A Review of the Costs and Benefits for certain pests in the Tasman- Nelson Proposed Regional Pest Management Plan

A technical report examining the costs and benefits of recommended changes to the Plan

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Executive Summary

The Joint Committee for the Proposed Tasman Nelson Regional Pest Management Plan 2017-2027 (the Plan) recommended a number of amendments that affect the status of certain pests under the Plan. This document lists and assesses those changes against Section 6 (Directions on Analysing Benefits and Costs) of the National Policy Direction for Pest Management (NPD).

This report also contains the results of a review of occupier costs that was undertaken for all of the pests that have occupier costs associated with them. The review identifies 22 pests where occupier costs should be considered. Consequential changes to the analysis and costs and benefits caused by this review are presented in this report.

This report includes the results of the benefits and costs analysis work undertaken for numerous pests which are included in the amended Proposed Plan or were recommended to change management category (such as rats at the Waimea site and yellow jasmine), and Argentine/Darwin's ants, boneseed, and pampas, which are not included. The Joint Committee has decided not to include programmes for Argentine/Darwin's ants, boneseed, and pampas due to the expense of control or because they are not cost beneficial.

All of the changes posed by the Joint Committee for new pests or pests with changes in category are cost beneficial and meet the requirements of the NPD.

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1. Introduction

To comply with Biosecurity Act 1993 (the Act) requirements for an analysis of the benefits and costs of pest programmes, the *Tasman Nelson Proposed RPMP Cost Benefit Analysis* (original CBA) document was produced in November 2017 as a supporting document to the proposed Tasman Nelson Regional Management Plan 2017 – 2027 (Plan).

Following a public submissions and hearing process, the Joint Committee for the Plan recommended a number of amendments which affect the status of certain pests under the Plan. The amendments are presented in section 2 *Proposed Changes leading to CBA Revision* of this report. Based on these recommendations, the Plan has been revised and is supported by the *Revised Tasman Nelson Proposed RPMP Cost Benefit Analysis 2019-2029* (Revised CBA).

This technical report provides further detail on the analyses undertaken that were used to inform the Revised CBA. In particular, this report presents a revised NPD 6 (1) assessment for programmes that have changed designation or which have potentially material changes proposed for the programmes, or programmes which have significant occupier costs associated with them. The criteria used to determine the NPD 6 (1) considerations are listed in section 3 *NPD 6 (1) Analysis* and the results are presented in the analysis table (Table 1). The NPD 6 (1) analysis finds that most of the pests that feature in the amended Plan only require a low (highly qualitative) level of analysis.

Section 6 (2) of the NPD requires that the analysis of the benefits and costs identify and quantify (if practicable) the benefits and costs of each option and state the assumptions on which these assessments are based. Where the response to the NPD 6 (1) analysis in Table 1 concludes the need for a low-level analysis, this report defers to the use of the Revised CBA to present the qualitative analysis. **The Revised CBA that attends the revised proposed Plan should be referred to when seeking low level CBAs of the pests in the Plan and other matters addressing section 6 of the NPD - particularly NPD 6 (3) and 6 (4).**

Where the response to the NPD 6 (1) analysis in Table 1 concludes the need for a medium level analysis or advises that a quantitative analysis would be useful, this report presents the results of the quantitative analysis of the preferred option and compares this to the cost consequences of doing nothing.

2. Proposed Plan Changes Leading to CBA revision

2.1 Changes to the status of certain pests

The Joint Committee recommended the following changes that may materially affect the weight of costs relative to the benefits:

- Add Cape tulip, water hyacinth and Johnson grass (all National Interest Pest Response (NIPR) plants) to the exclusion programme along with for *Phragmites*;
- Move Taiwan cherry from a site-led programme to an eradication programme;
- Move knotweeds from progressive containment to eradication;
- Move *Sabella* (Mediterranean fanworm) from the sustained control programme to an eradication programme;
- Better define the containment areas for the progressive containment of bomarea, Chinese pennisetum, purple loosestrife, reed sweetgrass, variegated thistle, and white edged nightshade;
- Extend the managed area of climbing asparagus to include Wainui Bay and change programme description to "sustained control";
- Change the programme description for chocolate vine, *Gunnera*, old man's beard, Queensland poplar, wild ginger yellow flag, and yellow jasmine from "progressive containment" to "sustained control";
- For banana passion vine, remove the Upper Buller from the map, and change the programme description to "sustained control";
- Move woolly nightshade from a progressive containment programme to a sustained control programme;
- Include good neighbour rules for gorse and broom in their respective sustained control programmes outside the Howard-St Arnaud area;
- Include rats in the Waimea Estuary Site-led programme; and
- Add a Site-led programme to manage rosemary grevillea, *Cotoneaster* species, European holly, sycamore, kūmarahou, Douglas fir (wildings only), in Abel Tasman National Park and private land enclaves along the coastal margin of the Park (in and around Awaroa, Torrent Bay and Marahau).

2.2 Other considerations leading to revised analyses contained in this report

The submissions from DOC and MPI expressed concern that the costs to occupiers to comply with the Plan were not fully considered in the original CBA. In response to this submission a review of the occupier cost was undertaken for all of the pests that have occupier costs associated with them. The conclusions for each pest are contained in the column labelled *likely costs relative to likely benefits* in the NPD 6 (1) analysis (Table 1) below. A summary of salient points is presented in section 4 *Identifying Significant Occupier Costs*.

In addition to the changes posed for the proposed Plan this report includes the results of a benefits and costs analysis undertaken for Argentine/Darwin's ants, boneseed (Port Hills), and pampas to determine the merit (or otherwise) of including these pest programmes in the Plan. The Joint Committee has decided not to include programmes for these pests due to expense or because they are not cost beneficial.

2.3 Other considerations leading to revised analyses mainly addressed by the Revised CBA

The submissions of Marlborough District Council and Project Janszoon noted that the description of the distribution of feral rabbits was not correct. The Joint Committee recommended an amendment to the Revised CBA to reflect that rabbits are seen in low numbers in parts of Takaka Hill and in areas of Golden Bay. The Revised CBA presents this change.

