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NEW ZEALAND INSTITUTE OF ECONOMIC RESEARCH

Proposed new national direction in aquaculture

A preliminary economic analysis

NZIER report to the Ministry for Primary Industries

March 2017

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NZIER was established in 1958.

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Key points

Objectives

This report provides a preliminary estimate of the costs and benefits of the new national direction in aquaculture management.

The new national direction could be through a National Policy Statement (NPS), National Environmental Standard (NES) or some other means of encouraging consistent national action in aquaculture management.

Main findings

The new national direction may provide the key foundation for the development of a durable aquaculture industry in New Zealand. It has potentially multiple benefits:

- **re-consenting gains**. More consistency in rules governing reconsenting and a reduction of regulatory uncertainty across regions may lead to increased investor confidence and streamline the reconsenting processes
- **innovation and R&D**. Over time planning to allow for innovative responses to changes in markets will improve industry flexibility e.g. farming of different species subject to environmental constraints
- **biosecurity**. Having adequate plans in place for biosecurity threats is fundamental to managing aquaculture resources. Mitigating these threats to ensure consistent approaches and adequate standards assists in long term management of the aquaculture resource.

We are assuming that the new national direction will partially reduce uncertainty around council processes. It takes account of reports that:

- suggest asset prices will drop substantially, between 10% and 40%, NZIER (2015)
- regulatory certainty has its limits, Martin Jenkins (2015).

To reflect the potential drop in asset prices we have estimated a reduction in output value of between 1% and 2% (2017-2025) without further national direction. This is at the lower end of the benefits forgone spectrum.[1]

The analysis takes into account that the impact of the new national direction will occur over a number of years, and that the benefits will not be captured immediately. Although the biggest benefit, "reduction in uncertainty" is likely to have an immediate impact on investment decisions i.e. in the form of an announcement effect.

Costs cover plan changes , learning/training, and rejigging council processes.

The table below summarises the estimated impacts of implementing the new national direction. The analysis assumes the initiative takes a number of years to implement. It considers the effect over 20 years, because that is the planning horizon for local government.

The benefits outweigh the costs. These benefits are driven by increased regulatory certainty under proposed reconsenting measures. There are also savings from,

[1] The estimates are conservative given the potential drop in asset prices and the consequent impact on production.

innovation and R&D, and biosecurity initiatives; because of a lack of New Zealand data it is difficult to determine the benefits with great confidence. Therefore, we have set out a range of benefits.

Further, local democracy is likely to suffer from the new national direction and there is some risk that local issues could be under-valued by further nationally determined direction.

Results are sensitive to assumptions. We produced low and high scenarios which indicate that the benefit cost ratio ranges from 15.9 to 20.8.

In the sensitivity analysis, we have halved the certainty benefit. This sees the cost benefit ratio drop to between 9.1 and 11.7. This highlights the crucial assumption that national direction will reduce the uncertainty around council processes and the New Zealand Coastal Policy Statement (NZCPS).

Results

$ millions, 2017

	Low	High	Comment
Costs	2.6	3.9	Administrative costs, plan changes and costs to industry and central government
Benefits	40.6	80.1	Impact of uncertainty and streamlining of rules governing aquaculture
Net benefit	38.1	76.3	
Benefits/cost ratio	15.9	20.8	
Note: Varying the discount rate has little impact on the result. Numbers rounded.			

Source: NZIER

Caveats

Most of the assumptions are derived from the Ministry for Primary Industries, industry publications, and council data. New Zealand data draws on a limited number of local studies and information from stakeholders. An important assumption is that the new national direction will bring clarity to the role of the NZCPS.

A key difficulty is establishing the 'baseline', or what would have happened in the counterfactual i.e. "without" the new national direction. We expect that councils would undertake their own initiatives (on a haphazard basis), so not all costs and all benefits we estimate would come from changing the status quo can be attributed to the national direction.

Furthermore, because of the complexity of the biological systems, it is impossible to calculate the impact of considering innovation and biosecurity initiatives with great accuracy.

We also must stress that there are limitations in the quantified analysis due to the limited information available. The robustness of the analysis is influenced by the potential bias in the information provided and the potential magnitude of unquantified costs and benefits, such as uncertainty about the environmental impacts of the new national direction.

The figures in this report should be regarded as an order of magnitude calculations rather than a definitive measure.

Contents

Appendices

Figures

Tables

1. Introduction

The Ministry for Primary Industries (MPI) and other government agencies (Department of Conservation and Ministry for the Environment) are considering the implementation of the new national direction for aquaculture management.

There are reasons for the proposed intervention. These include:

- the need for more consistent and efficient re-consenting processes given that 60% of farms are due to expire by 2025[2]
- the need to ensure that farms are in the most efficient locations and to take account the surrounding environment and cumulative environmental impacts
- the need to consider long run dynamic efficiency (innovation) that allows for new entrants and new species
- the importance of planning for and making provision for incursions of unwanted disease and other organisms so that their impacts are effectively mitigated against
- the uncertainty generated by current lack of regulatory certainty.

