

Murky Waters

adaptive management, uncertainty and seabed mining in the exclusive economic zone

Introduction

In 2012 the Exclusive Economic Zone and Continental Shelf (Environmental Affairs) Act (EEZ Act) established a discretionary consenting regime for resource activities and development in New Zealand waters beyond the territorial sea – the exclusive economic zone.¹ The act sought to strike a balance between economic development and environmental protection by obliging the Environmental Protection Authority (EPA) to consider adaptive management when

deciding whether to grant consent to applications with uncertain effects. Adaptive management was seen as a way to temper a precautionary approach to environmental management and to allow for flexible decision making (Adams, 2012); it was initially welcomed by industry submitters, who have since reversed their views (Ministry for the Environment, 2016).

This article explores the reversal in industry attitudes towards the use of adaptive management in EEZ seabed mining applications. It discusses the concept of adaptive management and its application in New Zealand, before examining the different provisions in the EEZ Act that both encourage and

Catherine Iorns is a Reader in Law at Victoria University of Wellington, on environmental law and statutory interpretation. She is a national board member of Amnesty International Aotearoa New Zealand, a member of the International Law Association Committee on the Implementation of the Rights of Indigenous Peoples, a member of the IUCN World Commission on Environmental Law, and the academic advisor to the New Zealand Council of Legal Education. She appeared as an expert witness for Te Kaahui o Rauru before the EPA in the 2016 application by Trans-Tasman Resources Ltd. **Thomas Stuart** has an LLB (Hons) and BA from Victoria University of Wellington. He is currently working as a legal researcher while preparing for admission to the Bar and as an intern at the United Nations in New York. He has appeared as an expert witness for Te Kaahui o Rauru before the EPA decision-making committee in the 2016 application by Trans-Tasman Resources Ltd.

proscribe the use of adaptive management in different situations. It will use the most recent application by Trans-Tasman Resources Limited (TTRL) to mine iron sands from the seabed in Taranaki to illustrate the difficulties of applying adaptive management in the EEZ. This article argues that the current legislative provisions have caused adaptive management an identity crisis, and left applicants and decision makers navigating murky waters.

The theory of adaptive management

Adaptive management is a resource management tool that involves systematically testing assumptions about the environment in order to adapt and learn. It enables development activities to be undertaken in the face of uncertainty while more is learnt about the resources being managed, and has been described as 'structured learning by doing' (Department of Conservation, 2000). The use of adaptive management was formally recognised as a resource management technique in the 1970s and was predicated on the belief that the management of resources must proceed even if all of the desired information is unavailable or the effects are uncertain (Holling, 1978).

Today adaptive management is read in light of the precautionary approach and applied only where the two concepts are in harmony. While precaution can be exercised with much more clarity in the absence of adaptive management, the converse is not true. Adaptive management without precaution amounts to 'permissive regulation' and results in negative environmental outcomes (Iorns Magallanes and Severinsen, 2015, p.213). Ecosystems are vulnerable and ecological harm caused by human activities can be unpredictable, significant and irreversible (Folke et al., 2004, p.559). If adaptive management cannot be made to sufficiently reduce associated risk, acting in the face of uncertainty can be a foolhardy and potentially catastrophic endeavour.

Adaptive management can be seen as one way to implement a precautionary approach, beyond simply refusing consent. Its 'learn as you go' method enables management techniques to be

adapted as environmental and other effects become clearer. As stated in Harding and Fisher's leading text, *Perspectives on the Precautionary Principle*:

Recognizing the extent of uncertainty in many areas, it may be necessary to implement a step-wise or adaptive management approach, whereby uncertainties are acknowledged and the area affected by a project or policy is expanded as the extent of uncertainty reduced. The approach is essentially one of reserved rationality where decision-makers 'proceed cautiously – to safeguard initially against the possibility of unexpected

information is easy to obtain and where any effects caused are reversible. Conversely, it will not be appropriate where there is a likelihood of irreversible or significant adverse effects, or where effects are hard to detect or temporally disconnected (Wright, 2011, p.11). A critical question will always be whether an adaptive management regime can sufficiently reduce associated risk and uncertainty. This will depend on the degree of risk that exists and the gravity of the consequences if that risk is realised. As articulated by the New Zealand Supreme Court in *Sustain Our Sounds v New Zealand King Salmon*: 'a small remaining risk of annihilation of an endangered