Nelson City Council submitted that Taiwan cherry be manged as an eradication species across both the Tasman District and Nelson City areas. That submission contained a quantitative assessment of the costs and benefits of that proposal and is not re-iterated here. The NPD 6 (1) analysis (Table 1) concludes that a qualitative CBA is all that is warranted. The Revised CBA presents the qualitative CBA.

3. NPD 6(1) analysis

When considering the recommendations of the Joint Committee under Section 75 of the Act, the Tasman District Council and Nelson City Council must consider whether they remain satisfied that the benefits of the Plan outweigh the costs after taking account of the likely consequences of inaction or other courses of action. These considerations are directed by Section 6 (Directions on Analysis Benefits and Costs) of the National Policy Direction for Pest Management 2015 (NPD).

When determining the appropriate level of analysis of the benefits and costs of the plan, Section 6(1) of the NPD requires that the councils consider:

a) the level of uncertainty of the impacts of the subject, or an organism being spread by the subject, and of the effectiveness of measures; and

b) the likely significance of the subject, or an organism being spread by the subject, or of the proposed measures, in terms of stakeholder interest and contention, and total costs of the proposed plan; and

c) the likely costs of the programme relative to the likely benefits; and

d) the level of certainty and the quality of the available data.

Guidance on how to set levels for each of these considerations is provided by *Meeting the requirements of the National Policy Direction for Pest Management 2015* (Version 1.0) produced by the Ministry for Primary Industries (MPI; 2015). The following assessment criteria have been derived from that source:

3.1 ND 6 (1) Assessment criteria

6 (1) a) Uncertainty of the impact of the pest and the effectiveness of the methods of control

- **High uncertainty** – Little known about its impacts and the effectiveness of control measures.
- **Medium uncertainty** – Some information available on its impacts and on the effectiveness of control measures**.**
- **Low uncertainty** – Plenty of information on its impacts and effectiveness of control measures.

6 (1) b) Significance of the pest or the proposed measures

- **High** – High total costs **or** strongly opposed community views **or** significant community interest.
- **Medium** – Moderate total costs **or** some opposed community views **or** moderate community interest.
- **Low** – Low total costs **or** limited community interest.

6 (1) c) Relationship between costs and benefits

- **High** – costs are likely to be similar to the benefits.
- **Medium** – costs are likely to be less than the benefits.
- **Low** – costs are likely to be much lower than the benefits.

6 (1) d) Level and quality of available data

- **High** – High quality data on distribution **and** well-established costs and impacts.
- **Medium** – Limited information on distribution **and** on costs and impacts**.**
- **Low** – Little information available on distribution **and** costs and impacts.

The level of Cost Benefit Analysis that is required to be undertaken is determined by the combination of ratings for these different categories where:

- A **High** level of CBA is needed when three of the four criteria are assessed as high.
- A **Low** level of CBA can be undertaken when none of the first three criteria (Criteria 1-3) are ranked high and no more than two are ranked as medium.
- A **Medium** level of CBA is required for all other combinations.

The results of the application of the NPD Section 6(1) criteria are presented in Table 1.

3.2 Identifying significant occupier costs

Neither the NPD nor the MPI guidance document provide guidance on what are "significant" occupier costs for each pest. For this review, occupier costs are considered collectively (i.e. **not** based on the cost to individual occupiers) and significance is attributed to the estimated size of that collective cost and acceptability of the cost to occupiers in comparison to the estimated value of pest control work. The larger the value or rate of return, the more likely the occupier cost is an acceptable economic decision and so the cost is considered less significant. This approach is assumed to apply equally to pests that affect environmental values as it does to direct economic evaluation.

The column labelled *likely costs relative to likely benefits* in Table 1 below presents the conclusions for each pest. Most of the occupier costs for the pests in the Plan are not considered significant enough to warrant revisiting the CBA. Never-the-less, where quantitative CBAs have been prepared in this report as part of a revision for other reasons, occupier costs have been included. Revisions include (for instance) estimating an additional occupier cost imposed on Crown agencies by the introduction of the Good Neighbour Rule for broom and gorse. The result is that 22 pests have had medium level quantitative CBAs applied to test changes in cost assumptions.

In the cases of the sustained control programmes for broom (Howard – St Arnaud), gorse (Howard – St Arnaud) and nassella tussock (Cape Soucis), the occupier costs are believed to be acceptable to

most of the occupiers in those areas and are not large. However, the original CBA for these pests showed very small or negative rates of return and therefore any additional cost is considered significant as it may result in the costs outweighing the benefits. Concurrent to reviewing the occupier costs for broom and gorse, the council costs for these programmes have been revised to acknowledge that these two programmes share the council cost between them.

The discount rates for broom, gorse, and nassella have been also been changed to 4% in line with advice from biosecurity cost analysis specialists. While the Joint Committee has not recommended that these programmes be changed, the CBAs for these pests have been revisited to check that the benefits outweigh the cost when considering the occupier costs and other changed assumptions.

Yellow bristle grass is the only other pest where the proposal remains unchanged and is assessed as having significant occupier costs. The effective management of yellow bristle grass potentially has a very large occupier cost associated with it and there is a risk that the programme may fail to deliver the outcomes proposed due to the potential difficulty with successfully containing this pest. A medium level CBA for this pest has been applied to check that the benefits outweigh the costs when occupier cost and risk of failure are considered.

Table 1 below presents the conclusions for the review of the occupier costs for each pest (*likely costs relative to likely benefits* column) and the response contained in this report.

