes. The mining would be at depths of up to 450 m. The applicant's outline mining plan included provision for establishing mining exclusion areas aimed at protecting areas of particular scientific or conservation sensitivity and values as identified through a marine spatial planning exercise. The applicant stated that it intended to undertake a range of monitoring and environmental surveys, including seabed sampling and habitat creation trials.

## The Process

The application was publicly notified on 12 June 2014, and submissions were open until 10 July. 294 submissions were made. 35 statements or supplementary statements of evidence were filed by the applicant, and 39 by submitters. A pre-hearing meeting on existing interests and twelve expert conferencing meetings were held. The hearing ran for 26 sitting days, starting on 25 September 2014 and adjourning on 19 November 2014. Sessions were held in Wellington, the Chatham Islands and Hamilton. The hearing formally closed on 12 December 2014. The DMC completed its deliberations and issued *its* decision on 11 February 2015.

## Summary of the Decision

The destructive impact of the drag-head on the seabed and on the benthic fauna in and on the seabed was a major concern, given that:

- (a) these effects could not be avoided, remedied or mitigated,
- (b) the mining would largely be occurring in an area where the seabed is currently protected from trawling and dredging by the Mid Chatham Rise Benthic Protection Area,
- (c) the effects would include the destruction of communities dominated by protected stony corals which are potentially unique to the Chatham Rise and which the DMC concluded are rare and vulnerable ecosystems,
- (d) the habitat would not return to its present form but rather would be transformed wholly into soft sediment habitat.

Moreover, the return of waste material to the seabed stood to have adverse effects on the benthic habitat in and around the mining blocks and across the wider marine environment.

Notwithstanding the efforts of the applicant to research, document and substantiate its case, the DMC was left with a lack of certainty about both the receiving environment and the adverse effects of the project on that environment and existing interests. Partly this is explained by the current state of scientific knowledge about the Chatham Rise marine environment, albeit well researched in some dimensions. But there were other uncertainties stemming from the fact that this would be the first seabed mining project ever undertaken at such depths anywhere in the world, and from the heavy reliance placed on insufficiently validated modelling to predict the impacts of the project.

The DMC gave consideration to the likely economic benefit to New Zealand of the proposal. It was not persuaded that the proposal's economic benefit to New Zealand would be of the significance argued by the applicant, or that reliance could be placed on economic benefits as a potential offsetting factor.

The DMC gave careful consideration to whether an adaptive management approach would allow the activity to be undertaken. It also, as required by Section 59(2)(j) of the EEZ Act, considered the extent to which imposing conditions under Section 63 of the EEZ Act might avoid, remedy or mitigate the adverse effects of the activity.

The DMC's finding is that the destructive effects of the extractive activity, coupled with the potentially significant impact of the deposition of sediment on the areas adjacent to the mining blocks and on the wider marine environment, could not be mitigated by any set of conditions or

adaptive management regime that might reasonably be imposed. The conditions proposed by the applicant, although they went some way towards addressing some of the risks associated with the proposal, did not allay the DMC's basic concern about the adverse effects of the proposal on a distinctive and important marine environment. The various proposals made by the applicant for environmental compensation did not in the DMC's view amount to mitigation. After weighing all the information and evidence, and taking into account the matters listed in Section 59 of the EEZ Act, the DMC concluded that the application could not be approved either in part or in whole. The DMC's decision therefore was to refuse consent.

## **International Law**

*The legislation mentions the United Nations Convention on the Law of the Sea 1982 and the Convention on Biological Diversity 1992. Others mentioned by the DMC include International Convention for Prevention of Pollution from Ships 73/79 (MARPOL), the Convention on the Conservation of Migratory Species (Bonn Convention) and the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Convention) and the Noumea Convention for the Protection of the Natural Resources and Environment of the South Pacific Region.*

*After much legal debate about the relevance of these instruments, the DMC took the view that "decision-makers on marine consent applications were not required to do anything more than apply the decision-making criteria in the EEZ Act in order to implement New Zealand's international obligations. That view is supported by the Supplementary Order Paper describing the final changes to the section. Although the EEZ Act does not explicitly preclude decision-makers from having regard to international instruments, it seems to the DMC that the direction provided in the EEZ Act must take precedence over guidance contained in an international instrument to which New Zealand is a signatory."*

## **The Chatham Rise**

*The DMC described the Chatham Rise as "highly productive compared to the surrounding waters and, in general, other parts of New Zealand's EEZ" and phytoplankton as "the engine of the Chatham Rise food chain." ...The productive food chain of the Chatham Rise supports valuable deep water commercial fisheries, primarily for hoki, orange roughy, ling and oreo species. Other fish species are also caught on the Rise... More than 200 species of fish have been identified.*

Marine mammals (cetaceans) have been observed along the Chatham Rise, although there has been no systematic study of their distribution. The majority of the recorded sightings of cetacean are of sperm whales and pilot whales, which prefer the Chatham Rise slopes where they forage in steep slope habitat. Various other species of dolphins, baleen whales and beaked whales use and transit through the area, including killer whales and southern right whales... Recent habitat modelling has revealed that the southern edge of the Chatham Rise is an important foraging ground for southern right whales during summer and autumn. There is some evidence that several species of cetaceans have a strong regional linkage to the environment on the south flank of the Chatham Rise. An abundant food supply appears to be one of the main attractants of cetaceans to the Rise. Observations of whales off the South Island eastern coast near Kaikoura led to the establishment of a thriving eco-tourist industry in 1987, centred on sperm whales. This and other whale species that frequent the area are known to range across the Chatham Rise.

The Chatham Rise is widely regarded as one of New Zealand's most important seabird areas. Fifty-two seabird species or sub-species have been observed on the Chatham Rise. This number of species represents 70 % of the seabirds that regularly breed in the New Zealand area. By comparison, only seventeen oceanic species live and breed in the much larger temperate North-east Atlantic area.