The purpose of this report is to provide a preliminary cost benefit analysis (CBA) of implementing further national direction in aquaculture management.

We have drawn on industry, domestic studies, case studies, information from MPI, councils, perceptions of those involved in aquaculture, and other sources.

The analysis is intended to give policymakers a general indication of the likely costs and benefits to assist in a decision on whether or not to progress the new national direction initiatives.

There remain a number of important uncertainties on costs, impacts, and practical implementation issues. As such, the depth of the CBA reflects the initial scoping nature of the assessment, in line with good policy practice.

[2] Many of the farms due to expire in 2024 are for smaller farms of 1 – 3 hectares.

2. The current situation

This section provides a very brief and high level outline of the current situation associated with the resource management of aquaculture and the aquaculture industry more generally.

Its purpose is to help identify the issues that may need to be addressed and identify the opportunities that the new national direction might assist.

2.1. The regulatory issues

2.1.1. Approaches and alternatives available

The Resource Management Act 1991 (RMA) governs aquaculture activity. The New Zealand Coastal Policy Statement (NZCPS) (2010) requires strategic planning for all activities and uses of the coastal environment including for aquaculture activities. However, it is common practice that individual farms are considered one at a time, on a consent by consent basis, making it difficult to assess and manage the cumulative effects of those farms.

2.1.2. Re-consenting is already underway

Applications by holders of a consent which is due to expire, entitle the holder to continue operating under their current consent until either a new consent is granted and all appeals are determined or a new consent is declined and all appeals are determined (see s124 and s165ZH RMA). The consent authority must have regard to the value of the investment of the existing consent holder (see s104(2A) RMA). Importantly, these rights are limited to applications for the 'same activity' (s124) and 'for the occupation of some or all of the same space' and 'for the same or another aquaculture activity' (s165ZH).

There are approximately 1,900 aquaculture resource consents operating in New Zealand.[3] Nearly two-thirds of these are located in the Marlborough region, while the great bulk of the remaining one-third are located in the Northland, Auckland and Waikato regions.

Approximately 60% of the existing consents are due to expire by 2025.[4] The percentage due to expire by 2025 is primarily the result of licences approved under the Marine Farming Act 1971 or Fisheries Act 1983 being deemed resource consent under the RMA through the 2004 amendments.

Therefore, industry is concerned about the structure and processes of the RMA, particularly the time and cost involved in consenting for an aquaculture activity even in places where it is provided for in the plan.

[3] MPI, 2016, Re-consenting Snapshot. Marine Farming database.

[4] Approximately 53% of area consented is due to expire by 2025.

In Table 1 we have set out the details of the status quo. Re-consenting is focused on Marlborough with 60% cost of re-consenting expected under the status quo.

Some reconsenting has already occurred e.g. approximately 40 farms in the Marlborough district have been reconsented.

Appendix A sets out the current status of plan development in each region.

Table 1 Aquaculture in New Zealand

Region	Northland	Auckland	Waikato	Bay of Plenty	Hawkes' Bay	Wellington	Tasman	Marlborough	Canterbury	West Coast	Southland
Existing Aquaculture Areas											
Consented Inshore and off shore trials[5]	782 ha	364 ha	1,420 ha	10.67 ha	n/a	3.4 ha	6,128 ha	5,911.1 ha	157 ha	45.6 ha	285 ha
Species currently farmed	Oysters, mussels	Oysters, Mussels	Oysters, Mussels	Oysters, Mussels	Mussels	Various species	Mussels, Scallop spats	Oysters, Mussels, Salmon	Mussels, Salmon, Paua, Seaweed	Mussels	Mussels, Salmon
Existing marine farm consents/farms											
No. of consents/farms[1]	157 / 99	85 / 68	309 /270	6 / 6	1 / 1	1/1	71 / 55	1136 / 583	20 / 12	1 / 1	51 / 51
Average size of inshore consent /Size range[3]	4.98 ha / 0.2 ha – 86.2 ha	4.43 ha / 0.7 ha – 76 ha	4.59 ha / 0.05 ha – 54 ha	2.13 ha / 0.03 ha – 4.6 ha	-	3.4 ha	86 ha / 0.99 ha – 534 ha	4.9 ha / 0.06 ha – 769 ha	8.3 ha / 0.9 ha – 25.9 ha	45.6	6.48 ha
Re-consenting activity status[2 4]	Controlled activity for re-consenting, otherwise discretionary	Restricted discretionary, subject to conditions	Controlled and discretionary for re-consenting for existing farms, other activities discretionary	Controlled or restricted discretionary around re-consenting for existing farms, other activities discretionary	Controlled	Controlled	The activity status ranges between controlled and discretionary	The activity status ranges between controlled and discretionary	Discretionary	Discretionary	Discretionary
Costs associated with re-consenting (2024/25)											
Costs under status quo for re-consenting[2 5]	$3.7 m	$5.5 m	$3.9 m	$0.3 m	$0.1 m	-	$1.7 m	$30.6 m	$2.1 m		$2.4 m

Notes (1) There are some discrepancies between the MPI database and the Aquaculture Direct report on consent numbers. However, the impact is relatively small, therefore the Aquaculture Direct calculations made for the cost of re-consenting have not been adjusted (for consistency reasons). (2) Aquaculture Direct, February 2016 and Britton R (2016) and NZIER adjustments. (3) Inshore only. (4) MWH (2016) (5) Numbers rounded.