Its 'learn as you go' method enables management techniques to be adapted as environmental and other effects become clearer.

severe future costs'. (Harding and Fisher, 1999, p.140)

Adaptive management functions to decrease levels of uncertainty that would otherwise necessitate a precautionary ban on an activity. By proceeding cautiously, more is able to be determined about the given effects of a particular activity than if it were prohibited outright. It provides a way to test a given activity in a real-world context, to determine the level of harm caused and to adjust an activity in the light of new site-specific information. Of course, the caveat is that, before such a trial can be undertaken, it must be determined that associated risks can be adequately managed and that reliable and timely information can be obtained and used to inform future decisions as to the discontinuation, or continuation (with or without amendment), of the activity in question.²

Adaptive management, while useful, is not always appropriate. It is likely to be of use where the resources in question are under stress only on an occasional basis, where temporally connected monitoring

species may mean an adaptive management approach is unavailable. A larger risk of consequences of less gravity may leave room for an adaptive management approach' (p.139).

Adaptive management applied in New Zealand

Since 2001 adaptive management has been employed by decision makers when giving effect to plans or drawing up consent conditions under the Resource Management Act 1991 (RMA) since 2001. The RMA is New Zealand's principal environmental and resource management statute and contains a consenting process broadly comparable to that of the EEZ Act. Although adaptive management is not defined in the RMA, the term is now in common parlance and there is an extensive body of case law discussing the concept (see discussion in *Sustain Our Sounds*, 2014 (pp.105, 133)). In particular, the courts have focused on identifying the indicators or elements that ought to be present before an adaptive management approach can be utilised. These factors include:

- (a) a level of uncertainty about the potential adverse effects of the activity in question, coupled with a risk that the activity will do real (and potentially irreversible) damage to the environment;
- (b) adequate baseline information about the state of the environment, which would allow the effect of the activity on the environment to be assessed. In some cases ... provision is made for baseline information to be bolstered ... before the activity is commenced;
- (c) certainty as to the desirable environmental outcomes or ... a clear understanding of what effects ... would be unacceptable;
- (d) [effective] monitoring of the state of
 - (ii) for the activity to be either halted, or reduced, if post-commencement monitoring shows it is having an unacceptable effect on the environment; and
 - (iii) for the activity to be expanded if post-commencement monitoring indicates that doing so would be appropriate. (Haden and Randal, 2017, pp.18-19)

Adaptive management and EEZ marine consents

Adaptive management appears in the EEZ Act as part of a suite of provisions designed to manage the risk of uncertain effects from economic development

qualified by section 61(3). This section requires decision makers to consider adaptive management before refusing consent on the basis of precaution. Adaptive management can contribute to the purpose of the precautionary approach in that it 'encourages caution and prudence because the activity will only be allowed to continue if its effects are addressed as they become apparent', but it also carries a higher degree of risk and may be used to water down precautionary measures (Wright, 2011, p.11).

The inclusion of adaptive management in section 61 reflects Parliament's desire to ensure that the precautionary approach does not have a burdensome, chilling effect on economic development (Smith, 2012). By providing decision makers with an alternative to outright refusal, while still giving effect to the precautionary principle, adaptive management assists the government's objective of enabling New Zealand to better 'pick up economic opportunities ... in an environmentally responsible way' (Adams, 2012).

Adaptive management is defined broadly in the EEZ Act. Section 64 provides that an adaptive management approach includes (though it is not limited to):

- 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.

On a plain reading of section 64, it includes – but is not limited to – allowing small-scale or trial activities aimed at monitoring the environmental and other effects of a proposed activity. It also includes allowing an activity to proceed at full capacity, uncertainty notwithstanding, on the basis that such uncertainty might be reduced with careful monitoring, periodic reviews and systematic adjustments.

