Proposed Amendments to the Environmental Reporting Act 2015

UPDATED Cost Benefit Analysis

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Executive summary

This report presents expected costs and benefits of proposed amendments to the Environmental Reporting Act 2015 (ERA). It is written to inform the preparation of relevant Cabinet papers and Regulatory Impact Statements.

The proposed amendments to the ERA addressed in this report are:

1. Clarify the purpose of environmental reporting.
2. Add drivers and outlooks to the reporting framework.
3. Adjust roles and responsibilities.
4. Mandate an evidence advisory panel.
5. Reduce the frequency of synthesis reports to six-yearly.
6. Replace domain reports with one commentary each year.
7. Introduce six-yearly data and evidence priority reports.
8. Strengthen the mechanisms for collecting data.
9. Report on progress towards outcomes

The 30-year present value of the national costs of these proposals is estimated to be $369 million, with a 95% confidence range from $293 million to $449 million.

Three types of potential national benefits are quantified:

- Reductions in regulatory burdens
- A slower pace of environmental degradation
- Less harm from pollution.

Uncertainty associated with the attribution of benefits from the proposed ERA amendments are addressed through the use of the conservative approach towards attributing potential benefits and with the use of Monte Carlo analysis techniques.

The 30-year present value of these types of benefits that can be credibly attributed to proposed ERA amendments is estimated to be $1,218 million, with a 95% confidence range from $995 million to $1,410 million.

The implication is net benefit estimates of $850 million, with a 95% confidence range from $614 million to $1,056 million. This implies a benefit cost ratio of 3.3 (95% range: 2.5 – 4.4). That is, a social return of $3.30 for every $1 of cost associated with the proposed amendments. In none of the 20,000 iterations underpinning the Monte Carlo analysis did cost estimates exceed benefit estimates.

1 Introduction

1.1 Background

Under the Environmental Reporting Act 2015 (ERA), the Ministry for the Environment (the Ministry) and Statistics New Zealand (Stats NZ) are required to produce six independent reports on the state of New Zealand's environment over a period of three years. Based on the experience of completing two three-yearly cycles and the Parliamentary Commissioner for the Environment's (PCE) review of the effectiveness of the ERA, the Ministry and Stats NZ are proposing changes to the ERA to increase the impact of the environmental reports. A consultation document[1] was issued by the Ministry in early 2022 inviting feedback on the proposed amendments.

This report outlines the expected costs and benefits of the proposed amendments to the ERA. It will inform the final recommendations in the Cabinet paper and Regulatory Impact Statement (RIS) to support Government decisions on progress changes to the ERA.

1.2 Proposed changes to the ERA

In 2019, the PCE issued a report on how well New Zealand reports on the state of its environment. *Focusing Aotearoa New Zealand's environmental reporting system* critiqued the approach to reporting set up under the ERA and outlined steps to improve the system. The report included, amongst others, specific recommendations on amendments to the ERA to improve its effectiveness.

Based on the experience of the Ministry, Stats NZ, and other contributing agencies the following changes to the ERA are being proposed:

1. Clarify the purpose of environmental reporting.
2. Add drivers and outlooks to the reporting framework.
3. Adjust roles and responsibilities.
4. Mandate an evidence advisory panel.
5. Reduce the frequency of synthesis reports to six-yearly.
6. Replace domain reports with one commentary each year.
7. Introduce six-yearly data and evidence priority reports.
8. Strengthen the mechanisms for collecting data.
9. Measure environmental progress.

[1] Ministry for the Environment. 2022. Te whakawhanake i te pūnaha rīpoata taiao o Aotearoa | Improving Aotearoa New Zealand's environmental reporting system: Proposed amendments to the Environmental Reporting Act 2015: Consultation document. Wellington: Ministry for the Environment.

1.3 Expected benefits

As the proposals have a high level of complementarity between them, the benefits of the changes accrue primarily from considering the changes as a package. In addition, the direct benefits from individual proposals are small and have only a very limited impact on the Cost Benefit Analysis (CBA). For this reason, the benefits have only been assessed in aggregate as this is greater than the sum of the individual parts.

A results chain for the expected benefits from the proposed changes to the ERA was developed to contextualise the process through which these benefits are achieved. It draws from the benefits identified by the Ministry in its consultation document, describing primarily non-monetised benefits. Additional benefits that were identified as monetisable are included in different stages of the results chain, including:

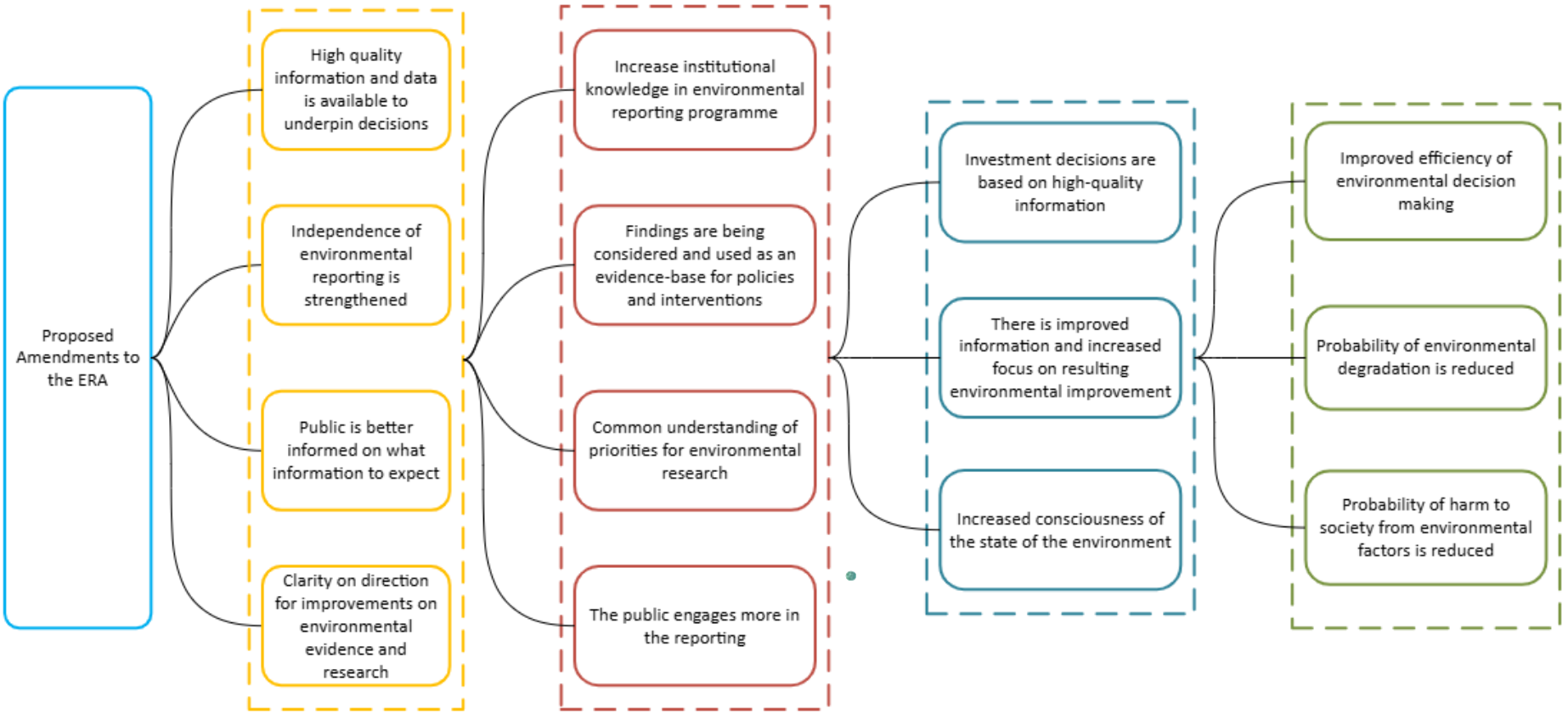
- **Reduced regulatory burden:** With an improved understanding of environmental status, policy makers will be better placed for setting environmental priorities with an expected reduction in the regulatory burden of the resource management system.

- **Slower ecosystem degradation:** An improved evidence base for policy making will increase the likelihood of effective decisions and investments. Together with increased accountability and greater consciousness of the environment, this is likely to reduce the pace of environmental degradation, increasing the ecosystem services available to society.

- **Less harm from pollution:** Similar to environmental degradation, better policy decisions and increased consciousness is likely to reduce harm to society from poor air quality, water quality, excess noise, and other environmental harm factors.

The results chain is presented in **Figure 1** overleaf.

Figure 1: Results chain of impact of proposed changes to the ERA



2 Approach and Assumptions

2.1 Approach

This 2024 CBA builds on an initial CBA on the proposed ERA that was completed in 2022 and an earlier preliminary, desk-based CBA in 2021. This 2024 CBA includes updates and refinements made to reflect changes made to proposals since the original analysis was completed. Changes in this current CBA include:

- Values updated into 2024 prices
- Central discount rate applied decreased from 5% to 2% following the advice of Treasury[2]
- Removal of proposals no longer progressing
- Refinements of proposals, including updated costs and assumptions.

The 2022 CBA built upon a preliminary, desk-based CBA that focused primarily on the costs with commentary provided on potential benefits and risks. To supplement the information reviewed during the preliminary CBA, the 2022 CBA included a set of targeted interviews that were held with key stakeholders to refine the analysis and discuss monetisation of benefits. A total of 23 interviews were conducted with stakeholders from the following entities:

- **Government Agencies:** Ministry for the Environment, Statistics New Zealand, Department of Conservation, New Zealand Transport Agency, Te Puni Kōkiri, Te Arawhiti, and the Office of the Parliamentary Commissioner for the Environment
- **Crown Entities and Crown Research Institutes:** Environmental Protection Authority, NIWA, and Manaaki Whenua - Landcare Research
- **Regional and District Councils:** Canterbury Regional Council, Horizon Regional Council, Marlborough District Council, Waikato Regional Council, and West Coast Regional Council
- **Others:** Federated Farmers.

In addition, other relevant documentation was identified and reviewed.

The approach has been to estimate specific costs for the relevant proposals individually where the proposal generates specific costs. If the proposal is not expected to generate any additional costs beyond the costs of passing new legislation, this is stated and legislation costs are accounted for in a separate cost item.

[2] Treasury Circular 2024/15: UPDATED PUBLIC SECTOR DISCOUNT RATES FOR COST BENEFIT ANALYSIS

Monetised benefits are estimated against the three areas outlined in Section 1.3. The general approach used to quantify these potential benefits is to seek evidence on realistic unit values of the benefits. We have, however, been conservative in attributing benefits likely to be generated by the ERA amendments.

Given the nature of the expected costs and benefits and the assumptions required to produce this CBA, a Monte Carlo analysis has been carried out to assess the range and probability of potential outcomes.

2.2 General assumptions

The following general assumptions apply to all proposals:

- Labour costs
- Deadweight cost of taxation
- Compliance Costs
- Current costs of passing the ERA amendments
- Monte Carlo analysis.