Source: Aquaculture Direct (2016), Britton R (2016), NZIER, MWH (2016), MPI Marine Farming Database

2.1.3. Varying region-to-region activity status

The activity status of the resource consent applications that will be needed to re-consent the farms varies from region-to-region. Furthermore, all regions are either in the process of reviewing the relevant provisions of their coastal plan, or are expected to do so before 2024. Two regions, Auckland and Bay of Plenty have completed their reviews.

Further some councils believe that they can achieve the objectives of the new national direction within their own jurisdiction without the new national direction occurring. As with other national direction processes, we expect the difference between what is proposed in consultations on the new national direction and what would happen "without" the new national direction to narrow.

2.1.4. Existing national policy and direction

The NZCPS places an emphasis on upfront planning by councils to identify where it is appropriate for aquaculture to be located (Policy 7 and Policy 8 of the NZCPS).

Policy 7 (Strategic Planning) requires consideration of the impacts on the coastal environment and whether the activities are deemed inappropriate or inappropriate without the consideration of effects through a resource consent process.

Policy 7 also requires provisions in plans to manage significant risk from adverse cumulative effects. These plans, where practicable should set thresholds and acceptable limits to change to determine when activities causing adverse cumulative effects are to be avoided.

Policy 8 (Aquaculture), in theory, requires regional plans giving effect to this national direction would need to consider a wide range of factors in determining 'appropriate places' for aquaculture, and in doing so would need to have regard to the cumulative effect of aquaculture in the locations identified as being appropriate.

There are a small number of existing farms which have either been or may be identified as being inappropriate locations for marine farming. As yet mechanisms that provide for these farms to be re-located to appropriate spaces have not been identified.

In Waikato, the regional council is developing guidance on aquaculture monitoring (with funding assistance from MPI – see next section). This is part of a wider long-term project which aims to develop and implement a framework for regional environmental monitoring with particular emphasis on integrating resource consent related monitoring information with broader scale SOE monitoring.

2.1.5. Aquaculture planning fund

MPI has a fund that assists regional councils with the costs of coastal planning for aquaculture developments. The fund criteria are set out on the MPI website.[5] Recent projects include:

- guidance for aquaculture monitoring (Waikato Regional Council)

[5] https://www.mpi.govt.nz/funding-and-programmes/fisheries-and-aquaculture/aquaculture-planning-fund/

- hydrodynamics and ecological modelling (Marlborough Regional Council)
- aquaculture zoning (Southland Regional Council).

Grants from these projects form part of the status quo.

2.2. The industry

The New Zealand aquaculture industry is currently based on farming of three species:

- Greenshell™ Mussels
- Pacific Oysters
- King Salmon.

Aquaculture New Zealand was formed in 2007 as a single industry body representing the aquaculture sector. It brought together the membership of the individual species bodies, the New Zealand Mussel Industry Council, the New Zealand Salmon Famers Association and the New Zealand Oyster Industry Association. The organisation is primarily funded through an industry levy.

In 2015, the aquaculture industry introduced a sustainable management framework as part of a joint effort with government (see Figure 1). Through the framework objectives and standards are set and the industries performance against these is monitored and publicly reported on.

This approach supports the efforts that the new national direction is proposed to address, for example, efforts to support long run innovation and biosecurity initiatives.

One of the main concerns of industry is associated with the uncertainty of re-consenting and the relationship between the proposed national direction and the NZCPS.