## **The Mining**

Mr van Raalte, a Senior Expert at Boskalis / Hydronamic bv in the Netherlands, told the DMC that the proposed mining process would use existing state of the art techniques applied in a new context. The mining concept was based on conventional trailing suction hopper dredger operations widely used around the world to dredge seabed materials. Although this technology and equipment had been widely used at depths of up to 150 m, it was confirmed to the DMC by Mr van Raalte that it had not previously been used anywhere in the world at the depths envisaged on the Chatham Rise. A trailing suction hopper dredger was to be employed, and the mined material would be pumped up to the vessel through a flexible hose or riser. The vessel, (a converted bulk material carrier or tanker built or modified specifically for deep seabed mining) would be equipped with an on-board separation system which separated the phosphorite nodules from the finer sediments. The phosphorite would be stored on board for transportation to shore and waste material returned to the seabed through a sinker with a diffuser. The dredging unit would consist of a pumping unit and suction pipe (riser) with a drag-head. The pumping unit would be suspended above the seabed, with the drag-head being trailed over the seabed. One pump would suck up the seabed material and another push the mixture through the riser to the mining vessel. A third pump would provide the jet water for the drag-head. The total pump power was estimated to be 10 to 12 MW. After being pumped up to the mining vessel, all seabed material would be processed on board by a nodule separation plant. The plant would contain three or four parallel processing streams for coarse fraction separation, and a set of log-washers and two to four processing streams for finer fraction separation. The exact configuration of the processing streams would depend on the vessel design. After extracting the phosphorite nodules, sediments less than 2 mm in size would be returned to the seabed via a sinker pipe positioned approximately 10 m above the seabed. The sinker pipe would be some 750 mm in diameter. A diffuser would limit turbidity and the spatial extent of the sediment plume. The release height of the discharge was expected to vary between 8 and 12 m from the bottom (10 m on average). A clump weight of some 50 tonnes would be attached to the sinker pipe to hold it in position.

Mr Currie, representing Greenpeace, the Deep Sea Conservation Coalition and Kiwis Against Seabed Mining raised concern over which flag the mining vessel would fly and the implications for adherence to which regulatory system, Mr van Raalte stated that normally Boskalis' larger vessels sailed under the Cyprus flag. Mr Currie suggested that Cyprus was known as a flag of convenience, making liability compensation potentially difficult to obtain in the event of unforeseen circumstances. The question was raised whether the laboratory experiments and design work done by Boskalis accurately reflected the sea and weather conditions of the Chatham Rise. Wave heights for example would affect the movement of the ship and consequently the height of the discharge pipe above the seabed. Submitters also questioned if the speed that the sediment would enter the benthic environment could be accurately estimated, particularly as detailed design of the diffuser and other components had not yet been completed. Boskalis' ability to control the depth of mining to avoid the chalk-ooze layer was a concern

### *Summary of CRP Decision*

shared by many submitters, particularly given the rugged terrain and varying depth of this layer. Mr Christensen noted that the level of sensitivity with a heavy drag-head, arm and clump weight at 400 m depth was astonishing. Concerns were raised that all these issues associated with the physical mining process could have flow on implications for the accuracy of the modelling of sediment dispersion. The noise associated with the seabed material passing through the riser and sinker pipes was a concern to some submitters, as was the overall noise level associated with the mining process. Concern was also expressed by a number of parties to the application about the absence of a contractual arrangement between CRP and Boskalis with regard to the mining operation. Although Boskalis had been involved with CRP for a number of years, and through a subsidiary was a significant shareholder of CRP, there was no absolute assurance that Boskalis would be undertaking the mining.

Although both the applicant and Boskalis had gone to considerable lengths to provide information about the mining operation, the DMC was left with a number of uncertainties. Many of these stemmed from the fact that this was the first proposal of its kind in the world to be undertaken at such depths and the heavy reliance placed on incompletely validated modelling.

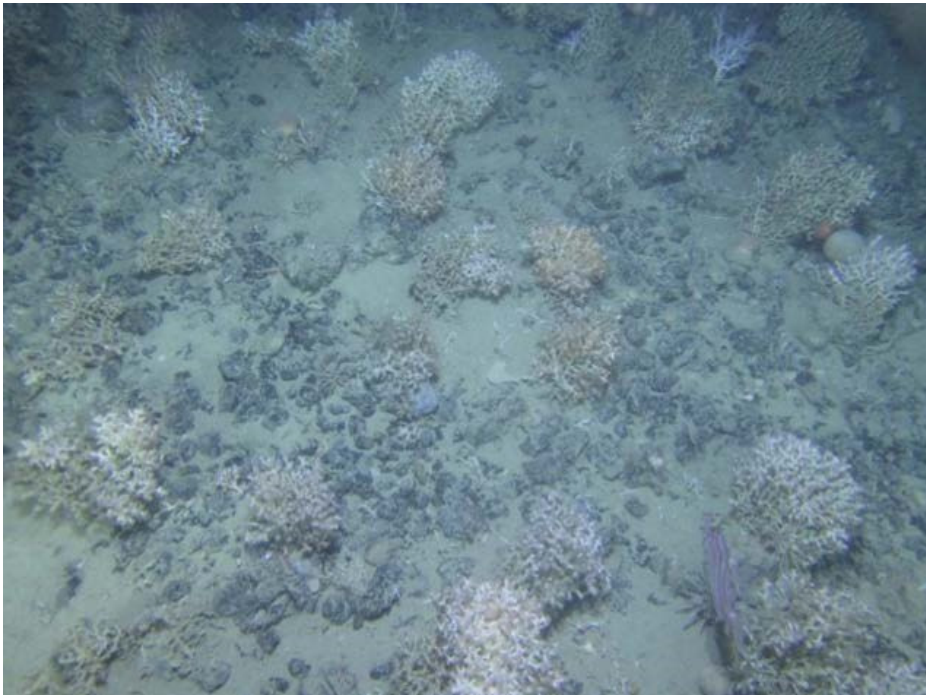
Prominent among the DMC's concerns were the technical and practical uncertainties associated with the mining operation itself. For example, controlling the extent of sediment dispersion would depend largely on avoiding the chalk-ooze layer and maintaining the discharge diffuser at the required height above the seabed. Achieving this would require accurate positioning and movement of the drag-head. However the testimony given by Mr van Raalte provided the DMC with only qualified reassurance: "As dredging or dredge-mining has not been attempted at depths of 400 m, a system has been designed on best available practices, supported by dedicated studies and expert assessments. In my opinion, the system is able to cope with the variable seabed conditions, and will, whilst operating, provide adequate survey data for further optimisation and fine-tuning of the processes. The initial phase of mining will be used as a pilot / prototyping period to test and optimise the system in all conditions." The applicant also acknowledged that monitoring at this depth and distance from shore would present challenges. The monitoring programmes Boskalis had deployed on other proposals around the world would not be possible on the Chatham Rise. The absence of a detailed and approved mining plan, monitoring programme and adaptive management until shortly before the commencement of mining, while understandable in terms of the process being followed, would leave a great deal to be resolved well after the conclusion of the consent process.