2.2.1 Labour costs

The cost of public sector time is benchmarked on a 2015 comprehensive investigation into the cost of policy advice in New Zealand, which has been adjusted for inflation to 2024 prices by subsequent increases in public sector wages (The Treasury. 2015). The approach is to account for frontline policy or analytical FTE labour inputs but to price these costs accounting for all overhead costs. This will include management overheads and support staff providing ancillary activities such as accounts, IT support and HR. Thus, while staff engaged in the direct activities of interest will earn less than the numbers used in the tables and graphs below, the calculations account for the higher comprehensive cost to society represented by these higher cost figures.

The original New Zealand Treasury (the Treasury) study presented a range of estimates that differed between departments. The Ministry's results in 2014 were close to the median result. Translated into 2024 prices, this median value is estimated to be $264,000, which is used to value general departmental labour costs and labour at Crown Research Institutes (CRI) costs. A value of $196,000 is used to value Stats NZ labour inputs, based on specific advice provided by Stats NZ. This value is also used to value regional council labour inputs. A higher value of $285,000 is used for the Ministry, reflecting specific information from the Treasury study.

2.2.2 Deadweight cost of taxation

The analysis uses the Treasury recommendation that a 20% deadweight cost of tax premium be applied to costs that will require tax funding as an assumption (The Treasury. 2015 (b)). Most of the costs of a project typically arise from the consumption of resources, such as labour, materials etc., but additional costs arise where the funds for the project come from taxation.

Taxes encourage people to move away from things that are taxed and toward things that are not taxed or more lightly taxed. Their consumption choices are distorted away from what they would prefer in the absence of taxes. The change in the mix of consumption has an adverse welfare effect which is additional to the loss of welfare resulting directly from the loss of money that is taken away in the form of tax. This welfare loss is referred to as the deadweight cost of taxation (or sometimes as a deadweight loss or 'excess burden').

2.2.3 Compliance costs

The cost estimates presented assume that agencies external to central government will be reimbursed on a full cost recovery basis. In some cases, an explicit monetary spend has been assumed, say for contracting expert advice or research. Although these other potential purchase costs have been explicitly accounted for, our estimates make no judgement about budget allocation decisions. The key presumption is that there will be budget that will fund full cost recovery so that the proposals will not impose any further compliance costs on society.

2.2.4 Costs of passing the ERA amendments

A number of activities involved with the ERA proposals are considered to be business as usual for the Ministry and other agencies involved and so are not regarded as imposing explicit additional costs on society. This includes all processes in relation to the design of amendments, consultation processes, and the government costs associated with passing legislation. This means that it is assumed that the proposal to *Clarify the purpose of environmental reporting* and the proposal to *Adjust roles and responsibilities* will have no additional cost consequences. However, from a national perspective there is an opportunity cost associated with the administrative activities associated with drafting legislation, consultations and parliamentary processes. Resources involved could have potentially been used for other government activities. Our approach is to cost the legislation costs for the entire suite of proposed amendments and not allocate such costs to specific proposed amendments.

2.2.5 Monte Carlo analysis

Monte Carlo simulation techniques provide a method for investigating the interactions between multiple areas of uncertainty. A Monte Carlo simulation is a computer-based technique that uses statistical sampling and probability distributions to simulate the effects of uncertain variables on model outcomes. It provides a systematic assessment of the combined effects of multiple sources of risk.

The approach adopted here is to simulate 20,000 observations for each varied component assuming random inputs into a Beta distribution.[3] The assumed distribution takes into account prior information about the potential distribution and can also constrain the distribution to avoid impossible outcomes, like negative costs.

The strength of the Monte Carlo simulation is that it allows a wide range of combinations between the different components (for example, one simulation could effectively assume that some costs are low, but others are high). Twenty thousand simulations were found to be sufficient to ensure that results were stable between different samplings.

A key implication of undertaking Monte Carlo analysis is that it allows us to present a graphical (histogram) presentation of the distribution of cost estimates and also to provide 95% confidence intervals for the cost estimates.

2.3 Overarching assumptions

Graphs present distributions of present value calculations for 20,000 iterations of cost and benefit items using Monte Carlo analytical methods using Beta distributions. There are six cost items (proposals to change the reporting framework; mandate a standing science advisory panel; introducing six-yearly data and evidence priority reports; strengthening the mechanisms for collecting data; and measuring environmental progress; as well as legislation costs for all the changes) and three forms of potential benefits (resource management efficiency gains; ecosystem services due to slower rates of degradation to natural environments; and a slower pace of increase in pollution).

[3] A Beta distribution was selected as it provides scope to constrain the distribution outcomes within plausible bounds (established by the A and B terms) and to allow skewed distributions (established by the relative size of the α and β terms).
In practice each alpha term has been set to 1 and then the beta value adjusted (which sets the distribution skewness) to ensure that the resulting distribution mean matches the values used in the central calculations. The resulting distributions are bounded by plausible constraints but also utilise available information about the likely distribution.
For example, if the average price of a milkshake is $10, prices below zero and over $50 may be excluded as impossible or implausible. But as the average price is $10, observations of $8-$12 would be expected to be more likely than observations of $38-$42. So, in this example, A would be set to 0, B to 50, and with α set to 1, a value of 5 would be chosen for β, as this is the value that will generate a sample average of 10.
For the Monte Carlo analysis of the cost estimates of the proposed ERA amendments, the following assumptions have been made:

- α = 1
- β = adjusted to ensure that the distribution average equals the central estimate
- A = lower bound of distribution (if not constrained by a zero lower bound, assumed to be lower than the low sensitivity test value by a proportion that is 25% of the gap between the sensitivity low value and the central estimate)
- B = upper bound (typically assumed to be greater than the high sensitivity test value by a proportion that is 25% of the gap between the sensitivity high value and the central estimate).

A 30-year time horizon is used[4], with central estimates of present values calculated with a 2% discount rate (1.5% - 8% low/high bands). Cost estimates apply a deadweight cost of taxation allowance (0%/20%/40% low/central/high beta distribution assumptions). The assumption is that the amendments will be enacted in 2023. A 30-year horizon means that the analysis incorporates five six-year reporting cycles. Values are presented in constant 2024 prices in present value terms for the entire 30-year period. Key assumptions are outlined in Table 1.

Table 1: Assumptions

Assumption	Low	Central	High	Beta (skewness)
Discount rate	1.5%	2.0%	8.0%	12.00
Deadweight cost of taxation	0%	20%	40%	1.40
Labour costs per FTE				
Ministry for the Environment	$211,404	$284,752	$378,768	1.28
Policy	$237,773	$264,142	$321,455	2.17
Non-policy	$176,185	$195,724	$238,191	2.17

[4] Note that the Preliminary CBA used a 12-year time horizon to cover two reporting cycles. A 30-year horizon has been selected for the Full CBA to allow for longer term benefits to better be measured and to align with other recent CBAs. This version also differs from previous versions in using a 2% discount rate for the central estimates following the advice of Treasury Circular 2024/15: UPDATED PUBLIC SECTOR DISCOUNT RATES FOR COST BENEFIT ANALYSIS

3 Net Benefits

3.1 Summary results

Summary results are presented in **Table 2**. The central column presents the mean outcome for each cost and benefit item. The bounds of the 95% distribution of outcomes from each Monte Carlo distribution is presented in brackets.

Table 2: Overview of Costs and Benefits, 2024 Present Values, NZ$ millions

Costs (including deadweight cost of taxation)	Central Estimate (NZ$ m)	95% confidence band (NZ$ m)
Clarify the purpose of environmental reporting	0	(0 / 0)
Add drivers and outlooks to the reporting framework	112	(81 / 146)
Adjust roles and responsibilities	0	(0 / 0)
Mandate an evidence advisory panel	20	(13 / 29)
Reduce the frequency of synthesis reports to six-yearly	0	(0 / 0)
Replace domain reports with one commentary each year	0	(0 / 0)
Introduce six-yearly data and evidence priority reports	3	(1 / 6)
Strengthen the mechanism for collecting data	220	(153 / 291)
Measure environmental progress	10	(6 / 15)
Legislative costs	4	(1 / 7)
Total Costs (C)	**369**	**(293 / 449)**
Benefits	**Central Estimate (NZ$ m)**	**95% confidence band (NZ$ m)**
Reduced regulatory burden	373	(269 / 480)
Slower ecosystem degradation	699	(500 / 853)
Less harm from pollution	146	(104 / 179)

Costs (including deadweight cost of taxation)	Central Estimate (NZ$ m)	95% confidence band (NZ$ m)
Total Benefits (B)	**1,218**	**(995 / 1,410)**
Net Benefits (=B – C)	850	(614 / 1,056)
Benefit-Cost Ratio (=B/C)	3.3	(2.5 / 4.4)
Probability of costs exceeding benefits	0.0%	

The net result is that benefits are estimated to exceed costs in every one of the 20,000 iterations, with a mean net benefit of $850 million and an average benefit cost ratio of **3.3**. The benefit cost ratio ranges from **2.5 to 4.4** for 95% of the iterations. This result emerges despite a conservative approach used for assigning attribution of potential benefits resulting from improved environmental reporting (see Section 5). This reflects the potential for increases in wellbeing that can come from a better understanding of the status of the environment and environmental processes. Regulating resource management is costly, meaning that there is considerable scope for improving its efficiency. Many households have their sense of wellbeing harmed by exposure to pollution (noise irritants, and poor air and water quality). Wellbeing is also enhanced by ecosystem services provided by the natural environment that have degraded over time and risk further degradation.

The major cost item relates to the proposal to strengthen the mechanisms for collecting data. This reflects feedback that the ability for the proposed amendments to deliver the intended improvements in environmental reporting, rely heavily on improved data collection to underpin the suite of changes. An implication is that the adequacy of data collection funding and the quality of its implementation is likely to be a critical aspect underpinning the scale of benefits expected from the amendments.

3.2 Distribution of summary results

Histograms of the count of outcomes from 20,000 iterations of the CBA are presented below. In each graph it is also noted the mean outcomes as well as the 95% range of the distribution (presented numerically in brackets and graphically by the red lines).

