STATEMENT OF EVIDENCE BY KEVIN COUNSELL FOR ENVIRONMENTAL DEFENCE SOCIETY INCORPORATED IN RESPECT OF SUBMISSION ON MINSTRY OF PRIMARY INDISTRIES POTENTIAL RELOCATION OF KING SALMON LTD SALMON FARMS IN THE MARLBOROUGH SOUNDS (ECONOMICS)

2 MAY 2017

Introduction

1. My name is Kevin Counsell. I am a Senior Consultant at NERA Economic Consulting Limited in Wellington, part of a global economics consulting firm. I have a Master's degree in economics (with Distinction), an Honours degree in economics (First Class), and an undergraduate degree in Mathematics, all from Victoria University of Wellington. Of relevance to the issues arising in the present proceedings, my experience includes having undertaken economic analysis of resource management decisions, including assessing economic benefits.

2. I have been asked by the Environmental Defence Society Inc (**EDS**) to review and comment on:

   - The economic report (**Report**) prepared by Pricewaterhouse Coopers (**PWC**) in support of the Ministry of Primary Industries' proposal to relocate King Salmon Farm Ltd owned and operated salmon farms in the Marlborough Sounds (**Proposal**).

   - Inferences drawn from the Report and relied on in the Ministry of Primary Industries (**MPI**) Proposal Discussion Document.

Code of Conduct

3. I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 and that I agree to comply with it. I further confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that this evidence is within my area of expertise, except where I state that I am relying on the evidence of another person.

Summary

4. A summary of my evidence was filed on 27 March 2017. This statement expands on that summary. Issues addressed are:

   - Caucus.

   - The Report's analysis is not a measure of 'economic benefit'.

- How net 'economic benefit' should be measured.
- A conceptual assessment of the net 'economic benefits' of the Proposal.

Caucus

5. Expert caucusing has been directed. The Panel has requested each expert prepare a document prior to caucus identifying:

   - Points of agreement with other experts.
   - Points of disagreement with other experts.
   - Why the panel should prefer my expert opinion/that of experts sharing my opinion.

6. Those points are covered in this statement. For convenience, bullet point, summarised response is provided in **Attachment A**.

The Report's analysis is not a measure of 'economic benefits'

7. The Report uses an economic methodology known as "input-output" (**IO**) analysis (also known as "economic impact analysis") to estimate the economic impacts of the Proposal on the Nelson and Marlborough regions.

8. The Report's analysis determines New Zealand King Salmon Ltd's (**NZKS**) operational and capital expenditure in the 2 regions associated with the relocated farms. In doing this it splits out the "value add" component of this expenditure. For a given expenditure category, value add is the total expenditure less the value of the intermediate inputs used.

9. The Report calculates the aggregate value add, which it reports as the "direct economic impact"[1] of the Proposal.

10. Using multipliers, the Report then scales up the direct economic impact to also capture "indirect economic impacts"[2], reflecting the impact that NZKS's expenditure has on its upstream suppliers.

[1] The Report defines the direct economic impact/effect as the impact on value add in the sector being studied (p.16).

11. The Report shows the total direct and indirect economic impact (or value add) as equivalent to the impact that NZKS's expenditure from the Proposal would have on Gross Domestic Product (**GDP**) in the 2 regions.[3]

12. Using this methodology, the Report finds that:

- Relocating 6 salmon farm sites would add approximately $49m per annum to GDP in Nelson and Marlborough.

- Construction of each site would add approximately $3.2m as a one-off increase in GDP.[4]

In contrast, if the salmon farm sites were not relocated and NZKS was required to implement the Bethnic Guidelines at the existing sites, the Report finds that this would add between approximately $8.2m to $18m per annum to GDP in Nelson and Marlborough.[5]

13. In the Proposal Discussion Document MPI has attributed these additions to regional GDP[6] as "economic benefits".[7] For example, MPI states that the relocation "would have economic benefits" and "would maintain or increase the economic benefits from salmon farming".[8]

14. Consideration of economic benefits is consistent with the Government's policy for aquaculture. As MPI reports, that policy is:[9]

> *(i) To recognise the significant existing and potential contribution of aquaculture to the social, economic and cultural well-being of people and communities by:*

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[2] The Report defines the indirect economic impact/effect as the impact on value add in sectors that are upstream, downstream or supporting the sector being studied (p.16).