The broad definition in the act is indicative of the fluid nature of adaptive management as a concept and its wide

The inclusion of adaptive management in section 61 reflects Parliament's desire to ensure that the precautionary approach does not have a burdensome, chilling effect on economic development.

- the environment, and the effect that the activity is having on the environment[, before, during, and/or after the activity has commenced];
- (e) provision for the results of the monitoring to be analysed, and for the consented activity to be adjusted, [conditional on those results]. The intention will generally be that any adjustment can occur before the activity results in irreversible and unacceptable effects on the environment;
- (f) that adjustment will often be formally 'triggered' by quantitative thresholds [or limits];
- (g) the possible adjustments ... will be some combination of the following [three alternatives]:
 - (i) for the consent to be ... cancelled, if pre-commencement monitoring indicates the baseline state of the environment renders the activity inappropriate;

activities in the EEZ. Section 61 of the EEZ Act concerns the information-gathering obligations that burden the EPA when it is considering whether to grant a consent. It requires the EPA to make full use of its powers to obtain information, to base its decisions on the best information available, and to take uncertainty or the inadequacy of available information into account when making its decisions.

Section 61(2) places an additional burden on the EPA, obliging it to 'favour caution and environmental protection' when faced with uncertain or inadequate information. This shifts the decision-making balance in favour of environmental protection where information regarding the effects of an activity is uncertain or inadequate. Although framed in 'undefined legal language', section 61(2) has the effect of encumbering the EPA with an obligation akin to the precautionary approach (Local Government and Environment Committee, 2012, p.9). It is, however,

range of uses (Fabricius and Cundill, 2014). It also recognises the overarching goal of the principle: to reduce information gaps and inform future decision making through knowledge accumulation. The key benefit of the broad definition, along with the obligation contained in section 61, is that it provides the EPA with considerable leeway when ruling on marine consent applications. It can employ adaptive management in any way it sees fit, but must bear in mind that adaptive management 'does not negate the need to exercise caution in situations where there is a threat of serious or irreversible environmental damage occurring'. The Ministry for the Environment has recognised that 'adaptive management cannot compensate for a lack of baseline environmental data or inadequate modelling. In the words of the King Salmon Board of Inquiry, some information gaps cannot "be simply filled by invoking adaptive management"' (Ministry for the Environment, 2016, para 48)

Adaptive management and marine discharge consents

Adaptive management was envisaged as a flexible tool to overcome the uncertainty inherent in marine consent applications. However, a 2013 amendment that prohibits the EPA from considering adaptive management in marine discharge applications has muddied the waters. While adaptive management may still be used for marine consent activities, it is now prohibited for marine discharges and dumping. The conundrum is what to do when a development proposal requires both a marine activity consent and a marine discharge consent.

Section 87F(4) was introduced into the EEZ Act as part of the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Amendment Act 2013 (EEZ Amendment Act). This amendment was part of a wider marine legislation overhaul that sought to transfer regulatory authority from Maritime New Zealand to the EPA (Williamson, 2013). The amendment brought marine discharges and dumping under the ambit of the EEZ Act and introduced an auxiliary purpose to the act, namely 'protecting the

environment from pollution by regulating or prohibiting the discharge of harmful substances and the dumping or incineration of waste or other matter' (EEZ Amendment Act, s7). Consistent with this purpose, it adopted a separate, stricter consenting process with respect to marine discharge and dumping applications, one that explicitly ruled out the use of an adaptive management approach as a response to uncertain or inadequate information (s33). Section 87F(4) provides that if the EPA grants a marine discharge consent, 'it may issue the consent subject to conditions under section 63, but not ... [conditions] that together amount or contribute to an adaptive management approach'.