Figure 2: Distribution of Present Value of total costs

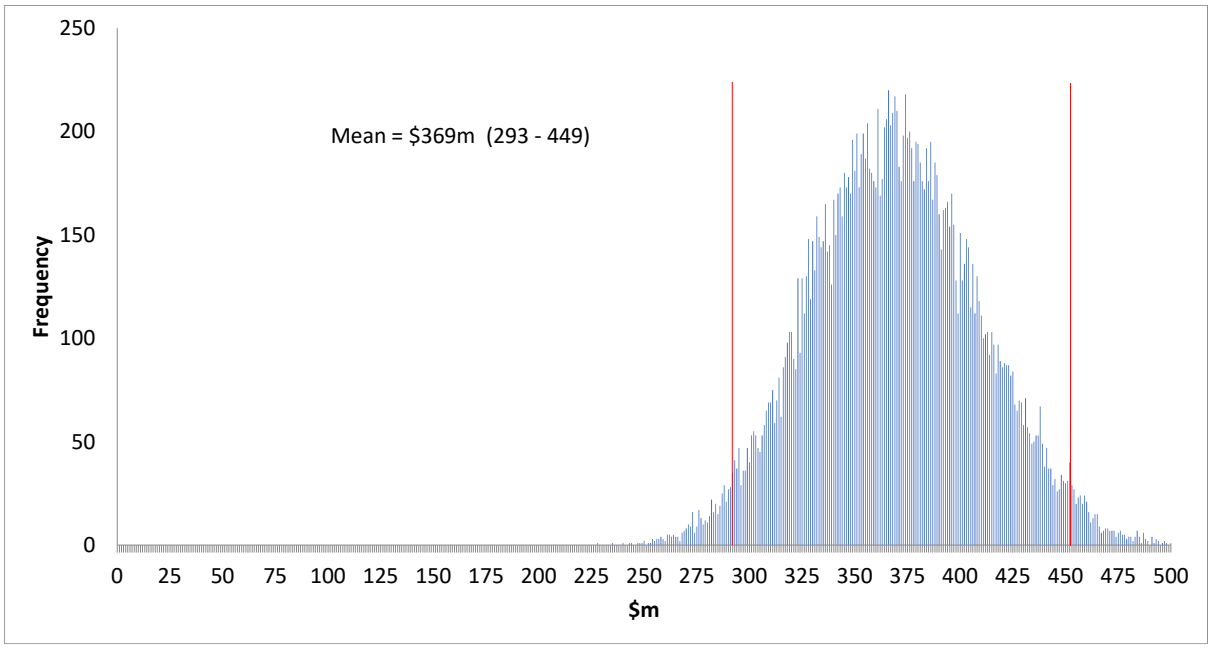


Figure 3: Distribution of Present Value of total benefits

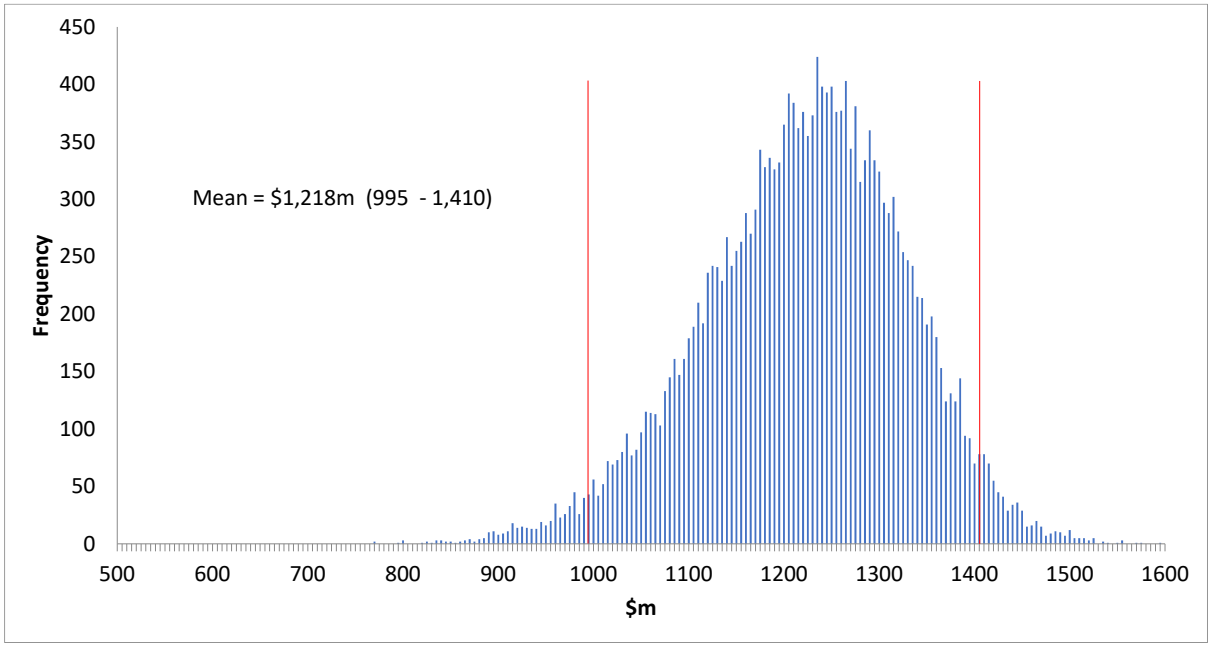


Figure 4: Distribution of Present Value of net benefits

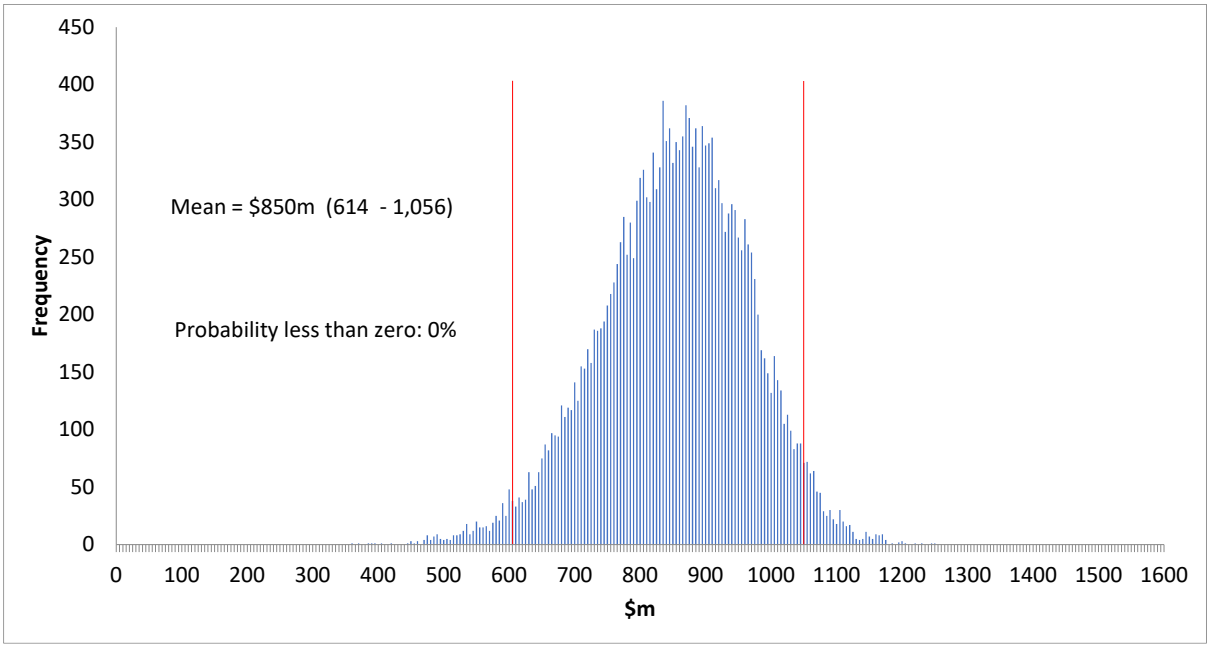
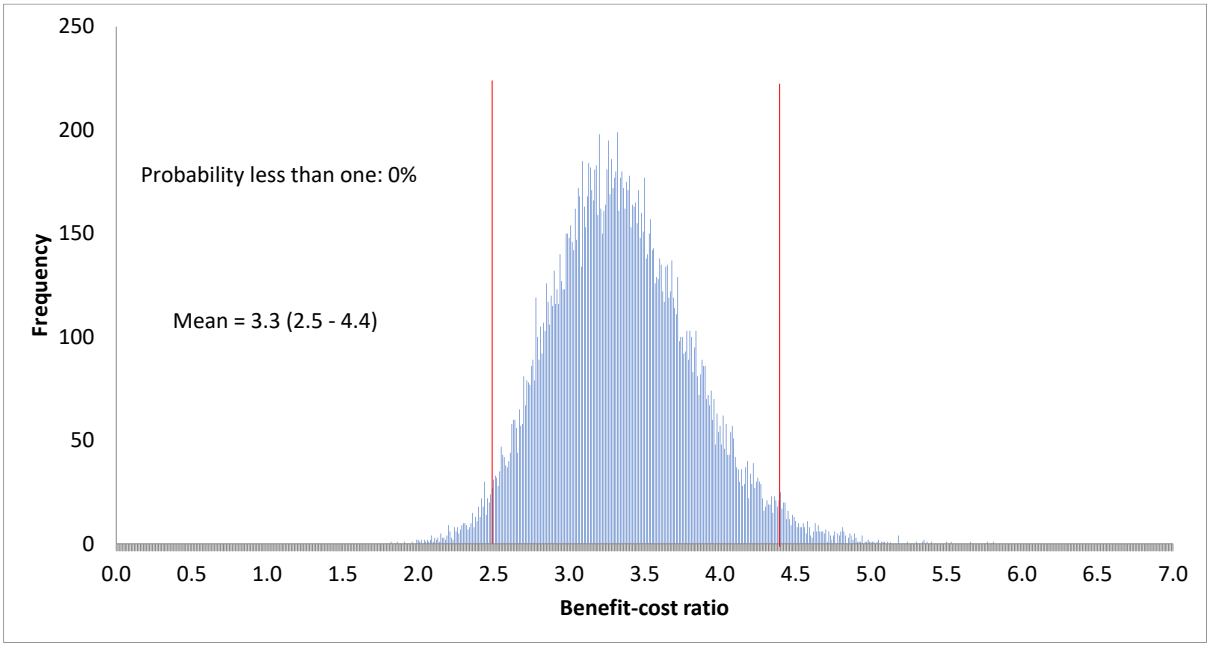


Figure 5: Distribution of Present Value of benefit cost ratio



4 Analysis of Expected Costs for Individual Proposals

Below we present exposition of the estimation of costs from each cost source: the proposed amendments included in the preliminary CBA plus estimates for the drafting and enacting the proposed amendments. For each source a brief description is provided of activities involved, assumptions underpinning the cost estimates, the assumptions underpinning the Monte Carlo distribution analysis, and a presentation of cost estimates in present value terms.

4.1 Proposal: Clarify the purpose of environmental reporting

Details of proposed change

Clarify the purpose of the ERA to include the purpose of reporting on the state of the environment and what the reports are supposed to achieve.

Assumptions

Although a key component of the suite of ERA proposals, it is presumed that the activities involved fall within the business-as-usual activities of the Ministry. This means there should be no explicit additional cost implications from this proposal.

Costs

This proposed change has no impact on FTE requirements or costs.

Monte Carlo analysis

No Monte Carlo analysis undertaken for this proposal as there is no associated cost.

4.2 Proposal: Add drivers and outlooks to the reporting framework

Details of proposed change

Extend the pressure-state-impact framework to include a requirement for information on:

- drivers – factors that cause the pressures on the environment
- outlooks – how the state of the environment may change in the future and the likely impact of such changes.

Assumptions

Stats NZ has estimated that set up activities will involve one full FTE, with an additional two FTE required in each subsequent year. Allowance has also been made for additional expert resources at the Ministry (four FTE per year), and from CRIs and regional councils. An additional cost of $1m per year has been provided to purchase services from other organisations.

Costs

The cost estimates of the proposal are presented in **Table 3**. The 12 FTE labour requirement and budget for purchase of services is estimated to impose a $4m cost per year. Including allowance for a 20% deadweight cost of tax and using a 2% discount rate this represents a present value of $112m over a thirty-year period.