[3] Report, p.16.

[4] See page 46 of the Report, albeit that the results reported there cover nine sites. The $49m and $3.2m figures noted are as reported in the Proposal Discussion Document for 6 sites, at section 7.2.1.

[5] Report, p.6.

[6] Regional GDP capturing both Nelson and Marlborough.

[7] I note that PWC itself only refers to its results as "economic benefits" once in the Report (at page 52), instead referring mostly to the results as economic impacts. However, as I point out below, a later report by PWC does more explicitly refer to changes in GDP as "economic benefits".

[8] Proposal Discussion Document, at section 7.2 and section 1 respectively.

[9] *Ibid.*, at section 3.1.1, emphasis added.

…

*b. Taking account of the social and **economic benefits** of aquaculture, including any available assessments of national and regional **economic benefits**…*
(**emphasis** added)

15. To be clear, my concern in the forthcoming discussion is in respect of MPI's interpretation of the Report's results as economic benefits, in the context of the need to take account of economic benefits for government aquaculture policy. In its supplementary submission of 11 April 2017, filed in response to my 27 March 2017 summary statement, PWC states that my summary statement "is premised on an interpretation that the PwC report's results are intended to show economic benefits, not impacts".[10] This is not correct. Rather, my point is that it is MPI that has interpreted the Report's results as "economic benefits", when (as PWC acknowledges[11]) they are "economic impacts". I do note, however, that later in its 11 April 2017 report, PWC does interpret GDP impacts as "economic benefits".[12] I elaborate on these issues below.

16. It is important to note that the Proposal Discussion Document refers only to economic benefits. There is no mention of costs. This is a significant omission. In my opinion it is the **net** economic benefits that matter (i.e., gross benefits net of costs). To consider only gross benefits will likely lead to perverse outcomes. For example, an action that costs $1m but yields a gross benefit of only $1 would be considered a desirable outcome. Accordingly, I proceed on the basis that it is net economic benefits that matter in assessing the Proposal.

17. Moreover, as I will discuss below, net economic benefits encompass a broader set of effects than just those that might be considered "market" benefits or costs.[13]

18. Even if the assessment were restricted to considering market effects the Report's IO analysis is not a correct measure of the net economic benefit of the Proposal. This is

[10] "Marlborough Salmon Relocation: review of economic submissions", letter dated 11 April 2017 from PWC to MPI, at p.3.

[11] *Ibid.*, at p.3, stating "the purpose of the PwC assessment is to measure the impacts".

[12] PWC, "Review of the McGuinness Institute report on New Zealand King Salmon: An economic and financial perspective", April 2017, referring to "economic benefits" as changes in regional GDP and employment (p.14) and stating that impacts on GDP and employment "means more economic benefits through greater production and employment within the BMP guidelines" (p.15).

[13] "Market" benefits and costs might be those benefits and costs that can be assessed through market transactions.

because the IO analysis measures only the economic **impacts** of the relocation on the Nelson and Marlborough regions. This is different from a measure of the net economic benefits.

19. The Report's IO analysis is intended to estimate the impact of the Proposal on regional GDP. GDP is a measure of the output of goods and services produced by an economy.[14] It can be calculated as the total value of final goods and services produced, less the value of any intermediate goods and services used in the production process.[15] This is known as the "production approach" to calculating GDP. Alternatively (and, in theory, equivalently), GDP can be calculated using the "income approach", as the total income received by inputs that are used in the production process: wages and salaries are the returns for labour inputs; interest is the return for capital inputs; rent is the return for land inputs; and profits are the returns to entrepreneurial inputs.[16]

20. Changes in GDP are not the same as net economic benefits. This is because an increase in production that brings about a rise in GDP will often require the application of additional inputs, such as labour and capital. These additional inputs will have a cost, being their "opportunity cost": the foregone value that could have been received from otherwise applying the inputs to an alternative activity.