A significant feature of this application was the applicant's extensive reliance upon modelling and (largely) post-operational monitoring in the absence of, or additional to, what might be considered necessary empirical or observational evidence. There is no question that the use of modelling is appropriate both legally under the EEZ Act and technically in order to produce forecasts and predictions and to reduce levels of uncertainty. However, the extent to which reliance is placed upon modelling in this particular application is unusual. Moreover, there were questions about the reliability of some of the models used, particularly as much of the data was manifestly far from complete and in many cases the results of the modelling had not been field tested. ... What concerned many experts, including some of CRP's own witnesses, was the absence of "ground-truthing" of some of the more important models, which might have been internally verified but lacked empirical validation and more complete data collection.

## **Sediment Dispersion and Sedimentation**

Any dispersion of suspended sediment and sedimentation is however highly reliant on the nature of the mining operation, of which there are many possible operating and environmental variables that can affect the physical behaviour of the discharged sediment. If one or more of these variables was altered (or found to differ) relative to the assumptions and inputs used in the modelling to date (eg the design of the discharge diffuser, the speed of currents or the degree of sediment suspension created by the drag-head), it could potentially alter the behaviour and distribution of the sediment plume and subsequent sediment deposition on the seabed. While the DMC accepts that validation could be achieved through monitoring of the sediment plume and associated sediment deposition once mining commenced, it has reservations regarding the ability to accurately monitor these parameters at the depths and scale that mining would take place at, in order to protect the surrounding ecosystems. Provision would be needed for a rapid response when environmental thresholds were triggered. Questions also remain over the availability of specialised equipment. The DMC finds that the proposed adaptive management conditions of the applicant surrounding the behaviour of suspended sediment and sediment deposition contain a good deal of residual uncertainty in terms of the likely environmental outcomes. The DMC also retains reservations about suspended sediment threshold levels in the proposed conditions

## **Effects of the Proposal on the Environment**



The DMC considers it likely that there would be four broad physical changes to the benthic environment as a result of the proposed mining operation:

- i) the removal of large tracks of seabed and any associated benthic communities and probably hyper-benthic species;



*Summary of CRP Decision*

- ii) the replacement of benthic habitat with a relatively thick layer of screened sands and silts of a more homogenous character minus the original hard substrate (ie phosphorite nodules) and living benthic biota;
- iii) the deposition of mainly clay and silt sediment particles over un-mined seabed in areas adjacent to the mine tracks;
- iv) the creation of a turbid sediment plume in the water column immediately above the seabed that would persist for a limited period of time determined largely by when active mining takes places.

In general, the DMC found that changes to the benthic environment were undisputed by any party to this application, and these physical and biological changes would be inevitable as a result of the proposed mining and sediment disposal methods. All these changes are adverse in nature. A key consideration for the DMC was determining how significant these changes would be, and in particular, the likely short and long term effects on benthic communities, and how they may be avoided, remedied or mitigated.

The extraction of phosphorite nodules in the proposed mining area would remove both the phosphorite nodules and surrounding soft sediments, together with associated benthic faunal communities. The DMC accepts that it is unavoidable that all benthic organisms (both flora and fauna) to the depth mined by the drag-head would be killed, or at the very least displaced. This is an inevitable consequence of the proposed mining technique. Overall, the DMC agrees with Mr Kennedy that the benthic biota within the mining blocks would be removed and that this was a significant impact of the proposed mining operations that could not be avoided, remedied or entirely mitigated. ... From the information provided and evidence heard, the DMC agrees with Dr Hourigan that recolonisation trials are unlikely to prove successful in a short time span, if at all. The DMC also agrees with Mr Kennedy that if indeed recolonisation of the mined areas occurred, it would be by the benthic fauna and communities that characterise soft sediment habitats and would result in a notably different habitat and benthic community to the existing phosphorite nodule communities.... The experts for benthic ecology agreed that there was no information available on the sensitivity of organisms to increased sediment, and insufficient information to reliably assess the effects of changes to the sediment regime on benthic communities.

Both Dr Berkenbusch and Professor Watling considered that the sediment that is returned would not be as consolidated as it was before, and it is very likely that nothing can settle in that sediment until it consolidates from a "soupy" state. Professor Watling opined that larvae that are only two-tenths of a millimetre in diameter would have difficulty settling in sediment with very high water content, even if the high water content is only in the top centimetre. Fine sediment deposited over the top of coarser sediment may reduce sediment permeability by filling interstitial pore spaces, creating a cap on top of the coarser sediment through which pore water, nutrients and oxygen can no longer pass. The DMC understands that under such hypoxic conditions, suspension feeders may be replaced by deposit feeders, and macrobenthos by meiobenthos, ultimately resulting in a change in benthic community. Regardless of how quickly deposited fine sediments would consolidate, there was little doubt that the benthic community within mined areas of the seabed would change to one dominated almost exclusively by species that favour a soft sediment environment. The DMC heard from Professor Watling that the particle concentration in the water may increase to the point where either the organism that is filtering particles out of the water for its food would get overwhelmed by sediment particles, or

the actual food particles themselves would be diluted by the mineral grains from the plume. In either case the animal would not be getting enough food.

### **Mitigation**

Proposed Condition 60 acknowledged the need for a legal mechanism to provide protection for any mining exclusion areas from uses other than mining. The difficulty with this proposed condition was that any legal mechanisms could not be implemented by the applicant, and would rely upon the actions of third parties such as the Ministry for Primary Industries and the Department of Conservation. As stated in the opening legal submissions for KASM, Greenpeace and DSCC, this would involve an entirely different process with entirely different participants.... The DMC agrees with EPA staff that this proposed condition may not be enforceable. The DMC concludes in any event that this proposed condition could not realistically be relied upon to provide effective protection for mining exclusion areas.

### **Adaptive management**

*The DMC were required to consider an adaptive management approach. The Act contains detailed description of what an adaptive management approach is.<sup>1</sup> The DMC found that “once consent had been granted, the applicant proposed to ground-truth its proposed mining exclusion areas, with possible adjustment or expansion to the exclusion areas. However our reading of the applicant’s proposed conditions is that mining would be able to commence regardless of the ground-truthing outcomes.” The DMC noted that “The experts who participated in conferencing on benthic ecology and spatial planning agreed that benthic communities of the crest of the Chatham Rise play an important role in ecosystem functions, such as biodiversity, nutrient recycling and habitat provision.” The DMC found that “several potentially unique benthic communities within the consent application area were identified and they included at least one species protected under the Wildlife Act (the stony coral *G. dumosa*). While there is a general lack of detailed benthic survey work throughout the EEZ, the DMC is satisfied that these communities may be rare on the Chatham Rise and within New Zealand’s EEZ. Given the communities are potentially unique to the Chatham Rise, it follows they are likely to be rare in that area.” “There are substantial gaps in the knowledge of benthic communities on Chatham Rise as well as considerable uncertainty about the full extent of biodiversity and cryptic and rare species due to restricted sampling effort and limited taxonomic resolution.” In an important finding, the DMC found that:*