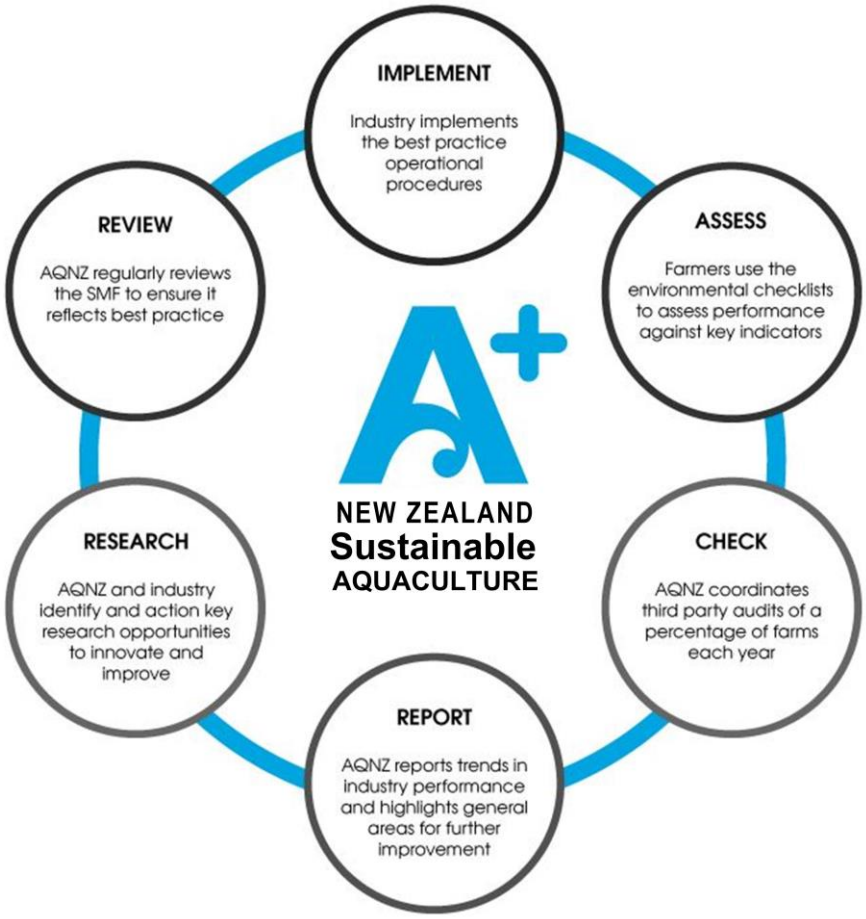
The industry is concerned that decisions such as the *EDS v New Zealand King Salmon* in the Supreme Court have made it more difficult to obtain re-consent. Specifically, marine farmers are concerned about how future re-consenting processes might play out. However, 40 farms have been re-consented in outstanding natural character areas recently.

Underpinning this concern is a perception that apparent increased weight is given to the language in the NZCPS. Specifically, policies:

- 11 (biodiversity)
- 13 (natural character)
- 15 (natural features and landscape);

are strong in terms of protection, preservation and avoiding, remedying or mitigating.

Figure 1 A+ Sustainable Aquaculture framework



Source: Aquaculture New Zealand

Regulatory uncertainty arises in how these protections apply to individual farms which leads to potentially less investment and with a subsequent decrease in production (see NZIER, 2015).

A recent paper commissioned by industry (Aquaculture Direct, 2016) estimates that the cost of re-consenting marine farm consents over the 2024-2025 period nationally under the status quo will be a minimum of $50.0 million.[6]

[6] The peer review (Britton, 2016) suggested improvements to the paper which boosted costs from $42 million to $50.3 million.

3. Opportunities for the proposed national direction

3.1. Re-consenting

3.1.1. More efficient national direction

The number of applications that need to be re-consented by 2025 has put under the spotlight the varying approaches used by regional councils to aquaculture re-consenting.

The new national direction could assist this process by standardising council processes making it more efficient per re-consent for councils, industry and other stakeholders. Because of the significant number of re-consents even small improvements in re-consenting certainty are worth having. It will also have the impact of refocusing councils and industry on other priority issues.

There is good information on re-consenting costs from a report commissioned by Aquaculture New Zealand (Costs of Renewing Marine Farm Resource Consents, Aquaculture Direct, February 2016). Where successful, the assumption is that the new national direction introduces efficiency gains through re-consenting process certainty.

3.1.2. Improving certainty

One of the major issues for industry is improving certainty. Providing further guidance on how aquaculture should be assessed in relation to other uses and values is likely to lead to more re-investment, growth, and a more vibrant industry. This will be a significant improvement over the status quo.

The more certainty that the new national direction can give the aquaculture industry the greater the benefits are to industry, the surrounding region, and to New Zealand.

3.2. Innovation and R&D

Aquaculture innovation and research activities can be grouped into three broad categories:

- changes to existing farms based on species:
  - adding species to farm multiple species in the same space
  - change in species.
- changes to existing farms to increase efficiency and productivity:
  - changes to structures
  - different growing techniques, such as increasing stocking densities, new technology, new additives, different timeframes for certain activities.

The benefits for the first two categories will have shorter term economic effects for the farmer. The purpose of a farmer either changing the species being farmed or changing farming methodology and practice is to increase the output from the farm and therefore increase revenue.

3.3. Biosecurity

Biosecurity protections are important for all land and sea based farming.

Prudent protections are important despite current low threat levels.[7] Further improvements to the biosecurity system as part of an on-going long term programme of biosecurity management supported by the new national direction is required to safeguard the industry and mitigate against the worst aspect of an incursion.

Any new national direction on biosecurity must be based on risk – ensuring that regulation does not impose costs that are out of all proportion to the benefits.

[7] The mortality rates associated with the oyster herpes outbreak in 2010/11 illustrate the biosecurity threat.