21. In particular, when inputs would otherwise not be idle, underemployed or unemployed absent their application to a particular activity, then there is a positive opportunity cost from applying them to that activity.[17] This can be thought of as a "crowding out" effect – the cost of applying labour and capital inputs (for example) to a particular activity crowds out the value that could be received from applying these inputs elsewhere in the economy.

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[14] Statistics New Zealand (2014), "Quarterly gross domestic product: Sources and methods", fourth edition.

[15] *Ibid.*

[16] Australian Bureau of Statistics (2015), *Australian System of National Accounts: Concepts, Sources and Methods*, ABS Catalogue No. 5216.0.

[17] In fact, even when resources are unemployed there will still be some opportunity cost from applying those resources to a productive use. For example, in the case of labour, the opportunity cost of employing labour that would otherwise be unemployed is the lost value of the leisure time and other non-market opportunities. See E. J. Mishan (1976), *Elements of Cost-Benefit Analysis*, George Allen and Unwin: London, at p.57; and New Zealand Treasury (2015), "Guide to Social Cost Benefit Analysis", July, at paragraph 55.

22. Measures of GDP do not subtract[18] the opportunity cost of inputs such as labour and capital. This can be seen from the GDP calculation approaches referred to above: the production approach only subtracts the value of intermediate goods and services (and not the cost of inputs such as labour or capital); while the income approach explicitly adds the returns to inputs such as labour and capital.

23. To illustrate these GDP calculations further, Samuelson and Nordhaus (2001) give the simple example of GDP for a "barbershop economy", where a barber earns $80 from haircuts and has no other costs. Here GDP under the production approach is $80 (the total value of haircuts provided). This is the same as the barber's earnings (wages and profits) of $80, which is GDP using the income approach.[19]

24. However, it can be seen that these calculations do not account for the opportunity cost of the barber's labour. For example, if the barber could have earned $60 from applying his labour in an alternative role, then the net benefit to the barber from providing haircuts would be $20. The calculations of GDP above also ignore any net benefits that consumers enjoy from receiving haircuts, as I will discuss in more detail below.

25. What this means for the Report's IO analysis is that while the analysis identifies the impacts on GDP from the Proposal, it does not account for the additional costs of using inputs such as labour and capital to produce those impacts. The IO analysis does not tell us whether the impacts on GDP produce a benefit over and above these costs. Accordingly, the Report's analysis is not a correct measure of the net economic benefits of the Proposal.

26. The inability of IO analysis to measure net economic benefits has been identified by New Zealand Treasury:[20]

> *"Economic Impact Analysis (EIA) differs from CBA [cost benefit analysis] in that it measures the economic impact of a project, that is to say the activity generated,* ***rather than the net benefit created****. Because it measures the activity generated, it treats costs as a benefit. Using an extreme example, if a project involved*

[18] Or, as also described by economists, does not "net off" the opportunity costs of inputs.

[19] Paul A. Samuelson and William D. Nordhaus (2001), *Macroeconomics*, Seventeenth Edition, McGraw-Hill, at p.90.

[20] New Zealand Treasury (2015), "Guide to Social Cost Benefit Analysis", July, at paragraph [242], emphasis added.

digging a hole in the ground and filling it in again, then the expenditure on labour employed would [under EIA] be treated as a contribution to the economy and therefore as a benefit. The cost would be ignored".

27. Other government agencies in New Zealand and overseas have also identified this distinction. For example, the Ministry of Business, Innovation and Employment,[21] and the US Environmental Protection Agency.[22] I also understand that MPI, in a recent peer review of an IO analysis for recreational fisheries, has recognised that economic impacts differ from economic benefits, and that policy should not be based on the former.[23] That recognition does not appear to have been followed through by MPI in the Proposal Discussion Document.

28. Economics literature makes similar criticisms of the IO analysis approach. For example, Dwyer, Forsyth and Spurr (2006) state:[24,25]

Economic impacts, such as the change in GDP resulting from an event, are not the same thing as the economic benefits which arise. The impact on GDP is a gross measure of the change in value of output as a result of an event. This addition to output normally requires additional inputs, of land, labour and capital, to enable it to be produced. These inputs have a cost, and this cost must be deducted from

[21] MBIE states that economic impact analyses for major events "do not fully account for the costs associated with hosting events, meaning EIA's only represent the positive gains in terms of output, income and employment generation". MBIE (2013), "Post-Event Economic Evaluation Guidelines", Final draft for feedback, at p.3.