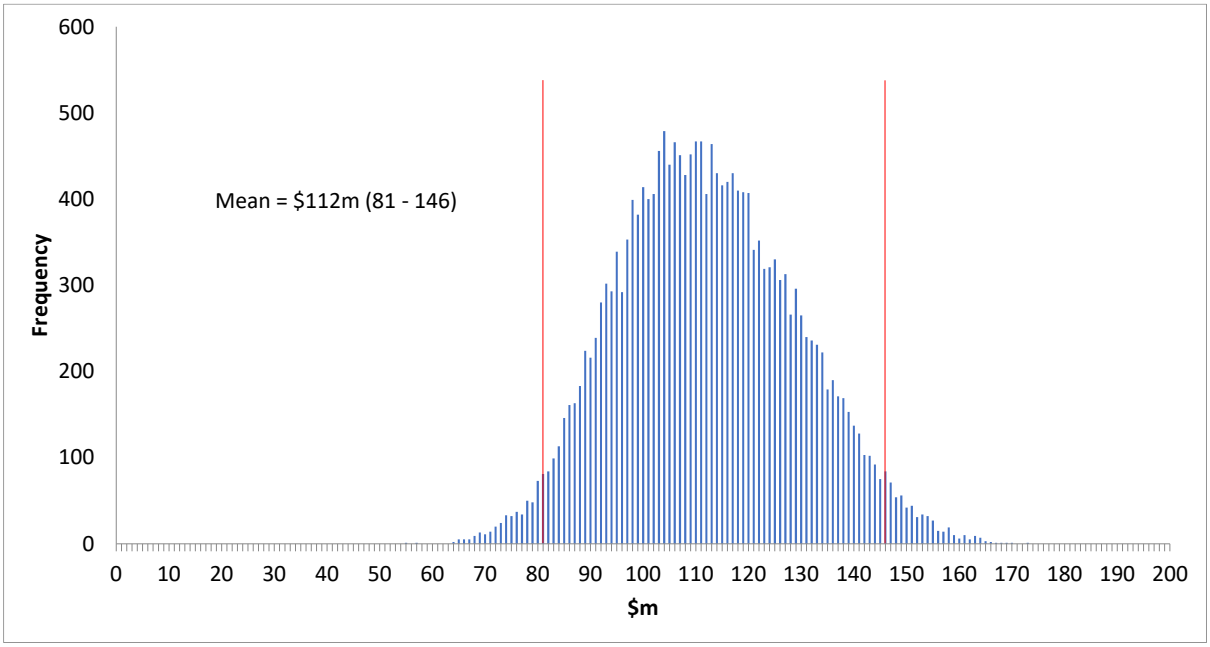
Monte Carlo analysis

In addition to the standard risks around the size of discount rate, deadweight costs of taxation and labour costs, the critical cost estimate risks for this proposal revolve around the actual level of labour input used in the Ministry, Stats NZ, CRIs, and regional councils. In addition, we have allowed for annual purchases averaging $1m per year, which could also be more or less in practice. Allowing for variations in assumptions as presented in **Table 3** underpinning analysis of the proposal to add drivers and outlooks to the reporting framework implies a 95% confidence interval around the present value of cost estimates that range from $81m to $146m. This distribution is illustrated in **Figure 6**.

Table 3: Cost Assumptions and Present Value of proposal to add drivers and outlooks to the reporting framework

	Low	Central	High	Beta (skewness)
Discount rate	1.5%	2.0%	8.0%	12.00
Deadweight cost of taxation	0%	20%	40%	1.00
Labour costs per FTE				
Ministry for the Environment	$211,404	$284,752	$378,768	1.28
Policy	$237,773	$264,142	$321,455	2.17
Non-policy	$176,185	$195,724	$238,191	2.17
Proposal 3				
Labour requirements (FTE)				
Ministry for the Environment				
Set up	0.2	0.5	1.0	1.67
Ongoing	2.0	4.0	8.0	2.00
Statistics New Zealand				
Set up	0.2	1.0	2.0	1.25
Ongoing	0.5	2.0	5.0	2.00
Other Departments				
Set up	0.0	0.0	0.0	0.00
Ongoing	0.0	0.0	0.0	0.00
CRI				
Set up	0.0	0.0	0.0	0.00
Ongoing	0.8	2.8	6.0	1.60
Regional Councils				
Set up	0.0	0.0	0.0	0.00
Ongoing	1.6	3.2	6.4	2.00
Other costs ($m)				
Set up	$0.1	$1.0	$3.0	2.22
Ongoing	$0.1	$1.0	$3.0	2.22
Present Value ($m)	$81	$112	$146	

Figure 6: Distribution of Present Value of proposal to add drivers and outlooks to the reporting framework



4.3 Proposal: Adjust roles and responsibilities

Details of proposed change

Adjust the roles and responsibilities for the Secretary for the Environment and the Government Statistician, to reduce overlaps and ensure that each organisation uses their expertise, with:

- the Secretary for the Environment as the steward for New Zealand's environment
- the Government Statistician as the leader of the official statistics system.

Assumptions

It is assumed that the costs involved in delivering this proposal represent business as usual activities for both agencies and so no additional cost implications are expected.

Costs

This proposed change has no impact on FTE requirements or costs.

Monte Carlo analysis

No Monte Carlo analysis undertaken for this proposal as there is no associated cost.

4.4 Proposal: Mandate an evidence advisory panel

Details of proposed change

Require the establishment of an evidence advisory panel under the ERA.

Costs

The costs associated with formally instituting an evidence advisory panel include the Ministry providing secretariat services for the advisory panel and the costs of holding panel meetings. The cost estimates presented are based on secretariat duties requiring two FTE input from the Ministry each year. We have assumed that there will be on average nine panel members, plus a panel chair, who will meet twelve times a year, but with ten of these meetings being conducted remotely and two face-to-face meetings each year. Meeting costs include payments for panel members' time, assumed to average 11 hours per meeting, and travel, accommodation and venue hire[5] costs for the face-to-face meetings. The central assumption is that half of the members will need to travel for the face-to-race meetings. The key assumptions underpinning meeting costs are presented in **Table 4**.

Once established the annual cost of the evidence advisory panel is likely to be $0.7m with a present value of $20m over a 30-year period (using a 2% discount rate and allowing for a 20% deadweight cost of tax).

Monte Carlo analysis

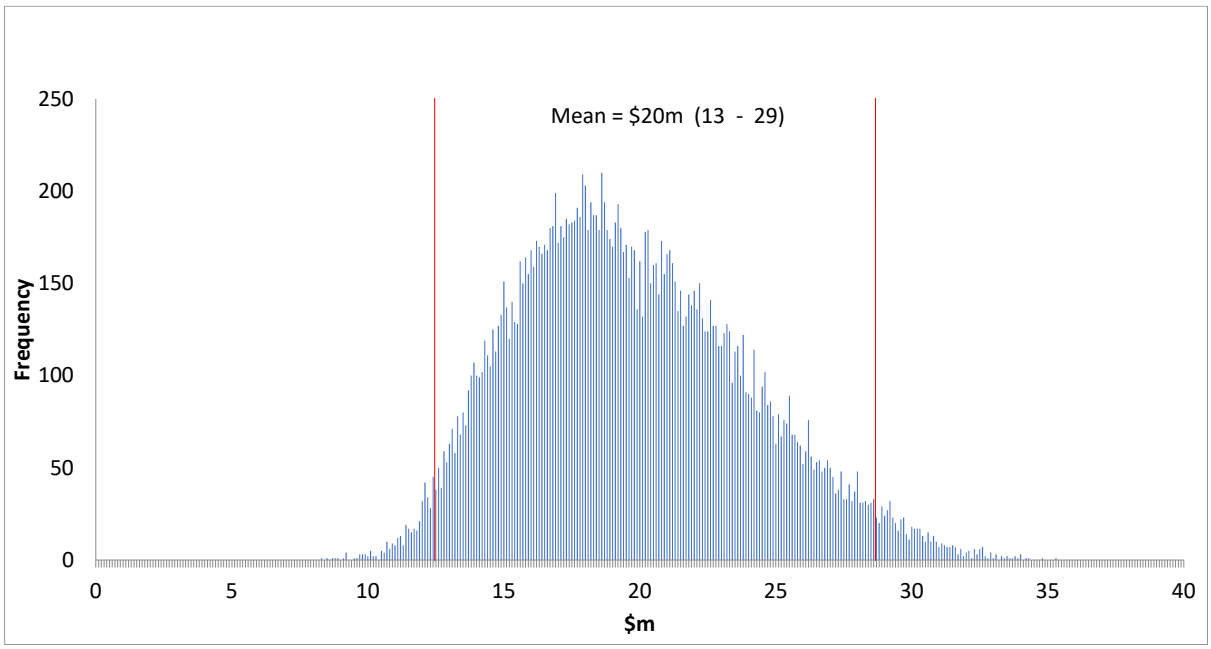
In addition to the standard risks around the size of discount rate, deadweight costs of taxation and labour costs, the critical cost estimate risks for the proposal to mandate an evidence advisory panel revolve around the actual level of labour input required to provide secretariat services for the panel. Factors to be considered include the size of the panel, the number of times they meet each year, and the costs associated with holding each meeting. Allowing for variations in assumptions as presented in **Table 4** implies a 95% confidence interval around the present value of cost estimates for this proposal that ranges from $13m to $29m. This distribution is illustrated in **Figure 7**.

[5] While it is likely that premises will be available at the Ministry, including the costs accounts for the opportunity cost of the premises

Table 4: Cost Assumptions and Present Value of proposal to mandate an evidence advisory panel

	Low	Central	High	Beta (skewness)
Discount rate	1.5%	2.0%	8.0%	1.00
Deadweight cost of taxation	0%	20%	40%	1.40
Labour costs per FTE				
Ministry for the Environment	$183,619	$247,327	$328,987	1.30
Policy	$206,523	$229,426	$279,207	2.20
Non-policy	$153,029	$170,000	$206,886	2.20
Proposal 5				
Labour requirements (FTE)				
Ministry for the Environment				
Set up	1.0	1.5	2.5	2.00
Ongoing	1.5	2.0	4.0	4.00
Size of standing advisory panel	5	9	15	1.50
On-line meetings per year	7	10	12	0.67
Venue hire	$250	$1,000	$3,000	2.66
Average payable hours per meeting	9	11	18	3.50
Hourly rate - member	$70	$77	$125	6.86
Hourly rate -chair	$160	$175	$250	5.00
Proportion of members traveling to face-to-face meetings	30%	50%	80%	1.50
Travel costs, per member	$600	$820	$1,200	1.73
Venue hire, per face-to-face meetings	$250	$1,000	$3,000	2.67
Present Value ($m)	$13	$20	$29	

Figure 7: Distribution of Present Value of proposal to mandate an evidence advisory panel



4.5 Proposal: Reduce the frequency of synthesis reports to six-yearly

Details of proposed change

Move from a three-yearly to a six-yearly cycle for synthesis reports.

Assumptions

No cost implications are expected from this proposal, as a reduction in report frequency is not expected to reduce staffing requirements but instead enable more in-depth analysis underpinning the reports.

Costs

No cost implications expected.

Monte Carlo analysis

No Monte Carlo analysis undertaken for this proposal as there is no associated cost.

4.6 Proposal: Replace domain reports with one commentary each year

Details of proposed change

Between six-yearly synthesis reports, replace the six-monthly domain reports with one theme-based commentary each calendar year.