4. Costs and benefits of adopting the new national direction

We have used a cost benefit framework to examine the value of the new national direction in aquaculture.

CBA is a long-established technique intended to identify the economic efficiency of a proposed project or policy change. Efficiency is broadly about maximising outputs obtained from available inputs, but there are different variants used in economics:

- **technical efficiency** refers to the most cost-effective way of providing a given service, for instance, reducing the cost of a re-consent per farm (or per bay)
- **allocative efficiency** refers to the ease with which resources can move from one species to another, if scientifically/environmental practicable, as world prices change over time, or from one location to another in the face of climatic or other environmental change
- **dynamic efficiency** refers to innovation and changing to new activities over time.

If the introduction of the new national direction can reduce the community-wide costs of aquaculture management, it will improve technical efficiency. To the extent that it shifts resources from one less productive activity to a more productive activity, it also improves the allocative efficiency of resource use. If it also allows new, more efficient ways and locations for aquaculture it also improves dynamic efficiency over time.

A cost benefit analysis proceeds by comparing effects and outcomes associated with the new national direction against what would have occurred under a counterfactual, without the proposed change. This counterfactual can be described as a projection of the status quo into the future as supply and demand conditions change.

4.1. The counterfactual

Setting up the counterfactual is difficult because there is:

- limited baseline data from which to measure any change (particularly for innovation, and biosecurity)
- uncertainty about what councils (and other parties) are likely to do in the absence of the introduction of the new national direction
- uncertainty about the impact of initiatives that would emerge without the new national direction.

Therefore, there are potentially a number of credible counterfactuals. The one we assume here is open to question, and should be treated as "work in progress". **We treat the counterfactual here as a tentative "peg in the ground".**

We assume that, if no new national direction was in place, councils will proceed with their own approaches to aquaculture. This may include some elements suggested by the new national direction. We expect that:

- some councils will continue to evolve their current systems
- compared to implementing the new national direction council-led approaches are likely to be:
  - more expensive for industry increasing uncertainty
  - stand-alone and configured differently region-to-region
  - take limited account of central government objectives for aquaculture growth.

At the same time a locally-centric approach does have the benefits of more closely representing local interests, allowing local solutions to match the local situation, however it may not assist in reducing re-consenting costs, biosecurity, or long term innovation.

Regardless, under the counterfactual, councils are going to continue approaches that manage aquaculture. They will also incur costs of investing and running the associated systems and processes.

4.2. Qualitative assessment of the new national direction proposal

This is a 'partial' cost benefit analysis in the sense that some effects will be too difficult to reliably quantify. For instance, it may well be that there is a benefit to society from more efficient management of aquaculture farms. While we can identify these benefits, it is not feasible to value them in economic terms, given time and resources.

For practical reasons the analysis has concentrated on quantifying effects that are readily quantified and valued, and describe in a qualitative way the effects that cannot be readily quantified or valued.

From the feedback from various entities including Aquaculture New Zealand, MPI, and councils, costs and benefits have been identified that need to be considered in the CBA, whether they can be quantified or not. Six groups are important:

- **the industry**. Aquaculture has been a growing vibrant industry. Industry will be a beneficiary of the new national direction through a more efficient re-consenting regime and improved certainty for investment
- **other industries/users of marine space** – tourism (including cruise ships), commercial shipping/ferries, commercial fishing, etc. – in some cases these users have the potential to be more limiting in terms of re-consenting than the regulatory environment
- **councils**. Councils will be given more guidance on the management approaches to aquaculture. There will be benefits in terms of more streamlined processes but also costs such as learning new management approaches and a loss of local discretion and democracy (because of the new national direction)

- **community groups**. There are costs and benefits for the local community. Improved certainty and reduced re-consenting costs are likely to maintain and even increase job opportunities while local democracy is likely to suffer from the new national direction and there is some risk that genuine local issues could be under-valued by nationally determined direction
- **environmental groups**. Increased adverse effects on important values may be opposed by environmental groups, however improved biosecurity management may assist in further understanding and better management of the impact of aquaculture farming on those values.
- **iwi**. There are a mixture of costs and benefits likely from the new national direction. More chances are likely for iwi new entrants and improved job prospects are likely in regional New Zealand from aquaculture. This is likely to benefit iwi more so than other groups. However, the new national direction does restrict local autonomy and rule setting.

5. Costs and benefits of the new national direction

We have focused on the costs and benefits associated with the proposed national direction. In this way, stakeholders receive a "big picture" view of the likely costs and benefits.

We have divided the costs and benefits into four areas where the new national direction aims to have an impact:

- re-consenting
- innovation and R&D
- biosecurity.

5.1. The new national direction costs

Assumptions have been made to assist in developing additional national costs (over and above those that would not have occurred in the status quo). These include:

- costs are incurred at the time that the national direction is put place – there will also be on-going costs associated with implementing national direction, both at the national and local level – there may also be costs associated with judicial review, depending how national direction is implemented.
- we use a discount rate of 8%, in line with standard Treasury guidance
- a 20-year planning horizon is used to reflect the long-term approach required for aquaculture management.