[22] The US EPA states that "Conceptually, the social cost of a regulation is generally not the same as a change in gross domestic product (GDP), or any other broad measure of economic activity, that may result from its imposition". US EPA (2010), "Guidelines for Preparing Economic Analyses", December 17 (updated May 2014), at p.8-2.

[23] As reported by Eric Crampton, "The true value of recreational fishing", available at: https://www.newsroom.co.nz/@environment/2017/03/22/16097/the-true-value-of-recreational-fishing, accessed 24 March 2017.

[24] Larry Dwyer, Peter Forsyth and Ray Spurr (2006), "Economic evaluation of special events", in Larry Dwyer and Peter Forsyth (eds.), *International Handbook of the Economics of Tourism*, Edward Elgar: Cheltenham, UK, at p.335.

[25] See also Kesenne (2012, p.271), noting that economic impact analysis "does not tell us which flow is a cost and which flow is a benefit" (Stefan Kesenne (2012), "The economic impact, costs and benefits of the FIFA World Cup and the Olympic Games: who wins, who loses?", in Wolfgang Maennig and Andrew Zimbalist (eds.), *International Handbook of the Economics of Mega Sporting Events*, Edward Elgar: Cheltenham, UK); Abelson (2011, p.58), who states that "[g]ross output or consumption is a poor measure of welfare [net benefits] because it assumes that labour has zero cost" (Peter Abelson (2011), "Evaluating Major Events and Avoiding the Mercantilist Fallacy", *Economic Papers*, 30(1), 48-59); and Dwyer and Forsyth (2009, p.491): "[t]he change in GSP [gross state product] is an exaggeration of how much better off the country, and more precisely, its residents are when additional resources are used to enable this activity" (Larry Dwyer and Peter Forsyth (2009), "Public Sector Support for Special Events", *Eastern Economic Journal*, 35, 481-499).

the change in value of gross output if a measure of the net economic gain is to be made.

29. To illustrate the issue further, consider Treasury's analogy referred to above of digging a hole in the ground and filling it in. Suppose that a household pays a landscape gardener $100 to dig a hole in the front lawn and fill it in again. The gardener may incur some costs of doing so, perhaps $10 to cover transport to the property and some grass seed. The positive impact that this has on GDP would be $90: the gross revenue of $100 less the cost of the intermediate inputs of $10.

30. This figure is quite different from the net economic benefit of the task. Suppose that, instead of digging the hole, the gardener could have otherwise spent the same time landscaping the front lawn, earning perhaps $80 in revenue net of landscape supplies. By instead digging the hole and filling it in, this foregone value to the gardener is an opportunity cost that should be accounted for in the assessment of net economic benefits. In this example, the net economic benefit is only $10 ($90 less the opportunity cost of $80), and in fact may be less if the foregone value to the household (i.e., the lost value that the household would have received from having a landscaped front lawn) is also taken into account.

31. Another example is that of the influence of damage (e.g., through natural disasters) on GDP. A classic economics thought experiment is that of the "fallacy of the broken window", in which a shopkeeper's window is broken.[26] Onlookers observe that this must be beneficial for the community, because it results in the shopkeeper having to pay a glazier to fix the broken window, thereby generating economic activity. But the fallacy here is that opportunity cost has not been taken in to account: the glazier would have likely shifted his labour away from other jobs in order to repair the window, while the amount the shopkeeper pays for repairs also offsets his spending elsewhere. The point relates more broadly to natural disasters. For example, while the Canterbury earthquakes resulted in a boost to GDP in the region,[27] it would be difficult to argue that overall they were beneficial to the region or made Cantabrians better off.

[26] As described in Chapter 2 of Henry Hazlitt (1946), *Economics in One Lesson*, Harper & Brothers: Alabama.