While commentary on section 87F(4) is limited, this shift in focus can be explained by the political climate at the

When considering marine discharge consent applications, the EPA must therefore be extremely careful to ensure that any conditions imposed fall outside the definition of adaptive management. This is no easy task, noting the broad definition of 'adaptive management approach' in section 64. It is arguable that any effects monitoring that has a bearing on the future continuation, alteration or discontinuation of a discharge activity 'amounts or contributes' to an adaptive management approach and is therefore prohibited.

Adaptive management and TTRL's iron sand mining application

Where consent applications are for activities that are wholly one or other type of consent – i.e., either a marine consent or a marine discharge consent – then

However, a 2013 amendment that prohibits the EPA from considering adaptive management in marine discharge applications has muddied the waters.

time. The amendment act was designed to give effect to international conventions related to dumping of waste, and it followed one of New Zealand's worst marine disasters in recent history, the Rena oil spill. Its spirit reflects a public desire for better protection of New Zealand's marine environment and the exclusive economic zone: 'What New Zealanders want ... is a guarantee from the industry and the Government that we will not see a spill' (Hughes, 2013). Discharges from seabed mining activities were included along with the dumping of other waste, and it is clear that 'Parliament can be assumed to have deliberately chosen to treat all harmful substances ... in a consistent way' (Haden and Randal, 2017). The no-tolerance approach to adaptive management is clear and acknowledges the higher degree of risk associated with marine discharges and dumping.

the task of the EPA is clear. In respect of marine consent applications, adaptive management can be applied broadly, as another string to the EPA's bow. It can implement adaptive management through staged development processes, timed trials, or the imposition of responsive conditions that allow an activity to be amended in light of new information. Whether or not a given condition or set of conditions contribute or amount to adaptive management is relatively unimportant. What is important is responding to risk and uncertainty in a way that is consistent with the purposes of the act.

On the other hand, where marine discharge consents are concerned, it is vital that decision makers demonstrate that any conditions do not resemble adaptive management in name or nature. Thanks to the explicit exclusion of adaptive management in section 87F(4)

of the act and its broad statutory definition, granting discharge consent subject to any conditions that resemble adaptive management risks invalidating the consent (Iorns Magallanes, Stuart and Scott, 2017). The line between general conditions and adaptive management conditions is likely to be a battleground for opposing parties in any marine discharge consent application.

It has certainly been a critical issue at the crux of the application lodged by Trans-Tasman Resources Limited to mine seabed ironsand in the South Taranaki Bight (TTRL, 2016). The proposed activity involves 'vacuuming' ironsand from the seabed of the EEZ, magnetically extracting the iron from the sand on

unconditionally or subject to consent conditions that do not amount or contribute to an adaptive management approach. Unconditional approval is the least likely of these options, particularly in light of the high degree of uncertainty in the marine environment, the novelty of seabed mining, and the uncertain effects of a sediment plume on marine life – e.g. marine mammals and benthic environments (Torres, 2016; Philips, 2017; Barbara, 2017). Some parameters must be placed around the activity to ensure that its effects are not greater than anticipated and that any risks are adequately managed. However, as soon as such parameters are proposed they quickly begin to resemble adaptive

On a plain reading of section 64(2)(b), an adaptive management approach includes any monitoring designed to inform the continuation, amendment or discontinuation of a proposed activity. The EPA may 'read down' this definition to some degree, and the legal advice offered to the decision-making committee has argued that a narrower interpretation might be possible, even if it is not clear on the face of the words (Haden and Randal, 2017). However, the conditions proposed by TTRL tread a very fine line between section 64(2)(b) adaptive management and routine monitoring assessments (Iorns Magallanes, Stuart and Scott, 2017). It is entirely possible, either at the initial consenting stage or on appeal to the courts, that conditions of this nature will be deemed unlawful on the basis that they contravene section 87F(4) of the act.