“Because this proposal was to mine the seabed to a depth of up to 0.5 m, benthic communities

---

<sup>1</sup> • (1) The Environmental Protection Authority may incorporate an adaptive management approach into a marine consent granted for an activity.  
(2) An adaptive management approach includes—  
• (a) allowing an activity to commence on a small scale or for a short period so that its effects on the environment and existing interests can be monitored:  
• (b) any other approach that allows an activity to be undertaken so that its effects can be assessed and the activity discontinued, or continued with or without amendment, on the basis of those effects.  
(3) In order to incorporate an adaptive management approach into a marine consent, the EPA may impose conditions under section 63 that authorise the activity to be undertaken in stages, with a requirement for regular monitoring and reporting before the next stage of the activity may be undertaken or the activity continued for the next period.  
(4) A stage may relate to the duration of the consent, the area over which the consent is granted, the scale or intensity of the activity, or the nature of the activity.

would be highly vulnerable to the effects of the proposed seabed mining. Those species that prefer hard substrates (or soft sediments for that matter) for habitat would be destroyed by the proposed mining operation. There is no dispute that this habitat and associated benthic communities would be destroyed over a large area if consent were to be granted. The DMC considers this is a significant matter. Compounding this effect, recolonisation of mined seabed by communities that prefer hard substrates (ie *G. dumosa* dominated communities) is unlikely to occur and the applicant has not committed to artificial recolonisation beyond a relatively small trial of unknown outcome. Given that recolonisation and recovery by other benthic communities are difficult to predict, the DMC finds that changes to the benthic environment through changes to substrate composition and sedimentation should be regarded as permanent at least in the timeframes relevant to re-colonisation by benthic organisms. In short, the DMC agrees with the applicant that the effects on the existing benthic communities within mining blocks would be significant and irreversible and that no avoidance, remediation or mitigation measures can be applied.”

“There is also uncertainty about the hyperbenthos and how it might be affected by the mining operation and what role it might play in providing food for demersal fish. The benthic experts involved in conferencing agreed that hyperbenthic communities on the Chatham Rise are an important component of the ecosystem and may be vulnerable to the proposed mining method.

*Furthermore*, “Outside of the mining blocks there are likely to be additional impacts to benthic communities associated with suspended sediment and sediment deposition. The area affected by these processes would depend on the nature and behaviour of the sediment plume, as discussed in Chapter 7, and the nature of the benthic communities, in particular their sensitivity to fine sediment. As such, there is likely to be a gradient of effects away from the mining blocks. These matters carry a significant degree of uncertainty. While the movement of the sediment plume and associated sediment deposition has been modelled, the model outputs have not been verified. The sensitivities of the benthic communities and individual species are largely unknown and the applicant has had to rely on information on species that do not live on the Chatham Rise and in many cases are not found in New Zealand waters. Given these uncertainties, the DMC finds that it is not possible to quantify the scale of effects on benthic communities away from the mining blocks.”

“In his presentation at the hearing, Dr Pinkerton helpfully summarised the potential ecosystem effects of the mining application. They included:

- direct impacts such as the physical removal of organisms from the seabed, the effects of the sediment plume on organisms, noise and so on;
- habitat mediated effects, where the mining changes the physical habitat of the seabed and that has an effect on some organisms or on some life stages of organisms;
- ecosystem effects are those effects on the individual species moderated through the food web. For example, if there is a change in the abundance of one organism, its predators and prey can both be affected through feeding relationships (as described by the food web model).”

“The DMC takes it from this sensitivity analysis that if the abundance of coral on the Chatham Rise is reduced, there is not likely to be a significant effect on the trophic web. However, as noted by Dr Pinkerton, there may be unforeseen effects that the model cannot demonstrate. For example, there may be effects on the trophic web because that coral provides habitat for something which has high trophic importance. The DMC acknowledges that the model cannot

consider the provision of habitat or the role of any particular species in the trophic web. “

“Dr Fulton drew to the DMC’s attention that the trophic model also did not address other ecosystem processes such as nutrient cycling. She considered that disturbance of the seabed, direct removal or mortality of species in the mining path and potential smothering of benthic species under the plume have the potential to modify local scale nutrient cycling which could further exacerbate effects on bottom communities and detritus based food webs.

Mr Bartle expressed concern there was a potentially significant risk of damaging ecosystem effects from the sediment plume; however the trophic model did not assist in addressing this concern.”

“The DMC notes that scale has been an issue throughout the process. Whether assessing the effect of the mining operation at the drag-head, at the mining block in the marine consent application area or on the Chatham Rise crest / flank / wider ecosystem, analyses and conclusions have been drawn at significantly different scales. It is self-evident that the more one zooms in or out, the more or less significance can be attributed to any particular effect. The DMC has in each case sought to apportion significance at an appropriate scale of effect.

In the DMC’s view it is unlikely that a sediment plume due to dredging would have significant flow-on effects to the wider Chatham Rise food web.”

## **Primary production and marine microbes**

“The DMC accepted that both benthic and pelagic bacteria are fundamental components of the Chatham Rise trophic web as indicated by Dr Pinkerton’s model. At the scale of the Chatham Rise, Dr Pinkerton considered the effects of mining on bacteria would be negligible. While the DMC’s understanding of the consequential effect of the proposal on the ecosystem within and immediately adjacent to the consent application area is limited, the DMC agrees with Dr Pinkerton’s conclusion given the scale of the proposed activity relative to the size of the Chatham Rise.

Toxicity testing of sediment elutriate indicated some mild toxicity towards the bacterium test organism. However the DMC considers that the level of dilution of the discharge after leaving the diffuser would be sufficient to reduce the potential for toxicity effects. The same reasoning applies to the risk for significant oxygen depletion as raised by Dr Krause.”

## **Zooplankton**

“From both Dr Pinkerton’s and Mr Bartle’s evidence, it is apparent that zooplankton would be subjected to increased levels of suspended sediment from the plume.”... “The DMC expects that the sediment plume would result in localised adverse effects to zooplankton through effects on the likes of health and reproduction, and the scale of these effects are likely to be proportionate to the size, intensity and duration of the sediment plume, characteristics which have a degree of uncertainty. Some zooplankton groups with a dependence on the benthos for reproduction (such as krill) may be more vulnerable than others. However, the risk to the wider Chatham Rise food web as a result of an adverse effect on zooplankton is probably low given their mobile nature, relatively short life cycles and the scale of the proposed activity relative to the size of the Chatham Rise.”