[27] Canterbury's GDP as a percentage of New Zealand's GDP increased from 12.4% in the year to March 2010, to 13.2% in the year to March 2013 – see Emma Doherty (2014), "Canterbury in numbers: the economic effects of

32. In summary, since IO analysis does not net (subtract) the cost from the benefits, it will always show economic activity (such as digging a hole and filling it in) as generating a positive impact on GDP. In this sense, the Report's analysis, showing only that the increased production at the relocated salmon farms will generate additional economic impacts, is a tautological result. The analysis does not necessarily imply **net** economic benefits, as suggested by MPI. Rather, a proper assessment of the net economic benefits would recognise that the relocated farms will produce some benefits but will also incur a range of costs.

33. Any assessment of benefits and costs is also broader than just those that relate to market impacts. I turn now to consider this broader set of benefits and costs, to show how an assessment of net economic benefits should be carried out.

How net economic benefits should be measured

34. When economists assess net economic benefits they do so using a concept known as "welfare" (also often referred to as "economic welfare" or "social welfare").[28] In broad terms, welfare refers to the net benefits that economic agents receive from an activity or transaction, such as salmon production. Economic agents include both those directly involved in the activity and those that are third parties who are more indirectly influenced by the activity. Welfare is essentially a measure of the well-being or how much "better off" society is from a particular activity or transaction.

35. The welfare of economic agents can be considered for 2 broad groups:

- "consumers": individuals or households that consume goods and services.
- "producers": suppliers of goods and services, such as businesses or people supplying their labour.

36. When consumers are involved in activities or transactions (such as purchasing farmed salmon), they receive some benefit but also incur some costs. The benefit to consumers

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the earthquakes", Parliamentary research paper, available at: https://www.parliament.nz/en/pb/research-papers/document/00PlibC5111/canterbury-in-numbers.

[28] See, e.g., Robert S. Pindyck and Daniel L. Rubinfeld (2009), *Microeconomics*, Seventh Edition, Pearson Education, Inc.: New Jersey, at p. 598; and, generally, Ronald C. Griffin (1998), "The fundamental principles of cost-benefit analysis", *Water Resources Research*, 34(8), 2063-2071.

represents the total value that the consumer derives (i.e., the maximum amount the consumer would be willing to pay), while the cost represents what the consumer actually pays. Economists refer to the consumer's net benefit, the difference between the value the consumer receives and the cost she pays, as "consumer surplus".

37. Similarly, producers receive some benefit from an activity or transaction in terms of the payment received, while they incur some costs to produce the relevant goods or services. The difference between benefits and costs for producers is the "producer surplus". This is broadly similar to a measure of a producer's profit from a transaction, over and above the amount that would be required to just induce the producer to supply the good or service (i.e., their opportunity costs).

38. An activity or transaction may also influence the surplus of third parties who are not directly involved in the transaction. Such effects are referred to by economists as "externalities".[29] A classic example of an externality is pollution. For example, suppose that a factory emits air pollution during its production process and this pollution has an adverse effect on nearby residents. The pollution therefore imposes an externality on those residents.

39. When taken together, consumer and producer surplus (including the benefits and costs arising from externalities) combine to measure welfare. In aggregate, consumer and producer surplus show how much better off consumers and producers are by undertaking an activity or transaction. In this way, welfare is a measure of the net benefit from a specific activity or transaction.

40. It is important to note that welfare covers the full spectrum of benefits and costs that affect society, including both those that can be valued in market transactions between consumers and producers, as well as those that arise from nonmarket activities, such as environmental, recreational or cultural effects.[30] In this regard, I note that Watson et al

[29] See, for example, Robert S. Pindyck and Daniel L. Rubinfeld (2009), *Microeconomics*, Seventh Edition, Pearson Education, Inc.: New Jersey, at pp.645-646.

[30] Although often the value of these "non-market" activities is reflected in market transactions.

(2007) define "economic benefit" as "a net increase in total social welfare. Economic benefits include both market and nonmarket values".[31]

41. This means that to properly assess the net economic benefits of the Proposal, assessment of change in welfare is required i.e., the consumer and producer surplus arising from the Proposal, including any positive or negative externalities.