In each case, the main driver of costs has been assumed to be the changes associated with re-consenting and the adjustments that need to be made by councils, industry, communities, environmental groups and iwi.

Table 2 sets out the costs of the new national direction. The costs of maintaining the status quo have been estimated at $50.3m for re-consenting (Aquaculture New Zealand, 2016, and adjusted for comments made by Britton, 2016)

In general, we have good information on re-consenting costs through various research reports and databases. The main costs associated with re-consenting are those associated with council plan changes. These are expected to take place over a 7-year period starting in 2019. These costs will vary from council to council which are at different stages through their plan changes. The total cost is likely to be between $1.0 million and $2.5 million in 2016 dollars.

Other costs include administrative costs in shifting farms, learning required by councils, and central government costs.

A further cost will be the increase in environmental monitoring of biosecurity. This will vary between councils but is expected to increase nationally by $210,000 in 2017 dollars.

In areas where aquaculture farms are situated near areas of significant landscapes further assessments will be required. Nationally costs are expected to be nearly $720,000.

The costs associated with introducing the new national direction are relatively small compared to the potential gains and are to do with changing council processes, administrative costs of shifting farms, and central government costs of introducing the new national direction.

In the Table below costs are averaged across the whole country. While in some areas the costs will not change much (Northland), in other areas they are likely to be more significant particularly in South Island jurisdictions.

Table 2 Additional costs associated with the new national direction

2017 dollars, Present value 8%

Status quo	Re-consenting	Innovation and R&D	Biosecurity	Summary of costs with the new national direction
$50.3 million	$1m – $2.5m	Small cost	Small cost	**$2.6 - $3.9m**

Source: NZIER

5.2. Benefits

5.2.1. Re-consenting

The two main benefits[8] from re-consenting are:

- a small to medium benefit associated with streamlining re-consenting processes
- a large benefit associated with reducing regulatory uncertainty.

The benefits of streamlining re-consenting processes are around a reduction in council2 processes, a reduced number of hearings, and a reduced number of Environment Court appeals.

New national direction will improve consistency of process and reduce ambiguity thereby reducing hearings and appeals to the Environment Court.

By far the most important benefit will be the reduction in uncertainty within the aquaculture industry. NZIER (2015) has already suggested that investors in New Zealand marine farms are beginning to respond to re-consenting risk by reducing their exposure to the industry. As uncertainty increases, the price that an investor is willing to pay for an asset (such as a marine farm) falls. The size of the decline ranges between

[8] It is difficult to pin down the size of the (large) uncertainty and the exact causes of the uncertainty since we have not surveyed industry in a way that we could cross check survey answers to ensure a consistent result. NZIER (2015) builds an uncertainty case around the lower than expected growth, the costs of obtaining consents, and risks around the re-consenting process. It also mentions the King Salmon case where investors spent a considerable sum of money with still no clarity on whether a consent would be granted. Therefore, it is not one thing that has created uncertainty, it is a combination of factors which concern the industry.

10% and 40%, indicating that regulatory uncertainty has a very large impact on the value of an investment.

Specifically, regulatory uncertainty led to:

- an increase in the risk premium an investor requires
- delays in the timeframe of when an investment is able to be executed
- reduction in the growth outlook for the business.

As a measure of uncertainty, production industry forecasts through time have not lived up to expectations. In 2010, NZIER calculated that the net economic benefit of aquaculture could be as much as $1,000 million by 2025. The forecast increase in production has not yet occurred and partly reflects the fact that the number of new consents (particularly for salmon farms) under current regulations have fallen well short of expectations.

A reduced number of consents or extended timeframes required to gain consents can have major economic impacts.[9] Even small reductions in expected production have large impacts.

To illustrate the benefit foregone we have used figures of 1% and 2% of future production (between 2017 and 2025) to show the size of the economic benefit that could be lost because of regulatory uncertainty.

We stress that this is expected to be at the lower end of the benefits forgone under the current situation.

5.2.2. Innovation and R&D

The immediate impact of the new national direction on innovation and R&D is relatively small. However, for the long-term health of the industry, innovation in the form of being able to change species (subject to environmental constraints), encourage new entrants, and allow industry flexibility in its farming operations will be crucial to the industries long term survival and growth.

5.2.3. Biosecurity

Making adequate provision for biosecurity is an important part of the new national direction. While the benefit is relatively small since in the status quo industry has taken the initiative through its Sustainable Aquaculture Framework (see Figure 1), government has some responsibility to safeguard not only the industry but other marine life.

The new national direction is beneficial if it can overcome a market failure or information failure that is causing sub-optimal responses in local institutions, or if it can provide a degree of co-ordination and consistency that improves the effectiveness of biosecurity measures. Government may be better placed through the new national direction to ensure that at least standards are set out that are consistent and provide for adequate protection.