## **Fish and pelagic fauna**

“Of all the potential effects on fish, the DMC concludes that the effect of increased sediment is the most significant. From the evidence and information provided to the DMC, the DMC finds that the most likely effect of increased total suspended sediment on mature fish and pelagic fauna would be avoidance of the sediment plume. The DMC accepts that fish are highly mobile and those not tolerant of high suspended sediment concentrations would likely move to more suitable habitats. However the DMC remains concerned that larvae and eggs are likely to be more affected by increased levels of sediment and do not have the same level of mobility as adults. The early life stages of ling in particular appear to be particularly susceptible to the effects of sediment, and the DMC heard from Dr O’Driscoll that the proposed mining area is an important ling spawning location.” ... “Given the importance of fish commercially as well as their role in the trophic web, the DMC find that the levels of knowledge and scale of impacts are uncertain and that the proposed conditions do not appropriately alleviate this concern.”

## **Marine mammals**

“As pointed out by Associate Professor Slooten, marine mammal surveys rather than habitat modelling were needed to determine which species of marine mammals use the Chatham Rise area and how much time they spend there.” ... “The experts agreed that the most significant potential impact on marine mammals was operational noise, and the DMC heard a large amount of evidence on this issue.”

“The acoustic model did not include riser pipe noise, although noise from the riser pipes was approximated and included in the dredge and subsea pumps’ maximum-over-depth planar sound map. The JASCO report considered that the individual contribution of the pipes as a sound source would be less than those of the sources already included in the modelling, and therefore that the inclusion of the pipes would not increase the maximum-over-depth planar sound field of the operation. This was acknowledged by the experts for marine mammals as introducing an element of uncertainty.”

“The experts in marine mammals agreed that there was uncertainty about the dredge pump as source levels above 40 kHz were not included in the modelling.” “The experts in the field of marine mammals agreed that not having data on the ambient noise (including other vessel and animal sound within the predicted ensonified area) introduced another uncertainty regarding the model’s application.” “The experts on marine mammals agreed that it was likely that there would be some behavioural effect on some species. Behavioural changes could include altered diving, foraging, pod cohesion, masking of significant acoustic cues (eg communication, echolocation from prey), reproduction, spatial distribution and habitat use.”

“The DMC accepts that the information and evidence about marine mammals was based on reported sightings and strandings rather than systematic and specific surveys. Based on the limited information available, the DMC cannot be certain as to the significance of the proposed marine consent area as habitat for marine mammals.”

“The DMC found operational noise from the proposed mining operation to have the greatest potential impact to marine mammals, but was satisfied that general knowledge about the marine mammal species observed in the wider area of the Chatham Rise, and knowledge about the species-specific behavioural and physiological characteristics and responses (including their

auditory ranges), provided sufficient confidence that any effects on individual marine mammals could be managed by a range of conditions, a suite of which were suggested in the final set of proposed conditions tabled by the applicant, including mechanical noise limits, monitoring arrays, vessel speed controls, observers, stop-work separation distances, and reduction of operating speeds.” “The DMC finds other potential adverse effects such as loss of habitat and food resources, pollution, ship strike and entanglement to be relatively minor, with likely minimal risk to individuals and little or no effect at the population level. Overall, the DMC considers that the suite of conditions based on the applicant’s proposals and including marine mammal observers would have addressed the concerns raised by the experts.”

### **Seabirds**

“The Chatham Rise is a nationally and internationally significant marine region for birds because of the diversity and abundance of seabirds using the area. This significance is highlighted by the presence of a number of endemic species that are considered threatened or at risk.”... “The DMC found no compelling evidence that significant direct adverse effects on the seabird population of the Chatham Rise would arise from the proposed mining operation provided that it adhered to an appropriately structured set of conditions.”

### **Uranium**

“The DMC heard from Dr Phillips and Associate Professor Peake that there were two effects in the case of uranium: the ecotoxic effect from the chemical perspective, and the effect of the radiation of the uranium and its breakdown products. The two were interrelated. The DMC heard that one of the areas where there is a distinct lack of information is toxicity data for uranium in the marine environment.”... “The experts in the field of radioactivity all agreed that it would be advisable to establish that levels of radionuclides especially Polonium 210 in the four pelagic fish species of the Chatham Rise would not pose a radiological risk.”... “Dr Santillo brought to the attention of the DMC the International Atomic Energy Agency as being recognised by Parties to the London Convention and London Protocol as the appropriate body to provide technical advice. He considered that International Atomic Energy Agency Guidelines, including the step-wise approach to consider criteria for de minimis exemption and the specific assessment for potential impacts on human health and marine flora and fauna had not so far been applied to the case of the phosphorite deposits on the Chatham Rise.” “The DMC understands that the potential toxicity to the aquatic environment depends on the bioavailability.”... “As already noted, the experts in the field of toxicology and water quality agreed that there was an absence of baseline data on the bioaccumulation of metals in important customary and commercial fisheries on the Chatham Rise, and that this must be collected before mining is undertaken.”

“The DMC finds that there are potential adverse water effects associated with the applicant’s proposed mining operation. These effects are associated with the mobilisation of trace elements (heavy metals including some with radioactivity) and organic enrichment. While there is some uncertainty around the magnitude of these effects, in general they appear to be localised and relatively minor.”... While the mobilisation of heavy metals is possible, testing suggests that the concentration levels would not be sufficient to exert toxic effects on marine organisms, particularly after mixing with the surrounding seawater.” “Biomagnification of heavy metals including radioactive elements appears unlikely. The experts in the field of radioactivity all agreed that although radionuclides have the potential to bioaccumulate, the radionuclides of interest do not biomagnify through the food chain. Monitoring of fish prior to the commencement of mining would in our view benchmark background contamination levels in

fish (and other local organisms if necessary) and the DMC considers that conditions could be developed to achieve the necessary level of information.”

“The DMC did not reach any firm conclusion on the impact on freshwater quality of the application of Chatham Rise phosphorite. There was insufficient information as to the quantities of phosphorite fertiliser that would be applied to New Zealand agricultural land, or in what form. In any event, the DMC considers this issue is sufficiently distant from the marine consent, and ultimately not material to our determination. The marine consent process does not provide for controls to be placed on the use made of this kind of end product.” ... “The DMC was persuaded by Mr Kennedy’s evidence that the proposed mining operation posed little risk to humans consuming seafood. While Chatham Rise phosphorite generally contains more uranium than current phosphate fertilisers used in New Zealand, it is not classed as a radioactive material.”