Assumptions

The reduction in report frequency is not expected to have resource or cost implications as reductions in report frequency are expected to be offset by improvements in depth of analysis.

Costs

No cost implications expected.

Monte Carlo analysis

No Monte Carlo analysis undertaken for this proposal as there is no associated cost.

4.7 Proposal: Introduce six-yearly data and evidence priority reports

Details of proposed change

For the Ministry to prepare six-yearly reports recommending priority areas for data and evidence development.

Costs

Based on advice provided by the Ministry, it is assumed that the preparation of the proposed data and priority reports will require full time input by five analysts (1 x Principal, 1 x Senior, 3 x Analyst) for six months every sixth year. This represents a total cost of around $0.7m every six years, with a 30-year present value of $3.2m (using a 2% discount rate and allowing for a 20% deadweight cost of taxation).

Table 5: Cost Assumptions and Present Value of proposal to introduce six-yearly data and evidence priority reports

	Low	Central	High	Beta (skewness)
Discount rate	1.5%	2.0%	8.0%	12.00
Deadweight cost of taxation	0%	20%	40%	1.00
Labour costs per FTE				
Ministry for the Environment	$211,404	$284,752	$378,768	1.28
Policy	$237,773	$264,142	$321,455	2.17
Non-policy	$176,185	$195,724	$238,191	2.17
Introduce six-yearly data and evidence priority reports				
Labour requirements (FTE)				
Ministry for the Environment				
Year 3, 9, 15, 21, 27	0.5	2.5	5.0	1.25
Present Value ($m)	$1.3	$3.2	$6.0	

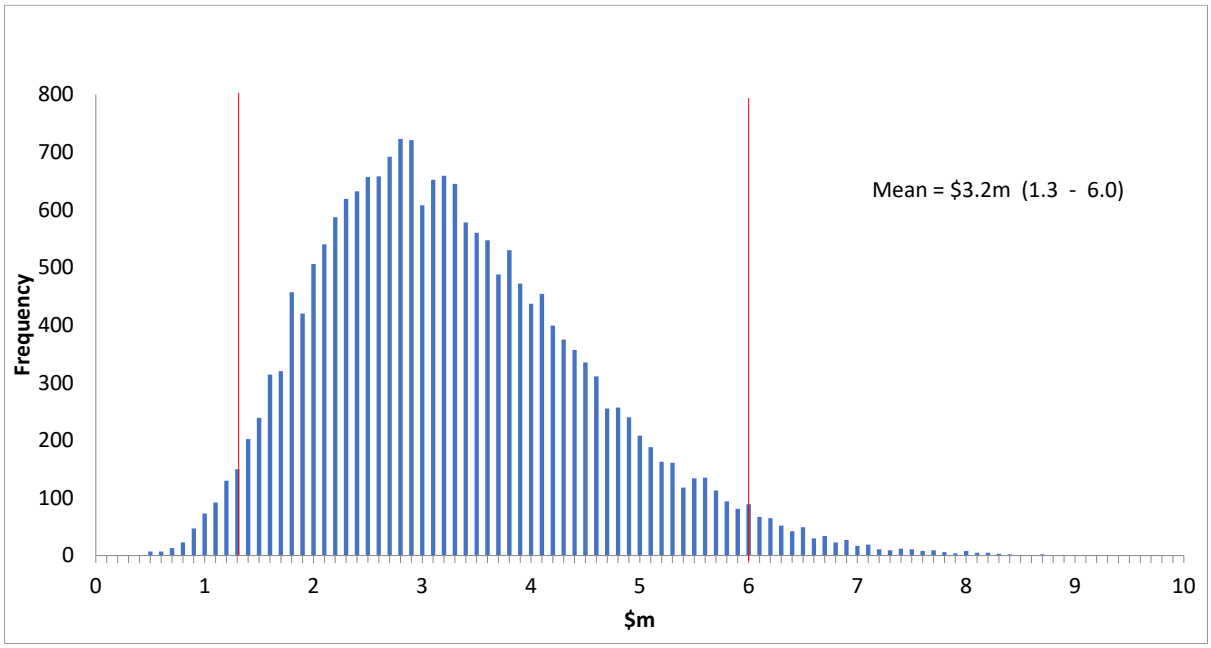
Monte Carlo analysis

Distribution analysis is based on higher and lower labour requirements to prepare the data and evidence priority reports each six years. The labour requirements each six years is allowed to vary from 0.5 to 5.0 FTEs. As with other proposal costs, the cost per FTE, the discount rate and the size of the deadweight cost of taxation are allowed to vary as indicated in

Table 5.

The analysis indicates the 95% confidence range for the estimated 30-year present value costs to range from $1.3m to $6.0m.

Figure 8: Distribution of Present Value of proposal to Introduce six-yearly data and evidence priority reports



4.8 Proposal: Strengthen the mechanisms for collecting data

Details of proposed change

Include new provisions in the ERA to set out powers for acquiring existing data for national environmental reporting.

Assumptions

It is assumed that most government department labour inputs associated with this proposal will be upfront, but that a level of ongoing input will also be required. Our cost estimates factor in a reasonable scale of input from CRIs and regional councils. In addition, an allowance has been made for increased environmental monitoring and data collection activity will be required, particularly from regional councils. There is also allowance for remote data collection, for example via satellite data collection. The purpose here is to estimate the scale of costs to the nation associated with increased levels of environmental monitoring and data collections. No assumption is made about the funding mechanism behind devolved environmental monitoring and data collections.

Key assumptions include:

- One new indicator is developed using remote sensing and analytical methods every five years (with a cost of $0.25m each) and once established these indicators are updated every three years (with an update cost of $0.1m).
- For each regional council or unitary authority, two new monitoring sites are established each year, with on average each monitoring site having an establishment cost of $30,000 and an annual maintenance cost of $10,000.
- The Ministry will require a dedicated team consisting of five FTE (1 x Principal, 1 x Senior, 3 x Analyst). The central assumption is that Stats NZ will dedicate 0.5 FTEs.

For the low cost assumption below, it is assumed that only five regional councils or unitary authorities establish monitoring sites. For the high cost, it is assumed that ten new monitoring sites established each year for six years and one site per year for the remaining 24 years for each regional council and unitary authority.

Costs

The implication is that ERA amendment associated data costs are expected to increase to $6.5m per year by year ten and steadily increase to around $13m by year 30. Allowing for a 20% deadweight cost of tax and using a 2% discount rate produces a 30-year central present value estimate of $220m.

Monte Carlo analysis

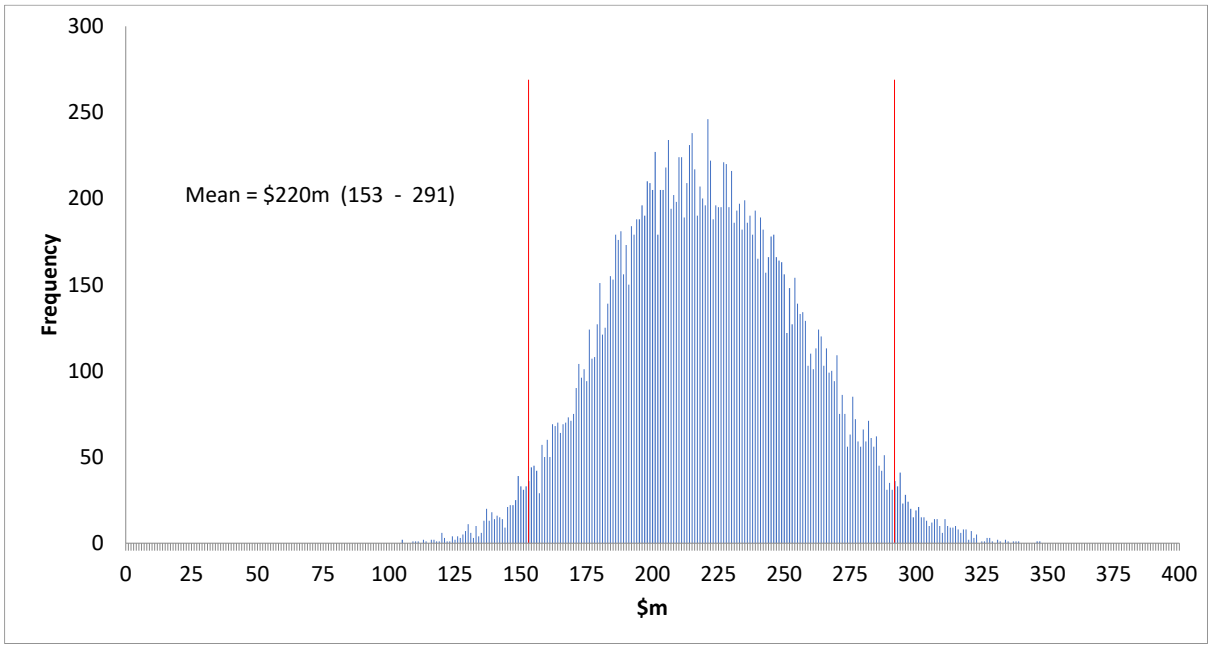
In addition to the standard risks around the size of discount rate, deadweight costs of taxation and labour costs, the cost estimate for this proposal will be influenced by assumptions on labour input requirements and on the budget for purchasing improvements. Allowing for variations in assumptions as presented in **Table 6** implies a 95% confidence interval around

the present value of cost estimates for this proposal that range from $153m to $292m as shown in **Figure 9**.

Table 6: Cost Assumptions and Present Value of proposal to strengthen the mechanisms for collecting data

	Low	Central	High	Beta (skewness)
Discount rate	1.5%	2.0%	8.0%	12.00
Deadweight cost of taxation	0%	20%	40%	1.00
Labour costs per FTE				
Ministry for the Environment	$211,404	$284,752	$378,768	1.28
Policy	$237,773	$264,142	$321,455	2.17
Non-policy	$176,185	$195,724	$238,191	2.17
Proposal 10				
Labour requirements (FTE)				
Ministry for the Environment				
Set up	1.0	2.0	3.0	1.00
Ongoing	2.0	5.0	8.0	1.00
Statistics New Zealand				
Set up	0.2	2.0	5.0	1.67
Ongoing	0.1	0.5	2.0	3.75
Other Departments				
Set up	0.0	0.0	0.0	0.00
Ongoing	0.0	0.0	0.0	0.00
CRI				
Set up	0.7	3.5	7.0	1.25
Ongoing	0.4	0.9	3.5	5.00
Regional Councils				
Set up	1.6	4.0	10.0	2.50
Ongoing	1.6	4.0	10.0	2.50
Other costs ($m)				
Year 6	$0.6	$2.7	$13.4	3.00
Year 12	$1.1	$4.7	$11.5	3.00
Year 30	$2.4	$10.4	$14.4	3.00
Present Value ($m)	$153	$220	$292	

Figure 9: Distribution of Present Value of proposal to strengthen the mechanisms for collecting data



4.9 Proposal: Report on progress towards outcomes

Details of proposed change

This proposal would enable, at the Secretary's discretion, the measurement of progress towards long-term policy outcomes, goals or targets as set in relevant legislation.