[9] In the short term this is alleviated by the old consent being operational until decisions are made on the new consent. However, when it comes to plans to expand or introduce new technologies/techniques these decisions are put on hold.

For example, if the new national direction could prevent or mitigate the costs of a biosecurity incursion such as the oyster herpes virus in 10 years' time, the present value of avoiding that incursion is approximately $6.4 million. While we have not used this in the analysis it does demonstrate the importance rules in place that can cope with biosecurity incursions.

5.2.4. Summary of benefits

The benefits are set out in Table 3.

Table 3 Benefits associated with the new national direction

2017 dollars, Present value 8%

Re-consenting	Innovation and R&D	Biosecurity	Summary of costs with the new national direction
Large benefit between $40m - $80m	Initial small benefit but improves flexibility and becomes more important over time	Initially a small benefit but becomes more important over time	**Large benefit: Between $40m and $80m**

Source NZIER

5.2.5. Environmental and other impacts

Table 4 sets out the environmental and other impacts of the status quo and the new national direction. Other impacts include relative magnitude of impact, duration of effect and level of knowledge.

Knowledge of environmental impacts are less well known.

The new national direction also means that groups concerned about shaping distinct local responses to aquaculture farming activity will be constrained to a degree. This is because the new national direction is more about national objectives and priorities. These priorities can sometimes cut across local autonomy and cost.[10]

[10] This isn't just a question of autonomy and "voice", but whether application of the new national direction imposes real cost in particular local conditions. Until the specific detail of the new national direction becomes available it is hard to know it if will impose costs.

Table 4 Environmental and other impacts

Category	Environmental impact	Relative magnitude of impact	Duration of effect	Level of knowledge
Status quo	Not yet determined, difficult to determine impact of individual farms	Not determined	Focused on re-consenting in 2024/25	Less knowledge is available
The new national direction				
Re-consenting	Not known	Local community losses some autonomy	Focused on re-consenting in 2024/25	Less understanding of environmental impacts
Innovation and R&D	Not known	Small impact	Long term focus	Increases flexibility
Biosecurity	Helps mitigate against invasive pests and diseases	Small impact, but becomes larger over timer	Long term focus	Attempts to future proof industry development
Total impact of national direction	**Yet to be determined.**	**Communities loss some autonomy**	**Long term focus**	**Patchy: good knowledge on innovation, and biosecurity and less understanding of environmental impacts. Builds a coherent approach to environmental monitoring**

Source: NZIER

5.3. Results

The section above has indicated the basis on which the CBA has been developed. The results are summarised below. On the basis of the central "typical" assumptions, the quantified analysis returns a net benefit.

However, the robustness and representativeness of the analysis is influenced by:

- gaps in, and uncertainty about applicability of, the literature
- any bias and errors in information provided by experts[11]
- the potential magnitude of unquantified costs and benefits, such as costs associated with local autonomy and impact on environment of national direction.

Table 5 Results

$ millions, 2017

	Low	High	Comment
Costs	2.6	3.9	Administrative costs, plan changes and costs to industry and central government
Benefits	40.6	80.1	Impact of uncertainty and streamlining of rules governing aquaculture
Net benefit	38.0	76.3	
Benefits/cost ratio	15.9	20.8	
Note: Varying the discount rate has little impact on the result. Numbers rounded.			

Source: NZIER

5.4. Sensitivity analysis

We tested the sensitivity of results to key assumptions, drawing on ranges found in the literature or suggested to us by sector experts. We focused on the benefits, since they are large and the costs much smaller.

The sensitivity analysis highlights that the results are particularly sensitive to assumptions around uncertainty. This is not surprising since the risks around a concentrated re-consenting process in 2024/25 are relatively high.

[11] To try and avoid bias and errors we asked a standard set of questions of each interviewee and where possible cross-checked answers with different sources.

By reducing all benefits by 25%, we estimate the cost benefit ratio to be between 12.0 and 15.6. This is because of the significant benefits around certainty and streamlining re-consenting processes under national direction.

By halving the certainty benefit, the cost benefit ratio drops to between 9.1 and 11.7. This highlights the crucial assumption that the national direction will address the uncertainty around council processes and the NZCPS.[12]

Table 6 Sensitivity analysis

PV 8% 2017 dollars

	Scenario 1: Reducing the benefits by 25%	Scenario 2: Halving the certainty benefit	Comment
Costs	2.6m/3.9m	2.6m/3.9m	unchanged
Benefits	30.5m/60.1m	23.2m/45.3m	
Net Benefit	27.9m/56.3m	20.6m/41.4m	
Cost benefit ratio	12.0/15.6	9.1/11.7	This highlights the importance of certainty This highlights the importance of certainty
Note: Numbers rounded.			

Source: NZIER

[12] There are other techniques we could use once we have more detail on the form of national direction i.e. we could calculate how much of the assumed benefit could be lost before the BCR drops to a more doubtful outcome – e.g. given uncertainty, you may want a BCR of 4, which would imply just 37% of the "low assumed benefits" above would suffice. Further, we could test a particular assumption e.g. reducing uncertainty and verify the scale against other examples of uncertainty reduction observed elsewhere.