Table 1: Assessment of the level of cost and benefits analysis (CBA) to be applied to each pest in the Plan

Pest	6(1)(a) Uncertainty of impacts and effectiveness of methods	6(1)(b) Likely significance or controversy of the pest or proposed measures or cost of measures	6(1)(c) Likely costs relative to likely benefits	6(1)(d) Level and quality of data	Level of CBA warranted	Response
Abel Tasman NP site-led programme for: Rosemary grevillea; Cotoneaster spp.; European holly; Sycamore; Kūmarahou; and Douglas fir (wildings only);	Low - the environmental impacts of these species are known. Control measures known.	Low – a very high level of acceptance indicated by submissions. Most opposition can be resolved through collaboration.	Low - the increased protection to the National Park from these invasive weeds is more than likely to outweigh the additional cost.	Medium - area of attention very specific, but sizes of infestation not well known.	Low	A qualitative CBA for each pest is presented in the Revised CBA document.
Argentine and Darwin's ants (exclusion sites)	Low - the environmental impacts are well known. Possibly some risk to success in urban areas if occupier control is relied on.	Medium - public already aware of the pest, but experience shows there is resistance to adoption / participation.	Medium - the environmental benefits are likely to outweigh the costs in most but not all scenarios.	Medium to high - delimitation surveys for known sites, but new sites not monitored for, so would need to check infestations relative to site of interest.	Medium	The results of a medium level CBA are presented in Table 2 of this report.
Banana Passion vine (Golden Bay)	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original CBA shows benefits outweigh costs for sustained control and progressive containment programmes. Occupier costs were considered in original CBA.	High - the total extent assumption is based on good existing information about the extent of the pest in Golden Bay.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.
Banana Passion vine (Upper Riwaka)	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original CBA shows benefits outweigh costs for sustained control and progressive containment programmes. Occupier costs were considered in original CBA.	Medium - the total extent assumption is based on good existing information though the pest may be more widespread than realised in Riwaka.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.

Pest	6(1)(a) Uncertainty of impacts and effectiveness of methods	6(1)(b) Likely significance or controversy of the pest or proposed measures or cost of measures	6(1)(c) Likely costs relative to likely benefits	6(1)(d) Level and quality of data	Level of CBA warranted	Response
Black spot	Low - the production impacts are well known.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original qualitative CBA adequately describes the costs and benefits in qualitative terms. Occupier costs are not considered significant as control is sustained through normal crop management practices - i.e. there is very little additional cost imposed by the Plan.	High - the pest is known to be throughout the region	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Blackberry	Low - the production impacts are well known.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original qualitative CBA adequately describes the costs and benefits in qualitative terms. Occupier costs are not considered significant.	High - the pest is known to be throughout the region	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Bomarea	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low to medium - the original CBA shows benefits outweigh costs for this type of programme. The reconsideration of the containment area size of infestation and occupier costs may have increased cost effect.	Medium - the original total extent assumption is based on existing observations at scattered sites. Mapping the pest is very assumption based.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.
Boneseed (Port Hills)	Low - the environmental and production impact of the species is known. Control measures known.	Low - public are generally aware of the pest nature of this species.	Low to medium - the environmental benefits are likely to outweigh the costs on most scenarios except where sites are steep and inaccessible. A progressive containment strategy provides for this outcome.	High - location of infestations relatively well known. Some further monitoring would be needed to improve knowledge of full distribution	Low	The results of a medium level CBA are presented in Table 2 of this report.
Broom (Howard-St Arnaud)	Low - production and environmental impacts well understood	Low - the pest is subject of the Proposed Plan and there was little contention on its inclusion.	High - the original quantitative CBA showed a negative rate of return and overlooked the of control for landowners.	High - the location of this pest in the interest area can be readily identified through monitoring. The original CBA was focused on protecting areas inside the area of interest (which is effectively progressive containment under the NPD), but the means of achievement requires ongoing commitment (sustained control) in real terms.	Medium	A qualitative CBA is presented in the Revised CBA, supported with the results of a medium level CBA. The results of the medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.

Pest	6(1)(a) Uncertainty of impacts and effectiveness of methods	6(1)(b) Likely significance or controversy of the pest or proposed measures or cost of measures	6(1)(c) Likely costs relative to likely benefits	6(1)(d) Level and quality of data	Level of CBA warranted	Response
Broom (outside the Howard - St Arnaud area)	Low - production impacts well understood, as are control measures.	Low to medium - was a subject in the Proposed Plan and there was support for control of this species. A potential increased cost imposition is placed on Crown agencies who would be bound by the rule.	Medium - the benefits are likely to outweigh the costs, but the change increases the assumed landowner costs.	High - the pest is known to be throughout the region in patchy infestations	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.
Chinese pennisetum	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low to medium - the original CBA shows benefits outweigh costs for this type of programme. The reconsideration of the containment area size of infestation and occupier costs may have increased cost effect.	Medium - the original total extent assumption is based on existing observations at scattered sites. Mapping the pest is very assumption based.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.
Chocolate vine	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original CBA shows benefits outweigh costs. Change from sustained control from progressive containment may reduce benefits but there is also a reduction in control costs.	Medium - assumption of extent is based on existing observations at scattered sites, but there is no targeted monitoring data that best ascertains a limited control area.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.
Climbing Asparagus (eastern Golden Bay)	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low to medium - the original CBA shows benefits outweigh costs for this type of programme. Extension of control area without increased cost should improve the rate of return. Occupier costs may be significant.	High to medium - the total extent assumption is based on good existing information about the extent of the pest.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.

Pest	6(1)(a) Uncertainty of impacts and effectiveness of methods	6(1)(b) Likely significance or controversy of the pest or proposed measures or cost of measures	6(1)(c) Likely costs relative to likely benefits	6(1)(d) Level and quality of data	Level of CBA warranted	Response
Codling moth	Low - the production impacts are well known.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original qualitative CBA adequately describes the costs and benefits in qualitative terms. Occupier costs are not considered significant as control is sustained through normal crop management practices - i.e. there is very little additional cost imposed by the Plan.	High - the pest is known to be throughout the region	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
European canker	Low - the production impacts are well known.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original qualitative CBA adequately describes the costs and benefits in qualitative terms. Occupier costs are not considered significant as control is sustained through normal crop management practices - i.e. there is very little additional cost imposed by the Plan.	High - the pest is known to be throughout the region	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Fireblight	Low - the production impacts are well known.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original qualitative CBA adequately describes the costs and benefits in qualitative terms. Occupier costs are not considered significant as control is sustained through normal crop management practices - i.e. there is very little additional cost imposed by the Plan.	High - the pest is known to be throughout the region	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Giant buttercup	Low - the production impacts are well known.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original qualitative CBA adequately describes the costs and benefits in qualitative terms. Occupier costs are not considered significant as control is sustained through normal pasture management practices - i.e. there is very little additional cost imposed by the Plan.	High - the pest is known to be throughout the region	Low	A qualitative CBA for this pest is presented in the Revised CBA document.