42. The IO analysis does not undertake such an assessment. As well as the differences between economic impacts and economic benefits as discussed above, another issue with relying on IO analysis is that it does not capture any measure of consumer surplus, nor the benefits or costs arising from externalities.[32]

43. Many economists and government agencies have recognised that impacts on GDP are not the same as impacts on welfare. For example, Statistics New Zealand ("GDP is not a measure of welfare"),[33] New Zealand Treasury ("GDP doesn't measure welfare"),[34] Dwyer and Forsyth (2009) ("changes in GSP/GDP are gross changes, and not measures of the net welfare gain"),[35] and Tietenberg and Lewis (2009) ("GDP is not a measure of welfare and was never meant to be one").[36]

44. The preferable approach to measuring welfare, and therefore net economic benefits, would be to use the methodology of cost benefit analysis (**CBA**). The theory underlying CBA is that of welfare economics,[37] which seeks to understand how welfare is impacted in an economic system. A properly-applied CBA will capture both consumer and producer surplus, and identify all relevant benefits and costs, including opportunity costs, benefits and costs arising from externalities, and any other "nonmarket" benefits and costs. In

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[31] Philip Watson, Joshua Wilson, Dawn Thilmany and Susan Winter (2007), "Determining Economic Contributions and Impacts: What is the difference and why do we care?", *Journal of Regional Analysis and Policy*, 37(2), 140-146.

[32] This latter aspect appears to be acknowledged by PWC, where it is stated that "[n]o non-market effects were included" – Report at p.51.

[33] Statistics New Zealand (2014), "Quarterly gross domestic product: Sources and methods", Fourth Edition, at p.5.

[34] New Zealand Treasury (2015), "Guide to Social Cost Benefit Analysis", July, at paragraph [200].

[35] Larry Dwyer and Peter Forsyth (2009), "Public Sector Support for Special Events", *Eastern Economic Journal,* 35, 481-499, at 497, where GSP refers to gross state product (GDP at the state-level).

[36] Tom Tietenberg and Lynne Lewis (2009), *Environmental & Natural Resource Economics*, Eight Edition, Pearson Education Inc.: Boston, at p.560.

[37] Ronald C. Griffin (1998), "The fundamental principles of cost-benefit analysis", *Water Resources Research*, 34(8), 2063-2071.

doing so, CBA provides a measure of the total economic welfare arising from an activity or transaction.

A conceptual assessment of the net economic benefits of the proposed salmon farm relocations

45. In this section I consider how, from a conceptual standpoint, one would assess the net economic benefits of the proposed salmon farm relocation, using a CBA methodology.

46. An important component in any CBA is specification of the "factual" and "counterfactual". The factual is the state of the world with the proposed activity that is being assessed. The counterfactual is the situation that would exist if the activity did not go ahead. It is important to note that the counterfactual is not necessarily the status quo (i.e., the present situation), because if an activity does not go ahead there may still be changes from the status quo.

47. Indeed, this appears to be the case in respect of the Proposal. Here the factual scenario is the relocation of the 6 salmon farming sites, with NZKS implementing the Bethnic Guidelines at each of these farms. This is the proposal that MPI is seeking to assess.[38]

48. If the farms are not relocated (i.e., the counterfactual), it appears unlikely that the status quo will remain. The status quo involves operation of the 6 salmon farms at their existing sites, but at present the Bethnic Guidelines are not implemented (as these are not a current condition on operation of the farms).[39] However, it is evident from the Proposal Discussion Document that, if the farms are not relocated, NZKS would implement these Guidelines at the existing farms (and indeed may be required to do so under updated consent conditions in the future).[40] Accordingly, the likely counterfactual is that the farms will remain at their existing location until (at least) their existing consents expire, but with implementation of the Guidelines.

49. It is also important to define the geographic scope of CBA. Typically CBA is undertaken from a national perspective.[41] This makes sense from the perspective of assessing whether the nation's welfare as a whole is enhanced by a particular activity or transaction.

[38] Proposal Discussion Document, at p.5.

[39] Proposal Discussion Document, at p.12.

[40] Proposal Discussion Document, at p.7, p.12 and p.13.

[41] See New Zealand Treasury (2015), "Guide to Social Cost Benefit Analysis", July, at paragraph [15].

Nonetheless, it is at least possible (from a technical perspective) to undertake a CBA at a regional level. The Report's analysis (albeit not a CBA, as is evident from the earlier discussion) is undertaken just for the Nelson and Marlborough areas. I therefore apply a similar regional (Nelson and Marlborough) perspective in my conceptual considerations of the costs and benefits.