6. Conclusions

Of the components that could be quantified, results suggest that benefits outweigh the costs.

The principal parts of the analysis are the:

- decreased re-consenting costs
- decrease in uncertainty associated with re-consenting
- increased costs associated with administering national direction
- importance of future-proofing the industry with elements of national direction specifically targeting biosecurity and the ability to innovate.

We must stress that there are limitations in the quantified analysis due to the information available on different aspects. The robustness of the analysis is influenced by the potential bias in the information provided and the potential magnitude of unquantified costs and benefits, such as uncertainty about the environmental impacts of national direction.

The figures in this report should be regarded as an order of magnitude calculation rather than a definitive measure.

7. References

Aquaculture Direct (2016) Costs of Renewing Marine Farm Resource Consents. Report prepared for Aquaculture New Zealand, February 2016.

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Martin Jenkins (2015) Supporting Aquaculture Growth: Issues and Opportunities. August 2015.

MWH (2016) Addendum to Plan Readiness Report. Prepared for the Ministry for Primary Industries. August 2016.

NZIER (2015) NZIER overview of the impacts of re-consenting uncertainty and delay on aquaculture investment in New Zealand. Memo to Aquaculture New Zealand.

Appendix A Current plan status

Council	Current status
Northland **RCP operative 2004**	Draft single regional plan was released for non-statutory public feedback in August 2016. Proposed regional plan scheduled to be publicly notified in August 2017.
Auckland **RP:C operative 2004**	Proposed Unitary Plan notified September 2013. Most coastal topics went to hearings in April 2015 (in front of Independent Hearings Panel). Rezoning and precincts going to hearing Feb 2016. Independent Hearings Panel released recommendations in July 2016. Council released decisions on 19 August 2016.
Waikato **Operative 2005**	Review has commenced with project planning and issue scoping underway. The review will consist of several stages that will ultimately produce a single combined plan (currently we have a regional coastal plan and a regional plan). Stage one of the review will consist of most of the coastal plan (except the water quality provisions). Notification of a proposed plan for submissions is expected in 2018.
Bay of Plenty **Operative 2003**	Decisions on the Bay of Plenty Proposed Regional Coastal Environment Plan were notified 1 September 2015. 16 appeals were received. Mediation started in February and is ongoing.
Hawkes Bay **2nd gen RCEP operative 2014**	RCEP (covering CMA and wider coastal environment) was notified Aug 2006 and became operative Nov 2014 (after delays getting MCon approval). Gap analysis of RCEP compared to NZCPS 2010 undertaken by Rob van Voorthuysen in 2014. 2015-25 LTP timetables RCEP review/changes to commence in 2020-21 period as priorities remain land and freshwater matters and RCEP not considered terribly broken to warrant higher priority. Actual notification timeframes for any subsequent PCs is unspecified in LTP. Some issue-specific issues may arise and require amendments to RCEP from time to time ahead of full RCEP review programme. For example, revised coastal hazard zones and associated policy response following development of non-statutory coastal hazards management strategy (refer www.hbhazards.co.nz)
Greater Wellington **RCP operative 2000**	Our operative five regional plans have been integrated into one Proposed Natural Resources Plan (which also incorporates the regional coastal plan). Submissions and further submissions have been received and pre-hearing meetings are being determined. Hearings are scheduled for early-mid 2017. The PNRP can be viewed here http://www.gw.govt.nz/proposed-natural-resources-plan/

Council	Current status
Tasman **RMP operative 2011**	Rolling review for all planning documents. Council will initiate a scoping exercise looking at the structure, e-plans etc. within the year. Currently preparing plan changes for coastal occupation charges and moorings. A private plan change regarding aquaculture spat catching sites at Wainui Bay is underway (hearings were held in August). Further plan review on aquaculture provisions not likely until 2021 at earliest.
Marlborough **MSRMP operative 2003**	The Marlborough Environment Plan (combined RPS and resource management plan) was notified in June 2016, submissions are due in September 2016. The aquaculture provisions were not notified as part of the process. A separate review will occur for these, preceded by intensive stakeholder engagement through a working group – this will begin in September 2016, likely with a view to getting notified plan provisions at some point in 2017.
Canterbury **RCEP operative 2005**	An RMA section 35 evaluation of the operative Regional Coastal Environment Plan has commenced and was due to be completed by 30 June 2016. New plan likely to be ready for notification in 2017/18
West Coast **RCP operative 2001**	The Proposed Coastal Plan was notified for submissions on 25 January 2016. Submissions closed 21 March 2016. 26 submissions were received. Staff are preparing the Summary of Submissions.
Southland **RCP operative 2007**	Full review of Coastal Plan awaiting national direction on aquaculture. Some scoping work will be started as other priorities allow. Expected to commence review of coastal plan in 2019.

Source: MPI