In order to fall outside the definition in the statute, the monitoring conditions must not be designed with amendment of the development or discharge activities in mind: i.e. they must merely create a benchmark against which to assess conduct and go no further. If the operational and response limits proposed by TTRL are environmental benchmarks, and it is known with a high degree of certainty that no unacceptable effects will occur (i.e. no significant or irreversible effects) within those limits, then they do not contribute to an adaptive management approach (ibid., p.28). No structured learning by doing is taking place and the trigger conditions are simply a routine assessment of the activity against predetermined thresholds – i.e. a safeguard against unlikely events.

However, if the response and operational limits are better interpreted as 'best guesses' – informed on the basis of the best available information but still subject to error – then they may contribute to an adaptive management approach. This is particularly the case if the activity's expansion, contraction or termination is conditional on whether or not those limits are met (Haden and Randal, 2017). According to *Sustain our Sounds v King Salmon* (p.125), where a decision maker is uncertain as to what level of activity can be tolerated by a receiving environment and adopts his or her best guess, in the

On a plain reading of section 64(2)(b), an adaptive management approach includes any monitoring designed to inform the continuation, amendment or discontinuation of a proposed activity.

board a processing vessel and discharging the remaining sediment back into the ocean. Due to the nature of the activity, both a marine consent and a marine discharge consent are required, and one cannot be approved without the other. At the time of writing, the decision-making committee appointed by the EPA had not yet given its verdict on whether to grant consent to TTRL, nor whether such consent would be subject to any conditions. What had been confirmed was that, due to the mixed-nature of the application, the decision-making committee was bound by the more restrictive of the two consenting processes and therefore subject to section 87F(4).³ Consent cannot be granted subject to adaptive management conditions.

This leaves the decision-making committee with few options. It can either decline the application (on the basis that the effects on the marine and existing environment are too severe or too uncertain), or approve the application,

management conditions.

Take, for example, the conditions offered by TTRL in support of its application.⁴ TTRL has proposed conditions that require it to take sediment concentration and quality samples at seven different locations within the receiving environment, and to assess those samples against 'operational' and 'compliance' limits that have been predetermined on the basis of plume modelling and baseline monitoring (Environmental Protection Authority, 2017). It attests that, if sediment concentration or quality limits are exceeded at any point during mining operations, it will take operational action and, if the problem persists, halt mining operations (ibid., p.24). While TTRL claims that these conditions are simply routine safeguards against unlikely effects and do not amount or contribute to adaptive management, this claim is contentious given the broad definition of adaptive management in the EEZ Act.

hope that more might be learnt about the environment, then an adaptive management approach has been undertaken. Taking a calculated risk on the basis that more might be learnt about environmental effects is a way of learning by doing and falls within a section 64(2) (b) definition of adaptive management; this is prohibited in respect of marine discharge consent applications.

It is not the intention of this article to offer an opinion on whether the conditions proposed by TTRL do or do not meet the statutory definition of adaptive management, but rather to demonstrate but one of the murky questions faced by decision makers when confronted with marine discharge consent applications under the EEZ Act. Adaptive management has been defined so broadly in the act that, where it is excluded, decision makers have very limited power to impose consent conditions. Perhaps this limitation is justified given the high-risk nature of marine discharges and dumping, and in light of the 'prevention of pollution' purpose imported by the EEZ Amendment Act. Yet it is doubtful whether the exclusion of a concept so broadly defined in other sections of the act is the best way to achieve such a purpose.

On the one hand, the explicit prohibition of adaptive management may incentivise decision makers to err on the side of caution and decline marine discharge consent applications whenever there is a degree of uncertainty as to the causal effects of a proposal. But, on the other, it may push decision makers to grant consent, subject to dangerously slim and routine conditions, where more robust and adaptable alternatives would have been appropriate. To put decision makers in the awkward position of having to choose between two extremes – outright refusal or approval subject to cursory conditions – is a risky way to engage in sustainable management of natural resources. It also appears

particularly prone to unsubstantiated decision making and judicial challenge.

Conclusion

Adaptive management appears to offer an approach to resource management that takes away the guess work, that allows room for correction and that can be adapted in light of new information. It was argued for by industry submitters and included in the EEZ Act as a way to give effect to the precautionary principle without refusing consent and to enable more flexibility in decision making. Yet it has fallen far from the tree.