50. My understanding is that the relocation of the salmon farms in the factual is likely to result in an increase in production of salmon (output) relative to the counterfactual.[42] At the same time, however, I also understand that there will be an increase in inputs applied (e.g., feed levels) in the factual relative to the counterfactual.[43] To the extent that output increases for the same (or smaller increase in) inputs, then this represents a more efficient use of resources. This would be considered a welfare gain that should be incorporated in a CBA. This welfare gain would be captured in an increase in producer surplus for NZKS: essentially profits (which should be exclusive of the opportunity cost of labour) less opportunity costs of capital invested.

51. I do not have sufficient information to determine whether NZKS's annual profits will increase as a result of the salmon farm relocation, but it is reasonable to expect that the proposed relocation would be profitable to NZKS (as it would otherwise not be in its own best interests to support the relocation).[44] To the extent that NZKS's profits from salmon farming do increase in the factual relative to the counterfactual, then this increase in producer surplus could be considered a benefit from the proposed relocation.

52. It is important to note that a proper measure of any increase in producer surplus would be net of the cost of the capital investment in the relocated salmon farms. As the Report identifies, construction of the new sites involves additional expenditure.[45] Unless the resources used in this construction (e.g., labour and capital equipment) would have otherwise been idle, the cost of constructing the sites would have an opportunity cost, by "crowding out" construction activity that could have been undertaken elsewhere (as discussed earlier). The conventional assumption in CBA is that resources are otherwise

[42] Proposal Discussion Document, at p.5 and p.7.

[43] *Ibid.*

[44] Having said this, if there is an element of public subsidy inherent in the salmon farm relocation (e.g., with local or central government bearing some of the costs), then it could be that the salmon farm relocation is only profitable to NZKS because of this.

[45] Report, at p.50.

fully employed (i.e., are *not* otherwise idle),[46] and therefore construction of the relocated farms should be properly entered as a cost in CBA.

53. It is possible that an increase in salmon production could lead to an increase in consumer surplus if the increase in production were to lower consumer prices. If this were the case, then consumers could buy more salmon at a lower price, thereby providing them with some additional surplus. However, given that New Zealand's salmon exports are only a small portion of global consumption,[47] it is unlikely that an increase in production by 1 New Zealand supplier would materially alter the world price. As such, there are unlikely to be any effects from the salmon farm relocation on consumer surplus.

54. As noted earlier, a proper assessment of the net economic benefits of the Proposal would also capture the broader range of benefits and costs from, for example, an environmental and recreational perspective. CBA provides a framework within which these nonmarket benefits and costs can be assessed using a common metric, allowing them to be weighed against other market benefits and costs, such as producer surplus.

55. Some of the key environmental costs arising from the Proposal include potential adverse effects on endangered King Shags,[48] on landscape and natural character values,[49] and on water quality.[50] I note also that, if the factual and counterfactual are defined as I have described them above, then it is not correct to include in the CBA any environmental benefit from reduced effects on the seabed due to implementation of the Bethnic Guidelines because the Guidelines are implemented in both the factual and counterfactual scenarios with the same effects.

56. Moreover, some of the salmon farms will be relocated into an area that is identified as an Outstanding Natural Feature and an Outstanding Natural Landscape in the proposed Marlborough Environment Plan and by Mr Brown for EDS.[51] The nature of this effect differs slightly from environmental costs that might be imposed on society through, for example, society's use of the environment, such as water quality effects. In this instance,

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[46] See New Zealand Treasury (2015), "Guide to Social Cost Benefit Analysis", July, at paragraph [249].

[47] As noted in the Report at p.51.

[48] Proposal Discussion Document, at section 7.3.5.

[49] Statement of Evidence of Stephen Brown for EDS, 27 March 2017.

[50] Proposal Discussion Document, at section 7.3.2.

[51] Proposal Discussion Document, at section 7.31; and Statement of Evidence of Stephen Brown for EDS, 27 March 2017.

the adverse effect on the environment is likely to be through the "non-use value" that society places on the environment.