### **Existing Interests**

“On the evidence and testimony it heard, the DMC judges that the effects of the mining proposal on existing interests generally are unlikely to arise to the extent submitted and are not determinative of the application. However, the DMC acknowledges the concerns of existing interest holders regarding the mining proposal which they see as involving a number of uncertainties and posing risks to their livelihood and wellbeing.”

### **Benthic Protected Areas**

“Almost the entire proposed mining operation would take place within the 8,732 km<sup>2</sup> Mid Chatham Rise BPA.” “The DMC takes the view that mining the seafloor in an area in which a comparable activity is prohibited would be, at the very least, contradictory. Notwithstanding the argument that mining per se is not prohibited and is therefore lawful for the purposes of the Regulations, the DMC finds such a position untenable from a benthic ecology point of view. The net effect, being the destruction of a sizeable benthic area that is protected from an activity similar to mining, is clearly contrary to purpose (a) of the BPA, which is not just to prohibit the specific activities of trawling and dredging but also to protect the benthos.” ... “The DMC concludes that granting consent to this application would effectively negate, and make redundant, one of the purposes and the effect of the Mid Chatham Rise BPA.”

### **Economic Benefit to New Zealand**

“The applicant produced an analysis from the New Zealand Institute of Economic Research (NZIER) suggesting that, on the basis of the information provided in CRP’s prospectus ... the proposed mining activity would boost New Zealand’s GDP by some NZ\$ 280 million per year and produce a net welfare gain of NZ\$ 130 million per year. According to NZIER, some 40 % of this benefit would accrue to New Zealanders not involved with the applicant.”

“The DMC accepts that if the applicant’s operating cost forecasts and its other assumptions and projections ... were borne out and the proposal were to proceed as planned, there would be some positive economic spinoff to New Zealand. The return to the government from taxes and royalties in that situation was estimated by the applicant to be of the order of \$24 million per year. There would be some modest employment gains (primarily an estimated 50 crew positions on the mining vessel) and a positive flow-on economic impact on one or more ports, port engineering services and the transportation sector.” ... “Finally, the DMC was not persuaded that

the NZIER analysis took sufficient account of the proposal's possible adverse impact on existing interests, primarily the commercial fishing industry. Certainly, the applicant's proposal attracted widespread criticism and opposition from such groups as the Deepwater Group, Ngāi Tahu and Kaikoura Whale Watch. It might well be the case, as the applicant argued, that the proposal would not deplete commercial fish stocks to any significant extent, would not result in the loss of MSC certification and would not cause reputational damage that would reduce the value of the industry's exports. These risks, however small, do exist, and in our view the possible economic impacts of the proposal in those areas were deserving of more careful analysis by the applicant. Similarly, the consequences for existing interests of the proposal's adverse impacts on the Chatham Rise environment should have been considered more closely. While such uncertainty surrounds these issues, the overall net economic impact of the proposal cannot be predicted with confidence."

## **Cultural Values**

"The DMC heard from a number of submitters and from Ngā Kaihautū that the proposal was seen as having an adverse impact on the cultural interests and values of iwi and imi. There is no specific guidance in the EEZ Act as to just how adverse effects of this nature should be assessed and weighed in the consideration of marine consent applications. The DMC accepts that the impact of this proposal on the cultural and spiritual values and sense of identity of iwi and imi is a matter of concern and importance to a number of individuals and groups with a direct interest in the application and that it is a matter that the DMC needed to take into account as relevant and reasonably necessary in terms of Section 59(2)(m) of the EEZ Act. While the DMC does not see these matters as determinative in the decision, it does wish to recognise the importance attached to these effects by a large number of submitters and witnesses."

## **The Decision Path**

### **Uncertainty**

"The DMC recognises that considerable efforts were made by the applicant to provide the necessary baseline information on the marine environment in the consent area and to commission expert modelling and analysis in support of the application. However, it is incontestably the case that there remained significant gaps in the data and information provided about the consent area's marine environment as well as uncertainty about the impact of the proposal on existing interests and the environment. This was particularly the case with regard to the wider consent area, where much less information had been assembled by the applicant. As already noted above, the applicant was proposing to collect additional baseline information prior to mining commencing and after the consent was granted. The DMC interprets the wording of the legislation to mean that a complete understanding of the environment and absolute certainty about the risks posed by the proposal are not a prerequisite to the granting of a consent. On the other hand, scientific knowledge of the Chatham Rise ecosystem is manifestly incomplete and the DMC does need to have sufficient, and sufficiently certain, information to identify and evaluate the risks involved in a proposal such as this. A good level of baseline information is also necessary in determining the standards, limits, thresholds and triggers for any proposed conditions or adaptive management framework applied to a consent.



Of particular concern to the DMC are the uncertainties associated with modelling that could not be empirically and in situ validated before the commencement of mining, for example in respect of the nature, spread and impact of sedimentation caused by the return to the seabed of waste material (although the DMC acknowledges some internal model validation has occurred). As indicated above, there was a large measure of agreement among experts in a range of fields that more, and more certain, information was needed on which to base assessments of the impact of the proposal on the environment and existing interests, which the DMC found persuasive. The DMC's overall conclusion is that the information made available to it on the application, while it met the EEZ Act's definition of best available information, it was uncertain and in some areas inadequate. The DMC did not take up the offer made by the applicant in its closing statement to provide more information because it judged that the kind of additional information that would have been useful (for example, from further surveys to obtain better baseline information and from model validation tests) could not have been obtained at reasonable cost, effort and time.

To favour caution and environment protection would in this case mean that the proposal would be likely to be refused consent. The DMC was therefore required to consider whether taking an adaptive management approach would allow the proposal to proceed. This is addressed in the following chapter.”

### **Adaptive Management**

Section 61(3) of the EEZ Act directs that if favouring caution and environmental protection (as directed under Section 61(2) of the Act) means that consent is likely to be refused, then the option of adaptive management must first be contemplated.<sup>2</sup>

Mr Currie, for KASM, Greenpeace and DSCC, submitted that the DMC could not apply adaptive management conditions in the hope that these would ameliorate problems in time; problems that are currently on the table rather than those that may arise and are not presently identified. While the DMC generally agrees with the import of that proposition, it does not hold necessarily in all circumstances. That essentially, is why staging is a reasonably fundamental aspect of adaptive management. It recognises that certain effects may arise and be addressed at a future time; and puts in place objectives, thresholds, responses, triggers, limits, standards, restart parameters, and so on, precisely to allow that decision point to be deferred to a future time but within the ambit of the consent granted.