Pest	6(1)(a) Uncertainty of impacts and effectiveness of methods	6(1)(b) Likely significance or controversy of the pest or proposed measures or cost of measures	6(1)(c) Likely costs relative to likely benefits	6(1)(d) Level and quality of data	Level of CBA warranted	Response
Gorse (Howard-St Arnaud)	Low - production and environmental impacts well understood	Low - the pest is subject of the Proposed Plan and there was little contention on its inclusion.	High - the original quantitative CBA showed a negative rate of return and overlooked the of control for landowners.	High - the location of this pest in the interest area can be readily identified through monitoring. The original CBA was focused on protecting areas inside the area of interest (which is effectively progressive containment under the NPD), but the means of achievement requires ongoing commitment (sustained control) in real terms.	Medium	A qualitative CBA is presented in the Revised CBA, supported with the results of a medium level CBA. The results of the medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.
Gorse (outside the Howard - St Arnaud area)	Low - production impacts well understood, as are control measures.	Low to medium - was a subject in the Proposed Plan and there was support for control of this species. A potential increased cost imposition is placed on Crown agencies who would be bound by the rule.	Medium - the benefits are likely to outweigh the costs, but the change increases the assumed landowner costs.	High - the pest is known to be throughout the region in patchy infestations	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.
Gunnera	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original CBA shows benefits outweigh costs. Change from sustained control from progressive containment may reduce benefits but there is also a reduction in control costs.	Medium - assumption of extent is based on existing observations at scattered sites, but there is no targeted monitoring data that best ascertains a limited control area.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.
Knotweeds	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low to medium - was a subject in the Proposed Plan and there was support for control of this species. A potential increased cost imposition is posed on landowners who have this pest.	Low to medium - the original CBA shows benefits of progressive containment outweigh costs. The further reduction in extent may be more cost beneficial (depending on implementation cost). Consideration of the risk of not achieving the objective (due to difficulty on controlling these pests) may be necessary and this will reduce the rate of return.	High - new information provides very good level of detail of size of infestation	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.

Pest	6(1)(a) Uncertainty of impacts and effectiveness of methods	6(1)(b) Likely significance or controversy of the pest or proposed measures or cost of measures	6(1)(c) Likely costs relative to likely benefits	6(1)(d) Level and quality of data	Level of CBA warranted	Response
Lagarosiphon	Low - the environmental effects are well known. The difficulties managing this aquatic pest is well understood, and can be factored into the cost of control.	Low - the pest is subject of the Proposed Plan and there was little contention on its inclusion. Boat owners have no increased responsibility as a result of the proposal (the rule has been around for some time).	Low - the original qualitative CBA adequately describes the costs and benefits in qualitative terms. While the quantitative CBA overlooked the time cost to boaties, the potential loss value of $467,153 (i.e. benefits realised) are likely to be much greater than the cost of checking that boat and trailer are clear of this weed.	High - the lakes and rivers that have and do not have this pest are known. The original CBA was focused on protecting areas from further spread (which is effectively sustained control under the NPD) but the means of achievement is effectively containment in real terms.	Low	A qualitative CBA for this pest is presented in the Revised CBA document. Cost to boaties is not considered significant.
Magpies (Golden Bay)	Low - the environmental, production, and "human health" impacts are well known. While good control methods are still being investigated, there are adequate tools for managing this pest in Golden Bay.	low - considered a pest by most people	Medium - the biodiversity benefits are likely to outweigh the costs in most but not all scenarios. Unlikely to stack up as a production pest (otherwise farmers would control them). Benefits outweigh costs with respect to health-related pest with specific reference to birds in parks that are attacking people.	Medium - the pest is throughout the region but not very common in Golden Bay. Local densities are not known.	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Nassella Tussock (Cape Soucis area)	Low - production impacts well understood. The limitations of control methods are well understood and can be factored into the cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	High - While the original quantitative CBA shows benefits outweigh costs for this programme, the NPV is very small ($8). While the occupier costs are unlikely to be considered significant to the occupiers (estimated to be around $200 per annum), they might cause costs to outweigh benefits.	High - the pest is known to be throughout this area in patchy infestations	Medium	A qualitative CBA is presented in the Revised CBA, supported with the results of a medium level CBA. The results of the medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.

Pest	6(1)(a) Uncertainty of impacts and effectiveness of methods	6(1)(b) Likely significance or controversy of the pest or proposed measures or cost of measures	6(1)(c) Likely costs relative to likely benefits	6(1)(d) Level and quality of data	Level of CBA warranted	Response
Nassella Tussock (outside Cape Soucis area)	Low - production impacts well understood. The limitations of control methods are well understood and can be factored into the cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original quantitative CBA shows benefits outweigh costs for this type of programme. Occupier costs are not considered significant as TDC undertakes the management of this pest - i.e. there is very little additional cost imposed by the Plan to occupiers above their normal pasture management practices.	High - the location of the pest is well known though regular monitoring and surveillance. New knowledge has led to an increase in the assumed infestation size to acknowledge the total area searched for this pest.	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Nodding thistle	Low - the production impacts are well known.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original qualitative CBA adequately describes the costs and benefits in qualitative terms. Occupier costs are not considered significant as control is sustained through normal pasture management practices - i.e. there is very little additional cost imposed by the Plan.	High - the pest is known to be throughout the region	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Old Man's Beard	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was much support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules). Occupier costs may be high, but given support, they are not considered "significant".	Low - the original CBA shows benefits outweigh costs for this type of programme and no change is proposed. Occupier costs are assumed to be insignificant due to high level of support and acceptability.	High to medium - the total extent assumption is based on good existing information about the extent of the pest.	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Other NIPR plants: Cape tulip; water hyacinth; and Johnson grass.	Low - the environmental and production impact of the species is known. Control measures known.	Low - public are generally aware of the pest nature of these species.	Low - the environmental benefits of keeping these pests out of the region are more than likely to outweigh the minor surveillance cost.	High - location of areas most prone to re- infestation are well known.	Low	A qualitative CBA for each of these pests is presented in the Revised CBA document.