Assumptions

It is assumed that this proposal will require the Ministry for the Environment to dedicate one full time analyst and Stats NZ to dedicate one half of a full-time equivalent analyst each year.

Costs

Reporting on progress towards outcomes is therefore expected to have an annual cost of $0.38 million. Allowing for a 20% deadweight cost of tax and using a 2% discount rate produces a 30-year central present value estimate of $10m.

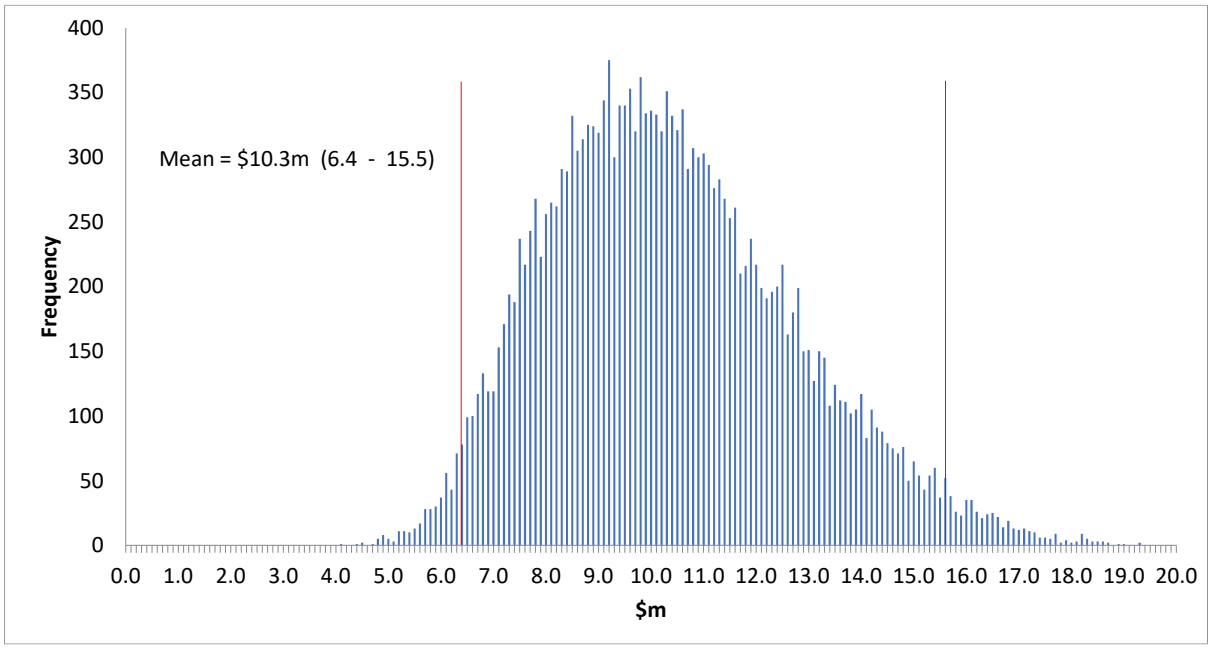
Table 7: Cost Assumptions and Present Value of proposal to report on progress towards outcomes

	Low	Central	High	Beta (skewness)
Discount rate	1.5%	2.0%	8.0%	12.00
Deadweight cost of taxation	0%	20%	40%	1.00
Labour costs per FTE				
Ministry for the Environment	$211,404	$284,752	$378,768	1.28
Policy	$237,773	$264,142	$321,455	2.17
Non-policy	$176,185	$195,724	$238,191	2.17
Measure environmental progress				
Labour requirements (FTE)				
Ministry for the Environment	0.2	1.0	2.0	1.25
Statistics New Zealand	0.2	0.5	1	1.67
Present Value ($m)	$6	$10	$15	

Monte Carlo analysis

In addition to the standard risks around the size of discount rate, deadweight costs of taxation and labour costs, the cost estimate for this proposal will be influenced by assumptions on labour input requirements and on the budget for purchasing improvements. Allowing for variations in assumptions as presented in **Table 7** implies a 95% confidence interval around the present value of cost estimates for this proposal that range from $6m to $15m as shown in **Figure 10**.

Figure 10: Distribution of Present Value of proposal to report on progress against outcomes



4.10 Legislative costs

Details

The cost associated with legislation need to be explicitly accounted for as from a national perspective there is an opportunity cost associated with the administrative activities associated with drafting legislation, consultations and parliamentary processes. Resources involved could potentially been used for other government activities. Our approach is to cost the legislation costs for the entire suite of proposed amendments and not allocate such costs to specific proposed amendments.

Assumptions

Departmental costs for legislation are based on the assumption of five FTE from Ministry for the Environment and 0.5 FTE from Statistics New Zealand. This provides a central departmental cost of $1.5m. International literature suggests a rule of thumb that associated parliamentary costs are 43% of departmental costs. Here we have taken a more conservative approach assuming that parliamentary costs will match departmental costs.

Costs

As all legislation costs are assumed to be set up costs, the present value of legislation is estimated to be departmental costs ($1.5m) plus parliamentary costs ($1.5m) multiplied by the 20% deadweight cost of tax allowance, implying a present value of $3.7m.

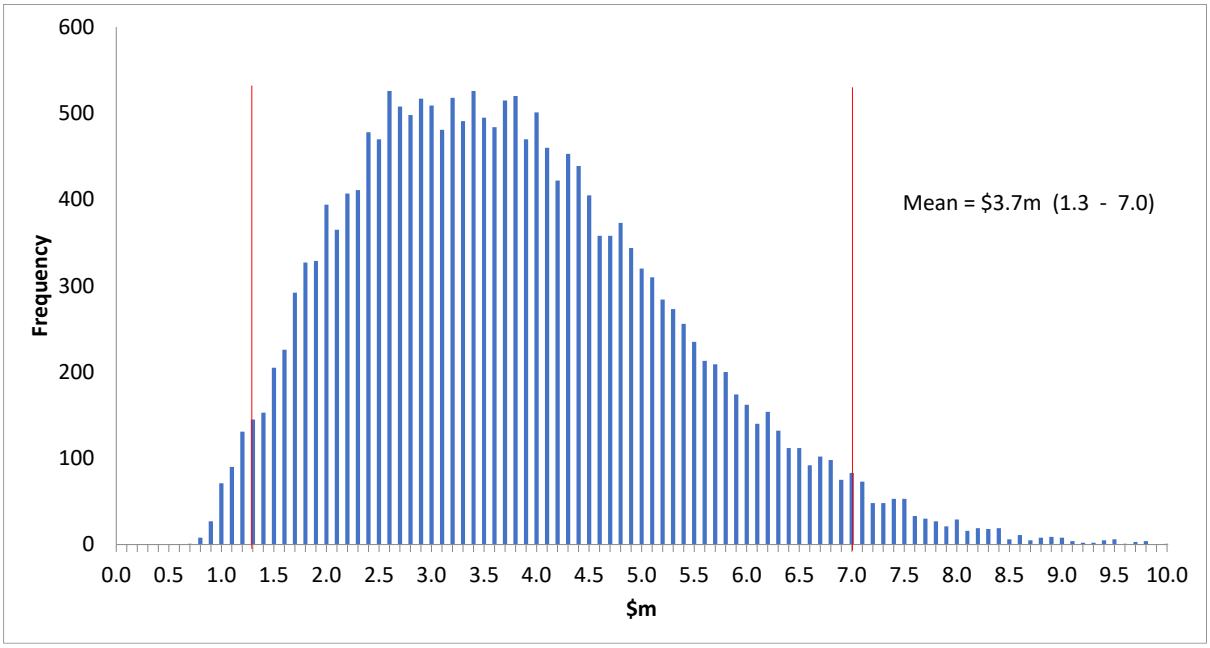
Table 8: Cost Assumptions and Present Value of legislation cost

	Low	Central	High	Beta (skewness)
Discount rate	1.5%	2.0%	8.0%	12.00
Deadweight cost of taxation	0%	20%	40%	1.00
Labour costs per FTE				
Ministry for the Environment	$211,404	$284,752	$378,768	1.28
Policy	$237,773	$264,142	$321,455	2.17
Non-policy	$176,185	$195,724	$238,191	2.17
Legislation costs				
Labour requirements (FTE)				
Ministry for the Environment	2.0	5.0	8.0	1.00
Statistics New Zealand	0.3	0.5	2.0	6.00
Other costs ($m)				
Parliamentary costs	$0.5	$1.5	$4.0	2.43
Present Value ($m)	$1.3	$3.7	$7.0	

Monte Carlo analysis

In addition to the standard risks around the size of discount rate, deadweight costs of taxation and labour costs, the cost estimate for legislation will be influenced by assumptions on departmental labour requirements and the efficiency of parliamentary processes. Allowing for variations in assumptions as presented in **Table 8** implies a 95% confidence interval around the present value of cost estimates for Māori engagement that range from $1.3m to $7.0m. These outcomes are illustrated in **Figure 11**.

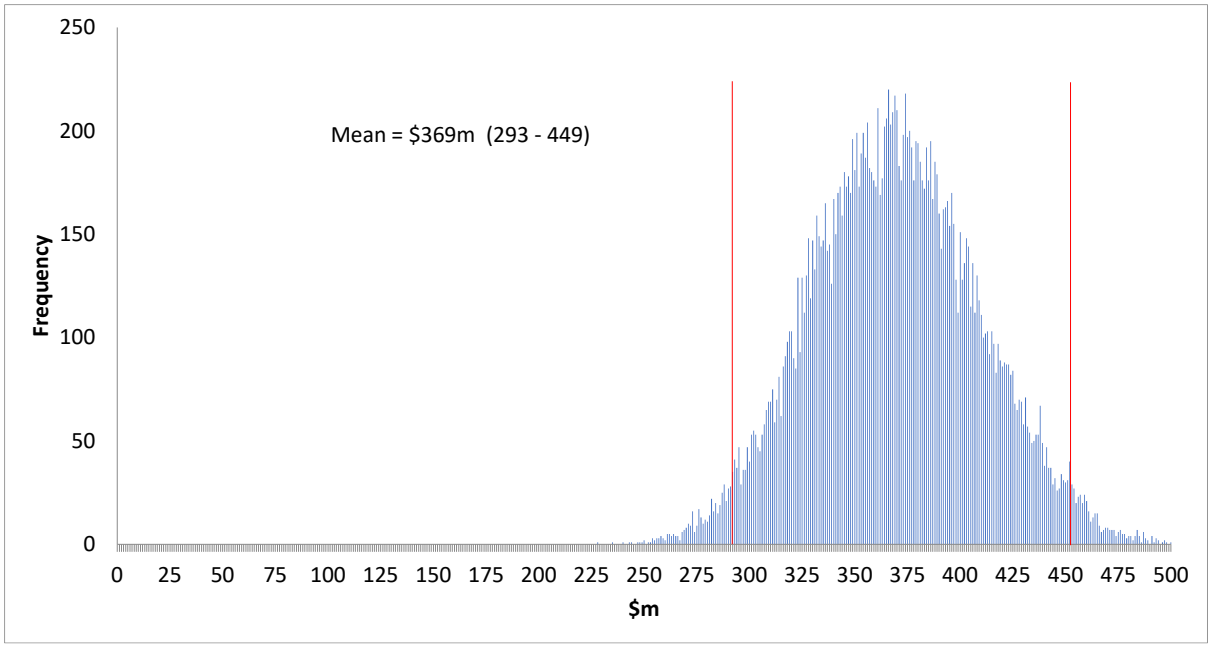
Figure 11: Distribution of Present Value of legislation cost



4.11 Total costs

Combining all estimated costs produces a central estimate of $369m for the present value of costs associated with proposed amendments to the ERA. Monte Carlo analysis produces a 95% confidence interval for these present value costs that range between $293m and $449m (see **Figure 12**).