57. Economists define non-use values as a category of value in which "people are more than willing to pay for improving or preserving resources that they will never use".[52] The effects of salmon farming on an outstanding natural landscape, as well as effects on endangered species such as King Shags, are consistent with this. In this regard, Mendelsohn and Olmstead (2009, p.333) state that "non-use values may be the largest, most important social values in some policy contexts, such as endangered species and wilderness preservation".[53] These non-use values are reflected in ss6(a)-(c) RMA and Policies 11, 13-15 NZCPS. Accordingly, adverse effects on non-use values through impacts of salmon farming on the natural landscape, natural character, and indigenous biodiversity should be properly captured in any measure of net economic benefits.

58. Finally, I note that the Report's IO analysis also includes "indirect" impacts - changes in the primary market (salmon production) flowing through to secondary markets that are linked either upstream or downstream with the primary market. The common approach in CBA is not to include any secondary market welfare effects in the analysis.[54] Indeed, it can be shown that if secondary markets are reasonably competitive and undistorted (which the Treasury states is "fairly true for most of the New Zealand economy"),[55] then an estimation of the welfare effects in the primary market implicitly includes the welfare effects in secondary markets.[56] Even where this is not the case, secondary market welfare effects are generally considered to be relatively small,[57] and care should be taken to avoid double counting of effects in both primary and secondary markets.

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[52] Tom Tietenberg and Lynne Lewis (2009), *Environmental & Natural Resource Economics*, Eight Edition, Pearson Education Inc.: Boston, at p.38

[53] Robert Mendelsohn and Sheila Olmstead (2009), "The Economic Valuation of Environmental Amenities and Disamenities: Methods and Applications", *Annual Review of Environment and Resources*, 34, 325-347.

[54] New Zealand Treasury (2015), "Guide to Social Cost Benefit Analysis", July, at paragraph [64].

[55] New Zealand Treasury (2015), "Guide to Social Cost Benefit Analysis", July, at paragraph [63].

[56] See Chapter 5 of Anthony Boardman, David Greenberg, Aidan Vining, and David Weimer (2006), *Cost-Benefit Analysis: Concepts and Practice*, Fourth edition, Pearson.

[57] New Zealand Treasury (2015), "Guide to Social Cost Benefit Analysis", July, at paragraph [63]; Anthony Boardman, David Greenberg, Aidan Vining, and David Weimer (2006), *Cost-Benefit Analysis: Concepts and Practice*, Fourth edition, Pearson, at p.123.

Attachment A

Points of disagreement with other experts.

- I do not agree that the IO analysis in the PwC Report provides a measure of the economic benefits of the proposal, because it does not account for opportunity costs, consumer surplus or externalities.

  I recognise that it is predominately MPI that claims the results of the IO analysis are economic benefits, although I note that Mr Bill Kaye-Blake also makes this same claim in his 11 April 2017 report.

  I do, however, agree with Mr Kaye-Blake where he states (11 April 2017 report) that the IO analysis in the PWC Report is intended to measure economic impacts. I note that economic impacts are not the same as economic benefits.

  As evident from the above Mr Kaye-Blake's 11 April 2017 presents conflicting commentary of the relationship between the IO analysis and economic benefits/economic impacts. It is not clear what Mr Kaye-Blake's position is.

- I do not agree with Mr Andrew Clark's view (in his 11 April 2017 statement) that the **net** benefit would understate the benefit of the Proposal. In my view, a proper assessment needs to take into account costs as well as benefits i.e., net benefits.

Points of agreement with other experts.

- I agree with the key points of economic substance in Mr Trevor Offen's statement, with the exception that I consider the net economic benefits of the Proposal differs from that calculated by Mr Offen, as it would, for example, include other costs such as environmental costs.

- I agree with the key points of economic substance in Ms Wendy McGuinness' statement.

Why the panel should prefer my expert opinion/that of experts sharing my opinion

- I consider that a cost benefit analysis methodology is more appropriate and should be preferred over the IO analysis because:

- A cost benefit analysis provides a measure of net economic benefits of the Proposal.

- The use of cost benefit analysis to measure net economic benefits, rather than IO analysis, is supported in the economics literature, and by New Zealand and overseas government agencies.