Pest	6(1)(a) Uncertainty of impacts and effectiveness of methods	6(1)(b) Likely significance or controversy of the pest or proposed measures or cost of measures	6(1)(c) Likely costs relative to likely benefits	6(1)(d) Level and quality of data	Level of CBA warranted	Response
Pampas jubata and selloana	Low - the environmental impacts are understood. Control tools are known.	low - public already aware of the pest. Possibly some resistance to imposing any new costs onto occupiers.	High. Given the distribution of these pests, significant investment would be required to include this in the Plan as a progressive containment or sustained control pest. It has not been in any previous RPMS so there are no established control programmes on which to base costs.	Medium to high. Both species are known to be widely distributed. Sellona has been extensively planted throughout the NCC/TDC areas.	Medium	The results of a medium level CBA are presented in Table 2 of this report.
Powdery mildew	Low - the production impacts are well known.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original qualitative CBA adequately describes the costs and benefits in qualitative terms. Occupier costs are not considered significant as control is sustained through normal crop management practices - i.e. there is very little additional cost imposed by the Plan.	High - the pest is known to be throughout the region	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Purple loosestrife	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low to medium - the original CBA shows benefits outweigh costs for this type of programme. The reconsideration of the containment area size of infestation and occupier costs may have increased cost effect.	Medium - the original total extent assumption is based on existing observations at scattered sites. Mapping the pest is very assumption based.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.
Queensland Poplar	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	High - the original CBA shows costs outweigh the benefits slightly. Change from sustained control from progressive containment may reduce benefits further but there is also a reduction in control costs.	Medium - there is a revised assumption of extent of existing infestation is which is based on existing observations at scattered sites and requirement for greater search area. There is no targeted monitoring data that best ascertains a more limited control area.	Medium	A qualitative CBA is presented in the Revised CBA, supported with the results of a medium level CBA. The results of the medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.

Pest	6(1)(a) Uncertainty of impacts and effectiveness of methods	6(1)(b) Likely significance or controversy of the pest or proposed measures or cost of measures	6(1)(c) Likely costs relative to likely benefits	6(1)(d) Level and quality of data	Level of CBA warranted	Response
Ragwort	Low - the production impacts are well known.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original qualitative CBA adequately describes the costs and benefits in qualitative terms. Occupier costs are not considered significant as control is sustained through normal pasture management practices - i.e. there is very little additional cost imposed by the Plan.	High - the pest is known to be throughout the region	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Rats included in the Waimea Estuary Site-led Programme.	Low - the environmental and production impact of the species is known. Control measures known.	Low - public are generally aware of the pest nature of this species.	Low - the increased protection to wildlife from rat control is more than likely to outweigh the additional cost.	High - location of areas most prone to re- infestation are well known.	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Reed sweet grass	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low to medium - the original CBA shows benefits outweigh costs for this type of programme. The reconsideration of the containment area size of infestation and occupier costs may have increased cost effect.	Medium - the original total extent assumption is based on existing observations at scattered sites. Mapping the pest is very assumption based.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.
Sabella	Medium - the environmental effects are well known. The difficulties managing this aquatic pest is known but there is some uncertainty about the efficacy of control measures.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on boat owners (e.g. no fundamental change to the rules).	Low - the original qualitative CBA adequately describes the costs and benefits in qualitative terms.	High - the source of this pest and mechanisms of dispersal are well known	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Taiwan cherry	Low - the environmental and production impact of the species is known. Control measures known.	Medium - public are generally aware of the pest nature of these species, but it is an attractive ornamental so some initial resistance is expected.	Low - quantitative CBA provided by submitter shows benefits outweigh costs.	High - location of infestations relatively well known. Some further monitoring would be needed to improve knowledge of full distribution	Low	A qualitative CBA for this pest is presented in the Revised CBA document. The reader should refer to the submission of Nelson City Council for the quantitative CBA.

Pest	6(1)(a) Uncertainty of impacts and effectiveness of methods	6(1)(b) Likely significance or controversy of the pest or proposed measures or cost of measures	6(1)(c) Likely costs relative to likely benefits	6(1)(d) Level and quality of data	Level of CBA warranted	Response
Variegated thistle	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low to medium - the original CBA shows benefits outweigh costs for this type of programme. The reconsideration of the containment area size of infestation and occupier costs may have increased cost effect.	Medium - the original total extent assumption is based on existing observations at scattered sites. Mapping the pest is very assumption based.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.
White-edged nightshade	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low to medium - the original CBA shows benefits outweigh costs for this type of programme. The reconsideration of the containment area size of infestation and occupier costs may have increased cost effect.	Medium - the original total extent assumption is based on existing observations at scattered sites. Mapping the pest is very assumption based.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.
Wild ginger	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original quantitative CBA shows benefits outweigh costs for progressive containment. The occupier costs (estimated to be less than $1000 in total per annum) are not significant.	High to medium - the total extent assumption is based on good existing information about the extent of the pest.	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Wild kiwifruit	Low - the environmental impact of the species is known. Control in steep areas is extremely risky and may not be able to be undertaken.	Low - public are generally aware of the pest nature of this species. Maybe some resistance in urban areas initially if individual plants are being retained for amenity reasons.	Low - Cost of the programme (including cost to occupiers) is not considered significant compared to the cost of a PSA outbreak.	High - location of areas most prone to rats can be readily identified.	Low	A qualitative CBA for this pest is presented in the Revised CBA document.
Woolly nightshade.	Low - production impacts well understood. Control methods are well understood and effective.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low to medium - the original CBA shows benefits outweigh costs for progressive containment. Sustained control reduces cost but also reduces benefits and the proposed change may reduce the rate of return.	High to medium - the total extent assumption is based on good existing information about the extent of the pest.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.