Figure 12: Distribution of Present Value of total costs



5 Analysis of Expected Benefits

As outlined in Section 2, the impacts of individual proposals have not been estimated. In particular, as there are significant synergies between different proposals the potential impact of the suite is likely to be greater than the sum of its individual parts. This section sets out the assumptions and estimates of benefits against each of the categories of monetised benefits identified.

5.1 Resource management efficiency benefits

Cost benefit analysis of proposed reforms to the resource management system estimated annual benefits of $210m. Our calculations are based on the ERA amendments eventually generating resource management efficiency gains equivalent to 10% of those generated by the RM reforms, i.e. $21m per year from year six onwards.

This generates a central estimate for the present value of $373m for the benefit expected from efficiency gains to resource management regulatory processes. This is based on calculations using a 2% discount rate. Note that benefit calculations do not involve a tax impact so no adjustment is made for tax deadweight cost impacts.

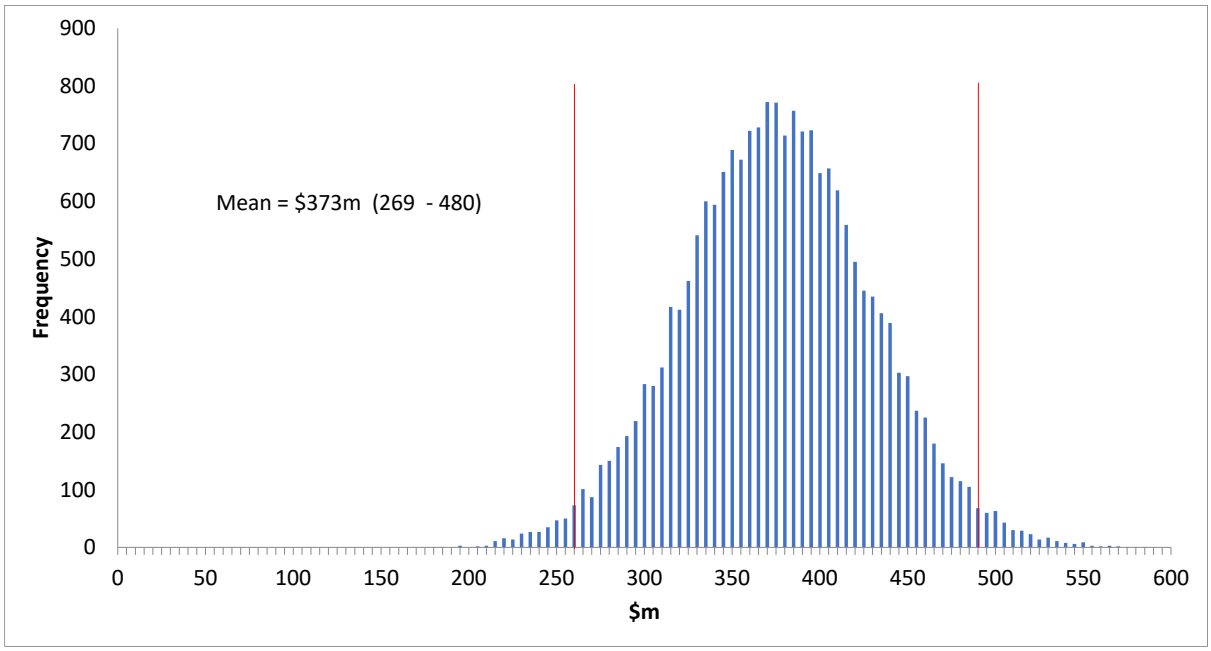
Table 9: Benefit Assumptions and Present Value of resource management efficiency benefits

	Low	Central	High	Beta (skewness)
Discount rate	1.5%	2.0%	8.0%	12.00
Resource Management efficiency benefit ($m)				
Before year 6	$0.0	$0.0	$0.0	1.00
From year 6	$10.5	$21.0	$105.0	8.00
Present Value ($m)	$268	$373	$478	

Monte Carlo analysis

In addition to the standard risks around the size of discount rate, the benefit estimate from efficiency gains from the resource management system will be influenced by assumptions on the extent that ERA will generate efficiency improvements. Our low assumption presumes an ERA impact of just 5% of the resource management CBA estimate. The high figure is equivalent to 50%. This upward skew in the distribution analysis reflects perspectives that, although difficult to predict, that changes in focus have the potential to generate very large gains in efficiency. That is what you choose to do can have more profound impacts than changing how you do things. As the ERA amendments are all about improving our understanding of the state of the environment, but more importantly about what truly matters, there is a non-trivial chance that this improved understanding could produce profound efficiency gains. However, note that the Monte Carlo analysis accounts for the fact that these high outcomes come with a low probability, so the 95% confidence interval is estimated to range from $269m to $480m (**see Figure 13**).

Figure 13: Distribution of Present Value of resource management efficiency benefits



5.2 Slower ecosystem degradation

Ecosystem services from inland wetlands, indigenous forest, grasslands and coastal systems are incorporated in the estimation of potential benefits from the ERA amendments. We attempt to estimate a benefit that would come from the ERA amendments encouraging policy and/or behaviour responses that slow down the pace of environmental degradation. The approach is to estimate the value of ecosystem services generated by natural capital in New Zealand. A lower level of natural capital will generate lower levels of ecosystem services, which will have impacts for New Zealanders, either through reduced services (e.g. scenic values, leisure opportunities, water purification, carbon sequestration etc.) or though increasing adaptation opportunity costs (e.g. coastal protection, sewage treatment, desalination etc.).

Valuations of per hectare ecosystem services are sourced from de Groot et al 2012[6], translated into 2024 New Zealand prices, see **Table 10**.

Table 10: Estimates of the value of services provided by different ecosystems, NZ$/Ha (2024 prices)

Environment	Mean	Median	High	Low
Inland wetlands	$91,863	$59,143	$375,320	$10,796
Indigenous forest	$10,785	$4,033	$58,705	$995
Grassland	$10,273	$9,654	$21,219	$444
Coastal system	$103,434	$95,716	$150,452	$93,595

To obtain national values the amount of land with indigenous forest cover and wetlands was sourced from the Ministry for the Environment's LUCAS land use map tables.[7] The grassland area was assumed to be 13% of New Zealand's land area[8] and coastal systems were calculated based on 15,000 km2 (assuming a width of 1km around the New Zealand coastline). The resulting range of ecosystem services from these environments is presented in the **Table 11** below.

[6] Rudolf de Groot et al., 'Global Estimates of the Value of Ecosystems and Their Services in Monetary Units', Ecosystem Services 1, no. 1 (1 July 2012): 50–61, https://doi.org/10.1016/j.ecoser.2012.07.005.
[7] https://www.mfe.govt.nz/more/data/available-datasets/land-use-map
[8] https://www.environmentguide.org.nz/issues/biodiversity/new-zealands-biodiversity/grasslands/

Table 11: Estimates of the annual value of services provided by ecosystems in NZ, NZ$ m (2024 prices)

Environment	Mean	Median	High	Low
Inland wetlands	$66,800	$43,000	$273,000	$7,900
Indigenous forest	$83,500	$31,200	$454,600	$7,700
Grassland	$35,800	$33,600	$73,900	$1,500
Coastal system	$155,200	$143,600	$225,700	$140,400

The benefit generated by the ERA assumed in the CBA estimates is effectively to assume a one-off, but sustained prevention of a 0.02% degradation in each environment. No impact is accounted for in the first five years, with a gradual increase in "saved" ecosystem services over the next twenty years. This is a remarkably small attribution of benefit expected to result from the ERA amendments. Our central estimates incorporate an annual benefit of $3.4m in year six increasing gradually to $68.3m per year from year 25 onwards. Over the 30-year analysis period this represents a present value of $699m.

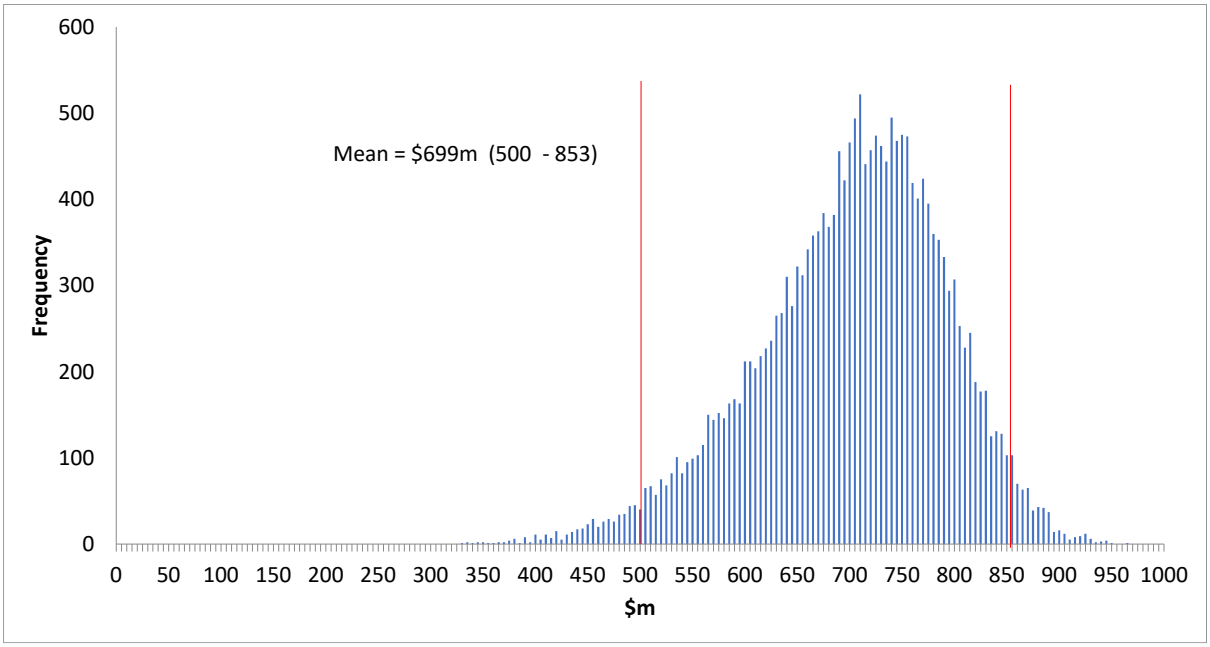
Table12: Benefit Assumptions and Present Value of reduced degradation

	Low	Central	High	Beta (skewness)
Discount rate	1.5%	2.0%	8.0%	12.00
Reduced degradation benefit ($m)				
From year 25				
Inland wetlands	$0.8	$13.4	$54.6	3.83
Indigineous forest	$0.8	$16.7	$90.9	5.56
Grassland	$0.2	$7.2	$14.8	1.34
Coastal systems	$14.0	$31.0	$45.1	0.83
Present Value ($m)	$502	$699	$853	

Monte Carlo analysis

In addition to the standard risks around the size of discount rate, the benefit estimate reduced natural environment degradation will be influenced by the accuracy of ecosystem valuation estimates and the extent that the ERA amendments will be able to slow the pace of degradation. These factors are implicitly accounted for in the Monte Carlo analysis by adjusting the value of ecosystem services between the high and low estimates presented in **Table 10** and **Table 11**. The resulting change in inputs into the benefit estimates are presented in **Table 12**. Applying this range of assumptions into the Monte Carlo analysis generates present value estimates of the benefits from reduced environmental degradation that range from $502m to $853m (**see Figure 14**).