In light of the 2013 amendment act, adaptive management is not only excluded from decisions on whether marine

The inclusion of the adaptive management exclusion reflected an underlying intention to be particularly careful with pollutants and other discharges in the EEZ. However, Parliament has eroded the flexibility of decision makers to 'proceed cautiously' when deciding on mixed-nature activities in the EEZ (Harding and Fisher, 1999). The EPA and its appointed decision makers are, effectively, shackled to a broad-brush approach that fails to take into account the subtleties of individual applications. It seems that Parliament did not fully comprehend the effect that so strict an exclusion would have on seabed mining projects.

Whether Parliament will permit

Adaptive management has been defined so broadly in the act that, where it is excluded, decision makers have very little power to impose consent conditions.

dumping or discharging should be permitted (its original intention), but also whenever a broader marine consent application contains a marine discharge component that is inseparable from the application as a whole. As demonstrated by the TTRL consent application, section 87F(4) has the effect of putting decision makers in a tight position whenever they are faced with such an application. They must give full consideration to the benefits of a proposed activity but, as soon as the degree of uncertainty is sufficient to give them pause, there remains little option but to decline the application. While approval may be granted subject to consent conditions, those conditions can do little to address any underlying uncertainty. They must not regulate the course of future conduct or amount to learning by doing.

adaptive management to proceed in this precarious manner remains to be seen. In the meantime, the TTRL application may find its way to the courts, whether the decision-making committee decides to grant the consents or not. It will then fall to the judiciary to provide the final word on how to apply adaptive management in mixed-nature applications in New Zealand's EEZ.

- 1 The United Nations Convention on the Law of the Sea states that a state has special rights regarding the exploration and use of marine resources in the sea zone that stretches from the baseline out to 200 nautical miles from its coast. That zone is called the exclusive economic zone. See United Nations Convention on the Law of the Sea, article 56 for more information.
- 2 *Sustain Our Sounds Incorporated v The New Zealand King Salmon Company Limited and Ors* [2014] NZSC 40 [at 114].
- 3 Minute 28, February 2017, http://www.epa.govt.nz/EEZ/EEZ000011/DMC_Minute_28_Updated_Minute.pdf.
- 4 The authors note that the conditions proposed by TTRL have changed during the application consideration process; the conditions referred to here are those at the time of writing.

References

Adams, A. (2012) 'Exclusive Economic Zone and Continental Shelf (Environmental Effects) Bill – third reading', 28 August, retrieved from <https://www.parliament.nz/en/pb/hansard-debates/rhr/document/50Ha>

nsD_20120828_00000016/exclusive-economic-zone-and-continental-shelf-environmental