Pest	6(1)(a) Uncertainty of impacts and effectiveness of methods	6(1)(b) Likely significance or controversy of the pest or proposed measures or cost of measures	6(1)(c) Likely costs relative to likely benefits	6(1)(d) Level and quality of data	Level of CBA warranted	Response
Yellow bristle grass	Medium - the production impacts are well known, but control methods are still being researched	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Medium - the original qualitative CBA describes benefits outweighing the costs. However, this is considered a significant programme in terms of estimated occupier cost inputs.	Medium - the general location of the pest is known but little is known about local rates of spread	Medium	A qualitative CBA is presented in the Revised CBA, supported with the results of a medium level CBA. The results of the medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions – especially the significant costs to landowners.
Yellow flag	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original CBA shows benefits outweigh costs. Change from sustained control from progressive containment may reduce benefits but there is also a reduction in control costs.	Medium - assumption of extent is based on existing observations at scattered sites, but there is no targeted monitoring data that best ascertains a limited control area.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.
Yellow Jasmine	Low - environmental impacts well understood. The limitations of control methods are well understood and can be factored into the total cost of control.	Low - was a subject in the Proposed Plan and there was support for control of this species. No new impositions posed on landowners (e.g. no fundamental change to the rules).	Low - the original CBA shows benefits outweigh costs. Change from sustained control from progressive containment may reduce benefits but there is also a reduction in control costs.	Medium - assumption of extent is based on existing observations at scattered sites, but there is no targeted monitoring data that best ascertains a limited control area.	Low	A qualitative CBA is presented in the Revised CBA. The results of a medium level CBA are presented in Table 2 of this report to examine the effect of changes to costs and benefits assumptions.

4. Quantitative Analyses

This section presents the results of the medium level quantitative cost benefit analyses. Each analysis uses the AgResearch AgPest model developed for regional councils as described in the *Cost Benefit Analysis for Regional Weed Management User Guide* by Russel McAuliffe and Graeme Bourdot (2017). This model was designed to undertake cost benefit analysis of pest management programmes in Regional Pest Management Plans. The models have been run over a 30-year analysis period using "Tasman" as the affected region. Selecting "Tasman" has no material effect on the model output which should be assumed to apply to both Tasman and Nelson as a single entity.

4.1 Assumptions of infestation size, speed, and costs

The AgPest model has a number of key input factors which contain assumptions about the size and rates of infestation and the cost to manage the pest. The values for infestation size and growth for each pest are listed in Appendix 1 and the annual control costs (including occupier costs) are listed in Appendix 2. The key model factors are summarised here.

- **Time to containment and containment area:** this aspect of the model captures the assumptions on how long it takes to contain or eradicate the pest, and the area that will remained infested at the end of the Plan.
- **Area infested (ha):** this is an estimate of the current area of known infestation Including search area, based on Council records for established pests and estimates for new pests.
- **Maximum area that could become infested (ha):** this is based on an assessment of the areas that were likely to become infested over the nominated time frame, based on different land uses and using the Land Cover Data Base (LCDB 4).
- **Time for infestation to reach 90% of maximum (years):** this is an educated guess, based on the biological characteristics of the plant (seed production, rate of spread, seed life), and the methods of distribution.
- **Cash operating surplus ($/ha):** this is based on the assumptions presented in the original CBA. The net economic income for productive land uses, using information that was provided by Beef & Lamb NZ and Dairy NZ. Ecological values were derived from work by Murray Patterson (Massey University) and Antony Cole (Panopsy Ltd) valuing the services from New Zealand's terrestrial ecosystems.
- **Loss due to the pest:** this is an estimate of the potential loss in cash operating surplus as a consequence of the pest.
- **Discount rate:** 6% has generally been used for all pest programmes to keep the analysis consistent with the original CBA. The exception are the analyses broom and gorse analyses, which have been discounted at 4% as due to their very long-term nature and the substantial sunk cost of past investment.
- **Probability of success:** Many of the programmes are either established long-term programmes or new programmes with a high level of community support and therefore there is a high degree of confidence that these programmes will meet their objectives. In most cases 100% probability of success has been applied, with the exception of bomarea (75%) and yellow bristle grass (50%), due to potential difficulty with managing these pests.

4.3 Results

The results of the quantitative analysis of benefits and costs for each pest programme are presented in Table 2 where:

- **Loss:** this is an estimate of the value of loss that would occur over 30 years if the pest was not managed (i.e. the "Do Nothing" scenario). The figure is discounted to represent the present-day figure.
- **NPV (Net Present Value):** this is the present value of all current and future cash flows relating to the costs of managing the pest under the preferred option (i.e. as presented in the Plan). It includes an assessment of the loss of income from the effect of the pest on the land use, discounted to the present day. A positive NPV indicates a cost beneficial outcome.
- **IRR (Internal Rate of Return):** this is the return on the funds invested in pest control and corresponds to the discount rate that would result in NPV=0. A positive IRR indicates a cost beneficial outcome. IRRs above the current official cash rate indicate good investments.