Figure 14: Distribution of Present Value of reduced degradation



5.3 Less harm from pollution

The valuation of the potential impact of pollution on wellbeing was estimated using information from the 2018 Quality of Life Survey[9] by regressing individual response data to the 2018 survey of the form:

$$Y_{ij} = \alpha + \sum_{j} \beta_j X_{ij} + \gamma F_{ij} + \mu_{ij}$$

Whereby household income is estimated to be a function of a number of control variables (X), and whether respondents stated that they were impacted by the factor of interest (F). The resulting estimate of the parameter γ provides an estimate of the marginal trade-off of the factor with household income and so provides a method for monetising the impact of the social or environmental wellbeing phenomenon of interest. Typically, the analysis from the survey indicates a negative correlation between household income and exposure to wellbeing damaging problems such as noise or air pollution.

The premise behind this approach is that the financial equivalence of a factor can be deduced by the ability for people to use their financial resources towards avoiding exposure to the factor. For example, people living beside an airport will be exposed to noise irritations. There will naturally be a house price or rental discount associated with being exposed to such irritations or conversely there is likely to be a premium on dwellings that are insulated from such noise (either due to location or building design and materials). Thus, those who have sufficient wealth can reduce their exposure to a wellbeing harming irritant. Of course, this comes at a financial cost to them (e.g. they have to spend more on rent) but they have a lower exposure to the irritant. The price that these people are willing to spend to avoid this irritant therefore provides a financial-equivalent estimate of the cost to people who remain exposed to the irritant.

This approach provides estimates of the monetised value of exposure to noise or poor-quality air or water, with such exposure self-defined by survey respondents. To provide some context 19% of survey respondents in 2018 reported that water quality water pollution was a “big problem” locally. Similar figures for air quality and noise problems were 4% and 7% respectively. **Table 12: Estimates of annual costs of pollution, 2018** provides the central results of this pollution valuation analysis.

[9] Nielsen. (2018) Quality of Life Survey 2018. (A report to participating City and Regional Councils). Wellington, New Zealand

Table 12: Estimates of annual costs of pollution, 2018

	Water	Air	Noise
Cost to individual households ($)	$2,230	$11,950	$7,460
Household count with potential issues	319,400	67,300	123,300
Implied national value ($m)	$713.5	$804.8	$918.1

To value the potential impacts that the ERA amendments might have on the costs to society from exposure to pollution we assume that:

- The benchmark exposure to pollution will remain proportional to the 2018 Quality of Life Survey (i.e. the number of houses exposed will increase with population growth, as projected by Stats NZ).
- The ERA amendments are assumed to reduce the pace of increase in exposure by 5% from 2029 onwards. Thus, if annual population growth is 0.6% in a particular year, the ERA is assumed to reduce the increase in households exposed to a problem from 0.6% to 0.57%.

The result of this approach generates values that vary from year to year but generally increase due to the impact of population growth (a given level of pollution is likely to adversely affect more people when the population is larger). Our estimates assume no impact before year six, when impacts are valued at less than $1m for each type of pollution but increase to annual impacts of $16m by year 30.

Despite the quite minor potential impact attributed to impacts from ERA amendments[10], the estimated positive impact on wellbeing has a present value of $146m.

[10] The Quality of Life Survey provides circumstantial evidence that environmental policies can have meaningful impacts on wellbeing with a 29% reduction in the number of households complaining about air quality between 2014 and 2018 potentially reflecting changes in emission regulations. Such changes are far in excess of potential benefits assumed here, where we are factoring in slower growth rates in exposure to pollution, not the reductions that actually occurred between 2014 and 2018.

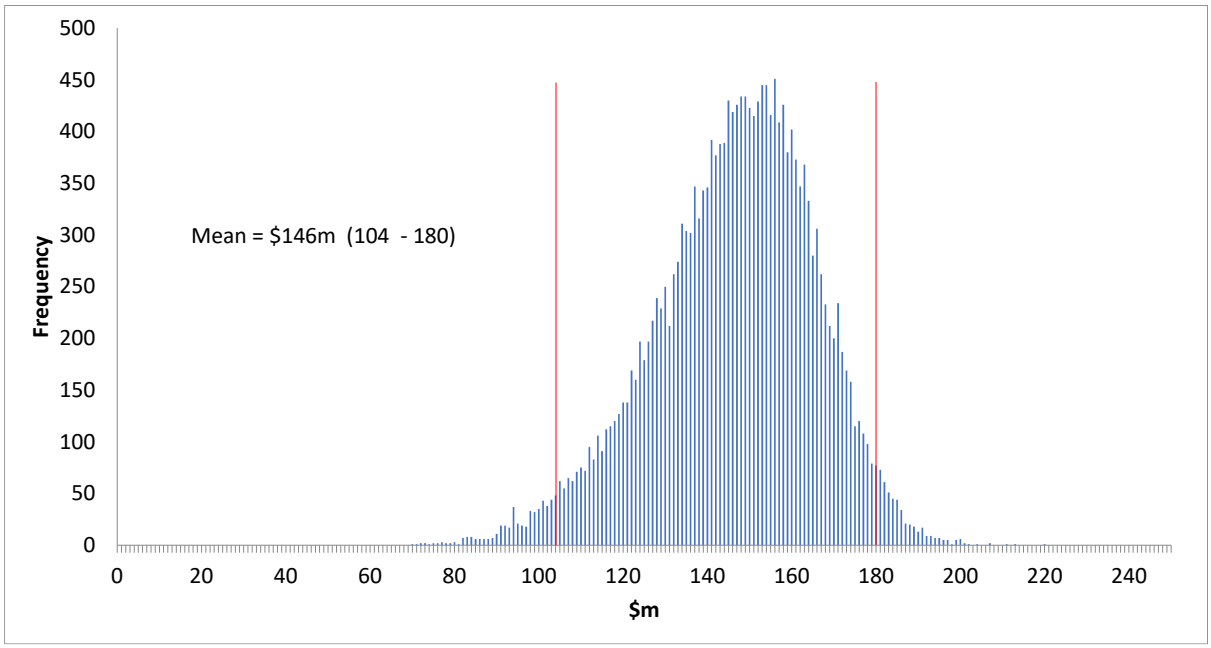
Table 13: Benefit Assumptions and Present Value of less harm from pollution

	Low	Central	High	Beta (skewness)
Discount rate	1.5%	2.0%	8.0%	12.00
Benefit from lower exposure to pollution ($m)				
Air quality				
Year 6	$0.2	$0.3	$1.0	4.12
Year 30	$3.6	$7.2	$21.8	4.12
Water quality				
Year 6	$0.0	$0.1	$1.0	31.09
Year 30	$0.6	$1.3	$20.7	31.09
Noise				
Year 6	$0.2	$0.4	$1.2	4.76
Year 30	$3.7	$7.5	$25.2	4.76
Present Value ($m)	$104	$146	$180	

Monte Carlo analysis

In addition to the standard risks around the size of discount rate, the benefit estimate from reduced exposure to pollution will be influenced by the accuracy of the estimates of valuations of the impact of pollution on wellbeing and the extent that the ERA amendments will be able to slow the increase in exposure to pollution. These factors are implicitly accounted for in the Monte Carlo analysis by adjusting the value of pollution and the impact attributed to the ERA amendments. The net impacts of these adjustments are summarised as the high and low estimates presented in **Table 13**. Applying this range of assumptions into the Monte Carlo analysis generates present value estimates of the benefits from reduced exposure to pollution that range from $104m to $180m (**see Figure 15**).

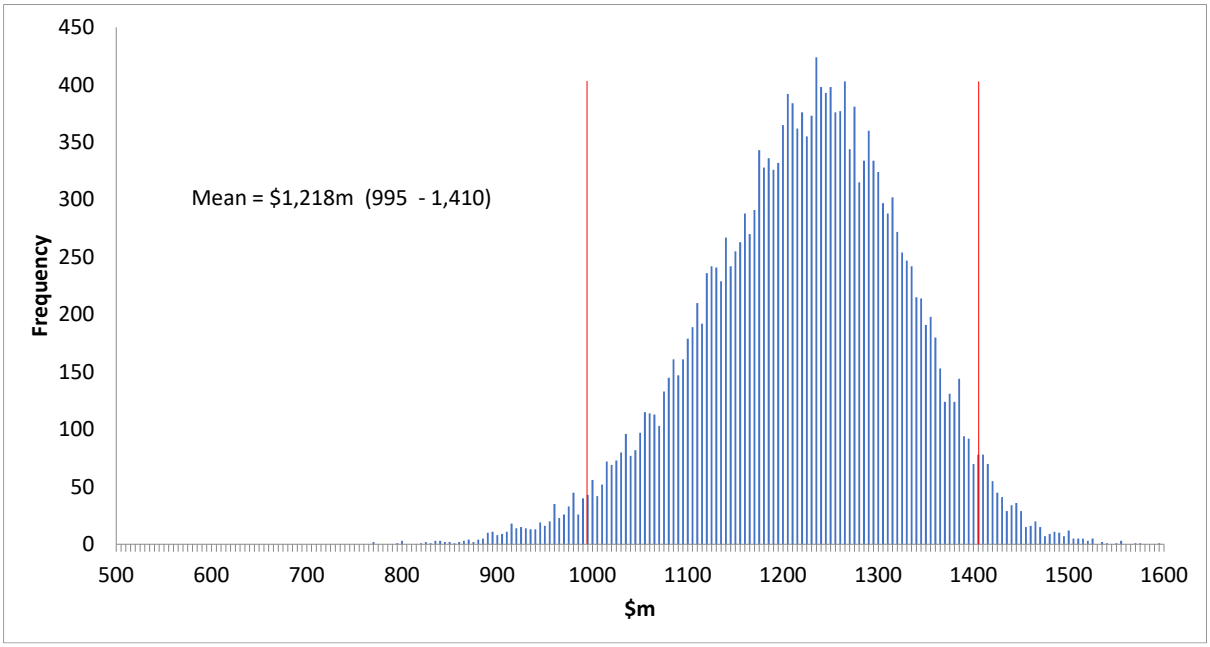
Figure 15: Distribution of Present Value of less harm from pollution



5.4 Total benefits

Combining all estimated benefits produces a central estimate of $1219m for the present value of costs associated with proposed amendments to the ERA. Monte Carlo analysis produces a 95% confidence interval for these present value costs that range between $995m and $1410m (**see Figure 16**).

Figure 16: Distribution of Present Value of Total Benefits



Annex 1 - References

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