Towards the end of the hearing, the DMC invited parties to the application to comment on a staged approach as outlined in Section 64 of the EEZ Act. In his closing statement, legal counsel for the applicant stated in relation to a staged approach or trial run: “given the economics of this project, is simply never going to fly for the applicant because the upfront investment is too great to take a risk of a trial run and the quid pro quo of that, in terms of Chatham Rock's view of the evidence, is that a trial run isn't necessary based on risks and effects”.

The DMC also invited parties to the application to comment on the option of a partial approval as provided for in Section 62 of the EEZ Act, noting that considerably more information and evidence had been received on the proposed activities in mining area MPL 55549 than for

---

<sup>2</sup> Adaptive management is defined in Section 64 of the Act to include:

- (a) allowing an activity to commence on a small scale or for a short period so that its effects on the environment and existing interests can be monitored;
- (b) any other approach that allows an activity to be undertaken so that its effects can be assessed and the activity discontinued, or continued with or without amendment, on the basis of those effects.

mining in the wider consent application area. The applicant responded “that is obviously not Chatham Rock’s preference but it would take the view that a consent which enabled it to mine and do so in accordance with at least its current business plan is better than none.” Parties opposing the application were resistant to the idea of even a partial approval.

The DMC finds that an adaptive management approach would not resolve the primary question of the adverse effect on the benthic environment without considerable pre-mining research and model validation in situ, which the applicant informed the DMC was not a viable option.

The DMC gave careful consideration to the option of partial approval. Its conclusion is that the destructive impact of mining on the area in MPL 55549, coupled with the potential adverse effects on the wider marine environment, ruled out such a partial approval.

### **Restoration**

*The DMC found that* “Overall, the DMC considers there to be a large degree of uncertainty associated with recolonisation of the deep-water benthic environment following significant disturbance to the seabed.”

### **Consideration of the Application and Decision**

“The most significant adverse effect would be that caused by the extractive part of the mining operation itself. This would result in the physical removal of phosphorite nodules and associated surface sediment along with all benthic biota living within and on the seabed over an area of between 450 km<sup>2</sup> (15 year consent) and 1050 km<sup>2</sup> (35 year consent) to a depth of up to 0.5 m. This would include the epifauna communities described by Dr Rowden which are dominated by the stony coral *G. dumosa* and are potentially unique to the central crest of the Chatham Rise and which the DMC concludes are rare and vulnerable ecosystems which merit protection.

In addition to the removal of habitat and mortality of benthic biota, the benthic communities surrounding the worked mining block would be impacted by deposition of the returned sediment discharged from the mining vessel. That deposition (at a depth of 1 mm) is modelled to extend at least 10 km beyond the consent area sought after 15 years of mining, 1 mm being a reasonable precautionary threshold for potentially adverse effects on sensitive benthic organisms as identified by Dr Hewitt and broadly agreed.

The mining would result in a long-term change in habitat from a mixed phosphorite nodule / soft sediment habitat to a graded soft sediment habitat. Restoration of the area to its original state is not expected as stony coral and other sessile organisms found in the marine consent area are dependent on hard substrate for settlement. Re-establishment of communities following mining is uncertain and at best would take decades. Moreover the re-established communities would be based on soft sediment rather than hard coral.

The spatial and temporal extent of the indirect impacts of mining are, however, uncertain as the modelling has yet to be verified in situ.

Almost the entire proposed mining operation would take place within the 8,732 km<sup>2</sup> Mid Chatham Rise BPA.....The DMC concludes that the environmental protection afforded by that mechanism would then be rendered redundant.

The DMC recognises that cumulative effects in conjunction with fishing industry activities across the Chatham Rise might eventuate, but the DMC is unable to conclude from the evidence received that they would necessarily arise or, if they did, what their magnitude and significance would be.

On the effects that might occur in New Zealand arising from the application of mined phosphorite, the DMC found that there was uncertainty as to the extent and nature of its use in New Zealand and, given its distance from the marine consent, this issue was not material to the DMC's decision.

The DMC concludes that there would be significant and permanent adverse effects on the existing benthic environment. The DMC considers this is a significant factor amongst all the matters that it is required to take into account."

### **Existing Interests**

Overall, the DMC concludes that the effects on existing interests that it needs to take into account are principally the effects on fishing interests, which are of low probability and potentially moderate impact. Such effects are not determinative of the application and, relative to some of the other factors that the DMC must take into account, are of limited weight in the overall assessment.

### **Effects on human health**

The DMC concludes that there are unlikely to be any significant adverse effects on human health arising from effects of the proposal on the environment.

### **Protecting biological diversity and integrity**

"Communities with a high abundance of *G. dumosa* were acknowledged by the applicant to be habitat forming communities which to date have not been found outside the marine consent area. *G. dumosa* as a species is not endemic to Chatham Rise (it is found elsewhere in the EEZ) but it is protected under the Wildlife Act 1953." ... "The phosphorite nodule habitat is considered unique in New Zealand's EEZ. In addition Dr Rowden described the Chatham Rise "as one of the most obvious and distinct ecosystems we have in the EEZ and it is one of the most productive." ...

"The DMC was persuaded that communities dominated by *G. dumosa* (among others) in the mining area fall within the scope of Section 59(2)(d) and notes that the applicant reached a similar conclusion. The extractive activity would not protect those communities. The DMC considers this is a significant factor amongst all the matters that it is required to take into account."

### **Protecting rare and vulnerable ecosystems**

"The high density of *G. dumosa* forming communities in the mine permit area is strongly correlated with the presence of phosphorite nodules. These nodules also occur in high density in the mine permit area, hence the applicant's focus on this area of the Chatham Rise. The DMC accepts the evidence of Drs Rowden and Berkenbusch that the communities dominated by *G. dumosa* are potentially unique, and in the absence of any strong evidence on the presence or abundance of such communities beyond the mining permit area (and given the requirement to favour caution and environmental protection), the DMC finds it more than likely that such communities are rare. That, in combination with their vulnerability, signifies that the DMC must take into account the importance of protecting those communities. The DMC concludes that the

potentially unique communities of *G. dumosa* in the mining areas are rare and vulnerable ecosystems which merit protection. The DMC considers this a significant factor amongst all the matters that it is required to take into account.”

### **Economic Benefit to New Zealand**

“The DMC considers that the potential economic benefit to New Zealand was overstated in the application, although it does not accept the most pessimistic of the expert opinions.”...” The DMC concludes that the proposal would be unlikely to generate more than a modest economic benefit to New Zealand and that the quantum and distribution of that benefit remains uncertain. The DMC observes that economic benefit to New Zealand is one of the few criteria in Section 59(2) that focuses on the benefits, as opposed to the environmental costs, of a marine consent proposal. Having found that the economic benefit to New Zealand of this proposal is unlikely to be more than modest, the DMC must weigh that alongside the significant and permanent adverse effects on the benthic environment and other potential environmental adverse effects of the project.”