Table 2: Quantitative Cost Benefit Analysis for Selected Pests that appear in the Plan

Pest	Infested area (ha)		Loss ($000)	NPV ($000)	IRR (%)
	Current	Max			
Argentine and Darwin's Ants (Golden Bay)	1	3,756	5,324	1,974	16.11
Banana passion vine (Golden Bay)	16	27000	439	86	9.44
Banana passion vine (Riwaka)	12	13000	314	24	8.50
Bomarea	334	200,284	5,067	2,324	>100
Boneseed (Port Hills)	200	735	521	-4,667	0.00
Broom (Howard - St Arnaud)	24	8,000	645	8	4.29
Broom (outside Howard – St Arnaud	8,800	150,000	58,400	15,572	71.32
Chinese pennisetum	350	150,000	1,362	727	>100
Chocolate vine	15	200,284	320	111	20.31
Climbing asparagus	200	40,000	4,245	1,264	32.76
Gorse (Howard -St Arnaud)	24	8,000	645	8	4.29
Gorse (outside Howard -St Arnaud)	8,800	150,000	58,400	15,572	71.32
Gunnera	2	8,200	30	0.5	6.35
Knotweeds (Asian, Giant, hybrids)	1	1170	226	8	6.22
Nassella tussock (Cape Soucis)	5	8000	38	2	4.69
Pampas	1,000	96,000	9,204	2,864	13.3
Purple loosestrife	2	8,000	9,294	223	>100
Queensland poplar	25	96,000	301	17	7.06
Reed sweetgrass	40	1,500	28,655	15,602	>100
Variegated thistle	700	200,284	10,664	5,350	>100
White edged nightshade	350	96,000	2,308	1,173	>100
Woolly nightshade (Golden Bay)	500	40,000	3,084	1,040	>100
Yellow bristle grass	200	40,000	45,762	2,880	7.81
Yellow flag	2	8,200	361	92	31.25
Yellow jasmine	1500	45,000	20,949	6,714	>100

4.4 Conclusions for Quantitative CBA

These pests all have relatively small areas (Column 2) with the potential to spread over much larger areas (Column 3) if no control is undertaken. The potential loss of value (Column 4) highlights the magnitude of the losses that could occur if these pests were left to spread unchecked.

With the exception of boneseed (Post Hills), all of the preferred options present positive Net Present Values, showing that these programmes are cost beneficial (the benefits outweigh the costs). The Internal Rates of Return for cost beneficial options show that the investment in pest control is a good investment with rates of return above the present official cash rate.

The results of the quantitative CBA highlights that the amendments proposed by the Joint Committee comply with the expectations of the NPD and Act that the benefits of pest management outweigh the costs.

Note: a cost beneficial outcome is only one of the considerations the Joint Committee must bear in mind when deciding to change a pest programme or include a new pest into the Plan. Under section 74 (d) of the Act the Council must also consider whether there is likely to be adequate funding available for implementation of the Plan. In making these considerations, the Joint Committee has not recommended including Argentine and Darwin's ants or pampas for the reason of the expense that managing these pests would add to the existing pest management budget.

5. References

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Appendix 1: CBA Pest Growth and Effects Assumptions for Quantitative Analysis

Pest	Years of Simulation	Time to containment	Containment Area Ha	Area infested ha	Potential area ha	Time to cover 90% area (yr)	Cash surplus ($/ha/yr)	Loss due to pest (%)	Discount rate (%)	probability of success (%)
Argentine and Darwin's ants (exclusion sites)	30	1	0	1	3756	30	1000	100	6	50
Banana passion vine (Golden Bay)	30	15	16	16	27000	120	485	100	6	100
Banana passion vine (Riwaka)	30	30	12	12	13000	120	485	100	6	100
Bomarea	30	4	1	334	200284	150	585	60	6	75
Boneseed (Port Hills)	30	30	20	200	735	200	221	40	6	100
Broom (Howard-St Arnaud)	30	30	24	24	8000	100	585	60	4	100
Broom (outside the Howard - St Arnaud area)	30	30	8800	8800	150000	100	221	60	4	100
Chinese pennisetum	30	10	1	350	150000	250	564	20	6	100
Chocolate vine	30	30	15	15	200284	150	485	80	6	100

Pest	Years of Simulation	Time to containment	Containment Area Ha	Area infested ha	Potential area ha	Time to cover 90% area (yr)	Cash surplus ($/ha/yr)	Loss due to pest (%)	Discount rate (%)	probability of success (%)
Climbing Asparagus (eastern Golden Bay)	30	30	200	200	40000	120	585	80	6	100
Gorse (Howard-St Arnaud)	30	30	24	24	8000	100	585	60	4	100
Gorse (outside the Howard - St Arnaud area)	30	30	8800	8800	150000	100	221	60	4	100
Gunnera (Chilean rhubarb)	30	30	2	2	8200	120	485	50	6	100
Knotweeds (Asian, Giant, hybrids)	30	5	0	1	1170	60	1313	90	6	100
Nassella Tussock (Cape Soucis)	30	30	5	5	8000	75	221.006	25	4	100
Pampas	30	30	1000	1000	96000	60	1103	10	6	100
Purple loosestrife	30	10	1	2	8000	160	5000	90	6	100
Queensland Poplar	30	30	25	25	96000	150	485	50	6	100

Pest	Years of Simulation	Time to containment	Containment Area Ha	Area infested ha	Potential area ha	Time to cover 90% area (yr)	Cash surplus ($/ha/yr)	Loss due to pest (%)	Discount rate (%)	probability of success (%)
Reed Sweetgrass	30	10	1	40	1500	200	30855	70	6	100
Variegated thistle	30	20	8	700	156000	250	564	80	6	100
White Edged Nightshade	30	10	1	350	96000	250	485	40	6	100
Woolly nightshade (Golden Bay)	30	30	500	500	40000	110	564	25	6	100
Yellow bristle grass	30	30	200	200	40000	30	2154	20	6	40
Yellow flag	30	30	2	2	8200	190	5000	85	6	100
Yellow jasmine	30	30	1500	1500	45000	100	485	70	6	100