- Barbara, M. (2017) 'Primary expert evidence of Dr Gregory Matthew Barbara on marine ecology for fisheries submitters', http://www.epa.govt.nz/EEZ/EEZ000011/Fisheries_Submitters_Greg_Barbara.pdf
- Department of Conservation (2000) *The New Zealand Biodiversity Strategy*, Wellington: Department of Conservation, retrieved from <http://www.doc.govt.nz/Documents/conservation/new-zealand-biodiversity-strategy-2000.pdf>
- Environmental Protection Agency (2017) *Trans-Tasman Resources Limited Offshore Iron Sand Extraction and Processing Project: application for marine consents and marine discharge consents*, EPA conditions report, retrieved from http://www.epa.govt.nz/EEZ/EEZ000011/EPA_Conditions_Report_Final.pdf
- Fabricius, C. and G. Cundill (2014) 'Learning in adaptive management: insights from published practice', *Ecology and Science*, 19 (1), <http://dx.doi.org/10.5751/ES-06263-190129>
- Folke, C., S. Carpenter, B. Walker, M. Scheffer, T. Elmqvist, L. Gunderson and C.S. Holling (2004) 'Regime shifts, resilience, and biodiversity in ecosystem management', *Annual Review of Ecology, Evolution, and Systematics*, 35, pp.557-81, <http://dx.doi.org/10.1146/annurev.ecolsys.35.021103.105711>
- Haden, C. and D. Randal (2017) 'Memorandum of counsel assisting the decision-making committee: response to minute 28', retrieved from http://www.epa.govt.nz/EEZ/EEZ000011/Adaptive_management_Memo_of_counsel_for_Crown.pdf
- Harding, R. and E.C. Fisher (1999) *Perspectives on the Precautionary Principle*, Annandale: Federation Press
- Holling, C.S. (1978) *Adaptive Environmental Assessment and Management*, New York: John Wiley and Sons
- Hughes, G. (2013) 'Exclusive Economic Zone and Continental Shelf (Environmental Effects) Amendment Bill – third readings', 15 October, retrieved from https://www.parliament.nz/en/pb/hansard-debates/rhr/document/50HansD_20131015_00000016/maritime-transport-amendment-bill-exclusive-economic-zone
- Iorns Magallanes, C., T. Stuart and D. Scott (2017) 'Expert Evidence of Catherine Iorns Magallanes, Thomas Stuart and Dale Scott in Support of Te Kaahui O Rauru', retrieved from http://www.epa.govt.nz/EEZ/EEZ000011/Catherine_Iorns_Expert_evidence_in_support_of_Te_Kaahui_O_Rauru.pdf
- Iorns Magallanes, C.J. and G. Severinsen (2015) 'Diving in the deep end: precaution and seabed mining in New Zealand's exclusive economic zone', *New Zealand Journal of Public and International Law*, 13 (1), pp.201-34
- IUCN (2010) 'Guidelines for applying the precautionary principle to biodiversity conservation and natural resource', Gland: International Union for Conservation of Nature
- Local Government and Environment Committee (2012) 'Exclusive Economic Zone and Continental Shelf (Environmental Effects) Bill', retrieved from https://www.parliament.nz/resource/en-NZ/50DBSCH_SCR5471_1/a9b1cb26342dc06ab7e1853a079be6ea25b40bea
- Ministry for the Environment (2016) *New Zealand's Experiences with Adaptive Management for Seabed Mining Projects*, ME 1226, retrieved from <http://www.mfe.govt.nz/sites/default/files/media/Marine/NZ%27s%20experiences%20with%20adaptive%20management.pdf>
- Phillips, N.R. (2017) Statement of evidence by Ngaire Robyn Phillips on behalf of Kiwis against Seabed Mining Incorporated', retrieved from http://www.epa.govt.nz/EEZ/EEZ000011/KASM_and_Greenpeace_Ngaire_Phillips.pdf
- Smith, N. (2012) 'Exclusive Economic Zone and Continental Shelf (Environmental Effects) Bill – in committee', 16 August, retrieved from https://www.parliament.nz/en/pb/hansard-debates/rhr/document/50HansD_20120816_00000020/exclusive-economic-zone-and-continental-shelf-environmental
- Torres, L. (2016) 'Statement of evidence By Dr Leigh Torres on behalf of Kiwis against Seabed Mining Incorporated', retrieved from http://www.epa.govt.nz/EEZ/EEZ000011/KASM_and_greenpeace_Leigh_Torres.pdf
- TTRL (2016) 'Application for a marine consent to undertake a discretionary activity under section 38 of the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012', retrieved from <http://www.epa.govt.nz/EEZ/whats-going-on/current-applications/ttr-2016/application/Pages/application-docs.aspx>
- Williamson, M. (2013) 'Exclusive Economic Zone and Continental Shelf (Environmental Effects) Amendment Bill – third readings', 15 October, retrieved from https://www.parliament.nz/en/pb/hansard-debates/rhr/document/50HansD_20131015_00000016/maritime-transport-amendment-bill-exclusive-economic-zone
- Wright, J. (2011) 'Exclusive Economic Zone and Continental Shelf (Environmental Effects) Bill: submission to the Local Government and Environment Committee', Wellington: Parliamentary Commissioner for the Environment