### **Nature and effect of other marine management regimes**

“There is little doubt that mining the seafloor in an area in which the only other significant and potentially destructive activity (bottom trawling) is prohibited is, at the very least, contradictory, and that the resultant effect of mining 1050 km<sup>2</sup> of the seabed over 35 years would negate the effect that the Mid Chatham Rise BPA has had for protecting that benthic environment. What effect that might have on the BPA network as a whole, and what response, if any, might be required of government was left unanswered at the hearing. The DMC concludes that there would be a significant adverse effect on the Fisheries (Benthic Protection Areas) Regulations with respect to the Mid Chatham Rise BPA and that one of the purposes and the effect of the BPA would be undermined if the application were granted. The DMC considers this is a significant factor amongst all the matters that it is required to take into account.”

### **Best practice**

“While the Boskalis representatives told the DMC the technology and practices involved in this proposal were well understood and that Boskalis is a leader in the industry, the proposed mining method and equipment to be used on the Chatham Rise has not been used at similar depths anywhere in the world. The DMC understands that globally marine mining is an industry in its gestation and that guidance on best practice for deep-sea mining is therefore limited. However, Boskalis stated that the operation on board the vessel would adhere to international laws and standards (specifically MARPOL), as well as the additional requirements that follow from New Zealand law. In addition Mr Ross-Watt for Ngāi Tahu identified a number of good practice codes and guidelines that might be appropriate, for example the International Marine Minerals Society’s Code for Environmental Management of Marine Mining (IMMC), the Noumea Convention, the London Protocol and the Mining Code issued by the International Seabed Authority. The DMC concludes that regardless of the present uncertainty about what might constitute best practice for this operation (a matter that would inevitably and necessarily evolve over a 35 year consent duration) conditions could be developed, including explicit review conditions, that would ensure best practice was implemented, maintained and amended

appropriately throughout any consent duration.”

## **Mitigation**

“As discussed, the DMC does not accept that the proposed mining exclusion areas could be considered compensation for the damage from mining because if they are within the BPA then these areas are already protected from disturbance from bottom trawling and shellfish dredging. If they are not within the BPA, then the DMC could have no certainty that the areas would be protected from any activity other than the present application. The DMC also notes that the mining exclusion areas, as proposed, did not appear to encompass habitat that is suitable for potentially unique epifaunal communities and at least one infaunal community. Similarly the DMC cannot accept the proposed recolonisation trials with introduced substrate as any form of positive mitigation because the likelihood of success at any reasonable scale remains uncertain at best. The applicant also offered an environmental package to help address the adverse effects of mining. This included an Environmental Compensation Trust Fund, the funding of an Environmental Reference Group and the establishment of a Chatham Islands Trust Fund. The DMC notes that these are not mitigation measures because they do not directly relate to any particular adverse effect of the mining. Rather, they are an indirect offset, the logic and rationale (including the quantum proposed) of which was not clearly evident. The DMC concludes that conditions could be refined to address many of the matters discussed throughout this decision. However, no avoidance, remediation or mitigation measures could be applied to the direct loss of benthic communities within and alongside the mining block. This is seen by the DMC as a significant matter.”

## **Decision**

“The DMC concludes that there would be significant and permanent adverse effects on the existing benthic environment. The most significant adverse effect would be the physical removal of phosphorite nodules and associated surface sediment along with all benthic biota living within and on the seabed over an area of up to 1050 km<sup>2</sup> over 35 years, to a depth of up to 0.5 m. This would include communities which are dominated by the stony coral *G. dumosa* and are potentially unique to the central crest of the Chatham Rise, and which the DMC concludes are part of rare and vulnerable ecosystems which merit protection. In addition to the removal of habitat and the mortality of benthic biota, the benthic communities surrounding the worked mining block would be impacted by deposition of the returned sediment discharged from the mining vessel. That deposition (at a depth of 1 mm) is modelled to extend at least 10 km beyond the consent area sought after 15 years of mining. The mining would result in a long term change in habitat from a mixed phosphorite nodule/soft sediment habitat to a graded soft sediment habitat. The DMC concludes that the project was unlikely to generate more than a modest economic benefit to New Zealand and that the quantum and distribution of that benefit were uncertain. As against this, there would be significant and permanent adverse effects on the benthic environment and other potential environmental adverse effects. The DMC finds the economic benefits of the proposal to New Zealand to be insubstantial relative to potential adverse environmental effects of the proposal. The DMC also concludes that the proposal would have a significant adverse effect on the Fisheries (Benthic Protection Areas) Regulations with respect to the Mid Chatham Rise Benthic Protection Area, and that at least one of the purposes and the effect of the BPA would be undermined if the application were granted. Taking these

### *Summary of CRP Decision*

matters into account, and favouring caution and environmental protection (in light of the uncertainties and inadequacy inherent in the information), the DMC concludes that consent for the proposal must be refused unless there were some way in which an adaptive management regime could overcome its concerns or the outcome were somehow contrary to the purpose of the EEZ Act. The DMC has considered the adaptive management approach offered by the applicant and finds that it would not address its fundamental concerns such as the need to validate the habitat predictions of the Zonation model in advance of mining, and to validate the sediment modelling in situ through a limited preliminary mining trial. However, an adaptive management approach designed to address those concerns would render the project unviable for the applicant, and could not be imposed without frustrating the consent. The DMC has also considered whether the conclusion it reached, guided by the specific decision-making criteria, the information principles, and in particular the requirement to favour caution and environmental protection, is in keeping with the express purpose of the EEZ Act. Unlike the RMA, the detailed machinery provisions for guiding the DMC's decision are not subservient to the legislative purpose. It is still however relevant to consider in the round whether the decision is consistent with the EEZ Act's purpose. Similar to the RMA, the purpose of the EEZ Act balances a number of potentially competing factors whose relevant weight depends on the facts of the application being considered.

In this instance, the DMC is convinced that the proposal would create significant and permanent adverse effects on the environment which are incapable of being avoided, remedied or mitigated, and that this aspect of sustainable management is of paramount concern in this instance. The DMC finds nothing in the purpose of the Act that suggests it is inappropriate for it to be guided by that concern, particularly when the requirement to favour caution and environmental protection has been invoked.

The DMC's decision is to refuse the application by Chatham Rock Phosphate Limited for a marine consent to mine phosphorite on the Chatham Rise.