Appendix 2: CBA Annual Cost of Management Assumptions for Quantitative Analysis

Pest	Cost bearer	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6-10	Years 11-15	Years 16-20	Years 21-30
Argentine and Darwin's ants (Golden Bay)	Occupiers	0	0	0	0	0	0	0	0	0
	Councils	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
	TOTAL	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Banana passion vine (Golden Bay)	Occupiers	12,500	12,500	12,500	12,500	12,500	7,500	7,500	500	500
	Councils	12,500	12,500	12,500	12,500	12,500	7,500	7,500	500	500
	TOTAL	25,000	25,000	25,000	25,000	25,000	15,000	15,000	1,000	1,000
Banana passion vine (Riwaka)	Occupiers	6,588	6,588	6,588	6,588	6,588	7,061	7,649	8,235	9,990
	Councils	1,512	1,512	1,512	1,512	1,512	1,620	1,755	1,890	2,295
	TOTAL	8,100	8,100	8,100	8,100	8,100	8,681	9,404	10,125	12,285
Bomarea	Occupiers	12,800	480	480	480	0	0	0	0	0
	Councils	110,680	63,820	53,860	10,600	1,000	1,000	1,000	1,000	1,000
	TOTAL	123,480	64,300	54,340	11,080	1,000	1,000	1,000	1,000	1,000
Boneseed (Port Hills)	Occupiers	318,600	318,600	318,600	318,600	318,600	318,600	318,600	318,600	318,600
	Councils	35,400	35,400	35,400	35,400	35,400	35,400	35,400	35,400	35,400
	TOTAL	354,000	354,000	354,000	354,000	354,000	354,000	354,000	354,000	354,000

Pest	Cost bearer	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6-10	Years 11-15	Years 16-20	Years 21-30
Broom (Howard-St Arnaud)	Occupiers	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
	Councils	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
	TOTAL	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Broom (outside the Howard - St Arnaud area)	Occupiers	123,000	123,000	123,000	123,000	123,000	123,000	123,000	123,000	123,000
	Councils	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
	TOTAL	143,000	143,000	143,000	143,000	143,000	143,000	143,000	143,000	143,000
Chinese pennisetum	Occupiers	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Councils	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
	TOTAL	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Chocolate vine	Occupiers	0	0	0	0	0	0	0	0	0
	Councils	6,000	6,000	6,000	3,000	3,000	3,000	3,000	3,000	3,000
	TOTAL	6,000	6,000	6,000	3,000	3,000	3,000	3,000	3,000	3,000
Climbing Asparagus (eastern Golden Bay)	Occupiers	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
	Councils	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
	TOTAL	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000

Pest	Cost bearer	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6-10	Years 11-15	Years 16-20	Years 21-30
Gorse (Howard-St Arnaud)	Occupiers	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
	Councils	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
	TOTAL	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Gorse (outside the Howard - St Arnaud area)	Occupiers	123,000	123,000	123,000	123,000	123,000	123,000	123,000	123,000	123,000
	Councils	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
	TOTAL	143,000	143,000	143,000	143,000	143,000	143,000	143,000	143,000	143,000
Gunnera (Chilean rhubarb)	Occupiers	0	0	0	0	0	0	0	0	0
	Councils	2,000	2,000	2,000	1,000	1,000	1,000	1,000	1,000	1,000
	TOTAL	2,000	2,000	2,000	1,000	1,000	1,000	1,000	1,000	1,000
Knotweeds (Asian, Giant, hybrids)	Occupiers	39,525	35,450	35,450	35,450	35,450	0	0	0	0
	Councils	11,000	11,000	11,000	11,000	7,000	7,000	0	0	0
	TOTAL	50,525	46,450	46,450	46,450	42,450	7,000	0	0	0
Nassella Tussock (Cape Soucis)	Occupiers	200	200	200	200	200	200	200	200	200
	Councils	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
	TOTAL	1,640	1,640	1,640	1,640	1,640	1,640	1,640	1,640	1,640

Pest	Cost bearer	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6-10	Years 11-15	Years 16-20	Years 21-30
Pampas	Occupiers	216000	216000	216000	216000	216000	216000	216000	216000	216000
	Councils	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000
	TOTAL	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Purple loosestrife	Occupiers	500	500	500	500	500	500	500	500	500
	Councils	500	500	500	500	500	500	500	500	500
	TOTAL	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Queensland Poplar	Occupiers	17,760	17,760	12,760	12,760	12,760	9,760	760	0	0
	Councils	2,240	2,240	2,240	2,240	2,240	2,240	2,240	2,240	2,240
	TOTAL	20,000	20,000	15,000	15,000	15,000	12,000	3,000	1,500	1,500
Reed Sweetgrass	Occupiers	3,500	3,500	3,500	3,500	3,500	3,500	0	0	0
	Councils	10,500	10,500	10,500	10,500	10,500	10,500	1,000	1,000	1,000
	TOTAL	14,000	14,000	14,000	14,000	14,000	14,000	1,000	1,000	1,000
Variegated thistle	Occupiers	6,930	6,930	6,930	6,930	6,930	6,930	6,930	6,930	6,930
	Councils	14,070	14,070	14,070	14,070	14,070	14,070	14,070	14,070	14,070
	TOTAL	21,000	21,000	21,000	21,000	21,000	21,000	21,000	21,000	21,000

Pest	Cost bearer	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6-10	Years 11-15	Years 16-20	Years 21-30
White Edged Nightshade	Occupiers	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Councils	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000
	TOTAL	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Woolly nightshade (Golden Bay)	Occupiers	5,625	5,625	5,625	5,625	5,625	5,625	5,625	5,625	5,625
	Councils	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875
	TOTAL	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Yellow bristle grass	Occupiers	900,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000
	Councils	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
	TOTAL	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Yellow flag	Occupiers	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
	Councils	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	TOTAL	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Yellow jasmine	Occupiers	9,400	9,400	9,000	9,000	9,000	8,000	9,000	8,000	8,000
	Councils	5,600	5,600	6,000	6,000	6,000	7,000	7,000	8,000	9,000
	TOTAL	15,000	15,000	15,000	15,000	15,000	15,000	16,000	16,000	17,000